Uterine Anomalies in Women with Subfertility: A Cross-Sectional Study

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ABSTRACT

Background: Uterine anomalies are a significant factor contributing to subfertility, affecting reproductive outcomes. Identifying these anomalies in subfertile women is crucial for effective management and treatment.

Objective: To determine the prevalence and types of uterine anomalies in women with subfertility presenting to a tertiary care hospital.

Methods: This cross-sectional study was conducted at the Obstetrics and Gynecology Department of Khyber Teaching Hospital, Peshawar, from June 2023 to December 2023. A total of 150 women aged 18-40 years with primary or secondary subfertility were included. Exclusion criteria were male factor infertility, medical comorbidities, or prior uterine surgeries. Saline infusion sonography (SIS) was used to evaluate uterine anomalies, including endometrial polyps, submucosal fibroids, and congenital anomalies. Data were analyzed using SPSS version 25, with descriptive statistics calculated for age, BMI, and types of anomalies.

Results: The most common uterine anomaly was endometrial polyps (47.3%), followed by submucosal fibroids (26.0%). Congenital anomalies such as septate uterus (8.0%) and bicornuate uterus (7.3%) were less common. The mean age of participants was 29.33 years (SD ±5.67).

Conclusion: Uterine anomalies, especially acquired ones like endometrial polyps and submucosal fibroids, are prevalent among subfertile women, necessitating targeted diagnostic and treatment approaches.

INTRODUCTION

Subfertility is defined as the inability of a couple to achieve pregnancy after engaging in frequent, unprotected sexual intercourse for a period of one year or more. Among the myriad causes of subfertility, uterine anomalies play a significant role in hindering conception and leading to reproductive challenges. These anomalies can be congenital, arising from developmental disturbances, or acquired, often resulting from pathological changes within the uterine structure (1, 2). The uterus, being the primary site for embryo implantation and fetal development, is essential for reproductive success. Any deviation in its anatomical or functional integrity can significantly impact fertility, disrupting the delicate processes of implantation and gestation. Congenital uterine anomalies (CUAs), caused by aberrations in the development of the Müllerian ducts, are critical in understanding reproductive challenges, as these ducts are fundamental in forming the female reproductive tract (3).

Acquired uterine abnormalities, which are frequently encountered in clinical settings, typically arise from conditions such as fibroids, endometrial polyps, adenomyosis, or intrauterine adhesions. These conditions can lead to distortion of the uterine cavity, which may impair fertility by disrupting the implantation of the embryo or by increasing the risk of miscarriage (4, 5). The impact of uterine anomalies on fertility varies based on the type, size,

and location of the abnormality. It is noteworthy that not all women with uterine anomalies will experience symptoms, with many being unaware of their condition until they seek medical attention for issues related to subfertility or recurrent pregnancy loss. Non-invasive imaging modalities, such as transvaginal ultrasonography, are commonly used to assess these anomalies and evaluate the dimensions, shape, and structure of the uterus (6, 7). This method is particularly effective in detecting prevalent abnormalities such as fibroids and polyps. However, advanced diagnostic techniques such as three-dimensional ultrasonography (3D-US), hysteroscopy, or magnetic resonance imaging (MRI) may be required for a more comprehensive assessment (8, 9).

Despite advancements in reproductive medicine, uterine anomalies are often overlooked as a potential cause of unexplained subfertility. These anomalies, whether congenital or acquired, can interfere with the implantation and development of the embryo, leading to subfertility. A thorough understanding of the role uterine anomalies play in subfertility may lead to improved diagnostic strategies and targeted interventions, ultimately enhancing fertility outcomes. This study aims to assess the frequency of uterine anomalies in women with subfertility presenting to a tertiary care hospital, thereby contributing to the growing body of knowledge on how structural abnormalities of the uterus influence reproductive outcomes (10).

MATERIAL AND METHODS

This cross-sectional study was conducted from June 2023 to December 2023 in the Department of Obstetrics and Gynecology at Khyber Teaching Hospital, Peshawar, with the objective of identifying uterine anomalies in women presenting with subfertility. A total of 150 subfertile women aged between 18 and 40 years were included in the study after fulfilling the inclusion criteria, which required a diagnosis of either primary or secondary subfertility. Women with other identified causes of infertility, such as male factor infertility, significant medical comorbidities, or a history of previous uterine surgeries, were excluded to ensure that the focus remained solely on subfertile women with potential uterine anomalies. Ethical approval for the study was obtained from the institutional review board, and the study adhered to the principles of the Declaration of Helsinki, ensuring that participants were informed about the study's purpose, procedures, risks, and benefits. Written informed consent was obtained from all participants prior to inclusion in the study (11-13).

Data were collected through structured interviews, physical examinations, and review of medical records to gather demographic details, including age, body mass index (BMI), and duration of subfertility. Participants were categorized into two groups: primary subfertility and secondary subfertility, based on their reproductive history. Saline infusion sonography (SIS) was employed as the primary diagnostic tool for evaluating uterine anomalies. SIS was chosen due to its high sensitivity and specificity in detecting intrauterine abnormalities, particularly compared to other techniques such as hysterosalpingography and 2D ultrasound. The procedure involved the infusion of sterile saline into the uterine cavity via a catheter, allowing better visualization of the uterine contour and structure through transvaginal ultrasonography. An experienced radiologist performed the SIS in an outpatient setting to ensure consistent and accurate assessment of the uterine cavity. The uterine anomalies assessed included endometrial polyps, submucosal fibroids, septate uterus, bicornuate uterus, unicornuate uterus, and intrauterine adhesions.

The study's data were analyzed using SPSS version 25. Descriptive statistics were calculated for demographic variables such as age and BMI. Continuous variables like age and BMI were presented as means and standard deviations, while categorical variables such as the type of subfertility (primary or secondary) and the presence of specific uterine anomalies were presented as frequencies and percentages. The prevalence of uterine anomalies was compared between women with primary and secondary subfertility, and chi-square tests were used to assess any statistically significant associations between categorical variables. A p-value of less than 0.05 was considered statistically significant.

The study aimed to provide a comprehensive understanding of the prevalence and types of uterine anomalies in subfertile women, contributing to improved diagnostic and treatment strategies for this patient population (14).

RESULTS

The study included 150 women aged between 18 and 40 years with subfertility, of which 88 (58.7%) were diagnosed with primary subfertility, and 62 (41.3%) with secondary subfertility. The mean age of the participants was 29.33 years (SD ±5.67), and the mean BMI was 26.12 kg/m^2 (SD ±2.70). The age distribution showed that the majority of participants were in the age group of 31–35 years (38.7%), followed by the 25–30 age group (27.3%). The BMI analysis showed that 54.7% of the women were classified as

Table 1: Type of Subfertility

Type of Subfertility	Frequency	Percentage
Primary	88	58.7%
Secondary	62	41.3%
Total	150	100%

overweight (BMI 25-29.9 kg/m^2), while 39.3% had a normal BMI (18-24.9 kg/m^2). About uterine abnormalities, the most prevalent condition was endometrial polyps, identified in 71 women (47.3%). Submucosal fibroids were found in 39 women (26.0%), while intrauterine adhesions were observed in 13 women (8.7%). Less frequent anomalies included septate uterus in 12 women (8.0%), bicornuate uterus in 11 women (7.3%), and unicornuate uterus in 4 women (2.7%). The results demonstrated that acquired uterine anomalies, particularly endometrial polyps and submucosal fibroids, were the most common causes of subfertility in the studied population. Congenital uterine anomalies, such as septate, bicornuate, and unicornuate uteri, were less prevalent but still significant contributors to subfertility in some women. These findings highlight the need for careful uterine evaluation in subfertile women, particularly using advanced diagnostic techniques such as saline infusion
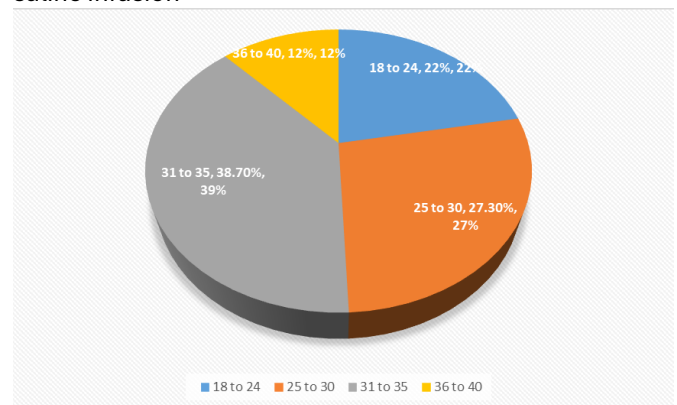

Figure 1 Age Distribution

Table 2: Uterine Anomalies Identified

Uterine Anomalies	Frequency	Percentage
Endometrial Polyps	71	47.3%
Submucosal Fibroids	39	26.0%
Intrauterine Adhesions	13	8.7%
Septate Uterus	12	8.0%
Bicornuate Uterus	11	7.3%
Unicornuate Uterus	4	2.7%
Total	150	100%

sonography (SIS), which provided high sensitivity in detecting these anomalies. The study further revealed that overweight women (BMI 25-29.9 kg/m^2) were more likely to present with uterine anomalies, particularly endometrial polyps, compared to women with a normal BMI, underscoring the role of body weight as a potential contributing factor to subfertility (1, 2).

Table 3: Association between BMI and Presence of Uterine Anomalies

BMI Category	With Uterine Anomalies	Without Uterine Anomalies	Total	Chi-Square	p-Value
Normal (18-24.9)	20	39	59	6.45	<0.05
Overweight (25-29.9)	51	31	82		
Total	71	70	150		

Statistical analysis using chi-square tests showed a significant association between BMI and the presence of uterine anomalies (p<0.05), suggesting that higher BMI could be a risk factor for developing certain uterine conditions linked to subfertility.

DISCUSSION

The findings of this study revealed a significant prevalence of uterine anomalies in women presenting with subfertility, with endometrial polyps (47.3%) and submucosal fibroids (26.0%) being the most common abnormalities. These results align with previous research that has identified structural uterine abnormalities as major contributors to subfertility. The high prevalence of endometrial polyps in this study is consistent with reports from Izhar et al., who found endometrial polyps to be the most frequent uterine abnormality among women with unexplained infertility (12). However, the prevalence of polyps in our study was significantly higher, which could be attributed to the use of more sensitive diagnostic tools such as saline infusion sonography (SIS), compared to less sensitive methods like hysterosalpingography (12-15). Similarly, submucosal fibroids were found in 26.0% of women in our study, a finding that is supported by other studies indicating that fibroids are a frequent cause of subfertility due to their disruptive effects on the uterine cavity and implantation process (16).

Congenital uterine anomalies, such as septate uterus (8.0%), bicornuate uterus (7.3%), and unicornuate uterus (2.7%), were less commonly observed, yet they remain important factors in reproductive failure. The prevalence of congenital uterine anomalies (CUAs) in this study was lower than that reported by Saravelos et al., who found that CUAs were present in 7.3% of infertile women, with the septate uterus being the most common anomaly (17). This discrepancy may be explained by differences in diagnostic methods, as Saravelos et al. utilized a combination of laparoscopy and hysteroscopy, which have higher sensitivity for detecting CUAs than ultrasonography alone.

Furthermore, studies such as Albalushi et al. have reported lower rates of congenital uterine anomalies (3%) in Omani women undergoing infertility evaluation, which further emphasizes the variability of prevalence based on population characteristics and diagnostic tools used (13).

One of the strengths of this study was the use of saline infusion sonography, a highly sensitive method for detecting intrauterine abnormalities, which may have contributed to the higher detection rate of anomalies compared to studies relying on less sensitive imaging techniques. Additionally, the inclusion of both primary and secondary subfertility cases allowed for a broader understanding of how uterine anomalies affect different categories of subfertile women. The study's sample size of 150 women provided a robust dataset for assessing the prevalence and types of uterine anomalies (3, 14).

However, there were several limitations in this study. The cross-sectional design limited the ability to establish a causal relationship between uterine anomalies and subfertility outcomes. Longitudinal studies would be necessary to determine how treating these anomalies affects fertility rates over time. Furthermore, the study was conducted at a single tertiary care hospital, which may limit the generalizability of the findings to other populations. Differences in healthcare access and diagnostic tools in other settings may result in varying prevalence rates. Additionally, while SIS is a highly sensitive tool for detecting uterine abnormalities, its specificity in distinguishing between different types of fibroids and polyps is limited, which may have led to some diagnostic inaccuracies (11, 15).

The study highlights the importance of routine uterine evaluation in subfertile women, particularly using advanced imaging techniques such as SIS, 3D ultrasonography, or MRI to ensure accurate detection of anomalies. Addressing both acquired and congenital uterine conditions in the clinical management of subfertility is crucial for improving reproductive outcomes. Future research should focus on

the impact of treating these uterine anomalies on fertility outcomes, as well as exploring the potential role of body mass index (BMI) in the development of such conditions. Further studies with larger, more diverse populations and the use of standardized diagnostic methods are recommended to enhance the understanding of the relationship between uterine anomalies and subfertility. Additionally, randomized controlled trials assessing the effectiveness of different treatment modalities for uterine abnormalities in improving fertility outcomes would provide valuable insights into the optimal management of these conditions (11-13, 18).

CONCLUSION

In conclusion, this study identified a high prevalence of uterine anomalies, particularly endometrial polyps and submucosal fibroids, among subfertile women, underscoring their significant role in reproductive challenges. Both congenital and bought uterine abnormalities can hinder fertility, and accurate diagnosis using sensitive methods such as saline infusion sonography is crucial for effective management. Addressing these structural issues through timely interventions may enhance fertility outcomes and reduce subfertility rates. In the broader context of human healthcare, early identification and treatment of uterine anomalies hold potential for improving reproductive health and reducing the emotional and financial burden associated with subfertility.

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