

## ORIGINAL ARTICLE

**IMPACT OF BARIATRIC SURGERY ON CONCEPTION AND PREGNANCY OUTCOMES IN PATIENTS WITH POLYCYSTIC OVARY SYNDROME (PCOS): A PROSPECTIVE STUDY OF ONE YEAR**Mushtaq Ahmad<sup>1</sup>, Mah Noor Dad Khan<sup>4</sup>, Waqar Ahmad<sup>3</sup>, Maria Alamgir<sup>4</sup>**ABSTRACT**

**Introduction:** In obese patients with PCOS, even a small weight loss of up to 5% of the initial body weight can cause spontaneous ovulation, the restoration of regular menstrual cycles, and conception. The aim of this prospective study was to determine the outcomes of Bariatric Surgery in terms of Conception and Pregnancy in patients with Polycystic Ovary Syndrome (PCOS).

**Material & Methods:** This prospective study was conducted at International metabolic and bariatric center, Afridi medical complex, Peshawar on patients who underwent bariatric surgery from February 2021 till February 2022 with one year follow up period. A total of 518 premenopausal women who attended the facility during the study period were included in the study. Patients who met the Rotterdam criteria for PCOS and were between the ages of 18 and 45 were recruited. It was mandatory for the participants to have had bariatric surgery, such as a sleeve gastrectomy or gastric bypass, within the previous year. Baseline demographic and clinical data was noted while conception rate and pregnancy outcomes were assessed in follow up. Data was analyzed using SPSS version 26.

**Results:** A total of 62 patients (12%) had Polycystic Ovary Syndrome (PCOS) diagnosis. Following one year after the bariatric surgery, forty of the participants became pregnant accounting for conception rate of 65% of the total individuals. The majority of pregnancies resulted in live births, accounting for 38 (95%) of cases. Miscarriages occurred in only 1(3%) of pregnancies. Additionally, 5(12%) of newborns were underweight while 2(5%) were overweight at birth.

**Conclusion:** The findings of our study concluded that bariatric surgery is a safe and effective therapeutic alternative for enhancing reproductive function, conception rate and better pregnancy outcomes in females suffering from polycystic ovary syndrome.

**Key Words:** Bariatric Surgery, Conception, PCOS, Pregnancy Outcomes, Women's Health

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## INTRODUCTION

Polycystic ovary syndrome (PCOS) is characterized by a complicated endocrine condition that affects women of reproductive age and is responsible for over 80% of cases of anovulatory infertility.<sup>1,2</sup> This condition is characterized by two of the following: irregular menstrual cycles, the typical ultrasound image of a polycystic ovary, and clinical and/or biochemical hyper-androgenic characteristics, after other endocrine system illnesses have been ruled out, as per the 2004 Rotterdam Criteria.<sup>3</sup> Moreover, type II diabetes, cardiovascular disease, and poor glucose tolerance are among the conditions that women with PCOS are more likely to suffer.<sup>4</sup> Clinically, PCOS manifests as a persistent hyperandrogenic condition that can lead to a range of acute and long-term conditions, such as dyslipidemia, oligomenorrhea, hypertension (HTN), hirsutism, infertility, and type 2 diabetes mellitus (T2DM). Recent studies have shown that almost 60% of PCOS patients are overweight or obese.<sup>5,6</sup>

The complicated etiology of PCOS makes the treatment more difficult. A comprehensive review and meta-analysis revealed that women with PCOS had a higher likelihood of becoming obese.<sup>7</sup> First-line therapy therefore focuses on changing lifestyles and losing weight. Losing weight helps the body respond better to hormone therapies and ovulatory induction.<sup>8</sup> It has been shown that even little weight loss, up to 5% of the initial body weight, can induce spontaneous ovulation, the return of regular menstrual cycles, and conception in obese women with PCOS.<sup>9</sup> In addition to alleviating metabolic profile disruptions, bariatric surgery is a viable choice for obese individuals seeking long-term weight loss. Following improvements in laparoscopic methods, bariatric surgeries have now been considered as a preferred option for obese PCOS patients suffering from infertility.<sup>10</sup> According to recent studies, women who undergo bariatric surgeries and maintain their weight loss may have a higher chance of conceiving, as well as see improvements in the clinical and laboratory aspects of PCOS.<sup>11</sup> However, there is little evidence available about the results of post-bariatric pregnancies. While it is usual for females undergoing bariatric surgery to experience restored ovulation following

surgically induced weight loss, it is unclear that this positive outcome would improve PCOS-associated infertility and rate of conception.<sup>12</sup> This prospective study sought to determine the prevalence of polycystic ovarian syndrome (PCOS) and the outcomes of bariatric surgery in terms of pregnancy and conception.

## MATERIAL AND METHODS

This prospective study was conducted at International metabolic and bariatric center, Afridi medical complex, Peshawar on patients undergoing bariatric surgery from February 2021 till February 2022 with one year follow up period. Data was collected from the participants after obtaining informed consent. Non-probability convenience sampling was used. A total of 518 premenopausal females constituted the sample size. The ethical committee of the hospital granted the ethical approval.

All the premenopausal female patients undergoing bariatric surgery with the age range between 18 and 45 and undergoing bariatric surgery such as sleeve gastrectomy or gastric bypass, within the previous year were included in the study while those patients who had the Confirmed or expected pregnancy while undergoing bariatric procedures or had infertility history unrelated to PCOS and with infertile male partner were excluded from the study.

The prevalence of PCOS was determined by using Rotterdam criteria.

### Diagnosis of PCOS through Rotterdam Criteria:

Patients were classified as having PCOS if two of the following three requirements were met:

- Oligo-ovulation or oligo menorrhea
- Features of hyperandrogenism (Clinical or biochemical) including acne, alopecia and hirsutism.
- Ultrasonography images of polycystic ovaries showing that at least one ovary has an ovarian volume more than 10 mL and/or at least 12 follicles with a diameter of 2 to 9 mm.
- Baseline demographic and clinical data including the age, body mass index (BMI), hormonal profile (including testosterone, FSH, LH, and AMH levels), and past reproductive history were noted.

### Surgical techniques of bariatric surgery:

The Roux-en-Y gastric bypass and laparoscopic sleeve gastrectomy (LSG) were the two primary bariatric surgical procedures carried out. Our institution's skilled bariatric surgeons carried out these surgical procedures in compliance with established standards and guidelines. The patient

selection for each procedure was determined by unique assessments that took into account the patient's preferences, comorbidities, and BMI. In order to provide well-informed decision-making and the best possible postoperative results, preoperative counseling and education were given to every patient.

#### **Outcome Measures:**

When scheduling bariatric surgery, the patient's desire for fertility was noted at the initial appointment.

The following were the main outcome measures:

**Conception rate:** The percentage of females who became pregnant during the time frame of one year follow up was known as the conception rate.

**Results of pregnancy:** This included the percentage of live births, miscarriages, underweight or overweight at birth (weight less than 2.5kg or greater than 4.5kg), premature births (less than 37 gestational weeks), and birth problems like hypertension and gestational diabetes.

One year post bariatric surgery, the participants were examined on at regular intervals after the span of one year time period (e.g., three months, six months, and twelve months). Participants completed clinical evaluations at these visits, which included weight and BMI measures as well as an assessment of menstrual regularity. Every follow-up appointment included a hormonal assessment to track any changes in hormone levels. Participants were also asked about their experiences with reproductive treatments, attempts at conception, and pregnancy outcomes.

SPSS version 26 was used for conducting the statistical analysis of the obtained data. Descriptive statistics, such as mean and standard deviation for numerical data and frequency and percentages for categorical data, were used to establish the baseline characteristics of the study population. The data's normality was evaluated using the Shapiro-Wilk test. The Wilcoxon signed-rank test was employed to investigate the changes over time.

Pregnancy outcomes and conception rates were presented as percentages with matching 95% confidence intervals. With the p value less than 0.05, the results were classified as statistically significant.

## **RESULTS**

A total of 518 premenopausal women who attended the facility during the study period were included in the study. Of these, 62 people (12%) had a Polycystic Ovary Syndrome (PCOS) diagnosis. The participants' mean age was reported as 34.1 years  $\pm$  6.3. At the baseline, the average weight and Body Mass Index (BMI) were 112 kg and 41.9 kg/m<sup>2</sup>, respectively. 5.2mmol/L was the average fasting glucose level. Furthermore, the average serum levels of free testosterone (FT) and total testosterone (TT) were 48pmol/L and 2.2nmol/L, respectively.

Table 1: Demographic/Patient Characteristics

### **Results of Bariatric Surgery with Regard to Conception Rate and Fertility**

Following one year after the bariatric surgery, forty of the participants became pregnant accounting for a conception rate of 65% of the total individuals. This result points to a significant improvement in PCOS-afflicted women's reproductive results after bariatric surgery.

Table 2 provides a summary of the pregnancy outcomes after bariatric surgery.

Most pregnancies were successful in terms of live births, accounting for 38 (95%) of cases. Miscarriages occurred in only 1(3%) of pregnancies. Additionally, 5(12%) of newborns were underweight (defined as less than 2.5 kg), while 2(5%) were overweight (defined as greater than 4.5 kg) at birth. Premature births were those that happened before 37 weeks of pregnancy, accounted for 2(5%) of pregnancies. Maternal complications were reported in 4% of cases.

Table 2: Conception and pregnancy outcomes post bariatric surgery

## **DISCUSSION**

This study highlighted the outcomes of bariatric surgery in patients suffering from polycystic ovarian syndrome (PCOS) in terms of conception and the quality of pregnancy. Our results showed that bariatric surgery significantly improved the fertility rates of PCOS-afflicted women, with a noteworthy increase in the rate of conception after surgery. This finding raises the possibility that for these specific patient groups, improving fertility with bariatric surgery may be a feasible course of action.

When comparing our study's conception rate with previous research findings, it is important to highlight that our study demonstrated a comparatively higher conception rate—65%—after bariatric surgery as compared to a study conducted in Italy (63%).<sup>13</sup> While a similar study

conducted in 2020 reported the conception rate of 40.8% .<sup>12</sup> On the other hand, different researches has shown that within 2.5 years of follow-up, 69% of infertile obese women were able to conceive and the conception rates can range from 50% to 75%.<sup>14,15</sup> The disparities seen amongst research could be attributed to variations in study demographics, surgical methods, follow-up times, and conception definitions. In addition, a patient's age, pre-existing reproductive problems, PCOS severity, and baseline BMI may all have an impact on the rate of getting pregnant after surgery.

The Obesity Society and the American Society for Metabolic & Bariatric Surgery advised against getting pregnant for 12 to 18 months following bariatric surgery, using the clinical practice guideline published by the American Association of Clinical Endocrinologists as their basis.<sup>16</sup> While the Royal College of Obstetricians and Gynecologists suggests an individualized approach based on the age of the woman and its effect on delaying pregnancy for older women, other professional bodies, such as the American College of Obstetricians and Gynecologists, recommend a duration of 12–24 months before conception.<sup>17</sup> Our study assessed only those cases whose surgery was conducted 12 months ago in order to adhere with the guidelines. The reason behind this is attributed to the fact that 12 to 18 months' time is needed to stabilize weight loss and take care of nutritional demands. This window of time guarantees optimal maternal health prior to conception and minimizes difficulties, such as nutritional shortages. It lowers hazards during pregnancy and labor and enables the development of healthful eating habits. This waiting time window reduces the possibility of problems for mother and child by allowing the body to adapt.<sup>18</sup>

The high proportion of live newborns seen in our research provides more evidence for the positive impact of bariatric surgery on PCOS-affected women's pregnancy outcomes. In this study, the low rate of miscarriages and difficulties for mothers highlights the safety and effectiveness of bariatric surgery. These results are in line with earlier studies showing better pregnancy outcomes in obese and PCOS women who have bariatric surgery.<sup>19,20</sup>

Additionally, our research showed that

among mothers who had bariatric surgery, the incidence of underweight 5(12%) and overweight babies 2(5%) was comparatively low. This is a significant finding because both low birth and high birth weight are linked to poor health outcomes. Because there is a lower chance of unfavorable birth outcomes, bariatric surgery may benefit PCOS-affected women's fetal health. The hypothesis that weight loss by bariatric surgery can enhance ovulatory dysfunction, irregular menstruation, spontaneous conception, and improved pregnancy outcomes—especially in women with PCOS—is receiving more and more support from evidence.<sup>21</sup>

There are several different pathways that contribute to the noted increases in PCOS women's fertility and pregnancy outcomes after bariatric surgery. Restoring fertility and improving pregnancy outcomes are probably greatly influenced by weight loss and metabolic improvements brought about by bariatric surgery. After surgical weight loss, the altered profile of reproductive hormones associated with morbid obesity seems to shift, either totally or partially.<sup>22</sup> Furthermore, changes in hormonal profiles, such as decreased testosterone and increased insulin sensitivity, increase in leptin levels may also be contributed to the improved fertility and lower risk of pregnancy problems.<sup>23</sup> Even though our study demonstrated encouraging results, there are a few limitations to keep in mind when analyzing the data. The single-center strategy and rather small sample size could restrict how broadly applicable our results can be. Furthermore, it is difficult to distinguish the precise effects of bariatric surgery on fertility and pregnancy outcomes in women with PCOS due to the lack of a control group. It is necessary to conduct more research with bigger sample sizes, multicenter setups, and long-term follow-up to better understand how bariatric surgery affects this population's reproductive health.

## CONCLUSION

Our study's finding indicated that bariatric surgery is a safe and useful therapeutic alternative for enhancing reproductive function, conception rate and better pregnancy outcomes in females suffering from polycystic ovary syndrome.

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Table 1: Demographic/Patient Characteristics

Variables	Frequency/Percentages
Premenopausal women visit to center	518
PCOS diagnosed	62 (12%)
Mean Age	34.1 ± 6.3
Weight	112 ± 8.4
BMI	41.9 ± 8.2
Fasting glucose (mmol/L)	5.2 ± 0.7
Serum TT (nmol/L)	2.2 ± 6.0
Serum FT (pmol/L)	48 ± 24

Table 2: Conception and pregnancy outcomes following bariatric surgery

Outcomes	Frequency/Percentages
Conception rate	40 (65%)
Percentage of live births	38 (95%)
Miscarriages	1 (3%)
Underweight at birth (weight less than 2.5kg)	5 (12%)
Overweight at birth (weight greater than 4.5kg)	2 (5%)
Premature births (less than 37 gestational weeks)	2 (5%)
Maternal complications	2 (4%)