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FREQUENCY OF PRIMARY INFERTILITY IN OBESE WOMEN

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Abstract

Background: *Obesity may adversely affect female reproductive health and contribute to infertility. This study assessed the frequency of primary infertility and its associated factors among obese women of reproductive age.*

Study Design: *Cross-sectional study.*

Place and Duration of Study: *Department of Obstetrics and Gynaecology, Ziauddin Medical University and Hospital, Karachi, over a period of six months from January 2025 to June 2025.*

Methods: *A total of 82 married women aged 18–35 years with BMI ≥25 kg/m² were recruited through consecutive sampling. Women with secondary infertility, male-factor infertility, or major comorbidities were excluded. Data were collected using a structured proforma. Primary infertility was defined as failure to conceive after at least 12 months of regular unprotected intercourse without previous conception. Data were analysed using SPSS version 26.0. Associations between categorical variables were assessed using the chi-square or Fisher's exact test, with $p<0.05$ considered statistically significant.*

Results: *The mean age and BMI of participants were 28.6 ± 4.1 years and 29.1 ± 3.5 kg/m², respectively. Primary infertility was identified in 10 (12.2%) women. It was significantly associated with age group ($p=0.041$), menstrual pattern ($p<0.001$), and family history of infertility ($p=0.018$). Among women with primary infertility, 70.0% were aged 30–35 years, 80.0% had irregular menstrual cycles, and 40.0% reported a family history of infertility. BMI category was not significantly associated with infertility ($p=0.214$).*

Conclusion: *Primary infertility affected approximately one in eight obese women and was particularly associated with older reproductive age, irregular menstruation, and a positive family history. Early reproductive assessment and appropriate weight-management counselling may help identify women at increased risk.*

INTRODUCTION:

Obesity is an important public health problem and is increasingly common among women of reproductive age. It is characterized by excessive accumulation of body fat that can adversely affect overall health. The prevalence of obesity has increased considerably worldwide, with more than one billion people currently affected. However, its prevalence varies across populations and geographic regions.[1,2]

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Infertility is also a major global health concern affecting millions of couples of reproductive age. It can result from factors involving either the female or male partner, or both. Globally, infertility affects approximately 8–15% of couples in their reproductive years, although its prevalence varies between countries and regions.[3] In Pakistan, the reported prevalence of infertility is 21.9%, of which 3.5% is attributed to primary infertility and 18.4% to secondary infertility.[4,5]

Obesity can adversely affect female reproductive health and is associated with disturbances in hormonal function, menstrual irregularities and impaired ovulation. Although most women with obesity are not infertile, the negative effect of excess body weight on fecundity and fertility has been well documented.[6,7] Other factors that may contribute to subfertility include increasing age, psychological stress, smoking, alcohol consumption, exposure to environmental toxins, sexually transmitted infections, and both underweight and overweight.[8]

Female infertility may have several underlying causes, including polycystic ovary syndrome, hormonal disorders, premature ovarian insufficiency, genital tract infections, endometriosis, tubal obstruction and uterine abnormalities. Medical conditions such as diabetes and thyroid disorders may also affect reproductive function.[9] Apart from its medical consequences, infertility can have a considerable emotional and social impact on couples and may contribute to anxiety, depression and difficulties in marital life.[10]

Despite the high burden of both obesity and infertility in Pakistan, there is limited local evidence regarding the frequency of primary infertility among obese women. With changing lifestyles and increasing obesity among women of reproductive age, understanding its possible effect on reproductive health is important. Local data may help clinicians identify women at increased risk and provide timely counselling regarding weight management and reproductive health. The present study was therefore conducted to determine the frequency of primary infertility among obese women presenting to a tertiary care hospital in Karachi.

MATERIAL AND METHODS:

A cross-sectional study was conducted in the Department of Obstetrics and Gynaecology, Ziauddin Medical University and Hospital, Karachi, over a period of six months from January 2025 to June 2025 following approval of the study synopsis by the CPSP. Women fulfilling the eligibility criteria were recruited through non-probability consecutive sampling. The sample size was calculated using the WHO sample size calculator based on a reported prevalence of primary infertility among obese women of 11.8%[11], with a 95% confidence level and a margin of error of 7%. The calculated minimum sample size was 82 participants.

Married women aged 18–35 years who presented to the gynaecology outpatient department and fulfilled the criteria for obesity were eligible for inclusion. Women with secondary infertility, women whose male partners had evidence of infertility on semen analysis, and women with major comorbidities including diabetes mellitus, hypertension, asthma or cardiac disease were excluded. Written informed consent was obtained from all participants after explaining the purpose and procedures of the study. Confidentiality of the collected information was maintained throughout the study.

Obesity was defined according to the Asian BMI criteria as a body mass index (BMI) of ≥25 kg/m^2. BMI was calculated by dividing body weight in kilograms by height in metres squared. Weight was measured using an electronic weighing scale, while height was measured using a wall-mounted stadiometer with the participant standing upright and wearing a hospital gown. Primary infertility was defined as failure to achieve pregnancy despite regular unprotected sexual intercourse for at least 12 months in a woman who had never previously conceived.

Data was collected by the researcher using a pre-designed structured proforma. Information regarding age, height, weight, BMI, age at menarche, duration of marriage, duration of infertility, ethnicity, family income, educational status, residential status, occupation, menstrual pattern, history of contraceptive use and family history of infertility was recorded. The outcome

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variable, primary infertility, was assessed according to the predefined operational definition. Relevant clinical and demographic information was obtained directly from the participants and, where required, from the available clinical records.

The collected data were entered and analysed using SPSS version 26.0. The normality of continuous variables, including age, height, weight, BMI, age at menarche, duration of marriage, duration of infertility and family income, was assessed using the Shapiro-Wilk test. Normally distributed continuous variables were expressed as mean ± standard deviation, whereas non-normally distributed variables were presented as median with interquartile range. Categorical variables, including ethnicity, educational status, residential status, occupation, menstrual pattern, history of contraceptive use, family history of infertility and primary infertility, were presented as frequencies and percentages. The frequency of primary infertility was calculated as a percentage of the study population. Stratified analysis was performed according to age, BMI, age at menarche, duration of marriage, duration of infertility and other relevant sociodemographic and clinical characteristics. The chi-square test or Fisher's exact test, as appropriate, was used to assess associations between categorical variables. A p-value of <0.05 was considered statistically significant.

RESULTS:

As shown in **Table 1**, the mean age of the participants was 28.6 ± 4.1 years, while the mean BMI was 29.1 ± 3.5 kg/m². The mean age at menarche was 12.8 ± 1.1 years. The mean duration of marriage and infertility was 5.2 ± 2.8 and 2.9 ± 1.6 years, respectively. Most participants had primary or secondary education (57.3%), were housewives (82.9%), and resided in urban areas (81.7%). A regular menstrual pattern was reported by 65.9% of participants, while 34.1% had irregular cycles. Nearly half (47.6%) reported a history of contraception, whereas 14.6% had a family history of infertility

Table 1. Sociodemographic and clinical characteristics of participants

Characteristics	Frequency (%) / Mean ± SD
Age (years)	28.6 ± 4.1
BMI (kg/m²)	29.1 ± 3.5
Age at menarche (years)	12.8 ± 1.1
Duration of marriage (years)	5.2 ± 2.8
Duration of infertility (years)	2.9 ± 1.6
Educational status	
Primary/secondary	47 (57.3)
Graduate and above	35 (42.7)
Occupation	
Housewife	68 (82.9)
Employed	14 (17.1)
Residential status	
Urban	67 (81.7)
Rural	15 (18.3)
Menstrual pattern	
Regular	54 (65.9)

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Characteristics	Frequency (%) / Mean ± SD
Irregular	28 (34.1)
History of contraception	
Yes	39 (47.6)
No	43 (52.4)
Family history of infertility	
Yes	12 (14.6)
No	70 (85.4)

According to **Table 2**, primary infertility was present in 10 (12.2%) of the 82 obese women, while 72 (87.8%) had no primary infertility.

Table 2. Frequency of primary infertility among obese women

Primary infertility	Frequency (%)
Present	10 (12.2%)
Absent	72 (87.8%)
Total	82 (100%)

As presented in **Table 3**, primary infertility was significantly associated with age group, menstrual pattern, and family history of infertility. Participants aged 30–35 years accounted for the largest proportion of women with primary infertility (70.0%), compared with 41.7% among those without infertility (**p = 0.041**). Irregular menstrual cycles were substantially more common among women with primary infertility (80.0%) than among those without infertility (27.8%), showing a statistically significant association (**p < 0.001**). Similarly, a positive family history of infertility was reported by 40.0% of women with primary infertility compared with 11.1% of those without infertility (**p = 0.018**). In contrast, BMI category and duration of marriage were not significantly associated with primary infertility (**p = 0.214** and **p = 0.083**, respectively).

Table 3. Association of primary infertility with selected characteristics

Characteristics	Primary infertility n (%)	No primary infertility n (%)	p-value
Age group			0.041
18–24 years	1 (10.0%)	14 (19.4%)	
25–29 years	2 (20.0%)	28 (38.9%)	
30–35 years	7 (70.0%)	30 (41.7%)	
BMI category			0.214
25.0–29.9 kg/m²	4 (40.0%)	44 (61.1%)	

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Characteristics	Primary infertility n (%)	No primary infertility n (%)	p-value
≥30 kg/m²	6 (60.0%)	28 (38.9%)	
Menstrual pattern			
Regular	2 (20.0%)	52 (72.2%)	<0.001
Irregular	8 (80.0%)	20 (27.8%)	
Duration of marriage			
≤5 years	4 (40.0%)	43 (59.7%)	0.083
>5 years	6 (60.0%)	29 (40.3%)	
Family history of infertility			
Yes	4 (40.0%)	8 (11.1%)	0.018
No	6 (60.0%)	64 (88.9%)	

DISCUSSION:

In the present study, primary infertility was identified in 10 (12.2%) of 82 obese women. This prevalence was higher than the 8.9% reported in a community-based study from Central India, although that study included women of reproductive age irrespective of obesity status.[12] A recent systematic review similarly found that overweight and obesity were associated with reduced fecundability and an increased risk of infertility, supporting the relevance of obesity as an important reproductive health factor.[13]

Age showed a significant association with primary infertility in our study (p = 0.041). Among women with infertility, 70.0% were aged 30–35 years, compared with 41.7% of women without infertility. This finding is consistent with population-based evidence showing a progressive decline in female fertility with increasing age.[14] In the Yazd population, infertility was also significantly correlated with age.[15] The higher proportion of infertility among women aged 30–35 years in our study may therefore reflect the combined effects of increasing reproductive age and obesity.

Although 60.0% of women with primary infertility had BMI ≥30 kg/m² compared with 38.9% of those without infertility, the association between BMI category and infertility did not reach statistical significance (p = 0.214). This finding differs from larger studies in which obesity was independently associated with reduced fertility. A meta-analysis of 18 studies reported that obesity was associated with a 24% reduction in fecundability (FOR 0.76) and a 60% higher odds of infertility (OR 1.60).[13] Similarly, NHANES data showed that women in the highest BMI category had approximately 2.1-fold higher odds of infertility than those in the lowest category.[16] The absence of statistical significance in our study may be related to the relatively small sample size and the fact that all participants were already overweight or obese.

The strongest association in our study was observed with menstrual pattern (p < 0.001). Irregular menstruation was present in 80.0% of women with primary infertility compared with 27.8% of those without infertility. This finding is biologically plausible because obesity can disturb the hypothalamic–pituitary–ovarian axis and is associated with anovulation and menstrual dysfunction.[17] Earlier evidence also demonstrated that menstrual abnormalities increased progressively with increasing excess body weight.[18] Importantly, previous research among obese women has shown that weight reduction can

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improve menstrual function and ovulation, further supporting the clinical importance of this association.[19]

A significant association was also observed between family history of infertility and primary infertility (p = 0.018). A positive family history was reported by 40.0% of women with infertility compared with only 11.1% of those without infertility. This finding is consistent with population-based evidence from Yazd, where family history of infertility was significantly associated with infertility (p = 0.001),[4] and with a case-control study from Sudan in which family history remained significantly associated with unexplained infertility after adjustment for potential confounders.[20] Familial clustering may partly reflect shared genetic, endocrine, metabolic, or environmental factors; however, family history alone should not be interpreted as evidence of a direct genetic cause.[21]

Strengths, limitations and recommendations:

The main strength of this study is its focus on obese women, allowing assessment of clinical factors associated with primary infertility within a higher-risk population. However, the relatively small sample size, single-centre design, cross-sectional nature, and use of non-probability sampling limit generalizability and prevent causal interpretation. Potential confounders such as PCOS, insulin resistance, thyroid dysfunction, tubal factors, and male-factor infertility were not comprehensively assessed. Larger multicentre prospective studies incorporating hormonal, metabolic, and partner-related factors are recommended. Routine assessment of menstrual irregularity, reproductive age, and family history, together with appropriate weight-management and preconception counselling, may help identify obese women at increased risk of infertility.

CONCLUSION:

Primary infertility was observed in 12.2% of obese women and was significantly associated with older reproductive age, irregular menstrual cycles, and a positive family history of infertility. BMI category alone was not significantly associated with infertility. Early identification of these risk factors, together with appropriate weight management and preconception counselling, may help improve reproductive outcomes in obese women.

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Conflict of interest:

The authors declare no conflict of interest.

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