Research Article

Is Obesity A Cause Of Infertility In Women? A Comparative Study between Obese, Polycystic Ovarian Syndrome Women and Obese, Non-Polycystic Ovarian Syndrome Women of Child-Bearing Age.

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ABSTRACT:
Objective: The study aims in determining the effect of obesity on fertility rate in women of child bearing age. The obesity due to PCOS [polycystic ovarian syndrome] and any other cause was compared to study the effect.
Methods: The women of child bearing age who were suffering from PCOS and had BMI falling in obese range alongwith women with obesity due any cause other than PCOS were included in the study. The study was conducted at Lady Aitchison hospital, Lahore after taking permission from ethical board. Total 121 patients were enrolled in study.The cases included in study were chosen from those who presented to hospital infertility clinic. Study duration was 1 year lasting from January, 2013 to December, 2013. Study follows descriptive pattern.
Results: There was significant relationship between BMI and PCOS and infertility.
Conclusion: The p value turned out to be 0.007 which showed significant association between increased BMI and PCOS. The obesity in PCOS is the cause of insulin resistance and infertility. By weight loss reproductive health of women suffering from PCOS can be improved.

Keywords: infertility, women, polycystic ovarian syndrome, obesity.

INTRODUCTION:

Polycystic ovarian syndrome is a common endocrinological problem in women. This occurs due to elevated blood androgens levels which results in signs and symptoms like, obesity,reduced fertility rate, acne, hirsutism, thickened skin, hyperpigmentation, irregular menstruation whether oligomenorrhea or amenorrhea. The other associated diseases are diabetes mellitus, ischemic heart disease, obesity, adrenal gland tumors etc.Diagnosis is made on the basis of measuring serum androgen levels and signs and symptoms, LH, FSH ratio is measured. On abdominopelvic ultrasonography, multiple ovarian cysts are noticed. Cause of disease is still unknown. It starts after first menstruation or may be later in life during child bearing age[1,2].The weight loss can help in reducing the disease symptoms and improve overall health status in patients with PCOS. Disease has no particular treatment. However, the obesity can be controlled by exercise and dietry restrictions, besides that metformin is advised. The menstrual irregularities are treated by prescribing oral contraceptive pills [3, 4,5].
Obesity affects serum level of certain hormones, for example LH [leutinizing hormone], prolactin,

FSH [follicle stimulating hormone] which alters the reproductive hormones levels and as a results affects the fertility rate. However, this study is conducted to find out whether bringing BMI within normal range helps in treating infertility or not. In addition to that, it also studies the effect of obesity on fertility rate in non-PCOS patients [6, 7, 8].

MATERIAL AND METHOD:

Many studies have highlighted the link between obesity and infertility in women. For example, obesity can contribute to problems with ovulation and to irregular menstrual periods. It also contributes to a lowered response to fertility treatment and to miscarriages. Research indicates that reducing obesity improves women's reproductive health [9]. Women with a condition called polycystic [pronounced pah-lee-SIS-tik] ovary syndrome, or PCOS, face a higher risk of both obesity and infertility. Lifestyle changes, such as losing weight, can trigger body changes that facilitate conception in women with PCOS.2,3 Learn more about PCOS. Men's obesity also is associated with a higher risk of infertility. There are several ways that excess weight may affect a man's fertility, including changes in his hormone and semen production [5].

The relationship between obesity and reproductive functions has been known for many years [10] and it is still being explored. The negative effects of obesity on reproductive consequence are well known. However, it is difficult to describe the mechanism of how obesity affects the reproductive system because it is complex and multifactorial. Several mechanisms are involved in the relationship of fertility and obesity. The insulin resistance and leptin levels are increased and hyperandrogenemia occurs in obese women. Similarly, anovulation, changes in adipokine levels and the HPG axis, and steroidogenesis in obese women affects the reproductive system. Because of reduced pregnancy rates, increased miscarriage rates, and increased pregnancy complications, live birth rates decrease in obese women in both natural and assisted conceptions. Obesity may impair reproductive functions by affecting both the ovaries and endometrium. The HPG axis deteriorates because of changes in hormonal and some substrate levels. The levels of luteinizing hormone [LH], androstenedi-one, estrone, insulin, triglycerides, and very low density lipo-protein are increased and high density lipoprotein levels are decreased in obese women. Because of these changes, the HPG axis deteriorates and different gynecological effects occur [11].

One hundred and twenty-one infertile women of child bearing age were enrolled in study, these were diagnosed or still to be diagnosed cases of PCOS, obese infertile and healthy infertile women who presented to infertility clinic at Lady Aitchison Hospital, Lahore, Pakistan. Study duration was one year starting from January 2013 to December, 2013. No ethical issue certificate was signed from hospital ethical board. Informed written consent was taken from all participants. Amongst 12 cases, 52 were obese PCOS, 30 were infertile, 39 were healthy cases enrolled in study. A questionnaire was designed to collect data including biodata of patient, BMI. Body mass index was measured and its relation with PCOS was estimated. The formula used to calculate BMI was:

BMI [kg/m2] = weight in kg/height in meters square.

The BMI range defined by WHO was followed to stratify patients into different categories according to weight [table:1].

BMI Range	interpretation
<18.5	underweight
18.5 to 24.9	Normal weight
25 to 29.9	overweight
30 or above	obese

Table:1. Stratification of cases according to BMI.

SPSS version 20 was utilized to analyse data. P-value of less than 0.05 was considered statistically significant.

RESULTS:

The evaluation of patients was done according to the method mentioned above. After that, the number of patients who were obese with PCOS and those who were obese without PCOS were

calculated. The results were 52 and 30, respectively.

Table:2 Statistics of groups.

group		Number of cases	Mean	SD of mean	Mean Error
BMI	C	30	24.60	4.11	0.75
BMI	T	52	27.30	4.28	0.59

Table:3. Comparison of BMI statistics in patients with PCOS and those without PCOS.

	Two tailed t-test	Mean difference	Standard error difference	95% lower
Equal variance not assumed	.007	2.699	.958	.770
Equal variance assumed	.007	2.699	.969	.783

The statistical comparison shown above clearly depicts that obesity in infertile PCOS patients is higher than obesity in non PCOS patients, which means obesity with PCOS is a main culprit in causing infertility in women as compared to obesity due to other reasons.

DISCUSSION:

A study conducted by Antoniotti GS, et al in 2017 and published in Human Reproducation Journal in 2018 elaborated the effect of obesity induced changes within uterine cavity and its effects on conception. The study results were raised AGE levels in uterine cells in obese as compared to non obese which hampers the proliferative phase of uterine cells and thus cause less effective conception as compared to lean individuals[4].

The obesity is not only a culprit in reducing fertility in women but it has its adverse effects of male sperm quality and count as well[5]. Thus both genders are somehow affected by obesity.A study conducted by Sinnha A, et al searched for the effect of lipid peroxidation on sperms and oocytes, clinical effects of obesity and dyslipidemia on male and female infertility and concluded that obesity is one of the factors causing infertility in humans in both sexes[6].

In a study conducted by Christ JP, et al the effect of reducing obesity through bariatric surgery in PCOS patients helped in reducing the altered reproductive enzymes levels and thus helps in improving fertility status[7]. Similar effect was studied by Simoes-Periera, et al[8]. The aim of our study is to estimate the damage on reproduction caused by obesity in PCOS women and non PCOS women. As less research data is available on Pakistani population, thus this title was aimed to study the effect on local population.

CONCLUSION

The p value turned out to be 0.007 which showed significant association between increased BMI and PCOS. The obesity in PCOS is the cause of insulin resistance and infertility. By weight loss reproductive health of women suffering from PCOS can be improved.

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