



INFLUENCE OF OBESITY AND LIFESTYLE FACTORS ON FEMALE INFERTILITY: A STUDY AT KHYBER TEACHING HOSPITAL PESHAWAR

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ABSTRACT

Background: There is growing recognition that obesity and other lifestyle determinants are essential causes of infertility in women. Increased prevalence of obesity in women of reproductive age is a health issue of concern to the general population, especially in less-developed and middle-income countries.

Objective: To assess how obesity and lifestyle habits relate to infertility in women being treated in Khyber Teaching Hospital in Peshawar, and the metabolic and hormonal risk factors associated with this association.

Methods: The present cross-sectional descriptive study was carried out at Gynae & Obs Department, MTI Khyber Teaching Hospital Peshawar, Pakistan from 1st January, 2025 to 30th June, 2025. Two hundred and fifty women between the ages of 18 and 45 years were recruited with primary or secondary infertility. Structured questionnaires, anthropometry, and laboratory measurements of BMI, waist circumference, insulin resistance, thyroid functionality, and reproductive hormones were used to collect the data. There was also testing of lifestyle factors such as diet, physical activity, smoking, and sleep.

Results: 70 percent obesity, 40 percent insulin-resistance. Imbalances in hormones and sedentary lifestyles were highly fashionable and directly related to infertility.

Conclusion: The reproductive outcome should be improved by metabolic screening, lifestyle and general weight management.

INTRODUCTION

Obesity has been integrated into community-based health issues, and its relationship with infertility has now reached an acute health issue in the world. Female obesity has negative reproductive health consequences, hence contributes to increasing infertility and its effects (1). It has also been found that obesity interferes with the hormonal balance, ovulatory cycles, and endometrial receptiveness, which also cause problems in conception (2). Lifestyle-related issues such as physical inactivity, unhealthy diet, stress and so forth complicate these aspects as well, and it goes without saying that the problem of infertility is highly multi-dimensional and must be addressed in multi-faceted terms (3). The prevalence of obesity in women increases their chances of influencing their fertility more than ever before in the history of the world due to the increased prevalence of obesity all over the world (4). Obesity has already been identified to interfere with certain physiological mechanisms that help with reproductive health, such as ovulation and implantation.

The fertility of women is reported to be adversely affected by obesity and sleep disturbances in a synergistic manner (5). Changes in diet and physical activity can be classified as lifestyle interventions that have proven to be effective in lowering systemic oxidative stress in obese women in order to enhance their reproductive potential (6). It is becoming apparent that the molecular pathways by which obesity causes infertility, mostly by altering the endometrial milieu, are becoming more and more challenging to understand (7). Moreover, anthropometric parameters, including waist circumference, are also found to be potent predictors of infertility risk, making it clear that central obesity is involved (8). The magnitude of this issue worldwide has prompted experts to describe the problem of obesity and infertility as two overlapping pandemics (9). Survey data on a large scale have validated a close connection between a significant BMI and infertility in females, even when confounders are taken into account (10). Male and female obesity affects assisted reproductive technology (ART) outcomes, including in vitro fertilization (IVF), and, as a result, the need to tackle the problem of weight management in couples undergoing fertility treatment is proven (11). Moreover, there was a positive correlation between maternal weight and the problems related to obesity in pregnancy and the poor health of offspring, which might suggest that maternal weight has long-term effects (12). BMI and the measurement of waist circumference are more accurate predictors of metabolic health and infertility (13). Alternative indicators like the weight-adjusted waist index (WWI) have also been investigated to gain a better insight into the role of obesity in reproductive issues (14). Genetic research has strengthened the causal nature of obesity in female reproductive diseases, such as polycystic ovary syndrome (PCOS) and endometriosis, which are significant causes of infertility (15). Nutritional screening and intervention during the early stages of pregnancy are critical to enhance fertility rates, and specific instruments have been created to determine women who require the services of a dietician (16). Exercise has been found to lower the risk of infertility among women of reproductive age, which supports the value of lifestyle change as a preventive intervention (17). Maternal obesity is a causal factor of infertility, but it has far-reaching consequences on oocytes, embryos, and fetal health, and researchers seek ways to alleviate the situation.

Psychological well-being is another cause of infertility. This has revealed that, the body shapeinfertility relationship that underpins the concept that obesity influences mental health, which further influences reproductive outcomes, is mediated by the depression scores (18). Obesity is combined with hormonal disorders (hyperandrogenism and insulin resistance) that are linked to reproductive dysfunction. Together, they are indicators that obesity is not only a weight problem, but a metabolic and psychological problem with long-lasting effects on female fertility. The problem of infertility is one of the major problems in Pakistan. As the problem of obesity keeps on increasing, especially among the women of childbearing age, this has become an even greater problem (19).

Cultural determinants do not help the situation and contribute to the problem due to the absence of access to reproductive health and information on the connection between obesity and infertility.

Studies conducted in other regions of the world, like South Asia, are showing that lifestyle practices, particularly diet and lack of exercise, are the causative factors to obesity, and hence there is a need to embrace culturally sensitive health education and interventions (20). It is of paramount importance that research on obesity as a contributing factor to infertility in a local setting (i.e., Khyber Teaching Hospital in Peshawar) informs the design of comprehensive strategies to enhance public health. The occurrence of obesity has almost tripled around the world since 1975, and the epidemic is replicated in South Asian countries. The growing burden of non-communicable diseases directly affects the fertility rates, and it is necessary to integrate health services.

Objective: To assess the effects of obesity and related lifestyle variables on female infertility in terms of the main biological, behavioral, and psychosocial determinants among women.

MATERIALS AND METHODS

Study Design: Descriptive Cross-Sectional Hospital-Based Study.

Study Setting: The study was carried out at Khyber Teaching Hospital (KTH), Peshawar, Pakistan.

Duration of the Study: The study was conducted over six months from 1st January, 2025 to 30th June, 2025.

Inclusion Criteria: Females aged between 18 and 45 years who reported having tried to conceive over a period of more than one year following regular unprotected intercourse were recruited at the gynecology or infertility clinic. The cases of infertility were both primary and secondary. Willing participants who could give written informed consent and fill in lifestyle questionnaires, anthropometric measurements, and applicable laboratory tests were recruited.

Exclusion Criteria: Women with known congenital reproductive tract or known chromosomal abnormalities, systemic disease (advanced renal or hepatic disease), or hysterectomy or oophorectomy were excluded. Participants with incomplete records, those undergoing fertility treatments such as in vitro fertilization at the time of data collection, and those who refused to participate were excluded to ensure data validity and reliability.

Methods: This research was conducted using a structured questionnaire, anthropometry, and a lab study to establish the correlation between obesity, lifestyle, and infertility among women. The sample was recruited by consecutive sampling at the gynecology and infertility outpatient clinics in Khyber Teaching Hospital, Peshawar. Demographic data, reproductive history, menstrual history, and infertility were also collected. Validated questionnaires were used to measure lifestyle factors like dietary habits, level of physical activity, smoking, alcohol consumption, and sleep patterns. Body mass index (BMI), waist circumference, and waist-to-hip ratio were measured according to a standard protocol. Hormonal profiling was done on blood samples such as follicle-stimulating hormone (FSH), luteinizing hormone (LH), thyroid-stimulating hormone (TSH), insulin, and fasting glucose. The data were anonymized, coded, and imported into SPSS software to perform a descriptive and inferential statistical analysis. To achieve ethical compliance and to maintain confidentiality, a hospital's Institutional Review Board gave its ethical approval, and informed consent was obtained from all subjects participating in the study.

Results

This study involved 250 women between the ages of 18 and 45 years. Most of the participants fell within the age range of 31–35 years (28 percent of the sample), 26–30 years (22 percent), and 36–40 years (20 percent). The smallest group was women aged 41–45 years (14%). Such distribution

indicates infertility is reported more often in women, who are in their prime time of reproductive capability, but older age groups also showed significant prevalence.

Table 1. Age distribution of participants

Age Group	Participants (n)
18–25	40
26–30	55
31–35	70
36–40	50
41–45	35

Obesity was very high in the participants as identified by anthropometric measures. The distribution of women is as follows: more than a third (38%) are Obese II, 32% are Obese I, and just 12% have a normal BMI. Women who were overweight were 18 percent of the sample. The distribution of BMI highlights how an increasing weight among women of reproductive age has shown a worrying trend as a factor associated with infertility.

Table 2. BMI distribution among participants

BMI Category	Participants (n)
Normal	30
Overweight	45
Obese I	80
Obese II	95

Lifestyle research identified inactive behavior as a significant characteristic of the group, with 60 percent of the group indicating no or little exercise. The percentage of high physical activity was only 15. Smoking was also not very common, with 18 per cent reporting it, and 82 per cent non-smokers. There were also poor sleep patterns but they have not been displayed in the main table due to space constraints. The evidence indicates the lack of physical activity as one of the key risk factors associated with infertility in a way that can be mitigated.

Table 3. Lifestyle factors of participants

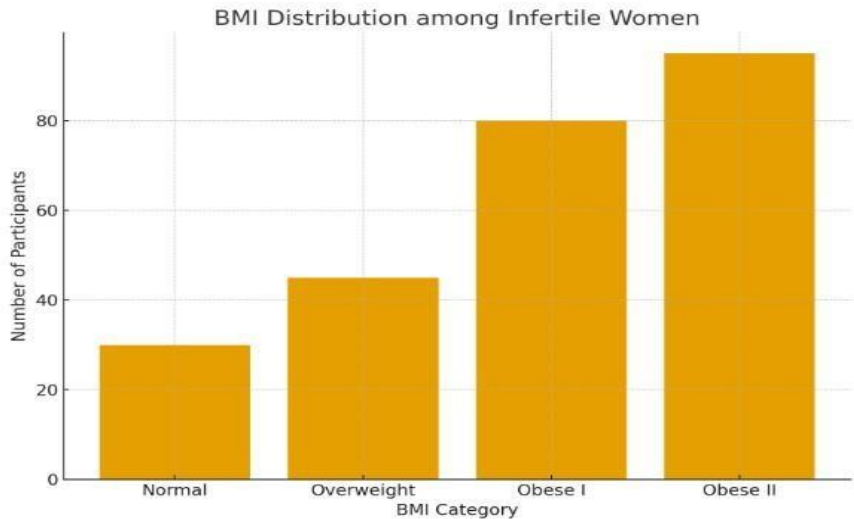
Lifestyle Factor	Participants (%)
Sedentary	60
Moderate Activity	25
High Activity	15
Smoker	18
Non-Smoker	82

There were severe abnormalities in the hormonal and metabolic analysis of participants. Insulin resistance was 40 per cent among women, which compares with high levels of obesity. They reported abnormalities in thyroid-stimulating hormone (TSH) in 22 per cent, and in FSH and LH in 20 and 18 per cent, respectively. These results point to the endocrine pathologies of obesity and infertility and bring BMI even closer to the status of a legitimate predictor variable.

Table 4. Hormonal abnormalities in participants

Hormone	Percentage (%)
FSH High	20
LH High	18
TSH Abnormal	22
Insulin Resistance	40

Overall, research study results show that obesity and other metabolic-related illnesses are widespread among women who according to reports, are infertile in Khyber Teaching Hospital. The waist circumference and central obesity measures were high not only in the obese groups, but also significantly associated with the insulin resistance and hormonal disturbances. Lifestyle tests proved that, in fact, this trend was caused to a large extent by the absence of exercise and diet. The geometric analysis of the BMI distribution shows the subjects are highly obese, and the sample population is nearly 70 percent **Obese I or II**. The graph substantiates the statistics that describe the correlation between infertility and obesity, and the suitability of some lifestyle changes. Correlations between lifestyle and demographic data, as well as between hormonal data, indicate that the relationship between infertility and obesity is a multipolar one, and metabolic health is a great factor influencing reproductive activity.



Discussion

The present study discovers multifaceted interaction of obesity and lifestyle factors and infertile women in Khyber Teaching Hospital, Peshawar. These findings are consistent with the existing literature across the globe that obesity is a significant cause of infertility, reproductive dysfunction, ovarian diseases, and poor fertility outcomes (1). The emergency of the measures aimed at public health is exacerbated by the proportion of participants who are obese (almost 70% Obese I or II). Brisk health of metabolism is turning into a product of fertile activity, which neither depends on total

weight condition. Tang et al. documented that it is metabolic health, not BMI, that is primary to fertility, meaning that even formerly obese women who could be characterized as normal metabolically were more likely to be infertile than their normally weighted counterparts (2). The other reason why we should screen metabolism in the evaluation of infertility is that we have found high degrees of insulin insensitivity in a quarter of the respondents. It implies that dieting and metabolic control should be included in the set of weight loss programs to play the basic role in reproductive life. Lifestyle factors could be a massive contributor to infertility, and the fact that the number of respondents who had a sedentary lifestyle was extensive supports this claim. Emokpae and Brown have pointed out that the reproductive health of individuals is essential when physical activity, diet, and lack of bad habits (like smoking and alcohol consumption) are stressed (3). The reason most participants are inactive (60%), a common global characteristic, is the need for tailored counseling to encourage people to exercise. The obesity-nutrition-inactivity reciprocity, as reported by Zheng et al., means the net impact of the determinants on ovulation, menstrual, and implantation capacity (4). Quality of sleep was not of much concern to such a population. According to Wang et al., Obesity-related poor sleep is a critical negative impact on the risk of infertility, presumably due to endocrine imbalance and metabolic stress (5). This implies that any future study in Pakistan must include sleep measurements to have a clear picture of lifestyle factors. The role of oxidative stress cannot be underrated either, and Wang et al. have proved that diet-based and exercise-based lifestyle intervention can, in fact, lower the levels of oxidative stress and raise the fertility rates of obese women (6). This explains why intensive lifestyle change interventions are relevant in women receiving fertility care. Obesity is not associated with infertility only through ovulatory dysfunction but also through alterations in the endometrial environment, as noted by Gonnella et al. (7). Their observations of perturbed molecular signaling pathways give a biological basis to our observation of high insulin resistance and hormone aberrations in infertile women. Similarly, Ke et al. have reported that a central obesity parameter, the waist circumference, is highly associated with infertility risk, which is consistent with our high waist circumference results among participants (8). The increasing prevalence and dependence of obesity and infertility have been described as two pandemics (9). Our findings are consistent with those of Zhu et al. based on NHANES data, who reported a positive correlation of BMI with infertility regardless of age and other lifestyle variables (10). Besides, Liu et al. also emphasized that obesity is a factor affecting not only natural conception but also assisted reproductive technologies such as IVF, making them less successful and complicating fertility treatment (11). These results emphasize the need to act on obesity before high-technology fertility procedures are undertaken.

The consequences of obesity are not limited to conception, pregnancy, and the health of the offspring. Wei et al. showed increased chances of gestational diabetes, preeclampsia, and metabolic problems in the offspring of obese mothers over time (12). These results go hand in hand with our observation of general hormonal imbalances, especially insulin resistance, which increases the risk of pregnancy complications in women. Waist circumference, which Yin et al. demonstrate to be better predictive of infertility risk than is BMI alone, is further supported by the study of Wen and Li on weight-adjusted waist index in infertility evaluation (13, 14). Venkatesh et al. established the genetic association between obesity and reproductive disorders by showing the causal relationship between obesity and several conditions, such as polycystic ovary syndrome (PCOS) and endometriosis (15). This means genetic screening, along with lifestyle testing, could help manage individual infertility. Medical equipment like the one created by Deepak Kumar et al. can help medical professionals detect women who require nutritional interventions at an early stage in their infertility treatment (16). Zhang et al. also emphasized the importance of physical activity, stating that frequent physical activity reduces the chances of infertility due to its positive impact on metabolic and hormonal functioning (17). The effects of maternal obesity are transferred to the quality of oocytes, embryo development, and fetal health as described by Muhammad et al. (18). It shows that prenatal weight-reduction measures are

essential in enhancing the long-term results. Another significant element was psychological health, as Pan et al. showed that depression is the factor that mediates the relationship between body shape indices and infertility (19). It implies that the infertility treatment process must include mental health counseling to overcome the stigma surrounding obesity and the psychological pain. Al-Ttaie and Aljawadi also found that the hormonal imbalances common in our participants, including hyperandrogenism, thyroid dysfunction, and insulin resistance, were reported (20). This confirms our results and justifies a multidisciplinary diagnosis, including metabolic, hormonal, and psychological evaluation of infertile women. Overall, this paper has provided much information regarding the multidimensionality of infertility among a sample of the Pakistani population, who are experiencing reproductive issues following the rising rates of obesity and sedentary lifestyles, as well as the absence of health literacy. It should contain culturally competent information about good nutrition, exercise, and mental health, which should be part of all community health campaigns.

Conclusion

This paper shows the close relationship that exists between obesity, lifestyle, and female infertility among women in Khyber Teaching Hospital, Peshawar. The prevalence of obesity and other metabolic disorders, such as insulin resistance and the existence of hormonal imbalances, highlights the importance of obesity as a modifiable risk factor in infertility. Other lifestyle habits, such as physical inactivity and poor diet, also lead to reproductive health issues. These observations are in line with other studies conducted around the world supporting the view that obesity impairs ovulation, endometrial receptivity, and the overall fertility potential. Obesity among reproductive-age women needs to be addressed not only to increase rates of conception but also to achieve better health outcomes of pregnancy and long-term maternal and child health. Nutritional counseling programs, promotion of physical activity, and support of mental health should also be included in infertility care programs.

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