

Association Of Infertility With Obesity In Patients Of Polycystic Ovary Syndrome

Naheed Khattak

Assistant Professor, Department of Biochemistry, Khyber Medical College, Peshawar, Khyber Pakhtunkhwa, Pakistan Email: naheed.khattak@kmc.edu.pk

Sadaf Durrani

Associate Professor, Department of Biochemistry, Khyber Medical College, Peshawar, Khyber Pakhtunkhwa, Pakistan Email: sadaf.durrani@kmc.edu.pk

Muhammad Anas Khan

Lecturer, Department of Biochemistry, Khyber Medical College, Peshawar, Khyber Pakhtunkhwa, Pakistan Email: anassharif115@gmail.com

Muhammad Farjad

Lecturer, Department of Biochemistry, Khyber Medical College, Peshawar, Khyber Pakhtunkhwa, Pakistan Email: mfarjad98@gmail.com

Ubaid ur Rahman

Professor, Department of Biochemistry, Khyber Medical College, Peshawar, Khyber Pakhtunkhwa, Pakistan Email: ubaidurrahman@kmc.edu.pk

Mudassir Ahmad Khan

Professor, Department of Biochemistry, Kabir Medical College, Peshawar, Khyber Pakhtunkhwa, Pakistan Email: mudasir.ahmad@kmc.edu.pk

Sobia Ali (Corresponding Author)

Assistant Professor, Department of Biochemistry, Khyber Medical College, Peshawar, Khyber Pakhtunkhwa, Pakistan Email: drsobiaali2@gmail.com

Abstract

Background: Polycystic ovary syndrome (PCOS) is one of the commonest causes of infertility in women. Obesity which has increased a great deal world over, serves as a risk factor to many disorders including type 2 diabetes mellitus, cardiovascular diseases and reproductive disturbances. There exists a complex link between obesity and infertility in PCOS.

Objectives: To find any possible association of infertility with the status of obesity in polycystic ovary syndrome.

Materials and Methods: It is a descriptive study having cross sectional study design. This study was conducted in gynecological units of three tertiary care hospitals of Khyber Pakhtunkhwa province. The study comprises of 125 subjects (sample size was calculated by using WHO sample size calculator) of newly diagnosed cases of PCOS. The cases were grouped into obese and non-obese PCOS patients.

Results: The results showed obesity as a common feature of PCOS and an increased occurrence of infertility in obese

patients than non-obese patients of PCOS.

Conclusion: Study findings revealed that the occurrence of infertility in obese patients is higher than in non-obese patients.

Author Details

Keywords: Polycystic Ovary Syndrome (PCOS), Obesity, Infertility, Type 2 Diabetes Mellitus, Cardiovascular Diseases.

Received on 25 Dec 2025

Accepted on 20 Jan 2026

Published on 03 Feb 2026

Corresponding E-mail & Author*:

Sobia Ali

Assistant Professor, Department of Biochemistry, Khyber Medical College, Peshawar, Khyber Pakhtunkhwa, Pakistan
Email: drsobiaali2@gmail.com

Introduction

Nowadays the occurrence of obesity has increased worldwide and got pandemic proportions. In higher income countries, roughly one-third of adults are overweight and one-third are obese.⁽¹⁾ This intensification in the prevalence of obesity has significant health-care consequences, since obesity is a vital risk factor for type II diabetes mellitus and cardiovascular disease.^(2,3)

Obesity is also involved in the pathogenesis of polycystic ovary syndrome.^(4, 5) However, the link between PCOS and obesity is complex. Some studies show that most of the women with PCOS are overweight but normal weight females can also have PCOS. It is suggested that about 40–70% of patients with PCOS are either overweight or obese⁽⁴⁻⁶⁾. The occurrence of PCOS is about four times higher in obese and overweight patients than in thin subjects.⁽⁷⁾ Women with PCOS have a greater risk for obesity and obese women have a greater risk for PCOS. An estimated 50-60% of women with PCOS have been observed to have central obesity regardless of their Body Mass Index (BMI). This is often evident as an increased waist circumference and also referred to as “masculinized body fat distribution” which is associated with lower conception rates and ovulatory frequency. The heavier a woman gets, the less likely she is to ovulate.⁽⁸⁾ Several studies showed that obese patients with PCOS have more impaired ovulation and lower pregnancy rates than normal-weight patients with this syndrome.⁽⁹⁾

Polycystic ovary syndrome is the most common endocrinal disorder of diverse etiology⁽¹¹⁾. PCOS affect women of child bearing age and can affect girls as young as 11years. It is one of the leading causes of anovulatory infertility⁽¹⁰⁾.

In PCOS, there is hyperandrogenism which causes anovulation through inhibition of follicular maturation and therefore causes the development of subfertility or infertility in obese women. Hyperandrogenism is further increased due to decreased levels of sex hormone binding globulin (SHBG) which is a protein carrier that binds testosterone and dihydrotestosterone. The level of SHBG is much higher in females with central obesity as compared with females having peripheral obesity⁽¹²⁾. In addition, the adipose tissue is a site of active androgen production which further increases the pool of free androgens in PCOS⁽¹²⁾.

MATERIAL AND METHODS:

This is a comparative descriptive study having cross sectional design. This study was conducted in gynae outpatient department (OPD) of hospitals namely, Khyber Teaching Hospital (KTH), Hayatabad Medical Complex (HMC) and Lady Reading Hospital (LRH). The study was approved by ethical committee of the institute. A total of 125 study subjects were included in the study, which is divided into two groups, obese and non-obese patients of PCOS.

The patients were informed about the study and a well-informed consent was signed from them. Demographic data including name, age, religion, marital status, and address were noted. Also, information regarding complete menstrual history, obstetrical history was noted. Physical examination of the patients was carried out in which blood pressure and anthropometric indices of obesity including height, weight, body mass index (BMI), [(class I=25 to 29.9), (class II=30 to 34.5) and (class III =35 to 39.9)] waist circumference, abdominal circumference and waist to hip ratio and clinical evidence of hyperandrogenism including acne, skin pigmentation and hirsutism were checked. Pelvic ultrasound of all the study subjects was obtained and recorded in a well-developed questionnaire.

All the data collected from the study subjects (cases and controls) was analyzed and expressed as mean and standard deviation (SD) using SPSS (statistical package for social sciences) version 20. Comparison of variables between the two study groups was made using independent student t-test.

RESULTS:

In our research study, 80% (n=101) of study participants were obese having BMI more than 30, 11 (8.8%) subjects were borderline obese having BMI between 25 and 30 while 13 (10.4%) subjects were non-obese having BMI less than 25 (table 1).

Table 1: Distribution of obesity in the study subjects

Obesity Level	Cases	
	Frequency	Percent
Present	101	80.8
Borderline	11	8.8
NA	13	10.4
Total	125	100.0

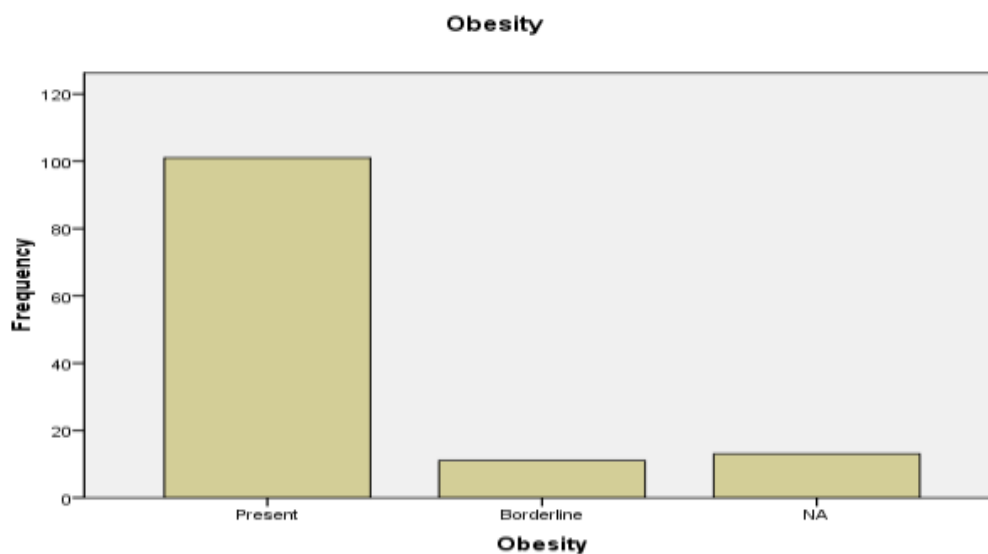


Fig. 1: Distribution of obesity in the study subjects

Description of infertility in cases

Table 2 shows the distribution of infertility in cases. It can be seen that 72 (57%) cases had primary infertility, 14 (11%) cases had secondary infertility while 39 (31%) cases did not have infertility.

Table 2: Distribution of infertility in the study subjects

Infertility	Frequency	Percent
Primary Infertility	72	57.6
Secondary Infertility	14	11.2
NA	39	31.2
Total	125	100.0

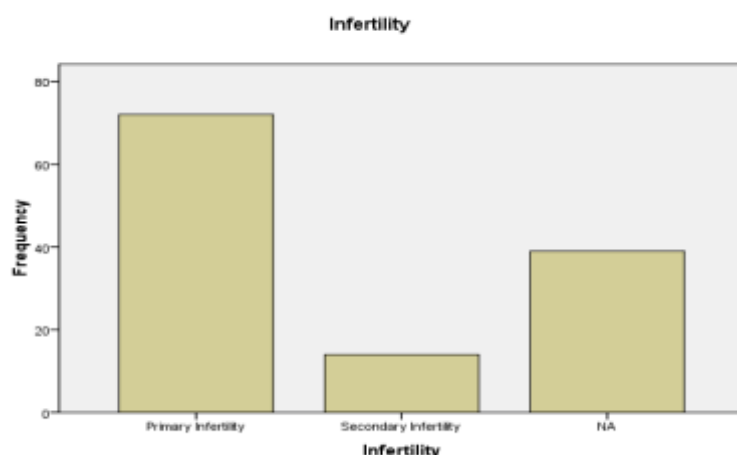


Fig. 2: Distribution of infertility in the study subjects

DISCUSSION

PCOS is a common endocrine disorder of reproductive age having a diverse etiology. One of the most common features of PCOS is obesity which if present not only worsens the disease by increasing the free androgen concentration in the body by different mechanisms but also leads to complications like infertility and type II diabetes⁽¹³⁾. In the present study, the mean BMI of cases was 30.46. Out of 125 cases, 101 were obese, and 11 were on borderline. In a study conducted by S Sam - 2007 and Gambineri A et al, obesity was stated as one of the common features in PCOS.^(14, 15) Similarly, Stanley T et al concluded that Obesity contributes to the pathophysiology of PCOS and raises the probability of connected metabolic and cardiovascular morbidities.⁽¹⁶⁾

PCOS is one of the foremost causes of infertility and about 90-95% of anovulatory females presenting to infertility health center have PCOS. In PCOS, the hormonal imbalance affects menstrual cycle, maturation of egg and ovulation process which hinder the process of fertilization leading to infertility. In the present study it was observed that PCOS patients were having primary or secondary infertility. Out of 125 cases, 72 females were having primary infertility, 14 females were having secondary infertility and only 39 females were normal. Similar results were reported in studies conducted by Melo AS et al and Gorry et al, in which it was observed that PCOS causes infertility.⁽¹⁷⁾

PCOS commonly causes infertility because of the hormonal imbalance but the probability of infertility is further increased in the presence of obesity. Similar observation was noted in the present study. Out of 125 cases, 86 were obese having infertility as compared with none obese females having infertility. The same was proved in a study by AKHTER A et al that polycystic ovary syndrome and obesity were significantly correlated with infertility⁽¹⁹⁾. In another study conducted by Pettigrew R et al it was proved that the risk of infertility and other pregnancy complications are increased in obese women with PCOs⁽¹²⁰⁾.

CONCLUSION:

It is concluded in the present study that obesity has a negative impact on the outcome of fertility status of a female suffering from PCOS. However, all obese women are not infertile but the chances to get pregnant in a well-established poly cystic ovary syndrome in obese women are reduced several folds.

REFERENCES:

Ng M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, Mullany EC, Biryukov S, Abbafati C, Abera SF, Abraham JP. Global, regional, and national prevalence of overweight and obesity in children and adults during

- 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. *The Lancet*. 2014 Aug 30;384(9945):766-81.
- Lu Y, Hajifathalian K, Ezzati M, Woodward M, Rimm EB, Danaei G. Metabolic mediators of the effects of body-mass index, overweight, and obesity on coronary heart disease and stroke: a pooled analysis of 97 prospective cohorts with 1·8 million participants.
- Di Angelantonio E, Bhupathiraju SN, Wormser D, Gao P, Kaptoge S, de Gonzalez AB, Cairns BJ, Huxley R, Jackson CL, Joshy G, Lewington S. Body-mass index and all-cause mortality: individual-participant-data meta-analysis of 239 prospective studies in four continents. *The Lancet*. 2016 Aug 20;388(10046):776-86.
- Yildiz BO, Knochenhauer ES, Azziz R. Impact of obesity on the risk for polycystic ovary syndrome. *The Journal of Clinical Endocrinology & Metabolism*. 2008 Jan 1;93(1):162-8.
- Carmina E, Bucchieri S, Esposito A, Del Puente A, Mansueto P, Orio F, Di Fede G, Rini G. Abdominal fat quantity and distribution in women with polycystic ovary syndrome and extent of its relation to insulin resistance. *The Journal of Clinical Endocrinology & Metabolism*. 2007 Jul 1;92(7):2500-5.
- Panidis D, Macut D, Tziomalos K, Papadakis E, Mikhailidis K, Kandaraki EA, Tsourdi EA, Tantanasis T, Mavromatidis G, Katsikis I. Prevalence of metabolic syndrome in women with polycystic ovary syndrome. *Clinical endocrinology*. 2013 Apr;78(4):586-92.
- Álvarez-Blasco F, Botella-Carretero JJ, San Millán JL, Escobar-Morreale HF. Prevalence and characteristics of the polycystic ovary syndrome in overweight and obese women. *Archives of internal medicine*. 2006 Oct 23;166(19):2081-6.
- Ardabili HR, Gargari BP, Farzadi L. Vitamin D supplementation has no effect on insulin resistance assessment in women with polycystic ovary syndrome and vitamin D deficiency. *Nutrition Research*. 2012 Mar 1;32(3):195-201.
- Strowitzki T, Capp E, von Eyck Corleta H. The degree of cycle irregularity correlates with the grade of endocrine and metabolic disorders in PCOS patients. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 2010 Apr 1;149(2):178-81.
- Balen AH, Morley LC, Misso M, Franks S, Legro RS, Wijeyaratne CN, Stener-Victorin E, Fauser BC, Norman RJ, Teede H. The management of anovulatory infertility in women with polycystic ovary syndrome: an analysis of the evidence to support the development of global WHO guidance. *Human reproduction update*. 2016 Oct 20;22(6):687-708.
- Bozdag G, Mumusoglu S, Zengin D, Karabulut E, Yildiz BO. The prevalence and phenotypic features of polycystic ovary syndrome: a systematic review and meta-analysis. *Human Reproduction*. 2016 Nov 17;31(12):2841-55.
- Pasquali R, Pelusi C, Genghini S, Cacciari M, Gambineri A. Obesity and reproductive disorders in women. *Human reproduction update*. 2003 Jul 1;9(4):359-72.
- Holte J, Bergh T, Gennarelli G, Wide L. The independent effects of polycystic ovary syndrome and obesity on serum concentrations of gonadotrophins and sex steroids in premenopausal women. *Clinical endocrinology*. 1994 Oct;41(4):473-81.
- Sam S. Obesity and polycystic ovary syndrome. *Obesity management*. 2007 Apr 1;3(2):69-73.
- Gambineri A, Pelusi C, Vicennati V, Pagotto U, Pasquali R. Obesity and the polycystic ovary syndrome. *International journal of obesity*. 2002 Jul;26(7):883.
- Stanley T, Misra M. Polycystic ovary syndrome in obese adolescents. *Current Opinion in Endocrinology, Diabetes and Obesity*. 2008 Feb 1;15(1):30-6.

- Melo AS, Ferriani RA, Navarro PA. Treatment of infertility in women with polycystic ovary syndrome: approach to clinical practice. *Clinics*. 2015 Nov;70(11):765-9.
- Gorry A, White DM, Franks S. Infertility in polycystic ovary syndrome. *Endocrine*. 2006 Aug 1;30(1):27-33.
- AKHTER A, MUSHTAQ R, KARIM A, KHWAJA S, AKRAM A. RELATIONSHIP OF INFERTILITY WITH WEIGHT AND POLYCYSTIC OVARIAN SYNDROME (PCOS) IN SPECIFIC FEMALE POPULATION OF KARACHI, PAKISTAN. *FUUAST Journal of Biology*. 2018 Dec 18;8(2):293-7.
- Pettigrew R, Hamilton-Fairley D. Obesity and female reproductive function. *British Medical Bulletin*. 1997 Jan 1;53(2):341-58.