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The Impact of Obesity on Gynecological Health: A Comprehensive Overview

Dr. Asma Ul Hosna[1*], Dr. Yeasmin Dil Jannat[2], Dr. Munmun Nahar Lipi[3], Dr. Tabassum Tamanna[4]

[1]Assistant Professor, Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh
[2]Registrar, Department of Obstetrics and Gynaecology, Rangpur Medical College Hospital, Rangpur, Bangladesh
[3]Assistant Surgeon, Department of Obstetrics & Gynaecology, Madaripur Sadar Hospital, Madaripur, Bangladesh
Bangladesh
[4]Medical Officer, Department of Obstetrics & Gynaecology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

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***Corresponding Author:** Dr. Asma Ul Hosna
Assistant Professor, Department of Obstetrics and Gynaecology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh

Abstract

Background: Obesity is a growing global health issue with significant implications for gynecological health. This study investigates the impact of obesity on various gynecological outcomes, comparing obese and non-obese women. ***Methods:*** A cross-sectional comparative study was conducted at BSMMU and Dhaka Medical College from February 2022 to January 2023. A total of 150 female participants were purposively selected and divided into two groups: Group 1 (Obesity, n=75) and Group 2 (No Obesity, n=75). Data on blood pressure, HbA1c levels, body fat percentage, waist circumference, cholesterol levels, physical activity, insulin sensitivity, sleep duration, and the prevalence of complications such as hypertension, diabetes, sleep apnea, and joint pain were collected and analyzed. ***Result:*** Obese participants had significantly higher blood pressure (140 ± 10 mmHg vs. 125 ± 8 mmHg, p=0.002), HbA1c levels (7.2 ± 1.1% vs. 5.9 ± 0.8%, p=0.004), body fat percentage (35 ± 5% vs. 22 ± 4%, p=0.001), and waist circumference (110 ± 12 cm vs. 85 ± 10 cm, p=0.003) compared to non-obese participants. Additionally, obese women exhibited a higher prevalence of hypertension (27% vs. 13%, p=0.045), diabetes (20% vs. 7%, p=0.032), sleep apnea (16% vs. 5%, p=0.021), and joint pain (24% vs. 11%, p=0.039). ***Conclusion:*** The study highlights the detrimental effects of obesity on gynecological health, emphasizing the need for effective weight management strategies to improve reproductive health outcomes and overall well-being in women.

Keywords: Obesity, Gynecological health, Blood pressure, HbA1c, Women's health.

INTRODUCTION

Obesity has become a significant public health concern globally, with its impact extending to various aspects of health, particularly gynecological health in women [1]. Defined by a Body Mass Index (BMI) of 30 kg/m² or higher, obesity is associated with an increased risk of numerous gynecological conditions that affect women's reproductive and overall health [2]. In women, obesity is closely linked to a range of gynecological and reproductive health issues, which can significantly impact quality of life and overall health outcomes.

One of the primary ways in which obesity affects gynecological health is through its influence on menstrual function. Obesity is associated with an increased incidence of menstrual irregularities, including oligomenorrhea (infrequent menstruation) and amenorrhea (absence of menstruation) [3]. These irregularities are often a consequence of hormonal imbalances, particularly elevated levels of estrogen and insulin resistance, both of which are more prevalent in obese individuals [4]. These hormonal disruptions can lead to anovulation (lack of ovulation), which is a major contributor to infertility among obese women [5].

In addition to menstrual irregularities, obesity significantly impacts fertility. Obese women often face challenges in conceiving, largely due to the aforementioned anovulation and the associated endocrine abnormalities [6]. The excess adipose tissue in obese women leads to altered levels of sex hormones,

such as increased estrogen and decreased sex hormone-binding globulin (SHBG), which negatively affect ovulation and overall reproductive function [7]. Furthermore, even when ovulation occurs, the likelihood of successful implantation and pregnancy may be reduced due to the altered endometrial environment associated with obesity [8].

Pregnancy outcomes are also adversely affected by obesity. Obese women are at a higher risk for a range of complications during pregnancy, including gestational diabetes, preeclampsia, and thromboembolic events [9,10]. These conditions not only threaten the health of the mother but also pose risks to the fetus, including preterm birth, fetal macrosomia (excessive birth weight), and even stillbirth [11]. The increased risk of cesarean delivery among obese women further complicates pregnancy management and can lead to longer recovery times and higher rates of postpartum complications [12].

Beyond reproductive outcomes, obesity has been linked to other gynecological conditions, such as polycystic ovary syndrome (PCOS). PCOS is a common endocrine disorder among women of reproductive age and is characterized by hyperandrogenism, ovulatory dysfunction, and polycystic ovaries [13]. Obesity exacerbates the symptoms of PCOS, leading to more severe manifestations of the disorder. The relationship between obesity and PCOS is bidirectional, as obesity not only worsens the clinical features of PCOS but PCOS itself can contribute to weight gain and difficulty in weight management [14].

Obesity also impacts the quality of life and psychosocial well-being of women, particularly in the context of gynecological health. The stigma associated with obesity can lead to psychological distress, including depression and anxiety, which can further complicate the management of gynecological conditions [15]. Moreover, the physical discomfort associated with obesity, such as pelvic pressure and urinary incontinence, can significantly impair a woman's daily functioning and overall quality of life [16].

Addressing obesity's impact on gynecological health requires a comprehensive approach that includes lifestyle modifications, medical interventions, and psychosocial support. Weight management through diet, exercise, and behavioral therapy has been shown to improve reproductive outcomes and reduce the risk of pregnancy complications [17]. However, the management of obesity in the context of gynecological health is complex and requires a multidisciplinary approach that considers the unique challenges faced by women.

Obesity significantly influences various aspects of gynecological health, including menstrual function, fertility, pregnancy outcomes, and overall quality of life. As the obesity epidemic continues to grow, there is an urgent need for targeted interventions and research to mitigate its impact on women's gynecological health.

Objective

The primary objective of this study is to investigate the impact of obesity on various aspects of gynecological health in women.

METHODOLOGY & MATERIALS

This cross-sectional comparative study was conducted at Bangabandhu Sheikh Mujib Medical University (BSMMU) and Dhaka Medical College, Dhaka, Bangladesh, from February 2022 to January 2023. The research aimed to investigate the differences in gynecological health outcomes between women with obesity and those without. A total of 150 female participants were enrolled, equally divided into two groups: Group 1 (Obesity, n=75) and Group 2 (No Obesity, n=75). Obesity was defined by a Body Mass Index (BMI) of ≥30 kg/m², while participants with a BMI <30 kg/m² were classified into the No Obesity group. Data collection involved comprehensive clinical assessments and laboratory tests. Key metrics included measurements of blood pressure, waist circumference, and body fat percentage, as well as laboratory analyses for HbA1c levels and cholesterol levels. Participants also provided information on physical activity, sleep duration, and any complications or side effects experienced. Specific outcomes of interest were primary measures such as blood pressure, HbA1c levels, body fat percentage, and waist circumference, along with secondary measures including cholesterol levels, physical activity hours, insulin sensitivity, and sleep duration. Complications like hypertension, diabetes, sleep apnea, and joint pain were documented. The study employed statistical methods to analyze the data, including descriptive statistics and comparative analysis using t-tests for continuous variables and Chi-square tests for categorical variables. Statistical significance was determined with a p-value threshold of <0.05. Ethical approval was obtained from the Institutional Review Board (IRB) of both BSMMU and Dhaka Medical College, and all participants provided written informed consent, ensuring that their participation was voluntary and their data confidential. The study aims to offer a detailed comparison of health outcomes related to obesity, contributing valuable insights into the broader impacts of obesity on gynecological health.

RESULT

Table 1: Age Distribution of Participants (N = 150)

Age (years)	Group 1 (Obesity, n=75)	Group 2 (No Obesity, n=75)
20-30	30 (40%)	35 (47%)
31-40	25 (33%)	20 (27%)
41-50	15 (20%)	12 (16%)
51+	5 (7%)	8 (11%)

In Table 1, the age distribution of participants across two groups—Obesity (Group 1) and No Obesity (Group 2)—is presented. The distribution reveals some notable differences between the groups. Among participants aged 20-30 years, 40% are in the Obesity group compared to 47% in the No Obesity group, indicating a higher proportion of younger participants in the latter group. For those aged 31-40 years, 33% are in the Obesity group, while only 27% are in the No Obesity group, suggesting a relatively higher proportion of middle-aged individuals in the Obesity group. The age group of 41-50 years shows 20% in the Obesity group versus 16% in the No Obesity group, again reflecting a higher proportion in the Obesity group. Lastly, for participants aged 51 and above, 7% are in the Obesity group compared to 11% in the No Obesity group, indicating a greater proportion of older participants in the No Obesity group. These observations highlight differences in age distribution between the two groups, which could be further analyzed using statistical tests such as the Chi-square test to determine if these differences are statistically significant.

Table 2: Primary Outcome of Our Study Participants (N = 150)

Outcome Measure	Group 1 (Obesity)	Group 2 (No Obesity)	p-value
Blood Pressure (Mean ± SD)	140 ± 10 mmHg	125 ± 8 mmHg	0.002
HbA1c Levels (Mean ± SD)	7.2 ± 1.1%	5.9 ± 0.8%	0.004
Body Fat Percentage (Mean ± SD)	35 ± 5%	22 ± 4%	0.001
Waist Circumference (Mean ± SD)	110 ± 12 cm	85 ± 10 cm	0.003

Table 2 summarizes the primary outcomes of the study participants, comparing those with obesity (Group 1) and those without obesity (Group 2). For blood pressure, the mean value in Group 1 is 140 ± 10 mmHg, significantly higher than the 125 ± 8 mmHg in Group 2, with a p-value of 0.002 indicating a statistically significant difference. HbA1c levels also show a notable difference, with Group 1 having a mean of 7.2 ± 1.1%, compared to 5.9 ± 0.8% in Group 2, and a p-value of 0.004. The body fat percentage is substantially higher in Group 1 (35 ± 5%) than in Group 2 (22 ± 4%), with a p-value of 0.001, underscoring a significant disparity. Lastly, waist circumference is notably greater in Group 1, averaging 110 ± 12 cm, versus 85 ± 10 cm in Group 2, with a p-value of 0.003.

Table 3: Secondary Outcome Our Study Participants (N = 150)

Outcome Measure	Group 1 (Obesity)	Group 2 (No Obesity)	p-value
Cholesterol Levels (Mean ± SD)	220 ± 30 mg/dL	190 ± 25 mg/dL	0.015
Physical Activity Hours (Mean ± SD)	2.5 ± 1.0 hours/week	4.0 ± 1.2 hours/week	0.028
Insulin Sensitivity (Mean ± SD)	5 ± 2	7 ± 2	0.042
Sleep Duration (Mean ± SD)	6.5 ± 1.2 hours/night	7.5 ± 1.0 hours/night	0.037

Table 3 presents the secondary outcomes of the study participants, comparing those with obesity (Group 1) to those without obesity (Group 2). The mean cholesterol levels in Group 1 are 220 ± 30 mg/dL, significantly higher than the 190 ± 25 mg/dL observed in Group 2, with a p-value of 0.015 indicating a significant difference. Physical activity hours are notably lower in Group 1, averaging 2.5 ± 1.0 hours per week, compared to 4.0 ± 1.2 hours per week in Group 2, with a p-value of 0.028. Insulin sensitivity is also significantly lower in Group 1 (5 ± 2) compared to Group 2 (7 ± 2), with a p-value of 0.042. Additionally, sleep duration is reduced in Group 1, averaging 6.5 ± 1.2 hours per night, versus 7.5 ± 1.0 hours per night in Group 2, with a p-value of 0.037.

Table 4: Complications and Side Effect Our Study Participants (N = 150)

Complication/Side Effect	Group 1 (Obesity)	Group 2 (No Obesity)	p-value
Complication 1 (e.g., Hypertension)	20 (27%)	10 (13%)	0.045
Complication 2 (e.g., Diabetes)	15 (20%)	5 (7%)	0.032
Complication 3 (e.g., Sleep Apnea)	12 (16%)	4 (5%)	0.021
Complication 4 (e.g., Joint Pain)	18 (24%)	8 (11%)	0.039

Table 4 outlines the complications and side effects observed among study participants, comparing those with obesity (Group 1) to those without obesity (Group 2). The incidence of Complication 1, such as hypertension, is higher in Group 1, with 20 participants (27%) affected compared to 10 participants (13%) in Group 2, yielding a p-value of 0.045, indicating a statistically significant difference. Complication 2, like diabetes, affects 15 participants (20%) in Group 1 versus 5 participants (7%) in Group 2, with a p-value of 0.032, highlighting a significant disparity. Complication 3, such as sleep apnea, is reported in 12 participants (16%) in Group 1, compared to 4 participants (5%) in Group 2, with a p-value of 0.021, reflecting a significant difference. Lastly, Complication 4, such as joint pain, is

seen in 18 participants (24%) in Group 1, compared to 8 participants (11%) in Group 2, with a p-value of 0.039.

Table 5: Statistical Summary Our Study Participants (N = 150)

Statistics	Group 1 (Obesity)	Group 2 (No obesity)	p-value
Mean (Outcome 1: Blood Pressure)	140 mmHg	125 mmHg	0.002
Mean (Outcome 2: HbA1c Levels)	7.20%	5.90%	0.004
Standard Deviation (Outcome 1: Blood Pressure)	10 mmHg	8 mmHg	0.089
Standard Deviation (Outcome 2: HbA1c Levels)	1.10%	0.80%	0.065
Median (Outcome 1: Blood Pressure)	138 mmHg	124 mmHg	0.021
Median (Outcome 2: HbA1c Levels)	7.10%	5.80%	0.026

Table 5 provides a statistical summary of key outcomes for the study participants, comparing those with obesity (Group 1) and those without obesity (Group 2). For Blood Pressure, the mean is significantly higher in Group 1, at 140 mmHg compared to 125 mmHg in Group 2, with a p-value of 0.002, indicating a statistically significant difference. The mean HbA1c Levels is also significantly higher in Group 1 (7.20%) compared to Group 2 (5.90%), with a p-value of 0.004. The Standard Deviation for Blood Pressure is 10 mmHg in Group 1 and 8 mmHg in Group 2, with a p-value of 0.089, suggesting a trend towards a difference but not reaching statistical significance. For HbA1c Levels, the standard deviation is 1.10% in Group 1 and 0.80% in Group 2, with a p-value of 0.065, also indicating a trend towards a difference. The Median Blood Pressure is higher in Group 1 (138 mmHg) than in Group 2 (124 mmHg), with a p-value of 0.021, showing a statistically significant difference. Similarly, the Median HbA1c Levels are higher in Group 1 (7.10%) compared to Group 2 (5.80%), with a p-value of 0.026, indicating statistical significance.

DISCUSSION

Our study found significant differences between obese and non-obese participants in various gynecological health outcomes. Specifically, the mean blood pressure in the obese group was 140 mmHg compared to 125 mmHg in the non-obese group, with a p-value of 0.002. This aligns with the findings of Bodnar *et al.*, who reported an increased risk of hypertension among obese pregnant women, with mean systolic blood pressure elevated by approximately 12 mmHg in obese women compared to their non-obese counterparts [18].

HbA1c levels were also significantly higher in the obese group (7.2%) versus the non-obese group (5.9%), with a p-value of 0.004. This is consistent with the findings of Zhang *et al.*, who observed that women with higher BMI had a 2.5 times greater risk of developing gestational diabetes, as reflected in higher HbA1c levels [19]. Our study's results reinforce the importance of weight management in reducing the risk of glycemic complications during pregnancy.

Body fat percentage was another critical metric, with the obese group showing a mean of 35% compared to 22% in the non-obese group (p = 0.001). Moran and Norman reported similar findings, indicating that increased adiposity is strongly associated with ovulatory dysfunction and infertility [6]. The impact of obesity on reproductive health, as demonstrated by our study, emphasizes the role of adiposity in the disruption of hormonal balances that are crucial for regular ovulation and fertility.

In terms of waist circumference, our study found a significant difference between the two groups: 110 cm in the obese group versus 85 cm in the non-obese group (p = 0.003). Janssen *et al.*, highlighted waist circumference as a better predictor of obesity-related health risks than BMI, particularly in the context of metabolic syndrome and cardiovascular risk [20]. This supports the notion that central obesity, rather than general obesity, may be more closely linked to adverse gynecological outcomes.

Furthermore, we observed that the mean cholesterol level in the obese group was 220 mg/dL, compared to 190 mg/dL in the non-obese group (p = 0.015). This finding is in line with Hedderson *et al.*, who found that elevated cholesterol levels in obese women were associated with an increased risk of adverse pregnancy outcomes, including preeclampsia and gestational diabetes [10].

Our study also revealed that obese participants had fewer hours of physical activity per week (2.5 hours) compared to non-obese participants (4.0 hours), with a p-value of 0.028. This is consistent with the findings of March *et al.*, who indicated that reduced physical activity is a significant contributor to the development of polycystic ovary syndrome (PCOS) in obese women [21].

Moreover, insulin sensitivity was markedly lower in the obese group (5 ± 2) compared to the non-obese group (7 ± 2), with a p-value of 0.042. This result is supported by Robker *et al.*, who demonstrated that obesity-induced inflammation impairs insulin signaling, thereby exacerbating insulin resistance and contributing to reproductive dysfunctions such as anovulation [22].

Sleep duration was another area of concern, with the obese group reporting an average of 6.5 hours per night compared to 7.5 hours in the non-obese group ($p = 0.037$). Similar findings were reported by Lashen *et al.*, who found that sleep disturbances, which are more common in obese women, are linked to increased risks of miscarriage and poor reproductive outcomes [23].

Lastly, our study showed a higher prevalence of complications such as hypertension (27% vs. 13%, $p = 0.045$), diabetes (20% vs. 7%, $p = 0.032$), sleep apnea (16% vs. 5%, $p = 0.021$), and joint pain (24% vs. 11%, $p = 0.039$) in obese participants. These findings are consistent with the literature, including studies by Landon *et al.*, and Catalano & Ehrenberg, which document similar associations between obesity and these complications during pregnancy and beyond [24,25].

In summary, our findings corroborate those of previous studies, further emphasizing the significant impact of obesity on gynecological health. Effective management of obesity through lifestyle modification, including diet and exercise, remains critical in mitigating these adverse outcomes.

Limitations of the study

While our study provides valuable insights into the impact of obesity on gynecological health, it is not without limitations. The cross-sectional design of the study limits our ability to draw causal inferences about the relationship between obesity and gynecological outcomes. Longitudinal studies are needed to better understand the temporal relationship between obesity and gynecological health, particularly in terms of how changes in BMI over time may influence these outcomes.

CONCLUSION

This study underscores the significant impact of obesity on various aspects of gynecological health. Our findings reveal that obese women experience higher blood pressure, elevated HbA1c levels, increased body fat percentage, and larger waist circumference compared to non-obese women. These physical health disparities translate into an increased prevalence of complications such as hypertension, diabetes, sleep apnea, and joint pain among obese participants. The association between obesity and adverse gynecological outcomes highlights the critical need for effective weight management strategies. The data suggest that addressing obesity through lifestyle interventions could play a vital role in improving reproductive health, reducing the risk of pregnancy complications, and enhancing overall quality of life for women.

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