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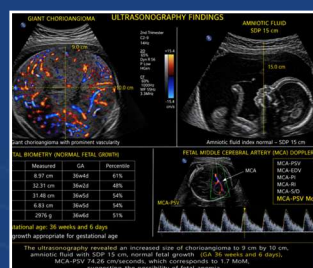


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EDITORIAL

This issue of the *Ethiopian Journal of Reproductive Health* presents six original articles and two case reports that collectively address key priorities across the continuum of reproductive health. The contributions span preconception care, maternal and adolescent health, cancer prevention, pelvic floor disorders, male infertility, and rare obstetric conditions, highlighting the importance of prevention, early diagnosis, and evidence-based clinical practice.

Prevention is a recurring theme throughout this issue. The Ethiopian study from Addis Ababa identifies important gaps in healthcare professionals' prescribing practices of periconceptional folic acid despite relatively good knowledge, emphasizing the need for targeted provider training to reduce folate-preventable neural tube defects. The study from Southern Ethiopia reports that nearly one-quarter of pregnant women consumed alcohol during pregnancy, underscoring the importance of strengthening antenatal counseling, preconception care, partner involvement, and mental health support to reduce preventable adverse pregnancy outcomes.

The issue also highlights persistent challenges in women's access to preventive healthcare. A community-based study from Jimma reveals low uptake of cervical cancer screening and identifies women's knowledge, autonomy, education, and access to health information as major determinants of screening utilization. These findings imply the need to expand socio-culturally appropriate health education messages and improve access to cervical cancer screening services.

Beyond clinical outcomes, reproductive health has profound social consequences. A qualitative study from Uganda demonstrates how adolescent motherhood contributes to interrupted education, economic hardship, stigma, and limited opportunities, emphasizing the importance of integrated interventions that support adolescent mothers through education, healthcare, and economic empowerment.

Addressing a common Uro-gynecologic disorders, a multicenter Ethiopian study identifies advanced age, prolonged labor, multiparity, vaginal delivery, and low body mass index as important risk factors for uterovaginal prolapse, emphasizing the need for strengthening intrapartum care, nutritional interventions, and early screening for high-risk women.

The study from India analyzed distinct hormonal alterations across different sperm abnormalities among infertile men. The authors emphasized the value of comprehensive endocrine assessment in the evaluation and management of male infertility.

The two accompanying case reports illustrate the educational value of rare clinical presentations. One describes successful prenatal diagnosis and management of a giant placental chorioangioma with favorable maternal and neonatal outcomes through close ultrasound surveillance and timely intervention. The other presents a rare partial molar pregnancy coexisting with a live fetus that resulted in inevitable abortion, emphasizing the importance of prompt diagnosis, multidisciplinary management, and careful follow-up.

Together, the articles in this issue reinforce that improving reproductive health requires a comprehensive approach that integrates prevention, early diagnosis, quality clinical care, provider capacity building, and community education. Importantly, they demonstrate the value of locally generated evidence in informing clinical practice, health policy, and future research across resource-limited settings.

The Editorial Board extends its sincere appreciation to the authors, reviewers, and editorial team for their valuable contributions. We hope the evidence presented in this issue will inform practice, stimulate further research, and contribute to improving reproductive health outcomes in Ethiopia and other LMICs.

Dr. Wondimu Gudu

Editor-in-Chief

Ethiopian Journal of Reproductive Health

SPERM ABNORMALITIES AND HORMONAL CORRELATES AMONG INFERTILE MEN IN GUWAHATI, ASSAM, INDIA

Ankita Bhattacharjee¹, Sandip Mukherjee², Arijit Chakraborty³

ABSTRACT

OBJECTIVE: The present study aimed to evaluate the spectrum of sperm abnormalities among infertile men in Guwahati, Assam, and to examine their association with key reproductive hormones. Specifically, it sought to correlate semen parameters with serum levels of follicle-stimulating hormone, luteinizing hormone, testosterone, and prolactin, in order to elucidate hormonal influences on male infertility in this regional population.

METHODS: This cross-sectional study evaluated semen samples from 185 male between January - December 2022 aged 21–48 years attending infertility clinics for clinical evaluation of infertility in Guwahati, Assam, India. Semen analysis and characterization of infertility, and hormonal profiles (Estrogen, FSH, LH, Prolactin, free testosterone and total testosterone level) were gathered from the hospital records. Statistical analysis was conducted using Graph Pad Prism software, with $P < 0.05$ regarded as statistically significant.

RESULTS: Increased estrogen along with reduced free testosterone levels were observed in the case of severe OAT (Oligoasthenoteratozoospermia), azoospermia, ED (erectile dysfunction), asthenozoospermia, oligoasthenozoospermia, oligozoospermia, occasional dead sperm, occasional dead and motile subgroups in comparison to the normozoospermia, clearly indicating an altered testosterone/estrogen ratio. In the same way, the total testosterone level was abruptly elevated in severe OAT, azoospermia, ED and occasional dead group in comparison to the normozoospermia groups. Elevated FSH and reduced LH levels were observed in almost all the groups, together with variable prolactin concentrations indicative of heterogeneous hormonal profiles in the different infertility subgroups.

CONCLUSION: This study highlights distinct endocrine alterations across all infertile sub-groups including changes in the testosterone-estrogen ratio, gonadotrophin secretion and prolactin levels. The observed hormonal variations reflect the heterogeneous endocrine profiles of male infertility and support the use of comprehensive hormonal assessment as part of the clinical evaluation of infertile men. Further longitudinal studies are warranted to determine the temporal and causal relationships between these hormonal changes and infertility in those populations.

KEYWORDS: Male-infertility, Northeast-India, hormone, spermatogenesis, testosterone

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INTRODUCTION

Infertility is a global issue and 15% of married couples worldwide suffer from infertility¹⁻³. It was previously reported that 30 million (approx.) couples in India struggle with infertility. Both men and women experience infertility, but in developing nations, women are typically held accountable. However, new improvements reveal the equal role (40-50%) of male partners in overall infertility situations. In India, the incidence is approximately 23%, while in the general population, the male factor accounts for 20-40% of the 15-20% prevalence of infertility⁴⁻⁶. Recent evidence suggests a possible decline in sperm count and overall semen quality among certain groups of Indian men, as indicated by earlier meta-analyses. However, newer large-scale regional studies report no significant temporal decline, highlighting substantial geographic and population variability. These mixed findings underscore the need for standardized, long-term national surveillance of male reproductive health. Hormonal imbalances and oxidative stress are closely associated with modifiable lifestyle factors that negatively impact spermatogenesis and semen quality. These factors include elevated body mass index (BMI), tobacco and alcohol use, poor dietary patterns, physical inactivity, and psychological stress⁷⁻⁹. In fact, according to Pandey et al., male reproductive health may be affected by geographic and environmental factors that change the quality of semen¹⁰. A study involving 500 infertile men attending private infertility clinics in Guwahati, Assam, reported a higher frequency of Y chromosome (Yq) microdeletions among individuals with abnormal semen parameters. This observation was attributed to the testis-specific nature of many genes located within the Yq region, which play a crucial role in spermatogenesis¹¹. Along the same vein, a study conducted by Juneja et al. in north eastern India demonstrated that abnormal semen quality is a major factor contributing to infertility in couples¹². Therefore, considering the distinct socio-cultural, ethnic, environmental, and nutritional

characteristics of the Northeast region, there remains a significant need for extensive, region-specific investigations to elucidate the determinants of male infertility and inform evidence-based reproductive health interventions.

Endocrinal variables also play a vital function in the development and maintenance of reproductive processes. It is widely documented that normal male fertility is represented by the entire development of male germ cells and proper spermatogenesis, which occurs due to the balanced endocrine interaction of hypothalamic-pituitary-gonadal (HPG) axis³. According to a preliminary World Health Organisation multi-center research, oligozoospermia or azoospermia afflicted 45% of infertile males^{13,14}. To determine the likelihood of hormonal imbalances or abnormalities, the semen analysis is first evaluated, and if it is discovered to be abnormal (if sperm concentration is <15 million per milliliter), the sample is then subjected to additional examination¹⁵. It is advised that people with such aberrant sperm counts undergo a blood hormonal test because these tests have been shown to be accurate and reliable.

Men who are infertile often exhibit hormonal abnormalities, such as changed levels of follicle-stimulating hormone (FSH), luteinizing hormone (LH), testosterone, estrogen, and prolactin. These endocrine markers are linked to DNA fragmentation and sperm chromatin instability in addition to reflecting testicular function^{16,17}. Follicle-stimulating hormone (FSH), luteinizing hormone (LH), and testosterone are the primary endocrine regulators of spermatogenesis and germ cell development. Alterations in the circulating levels of these hormones have frequently been associated with impaired spermatogenesis and male infertility. In a study involving 96 infertile men, serum concentrations of FSH, LH, and testosterone were evaluated in patients with diverse infertility phenotypes, including azoospermia (n = 35), oligozoospermia (n = 35), varicocele (n = 11), and histopathological abnormalities such as hypospermatogenesis, spermatid arrest, and Sertoli

cell-only syndrome ($n = 15$). The findings highlighted the importance of hormonal assessment in understanding the endocrine alterations associated with different causes of male infertility¹⁸. Along the same vein, elevated prolactin levels have a direct impact on the sexual system via the central nervous system and can hinder androgen production¹⁹. For individuals with high prolactin levels has low sex drive²⁰. Some cross sectional and longitudinal studies also showed that low prolactin levels in male associated with sexual dysfunction including psychogenic erectile and ejaculatory dysfunctions²¹. Similarly, estrogen affects the central nervous system during foetal and perinatal life by modifying the growth of certain brain regions dedicated to regulating male sexual behavior, including gender identity, the development of sexual orientation, and the evolution of typical adult male sexual behaviours²². Infertility in mice is caused by the loss of function of either the aromatase enzyme or the estrogen receptor alpha. Estrogens can operate on various reproductive cells and the reproductive tract at many levels in men^{23,24}.

Although numerous global studies have examined the hormonal determinants of male infertility, very few have explored alterations in serum hormone profiles across different subtypes of male infertility within the North-East Indian population. Moreover, evidence linking variations in serum LH, FSH, testosterone, estrogen, and prolactin levels with distinct infertility patterns remains limited and inconsistent. To address this gap, the present study investigates these hormonal differences and their correlations among infertile men from North-East India providing novel insights elucidating region-specific factors in idiopathic male infertility.

METHODS

Participants

This retrospective cross-sectional study included 185 infertile men aged 21–48 years who attended a renowned infertility clinic in Guwahati, Assam, India, between January 2022 and December 2022. Clinical and laboratory records were

retrospectively reviewed, and only participants with complete demographic, semen analysis, and hormonal profile data were included in the final analysis, while records with incomplete or missing data were excluded. The purpose of the study was informed to the participants and written consents were obtained. Information regarding primary or secondary infertility was not consistently available in the archived clinical records and, therefore, was not included in the analysis. The study protocol was reviewed and approved by the Institutional Human Ethics Committee (IHEC), The Assam Royal Global University, Guwahati, Assam, India (Approval No. RGU/IHEC/I/AC/Proposal/AC-01/2021–22; approved on 9th September 2021). The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. As this was a retrospective record-based study, only anonymized clinical and laboratory data were used for analysis to maintain participant confidentiality.

Semen analysis

The participants were asked to obtain the semen samples by masturbation in a sterile polypropylene container after 2–7 days of sexual abstinence. Processing of the samples was initiated with 30–40 minutes of ejaculation. The semen samples were allowed to liquify at 37°C in the incubator until examination. Afterwards, analysis of semen samples was performed according to WHO recommended guidelines according to the World Health Organization (WHO) Laboratory Manual for the Examination and Processing of Human Semen (5th Edition, 2010)²⁵. Counting of the sperm was determined by the use of the Makler counting chamber, one sample per patient.

Hormonal assays

Venous blood samples were collected between 08:00 and 10:00 h as part of the routine clinical evaluation of infertility. Serum concentrations of follicle-stimulating hormone (FSH), luteinizing hormone (LH), total testosterone, free testosterone, estradiol, and prolactin were measured using a

chemiluminescent immunoassay (CLIA) in the same clinical laboratory according to the manufacturer's instructions. Hormone concentrations were interpreted using the laboratory-specific reference ranges applicable during the study period. All hormonal analyses were performed under standardized laboratory conditions following the laboratory's standard operating procedures, with routine internal quality control and quality assurance measures implemented to ensure the accuracy, precision, and reliability of the test results while minimizing inter-assay variability.

Statistical analysis:

All statistical parameters were estimated using GraphPad Prism statistical software. Levels were considered as Mean $\pm$ SD. Data were checked for normality by the Shapiro-Wilk test and one-way ANOVA was performed followed by Tukey's multiple comparison test. Differences were considered significant if $P < 0.05$.

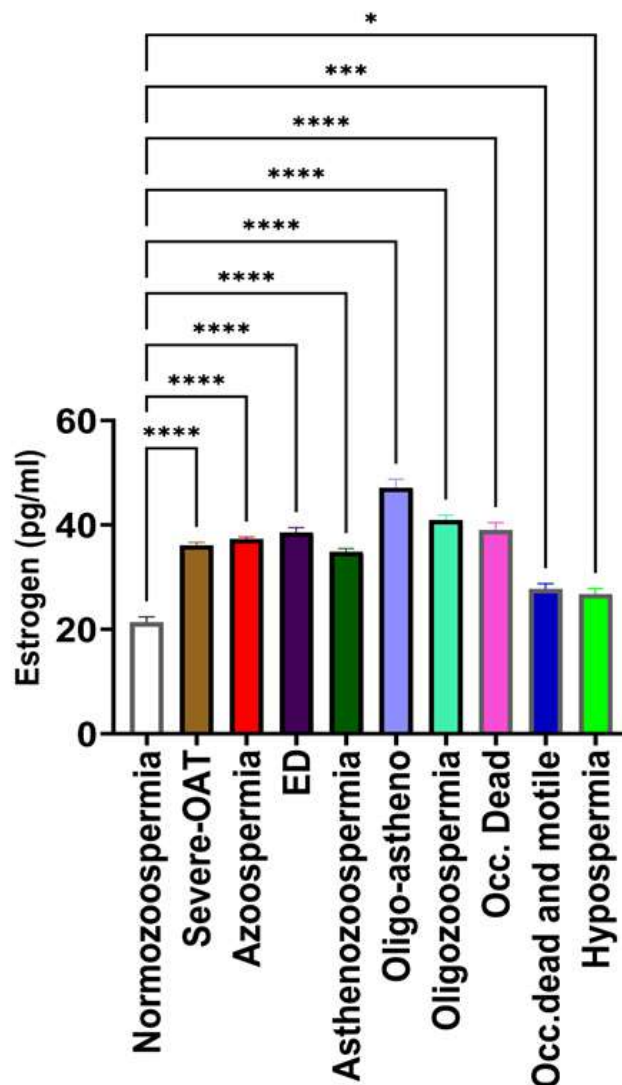


Figure 1. Comparative analysis of circulating estrogen levels between infertile men. Data are presented as mean $\pm$ standard deviation (SD). P-values represent comparisons with the normozoospermic reference group using one-way ANOVA followed by Tukey's multiple comparison test. $P < 0.05$ was considered statistically significant. # Severe OAT - Severe oligoasthenoteratozoospermia, ED - Erectile dysfunction, Occ. Dead - Occasional dead, Occ. dead and motile - Occasional dead and motile.

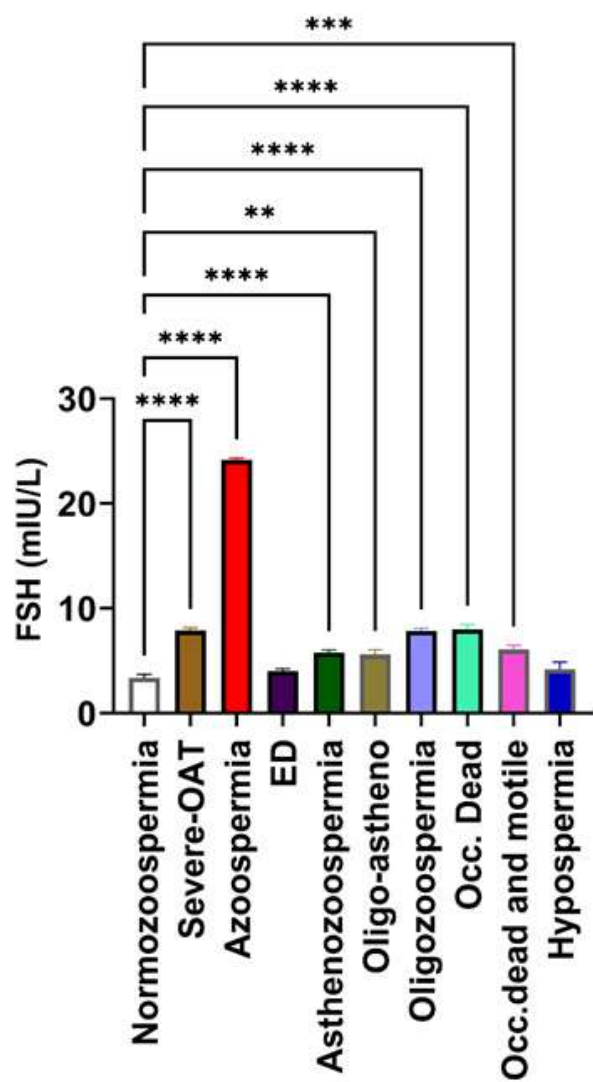


Figure 2. Comparative analysis of serum follicle-stimulating hormone (FSH) levels between infertile men. Data are presented as mean $\pm$ standard deviation (SD). P-values represent comparisons with the normozoospermic reference group using one-way ANOVA followed by Tukey's multiple comparison test. $P < 0.05$ was considered statistically significant. # Severe OAT - Severe oligoasthenoteratozoospermia, ED - Erectile dysfunction, Occ. Dead - Occasional dead, Occ. dead and motile - Occasional dead and motile.

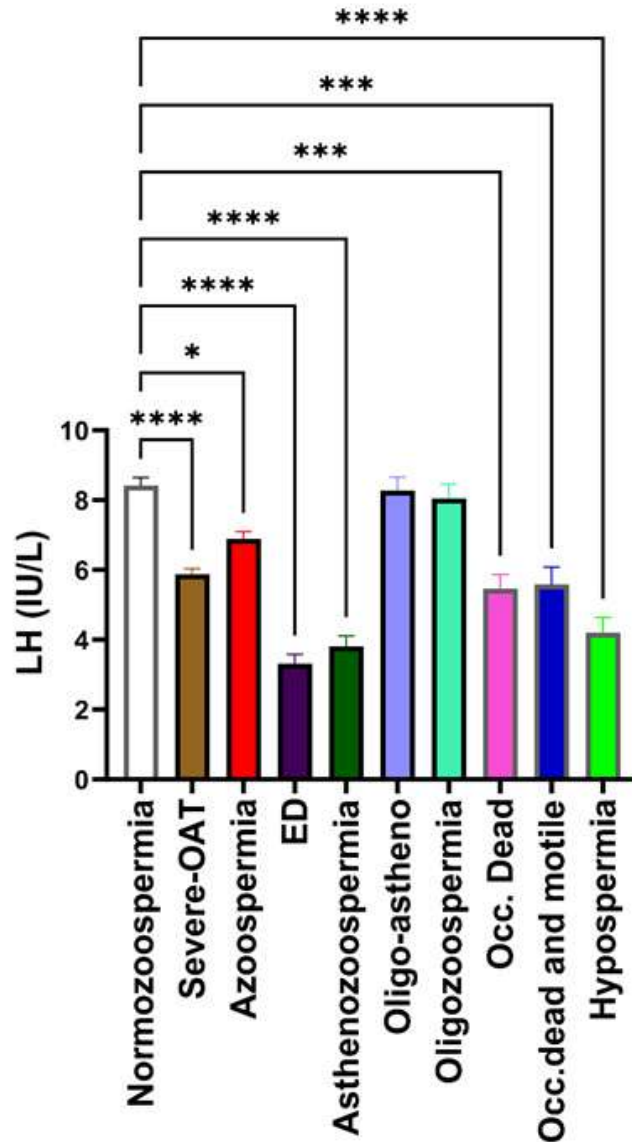


Figure 3. Comparative analysis of luteinizing hormone (LH) levels between infertile men. Data are presented as mean $\pm$ standard deviation (SD). P-values represent comparisons with the normozoospermic reference group using one-way ANOVA followed by Tukey's multiple comparison test. $P < 0.05$ was considered statistically significant. # Severe OAT - Severe oligoasthenoteratozoospermia, ED - Erectile dysfunction, Occ. Dead - Occasional dead, Occ. dead and motile - Occasional dead and motile.

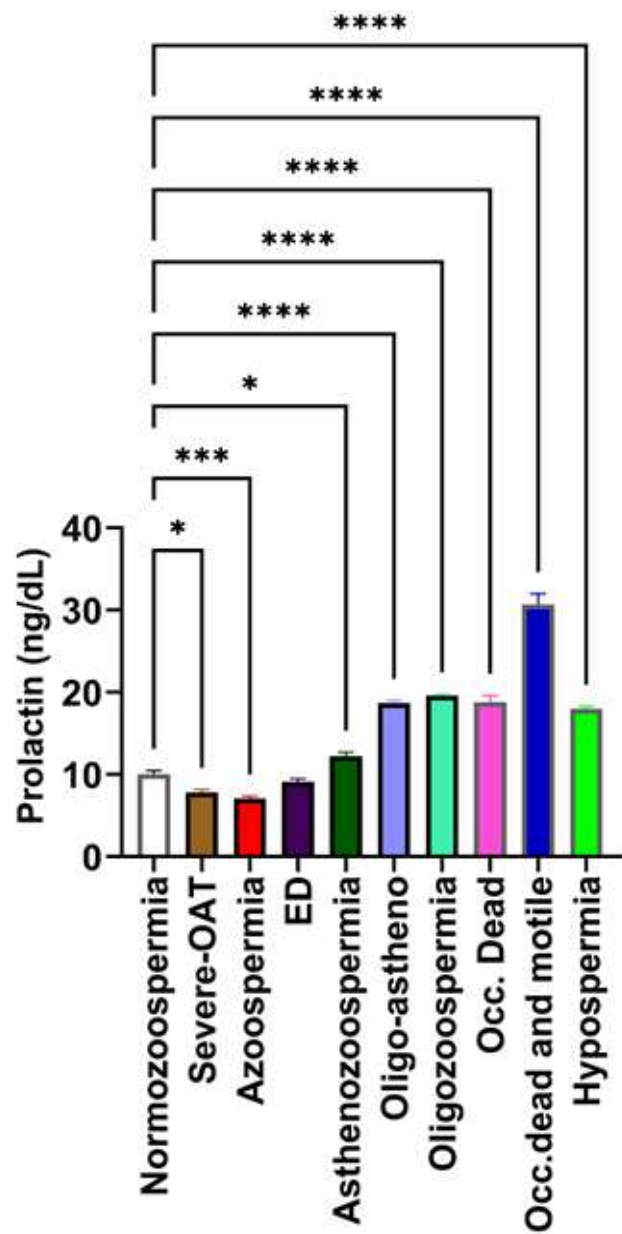


Figure 4. Comparative analysis of prolactin levels between infertile men. Data are presented as mean $\pm$ standard deviation (SD). P-values represent comparisons with the normozoospermic reference group using one-way ANOVA followed by Tukey's multiple comparison test. $P < 0.05$ was considered statistically significant. # Severe OAT - Severe oligoasthenoteratozoospermia, ED - Erectile dysfunction, Occ. Dead - Occasional dead, Occ. dead and motile - Occasional dead and motile.

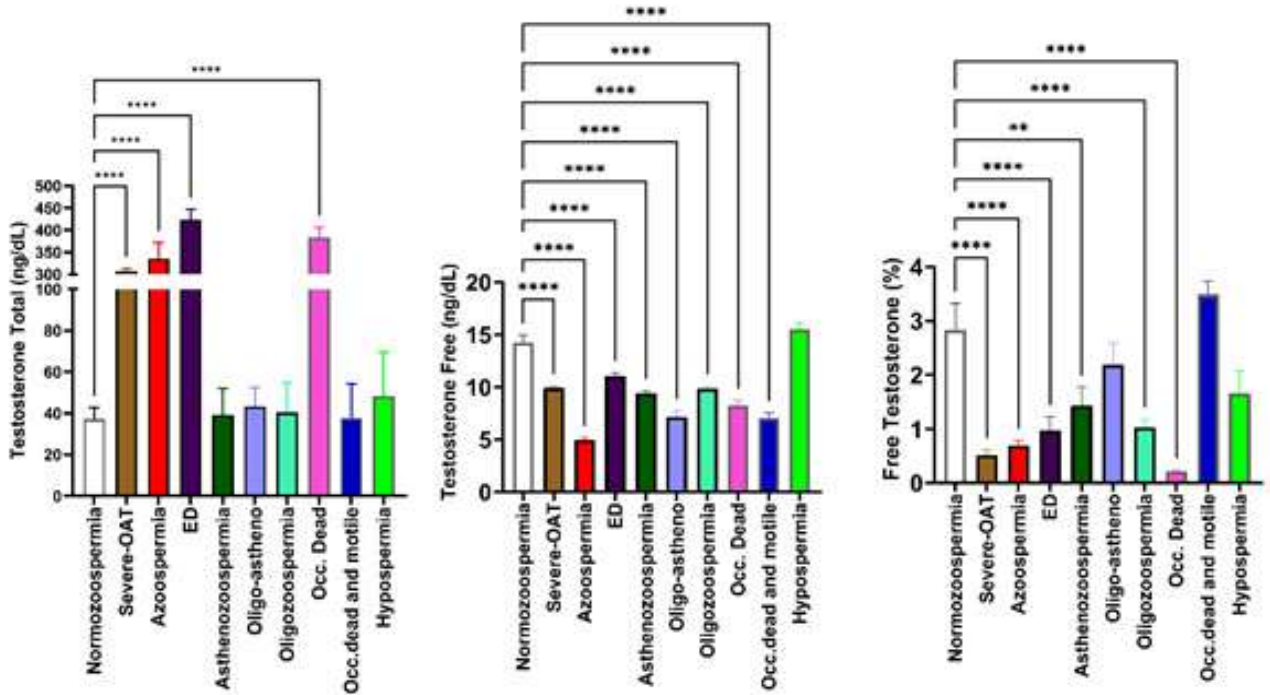


Figure 5. Comparative analysis of serum testosterone total, free testosterone, and percentage of free testosterone levels between infertile men. Data are presented as mean $\pm$ standard deviation (SD). P-values represent comparisons with the normozoospermic reference group using one-way ANOVA followed by Tukey's multiple comparison test. $P < 0.05$ was considered statistically significant. # Severe OAT - Severe oligoasthenoteratozoospermia, ED - Erectile dysfunction, Occ. Dead - Occasional dead, Occ. dead and motile - Occasional dead and motile.

RESULTS

For proportional representation of infertility phenotypes, the cohort of 185 infertile men was stratified into ten subgroups based on WHO semen analysis criteria and commonly reported clinic-based prevalence patterns. The categories included asthenozoospermia ($n = 35$), oligo-asthenozoospermia ($n = 9$), oligozoospermia ($n = 20$), normozoospermia ($n = 9$), azoospermia ($n = 39$), severe oligoasthenoteratozoospermia (OAT) ($n = 26$), erectile dysfunction ($n = 23$), occasional dead spermatozoa ($n = 7$), occasional dead and motile spermatozoa ($n = 10$), and hypospermia ($n = 7$). This proportional stratification was adopted to enable comparative analysis of semen characteristics and hormonal profiles across clinically relevant infertility subtypes while maintaining consistency with WHO-based diagnostic classifications.

Hormonal Analysis

In this study, the figure 1 showed increased estrogen level (pg/ml) in the case of severe OAT ($P \leq 0.0001$), azoospermia ($P \leq 0.0001$), ED ($P \leq 0.0001$), asthenozoospermia ($P \leq 0.0001$), oligo-asthenozoospermia ($P \leq 0.0001$), oligozoospermia ($P \leq 0.0001$), occasional dead ($P \leq 0.0001$), occasional dead and motile ($P \leq 0.001$) and hypospermia ($P \leq 0.05$) groups in comparison to the normozoospermia.

The FSH (mIU/L) level showed significantly elevated in the case of severe OAT ($P \leq 0.0001$), azoospermia ($P \leq 0.0001$), asthenozoospermia ($P \leq 0.0001$), oligo-asthenozoospermia ($P \leq 0.01$), oligozoospermia ($P \leq 0.0001$), occasional dead ($P \leq 0.0001$), occasional dead and motile ($P \leq 0.001$) groups in comparison to the normozoospermia according to the figure 2 though, ED and hypospermia groups showed no significant. But, in the case of the LH (IU/L) hormone, severe OAT ($P \leq 0.0001$), azoospermia ($P \leq 0.05$), ED ($P \leq 0.0001$), asthenozoospermia ($P \leq 0.0001$), occasional dead and motile ($P \leq 0.001$), occasional dead ($P \leq 0.001$) and hypospermia ($P \leq 0.0001$) groups were found to be reduced in figure 3 in comparison

to the normozoospermia group. Oligo-asthenozoospermia and oligozoospermia groups were not significant in the case of LH hormone.

Prolactin (ng/dl) levels were slightly lower in the case of the severe OAT ($P \leq 0.05$), azoospermia ($P \leq 0.001$) and ED (though not significant) but the elevated prolactin levels were observed in the case of asthenozoospermia ($P \leq 0.05$), oligo-asthenozoospermia ($P \leq 0.0001$), oligozoospermia ($P \leq 0.0001$), occasional dead ($P \leq 0.0001$) and hypospermia ($P \leq 0.0001$) groups in comparison to the normozoospermia. So the altered expression of prolactin was observed in figure 4.

Figure 5 clearly indicate that the decreased percentage (%) of free testosterone level in the case of the severe OAT ($P \leq 0.0001$), azoospermia ($P \leq 0.0001$), ED ($P \leq 0.0001$), asthenozoospermia ($P \leq 0.01$), oligozoospermia ($P \leq 0.0001$), occasional dead ($P \leq 0.0001$) groups though the occasional dead and motile group and hypospermia groups were found not significant. Similarly, the amount of free testosterone (ng/dl) levels was significantly reduced ($P \leq 0.0001$) in almost all the groups in comparison to the normozoospermia except hypospermia. Along the same vein, it was observed that the total testosterone level (ng/dl) was abruptly elevated in the case of severe OAT ($P \leq 0.0001$), azoospermia ($P \leq 0.0001$), ED ($P \leq 0.0001$) and occasional dead group ($P \leq 0.0001$) in comparison to the normozoospermia group. Though the level of total testosterone in asthenozoospermia, oligo-asthenozoospermia, oligozoospermia, occasional dead and motile and hypospermia groups were found not significant.

Table 1: Comparison of serum hormone profiles among infertile men with different semen abnormalities and the normozoospermic reference group.

	Estrogen (pg/ml)	FSH (mIU/L)	LH (IU/L)	Prolactin (ng/dL)	Total Testosterone level (ng/dL)	Free Testosterone (ng/dL)	Free Testosterone level (%)
Normozoospermia	21.35±2.76	3.36±0.90	8.41±0.66	10.02±1.18	37.08±0.66	14.23±2.03	2.83±1.29
Severe-	3P<0.0001	7.86±1.44	5.86±0.78	7.78±1.40	307.31±6.12	9.88±1.00	0.51±0.45
oligoastheno-	P <0.0001	P<0.0001	P<0.0001	P=0.0425	P<0.0001	P<0.0001	P<0.0001
teratozoospermia							
(OAT)	37.31±2.74	24.12±1.39	6.89±1.22	7.07±1.55	335.25±36.03	4.92±1.35	0.69±0.61
Azoospermia	P<0.0001	P<0.0001	P=0.0425	P=0.0008	P<0.0001	P<0.0001	P<0.0001
	38.55±4.65	4.00±1.05	3.31±1.27	9.10±2.02	424.00±22.39	11.05±1.42	0.96±1.25
Erectile	P<0.0001	P=0.681	P<0.0001	P=0.6896	P<0.0001	P<0.0001	P<0.0001
dysfunction	34.85±2.51	5.77±1.00	3.80±1.20	12.20±2.05	39.29±1.05	9.37±1.44	1.43±1.29
Asthenozoospermia	P<0.0001	P<0.0001	P<0.0001	P=0.0379	P>0.9999	P<0.0001	P=0.0036
	47.13±4.52	5.59±1.16	8.27±0.93	18.65±1.30	43.34±1.84	7.16±1.53	2.18±1.15
	P<0.0001	P= 0.0037	P>0.9999	P<0.0001	P>0.9999	P<0.0001	P=0.5141
Oligo-astheno	40.93±4.03	7.83±1.10	8.04±1.77	19.57±1.24	40.39±1.14	9.82±1.14	1.02±0.66
Oligozoospermia	P<0.0001	P<0.0001	P=0.9993	P<0.0001	P>0.9999	P<0.0001	P<0.0001
	38.99±3.55	7.99±1.11	5.46±0.99	18.79±1.95	383.74±21.15	8.21±1.26	0.21±0.06
Occasional Dead	P<0.0001	P<0.0001	P=0.0003	P<0.0001	P<0.0001	P<0.0001	P<0.0001
	27.74± 3.01	6.08±1.07	5.58±1.31	30.63±4.50	37.80±1.07	7.05±1.41	3.48±0.74
Occasional Dead	P=0.0009	P=0.0002	P=0.0003	P<0.0001	P>0.9999	P<0.0001	P=0.4824
and motile	26.75 ±2.57	4.18±1.77	4.19±1.08	17.98±0.72	48.24±1.03	15.49±1.52	1.65±1.00
Hypospermia	P= 0.0164	P= 0.6524	P<0.0001	P<0.0001	P>0.9999	P=0.3292	P=0.0733

Values are presented as mean ± SD. P-values represent comparisons with the normozoospermic reference group using one-way ANOVA followed by Tukey's multiple comparison test. P < 0.05 was considered statistically significant.

DISCUSSION

Altered hormonal states, whether excessive or insufficient, produce distinct reproductive traits in rodents and humans, thereby providing valuable evidence on the endocrine mechanisms governing male fertility. Clinical observations in men with congenital or acquired hormonal imbalances reveal distinct infertility biological traits beyond classical androgen deficiency. These findings collectively challenge the long-held view that androgens are the sole or predominant regulators of male reproductive capacity, highlighting a complex, multi-hormonal network essential for normal male fertility. In the present hospital-based study, semen samples were obtained from patients undergoing evaluation and treatment for infertility, providing a clinically relevant cohort for examining these hormonal variations. This approach allows for a more precise assessment of how deviations in LH, FSH, testosterone, estrogen, and prolactin correlate with specific forms and subtypes of male infertility. Every stage of spermatogenesis in the testes is influenced by estrogen, beginning with the HPA, Leydig, Sertoli, and germ cells, and ending with the ductal epithelium, epididymis, and mature sperm. Additionally, lower semen characteristics have been linked to an aberrant testosterone/estrogen ratio of less than 10. Male infertility was found to be substantially linked with elevated serum estradiol levels²⁶. Estrogen concentrations in this study were markedly elevated in severe oligoasthenozoospermia and oligozoospermia, with intermediate increase observed in azoospermia, erectile dysfunction, and asthenozoospermia groups, whereas comparatively lower levels were noted in hypospermia and men with a high proportion of dead and immotile sperm. These findings suggest a phenotype-specific dysregulation of estrogen homeostasis in male infertility. Elevated estrogen in oligozoospermic and oligoteratoasthenozoospermic men may reflect increased peripheral aromatization of testosterone to estradiol or impaired clearance, leading to suppression of the HPT axis and consequent

defects in spermatogenesis^{27,28}. Excess estrogen is known to exert negative feedback on gonadotropin secretion and to disrupt Sertoli cell function, thereby compromising sperm production and motility²⁹. So the results in our study of significantly high estrogen levels in each case of abnormal semen parameters are also well in line with earlier reports highlighting the critical role of balanced estrogen signaling in the regulation of spermatogenesis and sperm quality in infertile men.

Determining testosterone hormonal assessment is essential to comprehending the pathophysiology of infertility and identifying spermatogenic malfunction. Compared to total testosterone, free testosterone (and its percentage) is thought to be a better indicator of male infertility since it accurately represents the "active" hormone that is accessible to tissues³⁰. Low free testosterone and high total testosterone are linked to infertility, which may be caused by increased Sex Hormone-Binding Globulin (SHBG) binding more testosterone, rendering it inaccessible to the body and perhaps interfering with sperm formation. This imbalance may indicate problems with spermatogenesis, or the generation of sperm³¹. Rather than decreased Leydig cell steroidogenesis, low free testosterone in infertile males with normal or increased total testosterone indicates a disruption in androgen bioavailability and downstream signalling^{30,32,33}. As a crucial gatekeeper of circulating testosterone, SHBG elevation limits intra-testicular androgen activity independent of total testosterone levels by lowering the readily diffusible fraction available to reach the seminiferous tubules^{34,35}. Crucially, testosterone and FSH work together to sustain the metabolic function of Sertoli cells and the maturation of germ cells; this hormonal interaction is disrupted by the reduction of androgen signalling, which results in poor spermatogenic development even when gonadotropin stimulation is maintained³³. Furthermore, through estrogen-mediated feedback and receptor-level dysregulation, increased peripheral aromatisation of testosterone to estradiol and modified androgen receptor sensitivity may

further impede effective intratesticular androgen signalling^{36,32}. Excess aromatase, which changes testosterone into estrogen, is frequently the cause of high estrogen levels, which set off a negative feedback loop in the pituitary and hypothalamus. This lowers the amount of natural testosterone (produced by the testes) by suppressing the secretion of luteinizing hormone (LH)³⁷. When taken as a whole, these mechanisms may cause functional hypogonadism at the testicular level, which increases the risk of both quantitative and qualitative abnormalities in semen. Our findings are consistent with previous research, and low free testosterone level in most of the groups (Severe-OAT, azoospermia, ED, asthenozoospermia, oligo-asthenozoospermia, oligozoospermic, occasionally dead, and occasionally dead and motile); clearly indicate that high estrogen level and possibly SHBG played an important role in the alteration of those hormonal levels. Along the same vein increased total testosterone level was observed in the case of the severe-OAT, azoospermia, ED and occasional dead sperm groups. Furthermore, exogenous testosterone or anabolic steroid use, rare tumors of the adrenal glands or testes (like Leydig cell tumors), estrogen conversion imbalances can also enhance total testosterone level^{38,39}. These mechanisms remain plausible explanations; however, the present study was not designed to ascertain their contribution, and the precise underlying cause requires further investigation.

The current cohort's serum FSH profile shows a distinct gradation that corresponds to the degree of spermatogenic impairment across semen morphologies. The lowest FSH levels were seen in normozoospermia, which demonstrated normal Sertoli cell function and maintained inhibin B-mediated negative feedback. On the other hand, azoospermic and severe oligoasthenoteratozoospermic groups showed a considerable and statistically significant increase in FSH, which is consistent with severe damage to seminiferous tubules and Sertoli cell failure, where loss of inhibin B causes uncontrolled

pituitary FSH release. A partial disruption of spermatogenesis with varied Sertoli cell dysfunction is suggested by intermediate elevations in FSH among oligozoospermic, oligo-asthenozoospermic, asthenozoospermic, and sperm vitality-compromised phenotypes. Reduced inhibin B secretion eliminates negative feedback on pituitary FSH synthesis, and elevated FSH is linked with poor spermatogenesis and Sertoli cell dysfunction^{40,41}. Furthermore, differential regulation of the HPA axis is highlighted by the diverse and non-uniform endocrine pattern revealed by the LH profile among semen phenotypes, which contrasts with the FSH response.

The present findings reveal a distinct and phenotype-specific alteration in serum LH levels across different categories of male infertility when compared with the normozoospermic group. LH concentrations were significantly reduced in men with erectile dysfunction and asthenozoospermia, with further suppression observed in hypospermia and in individuals exhibiting a high proportion of dead and immotile sperm, suggesting compromised HPT axis signaling or impaired Leydig cell responsiveness in these subgroups. In contrast, oligoasthenozoospermic and oligozoospermic men demonstrated relatively preserved or elevated LH levels, which may reflect a compensatory pituitary response to suboptimal intratesticular testosterone production or reduced androgen bioavailability⁴². It is well-known that GnRH pulsatility and feedback from testosterone and estradiol derived from Leydig cells are the main factors regulating LH secretion, relatively preserved or dysregulated Leydig cell steroidogenesis may maintain enough sex-steroid feedback to suppress LH despite impaired seminiferous tubule function. Additionally, because LH synthesis is more sensitive to variations in pulse frequency and amplitude than FSH, which is also influenced by intrapituitary activin-follistatin signalling, changes in GnRH pulse dynamics disproportionately impact LH secretion in those infertile groups^{43,44}. So the results in our study are also well in line with earlier reports suggesting that

LH and FSH play a critical role in the alterations of sperm parameters. All of these results point to a hormonal pattern seen in some non-obstructive and mixed aetiologies of male infertility that the observed gonadotropin profile reflects predominant Sertoli cell failure with relative retention of Leydig cell feedback mechanisms.

Hyperprolactinemia, a disorder characterised by high prolactin levels in men, can have detrimental consequences on fertility. Male infertility may be exacerbated by hyperprolactinemia, which has been linked to lower sperm concentration, motility, and morphology⁴⁵. Elevated prolactin levels can further impair fertility by causing oxidative stress and DNA damage in sperm. Pituitary tumours (prolactinomas), drugs, stress, and specific medical disorders are some of the causes of hyperprolactinemia⁴⁶. Managing male infertility linked to hyperprolactinemia requires determining and treating the underlying cause of increased prolactin levels⁴⁷. Our data clearly showed a significantly elevated level of prolactin in most of the subgroups (asthenozoospermia, oligoasthenozoospermia, oligozoospermic) in comparison to the normozoospermia group which is in accordance with some previous investigations. Contradictorily, few references assumed that hyperprolactinemia was an infrequent cause of male infertility⁴⁸. The elevated level of prolactin modifies the feedback mechanism on the hypothalamus, further suppress the pulsatile nature of GnRH secretion, thereby diminishing the pulsatile discharge of LH, FSH and testosterone, which is a vital point or reason of reduced spermatogenesis, unusual sperm motility and quality⁴⁸⁻⁵⁰. Low prolactin (hypoprolactinemia) has been discovered to be positively connected with sperm concentration and sperm motility, implying that lower prolactin levels are associated with inferior semen quality, which can cause severe oligozoospermia, asthenozoospermia, hypofunction of seminal vesicles and hypoandrogenism⁵¹. In fact, low prolactin levels have been associated with metabolic syndrome and erectile dysfunction⁵². Similarly, in our study, prolactin levels were low in case of severe-

OAT and erectile dysfunction subgroups. Prolactin levels in azoospermic males are typically normal or raised (hyperprolactinemia) rather than low (hypoprolactinemia), according to previous study⁴⁸. In this study, prolactin level was low in the case of the azoospermia group, which clearly indicates that some other factors were involved in lowering the hormonal level of the males of the North-East region of India. Some studies suggested that low prolactin levels have been associated with decreased serotonergic tone in the CNS because it is one of the main releasers of prolactin at the hypothalamic level⁵³⁻⁵⁵. Along the same vein, decreased serotonergic activity is associated with anxiety and mood disturbances^{56,57}, which ultimately results in ejaculatory dysfunctions^{58,59} and can also create a worse metabolic profile in them¹⁵. So, all those reasons probably or possibly indicate that hypoprolactinemia could be a factor in male infertility. In the end, the cause of varying serum prolactin level results remains ambiguous. Further research is required to validate those results.

This hospital-based cross-sectional study has several limitations. As it included only men attending infertility clinics, the findings may be subject to referral and selection bias and are not generalizable to the broader male population. The use of retrospective hospital records limited standardization of semen analysis and hormone assays, while single-time-point hormone measurements did not account for physiological variation. The absence of a fertile control group and data on SHBG, inhibin B, genetic, lifestyle, and environmental factors limited causal inference. Furthermore, the relatively small subgroup sample sizes reduced statistical power and generalizability.

Conclusion

This study demonstrates substantial endocrine dysregulation underlying diverse sperm abnormalities in infertile men, characterized by altered testosterone-estrogen balance, disrupted gonadotropin secretion, and prolactin abnormalities. Reduced free testosterone despite elevated total

testosterone in some subgroups suggests impaired androgen bioavailability, potentially related to sex hormone-binding globulin. Elevated FSH with suppressed LH across most infertility phenotypes indicates primary testicular dysfunction and impaired spermatogenesis. These findings highlight male infertility as a multifactorial endocrine disorder rather than an isolated semen abnormality. Future multicenter longitudinal studies incorporating SHBG, inhibin B, hormonal ratios, and genetic, metabolic, and environmental risk factors are needed to clarify underlying mechanisms and support personalized diagnosis and management.

Conflict of Interest statement:

None declared

Ethical Approval:

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REFERENCES

1. Sharlip ID, Jarow JP, Belker AM, Lipshultz LI, Sigman M, Thomas AJ, et al. Best practice policies for male infertility. *Fertility and sterility*. 2002;77(5):873-882.
2. Palatty PL, Kamble PS, Shirke M, Kamble S, Revankar M, Revankar VM. A clinical round up of female infertility therapy amongst Indians. *Journal of Clinical & Diagnostic Research*. 2012;6(7).
3. Gangwar PK, Sankhwar SN, Pant S, Krishna A, Singh BP, Mahdi AA, et al. Increased Gonadotropins and prolactin are linked to infertility in males. *Bioinformation*. 2020;16(2):176-182.
4. George SS, Fernandes HA, Irwin C, Chandy A, George K. Factors predicting the outcome of intracytoplasmic sperm injection for infertility. *National Medical Journal of India*. 2003;16(1):13-15.
5. Mehta P, Chakraborty A, Andrabi SW, Sharma B, Kumar R, Bhaskar LV, Rajender S. COVID-19 vaccination does not affect male sexual functions. *Reproductive Biology and Endocrinology*. 2023;21(1):3-19.
6. Zargar AH, Wani AI, Masoodi SR, Laway BA, Salahuddin M. Epidemiologic and etiologic aspects of primary infertility in the Kashmir region of India. *Fertility and sterility*. 1997;68(4):637-643.
7. Mondal C, Sinha S, Chakraborty A, Chandra AK. Studies on goitrogenic/anti-thyroidal potentiality of thiocyanate, catechin and after concomitant exposure of thiocyanate-catechin. *Int J Pharm Clin Res*. 2016;8(1):108-116.
8. Kumar A, Kaur R, Kumar S, Kaur D. The effects of smoking & alcohol intake on sperm quality. *Poonam Shodh Rachna (PSR)*. 2024;3:1-7.
9. Pal N, Samanta SK, Chakraborty A, Chandra NK, Chandra AK. Interrelationship between iodine nutritional status of lactating mothers and their absolutely breast-fed infants in coastal districts of Gangetic West Bengal in India. *European Journal of Pediatrics*. 2018 Jan;177(1):39-45.
10. Pandey D, Pradhan M, Fatima A. Semen Quality in Hilly and Plain Regions of India: A Comparative Study. *Journal of Heart Valve Disease*. 2025;10;30:66-70.
11. Barbhuiya PN, Gogoi A, Ahmed G, Mahanta R. A study on genetic aspects of male infertility in North-east Indian population. India. *BMC proceedings*. 2012;6(6):31.
12. Juneja P, Phukan PK, Changmai D. A study of abnormal semen parameters in infertile couples in Assam, India. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 2019;8(3):997-1001.
13. Irvine DS. Epidemiology and aetiology of male infertility. *Human reproduction*. 1998;13(1):33-44.
14. Chakraborty A, Singh V, Singh K, Rajender S. Excess iodine impairs spermatogenesis by inducing oxidative stress and perturbing the blood testis barrier. *Reproductive Toxicology*. 2020;96:128-40.
15. Dey S, Das D, Chakraborty A, Roychoudhury S, Choudhury BP, Choudhury AP, Mandal SC. Plant-based traditional herbal contraceptive use in India: safety and regulatory issues. In: *Evidence based validation of traditional medicines: a comprehensive approach* 2021 Jan 19 (pp. 659-675). Singapore: Springer Singapore.
16. Kathrins M, Niederberger C. Diagnosis and treatment of infertility-related male hormonal dysfunction. *Nature Reviews Urology*. 2016;13:309-23.
17. Ramya S, Poornima P, Jananisri A, Geofferina IP, Bavyataa V, Divya M, et al. Role of hormones and the potential impact of multiple stresses on infertility. *Stresses*. 2023;3(2):454-474.
18. Babu SR, Sadhnan MD, Swarna M, Padmavathi P, Reddy PP. Evaluation of FSH, LH and testosterone levels in different subgroups of infertile males. *Indian Journal of Clinical Biochemistry*. 2004;19(1):45-49.
19. Chakraborty A. Excess iodine supplementation aggravates the toxic effects induced by perchlorate on the male reproductive system in rats. *Asian Pacific Journal of Reproduction*. 2021;10(5):215-24.
20. Zeitlin SI, Rajfer J. Hyperprolactinemia and erectile dysfunction. *Reviews in urology*. 2000;2(1):39.
21. Corona G, Rastrelli G, Sparano C, Vignozzi L, Maggi M. Acquired hypoprolactinemia in men, possible phenotype. *Reviews in Endocrine and Metabolic Disorders*. 2024;25(6):1109-1119.
22. Sarkar D, Chakraborty A, Mahapatra D, Chandra AK. Morphological and functional alterations of female reproduction after regular exposure of bamboo shoots of North East India. *Asian Pacific Journal of Reproduction*. 2017;6(4):151-7.
23. Hamilton KJ, Arao Y, Korach KS. Estrogen hormone physiology: reproductive findings from estrogen receptor mutant mice. *Reproductive biology*. 2014;14(1):3-8.
24. Carani C, Qin K, Simoni M, Faustini-Fustini M, Serpente S, Boyd J, et al. Effect of testosterone and estradiol in a man with aromatase deficiency. *New England Journal of Medicine*. 1997;337(2):91-95.
25. Singh V, Chakraborty A, Trivedi S. High frequency of sperm function defects in normozoospermic infertile men. *Journal of Basic and Clinical Physiology and Pharmacology*. 2026; 1-11.
26. Schulster M, Bernie AM, Ramasamy R. The role of estradiol in male reproductive function. *Asian journal of andrology*. 2016;18(3):435-440.
27. Kaltsas A, Zachariou A, Dimitriadis F, Chrisofos M, Sofikitis N. Empirical treatments for male infertility: a focus on lifestyle modifications and medicines. *Diseases*. 2024;12(9):209.
28. Chakraborty A. Excess iodine exposure: An emerging area of concern for male reproductive physiology in the post-salt iodization era. *Asian Pacific Journal of Reproduction*. 2021 May 1;10(3):102-12.
29. Leavy M, Trottmann M, Liedl B, Reese S, Stief C, Freitag B, et al. Effects of elevated β -estradiol levels on the functional morphology of the testis-new insights. *Scientific reports*. 2017;7(1):39931.

30. Singh V, Bansal SK, Sudhakar DV, Neelabh, Chakraborty A, Trivedi S, Gupta G, Thangaraj K, Rajender S, Singh K. SNPs in ERCC1, ERCC2, and XRCC1 genes of the DNA repair pathway and risk of male infertility in the Asian populations: association study, meta-analysis, and trial sequential analysis. *Journal of Assisted Reproduction and Genetics*. 2019 Jan 15;36(1):79-90.
31. Boeri L, Capogrosso P, Cazzaniga W, Pozzi E, Candela L, Belladelli F, et al. SHBG levels in primary infertile men: a critical interpretation in clinical practice. *Endocrine Connections*. 2020;9(7):658-666.
32. Antonio L, Wu FC, O'Neill TW, Pye SR, Ahern TB, Laurent MR, et al. Low free testosterone is associated with hypogonadal signs and symptoms in men with normal total testosterone. *The Journal of Clinical Endocrinology & Metabolism*. 2016;101(7): 2647-2657.
33. Rastrelli G, Corona G, Maggi M. Testosterone and sexual function in men. *Maturitas*. 2018;112:46-52.
34. Chakraborty A. Regulatory proteins in sperm motility: A review and development of non-hormonal male contraceptives. *Chemical Biology Letters*. 2021 Jan 13;8(1):10-7.
35. Singh V, Mohanty SK, Verma P, Chakraborty A, Trivedi S, Rajender S, Singh K. XRCC1 deficiency correlates with increased DNA damage and male infertility. *Mutation Research/Genetic Toxicology and Environmental Mutagenesis*. 2019;839:1-8.
36. Jarow JP. Endocrine causes of male infertility. *Urologic Clinics*. 2003;30(1):83-90.
37. Carolyn A. Salter, John P. Mulhall. Diabetes and Men's Health. Faysal A. Yafi, Natalie R. Yafi (eds), Effects of Lifestyle on Men's Health. Academic Press; 2019:121-147. ISBN 9780128166659
38. Rasmussen JJ, Selmer C, Østergren PB, Pedersen KB, Schou M, Gustafsson F, et al. Former abusers of anabolic androgenic steroids exhibit decreased testosterone levels and hypogonadal symptoms years after cessation: a case-control study. *PloS one*. 2016;17;11(8):e0161208.
39. Hibi H, Yamashita K, Sumitomo M, Asada Y. Leydig cell tumor of the testis, presenting with azoospermia. *Reproductive Medicine and Biology*. 2017;16(4):392-395.
40. Anawalt BD. Approach to male infertility and induction of spermatogenesis. *The Journal of Clinical Endocrinology & Metabolism*. 2013;98(9):3532-3542.
41. Krausz C, Rosta V, Swerdloff RS, Wang C. Genetics of male infertility. *Emery and rimoin's principles and practice of medical genetics and genomics*. 2022:121-147.
42. Huhtaniemi I, Forti G. Male late-onset hypogonadism: pathogenesis, diagnosis and treatment. *Nature Reviews Urology*. 2011;8(6):335-344.
43. Goodman RL, Herbison AE, Lehman MN, Navarro VM. Neuroendocrine control of gonadotropin-releasing hormone: pulsatile and surge modes of secretion. *Journal of neuroendocrinology*. 2022;34(5):e13094.
44. Tsigos C, Chrousos GP. Physiology of the hypothalamic-pituitary-adrenal axis in health and dysregulation in psychiatric and autoimmune disorders. *Endocrinology and metabolism clinics of North America*. 1994;23(3):451-466.
45. Singh P, Singh M, Cugati G, Singh AK. Hyperprolactinemia: An often missed cause of male infertility. *Journal of human reproductive sciences*. 2011;4(2):102.
46. Pirchio R, Graziadio C, Colao A, Pivonello R, Auriemma RS. Metabolic effects of prolactin. *Frontiers in endocrinology*. 2022;13:1015520.
47. Cunnah D, Besser M. Management of prolactinomas. *Clinical endocrinology*. 1991;34(3):231-5.
48. Al-Daghistani HI, Abdel-Dayem M. Hyperprolactinemia and hypergonadotropins in infertile males with severe oligospermia and azoospermia. *Internet J Endocrinol*. 2002;3:1540-2606.
49. Emokpae MA, Uadia PO, Mohammed AZ, Omale-Itodo A. Hormonal abnormalities in azoospermic men in Kano, Northern Nigeria. *Indian Journal of Medical Research*. 2006;124(3):299-304.
50. Masud S, Mehboob F, Bappi MU. Severe hyperprolactinemia directly depresses the gonadal activity causing infertility. *Esculapio J Services Inst Med Sci*. 2007;2(4):25-27.
51. Gonzales GF, Velasquez G, Garcia-Hjarles M. Hypoprolactinemia as related to seminal quality and serum testosterone. *Archives of andrology*. 1989;23(3):259-265.
52. Corona G, Wu FC, Rastrelli G, Lee DM, Forti G, O'Connor DB, et al. Low prolactin is associated with sexual dysfunction and psychological or metabolic disturbances in middle-aged and elderly men: the European Male Aging Study (EMAS). *The journal of sexual medicine*. 2014;11(1):240-253.
53. Corona G, Mannucci E, Jannini EA, Lotti F, Ricca V, Monami M, et al. Hypoprolactinemia: a new clinical syndrome in patients with sexual dysfunction. *The journal of sexual medicine*. 2009;6(5):1457-1466.
54. Mandal J, Chakraborty A, Chandra AK. Altered Acetyl cholinesterase and Na⁺-K⁺ ATPase activities in different areas of brain in relation to thyroid gland function and morphology under the influence of excess iodine. *Int J Pharm Clin Res*. 2016;8:1564-73.
55. Lyons DJ, Ammari R, Hellysaz A, Broberger C. Serotonin and antidepressant SSRIs inhibit rat neuroendocrine dopamine neurons: parallel actions in the Lactotrophic Axis. *Journal of Neuroscience*. 2016;36(28):7392-7406.
56. Stein MB, Andrews AM. Serotonin States and social anxiety. *JAMA Psychiatry* 2015;72(8):845-847.
57. Moncrieff J, Cooper RE, Stockmann T, Amendola S, Hengartner MP, Horowitz MA. The serotonin theory of depression: a systematic umbrella review of the evidence. *Molecular Psychiatry* 2023;28(8):3243-3256.
58. Chandra AK, Chakraborty A. Influence of iodine in excess on seminiferous tubular structure and epididymal sperm character in male rats. *Environmental toxicology*. 2017 Jun;32(6):1823-35.
59. Fanni E, Castellini G, Corona G, Boddi V, Ricca V, Rastrelli G, et al. The role of somatic symptoms in sexual medicine: somatization as important contextual factor in male sexual dysfunction. *The journal of sexual medicine*. 2016;13(9):1395-1407.

KNOWLEDGE AND PRESCRIBING PRACTICE OF PERICONCEPTIONAL FOLIC ACID AND ASSOCIATED FACTORS AMONG HEALTH PROFESSIONALS IN BOLE SUB CITY, ADDIS ABABA, ETHIOPIA

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ABSTRACT

BACKGROUND: Neural tube defects are a major public health concern, affecting approximately 200,000 neonates worldwide each year. Periconceptional folic acid supplementation effectively prevents these defects when prescribed accurately and initiated before conception. This study aimed to assess health professionals' knowledge and prescribing practices of periconceptional folic acid and identify associated factors

MATERIALS: A facility-based cross-sectional study was conducted in Bole Sub-City, Addis Ababa. Descriptive statistics summarized study variables. Binary logistic regression identified factors associated with appropriate periconceptional folic acid prescribing practice, with statistical significance set at $p < 0.05$.

RESULT: Nearly equal proportions of participants had good and poor knowledge regarding periconceptional folic acid use; however, prescribing practice was suboptimal, with 60.6% of healthcare professionals demonstrating poor prescribing practices. Factors significantly associated with higher odds of appropriate prescribing practice included professional background, with nurses (AOR = 2.84; 95% CI: 1.44–5.60) and public health work experience in non-governmental organizations (AOR = 2.52; 95% CI: 1.34–4.74), experience working in antenatal care clinics (AOR = 2.20; 95% CI: 1.07–4.53), prior training on folic acid (AOR = 2.85; 95% CI: 1.40–5.78), and training on neural tube defects (AOR = 12.60; 95% CI: 5.80–27.35).

CONCLUSION AND RECOMMENDATION: Despite relatively good knowledge of periconceptional folic acid use among health professionals, appropriate prescribing practices remained inadequate. Strengthening awareness of folic acid's role in preventing neural tube defects and implementing targeted, practice-oriented training particularly for midwives are essential to improve prescribing practices and reduce the burden of folate-preventable birth defects.

KEYWORDS: Folic Acid, Neural Tube Defects, Periconception Care, Prescribing Practices, Health Personnel, Knowledge, Attitudes, Practice, Maternal Health Services

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INTRODUCTION

Neural tube defects (NTDs), including spina bifida, anencephaly, and encephalocele, are among the most common congenital anomalies and contribute substantially to foetal and neonatal morbidity and mortality worldwide¹⁻³. These defects arise from incomplete closure of the neural tube during the third and fourth weeks of pregnancy^{2, 3}. Globally, an estimated 200,000 neonates are affected annually, with the highest burden occurring in low- and middle-income countries⁴.

In Ethiopia, the true magnitude of NTDs remains uncertain due to the absence of a national birth-defect registry. However, hospital-based studies provide important insights into the national burden. A study conducted in two teaching hospitals reported an NTD prevalence of 6.1 per 1,000 births, highlighting a significant public health concern^{5, 6}. This burden underscores the urgent need for effective preventive strategies. Periconceptional folic acid supplementation is the gold-standard intervention for preventing NTDs and other congenital anomalies³. Evidence shows that daily intake of 0.4 mg folic acid during the periconception period can reduce first-occurrence NTD risk by up to 62%, while a higher dose (4 mg) can reduce recurrence by up to 72%⁷. In addition to preventing NTDs, folic acid supplementation reduces risks of cardiac, orofacial, renal, and limb anomalies, as well as adverse pregnancy outcomes such as low birth weight and perinatal mortality⁷. Despite strong evidence, periconceptional folic acid use in Ethiopia remains low, particularly at primary healthcare levels where most women access services⁶. Nurses, midwives, and health extension workers provide antenatal, postnatal, family planning, and immunization services critical opportunities for counseling and prescribing folic acid. Nonetheless, over three-quarters of Ethiopian women lack awareness of early folic acid supplementation and do not receive appropriate counseling^{8, 9}. Health professionals' knowledge and prescribing practices play a central role in determining women's awareness and utilization

of folic acid. While studies from high-income countries report adequate provider knowledge and adherence to supplementation guidelines, evidence from developing countries including Ethiopia demonstrates gaps in knowledge, dosing accuracy, and timing of folic acid prescription^{10, 11}.

Although global and national strategies emphasize preconception care and NTD prevention, limited data exist on Ethiopian health professionals' preparedness to implement these recommendations effectively. Therefore, this study aimed to assess health professionals' knowledge and prescribing practices related to periconceptional folic acid use and to identify associated. Addressing these gaps is essential for designing targeted interventions to improve professional practice and reduce folate-preventable birth defects.

Methods

Study Setting and Design

The study was conducted in Addis Ababa, the capital city of Ethiopia with an estimated population of approximately four million. Administratively, Addis Ababa is divided into eleven autonomous sub-cities. This study was carried out in Bole Sub-City, located in the southeastern part of Addis Ababa and bordered by Yeka, Kirkos, Nifas Silk-Lafto, Akaky Kaliti, and Lemi Kura sub-cities. According to the Ethiopian Statistics Service (2022), the total population of Bole Sub-City is estimated at 435,421, of which 53.4% are females⁵. An institution-based cross-sectional study design was employed from May to July 2024 in all five public health centers in Bole Sub-City, namely Bole Bulbula, Bole 17, Bole 17/20, Gerji, and Dele Farea Health Centers. The study population included all health professionals working in these facilities for at least six months during the study period. Health professionals who were critically ill or unavailable at the time of data collection were excluded.

Sample Size Determination and Sampling Procedure

The sample size was determined using a single population proportion formula, assuming a 95%

confidence level and a margin of error of 5%. Based on a previous study conducted in Ethiopia, 47.7% of health professionals had sufficient knowledge of periconceptional folic acid use, while 9.7% reported prescribing folic acid during the preconception period³. Using these assumptions, the calculated sample size was 383, and after adding a 10% allowance for non-response, the final sample size was 421. Bole Sub-City was selected using simple random sampling from the eleven sub-cities of Addis Ababa. All public health centers in the selected sub-city were included. The sample size was proportionally allocated to each health center based on the total number of health professionals, and all eligible health professionals available during the data collection period were included in the study.

Operational and Definition of terms

Preconceptional folic acid use: it was defined as the use of folic acid supplements that had started before the last menstrual period. Folic acid is recommended for pregnant women¹².

Periconceptional Folic Acid use: According to the recommendation of the World Health Organization, this period is defined as the period between the first attempt to conceive (four–12 weeks before pregnancy) to 12 weeks of pregnancy¹³.

Prescribing Practice: It defined as the healthcare professional's activity that requires skills and experience developed by formal education and supporting training to deliver it effectively under law and safety¹⁴.

Knowledge of periconceptional folic acid

Health professionals' knowledge of periconceptional folic acid was assessed using eight structured items with dichotomous (Yes/No) responses. Each correct response was scored as one point, yielding a total possible score ranging from 0 to 8. Health professionals who correctly answered five or more items ($\geq 62.5\%$) were categorized as having "good knowledge," while those who scored fewer than five were categorized as having "poor knowledge." This cut-off point was adopted from previous studies and reflects an acceptable level of factual understanding

required to support appropriate counseling and prescribing practices¹⁵. Using this threshold is consistent with similar knowledge-assessment approaches applied in health-services research.

Prescribing practice of periconceptional folic acid

Good prescribing practice was defined as the provision of both counseling and supplementation or treatment-dose folic acid to women during the periconceptional (protective) period, which includes at least one month before conception and three months after conception. Health professionals who did not provide counseling and/or failed to prescribe folic acid during this period were classified as having poor prescribing practice. This definition is based on established clinical recommendations regarding the timing of folic acid supplementation for prevention of neural tube defects¹⁶.

Data Collection Procedures and Quality Assurance

Data were collected using a structured, closed-ended questionnaire developed following an extensive review of relevant literature. The questionnaire comprised sections on socio-demographic characteristics, knowledge of periconceptional folic acid use, and prescribing practices. The instrument was initially prepared in English, translated into Amharic by certified translators, and back-translated into English to ensure linguistic consistency and preserve the original meaning.

Data collection was conducted through face-to-face interviews by five trained midwives with previous data collection experience, while two health officers supervised the process. To reduce the potential for information bias, all data collectors and supervisors were recruited from outside the study facilities. Prior to data collection, a one-day training was provided on the study objectives, data collection procedures, ethical considerations, informed consent, confidentiality, and standardized interviewing techniques. Continuous supervision and daily review of completed questionnaires were undertaken throughout the data collection period to ensure completeness, consistency, and overall data quality.

Data Quality Assurance

To ensure data quality, the questionnaire was pretested on 5% of health professionals in Lemi Kura Sub-City, which was not part of the main study area. Based on the pretest, necessary modifications were made to improve clarity and reliability. Supervisors closely monitored the data collection process and reviewed completed questionnaires daily for completeness and consistency. Continuous supervision, standardized data collection procedures, and daily checks were implemented to ensure the accuracy and reliability of the data.

Data Analysis Procedure

The data were checked for completeness, entered into Epi-info version 7, and exported to SPSS version 26 for further data cleaning and analysis. Frequency distributions were obtained to check for data entry errors (missing/unrecognized values and codes). Descriptive statistics, tables, graphs, means, and frequency distributions were used to present the information. Then, bivariate analysis was performed using logistic regression to determine the crude association between the independent variables and the outcome variable. Finally, multivariate analysis using multiple logistic regression was performed to evaluate the independent effect of each variable on outcome variables. The strength of association between dependent variables and independent variables was expressed as odds ratio (OR) and 95% confidence interval, and variables with a p-value less than 0.05, were considered to be significantly associated with the outcome variable.

Results

Socio-demographic Characteristics

More than half of the participants (58.4%) were aged < 30 years, while 41.6% were aged ≥ 30 years. Regarding marital status, 62.3% of participants were single, 34.2% were married, and 3.4% were divorced. Females constituted slightly more than half of the respondents (53.9%), while 46.1% were male.

In terms of professional category, nurses comprised the largest proportion (36.2%), followed by midwives (23.6%), general practitioners (19.0%), and public health professionals/others (21.2%). The majority of participants (65.8%) had less than five years of work experience, while 26.1% had five to nine years, and 8.1% had more than nine years of experience. Regarding previous work experience, 43.1% of the participants had worked in the public sector, 34.0% in the private sector, and 22.9% in non-governmental organizations (NGOs) or other settings. (Table 1).

Table 1, sociodemographic characteristics of health professionals in Bole Sub City, Addis Ababa, Ethiopia 2024

Variables		Frequency	Percentage
Age	<30yrs	237	58.4
	>30	169	41.6
Marital status	Single	253	62.3
	Married	139	34.2
	Divorced	14	3.4
Gender	Female	219	53.9
	Male	187	46.1
Profession	Nurse	147	36.2
	Midwife	96	23.6
	General practitioner	77	19
	Public health and other	86	21.2
Work experience	<5yr	267	65.8
	5-9	106	26.1
	>9yr	33	8.1
Previous work area	Public	175	43.1
	Private	138	34.0
	NGO & other	93	22.9

Regarding professional experience, 37.7% of the participants had worked in an antenatal care (ANC) clinic, whereas 62.3% had no ANC clinic experience. Similarly, 43.6% of the respondents had worked in a labor and delivery ward, while 56.4% had not. In addition, 36.9% of participants

reported receiving training on prenatal and antenatal supplementation, while 63.1% had not. The majority of participants reported that they had never attended the birth of a neonate with neural tube defects (NTDs). see Table (2)

Table 2 the antenatal care (ANC) clinic, Labor ward and training exposure of health professionals in Bole Sub City, Addis Ababa, Ethiopia 2024

Variables		Frequency	Percentage
Have worked in ANC clinic	Yes	153	37.7
	No	253	62.3
Have worked in labor and delivery ward	Yes	177	43.6
	No	229	56.4
Have you ever taken training on prenatal & antenatal supplementation	Yes	150	36.9
	No	256	63.1
Attended birth of a neonate with NTDs	Yes	70	17.2
	No	336	82.8

Knowledge of Health Professionals on Folic acid use

Only 31.3% of participants reported knowledge of folic acid-enriched food items, while 68.7% did not. A large proportion (89.7%) knew that folic acid deficiency can cause neural tube defects (NTDs), whereas 10.3% were unaware. Similarly, 95.3% of participants were aware that folic acid supplementation can prevent NTDs, and 93.1% correctly identified NTDs as congenital abnormalities.

Regarding supplementation practices, 56.4% of participants knew that both pregnant and

non-pregnant women should take folic acid to reduce the risk of NTDs, while 43.6% lacked this knowledge. Although 84.5% were aware that folic acid should be administered during the periconception period, knowledge of the recommended dosage was limited. Only 40.1% correctly identified the standard dose of 0.4 mg for women with no previous NTD-affected pregnancy, and 34.7% knew the recommended 4 mg dose for women with a prior NTD-affected pregnancy; the remaining 59.9% and 65.3%, respectively, did not know the correct doses (Table 3).

Table 3: Knowledge of health professionals on folic acid use in Bole Sub City, Addis Ababa, Ethiopia 2024

Variables		Frequency	Percentage
Knowledge about Folic acid enriches food stuffs	Yes	127	31.3
Folic acid deficiency can cause NTDs	Yes	364	89.7
	No	42	10.3
Knowledge about the prevention of NTDs using Folic acid	Yes	387	95.3
	No	19	4.7
NTDs are congenital abnormality	Yes	378	93.1
	No	28	6.9
	No	279	68.7
Pregnant and non-pregnant women are subjected to folic acid supplement to decrease risk of NTDs	Yes	229	56.4
	No	177	43.6
To prevent NTDs, folic acid supplement should be taken during Preconception period	Yes	343	84.5
	No	63	15.5
Correct dose of folic acid for a women had no previous pregnancy with NTD is 0.4mg	Yes	163	40.1
	No	243	59.9
Correct dose of folic acid for a women with a prior NTD affected pregnancy is 4mg	Yes	141	34.7
	No	265	65.3

Over all Knowledge about periconceptional folic acid use

The Figure below presents information on the knowledge and practice of health professionals regarding the use of folic acid. This study determined that nearly equal numbers of participants had good (50.7%) and poor (49.3%) knowledge about periconceptional folic acid use.

Prescribing practice of periconceptional folic acid

This study determined that the majority of healthcare professionals (60.6%) had poor prescribing practices for periconceptional folic acid, whereas only 39.4% had good practices in the study area.

Factors associate with Knowledge periconceptional folic acid use.

Nursing professionals had 2.84 times higher odds of having good knowledge of folic acid use compared with midwives (AOR = 2.84; 95% CI: 1.44–5.60). Similarly,

public health professionals and others were significantly more likely to have good knowledge compared with midwives (AOR = 4.26; 95% CI: 1.98–9.40).

Health professionals with previous work experience in non-governmental organizations (NGOs) had higher odds of good knowledge compared with those working in public health institutions (AOR = 2.52; 95% CI: 1.34–4.74). Participants who had experience in working at antenatal care (ANC) clinics were 2.20 times more likely to have good knowledge of folic acid use than those without such experience (AOR = 2.20; 95% CI: 1.07–4.53).

In addition, health professionals who received training on prenatal and antenatal supplementation were significantly more likely to have good knowledge (AOR = 2.85; 95% CI: 1.40–5.78). Participants who had ever attended cases of neural tube defects (NTDs) were markedly more likely to have good knowledge compared with those who had not encountered such cases (AOR = 12.60; 95% CI: 5.80–27.35) (Table 4).

Table 4: Factors associate with Knowledge periconceptional folic acid use among health professionals in Bole Sub City, Addis Ababa, Ethiopia 2024

Identified factors		Frequency Good knowledge	Poor knowledge	COR (95 CI)	AOR (95 CI)
Age	<30yrs	124	113	Reference	
	>30	82	87	1.16(0.78-1.73)	
Profession	Midwife	68	28	Reference	Reference
	GP	52	25	1.17(0.6-2.23)	1.01(0.46-2.2)
	Nurse	61	86	3.4(1.97-5.9)*	2.84(1.44-5.6)*
	Public health	25	61	5.9(3.12-11.2)*	4.26(1.98-9.4)*
Previous work	Public	111	64	Reference	Reference
	Private	64	74	2(.27-3.16)	1.53(0.87-2.7)
	NGO & other	31	62	3.5(2.04-5.9)*	2.52(1.34-4.74)*
Have been worked in ANC clinic	Yes	115	38	5.38(3.44-8.43)*	2.85(1.4-5.78)*
	No	91	162	Reference	Reference
Have you ever taken training on folic acid	Yes	112	38	5.08(3.24-7.94)*	2.2(1.07-4.53)*
	No	94	162	Reference	Reference
Have you ever attended NTDs?	Yes	18	52	3.67(2.05-6.53)*	12.6(5.8-27.35)*
	No	188	148	Reference	Reference

NB: COR crude odds ratio, AOR adjusted odds ratio, * p <0.05, ** p <0.001

Practice about Folic acid use and Associated Factors

Older health professionals had 1.27 times higher odds of practicing folic acid use compared with younger professionals; however, this association was not statistically significant. Nurses (AOR = 2.74; 95% CI: 1.44–5.21) and public health professionals/others (AOR = 2.20; 95% CI: 1.06–4.58) were significantly more likely to have poor prescribing practice compared with midwives. Health professionals with previous work experience in non-governmental organizations (NGOs) also showed higher odds of poor practice compared with those working in public health institutions (AOR = 1.25); however, this association was not statistically significant.

In contrast, health professionals who had experience working in antenatal care (ANC) clinics were 2.37 times more likely to demonstrate good prescribing practice compared with those without ANC experience. Participants who had received training on prenatal and antenatal supplementation were less likely to have good prescribing practice (AOR = 2.11; 95% CI: 1.06–4.19). Health professionals who had ever attended cases of neural tube defects (NTDs) were significantly more likely to demonstrate good prescribing practice (AOR = 14.40; 95% CI: 6.07–34.20) compared with those who had not encountered such cases (Table 5).

Table 5. Factors associate with prescribing practice of periconceptional folic acid among health professionals in Bole Sub City, Addis Ababa, Ethiopia 2024

Identified factors		Frequency		COR (95 CI)	AOR (95 CI)
		Good practice	Poor practice		
Age	<30yrs	99	138	Reference	
	>30	61	108	1.2(0.84-1.9)	
Profession	Midwife	52	44	Reference	Reference
	GP	44	33	0.88(0.48-1.62)	0.71(0.34-1.48)
	Nurse	39	108	3.27(1.9-5.6)*	2.74(1.44-5.21)*
	Public health	25	61	2.9(1.56-5.3)*	2.2(1.06-4.58)*
Previous work	Public	76	99	Reference	Reference
	Private	59	79	1.02(0.65-1.61)	0.69(0.39-1.22)
	NGO & other	25	68	2.08 (1.2-3.6)*	1.35(0.73-2.59)
Have been worked in ANC clinic	Yes	89	64	3.56(2.33-5.43)*	2.37(1.2-4.64)*
	No	71	182	Reference	Reference
Have you ever taken training on folic acid	Yes	88	62	3.6(2.37-5.54)*	2.11(1.06-4.19)*
	No	72	184	Reference	Reference
Have you ever attended NTDs?	Yes	8	62	6.4(2.97-13.7)*	14.5(6.13-34.6)*
	No	152	184	Reference	Reference

NB: COR crude odds ratio, AOR adjusted odds ratio, * p <0.05, ** p <0.001

DISCUSSION

A key finding of this study was the substantial gap in healthcare providers' knowledge and prescribing practices regarding folic acid. Participants were almost equally divided between good and poor knowledge, while the majority reported suboptimal prescribing practices. These findings may be partly explained by the limited clinical exposure of many participants, particularly their lack of experience in antenatal care (ANC) clinics and labor and delivery wards, where folic acid supplementation is routinely provided.. This finding aligns with research conducted in developing countries³. The lack of adequate knowledge may be attributed to a lack of ongoing training and guidelines on the subject, leading to a decreased likelihood of updating knowledge on congenital abnormalities and their prevention methods.

In our study, being midwives and general practitioners was associated with good knowledge and practice on folic acid use. This might be explained by the level of clinical encounter in the different health professionals had to women seeking peri-conception care, it is more for midwives and GP. Owing to their work in ANC clinics and delivery wards, physicians and midwives may have had more opportunities to explore and learn about preventive methods, including folic acid supplementation, for tube defects and other congenital anomalies. This focused exploration and learning can contribute to their superior knowledge and practices compared with other healthcare professionals.

This study found that those who had never attended any training on prenatal and antenatal supplementation were less likely to have sufficient knowledge and that the odds of having insufficient

knowledge were 5.080 times higher for those who had not attended training. Its consistency with many findings in the UK revealed that a training program for general practitioners and practice nurses led to an increase in their knowledge and recommendations for folic acid¹⁷. Similarly, a study in Canada showed that an educational intervention for healthcare providers resulted in improved knowledge and counseling practices related to folic acid¹⁸. This finding highlights the crucial role of training and education in enhancing health care professionals' knowledge and use of folic acid. The finding that Health professionals who had worked in ANC clinic were more likely to have sufficient knowledge and good practice of prescribing is consistent with that of previous studies¹⁹. This might be due to the fact that , professionals who worked in ANC clinic were more likely to get update training on MCH service including prevention of congenital abnormality. Additionally, those who worked in ANC clinics were more likely to explore information on supplementation because it is a component of ANC care.

This study suggests that direct exposure to and experience in dealing with NTD cases can significantly improve healthcare professionals' knowledge and practices related to folic acid supplementation. Attending NTD cases allows them to witness the real-world consequences of insufficient folic acid intake, and the importance of proper folic acid supplementation during pregnancy. This hands-on experience can be more impactful in enhancing their understanding and appreciation of the role of folic acid in preventing congenital anomalies than theoretical knowledge alone. Direct exposure to the consequences of inadequate folic acid intake can help solidify their

understanding of and commitment to promoting folic acid supplementation¹⁹. However, the findings should be interpreted with caution, as the cross-sectional design precludes the establishment of causal relationships, and the possibility of selection bias could not be entirely avoided.

Conclusion and Recommendations

Although a considerable proportion of health professionals had adequate knowledge of periconceptional folic acid use, appropriate prescribing practices remained suboptimal. Professional exposure, antenatal care experience, and training on folic acid supplementation and neural tube defects were important determinants of both knowledge and prescribing practice. The observed gap between knowledge and practice suggests that awareness alone is insufficient to ensure evidence-based implementation. Strengthening healthcare providers' practical competence through targeted training, continuous professional development, and greater clinical exposure may improve adherence to recommended prescribing practices, enhance the quality of preconception and antenatal care, and ultimately reduce the burden of folate-preventable neural tube defects.

Competing Interests

The authors declare that they have no competing interests.

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Authors' Contributions

All authors made substantial contributions to the work reported, including the conception and design of the study, data acquisition, analysis, and interpretation. All authors were involved in drafting the manuscript or revising it critically for important intellectual content, approved the final version to be published, agreed on the journal to which the article has been submitted, and accept accountability for all aspects of the work.

Availability of Data and Materials

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Abbreviations and Acronyms

ANC	Antenatal Care
EDHS	Ethiopian Demographic Health Survey
ETB	Ethiopian Birr
FA	Folic Acid
FEP	Free Erythrocyte Protoporphyrin
FD	Folate Deficiency
Hgb	Hemoglobin
IDA	Iron Deficiency Anemia
IFA	Iron/Folic Acid
IFAS	Iron Folic Acid Supplementation
INACG	International Nutritional Anemia Consultancy Group
IRB	Institutional Review Board
LBW	Low Birth Weight
MCH	Maternal and Child Health
NNP	National Nutrition Planning
NTD	Neural Tube Defect
RDA	Recommended Dietary Allowance
SNNP	Southern Nation and Nationality
SRS	Simple Random Sampling
WHO	World Health Organization
WRA	Women of Reproductive Age

Declarations

Ethical Considerations

Ethical clearance was obtained from the Research Ethics Review Committee of Sante Medical College, Department of Public Health (Ref. No. V1/031/2024), following approval from the Addis Ababa Health Bureau Public Health Research Directorate. Permission to conduct the study was secured from the Bole Sub-City Administration Health Office, and a letter of cooperation was provided to the selected health facilities. Prior to data collection, informed oral consent was obtained from all participants. Participants were informed about the purpose of the study, the confidentiality of the information they provided, and their right to decline participation, skip any question, or withdraw from the interview at any time without any consequences.

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REFERENCES

1. Kindie Z, Mulu A. Prevalence of neural tube defects at Debre Berhan Referral Hospital, North Shewa, Ethiopia. A hospital based retrospective cross-section study. *PloS one*. 2022;17(2):e0261177.
2. Taye M, Afework M, Fantaye W, Diro E, Worku A. Magnitude of Birth Defects in Central and Northwest Ethiopia from 2010-2014: A Descriptive Retrospective Study. *PloS one*. 2016;11(10):e0161998.
3. Demilew YM, Asres Nigussie A. Knowledge of Health Professionals on Folic Acid Use and Their Prescribing Practice in Bahir Dar City Administration, Northwest Ethiopia: Cross-Sectional Study. *PloS one*. 2017;12(1):e0170116.
4. Ssentongo P, Heilbrunn ES, Ssentongo AE, Ssenyonga LVN, Lekoubou A. Birth prevalence of neural tube defects in eastern Africa: a systematic review and meta-analysis. *BMC Neurology*. 2022;22(1):202.
5. Bitew ZW, Worku T, Alebel A, Alemu A. Magnitude and Associated Factors of Neural Tube Defects in Ethiopia: A Systematic Review and Meta-Analysis. *Global pediatric health*. 2020;7:2333794X20939423.
6. Sorri G, Mesfin E. PATTERNS OF NEURAL TUBE DEFECTS AT TWO TEACHING HOSPITALS IN ADDIS ABABA, ETHIOPIA A THREE YEARS RETROSPECTIVE STUDY. *Ethiopian medical journal*. 2015;53(3):119–26.
7. Lassi ZS, Mansoor T, Salam RA, Das JK, Bhutta ZA. Essential pre-pregnancy and pregnancy interventions for improved maternal, newborn and child health. *Reproductive health*. 2014;11 Suppl 1(Suppl 1):S2.
8. Mohammed MA, Bushra AW, Aljadhey HS, Ahmed JH. Supplement Use Among Pregnant Women in Ethiopia: Prevalence and Predictors. *Therapeutic innovation & regulatory science*. 2013;47(4):416–23.
9. Wilson RD, Davies G, Désilets V, Reid GJ, Summers A, Wyatt P, et al. The use of folic acid for the prevention of neural tube defects and other congenital anomalies. *Journal of obstetrics and gynaecology Canada : JOGC = Journal d'obstetrique et gynecologie du Canada : JOGC*. 2003;25(11):959–73.
10. Wilson RD, Wilson RD, Audibert F, Brock JA, Carroll J, Cartier L, et al. Pre-conception Folic Acid and Multivitamin Supplementation for the Primary and Secondary Prevention of Neural Tube Defects and Other Folic Acid-Sensitive Congenital Anomalies. *Journal of obstetrics and gynaecology Canada : JOGC = Journal d'obstetrique et gynecologie du Canada : JOGC*. 2015;37(6):534–52.
11. Wilson RD, O'Connor DL. Guideline No. 427: Folic Acid and Multivitamin Supplementation for Prevention of Folic Acid-Sensitive Congenital Anomalies. *Journal of obstetrics and gynaecology Canada : JOGC = Journal d'obstetrique et gynecologie du Canada : JOGC*. 2022;44(6):707–19 e1.
12. Zhou Q, Dong G, Wang Q, Shen H, Zhang Y, Zhang S, et al. Preconception folic acid supplementation for the prevention of birth defects: a prospective, population-based cohort study in mainland China. *BMC Pregnancy and Childbirth*. 2024;24(1):114.
13. Werler MM, Shapiro S, Mitchell AA. Periconceptional folic acid exposure and risk of occurrent neural tube defects. *Jama*. 1993;269(10):1257–61.
14. Mitchell A, Pearce R. Prescribing practice: an overview of the principles. *British journal of nursing (Mark Allen Publishing)*. 2021;30(17):1016–22.
15. Khobrani M, Vasudevan R, Kandasamy G, Gramish JA, Prabahar K, Paulsamy P. Evaluation of Health Care Professionals' Knowledge, Attitudes, and Practice to Prevent the Pandemic Spread of COVID-19: A Questionnaire-Based Cross-Sectional Study from Abha, Saudi Arabia. *Healthcare (Basel, Switzerland)*. 2023;11(4).
16. Aravamuthan A, Arputhavanan M, Subramaniam K, Udaya Chander J SJ. Assessment of current prescribing practices using World Health Organization core drug use and complementary indicators in selected rural community pharmacies in Southern India. *Journal of Pharmaceutical Policy and Practice*. 2016;10(1):1.
17. Ojukwu O, Patel D, Stephenson J, Howden B, Shawe J. General practitioners' knowledge, attitudes and views of providing preconception care: a qualitative investigation. *Upsala journal of medical sciences*. 2016;121(4):256–63.
18. Mida LA. Knowledge, attitude and practice of physicians regarding periconceptional folic acid: Université d'Ottawa/University of Ottawa; 2020.
19. Mida LA, Della Zazzera V, Fontaine-Bisson B. Knowledge, attitude and practice of physicians regarding periconceptional folic acid for women at low risk of a neural tube defect affected pregnancy. *Preventive Medicine Reports*. 2021;22:101327.

EXPLORING THE SOCIOECONOMIC EFFECTS OF ADOLESCENT MOTHERHOOD: LIVED EXPERIENCES FROM MUTUNDA SUB-COUNTY, KIRYANDONGO DISTRICT, UGANDA

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ABSTRACT

BACKGROUND: Adolescent motherhood is a global public health concern due to its detrimental impact on mothers, children, and society as a whole. In Uganda, Adolescent motherhood is evident, with a significant 25% of women delivering babies before they turn 18 years old.

METHODOLOGY: Founded on a phenomenological perspective, this qualitative study used in-depth interview method. Twenty adolescent mothers aged 19 and younger selected using the snowball sampling technique were interviewed. The snowball sampling was chosen due to its importance in overcoming barriers of access, trust, and stigma, allowing researchers to gather valuable qualitative data from a population that would otherwise remain largely unheard. Eight key informants selected from the community that had in-depth knowledge about the research topic were interviewed. The data collected was transcribed verbatim and presented thematically.

RESULTS: This study found Adolescent motherhood caused a cycle of disadvantage. All school dropout due to financial strain and stigma, leading to shattered career dreams. These young mothers also experienced poorer physical health and emotional distress, with limited access to resources like healthcare and nutritious food further impacting their well-being.

CONCLUSION: Adolescent motherhood led to school dropout, limited healthcare access, and low-paying jobs, highlighting the need for programs to support education, healthcare, and economic opportunities for these young mothers. This cycle of social and economic disadvantage can be broken with interventions that empower adolescent mothers to build a brighter future for themselves and their children.

KEY WORDS: Adolescent Motherhood, Education, Health, Access to Resources

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BACKGROUND

Adolescent motherhood (AM) affects 21 million girls globally, with 55% of pregnancies unintended¹. This crisis fuels a cycle of disadvantage marked by violence, stigma, and limited education², hindering progress on poverty, health, and education (SDGs 1, 3, 4, 3). Health complications further impede women's empowerment (SDG 5)⁴. In Africa, AM is a major barrier to human capital development, increasing school dropout and limiting job opportunities^{5, 6}. Its impact extends beyond individuals to households, communities, and nations⁷. Additionally, AM is associated with significant health risks, including HIV/AIDS, mental health issues, and vulnerability to abuse^{8, 9}.

Uganda faces a significant AM crisis, with 25% of women giving birth before 18^{10, 11}. This rate is increasing, rising from 71.5 births per 1,000 adolescents in 2006 to 83.5 in 2011¹². Lira District has an alarming 49.3% birth rate for teenage mothers in 2020¹¹. COVID-19 exacerbated the problem, pushing the national rate to 28%. Busoga has the highest number of teen mothers, with 45% under 17, followed by Mukono, Wakiso, Kampala, Kasese, and Oyam¹¹. Ugandan young mothers face a poverty cycle: 66% lack primary education, leading to limited jobs (5% formal, 45% subsistence)^{13,14}. This strains government resources, requiring over Ug.Shs. 645 billion equivalent to USD 181.8 million) for healthcare and education. Mothers suffer from poor social and economic outcomes, low education, and limited healthcare¹⁴. Despite the existence of legal protections (e.g., Education for All and Convention on the Rights of the Child), AM remains a major challenge in Uganda¹⁴. Policies such as "Education for All" directly support Sustainable Development Goals (SDGs) 1 (No Poverty), 3 (Good Health and Well-being), and 4 (Quality Education). These policies are meant to reduce poverty through improved opportunities, enhance health outcomes through increased awareness and access to services, and directly contribute to achieving inclusive and equitable quality education.

Unfortunately, Kiryandongo General Hospital data (2018-2022: 1735 to 4298 cases) and Mutunda Sub-County (3,372 cases: 2018-2022) reveal fluctuating and high AM rates¹⁵.

Non-governmental organization programs in Mutunda focused on child protection, sexuality education, and parental awareness¹⁵, while the Ministry of Education and Sports provided guidelines for preventing and managing adolescent pregnancy, including re-entry policies¹⁶. Despite these interventions, adolescent motherhood persisted and negatively affected young mothers' social and economic well-being. This study investigated the socio-economic consequences of adolescent motherhood (AM) within Mutunda Sub-County, Kiryandongo District, Uganda. Specifically, the research examined the structural impacts of early childbearing on young mothers' educational attainment, health outcomes, and resource accessibility. By critically evaluating these dynamics, the study aimed to provide a nuanced, empirical understanding of how adolescent motherhood alters a young woman's societal and economic status. Finally, these findings are intended to inform context-specific policy interventions, targeted public health programs, and inclusive educational initiatives.

Methodology

To explore the social and economic impacts of AM, this study employed a phenomenological qualitative research design due to its unique ability to delve into the lived experiences of individuals regarding a specific challenge like health, education and access to resources. In the context of adolescent motherhood in Mutunda Sub-County, this design would allow researchers to understand the social and economic impacts not just through statistics, but through the actual experiences, perceptions, and meanings attributed to these experiences by the young mothers themselves. Adolescent mothers who became pregnant while in school were included and interviewed for participation while those who

got pregnant while out of school were excluded from the study. In-depth interview method was used to gather information about adolescent mothers' beliefs, perceptions, feelings experiences and convictions towards the experienced effects of AM towards their education, health and access to resources^{16, 17}. Qualitative approach, guided by the transitions theory¹⁸ and snow ball sampling¹⁹ were used to conduct in-depth interviews from 20 AM who gave birth between 2018 and 2022 while still in school.

This study employed thematic analysis, a preferred qualitative method for closely identifying recurring themes, ideas, and patterns of meaning within participant discussions²⁰. This approach facilitated the extraction of participants' views, opinions, and experiences from the qualitative data through familiarization, coding, and theme generation. The sample size of 24 was determined based on the principles of data saturation within qualitative research, particularly for a phenomenological study aiming to explore the lived experiences of adolescent mothers in Mutunda Sub-County. Data saturation is reached when the collection of new data no longer yields additional insights or themes relevant to the research questions²¹. Therefore the sample size for the study was 24. Eight key informants provided in-depth, insightful and detailed information towards the study and they included; school heads, a community development officer, healthcare providers, and local leaders were interviewed. The collected data was then transcribed verbatim, coded, interpreted, and analyzed thematically for presentation.

Ethical Considerations

Ethical approval was granted by the Directorate of Research and Graduate Training, Kyambogo University (Ref: DRGT/21/U/GMADS/14225/PE-31-07-203) and Local Council Leader in Mutundwe Subcounty. Participants were assigned anonymous identifiers to protect their privacy. Written consent and assent were obtained from

adolescent mothers and parents where the adolescent mother was below 19.

RESULTS

The study included 24 adolescent mothers and 8 key informants from Mutunda Sub-County, Kiryandongo District, Uganda. Most adolescent mothers were 19 years old (33%), had become mothers at 15–16 years of age (38% each), had attained primary-level education, and were never married (63%). The key informants comprised head teachers, health professionals, local government officials, and community leaders from the Diima and Nyamahasa parishes, providing diverse perspectives on adolescent motherhood.

Table 1: Demographic characteristics of Adolescent Mothers in Mutunda Sub-County Kiryandongo District- Uganda

Demographic characteristics	Category	Frequency	Percentages
Current Age	15	1	4 %
	16	6	25%
	17	6	25%
	18	3	13%
	19	8	33%
Age at motherhood	13	1	4%
	14	2	8%
	15	9	38%
	16	9	38%
	17	3	13%
Education	Primary 4	5	21%
	Primary 5	9	38%
	Primary 6	3	13%
	Primary 7	4	16%
	Senior 1	1	4%
	Senior 2	1	4%
Marital status	Senior 4	1	4%
	Married	6	26%
	Separated	3	13%
	Never married	15	63%

Source: Extracted from Primary Data 2023

Table 2: Demographic characteristics of Key Informants in Mutunda Sub-County Kiryandongo District- Uganda

S/N	KI Category	Frequency	Gender	Parish
1	Head teacher Nyabwengi Primary school	1	Female	Nyamahasa
2	Head teacher Diima Primary school	1	Female	Diima
3	Midwife	1	Female	Diima
4	Incharge Mutunda health center	1	Male	Diima
5	Secretary Women Affairs	1	Female	Nyamahasa
6	Parish Chief	1	Male	Diima
7	Community Development Officer(CDO)	1	Male	Diima
8	Local Council 1	1	Male	Nyamahasa

Source: Extracted from Primary Data 2023

Table 3: Study Themes and Subthemes in Mutunda Sub-County Kiryandongo District- Uganda

The findings of the study are presented and discussed according to the following themes and sub-themes

Themes	Subthemes	Implications
Thematic1:Experienced effects of AM on education	Effects of AM on Education	• Low educational attainment • School dropout
	Career Aspiration of AM	• Hairdresser • Teacher • Nurse • Fashion and design • Welder
Thematic2:Experienced Effects of AM on Health	Mode of delivery	• Natural childbirth. • Cesarean section
	Feelings about motherhood	• Thrilled • Sad • Ambivalence
	Effects of AM on Heath	• Social stigma
	Poor physical health	• Back and lower abdominal pain • Blood clots • Retained placenta • Eclampsia
Thematic 3: Access to Resources by AMs	Current economic activities	• Agriculture • Making snacks
	Experienced effect on resources accessibility	• Limited access to finances • Limited access to food • Limited access to health services
	Support received	• Fathers to children support • No support received • Support from relatives
	Support required to increase resource accessibility	• Financial support • Equip and stock health centres

Theme 1: Experienced Effects of AM on Education in Mutunda Sub-County Kiryandongo District- Uganda

Data from the study reveals a concerning trend: all 20 young mothers in the study left school early with limited education, effectively halting their career aspirations. Notably, 6 dreamt of becoming hairdressers, 5 teachers, 3 nurses, 6 aimed for fashion and design, and 1 for welding, highlighting the diverse paths motherhood cut short.

Table 4: Experienced effects of AM on education in Mutunda Sub-County Kiryandongo District- Uganda

Main Theme: Experienced Effects of AM on Education	Education and career Implications on AM	Frequency
Effects of AM on Education	Low educational attainment	20
	School dropout	20
Career Aspiration of AM	Hairdresser	6
	Teacher	5
	Nurse	3
	Fashion and design	6
	Welder	1

Source: Primary Data, 2023

Data from Table 3 indicates all participants' left formal education at a young age. None returned after childbirth, effectively ending their formal education. While some considered vocational training, financial constraints ultimately forced many to abandon their educational aspirations entirely.

Early pregnancy forced all AM to drop out of school

I got pregnant at Kakwokwo Primary School, I did not collect Primary Leaving Examination results, I didn't bother knowing how I performed. e being in school. [17 years, married Primary 7].

I became pregnant in 1st term of S1 holidays. I went back to school for 2nd term, I became sickly and later the school nurse checked and found that I was pregnant and I was expelled and faced parental disapproval. That marked the end of me being in school. [18 years, never married, and senior 1].

Overwhelmed by childcare, all adolescent mothers in the study faced a triple threat to returning to school: poverty, stigma, and an ineffective re-entry program. This, along with disapproval from teachers and the community, shattered their educational and career dreams. Becoming a welder and having a workshop was shattered by early pregnancy. The lack of support from the child's father has led to disappointment and a current situation of staying at home, [18 years, and never married, senior four].

Theme 2: Experienced Effects of AM on Health in Mutunda Sub-County Kiryandongo District- Uganda

The experienced effects of AM on health are presented in table 5 below.

Table 5 Experienced Effects of AM on Health in Mutunda Sub-County Kiryandongo District- Uganda

Main Theme: Experienced effects of am on health	Health Implications	Frequency
Mode of delivery	Vaginal delivery	15
	Cesarean section	9
Feelings about motherhood	Excited and happy	2
	Sad	18
	Mixed feelings	4
	Social stigma	20
Effects of AM on physical health	Back and lower abdominal Pain	18
	Blood clots	2
	Retained placenta	3
	Eclampsia	1

Source: Primary Data, 2023

Table 5 above shows that out of 20 young mothers in the study, fifteen AMs delivered vaginally, with 5 relying on Traditional Birth Attendants (TBAs). One AM who used a TBA reported an unexpected birth before her Expected Delivery Date (EDD).

I was planning to go to hospital a few days to my EDD but surprisingly my labor pains were quick and started a week to my EDD, so when the labor pains intensified my mother called our neighbor that helps deliver children. I only went to the hospital when I took the baby for immunization.

[16 years, never married Primary 6].

The study found teenage mothers faced difficulties during childbirth. Some had vaginal deliveries with tearing and pain, while others had C-sections, often after prenatal care outside the hospital. These risky pregnancies resulted in extra costs for transfers and deliveries, putting financial strain on the mothers. Regardless of delivery method, all the mothers, even the youngest at 15, experienced pain and weakness afterwards.

I delivered at Kiryandongo General Hospital at a young age. The incision caused severe pain and took nine months to heal. Despite needing rest, financial pressure forced me to resume digging for money after only three months.

[15 years, never married Primary 4]."

I was operated from Nyapyeya Hospital and my wound took 3 months to heal. During that time, I was in pain and the anesthesia left my left body paralyzed for over 6 months. [17 years, never married Primary 5]."

Feelings about motherhood

Happiness: Some mothers felt blessed and accomplished.

I feel happy that I have this baby, there are so many people out there who want children but they do not have them. For me God has blessed me with this one.

[16 years, never married Primary 5]."

Sadness: Many felt overwhelmed and lost opportunities due to early pregnancy. Negative experiences with healthcare providers added to their burden.

An unplanned pregnancy led to an unwanted marriage. The desire to escape the situation due to the torture my husband subjected me did not work because I could not leave young child behind. When the child made 3 years, I left the marriage.

[18 years, separated, Primary 7].

Mixed feelings: The study revealed a complex emotional experience for young mothers. While some found motherhood fulfilling and a chance to break the cycle of teen pregnancy for their children, others faced isolation and sadness due to negative treatment from healthcare providers during critical visits.

Sometimes I am mad at myself because motherhood spoilt my education and yet my friends are still at school, but then sometimes I am also happy when I see my baby. My baby gives me so much joy.

[17 years, married, Primary 5].

I was expelled from school because of this baby and I was very disappointed with myself for having a baby while in school. But every time people carry my baby, they tell me she is beautiful and this makes me happy and proud

[17 years, never married, Primary 5].

Back and lower abdominal pain

Due to prolonged labor, delivery interventions, and stitches, 18 adolescent mothers endured lingering back and abdominal pain, hindering their ability to perform strenuous activities.

After delivery, I had lower abdominal pain that lasted 6 months and it affected my general engagement in activities. I normally gets a burning sensation on my back every time I bend. [17 years, never married, Primary 6].

Key informants revealed that adolescent mothers often suffered persistent back pain due to inadequate postnatal rest and work demands, with some unable to afford prescribed pain medication due to financial limitations or clinic shortages.

Blood clots

Childbirth complications involving blood clots left two mothers in severe postpartum pain, with one, A9, a young mother of two now pregnant again, unable to afford further hospital treatment and resorting to local remedies.

After the birth of my 2nd baby, I was discharged from hospital but little did I know that I had blood clots. I felt horrible pain not until my mother-in-law got for me some local herbs to expel the clots from my womb.
[19 years, married, Primary 4].

The study revealed three cases of retained placenta, a complication where the placenta doesn't deliver naturally after childbirth. One such case involved a 17 year-old, whose baby is now 18 months old.

I was over bleeding after giving birth and the placenta had also refused to come out, this resulted into serious unbearable pain and I blacked out only for me to find myself re-admitted into hospital.
[17 years, never married, Primary 5].

Another AM aged 18 had endured a painful manual placenta removal and stitches after a difficult delivery at just 16, highlighting the physical challenges faced by these young mothers.

Eclampsia. One adolescent mother aged 19 years, shared a frightening experience of developing eclampsia after childbirth, a condition requiring immediate hospitalization.

My vaginal delivery required stitches, but the pain worsened with fevers and convulsions. Both me and my baby developed health complications, requiring a weeklong hospital stay - a truly awful experience.
[19 years, married, Primary 5].

Social stigma

The study found early motherhood in Uganda burdens young mothers with stigma, isolation, and mental/emotional strain due to childcare stress, gossip, and frequent abandonment.

Public shaming for having some child young has led to friend isolation and constant stress.
[18 years, married, Primary 7].

I feeling isolated and judged. Villagers won't let their kids near me, fearing I'll influence them to get pregnant, and my friends mock me for being a young mom,
[18 years, separated, Primary 5].

Theme 3: Access to Resources by Adolescent Mothers in Mutunda Sub-county Kiryandongo District- Uganda

Access to resources by AMs in presented in table 6 below.

Table 6: Access to Resources by Adolescent Mothers in Mutunda Sub-county Kiryandongo District- Uganda

Main Theme: Access to Resources by AM	Implications	Frequency
Current economic activities	Agriculture	18
	Snack-based small business	2
Experienced effect on resources accessibility	Limited access to finances	20
	Limited access to food	20
	Limited access to health services	20
Support received	Father's children support	7
	No support received	8
	Support from relatives	9
Support required to increase resource accessibility	Financial support	20
	Equip and stock health Centres	4

Source: Primary Data, 2023

Current economic activity

This study revealed that the 20 adolescent mothers were currently engaged into two economic activities that is small scale agriculture and making of snacks.

Agriculture

The study revealed that 18 adolescent mothers resorted to low-paying agricultural labor (weeding/ tilling) to support themselves and their children. Their earnings (Ushs. 1,000-5,000) covered basic necessities, with some relying on parents' gardens for additional food.

I cultivate people’s gardens where I earn just Ushs 1000 from it. I use this money to buy medicine and mukene for us to eat. This money is very little to satisfy all my needs. [18 years, separated, Primary 5].

Despite low-paid agricultural work (Ushs. 1,000-5,000), some Ugandan teen mothers struggled financially. Married teens faced an even greater burden, as partners controlled family garden income, limiting their financial autonomy.

My husband and I have gardens where we grow food crops. I do most of the garden work but whenever I sell produce from the garden, my husband collects all the money and I have no choice over it. I am unable to get proper health care for myself and the baby. [18 years, married, Primary 4].

Making and selling of snacks

The study also identified two adolescent mothers who found additional income by making and selling snacks like "mandaaazi" and pancakes during school breaks and at the local trading center in the evenings.

I am staying with my aged grandmother because I separated with the father of my child. I work extra hard to provide for our household. After birth, I started frying pancakes and it earns me a profit of about Ushs. 2000 (Two thousand shillings). [18 years, married, Primary 7].

I fry mandaaazi which I sell to school children and it earns me shs 4000 profit on sale. I save part of the money and use the rest to take care of myself and the baby. [18 years, never married, Senior 4].

Resource Accessibility

This study results reveal that adolescent motherhood adversely affected the manner in which the bearer’s accessed resources of finances, food and health services and many had been either cut off or having it very difficult to access the resources.

Limited access to finances

This study revealed that adolescent motherhood significantly restricted access to resources, as demonstrated in Table 5. Young mothers relied on low-paid agricultural labor (Ushs. 1,000-5,000 per job), barely affording basic necessities. Financial dependence also led to domestic violence for some, like an 18-year-old AM faced abuse for refusing to hand over earnings to her husband.

My husband takes away all the money I make and might only give me a small proportion of it or sometimes none and yet I toil so hard to get this money so that I address my personal needs. [18 years, married, Primary 7].

Limited access to food

The study found that 18 AM faced food insecurity and malnutrition (Table 5). With little control over household food (frequency and quality). The frequency of meals and meal type eaten largely depended on the decisions made by the head of household where AM lived. Some mothers went hungry for days, impacting their health and their children's well-being. These children solely relied on breast milk and lacked access to additional nutritional support.

I have a 4 months old baby I am breastfeeding but I last had a meal 4 days ago, I feel very hungry and sometimes I just survive on roasted maize and water. Such a situation has affected my breast milk production and also made me weak. [17 years, never married, Primary 7].

The study further made it known that some mothers especially those that were married had a choice in determining the food type eaten. This was because their husbands had shunned their responsibilities of providing and fending for their families.

My husband and I have a quarter and acre of land where I grow crops like maize and beans. Sometimes I sell and get money from the crops and I use the money to buy sauce for the family, [18 years, married, Primary 7].

Limited Access to Healthcare Services

A key informant highlighted that adolescent motherhood in Uganda significantly restricted access to reproductive healthcare. Financial constraints often led to home deliveries, while stock shortages at health centers made it difficult to obtain medications and specialized treatments. Additionally, adolescent mothers demonstrated limited knowledge of various sexual reproductive health services, including family planning methods, and were unaware of government-implemented reproductive health programs.

These adolescent mothers lack knowledge and information on reproductive health services and immunization programmes. Family planning services have not found very good reception and so they are not being utilized. [Key Informant, Nyamahasa Parish, 14th August 2023].

Another Key informant confirmed that adolescent mothers did not want to adopt family planning services due to the negative attitudes and perceptions about the family planning services.

The “Alur” community in Mutunda Sub-County does not subscribe to family planning due to the common slogan of produce and fill the world. They also hold a belief that family planning makes people barren so many do not use it. [Key Informant, Nyamahasa Parish, 5th August 2023].

However, earlier engagement and interaction with some AM revealed that adolescent mothers faced a lot of hostility from the midwives whenever they went for reproductive health services like antenatal and family planning services.

The nurses are very hostile to me whenever I come for antenatal and they are always blaming me for getting pregnant again when my 1st child is not 2 years yet. [18 years, never married, senior 2].

Support Received

Verdicts from the study elucidated that adolescent mothers got some financial and material support from both the fathers of their children and relatives.

Support from Fathers of the Children

The study revealed that seven adolescent mothers received financial and material support from the fathers of their children. While the support was inconsistent, it provided some assistance with child care expenses. For example, AM aged 19 years, married, and reported receiving financial support from her husband for food and child healthcare.

He gives me money when I ask for it and if there is any medicines to buy for the baby, he goes to the clinic and buys them.

[19years, married, Primary 5].

Support from Relatives

Findings from this study concealed that nine AM often got additional support from their relatives like their parents, siblings and guardians to help them provide for themselves and their children. These mostly gave them financial support to buy medicines from the children, buy food and as well buy clothes for the children.

My mother has been supportive from the time I gave birth. She is the one that buys for my baby cloths and when he is sick, she takes him to the hospital.

[15years, never married, Primary 4].

It is my grandmother that gives me money to buy clothes for the baby and myself. And when we are sick, my grandmother pays the money at the clinic.

[19 years, never married, Primary 7].

No Support Received

Eight AM in this study revealed that they did not receive any support from the fathers of their children as they had been abandoned and neglected. Failure to get any kind of support from them implied that they were solely responsible for the welfare of themselves and the children.

The father to my baby got me pregnant and ran away to live with his relatives in Gulu district. He has never sent me any money or even come to see his baby who is now 9 months old” revealed.

[19 years, never married, Primary 7].

The 18-year-old reported being abandoned by the father of her child, who had left for West Nile, Uganda.

He abandoned me when I was still pregnant and he went to Nebbi. He has never sent me any kind of support even when I gave birth.

[18 years, never married, senior 2].

Support Required to Increase Resource Accessibility

The AM in the study revealed that they needed financial support, equipment and stocking of health facility in order to increase and widen on their access to resources.

Financial Support

Twenty adolescent mothers sought financial assistance to improve their access to healthcare services, purchase food and clothing for their children, and acquire land for agricultural purposes. A 17 year old AM noted that financial support would help her pay off an outstanding clinic bill.

Right now, my baby is sick and they need Ushs 15,000 (fifteen thousand shillings) for treatment and I have only been able to raise Ushs 5,000 (five thousand shillings). So, if given financial support, I will be able to clear the debt at the clinic.

[17 years, never married, Primary 5].

Adolescent mothers sought financial support to start income-generating activities. They believed that training in various income-generating activities would empower them to become financially independent and plan for their future. They expressed interest in starting small businesses such as roasting maize, making snacks, hair braiding, tailoring, and poultry farming.

Government initiatives like the Parish Development Model (PDM) could support these efforts by providing loans of one million shillings. When AM generate their own income, they could more easily access healthcare services and food without relying on others.

[Key Informant, Diima, Parish, 5th August 2023].

Equip and Stock the Health Centre

The study revealed that twenty AM suggested that the health Centre's should be fully stocked with medicines to ease their access to health. The adolescent mothers said that often times, there was less or no stock of drugs at the hospital.

To supplement this, a KI reported that there was understaffing at the health centre that had only one midwife.

We are understaffed at the health centre since we have only one midwife. Right now, she is also pregnant and weak, she needs extra help. Government should recruit more midwives in the health centre because we have more demand as well.

[Key informant, Diima parish, 15th August 2023].

DISCUSSION

The transition from youth to adulthood is a critical window for human capital accumulation¹⁸, yet adolescent pregnancy inflicts systemic shocks that permanently halt this development¹⁹. Findings reported that trading long-term skill acquisition for immediate livelihood precarity, early childbearing creates an intergenerational poverty trap that diminishes lifetime productivity and relegates young women to marginal, low-skilled labor markets^{20; 21}. This dynamic reflects broader structural inequalities, including rigid gender divisions of labor and restricted social citizenship. These barriers systematically exclude marginalized women from formal development paths²² and impede their reproductive and economic rights²³.

This educational shock highlighted a failure to implement protective frameworks at the local level. As a result, progressive macro-level policies like Uganda's flexible re-entry guidelines become unfulfilled grassroots mandates driven by poverty, social stigma, and institutional exclusion. Across East Africa, local administrators lack the accountability mechanisms and training needed to enforce these policies against deep socio-cultural pressures²⁴. Ultimately, this structural barrier causes severe opportunity deprivation, permanently shifting young women's ambitions toward low-wage survival while peer stigmatization and moralizing school environments restrict long-term literacy and labor market inclusion^{25; 26; 27; 24}.

Parallel to educational deprivation, the physiological and psychological demands on adolescent mothers exposed profound human development failures. Biological immaturity significantly elevated the risk for severe obstetric complications and chronic postpartum morbidities like eclampsia^{28; 29}. At the same time, geographic and financial barriers forced a heavy reliance on non-formal delivery systems due to deep structural gaps in healthcare access. These vulnerabilities manifest as acute physical and psychosocial distress driven by community stigma and institutional hostility^{30, 31, 28, 29}.

Ultimately, postpartum depression was exacerbated by shattered educational aspirations³⁰, while healthcare worker bias acted as a critical deterrent to safe care, reflecting structural obstetric violence that penalizes young, unmarried patients³¹.

These vulnerabilities culminated in acute socioeconomic precarity, forcing young mothers into informal roles that exposed them to immediate food insecurity and malnutrition³². This deprivation was compounded by rigid intra-household power asymmetries and paternal abandonment. These dynamics stripped adolescent mothers of financial autonomy and shifted long-term caretaking burdens onto natal families, creating a classic asset and agency poverty trap^{32; 33; 34}. Ultimately, by treating households as homogenous units, development policies overlooked this internal disenfranchisement, preventing minor mothers from converting their labor into health security and validating feminist economics assertions that unequal resource distribution directly harms maternal and child welfare^{33; 34}.

The study further revealed critical operational and macroeconomic gaps driven by localized policy failures, narrow analytical frameworks, and systemic exclusions within flagship programs like Uganda's PDM. Collectively, these shortcomings overlooked the unique needs of unmarried minor mothers^{31,24}. From a macro-development perspective, adolescent motherhood severely drains national structural potential by halting female education, disrupting the demographic dividend, and trapping the future workforce in low-productivity livelihoods^{19; 32; 21}.

Conclusions and recommendations

The findings showed that adolescent motherhood adversely affected the socioeconomic status of young mothers in Mutunda Sub-County. Unplanned pregnancy and limited educational opportunities contributed to school dropout and poor educational attainment, restricting future employment prospects. Adolescent motherhood also negatively affected the physical and mental health of young mothers, further exacerbating

their socioeconomic disadvantage. The Ministry of Education and Sports should strengthen school re-entry programs and vocational training for adolescent mothers. The Ministry of Health should expand adolescent-friendly reproductive health services and improve access to counseling and contraception. Local government should increase awareness of livelihood support programs, while non-governmental organizations should provide educational, legal, and socioeconomic support. Community-based initiatives should promote positive attitudes and support the reintegration of adolescent mothers into education and society.

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Conflict of interest

The authors declare no conflict of interest

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Authors contributions

KR conceived the research idea, KR, KH & LG formulated the research question and data collection tool, RK collected and analyzed data. KR, KH & LG wrote the manuscript, KH reviewed manuscript. All authors have read and approved the final manuscript for publication.

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REFERENCES

1. World Health Organization. Adolescent pregnancy factsheet. www.who.int/news-room/fact-sheets/detail/adolescent-pregnancy. 2024.
2. Sakakibara K, Murray SM, Arima EG, Ojuka C, FamiliarLopez I. Exploring pregnancy-related stigma experiences among adolescents in rural Uganda. *Journal of Adolescence*. 2024.
3. Toska E, Saal W, Chen Charles J, Wittesaele C, Langwenya N, Jochim J, Steventon Roberts KJ, Anquandah J, Banougnin BH, Laurenzi C, Sherr L. Achieving the health and well-being Sustainable Development Goals among adolescent mothers and their children in South Africa: Cross-sectional analyses of a community-based mixed HIV-status cohort. *Plos one*. 2022 Dec 8;17(12): e0278163.
4. WHO. Addressing the global crisis of child and adolescent mental health. *JAMA pediatrics*. 2021 Nov 1; 175(11):1108-10. 2021
5. Zulaika G, Bulbarelli M, Nyothach E, van Eijk A, Mason L, Fwaya E, Obor D, Kwaro D, Wang D, Mehta SD, Phillips-Howard PA. Impact of COVID-19 lockdowns on adolescent pregnancy and school dropout among secondary schoolgirls in Kenya. *BMJ global health*. 2022 Jan 1; 7(1):e007666.
6. Cluver L, Jochim J, Mapukata Y, Wittesaele C, Shenderovich Y, Mafuya S, Steventon Roberts K, Banougnin B, Sherr L, Toska E. Associations of formal childcare use with health and human capital development for adolescent mothers and their children in South Africa: A cross-sectional study. *Child: care, health and development*. 2024 Jan; 50 (1):e13138.
7. Makhavhu EM, Ramukumba TS, Masala-Chokwe ME. Exploring the Dilemmas, Challenges, and Opportunities of Adolescent Fatherhood: An Exploratory Case Study. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*. 2023 May; 60:00469580221146827.
8. Steventon Roberts K, Smith C, Toska E, Cluver L, Haag K, Wittesaele C, Langwenya N, Jochim J, Saal W, Shenderovich Y, Sherr L. Risk factors for poor mental health among adolescent mothers in South Africa. *Psychology, health & medicine*. 2022 Dec 15; 27(sup1):67-84.
9. Ochieng Arunda M, Agardh A, Larsson M, Asamoah BO. Survival patterns of neonates born to adolescent mothers and the effect of pregnancy intentions and marital status on newborn survival in Kenya, Uganda, and Tanzania, 2014–2016. *Global Health Action*. 2022 Dec 31;15(1):2101731.
10. UBOS. Mutunda (Sub-County, Uganda) - Population Statistics, Charts, Map and Location (citypopulation.de). 2020.
11. UNFPA Uganda. Fact sheet on teenage pregnancy. 2021.
12. Byonanebye J, Brazauskas R, Tumwesigye N, Young S, May T, Cassidy L. Geographic variation and risk factors for teenage pregnancy in Uganda. *African Health Sciences*. 2020 Dec 16;20(4):1898-907.
13. Amongin D, Kågesten A, Tunçalp Ö, Nakimuli A, Nakafeero M, Atuyambe L, Hanson C, Benova L. Later life outcomes of women by adolescent birth history: analysis of the 2016 Uganda Demographic and Health Survey. *BMJ open*. 2021 Feb 1; 11(2):e041545.
14. UNFPA Report. Teenage_Pregnancy.Indd (Unfpa.Org). 2022 /2023.
15. Kiryandongo General Hospital Statistics on adolescent mothers in Kiryandongo District. 2022.
16. Ministry of Education and Sports. Revised guidelines for the prevention and management of teenage pregnancy in Uganda. 2020. <https://www.ungei.org/sites/default/files/2021/02/Revised-Guidelines>
17. Chick N, Meleis AI. Transitions: A nursing concern. PL Chinn (Ed.), *Nursing research methodology: Issues and implementation*. 1986:237-57.18. Hennink, M., & Kaiser, B. N. (2022). Sample sizes for saturation in qualitative research: A systematic review of empirical tests. *Social science & medicine*, 292, 114523.
18. Sen A. *Development as Freedom*. Oxford University Press; 1999.
19. Bergstrom K, Özler B. Improving the well-being of adolescent girls in developing countries. *The World Bank Research Observer*. 2022;38(2):179-212.
20. Senaratne P. Socioeconomic impacts of adolescent pregnancy on education and future employment in Batticaloa District, Sri Lanka. *BMC Women's Health*. 2024; 24 (1):1-12.
21. Smith B, Moore K. Intergenerational transmission of poverty in Sub-Saharan Africa - A select annotated bibliography with special reference to irreversibilities associated with poor nutrition, health and education. *SSRN Electronic Journal*. 2006.
22. Molyneux M. Change and continuity in social protection in Latin America: Mothers at the service of the state?. *Development and Change*. 2007; 37(4):775-809.
23. Maly C. Perceptions of adolescent pregnancy among teenage girls in Rakai, Uganda. *Global Qualitative Nursing Research*. 2017; 4:1-13.
24. Wado YD, Sully EA, Mumah JN. Pregnancy-related school dropout and the barriers to re-entry among adolescent girls in East and Southern Africa. *Studies in Family Planning*. 2022; 53(2):245-267.

25. Acharya DR, Bhattarai R, Poobalan AS, van Teijlingen ER, Chapman G. Factors associated with adolescent pregnancy in Sub-Saharan Africa: A systematic review. *Journal of Public Health*. 2010; 32(4):522-538.
26. Bustos-Gómez M, Santos-Sancho MA, Reguero-Celada M. Impact of adolescent pregnancy on educational pathways and labor market insertion: Evidence from rural Mexico. *International Journal of Educational Development*. 2019; 67:45-53.
27. Omwancha KM. The implementation of the re-entry policy for girls after childbearing in East Africa: Structural barriers and institutional attitudes. *Journal of Educational and Social Research*. 2012; 2 (3):89-101.
28. Neal S, Channon AA, Matthews Z. The impact of adolescent childbearing on long-term maternal physical health and chronic morbidity in low-income settings. *BMC Pregnancy and Childbirth*. 2018; 18 (1):1-12.
29. Nove A, Matthews Z, Neal S, Camacho AV. Maternal mortality in adolescents compared with women of other ages: Evidence from 144 countries. *The Lancet Global Health*. 2014;2(3):e155-e164.
30. Govender K, Cowden RG, Wong EB, George G. Psychosocial well-being and mental health outcomes among adolescent mothers in resource-constrained environments. *Social Science & Medicine*. 2020; 258:113098.
31. Kaye DK, Kakaire O, Osinde MO, Nakimuli A. The nature and structural drivers of obstetric violence and hostile maternal care in Ugandan health facilities. *International Journal of Gynecology & Obstetrics*. 2014; 126(3):210-213.
32. Birdthistle I, Floyd S, Machingura A, Mudziwapasi N, Glynn JR. From education to economic empowerment: Protecting adolescent girls from HIV and early pregnancy. *The Lancet Global Health*. 2016;4 (11):e812-e822.
33. Duflo E. Women empowerment and economic development. *Journal of Economic Literature*. 2012; 50 (4):1051-1079.
34. Klasen S. Intra-household allocation, gender relations, and micro-economic precarity in Sub-Saharan Africa. *World Development*. 2018; 105:321-334.

CERVICAL CANCER SCREENING UPTAKE AND ITS ASSOCIATED FACTORS AMONG REPRODUCTIVE AGE WOMEN IN JIMMA TOWN: A COMMUNITY BASED CROSS-SECTIONAL STUDY

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ABSTRACT

OBJECTIVE: This study assessed cervical cancer screening uptake and its associated factors among reproductive-age women in Jimma town.

METHODS: A community-based cross-sectional study was conducted in Jimma town among randomly selected 905 reproductive-age women. Data were collected using face-to-face interviews using a structured questionnaire. Descriptive summaries of data were done using descriptive statistics. Binary logistic regression was used for the analytical study. Adjusted odds ratio and 95% confidence interval were respectively used to measure statistical associations and their statistical significance.

RESULTS: From total of 905 women participated 83 (9.2%) women had ever been tested for cervical cancer. Being head of household (OR= 2.19, 95%CI; 1.38, 3.47), making decision autonomously (OR = 2.31, 95%CI;1.24, 4.30), good knowledge of cervical cancer (OR= 4.12, 95%CI; 2.41, 7.03), favorite attitude towards cervical cancer screening (OR= 6.10, 95%CI; 3.05, 12.18), and awareness on HIV self-status (OR = 3.57, 95%CI;1.57, 8.14) were factors positively associated with uptake of the screening. But, lack of accessibility to media like radio, television and etc. and lack of formal education were negatively associated with uptake of cervical cancer screening.

CONCLUSION: The rate of cervical cancer screening uptake from the current study is low. Streamlining and strengthening curriculum integration and extracurricular health education intervention on cervical cancer giving due emphasis using media like radio, television, mobile applications are recommended and increasing coverage of health education to promote cervical cancer screening.

KEY WORDS: Cervical cancer, screening, uptake, women, Ethiopia

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INTRODUCTION

Cervical cancer is a preventable and curable disease as long as it is detected early and managed effectively, however, it is yet the fourth most common cancer among women globally, with an estimated 604,000 new cases and 342,000 deaths in 2020¹⁻⁴.

The annual number of new cases of cervical cancer has been projected to increase from 570 000 to 700 000 between 2018 and 2030, with the annual number of deaths projected to increase from 311 000 to 400 000³. In the year 2020, globally, about 90% of the new cases of cervical cancer and deaths occurred in low- and middle-income countries^{1,4,5}. The systematic review and meta-analysis done in Ethiopia showed that the pooled prevalence of cervical cancer among women in Ethiopia is 13.4%⁶. The other cross-sectional study which was done among women who attended cervical cancer screening at Ghandhi Memorial Hospital, Ethiopia showed that 23.5% of the screened women were found positive for VIA test⁷. Despite these impacts, cervical cancer screening rates remain low, particularly in sub-Saharan Africa. In Ethiopia, the 2020 HSTP-I report indicated a screening rate of just 5%, with other studies showing a range from 2.5% to 38.7%⁸. “Screen-and-test” approach is an alternative method to swiftly decide on cervical cancer treatment instead of using the standard sequence of cytology, colposcopy, biopsy, and histological confirmation of CIN. The available screening tests include a human papillomavirus (HPV) test, visual inspection with acetic acid (VIA), and cytology (Pap test)^{1,5,8}. Two human papillomavirus (HPV) types (16 and 18) are responsible for nearly 50% of high-grade cervical pre-cancers. HPV is mainly transmitted through sexual contact and most people are infected with HPV shortly after the onset of sexual activity. Vaccination against HPV and screening and treatment of pre-cancer lesions is a cost-effective way to prevent cervical cancer^{1,5}. Even though cervical cancer screening test is an available alternative method to initiate early prevention and control of the disease, as to the best knowledge of the investigators, the proportion

of reproductive-age women utilizing the screening service and its associated factors are not well studied among reproductive-age women in Jimma town and there is a dearth of information at the national level. Therefore, the current study is aimed to investigate the cervical cancer screening uptake and its associated factors among reproductive-age women in Jimma town.

Methods

Study setting and period

The study was conducted in Jimma town from January 01-30, 2021. Jimma town is found in the Southwest of Ethiopia at 354 km from Addis Ababa, the Capital city of the country. According to the information from the population projection of the 2007 Population and Housing Census of Ethiopia, the town has 50286 households and a total population of 241, 372, of which 121, 362 are females⁹. There are 53,416 reproductive-age women in the town. According to the information from the town health office, Jimma town has 14 government health facilities: 2 hospitals, 4 health centers, and 8 health posts. The town has also 3 private hospitals and 37 private medium clinics. Currently, cervical cancer screening is being given at two governmental hospitals, four governmental health centers, three private hospitals, and four private medium clinics in the town.

Methodology

Study design and population

A community-based cross-sectional study was conducted among randomly selected reproductive-age women living in Jimma town.

Sample size determination and sampling techniques

The sample size was calculated using a single population proportion following assumptions: 95% two-sided confidence interval, 38.1% proportion of cervical cancer screening uptake among reproductive-age women from the study done in the Northern Ethiopia¹⁰, 4% margin of error, and a 10% non-response rate.

$$n = \frac{(Z_{\alpha/2})^2 pq}{d^2} * DEFF \quad n = \frac{(1.96_{\alpha/2})^2 (0.381 * 0.619)}{(0.04)^2} * 1.5 \sim 850$$

Then, by adding a 10% non-response rate, the final sample size will be 935 reproductive-age women.

Four Gendas (the lowest administrative unit) were randomly selected from the thirteen Gendas (kebele) in the Jimma town by proportionally allocating among selected Gendas based on the number of households. Systematic random sampling was used to select households from each Genda. The lottery method was used to select a single reproductive-age woman where there are two or more than two reproductive-age women in a single household.

Eligibility criteria

Inclusion criteria

- All women above 30-49 years old
- Women who had lived at least 6 months in the town

Exclusion criteria

- Women who couldn't give written consent having severe illness

Data collection procedure (Instrument, personnel, data collection technique)

Data were collected using a structured interviewer-administered questionnaire that was adopted from similar literature^{10,12-16}. The questionnaire has three major parts which comprise socio-demographic related, individual and behavioral related, and medical and obstetric related questions. Eight diploma nurses collected the data and two BSc nurses supervised the overall data collection process.

Operational Definition

Knowledge about cervical cancer and screening:

15 knowledge questions were used and correct answers were categorized as 1 while incorrect answers were categorized as 0. The total point scored was 15 and the minimum was 0. Then, the scores with their respective knowledge levels were 12-15 good knowledge, 8-11 satisfactory knowledge, 0-7 poor knowledge

Attitude towards cervical cancer and screening:

we assessed the attitude using a Likert scale. The scoring system used was: strongly disagree =1, disagree=2, indifferent=3, agree= 4, strongly agree=5. The responses were summed and a total score was obtained. Then we calculated the mean score. Those who scored the mean score and above were considered as having a favorite attitude, whereas those the women who scored below the mean score were categorized as unfavorable attitudes towards cervical cancer screening

Data quality control measures

The data collection tools were translated to the local languages (Afan Oromo and Amharic) to ensure the full comprehension of the questionnaire by the study participants. Data collection tools were pre-tested on 47 (5% of the total sample size) reproductive-age women in Agaro town which is located 45 km away from Jimma town in the Southwest. The data collection tools were modified based on the pre-testing results. A two-day intensive training was given to the data collectors and supervisors on the aim of the study, data collection tools, and ethical issues. The supervisors checked for data completeness and consistency daily on data collection dates.

Data processing and analysis plan

The collected data were checked for completeness and consistency, and coded manually. Data were entered using Epi-data manager software version 4.1, and exported to the SPSS Software version 26 for data processing and analyses. Descriptive studies were done to summarize descriptive data. Binary logistic regression was used to assess statistical associations between the dependent and independent variables. During the bivariate analysis, variables with a p-value <0.25 were considered as candidate variables for the multivariable logistic regression. Multicollinearity between the independent variables was tested using variable inflation factor (VIF) before fitting the final model. Multivariable logistic regression was fitted to identify independent predictors of cervical cancer

screening uptake and to control for confounders. Adjusted odds ratio and 95% CI were respectively calculated to assess statistical associations and their statistical significance in the final model.

Results

Socio-demographic Characteristics

Nine hundred five (905) reproductive-age women participated in the study making the response rate 96.79%. The mean age of the study participants was 33.59 years with a standard deviation of + 7.08 years.

More than one-fifth (22.4%) of the participants are in the age group of 30-34 years. The majority, 382(42.2%) of the study participants are Orthodox Christianity followers followed by Muslim, 295 (32.6%). Nearly one in ten, 95 (10.5%) women have no formal education, and nearly one-third, 305 (33.7%) of the women are housewives (Table 1)

Table 1: Socio-demographic Characteristics of reproductive-age women in Jimma town

Variable	Categories	Frequency	Percentage
Age	<24	193	21.3
	30-34	203	22.4
	25-29	103	11.4
	35-39	189	20.9
	40-44	131	14.5
	45-49	86	9.5
	Total	905	100.0
Religion	Orthodox	382	42.2
	Protestant	198	21.9
	Catholic	30	3.3
	Muslim	295	32.6
	Total	905	100.0
Marital status	single	71	7.8
	married	700	77.3
	divorced	56	6.2
	widow	54	6.0
	separated	24	2.7
	Total	905	100.0
Educational status	Can't read and write	95	10.5
	primary	235	26.0
	secondary	229	25.3
	technical/vocational	191	21.1
	higher	155	17.1
	Total	905	100.0
Occupation	Government employee	254	28.1
	Farmer	14	1.5
	Non-government employee	80	8.8
	Merchant	110	12.2
	House wife	305	33.7
	Daily Laborers	142	15.7
	Total	905	100.0

Cervical Cancer Screening Uptake

Of the total 905 (100%) women who participated in the study, 83 (9.2%) had ever been screened for cervical cancer. Among women ever screened for cervical cancer, 56 (67.5%) were screened five years before the research done, and 1(1.2%) was screened positive for cervical lesion (Table 2

Table 2: Cervical Cancer Screening Uptake among Reproductive-age women in Jimma Town

Variable	Categories	Frequency	Percentage
Ever been screened for cervical cancer	Yes	83	9.2
	No	822	90.8
	Total	905	100.0
The last time screened for cervical cancer	Within the past 3 years	27	32.5
	More than 5 years ago	56	67.5
	Total	83	100.0
Test result of the screening among screened	Positive	1	1.2
	Negative	82	98.8
	Total	83	100.0

Factors associated with cervical cancer screening uptake

There are several factors identified having statistically significant association in increasing the uptake of cervical screening at Jimma city. The odds of cervical cancer screening uptake was high among woman who are employed, the head of household, making decisions autonomy, using social media, having good knowledge and attitude towards screening, know their HIV status, and dwelling near health institution (Table 3).

Table 3: Factors associated with cervical cancer screening among reproductive-age women

Variable	Categories	Cervical Cancer Screening Uptake		AOR (95 % CI)	P Value
		Yes (%)	No (%)		
Educational status	Uneducated	3 (3.2%)	92 (96.8%)	0.20 (0.06,0.64)	0.005*
	Primary	24 (10.2%)	211 (89.8%)	0.69 (0.37,1.27)	0.23
	Secondary	17 (7.4%)	212 (92.6%)	0.49 (0.25,0.94)	0.03*
	Technical	17 (8.9%)	174 (91.1%)	0.59 (0.30,1.15)	0.12
	Higher	22 (14.2%)	133 (85.8%)	1	
Occupation	Government employee	28 (11.0%)	226 (89.0%)	4.27(1.53, 11.91)	0.004*
	Nongovernment employee	15 (16%)	79 (84%)	6.55 (2.30, 19.42)	0.0003*
	Merchant	16 (14.5%)	94 (85.5%)	5.87 (1.99, 17.24)	0.001*
	House wife	20 (6.6%)	285 (93.4%)	2.42 (.85, 6.89)	0.10
	Daily L	4 (2.8%)	138 (97.2%)	1	
Head of Household	Yes	34 (14.7%)	198 (85.3%)	2.19 (1.38, 3.47)	0.001*
	No	49 (7.3%)	624 (92.7%)	1	
Family size	<5	27 (7.2%)	347 (92.8%)	0.66 (.41, 1.06)	0.09
	>=5	56 (10.5%)	475 (89.5%)	1	
Woman decision making autonomy	Yes	71 (10.7%)	591 (89.3%)	2.31 (1.24, 4.30)	0.008*
	No	12 (4.9%)	231 (95.1%)	1	
Reading newspaper	More than 1/week	54 (15.2%)	302 (84.8%)	4.30 (2.51, 7.36)	0.000*
	Once a week	10 (13.7%)	63 (86.3%)	3.82 (1.73, 8.45)	0.001*
	not at all	19 (4.0%)	457 (96.0%)	1	
Listening to radio	More than 1/week	65 (13.9%)	403 (86.1%)	5.52 (2.74, 11.10)	0.000*
	Once a week	9 (7.5%)	111 (92.5%)	2.77 (1.11, 6.97)	0.03*
	Not at all	9 (2.8%)	308 (97.2%)	1	
Watching television	More than 1/week	79 (10.2%)	694 (89.8%)	3.60 (1.18, 10.10)	0.02*
	Once a week	1 (2.9%)	33 (97.1%)	0.96 (0.0, 7.02)	0.97
	Not at all	3 (3.1%)	95 (96.9%)	1	
Owning mobile	Yes	81(10.2%)	712 (89.8%)	6.26 (1.67,)	0.004*
	No	2 (1.8%)	110 (98.2%)	1	
Using internet	Yes	56 (12.5%)	393 (87.5%)	2.26 (1.41, 3.64)	0.001*
	No	27 (5.9%)	429 (94.1%)	1	
Distance from health facility	<30 minutes	46 (12.7%)	315 (87.3%)	2.00 (1.27, 3.15)	0.002*
	>= 30 minutes	37 (6.8%)	507 (93.2%)	1	
Knowledge of cervical cancer	Good knowledge	65 (14.5%)	384 (85.5%)	4.12 (2.41, 7.03)	0.000*
	Poor knowledge	18 (3.9%)	438 (96.1%)	1	
Attitude towards cervical cancer	Favorite attitude	74 (13.6%)	472 (86.4%)	6.10 (3.05, 12.18)	0.000*
	Unfavorite attitude	9 (2.5%)	350 (97.5%)	1	
Family History of Cervical Cancer	Yes	8 (11.8%)	60 (88.2%)	1.35 (0.63, 2.90)	0.44
	No	75 (9.0%)	762 (91.0%)	1	
Awareness on HIV self-status	No	6 (3.2%)	179 (96.8%)	1	
	Yes	77 (10.7%)	643(89.3%)	3.57 (1.57, 8.14)	0.002*

DISCUSSION

The current study revealed that out of the total 905 reproductive-age women who participated in the study 9.2% women had ever been screened for cervical cancer. This result is consistent with the finding from the study done in the Western Oromia region, Ethiopia (8.7%)¹³. The magnitude of cervical cancer screening uptake among reproductive-age women from the current study is far below the findings from similar studies done in Jordan (31.2%)¹⁷, Ghana (24.6%)¹⁸, Mekelle (19.8%) and Adigrat town (38.1%) of Tigray region, Ethiopia^{10,14}, Sidama Zone, Southern Ethiopia (17.8%)¹⁹, and North Shoa, Ethiopia (21.2%)²⁰. However, the result is higher than the findings from the studies done in Uganda (4.8%)²¹, Tanzania (7.9%)²², and Southwestern Ethiopia (7.3%)²³. The discrepancies might be due to differences in access to maternal health care services in the different geographical locations. Studies have shown that there are inter-countries variations and inequalities in access and utilization of maternal, newborn, and child health services in sub-Saharan Africa and need context-specific intervention programs^{24,25}. Besides, the study done in Ethiopia also portrayed that there is huge disparities in utilizing maternal health care services in Ethiopia and more attention is needed for Afar, Somali, and Oromia regions to sustain the progress equally²⁶.

The current study also depicted that different factors are significantly associated with the uptake of cervical cancer screening. The odds of cervical cancer screening uptake among are different in this study done on reproductive-age women even though there is no proven causative relationship. This finding is supported by different studies. The study done in Kenya using the secondary data analysis of the 2014 Kenya demographic and health survey (2014 KDHS) showed that Christian women had higher odds of being screened than Muslim women²⁷. The study done in Chicago also showed that American Muslim women had lower odds of cervical cancer screening uptake due

to their beliefs that diseases are manifestations of punishments from God²⁸. Similarly, the study done in Southern Ghana²⁹ and Canada¹⁵ showed that Islamic modesty and commitment to the Islamic faith, and being born in a Muslim majority community are associated with decreased odds of cervical cancer screening uptake. This might be due to differences in religion-related dogma and needs further qualitative exploration.

The current study also evidenced that being a head of a household was positively associated with the uptake of cervical cancer screening: a woman who is a head of a household was 2 times high likely to uptake cervical cancer screening as compared to a woman who is not a head of a household. The possible explanation for this can be the lack of autonomy or the diminished autonomy of the women who are not the head of a household to decide on their maternal healthcare services utilization. The study done using Secondary data from the Demographic and Health Surveys of six Sub-Saharan African countries showed that the odds of cervical cancer screening uptake was highest among women who made healthcare decision alone³¹. Similarly, many other studies have witnessed that women who have decision-making autonomy had higher odds of maternal healthcare services utilization³²⁻³⁵.

A woman's knowledge of cervical cancer was also significantly associated to cervical cancer screening uptake having odds of 4 times than a woman who has poor knowledge of cervical cancer. This result is concordant with the findings from many other similar studies. The studies from Ghana^{18,29}, Tanzania²², Nigeria³⁶, and Loa People's Democratic Republic³⁷ depicted that having knowledge of cervical cancer is significantly associated with increased odds of cervical cancer screening uptake. The different studies done in Ethiopia also showed that women who have higher knowledge of cervical cancer had higher odds of cervical cancer screening uptake as compared to the women who had poor knowledge of cervical cancer^{10,14,20,38-44}.

The present study also evidenced that attitude towards cervical cancer screening was significantly

associated with the uptake of the screening: a woman who has a favorable attitude towards cervical cancer screening 6 times odds likely to uptake the service as compared to a woman who does have a unfavorable attitude. This finding is consistent with the findings from the studies done in Southern Ghana²⁹, North Central Nigeria⁴⁵, Loa People's Democratic Republic³⁷, and Dhaka, Bangladesh⁴⁶. Similarly, the systematic review and meta-analysis done in Ethiopia showed that a woman who has a favorable attitude toward cervical cancer screening was 6.1 times more likely to accept cervical cancer screening as compared to a woman who has an unfavorable attitude towards cervical cancer screening³⁸. The other systematic review and meta-analysis done in Ethiopia using 14,582 age-illegible women from 24 different studies showed that women with favorable attitudes towards cervical cancer screening have higher odds of cervical cancer screening uptake as compared to women who have unfavorable attitudes towards cervical cancer screening⁴³.

A woman who does listen to a radio more than one per week was 5.5 times odds of high likely to uptake cervical cancer screening service as compared to a woman who doesn't listens to a radio at least once a week. This finding is supported by results from similar studies. The study done using secondary data analyses from the Demographic and Health Surveys of six Sub-Saharan African countries showed that women who listened to a radio at least once a week had significantly higher odds of cervical cancer screening uptake as compared to women who had not listened to a radio³¹. Similarly, the randomized controlled trial done among 658 randomly selected study participants in Cape Town, South Africa to evaluate the effect of media intervention on increasing cervical cancer screening uptake showed that the women who had recalled hearing the radio-drama were more likely to attend cervical cancer screening as compared to those who had not recalled hearing the radio-drama⁴⁷. This might be due to the reasons that exposure to the mass media increases the knowledge of cervical cancer which in turn increases the likelihood of accepting cervical

cancer screening. The sequential explanatory mixed methods approach consisting of an analytical cross-sectional survey and qualitative inquiry done in Harare, Zimbabwe depicted that the women who had listened to the radio had higher odds of cervical cancer knowledge as compared to the women who had not listened to the radio⁴⁸.

The odds of cervical cancer screening uptake among the women who had not ever used contraceptives was not significantly different the women who had ever used contraceptives. This result is contrary to the finding from a similar study done in Ambo Town, Central Ethiopia⁴⁴. The discrepancy could be due to the differences in age among the two populations. The current study included all randomly selected reproductive-age women in the study while the study done in Ambo Town, Central Ethiopia included only women aged between 30-49 years. The study done in Ambo Town, Central Ethiopia⁴⁴, and many other studies^{13,14,19,40,43} showed that older age was associated with increased odds of knowledge of cervical cancer among the women included in the studies.

Conclusions

The rate of cervical cancer screening uptake from the current study is critically low. Factors like being a household head, having good knowledge of cervical cancer, having favorable attitude towards cervical cancer, and using different social media were positively associated with cervical cancer screening uptake. The Ethiopian Federal Ministry of Health, the Jimma Zonal Health Department, the Jimma Town Health Office, and other stakeholders should consider streamlining and strengthening curriculum integration and extracurricular health education intervention on cervical cancer. Due emphasis should also be given to mass-media expansions and increasing coverage of health education to promote cervical cancer screening.

Author Contributions

All authors conceived and designed the study. F.A.D performed the data analysis, and A.T.K.,

M.N.G. and D.T.D. helped interpret the results. F.A.D and D.T.D. drafted the manuscript, and all authors revised it critically for important intellectual content. All authors approved the version to be published.

Ethics Statement

The Jimma University Institute of Health Institutional Review Board (JUIHIRB) approved the study, the informed consent, and the approach for obtaining informed consent from subjects. The approval was given on date 08/12/2020 with ref. no IHRPGY/1028/20. All women provided verbal or written informed consent, depending on their level of literacy. A local community health representative independent from the study ascertained that all instances of verbal consent were given after subjects listened attentively to the full text of the consent form read by the study staff.

Conflicts of Interest

The authors declare no conflicts of interest.

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REFERENCES

1. WHO. Cervical Cancer Key Facts. Geneva, Switzerland; Washington D.C, the United states; 2022.
2. World Health Organization. WHO Guideline for Screening and Treatment of Cervical Pre-Cancer Lesions for Cervical Cancer Prevention, Second Edition: Use of MRNA Tests for Human Papillomavirus (HPV).; 2021. <https://www.who.int/publications/i/item/9789240030824>.
3. World Health Organization. Global Strategy to Accelerate the Elimination of Cervical Cancer as a Public Health Problem and Its Associated Goals and Targets for the Period 2020 – 2030. Vol 2.; 2021. <https://www.who.int/publications/i/item/9789240014107>.
4. Sung H, Ferlay J, Siegel RL, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA Cancer J Clin*. 2021;71(3):209-249. doi:10.3322/caac.21660
5. WHO. Comprehensive Cervical Cancer Control.; 2014.
6. Zena D, Elfu B, Mulatu K. Prevalence and Associated Factors of Precancerous Cervical Lesions among Women in Ethiopia: A Systematic Review and Meta-Analysis. *Ethiop J Health Sci*. 2021;31(1):189-200. doi:10.4314/ejhs.v31i1.21
7. Mekuria M, Edosa K, Endashaw M, et al. Prevalence of Cervical Cancer and Associated Factors Among Women Attended Cervical Cancer Screening Center at Gahandi Memorial Hospital, Ethiopia. *Cancer Inform*. 2021;20. doi:10.1177/11769351211068431
8. WHO. Guideline For Screening and Treatment of Cervical Pre-Cancer Lesions for Cervical Cancer Prevention.; 2021.
9. (CSA) NSA. 2007 Population and Housing Cesus of Ethiopia. Addis Ababa, Ethiopia; 2007. <http://www.csa.gov.et/census-report/complete-report/census-2007.html>.
10. Tsegay A, Araya T, Amare K, Gtsadik F. Knowledge, attitude, and practice on cervical cancer screening and associated factors among women aged 15–49 years in Adigrat Town, Northern Ethiopia, 2019: A community-based cross-sectional study. *Int J Womens Health*. 2020;12:1283-1298. doi:10.2147/IJWH.S261204
11. Tekle T, Wolka E, Nega B, Kumma WP, Koyira MM. Knowledge, attitude and practice towards cervical cancer screening among women and associated factors in hospitals of Wolaita zone, southern Ethiopia. *Cancer Manag Res*. 2020;12:993-1005. doi:10.2147/CMAR.S240364
12. Zhang D, Advani S, Waller J, et al. Mobile Technologies and Cervical Cancer Screening in Low- and Middle-Income Countries: A Systematic Review. *JCO Glob Oncol*. 2020;(6):617-627. doi:10.1200/jgo.19.00201
13. Natae SF, Nigatu DT, Negawo MK, Mengesha WW. Cervical cancer screening uptake and determinant factors among women in Ambo town, Western Oromia, Ethiopia: Community-based cross-sectional study. *Cancer Med*. 2021;10(23):8651-8661. doi:10.1002/cam4.4369
14. Bayu H, Berhe Y, Mulat A, Alemu A. Cervical cancer screening service uptake and associated factors among age eligible women in Mekelle zone, Northern Ethiopia, 2015: A community based study using health belief model. *PLoS One*. 2016;11(3):1-13. doi:10.1371/journal.pone.0149908
15. Lofters AK, Vahabi M, Kim E, Ellison L, Graves E, Glazier RH. Cervical cancer screening among women from Muslim-majority countries in Ontario, Canada. *Cancer Epidemiol Biomarkers Prev*. 2017;26(10):1493-1499. doi:10.1158/1055-9965.EPI-17-0323
16. Chali K, Oljira D, Sileshi T, Mekonnen T. Knowledge on cervical cancer, attitude toward its screening, and associated factors among reproductive age women in Metu Town, Ilu Aba Bor, South West Ethiopia, 2018: community-based cross-sectional study. *Cancer Rep*. 2021;4(5):1-9. doi:10.1002/cnr2.1382
17. Al-Amro SQ, Gharaibeh MK, Oweis AI. Factors associated with cervical cancer screening uptake: Implications for the health of women in Jordan. *Infect Dis Obstet Gynecol*. 2020;2020. doi:10.1155/2020/9690473
18. Tawiah A, Konney TO, Dassah ET, et al. Determinants of cervical cancer screening uptake among women with access to free screening: A community-based study in peri-urban Ghana. *Int J Gynecol Obstet*. 2022;(August 2021):513-521. doi:10.1002/ijgo.14158
19. Gemedi EY, Kare BB, Negera DG, et al. Prevalence and Predictor of Cervical Cancer Screening Service Uptake Among Women Aged 25 Years and Above in Sidama Zone, Southern Ethiopia, Using Health Belief Model. *Cancer Control*. 2020;27(1):1-8. doi:10.1177/1073274820954460
20. Desta AA, Endale ZM, Aklil MB. Cervical cancer screening utilization and associated factors among women of 30–65 years in Girar Jarsoo district North shoa, Ethiopia, 2021. *Clin Epidemiol Glob Heal*. 2022;15(September 2021):101048. doi:10.1016/j.cegh.2022.101048
21. Ndejo R, Mukama T, Musabyimana A, Musoke D. Uptake of Cervical Cancer Screening and Associated Factors among Women in Rural Uganda : A Cross Sectional Study. *PLoS One*. 2016;142:1-13. doi:10.1371/journal.pone.0149696
22. Moshi F, Bago M, Ntwenya J, Mpondo B, Kibusi S. Uptake of Cervical Cancer Screening Services and Its Association with Cervical

- Cancer Awareness and Knowledge Among Women of Reproductive Age in Dodoma, Tanzania: A Cross-Sectional Study. *East African Heal Res J.* 2019;Vol 3(No 2):105-115. doi:10.24248/eahrj.v3i2.607
23. Dirirsa DE, Asefa EY, Awol Salo M. Utilization of cervical cancer screening service and associated factors among women of reproductive age group in Ilu Abba Bor zone, southwestern Ethiopia, 2019: Cross-sectional study. *SAGE Open Med.* 2022;10:205031212210949. doi:10.1177/20503121221094904
24. Sidze EM, Wekesah FM, Kisia L, Abajobir A. Inequalities in Access and Utilization of Maternal, Newborn and Child Health Services in sub-Saharan Africa: A Special Focus on Urban Settings. *Matern Child Health J.* 2022;26(2):250-279. doi:10.1007/s10995-021-03250-z
25. Bain LE, Aboagye RG, Dowou RK, Kongnyuy EJ, Memiah P, Amu H. Prevalence and determinants of maternal healthcare utilisation among young women in sub-Saharan Africa: cross-sectional analyses of demographic and health survey data. *BMC Public Health.* 2022;22(1):1-20. doi:10.1186/s12889-022-13037-8
26. Woldeamanuel BT, Aga MA. Trends, regional inequalities and determinants in the utilization of prenatal care and skilled birth attendant in Ethiopia: A multilevel analysis. *Clin Epidemiol Glob Heal.* 2021;11(August 2020). doi:10.1016/j.cegh.2021.100771
27. Dutta T, Haderxhanaj L, Agle J, Jayawardene W, Meyerson B. Association between individual and intimate partner factors and cervical cancer screening in Kenya. *Prev Chronic Dis.* 2018;15(12):1-9. doi:10.5888/pcd15.180182
28. Padela AI, Peek M, Johnson-Agbakwu CE, Hosseinian Z, Curlin F. Associations between religion-related factors and cervical cancer screening among muslims in greater chicago. *J Low Genit Tract Dis.* 2014;18(4):326-332. doi:10.1097/LGT.0000000000000026
29. Enyan NIE, Davies AE, Opoku-Danso R, Annor F, Obiri-Yeboah D. Correlates of cervical cancer screening participation, intention and self-efficacy among Muslim women in southern Ghana. *BMC Womens Health.* 2022;22(1):1-11. doi:10.1186/s12905-022-01803-0
30. Chakrabarti A. Understanding Female Autonomy in India through Their Family Headship Status. *J Popul Soc Stud.* 2019;27(3):266-285. doi:10.25133/JPSsv27n3.0017
31. Okyere J, Aboagye RG, Seidu AA, Asare BYA, Mwamba B, Ahinkorah BO. Towards a cervical cancer-free future: women's healthcare decision making and cervical cancer screening uptake in sub-Saharan Africa. *BMJ Open.* 2022;12(7). doi:10.1136/bmjopen-2021-058026
32. Rizkianti A, Afifah T, Saptarini I, Fajar M. Women ' s decision-making autonomy in the household and the use of maternal health services : An Indonesian case study. *Midwifery.* 2020;90. doi:10.1016/j.midw.2020.102816
33. Obasohan PE, Gana P, Mustapha MA. Decision Making Autonomy and Maternal Healthcare Utilization among Nigerian Women. *Int J MCH AIDS.* 2019;8(1):11-18. doi:10.21106/ijma.264
34. Auchynnikava A, Habibov N. Women's decision-making autonomy and utilization of antenatal, natal and post-natal healthcare services: Insights from Tajikistan's national surveys. *Int J Health Plann Manage.* 2020;36(1):10-11.
35. Ambachew A, Id K, Cherkos EA, et al. Married women ' s decision-making autonomy in the household and maternal and neonatal healthcare utilization and associated factors in Debretabor , northwest Ethiopia. *PLoS One.* 2021;16(9):1-16. doi:10.1371/journal.pone.0255021
36. Ijezie A, Johnson O. Knowledge of cervical cancer and the uptake of the Papanicolaou smear test among public secondary school teachers in Akwa Ibom State, Nigeria. *Niger Med J.* 2019;60(5):245. doi:10.4103/nmj.nmj_120_19
37. Phaiphichit J, Paboriboun P, Kunnavong S, Chanthavilay P. Factors associated with cervical cancer screening among women aged 25–60 years in Lao People's Democratic Republic. *PLoS One.* 2022;17(4 April):1-11. doi:10.1371/journal.pone.0266592
38. Kassie AM, Abate BB, Kassaw MW, Aragie TG, Geleta BA, Shiferaw WS. Impact of knowledge and attitude on the utilization rate of cervical cancer screening tests among Ethiopian women: A systematic review and meta-analysis. *PLoS One.* 2020;15(12 December):1-22. doi:10.1371/journal.pone.0239927
39. Yimer NB, Mohammed MA, Solomon K, et al. Cervical cancer screening uptake in Sub-Saharan Africa: a systematic review and meta-analysis. *Public Health.* 2021;195:105-111. doi:10.1016/j.puhe.2021.04.014
40. Belay Y, Dheresa M, Sema A, Desalew A, Assefa N. Cervical Cancer Screening Utilization and Associated Factors Among Women Aged 30 to 49 Years in Dire Dawa, Eastern Ethiopia. *Cancer Control.* 2020;27(1):1-9. doi:10.1177/1073274820958701
41. Desta AA, Endale ZM, Aklil MB. Cervical cancer screening utilization and associated factors among women of 30–65 years in Girar Jarsoo district North shoa, Ethiopia, 2021. *Clin Epidemiol Glob Heal.* 2022;15(April):101048. doi:10.1016/j.cegh.2022.101048
42. Ayanto SY, Belachew T, Wordofa MA. Determinants of cervical cancer screening utilization among women in Southern Ethiopia. *Sci Rep.* 2022;12(1):1-10. doi:10.1038/s41598-022-18978-z
43. Ayenew AA, Zewdu BF, Nigussie AA. Uptake of cervical cancer screening service and associated factors among age-eligible women in Ethiopia: systematic review and meta-analysis. *Infect Agent Cancer.* 2020;15(1):1-17. doi:10.1186/s13027-020-00334-3

44. Lemma D, Aboma M, Girma T, Dechessa A. Determinants of utilization of cervical cancer screening among women in the age group of 30–49 years in Ambo Town, Central Ethiopia: A case-control study. *PLoS One*. 2022;17(7 July):1-15. doi:10.1371/journal.pone.0270821
45. Idowu A, Olowookere SA, Fagbemi AT, Ogunlaja OA. Determinants of Cervical Cancer Screening Uptake among Women in Ilorin, North Central Nigeria: A Community-Based Study. *J Cancer Epidemiol*. 2016;2016(Vili). doi:10.1155/2016/6469240
46. Qayum O, Billah MM, Akhter R, Flora MS. Women's Knowledge, Attitude and Practice on Cervical Cancer and Its Screening in Dhaka, Bangladesh. *Asian Pacific J Cancer Prev*. 2021;22(10):3327-3335. doi:10.31557/APJCP.2021.22.10.3327
47. Risi L, Bindman JP, Campbell OMR, et al. Media interventions to increase cervical screening uptake in South Africa: An evaluation study of effectiveness. *Health Educ Res*. 2004;19(4):457-468. doi:10.1093/her/cyg044
48. Tapera O, Dreyer G, Kadzatsa W, Nyakabau AM, Stray-Pedersen B, Sjh H. Cervical cancer knowledge, attitudes, beliefs and practices of women aged at least 25 years in Harare, Zimbabwe. *BMC Womens Health*. 2019;19(1):1-10. doi:10.1186/s12905-019-0790-6



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FACTORS ASSOCIATED WITH PRENATAL ALCOHOL CONSUMPTION AMONG PREGNANT WOMEN IN SOUTHERN ETHIOPIA: A COMMUNITY-BASED CROSS SECTIONAL STUDY

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ABSTRACT

BACKGROUND: Prenatal alcohol consumption is a significant public health problem. Studies discover that there is no safe amount or safe time to drink alcohol during pregnancy, eventually affecting the foetus, neonate infant and children. Despite this effect, pregnant women in Ethiopia consume different alcohol containing beverages. This study was intended to assess prenatal alcohol use and associated factors among pregnant women in southern Ethiopia.

METHODS: A community based cross sectional study was employed from December 1 to 30, 2021, in southern Ethiopia among 573 pregnant women. A multi stage sampling was carried out. Data was analysed using statistical package for social science (SPSS) version 27.0 software. Binary logistic regression was used to assess the association between alcohol consumption with independent variables. P-value ≤ 0.05 with a 95% confidence interval was considered statistically significant.

RESULTS: The prevalence of alcohol use was found to be 22.7%. primiparity (AOR=2.12, 95% CI, 1.10, 4.09), having drinker partners (AOR= 3.01, 95% CI, 1.20, 3.94), uninformed on the risk of alcohol consumption (AOR= 3.90, 95% CI, 1.98, 7.70), presence of known medical problems (AOR= 0.09, 95% CI, 0.02, 0.31), depressive mental status (AOR=3.03, 95% CI, 1.15, 11.21) were found to have a statistically significant association with alcohol use.

CONCLUSION: This study found a high level of alcohol consumption. Interventions to create awareness on the adverse effects of alcohol are needed. Moreover, couples should be encouraged to seek preconception care to know their medical and mental health status. In addition, promoting husbands' involvement throughout the perinatal period may help reduce their influence on, and encouragement of, maternal alcohol consumption..

KEYWORDS: Alcohol consumption, Maternal, Pregnancy, Arba Minch, Ethiopia.

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INTRODUCTION

Prenatal alcohol consumption is a major public health problem because of the preventable enormous deleterious effects on a developing foetus¹. Worldwide, the majority of clinical and government guidelines advocate for pregnant women to abstain from alcohol consumption due to potential adverse effects on pregnancy outcomes^{2, 3}.

Globally the magnitude of alcohol consumption during pregnancy is estimated to be 10%⁴. People in Ethiopia including pregnant women highly consume alcohol beverages, especially the traditionally prepared alcohol beverages (Tella, Korefe, Tej, Areki, Chek ...) that have higher percentages of alcohol amount and easily accessible^{5, 6}. Thus, locally made alcohols are being used excessively without control in different holidays, festivals, parties, and in daily family meals and day to day life^{7, 8}. Some reports have shown that alcohol consumption is predominant in Ethiopia. For instance, Ethiopia has been ranked fifth among the ten top local alcohol drinking countries in the world⁹.

Study revealed that women might use alcohol as a coping mechanism to escape from pregnancy related stressful situations and emotional instability^{10, 11}. The drinking habits of alcohol can be also determined by the culture, attitude or other socio-demographic contexts of the society in which the pregnant mother belongs^{12, 13}.

The adverse effects of prenatal alcohol exposure can range from subtle developmental problems, or fetal alcohol effects, to full-blown fetal alcohol spectrum syndrome (FASS). However, it is not limited to infancy and childhood; prenatal exposure to alcohol, particularly in early pregnancy, has also been found to increase the likelihood of developing an alcohol disorder in adulthood^{14, 15}. World Health Organization (WHO) declared that there is no safe time and no safe amount to consume alcohol in pregnancy, the complete abstinence is recommended^{16, 17}.

Despite its serious consequences, evidence on alcohol consumption during pregnancy in Ethiopia is limited. This study assessed the prevalence of

maternal alcohol use and its associated factors among pregnant women in Southern Ethiopia

Methods and Clients

Study setting and design

A community based cross-sectional study design was conducted in Arba Minch, Sawla town and Jinka town from December 01 to 30/2021. Arba Minch, Sawla and Jinka town are the administrative cities of Gamo, Gofa, and South Omo zones, southern Ethiopia, which are 454, 495 and 531 kms south of Addis Ababa (capital city of Ethiopia) respectively.

Study Populations

All pregnant women who live in selected towns were the source population. All pregnant women who reside in selected kebeles of the town during the study period were the study population. All pregnant women who live in the three towns for six months and above were included in the study. However, women who were seriously ill and couldn't communicate during data collection period were excluded from the study.

Sample size determination and procedure

The sample size was calculated using a single population proportion formula by considering the following assumptions:

Assumptions: A 95% confidence level, margin of error (0.05)

$$n = \frac{(Z_{\alpha/2})^2 P (1-P)}{(d)^2}$$

n= 359, p= 37.1% proportion of alcohol users in Addis Ababa¹⁸

Where:

P= proportion d = the margin error between the sample and the population (0.05). Z $\alpha/2$ = critical value at 95% confidence level of certainty (1.96). By considering 10% non-response rate added to the value, it gives 390 and also by multiplying 1.5 times of the calculated sample size design effect, it

becomes 585 and it was the sample size of the study. Multi stage sampling technique was used. There are 14 zones in southern nation nationality and people (SNNP), out of which 3 Zones were selected using simple random sampling method and three towns were chosen using random sampling. List of the study subjects and the code of households were obtained from health extension workers (the lowest health professionals working at health posts) from each kebeles. Then the sample size for each of the selected kebeles was determined proportionally and selected using a systematic sampling method, in which every “kth ” intervals $K = N/n = 1693/585 = 2.89$. The first house was selected by lottery method and then every 3 house was interviewed. In cases of selected household with more than one eligible respondent, only one respondent was chosen by lottery method.

Study variables

Dependent variable: Prenatal alcohol consumption
Independent Variables

Socio-demographic characteristics: Age, Residence, Marital status, Education, Occupation, Income, Husband education

Obstetric and medical related factors like parity, gestational age, number of children, pregnancy plan status, previous history of abortion, antenatal care (ANC), Parity, History of preterm birth, past history of abortion, Intention to give birth, History of diabetes mellitus, and History of hypertension.

Individual & socio-cultural factors: Partner drinking habit, Cultural acceptability, Pressure from peer/partner, being served as meal, Social support status, Depression symptoms.

Awareness of clients: Awareness on risk of alcohol use on the foetus and herself.

Operational definition

Alcohol consumption was defined as intake of any alcoholic beverages in the course of the index pregnancy, while ‘binge drinking’ was defined as intake of four or more standard units of alcohol in a single occasion, and within 2 hours duration, in the course of the index pregnancy¹⁹.

The alcohol use screening tool, AUDIT-C, is the most popular shortened version of the 10-item AUDIT. It comprises of three items to assess alcohol consumption cross culturally and identify hazardous drinkers. **For men,** a score of ≥ 4 indicates hazardous or harmful alcohol use. **For women,** a score of ≥ 3 indicates hazardous or harmful alcohol use. Higher scores indicate a greater likelihood of risky drinking and potential alcohol-related problems²⁰.

Edinburgh Postnatal Depression Scale (EPDS) which has 10 items scored on a scale of 0–3; the score ranging from 0–30 and we used a cut-off point of 13 and above on the scale to identify women with depressive symptoms²¹.

Social support: the Oslo 3-items social support scale, which is considered one of the best predictors of mental health, covering different fields of social support and perceived way of getting assistance from neighbours. The sum ranges from 3 – 14 and the score shows poor support^{3–8}, moderate support^{9–11}, and strong support (12–14)²².

Cultural acceptability: the proportion of respondents who express neutral or positive attitudes toward pregnant women consuming alcohol, as measured by a 5-point Likert scale assessing perceived norms, social approval, and cultural beliefs²³.

Data collection tools

Data were collected using a semi-structured questionnaire adapted from previous studies. The questionnaire covered socio-demographic characteristics, the Edinburgh Postnatal Depression Scale (EPDS), the Oslo 3-item Social Support Scale, reproductive and medical factors, individual and socio-cultural factors, and client awareness. After obtaining written informed consent, six trained BSc midwives collected the data under the supervision of three MSc midwives. The questionnaire was translated into Amharic and back-translated into English to ensure consistency and accuracy.

Data quality assurance

A pretest was conducted on 5% of the sample to

ensure the consistency of the questionnaire. Data collectors and supervisors received two days of training before data collection. Data quality was maintained through daily supervision, checking for completeness and consistency, and immediate correction of identified issues. Final data verification was performed by the principal investigator before analysis.

Data processing and analysis

Data were collected using the Kobo Toolbox application and analyzed in SPSS version 26. Descriptive statistics were summarized using frequencies, percentages, means, and medians. Variables with a p-value <0.25 in the bivariate analysis were included in the multivariable logistic regression model. Model fitness was assessed using

the Hosmer–Lemeshow test, and multicollinearity was checked using Variance Inflation Factor (VIF). Statistical significance was declared at $p < 0.05$, and results were reported using adjusted odds ratios (AORs) with 95% confidence intervals

Results

Socio-demographic characteristics

A total of 573 pregnant women participated in the study, yielding a 97.9% response rate. The mean age was 26.1 ± 4.6 years. Most participants were married (92.0%), 34.6% had higher education, and 9.4% had no formal education. More than one-third (38.6%) were merchants or engaged in private business, and the median monthly household income was 5,600 ETB (IQR: 4,200 ETB) (Table 1).

Table 1: Socio-demographic characteristics of the study participants in, southern Ethiopia, 2021.

Variables	Frequency(n)	Percentage (%)	
Age	15-20	56	9.80
	21-30	406	70.80
	≥31	111	19.40
Marital status	Married	527	92
	Others*	46	8
Educational level	No formal education	54	9.40
	primary	193	33.70
	Secondary	128	22.30
	Above secondary	198	34.60
Occupation	Housewife	137	23.90
	Employed(Gov't/NGOs	157	27.40
	Private business	221	38.60
	Student	38	6.60
	Farmer	19	3.30
Family monthly income	<5600.00	281	49
	≥5600.00	292	51

Key=* widowed, separated, single

Reproductive and medical condition of the mothers Among the participants, 60.7% were multiparous, with 53.4% having five or more children. A history of preterm delivery and abortion was reported by 8.3% and 21.3% of women, respectively. Nearly all (95.8%) attended antenatal care, while 40.5%

had four or more ANC visits. Over half (50.8%) were in the third trimester, 84.8% had planned pregnancies, 72.6% desired future fertility, and 9.2% experienced medical illnesses during pregnancy, with hypertension (4.9%) and diabetes mellitus (2.4%) being the most common (Table 2).

Table 2: Obstetrics and medical characteristics among pregnant women in Southern Ethiopia, 2021, (n=573).

Variables		Frequency(n)	Percentage (%)
Parity	Nulliparous	70	12.20
	Primiparous	155	27.10
	Multiparous	348	60.70
Number of children (n=503)	<5	197	38.30
	≥5	306	61.70
History of preterm labor (PTL) (n=503)	Yes	42	8.30
	No	461	91.70
History of abortion (n=348)	Yes	72	21.30
	No	266	78.70
Antenatal care during the current pregnancy	Yes	509	95.30
	No	25	4.70
Any known medical illness	Yes	53	9.20
	No	520	90.80
The medical disease?	Hypertension	28	52.80
	CHD	3	5.70
	Genito urinary problem	5	9.40
	Diabetes mellitus	14	26.40
	Others	3	5.70
Gestational age	First trimester	62	10.80
	Second trimester	173	30.20
	Third trimester	291	50.80
	Unknown	47	8.20

PTL- preterm labor, LMP- Last Menstrual Period, US-ultrasound

Alcohol consumption and personal habits

Among the respondents 130(22.70%) of them consumed alcohol during the current pregnancy, of those drinkers 72(55.40%) of them consumed alcohol 2-3 times per week and regarding the types of alcohol used 32(5.60%) of them used beer, followed by wine and tella 17(3%). The most common reason for alcohol consumption is peer pressure 34(5.90%), social reason 30(5.20%)

followed by to get out from stress 27(4.70%). From all respondents, only 408 (71.20%) of them heard about the risk of alcohol consumption during pregnancy, health care providers 147(25.70%) were the main source of the information. Majority 396 (69.1%) of them were alcohol drinker in their pre pregnancy state. Most 479 (83.60%) of the women drunk coffee, 34(5.90%) of them were chewing chat and 26(4.50%) of women were smoke cigarette during the current pregnancy (Table 3).

Table 3: Prenatal alcohol consumption among pregnant women in southern Ethiopia, 2021.

Variables		Frequency(n)	Percentage (%)
Prenatal alcohol consumption	Yes	130	22.70
	No	443	77.30
Frequency of alcohol use	2-3 /week	72	55.40
	2-3/month	58	44.60
Reason of alcohol use	For relaxation	27	20.80
	For socialization	35	26.90
	Peer pressure	37	28.50
	To get out from stress	31	23.80
Pre pregnancy alcohol use	Yes	396	69.10
	No	177	30.90
Drinker Partner	Yes	396	69.10
	No	177	30.90
Partner encourage to drink alcohol	Yes	167	29.10
	No	406	70.90
Cultural acceptability of alcohol use	Yes	426	74.30
	No	147	25.70
Four or more standard units drinks on one occasion	Yes	35	26.90
	No	95	73.10
Heard about risk of alcohol use	Yes	408	71.20
	No	165	28.80
Source of information	Mass media	82	20
	HCPs	147	36
	Friend/family	79	19.40
	Mass media & HCPs	100	24.60

Social support and depressive symptoms

Majority 399(69.6%) of pregnant women had strong social support, 100(17.5%) had moderate social support and seventy four (12.9%) of them had poor social support during the current pregnancy from their social network. Regarding depressive symptom, fifty seven (9.9%) of pregnant women had depressive symptoms and 516 (90.1%) of them had no depression during pregnancy.

Factors associated with maternal alcohol consumption

In the bivariate analysis, educational level, parity, pre-pregnancy alcohol use, partner encouragement, medical illness, awareness of alcohol-related risks, partner alcohol use, future fertility desire, and depression were significantly associated with

prenatal alcohol consumption. In the multivariable binary logistic regression, primiparity, partner alcohol use, medical illness, lack of awareness about the risks of alcohol consumption, and depression remained independently associated with maternal alcohol consumption.

Pregnant women who are primiparous (AOR=2.12, 95% CI, 1.10, 4.09) were two times more likely to be alcohol drinker than those women who are multiparous. Pregnant women whose partners were alcohol drinker (AOR= 3.01, 95% CI, 1.20, 3.94) were three times more likely to drink alcohol as compared with women whose partners were alcohol drinker during pregnancy. Not being informed on the risk of alcohol consumption had significantly greater odds of being alcohol consumer (AOR= 3.90, 95% CI, 1.98, 7.70) than women who are

informed on the risk of alcohol consumption during pregnancy.

Pregnant women who had known medical problem (AOR= 0.09, 95% CI, 0.02, 0.31) were 91% less likely to take alcohol than women who had no any medical problem. The odds of being alcohol drinker was three times (AOR=3.03, 95% CI, 1.15, 11.21) more among pregnant women who are depressive mental status as compared to women who are not depressed (Table 4).

Table 4: Bivariate and multivariable analysis of factors associated with prenatal alcohol consumption in Southern Ethiopia, 2021, (n=573)

Variables	Alcohol use	Odd Ratio @ CI (95%)			
		Yes,N (%)	No,N(%)	COR	AOR
Educational level	Primary and no formal education	40(16.2)	207(83.8)	1	1
	2 ^{ry} and above	90(27.6)	236(72.4)	0.50(0.33,0.76)	0.60(0.34,1.06)
Parity	Null	24(34.3)	46(65.7)	0.65(0.38, 1.14)	0.85(0.39, 1.85)
	Primi	17(11)	138(89)	2.78(1.59, 4.87)	2.12(1.10,4.09)*
	Multi	89(25.6)	259(74.4)	1	1
Fertility desire	Yes	101(24.3)	315(75.7)	1	1
	No	29(18.5)	128(81.5)	1.41(0.89, 2.24)	1.26(0.69,2.31)
Pre-pregnancy alcohol use	Yes	63(15.9)	333(84.1)	3.21(2.14, 4.83)	0.99(0.03, 28.89)
	No	67(37.9)	110(62.1)	1	1
Partner alcohol drinker	Yes	63(15.9)	333(84.1)	3.21(2.14, 4.83)	3.01(1.20,3.94)**
	No	67(37.9)	110(62.1)	1	1
Partner encouraged you to drink alcohol	Yes	411(84.6)	75(15.4)	9.41(5.71,15.53)	11.04(0.94, 21.65)
	No	32(36.8)	55(63.2)	1	1
Having known medical illness	Yes	5(9.4)	48(90.6)	1	1
	No	125(24)	295(76)	0.32(0.12, 0.84)	0.09(0.02,0.31)*
Heard about risk of alcohol use	Yes	291(71.3)	117(28.7)	1	1
	No	152(92.1)	13(7.9)	4.70(2.56, 8.61)	3.90(1.98,7.70)**
Depressive symptom	Yes	52(91.5)	5(8.5)	3.36(1.51, 12.06)	3.03(1.15, 11.21)*
	No	390(75.6)	126(24.4)	1	1

*=p-value <0.05, **=p-value≤ 0.01, CI = Confidence Interval, COR = Crude Odds Ratio, AOR=Adjusted Odds Ratio

DISCUSSIONS

The results of this study revealed that the prevalence of alcohol use was found to be 22.7%. This finding was in line with the study findings done in Ghana (20.4%)²³. The magnitude of alcohol use in this study was higher than a facility based cross sectional study findings done in Gedeo zone, Ethiopia²⁴. A possible explanation for this difference is that our community-based study included both ANC attendees and non-attendees, whereas the Gedeo study included only women attending ANC. Women who receive ANC are more likely to receive counseling and education on the risks of alcohol use during pregnancy, which may contribute to a lower prevalence of alcohol consumption.

However, the prevalence of alcohol use in this study was lower than the prevalence of alcohol use reported from a study done in Bahr Dar town, Ethiopia (34%)²⁵. The possible explanation for this difference might be due to the difference in the screening tools used. In this study we used Alcohol Use Disorder Identification Test (AUDIT) which was less sensitive to screen alcohol use and might underestimate the prevalence of alcohol use than a tool used in Bahr Dar study Tolerance, Annoyed Cut down Eye opener (T-ACE)²⁶.

This study found that primiparity was a significant predictor of alcohol consumption during pregnancy. Primiparous women were twice as likely to consume alcohol during pregnancy compared with multiparous women. This finding is supported by the study conducted in Sub Saharan African countries²⁷. A possible explanation is that multiparous women have more frequent contact with health services through previous pregnancies and childbirths, increasing their exposure to health education and counselling on the harmful effects of alcohol consumption during pregnancy. This greater awareness may reduce their likelihood of drinking alcohol during pregnancy.

Pregnant women who had not heard about the harmful effects of alcohol use during pregnancy were 3.9 times more likely to consume alcohol than

those who were aware of its risks. This suggests that awareness of the adverse effects of alcohol on the fetus, newborn, infant, child, and mother plays an important role in reducing alcohol consumption during pregnancy. This finding was congruent with the studies conducted in Gondar, Addis Ababa, Ethiopia^{8, 22}, South Africa²⁸ and Nigeria²⁹. A possible explanation is that adequate awareness of the risks of alcohol consumption during pregnancy influences women's decisions to avoid drinking. Knowledge of the harmful effects of alcohol serves as an important motivator for adopting and maintaining healthy behaviours throughout pregnancy. Women who had their partners drank alcohol were three times more likely to report drinking than their counterparts. This finding was consistent with the studies conducted in Gondar town, Bahir Dar, Ethiopia^{22, 25}, Dodoma Region Tanzania³⁰, South Africa²⁸, and Kampala, Uganda³¹. Likewise, findings of a systematic review which was conducted in Sub-Saharan Africa revealed that male partners drinking behaviour is one of the risk factors for women to drink alcohol while pregnant³². A possible explanation is that partners often share similar lifestyle and substance use behaviours. Women whose partners consume alcohol may be more likely to drink due to shared drinking habits, partner influence, social pressure, and the difficulty of refusing repeated invitations to drink.

Furthermore, this study's finding revealed that depressive symptoms had significant association with maternal alcohol use while pregnant. Pregnant women with depressive symptom were 3.05 times more likely to use alcohol as compared to their counterparts. This correlation is supported by the study done in Gedeo zone, Ethiopia²⁴. This might be due to the fact that people with mental distress are more like to use alcohol to reverse the difficulties of sleep initiation, social engagement and lack of happiness which are hallmark symptoms of mental distress^{33, 34}.

Women who had never experienced medical complications in the pregnancy were more likely

to use alcohol in the pregnancy. This is in line with the study finding conducted in Nigeria³⁰. But, some studies have shown that there is no association between alcohol consumption during pregnancy and medical complication during pregnancy²⁵. This finding may be explained by the fact that women who have never experienced pregnancy-related complications may perceive themselves to be at lower risk and are therefore more likely to engage in risky behaviors, such as alcohol consumption during pregnancy. In our study maternal alcohol consumption had no statically significant association with adverse birth outcome, in contrast, the study done in Gondar town revealed that alcohol consumption during pregnancy was significantly associated with low birth³⁵.

Conclusions

The study findings revealed that alcohol use was common during pregnancy in southern Ethiopia. The predisposing factors for prenatal alcohol use were being primipara, having alcohol drinker partner, having medical disease, depression, and not ever heard information about the risk of alcohol drinking during pregnancy. Every couple in reproductive age should visit health facility and get pre conception care before getting pregnant and health care providers should provide information about the adverse effect of alcohol use on the developing foetus and on the mother.

Ethics approval and consent to participate

Ethical clearance was obtained from the Institutional Research Ethics Review Board of the college of medicine and health science, Arba Minch University (IRB/1165/21). All measures were employed to maintain human rights including written consent. All participants were informed about the objectives of the study and that their participation was voluntary. It was also clearly stated to the participants that the information they provided was for research purposes and strictly confidential.

Abbreviations

ANC: Ante Natal Care
EPDS: Edinburgh Postnatal Depression Scale
FASS: Fetal Alcohol Spectrum Syndrome
WHO: World Health Organization

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and/or analyzed during the current study are available here as S1 file and submitted as supplementary material.

S1 File. The dataset used for analysis of this study. (SAV)

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

KB, YA, TG, and GA conceptualized the study. KB, GD, YD, YT, and YA led the analysis. KB and BW: wrote the original draft with inputs from KB and AA. All authors have reviewed and approved this final draft of the manuscript.

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REFERENCES

1. Adeyiga G, Udofia EA, Yawson AE. Factors associated with alcohol consumption: a survey of women childbearing at a national referral hospital in Accra, Ghana. *African Journal of Reproductive Health*. 2014;18(2):152-65.
2. Gibbs A, Sherwood K. Putting fetal alcohol spectrum disorder (FASD) on the map in New Zealand: A review of health, social, political, justice and cultural developments. *Psychiatry, Psychology and Law*. 2017;24(6):825-42.
3. Butt P, Beirness D, Cesa MF, Gliksman L, Paradis MC, Stockwell T. Alcohol and health in Canada: A summary of evidence and guidelines for low-risk drinking. Ottawa: Canadian Centre for Substance Abuse. 2010.
4. Popova S, Lange S, Probst C, Gmel G, Rehm J. Estimation of national, regional, and global prevalence of alcohol use during pregnancy and fetal alcohol syndrome: a systematic review and meta-analysis. *The Lancet Global Health*. 2017;5(3):e290-e9.
5. Soboka M TM, Feyissa GT, Hanlon C. Alcohol use disorders and associated factors among people living with HIV who are attending services in south west Ethiopia. *BMC Res Notes*. 2014;7(1):828.
6. Lee M RM, Seleshe S. Uniqueness of Ethiopian traditional alcoholic beverage of plant origin, tella. *Ethnic Foods*. 2015;2(3):110-4.
7. Wedajo Lemi B. Microbiology of Ethiopian traditionally fermented beverages and condiments. *International journal of microbiology*. 2020;2020.
8. Bitew MS, Zewde MF, Wubetu M, Alemu AA. Consumption of alcohol and binge drinking among pregnant women in Addis Ababa, Ethiopia: Prevalence and determinant factors. *PloS one*. 2020;15(12):e0243784.
9. countries T. to drink the local alcohol - Toptenz.net <https://www.toptenz.net/top-10-countries-to-drink-the-local-alcohol.php>.
10. hompson O AI. Prevalence of antenatal depression and associated risk factors among pregnant women attending antenatal clinics in Abeokuta North Local Government Area, Nigeria. *Depression research and treatment*. 2016;4(1):34-5.
11. atu A HD. Prevalence of antenatal depression and associated factors among pregnant women in Addis Ababa, Ethiopia: a cross-sectional study. *Reprod Health*. 2015;12(1):99.
12. Peadon E PJ, Henley N, D'antoine H, Bartu A, O'Leary C, Bower C, Elliott EJ. attitudes and behaviour predict women's intention to drink alcohol during pregnancy: the challenge for health professionals. *BMC public health*. 2011;11(1):584.
13. Petersen Williams P JE, Mathews C, Lombard C, Parry CD. Alcohol and other drug use during pregnancy among women attending midwife obstetric units in the Cape Metropole. South Africa. *Adv Prev Med*. 2014;8(7):27.
14. Alati R, Al Mamun A, Williams GM, O'Callaghan M, Najman JM, Bor W. In utero alcohol exposure and prediction of alcohol disorders in early adulthood: a birth cohort study. *Archives of general psychiatry*. 2006;63(9):1009-16.
15. Manning MA, Hoyme HE. Fetal alcohol spectrum disorders: a practical clinical approach to diagnosis. *Neuroscience & Biobehavioral Reviews*. 2007;31(2):230-8.
16. Seiler NK. Alcohol and pregnancy: CDC's health advice and the legal rights of pregnant women. *Public health reports*. 2016;131(4):623-7.
17. Butt P, Beirness D, Gliksman L, Paradis C, Stockwell T. Alcohol and health in Canada: a summary of evidence and guidelines for low-risk drinking. Ottawa, ON: Canadian Centre on Substance Abuse. 2011.
18. Tesfaye G, Demlew D, Habte F, Molla G, Kifle Y, Gebreegziabbhier G. The prevalence and associated factors of alcohol use among pregnant women attending antenatal care at public hospitals Addis Ababa, Ethiopia, 2019. *BMC psychiatry*. 2019;20(1):1-10.
19. Martinez P RJ, Naidoo N, Clausen T. Alcohol abstinence and drinking among African women: data from the World Health Surveys. *BMC Public Health*. 2011;11(1):160.
20. Lopez MB LA, Conde K, Cremonese M. Psychometric properties of brief screening tests for alcohol use disorders during pregnancy in Argentina. <https://doi.org/10.1055/s-0037-1603744> PMID: 28609804. *Revista brasileira de ginecologia e obstetricia*. 2017;39(7).
21. Dibaba Y FM, Hindin MJ. The association of unwanted pregnancy and social support with depressive symptoms in pregnancy: evidence from rural Southwestern Ethiopia. <https://doi.org/10.1186/1471-2393-13-135> PMID: 23800160. *BMC pregnancy and childbirth*. 2013;13(1):135.
22. Addila AE, Azale T, Gete YK, Yitayal M. Individual and community-level predictors of maternal alcohol consumption during pregnancy in Gondar town, Northwest Ethiopia: a multilevel logistic regression analysis. *BMC pregnancy and childbirth*. 2021;21(1):1-14.
23. Adusi-Poku Y, Edusei AK, Bonney AA, Tagbor H, Nakua E, Otupiri E. Pregnant women and alcohol use in the Bosomtwe district of the Ashanti region-Ghana. *African journal of reproductive health*. 2012;16(1).
24. Mekuriaw B, Belayneh Z, Shemelis T, Hussien R. Alcohol use and associated factors among women attending antenatal care in Southern Ethiopia: a facility based cross sectional study. *BMC research notes*. 2019;12(1):1-7.

25. Anteab K, Demtsu B, Megra M. Assessment of prevalence and associated factors of alcohol use during pregnancy among the dwellers of Bahir-Dar City, Northwest Ethiopia, 2014. *Int J Pharma Sci Res Assess*. 2014;5(12):939-46.
26. Smith L, Savory J, Couves J, Burns E. Alcohol consumption during pregnancy: cross-sectional survey. *Midwifery*. 2014;30(12):1173-8.
27. Mulat B, Alemnew W, Shitu K. Alcohol use during pregnancy and associated factors among pregnant women in Sub-Saharan Africa: further analysis of the recent demographic and health survey data. *BMC Pregnancy and Childbirth*. 2022;22(1):1-9.
28. Morojele NK, London L, Olorunju SA, Matjila MJ, Davids AS, Rendall-Mkosi KM. Predictors of risk of alcohol-exposed pregnancies among women in an urban and a rural area of South Africa. *Social Science & Medicine*. 2010;70(4):534-42.
29. Onwuka CI, Ugwu EO, Dim CC, Menuba IE, Iloghalu EI, Onwuka CI. Prevalence and predictors of alcohol consumption during pregnancy in South-Eastern Nigeria. *Journal of clinical and diagnostic research: JCDR*. 2016;10(9):QC10.
30. Mpelo M, Kibusi SM, Moshi F, Nyundo A, Ntwenya JE, Mpondo BC. Prevalence and factors influencing alcohol use in pregnancy among women attending antenatal care in Dodoma region, Tanzania: a cross-sectional study. *Journal of pregnancy*. 2018;2018.
31. Namagembe I, Jackson LW, Zullo MD, Frank SH, Byamugisha JK, Sethi AK. Consumption of alcoholic beverages among pregnant urban Ugandan women. *Maternal and child health journal*. 2010;14(4):492-500.
32. Addila AE, Bisetegn TA, Gete YK, Mengistu MY, Beyene GM. Alcohol consumption and its associated factors among pregnant women in Sub-Saharan Africa: a systematic review and meta-analysis' as given in the submission system. *Substance abuse treatment, prevention, and policy*. 2020;15(1):1-14.
33. Hassan A. Household Food Insecurity and Mental Distress Among Pregnant Women in Southwestern Ethiopia: A Cross Sectional Study Design. *Food Insecurity and Disease: Apple Academic Press*; 2017. p. 49-66.
34. Geisner IM, Larimer ME, Neighbors C. The relationship among alcohol use, related problems, and symptoms of psychological distress: Gender as a moderator in a college sample. *Addictive Behaviors*. 2004;29(5):843-8.
35. Addila AE, Azale T, Gete YK, Yitayal M. The effects of maternal alcohol consumption during pregnancy on adverse fetal outcomes among pregnant women attending antenatal care at public health facilities in Gondar town, Northwest Ethiopia: a prospective cohort study. *Substance Abuse Treatment, Prevention, and Policy*. 2021;16(1):1-15.

PREVALENCE, STAGING AND ASSOCIATED FACTORS OF UTERO VAGINAL PROLAPSE AMONG GYNECOLOGIC PATIENTS IN KAFFA ZONE HOSPITALS, SOUTH WEST ETHIOPIA, 2021: A MULTI-CENTER CROSS-SECTIONAL STUDY

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ABSTRACT

BACKGROUND: Utero-vaginal prolapse is the descent of the uterus through the vaginal canal due to defects in the support structures of the uterus and vagina because of various factors

OBJECTIVE: This study assessed the prevalence, staging, and associated factors of utero vaginal prolapse among gynecologic patients in kaffa zone hospitals south west Ethiopia, 2021.

METHOD: Institutional-based cross-sectional study design was employed in kaffa zone hospitals among consecutively sampled 287 patients. The odds ratio with a 95% CI at a p-value <0.05 was used to declare the significance level.

RESULTS: Out of 287 study participants, 24(8.3%) were identified to have utero-vaginal prolapse. Being in age group 45 or above (AOR: 4.25, 95% CI: 1.17- 15.43), vaginal delivery for last birth, (AOR: 3.24; 95% CI: 1.01-10.4), staying in labor $\geq$ 24 hours for last birth (AOR: 3.31; 95% CI: 1.10- 9.98), being multi-gravida (AOR: 3.21; 95% CI: 1.11- 9.28) and body mass index <18.5 kg/m² of woman (AOR: 4.94, 95% CI: 1.44- 16.91) were significantly associated with utero-vaginal prolapse.

CONCLUSION: In this study, the prevalence of uterovaginal prolapse was relatively low. Advanced age, vaginal delivery, multi-gravidity, prolonged labor, and low BMI were significant contributing factors. Therefore, strengthening antenatal intrapartum care, promoting nutritional support, and establishing routine gynecological screening for high-risk women are strongly recommended to enable early detection and prevent disease progression

KEYWORDS: Utero-vaginal prolapse, associated factors, Kaffa zone, Ethiopia, gynecologic patients

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INTRODUCTION

Uterovaginal prolapse is a common gynecologic problem. It can occur at any age, but due to injuries to the pelvic floor muscles and fascia during delivery and age-related estrogen deficiency mostly it occurs in postmenopausal women. In young and nulliparous women might be caused by collagen insufficiency or genetically cervical lengthening¹.

Among women younger than 45 years of age, the global prevalence of genital prolapse is estimated to be 2% to 20%⁴. It is one of the most common reproductive morbidity in developing countries⁵. Even in developed countries like the United Kingdom, one out of every 1,000 women is admitted to the hospital due to utero-vaginal prolapse, and around 20% of women with this gynecological problem are awaiting major surgery⁶. In low income countries, the mean prevalence of pelvic organ prolapse is 19.7%⁷. In Africa, the prevalence of UVP varies by countries: 12.7% in Ghana⁸, 5.4% in south west Nigeria⁹, 64.6% in Tanzania¹⁰, according to a population-based study on POP and 22.3% in Ethiopia¹¹.

Women who are suffering from UVP experience a protruding mass inside or outside the vagina accompanied by difficulty sitting, walking, standing, and lifting objects. In developing countries, this can affect the social acceptance of women and can lead to physical and emotional isolation. Because of the stigma associated with UVP in low-income countries, women who are affected by it often hide their situation and do not seek care, and often suffer from the disease and its complications for a long time¹⁶. It is difficult to treat clinically because it requires resolving pelvic floor symptoms, improving quality of life, and minimizing complications¹⁷. It is the third most common reason for hysterectomy¹⁸, and surgery for the treatment of UVP have a high rate of reoperation¹⁹.

Utero vaginal prolapse and its complications have a significant economic burden for those affected. About 11% of American women have surgery for POPs or incontinence before the age of 79, with 29.2% likely to require additional surgery²⁰. In

Ethiopia, there is a significant variation in the magnitude of UVP within and between regions: 12.8% in Addis Ababa²², 22.3% in Gondar¹¹, and 42.3% in Axum²³.

Generally, this study is needed because of some reasons. Firstly, UVP is still a problem in low- and middle-income countries, particularly in Sub-Saharan African countries²⁴. As a result, assessing the prevalence and managing the risk factors of UVP early is critical to preventing its occurrence, lowering MMR, and improving maternal quality of life. Secondly, even though some research has been done in Ethiopia based on secondary data covering a small-scale area, the prevalence of UVP varies in each setting because there might be a lack of primary data in different studies, which enhances the variation in magnitude from setting to setting. Thirdly, despite the presence of a few studies regarding the prevalence and risk factors of UVP, there are some contradicting or inconsistent findings on some risk factors for UVP, like BMI^{25,26} and age²⁷, which demand further exploration. Due to these reasons, the investigators believe that there is a need to further investigation to assess the prevalence and risk factors of UVP. So, this study tried to identified the above gaps and assess the Prevalence, staging and associated factors of UVP among gynecologic patients in Kaffa zone hospitals, south west Ethiopia.

METHODS AND MATERIALS

Study Area and Period

This study was conducted among gynecologic patients attending in Kaffa zone hospitals. Kaffa is one of the 15 zones of Southern Nation Nationality People Region (SNNPR) and is located about 449 km southwest of Addis Ababa. There are three governmental hospitals in the kaffa zone, and the study was conducted in these three hospitals (Bonga Gebre-tsadik Shawo Memorial General Hospital, Wacha Primary Hospital, and Tello Primary Hospital). Bonga Gebre-tsadik Shawo Memorial General Hospital (BGSMGH) is located in Bonga town.

Study Design

An institution-based cross-sectional study was conducted.

Study Population

The study population was the selected women with gynecological problems in Kaffa zone Hospitals, South West Ethiopia.

Eligibility Criteria

All women attending the gynecology wards of the study hospitals during the study period were included in the study. Women who were unable to communicate were excluded from the study. Critically ill women were also excluded from the study. Additionally, women with a history of hysterectomy were excluded from the study.

Sample Size and Sampling Technique

Sample Size Determination

The sample size was calculated using a single population proportion formula based on the 22.3% prevalence of UVP in gynecologic hospital admissions, which was obtained from a study conducted in Gondar, Ethiopia¹¹.

Considering the following assumptions, z = standard normal distribution value at 95% confidence level of $z_{\alpha/2} = 1.96$ and margin of error (d) = 5%.

$$n = \frac{(z_{\alpha/2})^2 \cdot P(1-P)}{d^2}$$

Where; n = minimum sample size, p = estimated prevalence of UVP, $Z_{\alpha/2}$ = standard of normal variable, d = margin of error,

$$n = \frac{(1.96)^2 \cdot 0.223(1-0.223)}{(0.05)^2}$$

$n = 261$ then by adding 10% Contingency as non-response rate, $n = 287$ is the final sample size.

Sampling Technique

According to the Health Management Information System (HMIS) reports, the total sample size was allocated proportionally among the three

study hospitals based on the number of women with gynecologic conditions admitted to their gynecology wards during the reference period. Proportional allocation was performed using the formula $n_i = (N_i/N) \times n$, where n_i represents the sample size allocated to each hospital, N_i is the source population in each hospital, N is the total source population across all study hospitals, and n is the total calculated sample size. Finally, after calculating the sample size for each hospital, the study participants were selected by using the consecutive sampling technique

The diagnosis and staging of UVP were considered after the physical examination were done by a gynecologist, general practitioner, or IESO, and if there was a protrusion of mass and/or heaviness in the vagina, which should be documented on the patient's chart before admission.
digital scale

Study Variables

Dependent variable

Utero -vaginal prolapse

Independent variables

- ❖ Socio-demographic characteristics (Maternal, age, Residence, Religion, Educational status, Occupational status of respondents, Marital status), Medical and behavioral related variables (Chronic diarrhea, Chronic cough, Chronic constipation, Smoking, BMI)
- ❖ Gynecologic and obstetric related characteristics (Parity, Gravidity, Family planning, Duration of labor in last birth, Age at first marriage, Mode of delivery for last birth, Age at first pregnancy, Place of delivery for last child Duration of rest after last delivery)

Data Quality Assurance

Pre-testing was carried out on 5% of the sample size at Mizan Tepi University Teaching Hospital, which is nearer but outside the proposed study area. After pre-testing, the questionnaire was evaluated for clarity, understandability, length, and completeness.

Data processing and Analysis

After all the necessary data had been collected, the data was checked, coded, and entered into Epi-Data version 4.6, and the data from three hospitals were merged together and exported to SPSS (Statistical Package for Social Science) version 23 for analysis. For categorical variables, the results were reported as proportions and frequency tables. Variables with a p-value < 0.25 at 95% CI in the bivariate logistic regression were entered into a multivariable logistic regression³². Multiple logistic regressions were carried out by using the backward stepwise method to identify the factors associated with UVP in gynecologic patients. Then all the candidate variables were entered into a multivariate model since collinearity was not found between them. Finally, an AOR with a 95% CI and value <0.05 were considered as statistically significant.

Ethical Consideration

An ethical approval letter was secured from the Institutional Review Board (IRB) of Insitute Health of Jimma University (Ref.no: IHRPGJ/535/21). A permission letter was written to the Kaffa Zone Hospitals administration office. Written consent from each respondent was obtained after a detailed explanation of the main purpose of the study.

RESULTS

Socio demographic Characteristics

A total of 287 study participants were included in the study with response rate of 100%.

Among the two hundred eighty-seven participants, majority, 133(46.3%) was in the age group of 18-34 years and the minimum and maximum ages 21 and 53 years (see table 1).

Table 1: Socio demographic characteristics of the study participants in kaffa zone Hospitals October 6-December 6, 2021(n=287)

Variables	Category	Frequency (%)
Age of respondents	18-34 years	133(46.3)
	35-44 years	61(21.3)
	45 and above	93(32.4)
Religion	Orthodox	107(37.3)
	Protestant	104(36.2)
	Muslim	61(21.3)
	Catholic	12(4.2)
	Others *	3(1.0)
Residence	Rural	142(49.5)
	Urban	145(50.5)
Level of education	Unable to read and write	63(22)
	Read and write only	60(20.9)
	Primary education	67(23.4)
	Secondary education	65(22.6)
	Higher education and above	32(11.1)
Occupational status	Housewife	63(22)
	Farmer	53(18.5)
	Merchant	49(17.1)
	Daily laborer	9(3.1)
	Government employee	52(18.1)
	Private employee	61(12.2)
Marital status	Married	255(88.9)
	Single	4(1.4)
	Divorced	19(6.6)
	Widowed	9(3.1)

*Others =Traditional religion ("barri kocho")

Gynecologic and Obstetric Characterstics of the Study Participants

Most (37.7%) of the participants, were multiparous had vaginal delivery (51%) And delivered at health institutions (70%) (see table 2).

Table 2: Gynecologic and obstetric related characteristics of the study participants in kaffa zone hospitals October 13 -December 13, 2021(n=287)

Variables	Category	Frequency (%)
Experience of pregnancy	Yes	284(98.1)
	No	3(1.1)
Age at first pregnancy	≤18 years	5(1.8)
	>18 years	279(98.2)
Gravidity	Multigravida	114(40.1)
	Primi-gravida	170(59.9)
Parity	Multiparous	107(37.7)
	Primi-parous	177(62.3)
Mode of delivery for last birth	Vaginal delivery	145(51.1)
	Cesarean-section	139(48.9)
Place of delivery for last birth	Home	85 (29.9)
	Health institution	199 (70.1)
Rest after last delivery	≤ 42 days	139(48.9)
	>42 days	145 (51.1)
Duration of labor for the last birth	≥ 24 hours	119(41.9)
	<24 hours	165(58.1)
Family planning	Yes	169(58.9)
	No	118(41.1)

Medical and Behavioral Characterstics of the Study Participants

The majority of participants, 278(96.9%) had no history of smoking. However, 7(2.4%) of the respondents were exposed to other smokers, only 2(0.7%) had a previous history of smoking. Of the total number of participants, some of them had medical problems like chronic cough, chronic constipation, and chronic diarrhea that were present

in 35 (12.2%), 85 (29.6%), and 73 (25.4%) of these patients, respectively. Regarding participants' BMI, 108 (37.6%) of the respondents had a BMI of 18.5-24.9 kg/m² while the remaining respondents had BMI of above 25 kg/m² and below 18.5 kg/m² 107 (37.3%) and 72 (25.1%), respectively (Table 3).

Table 3: Medical and behavioral characteristics of the study participants in Kaffa zone Hospitals October13- December 13, 2021(n=287)

Variables	Category	Frequency (%)
History of smoking	Former	2 (0.7)
	Current	0 (0)
	Passive	7 (2.4)
	Never	278 (96.9)
History of chronic cough	Yes	35(12.2)
	No	252(87.8)
History of chronic constipation	Yes	85(29.6)
	No	202 (70.4)
History of chronic diarrhea	Yes	73 (25.4)
	No	214 (74.6)
Body mass index in kg/ m2	<18.5 kg/ m2	72 (25.1)
	18.5-24.9 kg/ m2	108 (37.6)
	25 and above	107(37.3)

5.4 Prevalence of Utero-vaginal Prolapse

Out of the two hundred eight seven patients attended in the selected hospitals who underwent gynecological evaluation, 24 were identified to have UVP resulting in a prevalence of 8.3%. The overall distribution of UVP in participants who lives in rural area is higher, The R: U ratio is 3.8:1, with rural accounting for 19 cases and urban 5 cases. The distribution of UVP in those who used family planning was 14(58.3%), in respondents who had a history of chronic cough was 5(20.8%), had history of chronic diarrhea was 4 (16.7%), had chronic constipation was 11(45.8%), and in those participants who had no history of smoking was 20 (83.3%).

Stage of Utero-vaginal Prolapse

Gynecologic evaluation of the study participants revealed 4 different types of staging, Of the 24 patients with utero vaginal prolapse, the majority 11 (45.8%) had stage IV UVP, 8(33.4%) had stage III, 3(12.5%) had stage II and 2(8.3%) had stage I utero vaginal prolapse and None of the women examined had stage 0 pelvic prolapse (Figure 2).

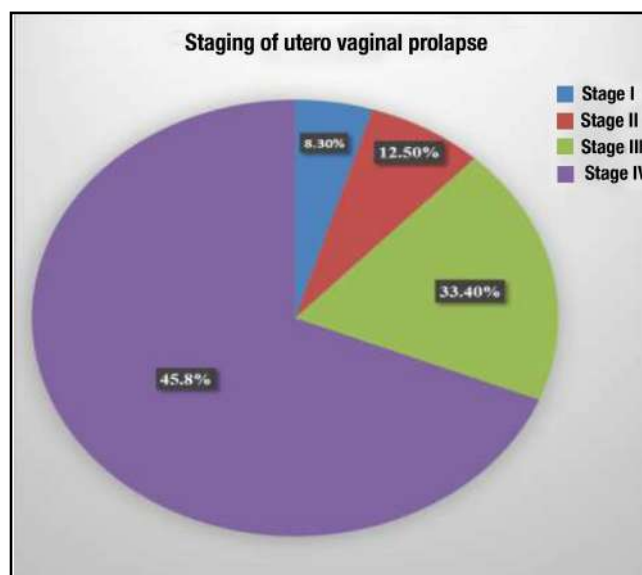


Figure 1: Distribution of UVP based on staging among admitted gynecologic patients in Kaffa Zone hospitals October 13, December 13 2021(n=287)

Factors Associated with Utero-vaginal Prolapse in Gynecologic Patients

Bi-variable and multivariable logistic regressions were used to assess factors associated with utero vaginal prolapse among gynecologic patients in the selected hospitals. Age, residence, mode of delivery in last birth, place of delivery in last birth, gravidity, duration of labor in last birth, rest after last delivery, chronic cough, chronic constipation, and body mass index showed significant association in the bi-variable model and were selected as candidates for multivariable logistic regression. Those candidates were entered into the multivariable model and age, mode of delivery for last birth, gravidity, duration of labor for last birth, and body mass index were found to be significantly associated with the development of UVP.

The odds of developing UVP among gynecologic patients whose age 45 and above was 4.25 times (AOR= 4.25, 95% CI: 1.17-15.43) when compared to those patients whose age between 18 and 34. History of vaginal delivery for the last birth was also one of the significantly associated variables with UVP (AOR = 3.24, 95% CI: 1.01- 10.4). The finding indicated that, those patients who had a history of vaginal delivery for the last birth were 3.24 times more likely to develop UVP compared to those patients who had a history of caesarian section delivery for their last birth.

Multi gravidity increases the chance of developing UVP among respondents by 3.21 times (AOR= 3.21, 95% CI: 1.11- 9.28) when compared to those respondents who had a history of Primi-gravida. In addition, the duration of labor for the last delivery was also found to raise the likelihood of developing UVP. Hence, those respondents who had a duration of labor for last birth ≥ 24 hours had 3.31 odds of developing UVP (AOR= 3.31, 95% CI: 1.10-9.98) when compared with those respondents who had duration of labor for thier last birth<24 hours

Lastly, the body mass index of the respondent was found to be significantly associated with the development of UVP among participants. Accordingly, those respondents whose BMI <18.5 kg/m² were 4.94 times (AOR=4.94, 95%CI: 1.44-16.91) more likely to develop UVP when compared with those respondents whose BMI 18.5-24.9 kg/m² (Table 4).

Table 4: Bi-variable and multi-variable binary logistic regression results of the factors associated with UVP in Kaffa zone Hospitals October 13, December 13 2021(n=287)

Independent variable	Category	UVP		COR (95 %CI)	P value	AOR (95 %CI)	P value
		Yes	No				
Age	18-34 years	4	130	1			
	35-44 years	6	55	3.51(0.95-12.9)	0.059	2.15(0.49-9.39)	0.30
	45 and above	14	79	5.71(1.81-17.9)	0.003*	4.25(1.17-15.43)	0.028**
Residence	Urban	5	140	1			
	Rural	19	124	4.32(1.56-11.83)	0.005*	2.94(0.88-9.79)	0.078
Mode of delivery for last birth	Cesarean-section	5	134	1			
	Vaginal delivery	19	126	4.04(1.46-11.18)	0.007*	3.24(1.01-10.4)	0.047**
Place of delivery for last birth	Health institution	10	190	1			
	Home	14	71	3.72(1.58-8.77)	0.003*	2.66(0.94-7.48)	0.063
Gravidity	Primi-gravida	7	164	1			
	Multigravida	17	97	4.08(1.63-10.19)	0.003	3.21(1.11-9.28)	0.031**
Rest after last delivery	>42 days	7	139	1			
	≤ 42 days	17	122	2.74(1.10-6.84)	0.03*	1.87(0.59-5.92)	0.28
	R54						
Duration of labor for last birth	<24 hours	7	159	1			
	≥ 24 hours	17	102	3.76(1.50-9.39)	0.005*	3.31(1.10-9.98)	0.033**
Chronic cough	Yes	5	30	2.04(0.71-5.87)	0.185*	2.61(0.61-11.14)	0.19
	No	19	234	1			
Chronic constipation	Yes	11	75	2.16(0.92-5.04)	0.07*	2.73(0.92-8.05)	0.068
	No	13	189	1			
Body mass Index	<18.5 kg/ m2	11	61	2.25(0.85-5.97)	0.099*	4.94(1.44-16.91)	0.011**
	18.5-24.9 kg/ m2	8	101	1			
	25 kg/ m2 and above	5	102	0.61(0.19-1.94)	0.40	0.88(0.22-3.46)	0.86

NB. * = $P \leq 0.25$, ** = $P < 0.05$, AOR= Adjusted Odds Ratio, CI= Confidence Interval, 1= reference Hosmer Lemshow test=0.46

DISCUSSION

The current study showed that the prevalence of UVP among admitted gynecologic patients was 8.3%. The prevalence of uterovaginal prolapse observed in this study is comparable to reports from China (9.6%) and rural Pakistan (10.3%), but substantially lower than those reported in Nepal (35.97%) and Brazil (52.3%)³⁶. The variation may be explained by differences in population demographics (i.e., racial or ethnic), and cultural diversity with time. Our finding is also lower than that reported in a study conducted in Gondar, which found a prevalence of 22.3%.¹¹ The variation might be due to the fact that the study done in Gondar was a retrospective analysis chart review, and many patients were referred from different parts of the region, for better evaluation and management.

In contrast, the prevalence of UVP in the present study was higher than that reported in studies from South India (1.6%)³⁷, Nepal (2.6%)³⁸, southwest Nigeria (5.4%)⁹, and Bangladesh (4.2%)³⁹. The observed differences may be attributed to variations in study design, study setting, participant characteristics (particularly age), and maternal healthcare utilization. Additionally, genetic and environmental factors may have contributed to the variation in prevalence across countries. The most commonly diagnosed stage in the current study was stage IV followed by Stage III and Stage II. This finding is comparable with that reported by Shireen Akhter Khanam, et al. in Bangladesh, identified stage IV (76%), Stage III (9%), Stage II (6%), Stage I (6%) and stage 0 (3%)³⁹.

In contrast to this, a study done in Ghana revealed that Stage II was the commonest symptomatic UVP which revealed that 33.3%⁸. Our finding is also not comparable with a study done in Brazil regarding the stage of UVP, which revealed that the prevalence of UVP in relation to stage were as stage I (27.8%), stage II (23.1%), and stage III (1.4%) and none of the women examined had stage

IV pelvic organ prolapse³⁶. The variation may be due to delayed treatment of POP due to lack of support, low income, and fear of social stigma across the countries. A study conducted in Turkey found that 27.1% of prolapses were stage II⁴⁰. A similar study in China revealed that symptomatic POP-Q stage II was the most common which shows that 7.52%³⁴. The possible reason for the variation in this finding may be due to environmental and geographical factors.

This study revealed that several factors like age of the respondents, mode of delivery for the last birth, number of pregnancies (gravidity), duration of labor for the last delivery, and BMI of the respondents were associated with the development of UVP.

In this study, the age of the respondents was found to be significantly associated with UVP. Women with the age of 45 and above were more likely to develop UVP than women under the age of 18-34 years. This finding is supported by studies conducted in Korea⁴¹, Brazil⁴² and USA⁴³. This might be due to; increasing age which leads to the age-related loss of muscle function known as Sarcopenia⁴⁴. As a result, loss of strength in pelvic muscles and ligaments occurs, which increases the risk of vaginal prolapse with age. In addition to this, the hormonal changes related to menopause, which are common in this age group, may have an effect on prolapse. Moreover, women of advanced age had reduced collagen content, lower collagen solubility, and higher collagen turnover, all of which contribute to the progression and development of UVP⁴⁵. In addition, the advanced age of the respondents, especially during the menopausal state due to a decrease in pelvic connective tissue resilience and genital atrophy, plays the most important role in the pathogenesis of utero-vaginal prolapse⁴⁶. In contrast, a study conducted in North West Ethiopia reported a contradictory finding²⁷. This might be due to a small sample size that may fail to show associations due to low statistical power.

Vaginal delivery for the last birth is also one of the independent factors of UVP in the current study. Specifically, women with vaginal delivery for their last birth had higher odds of experiencing UVP

than women with cesarean-section delivery for thier last birth. Different studies reported that the risk of UVP increases with vaginal delivery⁴⁷⁻⁵⁰. More over our study is consistent with studies done in USA⁵¹ and Australia⁵². The possible justification could be that following vaginal delivery, UVP is thought to develop as a result of the structural disruption caused by overstretching, compression, and avulsions during childbirth, or as a result of levator ani muscle injury, particularly to the pubococcygeal muscle⁵³. The current study, also revealed that the number of pregnancies (gravidity) was one of the significantly associated variables with UVP. Women with multigravida, were more likely risk to develop UVP than women with primigravida. Our finding is supported by a report done in Gambia¹⁶ and Ethiopia⁵⁵. This could be due to repeated pregnancy and childbirth that damage the sphincter and ligaments, sometimes failing to regain full strength and elasticity. In addition, as abdominal pressure increases, the length and angle of the cardinal and sacral ligaments change depending on the force exerted on the pelvic organs⁵⁶. The duration of labor for the last birth was found to be significantly associated with UVP. The duration of labor greater than or equal to 24 hours was significantly associated with the development of utero-vaginal prolapse. This finding is consistent with previous reports from Nepal⁵⁷, Tanzania¹⁰, and Nigeria⁵⁸. This could be because prolonged labor causes more damage to the supportive structures of the uterus and other pelvic organs. Prolonged labor can also be complicated by obstructed labor, which might need aggressive interventions like operative deliveries that might worsen damage to the supportive structure of the pelvic organ which increase the occurrence of POP⁵⁹. Moreover, the most common cause of levator ani muscle damage is prolonged labor. The principal contributors to the levator hiatus (weakest area in the pelvic floor) are the levator ani and puborectalis, which play a crucial and central role in the management of urination and defecation. This study has several limitations. First, the use of self-reported data may

have introduced recall bias. Second, the relatively small sample size may limit the generalizability of the findings. Finally, the cross-sectional study design precludes the establishment of causal relationships between the independent and dependent variable

Conclusion and Recommendations

The magnitude of Utero-vaginal prolapse was low in this study. Older age, vaginal delivery, prolonged labor, multigravidity, and undernutrition were independently associated with the condition. Targeted preventive strategies, including improved intrapartum care, nutritional support, and early identification of women at increased risk, are warranted to reduce the burden of utero-vaginal prolapse.

Abbreviations:

BMI	Body mass Index,
CI	Confidence interval,
CSI	Central Statistical agency
ETB	Ethiopian Birr,
FP	Family planning,
G.C	Gregorian calendar,
GP	General practitioner,
HMIS	Health management information system,
IRB	Institutional review board,
IESO	Integrated emergency surgery &obstetric,
JUMC	Jimma university Medical center,
OR	Odd ratio,
POP	pelvic organ prolapses,
SNNPR	South nation nationality people region,
SPSS	Statistical package for social science,
UNPF	United nation population fund agency,
UVP	Utero-vaginal prolapse

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article.

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Disclosure

The authors report no conflicts of interest in this work

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REFERENCES

1. Ministry of Health and Family Welfare (Government of India). Standard treatment guide lines Ministry of Health & Family Welfare. 2016;(June):1–108.
2. Dutta D. text book of obstetric. Vol. 9th editio. 2020. 321–325 p.
3. Parvatharthini K VA. Clinical epidemiological study of uterine prolapse. *Int J Reprod Contraception, Obstet Gynecol.* 2018;8(1):79.
4. Bonetti TR, Erpelding A, Pathak LR. Listening to “felt needs”: Investigating genital prolapse in Western Nepal. *Reprod Health Matters.* 2004;12(23):166–75.
5. Marahatta RK SA. Genital prolaps in women of Bhakatapur,. *Nepal Med collage J.* 2003;5(1)(PMID16583972):31–3.
6. Doshani A, Teo REC, Mayne CJ, Tincello DG. Clinical Review on Uterine prolapse. *Br Med J.* 2007;335(7624):818–23.
7. Walker GJA, Gunasekera P. Pelvic organ prolapse and incontinence in developing countries: Review of prevalence and risk factors. *Int Urogynecol J.* 2011;22(2):127–35.
8. Wusu-Ansah, Osei K and Opare-Addo HS. Pelvic organ prolapse in rural Ghana. -. *Int J Gynecol Obstet.* 2008;103(2):121–4.
9. Awotunde OT, Fehintola AO, Ogunlaja OA, Olujide LO, Aaron OI, Bakare B OI. An audit of uterovaginal prolapse in Ogbomoso, south-west Nigeria. *Res J Heal Sci.* 2016;4(1):31–6.
10. Masenga GG, Shayo BC, Rasch V. Prevalence and risk factors for pelvic organ prolapse in Kilimanjaro, Tanzania: A population based study in Tanzanian rural community. *PLoS One.* 2018;13(4):1–13.
11. Dessalegn Mekonnen B. Prevalence and Factors Associated with Uterine Prolapse among Gynecologic Patients at University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia. *J Women’s Heal Care.* 2020;9(4):1–8.
12. Elsayed FM, Hassan M, Manal A, Sayed A. Knowledge and Practices of women regarding Risk Factors of Uterine Prolapse. *IOSR J Nurs Heal Sci.* 2016;5(6):60–7.
13. Smith FJ, Holman CDAJ, Moorin RE, Tsokos N. Lifetime risk of undergoing surgery for pelvic organ prolapse. *Obstet Gynecol.* 2010;116(5):1096–100.
14. Broms I, Ingvarsson A, Segesten K, Janson-fagring A. Nepalese women suffering from uterine prolapse. 2012;
15. Detollenaere RJ, den Boon J, Stekelenburg J, Alhafidh AHH, Hakvoort RA, Vierhout ME, et al. Treatment of uterine prolapse stage 2 or higher: A randomized multicenter trial comparing sacrospinous fixation with vaginal hysterectomy (SAVE U trial). *BMC Womens Health.* 2011;11:2–7.
16. Scherf C, Morison L, Fiander A, Ekpo G, Walraven G. Epidemiology of pelvic organ prolapse in rural Gambia, West Africa. *BJOG An Int J Obstet Gynaecol.* 2002;109(4):431–6.
17. Siddiqui NY, Edenfield AL. Clinical challenges in the management of vaginal prolapse. *Int J Womens Health.* 2014;6(1):83–94.
18. Jelovsek JE, Maher C, Barber MD. Pelvic organ prolapse. *Lancet.* 2007;369(9566):1027–38.
19. Vergeldt TFM, Weemhoff M, IntHout J, Kluivers KB. Risk factors for pelvic organ prolapse and its recurrence: a systematic review. *Int Urogynecol J.* 2015;26(11):1559–73.
20. Tehrani FR, Hashemi S, Simbar M, Shiva N. Screening of the pelvic organ prolapse without a physical examination ; (a community based study). *BMC.* 2011;11(48):1472–6874.
21. Sah DK, Doshi NR, Das CR. Vaginal hysterectomy for pelvic organ prolapse in Nepal. *Kathmandu Univ Med J.* 2010;8(30):281–4.
22. Mekuria Z, Mengesha A, Seyoum G. Prevalence and Associated Factors of Utero-Vaginal Prolapse in AddisAbaba , Ethiopia : A Cross-Sectional. 2021;1–16.
23. Weldemariam TB. Epidemiology of utero - vaginal prolapse in Aksum University College of Health Sciences and Comprehensive Specialized Hospital (AKU-CHS-CSH), North Ethiopia. *Drug Invent Today.* 2019;12(7):1580–4.
24. Vos T, Flaxman A, Naghavi M. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet.* 2012;380(9859):2163–96.
25. Asresie A, Admassu E, Setegn T. Determinants of pelvic organ prolapse among gynecologic patients in Bahir Dar, North West Ethiopia: A case-control study. *Int J Womens Health.* 2016;8:713–9.
26. Whitcomb EL, Rortveit G, Brown JS, Creasman JM, Thom DH, Van Den Eeden SK, et al. Racial differences in pelvic organ prolapse. *Obstet Gynecol.* 2009;114(6):1271–7.
27. Megabiaw B, Adefris M, Rortveit G, Degu G, Muleta M, Blystad A, et al. Pelvic floor disorders among women in Dabat district, northwest Ethiopia: A pilot study. *Int Urogynecol J.* 2013;24(7):1135–43.
28. Bonnie L Bermas. Musculoskeletal changes and pain during pregnancy and postpartum. 2017.

29. Federal Democratic Republic of Ethiopia Population Census Commission. Summary and Statistical Report of the 2007 Population and Housing Census. Federal Democratic Republic of Ethiopia Population Census Commission. Addis Ababa, Ethiopia; 2008.
30. Charan J, Biswas T. How to calculate sample size for different study designs in medical research? *Indian J Psychol Med.* 2013;35(2):121-6.
31. Weir CB, Jan A. BMI Classification Percentile And Cut Off Points. *StatPearls.* 2019;(November).
32. Sperandei S. Lessons in biostatistics Understanding logistic regression analysis. 2014;
33. Paneru DP. A study of prevalence and associated factors of Uterus Prolapse in Doti District of Nepal. *Indian J Public Heal Res.* 2013;4(July):53.
34. Pang H, Zhang L, Han S, Li Z, Gong J, Liu Q, et al. A nationwide population-based survey on the prevalence and risk factors of symptomatic pelvic organ prolapse in adult women in China – a pelvic organ prolapse quantification system-based study. *BJOG An Int J Obstet Gynaecol.* 2021;128(8):1313–23.
35. Jokhio AH, Rizvi RM, MacArthur C. Prevalence of pelvic organ prolapse in women, associated factors and impact on quality of life in rural Pakistan: Population-based study. *BMC Womens Health.* 2020;20(1):1–7.
36. Horst W, do Valle JB, Silva JC, Gascho CLL. Pelvic organ prolapse: prevalence and risk factors in a Brazilian population. *Int Urogynecol J.* 2017;28(8):1165–70.
37. Sumathi, N and Nandhini C. Uterovaginal Prolapse-A Study In South Indian Women. *Sch J App Med Sci.* 2017;5(4F):1698–704.
38. Shrestha, AD and Lakhey, B and Sharma, J and Singh, M and Shrestha, B and Singh S. Prevalence of uterine prolapse amongst gynecology OPD patients in tribhuvan university teaching hospital in nepal and its socio-cultural determinants, Res Cent Women. 2012;1–21.
39. Khanam SA, Rashid F, Sharmin S, Sharmin S, Satter K, Nigad A. Factors Responsible for Utero-Vaginal Prolapse Among Women Attending at a District Hospital of Bangladesh. *Chattagram Maa-O-Shishu Hosp Med Coll J.* 2020;18(2):33–6.
40. Aytan H, Ertunc D, Tok EC, Yalla O, Nazik H. Prevalence of pelvic organ prolapsed and related factors a general female population in turkey. *J Turk Soc Obs Gynecol.* 2014;11(3):176–80.
41. Kim CM, Jeon MJ, Chung DJ, Kim SK, Kim JW, Bai SW. Risk factors for pelvic organ prolapse. *Int J Gynecol Obstet.* 2007;98(3):248–51.
42. Brito LGO, Pereira GMV, Moalli P, Shynlova O, Manonai J, Weintraub AY, et al. Age and/or postmenopausal status as risk factors for pelvic organ prolapse development: systematic review with meta-analysis. *Int Urogynecol J.* 2021;
43. Swift SE, Pound T, Dias JK. Case-control study of etiologic factors in the development of severe pelvic organ prolapse. *Int Urogynecol J.* 2001;12(3):187–92.
44. Rolland Y, Czerwinski S, Van Kan GA, Morley JE, Cesari M, Onder G, et al. Sarcopenia: Its assessment, etiology, pathogenesis, consequences and future perspectives. *J Nutr Heal Aging.* 2008;12(7):433–50.
45. Phillips CH, Anthony F, Benyon C, Monga AK. Collagen metabolism in the uterosacral ligaments and vaginal skin of women with uterine prolapse. *BJOG An Int J Obstet Gynaecol.* 2006;113(1):39–46.
46. Reay Jones NHJ, Healy JC, King LJ, Saini S, Shousha S, Allen-Mersh TG. Pelvic connective tissue resilience decreases with vaginal delivery, menopause and uterine prolapse. *Br J Surg.* 2003;90(4):466–72.
47. Dietz HP. Pelvic floor ultrasound: a review. *Am J Obstet Gynecol [Internet].* 2010;202(4):321–34. Available from: <http://dx.doi.org/10.1016/j.ajog.2009.08.018>
48. Dietz HP, Wilson PD. Childbirth and pelvic floor trauma. *Best Pract Res Clin Obstet Gynaecol.* 2005;19(6):913–24.
49. Dietz HP. Pelvic floor trauma in childbirth. *Aust New Zeal J Obstet Gynaecol.* 2013;53(3):220–30.
50. Memon H, Handa VL. Pelvic floor disorders following vaginal or cesarean delivery. *Curr Opin Obstet Gynecol.* 2012;24(5):349–54.
51. LH. Q, A. M, SH. S, RE. G, VL. H. Vaginal parity and pelvic organ prolapse. *J Reprod Med Obstet Gynecol.* 2010;55(3–4):93–8.
52. Shek KL, Dietz HP. Intrapartum risk factors for levator trauma. *BJOG An Int J Obstet Gynaecol.* 2010;117(12):1485–92.
53. Kearney R, Miller J. Vaginal Birth. *Obs Gynecol.* 2006;107(1):144–9.
54. Dietz HP, Gillespie AVL, Phadke P. Avulsion of the pubovisceral muscle associated with large vaginal tear after normal vaginal delivery at term. *Aust New Zeal J Obstet Gynaecol.* 2007;47(4):341–4.
55. Lema Z. Determinants of Pelvic Organ Prolapse among Gynecological Cases in Wolaita Sodo University Referral Teaching Hospital , Southern Ethiopia : A Case Control Study. 2015;5(21):1–10.
56. Van Geelen H, Ostergard D, Sand P. A review of the impact of pregnancy and childbirth on pelvic floor function as assessed by objective measurement techniques. *Int Urogynecol J.* 2018;29(3):327–38.

57. Thapa S, Angdembe M, Chauhan D, Joshi R. Determinants of pelvic organ prolapse among the women of the western part of Nepal: A case-control study. *J Obstet Gynaecol Res.* 2014;40(2):515–20.
58. Eleje G, Udegbumam O, Ofojebe C AC. Determinants and management outcomes of pelvic organ prolapse in a low resource setting. *Ann Med Heal Sci Res.* 2014;4(5):796–801.
59. Fitzpatrick M, O’Herlihy C. The effects of labour and delivery on the pelvic floor. *Best Pract Res Clin Obstet Gynaecol.* 2001;15(1):63–79.
60. Marsoosi V, Jamal A, Eslamian L, Oveisi S, Abotorabi S. Prolonged second stage of labor and levator ani muscle injuries. *Glob J Health Sci.* 2015;7(1):267–73.
61. ProgettoMenopausa Italia Study Group. Risk factors for genital prolapse in non-hysterectomized women around menopause: Results from a large cross-sectional study in menopausal clinics in Italy. *Eur J ObstetGynecolReprodBiol.* 2000;93(2):135- 40.
62. Babraj JA, Cuthbertson DJR, Smith K, Langberg H, Miller B, Krogsgaard MR, et al. Collagen synthesis in human musculoskeletal tissues and skin. *Am J Physiol - Endocrinol Metab.* 2005;289(5 52-5).
63. Bohlin KS, Ankardal M, Nüssler E, Lindkvist H, Milsom I. Factors influencing the outcome of surgery for pelvic organ prolapse. *Int Urogynecol J.* 2018;29(1):81–9.
64. Miedel A, Tegerstedt G, Mæhle-Schmidt M, Nyrén O, Hammarström M. Nonobstetric risk factors for symptomatic pelvic organ prolapse. *Obstet Gynecol.* 2009;113(5):1089–97.
65. Sauerland S, Korenkov M, Kleinen T, Arndt M, Paul A. Obesity is a risk factor for recurrence after incisional hernia repair. *Hernia.* 2004;8(1):42–6.

PRENATAL DIAGNOSIS OF A GIANT PLACENTAL CHORIOANGIOMA WITH FAVORABLE MATERNAL AND NEONATAL OUTCOMES: A CASE REPORT AND LITERATURE REVIEW

Elisha Mmari¹, Francis Kwetukia², Editha Timoth³, Witness Wenga⁴

ABSTRACT

INTRODUCTION: Placental chorioangioma is the most common benign tumor of the placenta. Although most lesions are small and asymptomatic, giant chorioangiomas (>5 cm) are rare and may result in serious maternal and fetal complications including polyhydramnios, fetal anemia, hydrops fetalis, and preterm delivery. Early diagnosis using ultrasonography and color Doppler is essential for appropriate surveillance and timely intervention.

CASE PRESENTATION: A 22-year-old primigravida at 36 weeks of gestation was referred after routine obstetric ultrasound detected a placental mass. The ultrasound showed a 6.5×7.5 cm vascular placental lesion arising near umbilical cord insertion, consistent with a giant chorioangioma, together with polyhydramnios. Initial fetal Doppler assessment showed no evidence of fetal anemia. The patient was managed conservatively with close maternal and fetal surveillance. During admission, the tumor enlarged, polyhydramnios worsened, and middle cerebral artery peak systolic velocity suggested fetal anemia. An emergency cesarean section was performed because of non-reassuring fetal status. A healthy female infant weighing 2.7 kg was delivered and was successfully treated for neonatal anemia with blood transfusion. Histopathological examination confirmed placental chorioangioma. Both mother and infant were discharged in good clinical condition.

CONCLUSION: Giant Placental chorioangioma is associated with significant maternal and fetal morbidity. Careful antenatal surveillance using ultrasonography and color Doppler allows timely recognition of complications and appropriate management. This case demonstrates that favorable maternal and neonatal outcomes can still be achieved through close monitoring and timely delivery even in resource-limited settings.

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INTRODUCTION

Placental chorioangioma is a benign tumor that arises from the abnormal proliferation of vessels from the chorionic mesenchymal tissue. It infiltrates the stroma of enlarged placental villi, predominantly perfusing it with fetal circulation. Most of these tumors are observed in the third trimester and less commonly in the second trimester of pregnancy as solitary or multiple nodules¹.

Placental chorioangioma is the most common tumor of the placenta, with a reported prevalence of 1% of all pregnancies². However, many authors argue that their true prevalence remains unknown since most are diagnosed incidentally by antenatal ultrasonography examination, and many are undetected due to their small and innocuous size³. In placental chorioangioma, the clinical significance is determined by the tumor size. Most of the tumors are small, less than 4cm, and are usually asymptomatic and remain undiagnosed. In contrast, large chorioangiomas larger than 5cm in diameter are rare, with a prevalence ranging from 1:9,000 to 1:50,000, and are often associated with adverse maternal and fetal outcomes⁴.

Complications are mainly associated with large chorioangioma, which are associated with significant arteriovenous shunting within the placenta, leading to fetal anemia, high output cardiac failure, fetal hydrops, polyhydramnios, fetal distress, intrauterine growth restriction, and stillbirths. Complications such as fetal microangiopathic anemia and thrombocytopenia can also occur due to sequestration of red blood cells and platelets by the tumor. The increased urine output with transudate from the tumor vessels across the chorionic plate is associated with fetal hyperdynamic circulation caused either by fetal anemia or shunting of blood to placental chorioangioma, leading to polyhydramnios, which in turn, can cause maternal discomfort due to uterine overdistention, an increased risk of preterm labor, preterm prelabor rupture of membrane, abruptio placenta, and postpartum hemorrhage^{4,5}. The exact cause of placental chorioangioma is

unknown; however, it is believed to be caused by malformation of primitive angioblastic tissue of the early placenta and has no malignant potential.

The main determinants of the prognosis of the outcomes in placental chorioangioma are the size of the mass and the presence of fetal hydrops, which will impact the pregnancy management, such as frequent visits and the need for antenatal fetal surveillance³.

This report aims to describe the successful conservative management of giant placental chorioangioma complicated by severe polyhydramnios and suspected fetal anemia in a resource-limited setting. The case highlights the importance of early prenatal diagnosis, close maternal and fetal surveillance, timely obstetric intervention, and the challenges encountered when advanced fetal therapeutic procedures are unavailable.

Case presentation

A 22 - year-old primigravida female at gestational age of 36 weeks, was referred from a primary health facility after a routine obstetric ultrasound identified placental mass of uncertain origin. The pregnancy had been uneventful, and she reported normal fetal movements. She had attended regular antenatal care since 1 weeks of gestation, and routine antenatal investigations were unremarkable. On admission, the patient was in good general condition with normal vital signs. Obstetric examination revealed a singleton pregnancy in breech presentation with fundal height of 36cm and a fetal heart rate of 143 beats/minute.

A transabdominal ultrasound was done, which revealed a singleton viable pregnancy at 36 weeks and 3 days of gestation with polyhydramnios (single deepest pocket (SDP) of 10cm). A well-circumscribed hypoechoic placental mass measuring 6.5cm×7.5 cm was identified near the umbilical cord insertion on the fetal surface of the placenta. Color Doppler examination showed marked vascularity within lesion, consistent with a giant chorioangioma (Image 1). There were no sonographic signs of hydrops

fetalis. Doppler assessment revealed an MCA-PSV of 43.84 cm/s (1.0 MoM for gestational age, <1.5 MoM, which was below the threshold suggestive of fetal anemia. However, interpretation of MCA-PSV after 35 weeks of gestation loses its mathematical correlation with fetal hemoglobin levels. This results in a higher rate of false positives (incorrectly

predicting anemia).To confirm severe anemia at this stage, doctors usually rely on amniocentesis or deliver the fetus if maturity allows. Umbilical artery Doppler findings were normal. Baseline laboratory investigations were unremarkable except for elevated maternal serum Alpha-fetoprotein (AFP) (335.3 ng/mL) and beta-human chorionicgonadotropin (hCG) (54,297 mIU/mL).

Table 1:Initial work-ups were done as shown below;

TEST	RESULTS	NORMAL RANGE
Hemoglobin	13.0 g/dl	>11g/dL
MCV	86.4	80-100fL
MCHC	33	32-36g/dL
Platelets	357 x 10 ⁹ /L	150-450 x 10 ⁹ /L
Blood group/Rh typing	O positive	
Hepatitis B	Negative	
HIV	Negative	
Syphilis	Non-reactive	
hCG	54,297 mIU/mL	<5mIU/mL
AFP	335.3 ng/mL	10 to 150 ng/mL



Image 1: Ultrasound image showing B-mode picture of polyhydramnios and placental mass giant chorioangioma of 6.5 cm x 7.5 cm, well-circumscribed mass extending beyond the placental margin.

After counseling regarding the diagnosis, potential maternal and fetal complications, and available management options, the patient was admitted for close maternal and fetal surveillance. Antenatal corticosteroids were administered through intramuscular injection of dexamethasone 6mg 12 hourly for 48 hours to accelerate fetal lung maturity in anticipation of possible preterm delivery. Therapeutic amnioreduction was considered; however, the procedure could not be performed because the hospital lacked the fetal medicine specialist.

During hospitalization, the fetus was closely monitored with serial ultrasonography, Doppler

assessment, and fetal surveillance. Three days after admission, polyhydramnios had increased despite a reassuring fetal condition. On the 6th day of admission (36 weeks and 6 days of gestation), she developed persistent abdominal pain, marked abdominal distention, and reduced fetal movements. Repeat ultrasonography demonstrated enlargement of the placental mass of 9cm by 10cm with worsening polyhydramnios (single deepest pocket of 15 cm). MCA-PSV had increased to 74.26 cm/s (1.7 MoM), suggesting fetal anemia (Image 2), while the biophysical profile score had decreased to 2/10, indicating non-reassuring fetal status.



Image 2: Ultrasound image showing B-mode picture of increased size of the placental mass (giant chorioangioma) of 9 cm x 10 cm, well-circumscribed mass extending beyond the placental margin.

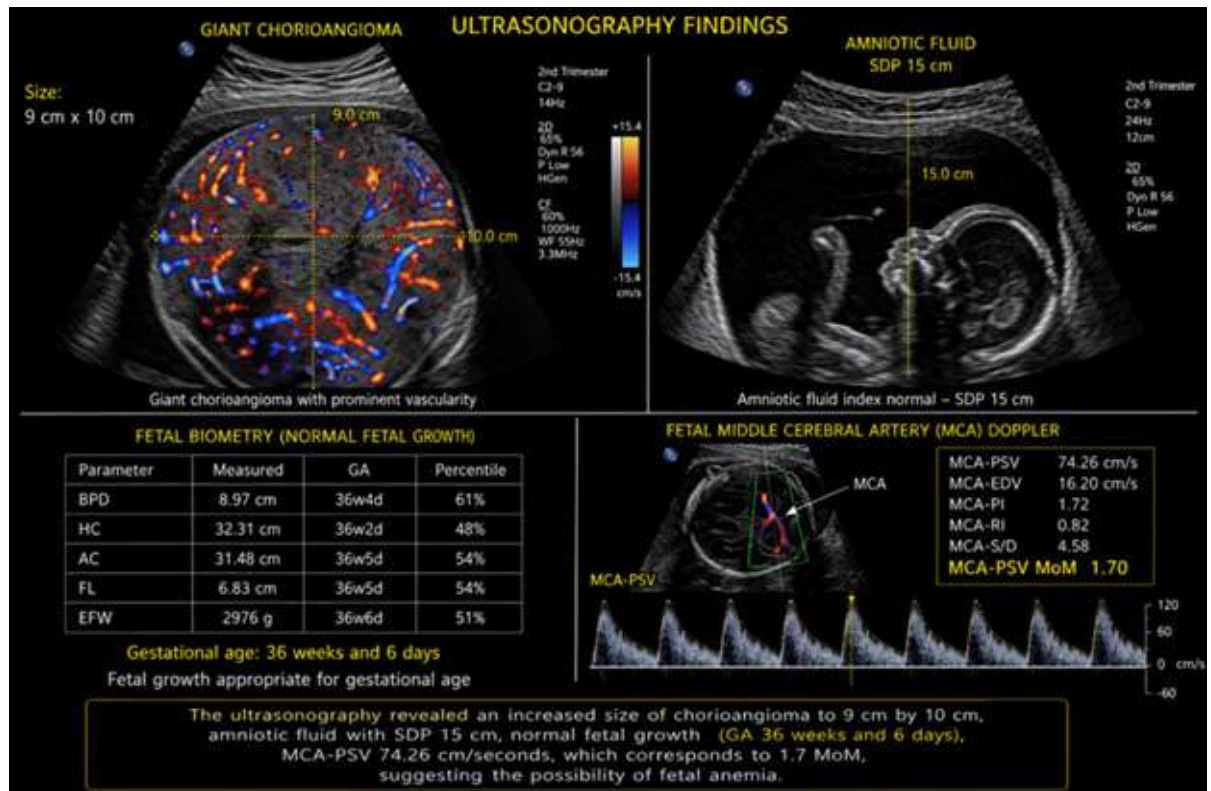


Image 2A: MCA-PSV/Color Doppler

In view of progressive maternal symptoms, worsening polyhydramnios, suspected fetal anemia, and fetal compromise, an emergency category II cesarean section was performed. A live female infant weighing 2.7 Kg was delivered with an APGAR score of 8 in the 1st minute and 10 in the 5th minute, respectively. Approximately, 5L of meconium-stained amniotic

fluid was drained. Gross examination revealed a giant placental chorioangioma measuring 11 cm by 10cm attached near umbilical cord insertion (image 3). The placenta was submitted for histopathological examination, which confirmed a benign placental chorioangioma (Image 4).

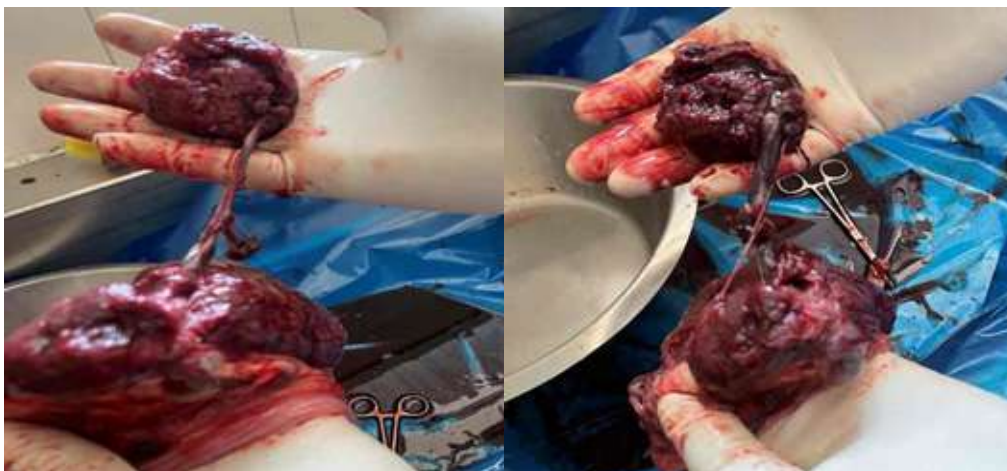


Image 3: Gross examination of the placenta showing a chorioangioma with the stalk connecting to the placenta.

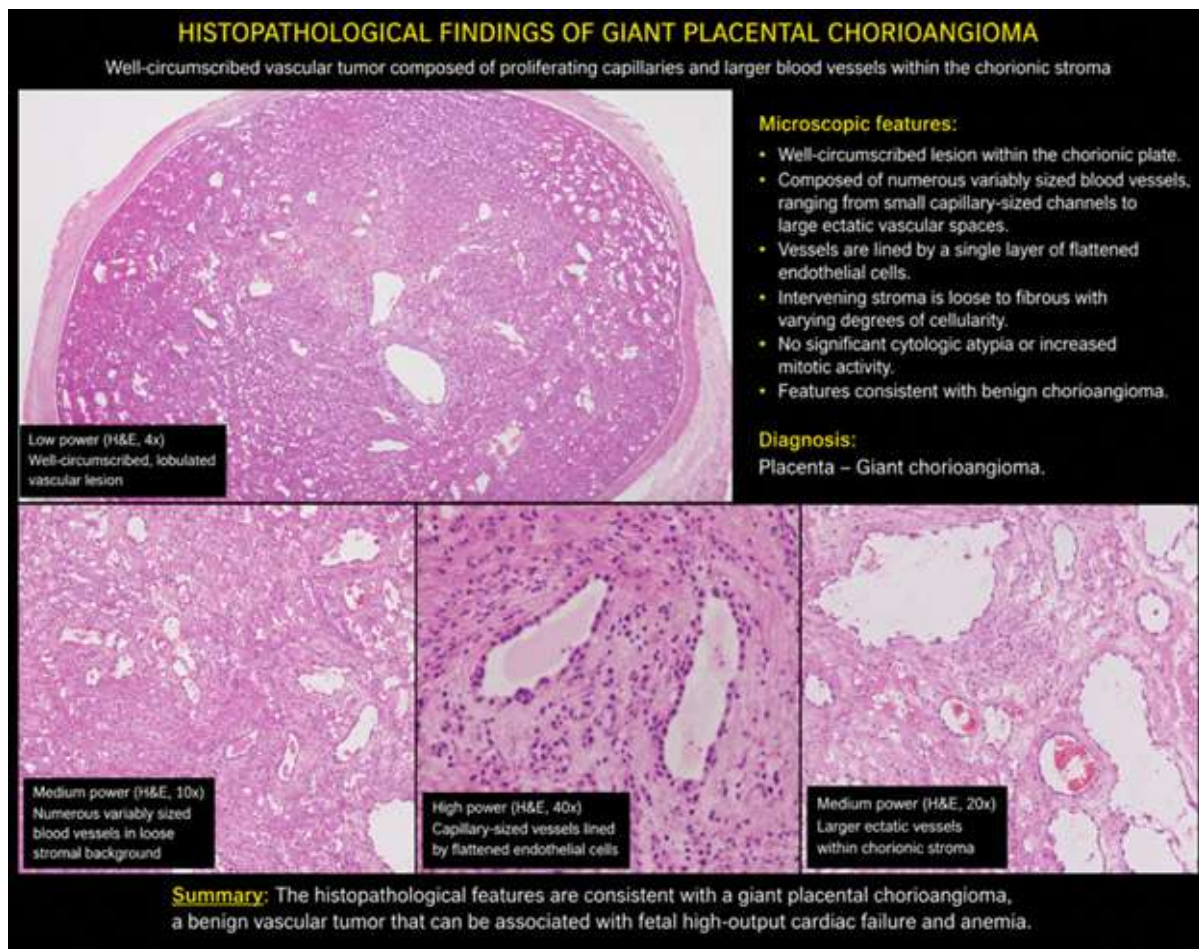


Image 4: The histopathology/ photomicrograph of the Vascular Neoplasia

The baby was taken to the Neonatal Intensive Care Unit (NICU) because of anemia (hemoglobin (Hb) 8 g/dl) and received two whole blood transfusions within the first 48hrs of life, after which the hemoglobin increased to 13g/dl. Echocardiography was normal. The neonate was discharged on day 3, and the mother was discharged in good clinical condition on postoperative day 4.

DISCUSSION

Giant placental chorioangioma is an uncommon placental vascular tumor associated with significant maternal and fetal morbidity, first described by Clarke in 1798. It resembles a hemangioma as a benign vascular neoplasm, but its precise cause is still unknown. This condition is often associated with metabolic disorders like hypertension and diabetes mellitus, as well as higher maternal age (over 30), female infants, and multiple pregnancies. In our case, the patient was 22 years old and a primigravida, which differs from these known associations.

The recurring risk associated with this tumor is still unknown but is generally considered very low. Some describe chorioangioma as a hamartoma or a hyperplastic capillary lesion rather than a true neoplasm, because it cannot metastasize and has no malignant potential. Additionally, a chorioangioma can lead to elevated maternal serum alpha-fetoprotein levels, which can help diagnose.

Chorioangioma usually develops on the 16th day after fertilization, and there have not been cases of chorioangioma in the first trimester. It is usually found as a solitary nodule in the third trimester, with the most common location being on the fetal side of the placenta in close proximity to the umbilical cord insertion. Chorioangioma typically develops in areas with reduced blood flow, likely caused by hypoxia. This hypoxic state, driven by vascular growth factors, encourages active proliferation of connective tissue and the growth of villous capillaries. The occurrence of chorioangioma is also associated with pre-eclampsia, high altitude pregnancy, and fetal anemia, suggesting that decreased oxygen tension may play an important role in the pathogenesis⁷.

In placental chorioangioma, the clinical significance is determined by the size of the tumor. The majority of the tumors are small, less than 4cm, and are usually asymptomatic and remain undiagnosed. In contrast, large chorioangiomas larger than 5cm in diameter are rare, with a prevalence ranging from

1:9,000 to 1:50,000, and are often associated with adverse maternal and fetal outcomes⁴. In our case, the patient had a tumor measuring 11 cm x 10 cm following delivery.

Complications mainly occur with large chorioangiomas, which involve significant arteriovenous shunting within the placenta. This can lead to fetal anemia, high-output cardiac failure, fetal hydrops, polyhydramnios, fetal distress, intrauterine growth restriction, and stillbirths. Additionally, fetal microangiopathic anemia and thrombocytopenia may develop due to sequestration of red blood cells and platelets by the tumor. The increased urine output, along with transudate from tumor vessels crossing the chorionic plate, is linked to fetal hyperdynamic circulation caused either by fetal anemia or blood shunting to the placental chorioangioma. This can result in polyhydramnios, which may cause maternal discomfort from uterine overdistention, and increase the risks of preterm labor, preterm prelabor rupture of membranes, placental abruption, and postpartum hemorrhage^{4,5}. In our case, initially the patient had polyhydramnios, although later on the Doppler ultrasonography showed the MCA-PSV 74.26 cm/seconds, corresponding to 1.7 MoM, suggesting the possibility of fetal anemia and the BPP of 2, revealing non-reassuring fetal status, which required immediate delivery.

The prognosis of placental chorioangioma primarily depends on the tumor size and the presence of fetal hydrops, which influence pregnancy management, such as more frequent visits and antenatal fetal monitoring. In our case, the chorioangioma measured 11 cm by 10 cm, making it large enough to cause several complications. Nevertheless, the fetus did not develop hydrops.

Placental chorioangioma can be detected during prenatal checkups using gray-scale sonography, color flow Doppler, and MRI. On ultrasound, it appears as a hypoechoic, rounded, well-defined placental mass with either uniform or mixed internal features, located on the fetal side of the placenta. Changes such as calcification, degeneration, or necrosis can

alter its ultrasound appearance. Color flow Doppler helps differentiate placental chorioangioma from other placental lesions and confirms its vascular nature. In this case, it was diagnosed through ultrasonography, with the diagnosis supported by elevated serum AFP, which increased the likelihood of placental chorioangioma as shown on Image 2A. Placental chorioangioma can be diagnosed during antenatal visits using gray-scale sonography, color flow Doppler ultrasonography, and Magnetic Resonance Imaging (MRI). On ultrasound, placental chorioangioma appears as a hypoechoic, rounded, well circumscribed placental masses homogeneous or heterogeneous internal architecture located on the fetal surface of the placenta. Calcification, degeneration, or necrosis of the tumor may cause a different appearance on the ultrasound. The application of color flow Doppler can be used to differentiate the placental chorioangioma from other placental lesions and to confirm the vascular component of the tumor. On MRI, placental chorioangioma appears as a heterogeneous mass, which can be used in conjunction with ultrasound findings⁶.

Giant chorioangiomas should be managed based on the presence and severity of related complications. Many cases are treated conservatively with close monitoring through serial ultrasounds and Doppler studies. Reported treatment options include alcohol-based chemosclerosis, fetoscopic or interstitial laser ablation of feeding vessels, embolization, medical therapy with propranolol, and surgical vessel ligation. In cases of severe polyhydramnios, amnioreduction can provide temporary relief. Intrauterine transfusion may correct hematologic imbalances in hyperdynamic fetal circulation, especially when significant anemia is present. In this case, the patient needed amniocentesis; however, limited resources prevented this due to lack of fetal medicine specialist. The increased MCA-PSV indicated a higher risk of fetal anemia, for which fetal sampling could have been performed, and intrauterine infusion could have been beneficial, but resource limitations hindered this approach. Consequently, the pregnancy was

closely monitored until signs of fetal anemia, non-reassuring fetal status, and maternal distress due to severe polyhydramnios appeared.

There are no established guidelines in Tanzania for managing placental chorioangiomas, and it is usually not a reason to perform a Cesarean section. Typically, vaginal delivery is preferred over Cesarean for a large placental hemangioma. In our case, the patient underwent a Cesarean due to non-reassuring fetal status and a giant chorioangioma, considering the potential risk of rupture and severe bleeding that could threaten fetal life.

Conclusion

This case demonstrates that giant placental chorioangioma can be successfully managed with close maternal and fetal surveillance, even in resource-limited settings where advanced fetal therapeutic interventions are unavailable. Serial ultrasonography, color Doppler assessment, and timely recognition of maternal and fetal deterioration were essential in guiding the timing of delivery and achieving favorable maternal and neonatal outcomes. This case also highlights the importance of early referral to a tertiary care center and the need to strengthen fetal medicine services to improve the management of complicated placental chorioangioma in low-and middle-income countries.

Declaration of use of Artificial Intelligence (AI)

AI was not used in the development of this manuscript.

Ethical clearance

This paper is a case report and not a research study. Therefore, ethical approval was not necessary.

Informed consent

Written informed consent was obtained from the patient for publication and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal upon request.

Disclosure of interest

No potential conflict of interest was reported by the author(s).

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REFERENCES

1. Almeida CS de, Miccoli LS, Andhini NF, Aranha S, Oliveira LC de, Artigo CE, et al. Title [Internet]. Vol. 5, Revista Brasileira de Linguística Aplicada. 2016. 1689-1699 p. Available from: <https://revistas.ufrj.br/index.php/rce/article/download/1659/1508%0Ahttp://hipatiapress.com/hpjournals/index.php/qre/article/view/1348%5Cnhttp://www.tandfonline.com/doi/abs/10.1080/09500799708666915%5Cnhttps://mckinseysociety.com/downloads/reports/Educa>
2. Barde KP, Aher GS, Gavali UG. A case report on placental chorioangioma. *Int J Reprod Contraception, Obstet Gynecol*. 2021;10(12):4555.
3. Tanush Vig, Richa S. Tirkey, Smitha E. Jacob RMK, Yenuberi, Hilda, Swati Rathore GM. Placental chorioangioma with an emphasis on rare giant placental chorioangioma and associated maternal and perinatal outcome: Clinicopathological study in a single centre. *J Fam Med Prim Care*. 2022;11(9):5116-22.
4. Patidar R, Gowdra Revannasiddappa K, Mestha S. Watchful Expectant Management of a Giant Placental Chorioangioma With Favorable Maternal and Fetal Outcomes: A Case Report. *Cureus*. 2023;15(5):2-10.
5. Empliouk E, Sidiropoulos A, Yfanti C, Tsakmaki E, Romanidou L. A Case Report of a Giant Placental Chorioangioma : Prenatal Diagnosis and Perinatal Outcome. 2025;17(9):1-8.
6. Ma H, Liu Z, Ruan J. Placental chorioangioma and pregnancy outcome: a ten-year retrospective study in a tertiary referral centre. *BMC Pregnancy Childbirth*. 2023;23(1):1-8.
7. Theresia E, Siti Nurdianti D, Widodo I. Giant placental chorangioma: The first case report in Indonesia. *Hum Pathol Case Reports* [Internet]. 2021;23:200472. Available from: <https://doi.org/10.1016/j.ehpc.2021.200472>

PARTIAL MOLAR PREGNANCY WITH A COEXISTING LIVE FETUS LEADING TO INEVITABLE ABORTION: A CASE REPORT

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ABSTRACT

BACKGROUND: The coexistence of a molar pregnancy with a viable fetus is rare and poses significant diagnostic and management challenges. Common symptoms include vaginal bleeding, anemia, hyperemesis gravidarum, hypertension, thyrotoxicosis, and disproportionate uterine enlargement to gestational age. While most such cases involve a complete mole, partial molar pregnancies with a coexisting fetus are extremely rare and usually result in miscarriage due to fetal triploidy.

CASE PRESENTATION: We report a case of a unbooked 26 year-old G7 P5+1, 5 alive Fulani woman presenting with severe vaginal bleeding and lower abdominal pain at 16 weeks gestation. Ultrasound confirmed a live fetus and revealed a large heterogeneous cystic mass suggestive of molar changes. She progressed rapidly to expel the fetus that died within few minutes and the placenta while suction evacuation was done to remove the remnant molar pregnancy. Histopathology confirmed a partial hydatidiform mole. Postabortal recovery was uneventful. B-hCG levels normalized within a month without intervention, and no evidence of persistent trophoblastic disease was found at six-month follow-up.

CONCLUSION: The case illustrates the rare occurrence of a partial molar pregnancy coexisting with a viable fetus, complicated by inevitable miscarriage and hemorrhage. Early recognition and multidisciplinary management are critical for optimizing outcomes.

KEYWORDS: Partial molar pregnancy, live fetus, inevitable miscarriage, vaginal bleeding.

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INTRODUCTION

Gestational trophoblastic disease (GTD) refers to a group of conditions characterized by abnormal proliferation of trophoblastic tissue.¹ Serum measurement of human chorionic gonadotropin (B-hCG), a hormone produced by trophoblasts, is essential for the diagnosis, management, and monitoring of GTD. Histologically, GTD can be classified into two main categories: non-molar trophoblastic neoplasms, which lack chorionic villi, and hydatidiform moles, which are defined by the presence of villi.¹

According to the revised World Health Organization (WHO) classification of gestational trophoblastic disease, GTD is categorized into three groups: first is Hydatidiform moles, which include complete, partial, and invasive moles; second is Trophoblastic tumor-like lesions, such as placental site nodules and exaggerated placental site reactions; third is Trophoblastic tumors, comprising choriocarcinoma, placental site trophoblastic tumor (PSTT), and epithelioid trophoblastic tumor.²

A complete mole is defined by the complete replacement of normal placental tissue with grossly enlarged, hydropic chorionic villi and absence of a fetus. In contrast, a partial mole involves partial replacement of placental tissue with hydropic villi and the presence of abnormal fetal parts. These pregnancies typically terminate during the first trimester.³ In such cases, the fetus is rarely viable at the time of diagnosis and often presents with severe congenital anomalies due to triploidy. Prognosis is generally poor due to a limited functional placenta and significant intrauterine growth restriction.³

Partial molar pregnancy with a coexisting live fetus is extremely rare, particularly in singleton pregnancies, and excludes cases involving multiple gestations. The estimated incidence of a viable fetus with a partial molar placenta range from 0.005% to 0.01% of all pregnancies.⁴ This rare entity has been classified into three distinct types: Twin pregnancy with one normal fetus and placenta, and a coexisting complete mole (most common); Twin

pregnancy with one normal fetus and placenta, and a coexisting partial mole; Singleton pregnancy with a partial molar placenta and a live fetus (least common).

In this report, we present the case of a 26-year-old unbooked woman who presented at 16 weeks of gestation with severe vaginal bleeding and lower abdominal pain. Ultrasound examination confirmed the presence of a live fetus and a large heterogeneous cystic mass consistent with molar changes.

Case Presentation

A 26years old unbooked G7P5+1 5 Alive Fulani woman who presented with Amenorrhea of 16weeks, profuse vaginal bleeding and lower abdominal pain of a day duration. There was associated dizziness, generalized body weakness and palpitation. She had a history of one spontaneous complete miscarriage at 8 weeks' gestation two years previously but had no previous history of molar pregnancy or contraceptive use.

Examination revealed conscious but lethargic young woman, severe pallor, tachycardia with a pulse rate 120 beats/min and blood pressure of 110/60mmHg. Uterus was 28 weeks size and contractions felt. Vaginal examination revealed cervical dilatation was 5cm and fully effaced.

On admission, her packed cell volume (PCV) was 16%, indicating severe anaemia and necessitating immediate resuscitation. She received two units of compatible whole blood during initial resuscitation and a further two units following uterine evacuation. Transabdominal ultrasonography demonstrated a live intrauterine fetus and a large heterogeneous multicystic placental mass with diffuse cystic spaces, highly suggestive of molar degeneration [figure 1a & 1b]. The pre-evacuation β -hCG concentration was 21,260.9 IU/L, which decreased dramatically to 1,082.49 IU/L within 48 hours following suction evacuation and subsequently became undetectable within one month.

Other investigations, including liver function tests, serum electrolytes, urea and creatinine levels, and chest radiography, were within normal limits. She spontaneously expelled a female abortus within 5 hours of admission. The placenta and fetal

membranes were expelled together, following which suction evacuation was performed, yielding copious grape-like vesicular tissue consistent with molar degeneration [Figure 2a & 2b].



Figure 1a: Transabdominal ultrasonography picture of partial mole



Figure 1b: Transabdominal ultrasonography at 16 weeks of gestation showing partial mole with fetal head

Other investigations, including liver function tests, serum electrolytes, urea and creatinine, and chest radiography, were within normal limits. She spontaneously expelled a female abortus within 5 hours of admission. The placenta and fetal

membranes were expelled together, following which suction evacuation was performed, yielding copious grape-like vesicular tissue consistent with molar degeneration [Figure 2a & 2b].



Figure 2a: shows the picture of the abortus and the placenta



Figure 2b: Shows picture of the cystic mass (partial mole)

The mother's vital signs became normal and stable after resuscitation. Histopathological examination demonstrated two distinct tissue components. The placental tissue associated with the fetus showed normal villous architecture (figure 3), whereas the separately evacuated vesicular tissue demonstrated

hydropic chorionic villi with focal trophoblastic hyperplasia consistent with a partial hydatidiform mole (figure 4). These findings were suggestive of a twin gestation comprising a normal fetus with a separate coexisting partial hydatidiform mole.

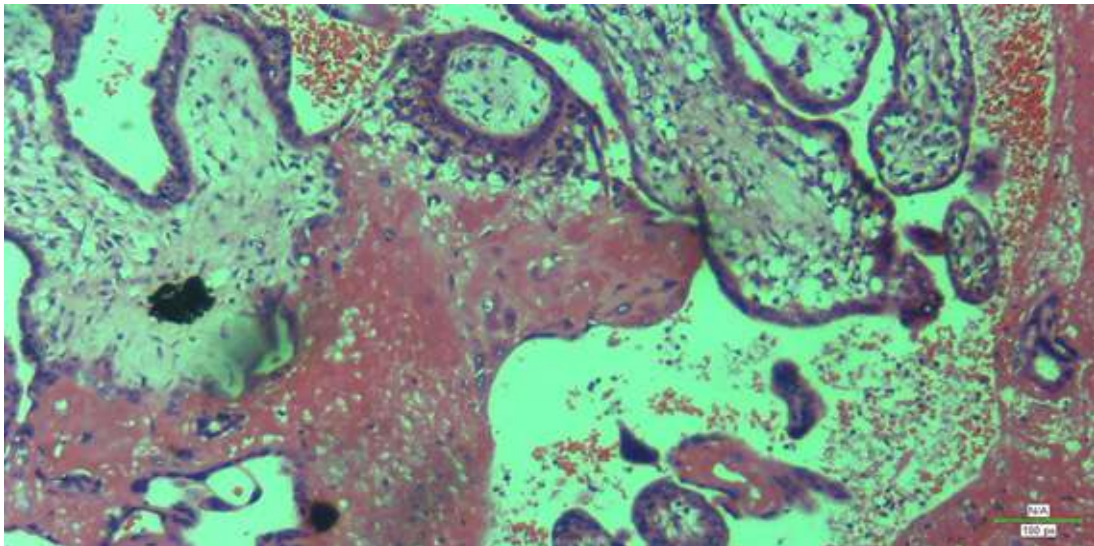


Figure 3: Histopathological picture of the placenta showing normal chorionic villi

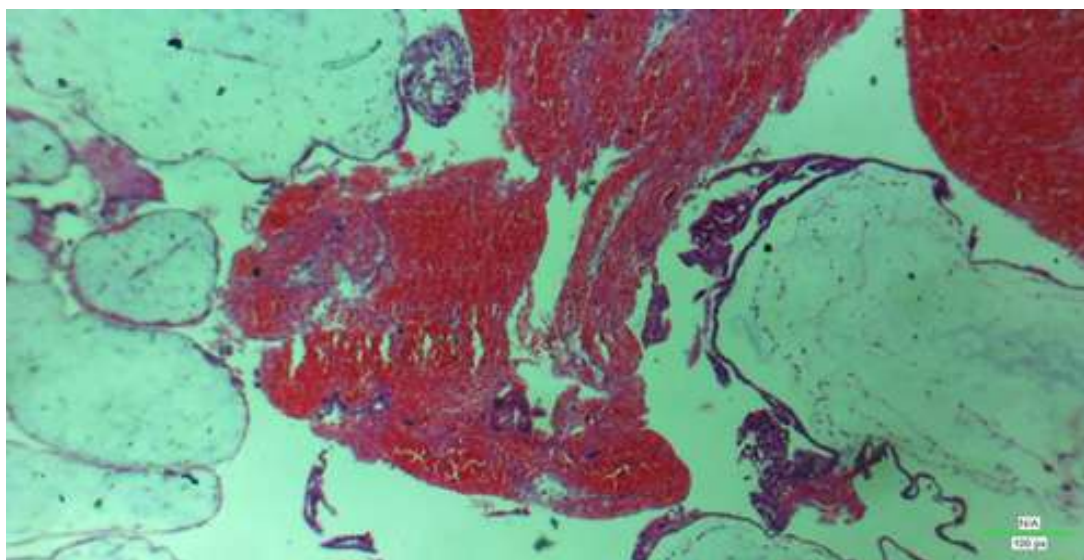


Figure 4: Histopathological picture of the cystic mass (partial mole)

Following uterine evacuation, the patient was enrolled in a post-molar surveillance programme in accordance with current FIGO recommendations. Serial serum β -human chorionic gonadotropin (β -hCG) measurements showed a marked decline from a pre-evacuation level of 21,260.9 mIU/mL to 1,082.49 mIU/mL 48 hours after evacuation. The weekly β -hCG concentration continued to decrease steadily and became undetectable (<5 mIU/mL) within 4 weeks. An intrauterine contraceptive device (IUCD) was inserted after serum β -hCG levels had returned to normal. After three consecutive weekly undetectable β -hCG results, surveillance was continued at 4-week intervals for six months. Throughout the follow-up period, serum β -hCG levels remained undetectable, and pelvic ultrasonography demonstrated complete resolution of the uterine lesion with no retained products of conception or evidence of recurrent or persistent gestational trophoblastic disease. The patient remained clinically well throughout follow-up and required no additional treatment.

DISCUSSION

The present case involved a 26-year-old Fulani woman, gravida 7 para 5+1, who presented at 16 weeks' gestation with heavy vaginal bleeding and lower abdominal pain. Although extremes of maternal age (<20 years and >40 years) have traditionally been associated with GTD, recent systematic reviews indicate that partial molar pregnancies with coexisting fetuses can occur in women within the normal reproductive age group, similar to our patient^{10,13}. Likewise, while ethnicity has not been established as an independent risk factor, reports from sub-Saharan Africa remain scarce, making this case an important contribution to the limited African literature on this uncommon condition.

Our patient had experienced one spontaneous miscarriage at 8 weeks' gestation two years before presentation. Although a previous molar pregnancy is the strongest recognised reproductive risk factor for recurrence, women with previous spontaneous pregnancy losses may also have a slightly increased risk of abnormal conceptions^{9,10}. Nevertheless, most reported cases of partial mole with a coexisting fetus, including ours, occur without a preceding history of gestational trophoblastic disease^{10,14}.

The clinical presentation observed in this case is consistent with findings reported in recent systematic reviews. Vaginal bleeding remains the most frequent presenting symptom, occurring in more than 80% of patients with molar pregnancy, while abdominal pain and excessive uterine enlargement are also common manifestations resulting from rapid trophoblastic proliferation and placental degeneration^{10,11}. Our patient presented with profuse vaginal bleeding, abdominal

pain, severe anaemia requiring transfusion of four units of blood, and a Symphysiofundal height corresponding to 28 weeks despite a gestational age of only 16 weeks. The marked discrepancy between uterine size and gestational age was attributable to the large volume of molar tissue occupying the uterine cavity and has been consistently reported in similar cases^{10,12}.

Ultrasonography plays a pivotal role in the antenatal diagnosis of molar pregnancy. In the present case, transabdominal ultrasonography demonstrated a viable 16-week fetus together with a distinct heterogeneous multicystic intrauterine mass suggestive of molar degeneration. This characteristic appearance has been described in several recent case reports and systematic reviews and should alert clinicians to the possibility of a coexisting molar pregnancy, particularly when accompanied by vaginal bleeding and uterine enlargement greater than expected for gestational age¹⁰⁻¹². Nevertheless, differentiation from placental mesenchymal dysplasia or a complete mole with a coexisting normal fetus may remain difficult on imaging alone, underscoring the importance of histopathological confirmation^{9,10}.

Unlike many reported cases in which conservative management is attempted to improve fetal viability, our patient presented with inevitable miscarriage, evidenced by heavy vaginal bleeding, cervical dilatation, and complete cervical effacement. She spontaneously expelled a fresh stillborn female fetus and placenta within five hours of admission, while the remaining grape-like vesicular tissue required suction evacuation. Similar pregnancy losses have been reported in the literature, where extensive molar degeneration compromises placental function, ultimately resulting in

spontaneous miscarriage or fetal demise before fetal viability^{10,13,14}. This case therefore reinforces the poor fetal prognosis associated with partial molar pregnancy complicated by significant placental involvement.

Histopathological examination remains the gold standard for diagnosing and differentiating partial from complete hydatidiform mole⁹. In our patient, examination of the placenta demonstrated normal placental tissue, whereas the separately evacuated vesicular tissue showed features consistent with a partial hydatidiform mole. These findings strongly suggest a twin gestation comprising a normal fetus coexisting with a partial molar pregnancy, a phenomenon that has been described only rarely in the literature^{10,14}. Correlation between clinical findings, ultrasonography, and histopathology was therefore crucial in establishing the diagnosis.

Serial serum β -human chorionic gonadotropin (β -hCG) monitoring is fundamental in post-molar surveillance because persistent gestational trophoblastic neoplasia may occur despite successful uterine evacuation⁹. Although β -hCG concentrations in partial moles are generally lower than those observed in complete moles, the rate of decline following evacuation is a more reliable indicator of disease resolution^{9,10}. In this case, the pre-evacuation β -hCG concentration was 21,260.9 IU/L, which decreased dramatically to 1,082.49 IU/L within 48 hours following suction evacuation and subsequently became undetectable within one month. This rapid biochemical resolution is comparable to findings reported in recent case reports, in which complete remission occurred following prompt evacuation and careful follow-up without progression to gestational trophoblastic neoplasia^{10,14}. Furthermore, pelvic ultrasonography

performed six months after treatment demonstrated no retained products of conception or evidence of recurrence, confirming successful management. This case underscores the importance of maintaining a high index of suspicion for molar pregnancy in women presenting with uterine enlargement disproportionate to gestational age, heavy vaginal bleeding, and a viable fetus with a multicystic placental lesion on ultrasonography. Early recognition, prompt haemodynamic stabilisation, appropriate uterine evacuation, histopathological confirmation, and serial β -hCG surveillance remain the cornerstones of management and are essential for reducing maternal morbidity and ensuring early detection of persistent trophoblastic disease^{9,11}.

Conclusion

Partial hydatidiform mole with a coexisting viable fetus is an exceptionally rare and diagnostically challenging obstetric condition. This case demonstrates that the coexistence of a viable fetus should not exclude the diagnosis of molar pregnancy when clinical features such as excessive uterine enlargement, heavy vaginal bleeding, and characteristic ultrasonographic findings are present. Early diagnosis, prompt maternal stabilisation, appropriate evacuation of molar tissue, histopathological confirmation, and diligent serial β -hCG surveillance are critical to achieving favourable maternal outcomes and preventing persistent gestational trophoblastic neoplasia. Greater awareness among obstetricians, particularly in low-resource settings, may facilitate earlier recognition and improve both maternal and fetal outcomes.

Abbreviations

B -hCG	Beta human chorionic gonadotropin;
GTD	Gestational Trophoblastic Disease;
PSTT	placental site trophoblastic tumors;
PCV	Packed Cell Volume;
WHO	World Health Organization;
BPD	Biparietal Biameter

Ethics Approval and Consent to Participate

Ethical approval was waived by the ethical committee of Bowen University Teaching Hospital, Ogbomoso, Oyo State, Nigeria. Written informed consent was obtained from the patient for the publication of this case report and accompanying images.

REFERENCES

1. Cunningham FG, Leveno KJ, Bloom SL, Dashe JS, Hoffman BL, Casey BM, Spong CY, et al. Williams Obstetrics. 27th ed. New York: McGraw Hill; 2024.
2. Akhtar N, Karim S. Molar pregnancy along with normal fetus – a case report. Bangladesh J Obstetrics Gynaecol. 2015;30(2):113–115.
3. Hsieh CC, Hsieh TT, Kuo DM, Lo LM, Hung TH. Delivery of a severely anaemic fetus after partial molar pregnancy: clinical and ultrasonographic findings. Hum Reprod 1999; 14:1122- 1126.
4. Agarwal R, Agarwal S, Roy KK. Diploid partial mole with neonatal survival: a case report. Indian J Pathol 2005 April; 48:225-227.
5. Kurman RJ et al. Gestational Trophoblastic Disease. Mills S.E. (ed) Sternberg's Diagnostic Surgical Pathology. 6th edition. Wolters Kluwer; 2015. pp. 2297-2319.
6. Guevara BF. Molar pregnancy with co-existing viable foetus delivered molar pregnancy with co-existing viable foetus delivered preterm at 27 weeks gestation. Waqainabete. 2021;22–25.
7. Sma A. Delivering a live fetus at 24th week gestational week: a case of partial imedpub journals delivering a live fetus at 24 th week gestational week: a case of partial hydatidiform molar pregnancy abstract. Gynecol Obstet Case Rep. 2021; 7:137.
8. Suzuki M, Matsunobu A, Vakita K, Osanai K. Hydatidiform mole with surviving co-existent fetus. Ombt Gynecol 1980; 56:384-388.
9. Ngan HYS, Seckl MJ, Berkowitz RS, Xiang Y, Golfier F, Sekharan PK, et al. Update on the diagnosis and management of gestational trophoblastic disease. Int J Gynaecol Obstet. 2021;155(Suppl 1):86-93.
10. Mangla M, Kaur H, Khoiwal K. Partial mole with coexistent live fetus: A systematic review of case reports. J Turk Ger Gynecol Assoc. 2022;23(2):83-94.
11. Wang G, Cao J, Xu X, Han X, Cui H. Delivery management of a complete hydatidiform mole with co-existing viable fetus: A systematic review and meta-analysis. J Gynecol Obstet Hum Reprod. 2022;51(1):102269.
12. Hajri T, Massoud M, Vergne M, Descargues P, Allias F, You B, et al. Multiple pregnancy with complete hydatidiform mole and coexisting normal fetus: Cohort analysis and maternal and fetal outcomes. Am J Obstet Gynecol. 2024;230(3): 362.e1-362.e8.
13. Zorzato PC, Ricci A, Bosco M, Galli L, Luka L, Porcari I, et al. Hydatidiform mole with coexisting normal pregnancy: a systematic review and individual participant data meta-analysis. Medicina (Kaunas). 2025;61(10):1781. doi:10.3390/medicina61101781.
14. Karimi M, Alizadeh A. Partial hydatidiform mole coexists with a living fetus: a case report. J Med Case Rep. 2025; 19:638. doi:10.1186/s13256-025-05646-9.

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