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RESEARCH ARTICLE
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HORMONAL IMBALANCES AND THEIR ASSOCIATION TO PCOS AND UTERINE FIBROIDS IN YOUNG PAKISTANI WOMEN

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ABSTRACT

Objective: This study aimed to investigate the relationship between hormonal imbalances, Polycystic Ovary Syndrome (PCOS), and uterine fibroids in young Pakistani women aged 18 to 35 years.

Methods: A cross-sectional observational study was conducted with 330 female patients presenting symptoms of hormonal imbalances. Data collection involved structured interviews, standardized questionnaires, clinical assessments, hormonal profiling, ultrasound imaging, and Body Mass Index (BMI) calculation. Descriptive statistics, correlation, and multiple logistic regression analyses were used to identify the association between hormonal imbalances and reproductive conditions.

Results: Among the 330 participants, 57.6% were diagnosed with PCOS and 27.3% with uterine fibroids. PCOS patients showed elevated androgen levels (60 ng/dL) and insulin resistance (65%), while fibroid patients exhibited high estrogen levels (350 pg/mL) and low progesterone levels (4 ng/mL). Metabolic disturbances, including insulin resistance and abnormal lipid profiles, were more prevalent in the PCOS group. Additionally, psychological impacts such as depression and anxiety were reported by 50% of PCOS patients and 35% of fibroid patients.

Conclusion: Hormonal imbalances, particularly elevated androgens and estrogen, significantly contribute to the development of PCOS and uterine fibroids in young Pakistani women. Early detection and comprehensive management are essential to prevent long-term reproductive and metabolic complications.

Keywords: Hormonal imbalance, PCOS, uterine fibroids, young women, reproductive health, Pakistan.

INTRODUCTION

Hormonal imbalances are a significant health concern for women globally, and young Pakistani women are no exception. The delicate interplay of hormones in the female body regulates many physiological functions, including menstrual cycles, fertility, and overall well-being. When these hormones, particularly estrogen and progesterone, become unbalanced, the result can be the onset of health conditions like Polycystic Ovary Syndrome (PCOS) and uterine fibroids. These conditions not only affect reproductive health but can also lead to long-term health complications if not managed properly. In this article, we'll take an in-depth look at the association between hormonal imbalances and their role in the development of PCOS and uterine fibroids in young Pakistani women. Hormones are chemical messengers produced by glands in the endocrine system, and they control various functions in the body. For women, the main reproductive hormones are estrogen, progesterone, and androgens (like testosterone). A proper balance of these hormones is crucial for reproductive health. However, factors such as lifestyle, diet, stress, genetics, and environmental influences can disrupt this balance, leading to either excess or deficiency of certain hormones. In young Pakistani women, changing dietary habits, sedentary lifestyles, stress from societal pressures, and limited access to healthcare have increasingly contributed to hormonal issues. These imbalances often manifest in irregular periods, unexplained weight gain, acne, and in more severe cases, the development of reproductive conditions like PCOS and uterine fibroids. PCOS is one of the most common hormonal disorders in young women, particularly in South Asia, including Pakistan. It is characterized by an overproduction of androgens (male hormones) and an imbalance between estrogen and progesterone. Women with PCOS typically experience irregular periods, difficulty with fertility, and physical symptoms like excessive hair growth (hirsutism), acne, and weight gain. On ultrasound, PCOS is often identified by the presence of multiple cysts on the ovaries. The exact cause of PCOS is not well understood, but hormonal imbalance plays a key role. In particular, insulin resistance a condition in which the body's cells do not respond effectively to insulin—can contribute to PCOS by increasing androgen levels. This hormonal dysfunction can lead to metabolic complications like diabetes, which is particularly concerning in a region like Pakistan, where diabetes rates are already high. In Pakistani society, there is often a lack of awareness about PCOS, which can delay diagnosis and treatment. Many young women may not seek medical help due to cultural stigmas surrounding menstrual and reproductive health issues. This delay in care can exacerbate the symptoms and lead to further complications, such as infertility, cardiovascular disease, and an increased risk of endometrial cancer. Uterine fibroids, another condition associated with hormonal imbalances, are benign tumors that grow in or on the uterus. They are more common in women during their reproductive years and are strongly influenced by estrogen levels. High levels of estrogen, particularly in the absence of adequate progesterone, can stimulate the growth of fibroids. Young Pakistani women who experience heavy menstrual bleeding, pelvic pain, and frequent urination could be suffering from uterine fibroids. These symptoms can significantly impact their quality of life, causing fatigue, anemia (due to excessive blood loss), and discomfort. Although fibroids are generally not cancerous, they can lead to complications such as infertility or pregnancy issues, including miscarriage or preterm birth. While fibroids are less commonly discussed than PCOS, they still represent a major health concern for young women, particularly in Pakistan, where access to gynecological care can be limited. Lack of awareness and the cultural taboo surrounding women's health issues often prevent women from seeking timely medical advice, making the management of fibroids more challenging. The prevalence of hormonal imbalances leading to conditions like PCOS and uterine fibroids is on the rise in Pakistan. Several factors contribute to this, including changes in diet, lack of physical activity, stress, and increasing urbanization. Young women are particularly vulnerable as they are often unaware of the symptoms of these conditions and may not have access to comprehensive healthcare. In addition to physical health impacts, these conditions can also affect mental and emotional well-being. For instance, the physical changes associated with PCOS, such as weight gain and hirsutism, can lead to body image issues, low self-esteem, and even depression. Uterine fibroids, with their associated pain and discomfort, can lead to social withdrawal and anxiety.

Objective
The main objective of the study is to find the hormonal imbalances and their association to PCOS and uterine fibroids in young Pakistani women.

METHODOLOGY
This cross-sectional observational study was conducted at Gynea Ward, Jinnah hospital from February 2022 to September 2023. Data were collected from 330 patients.

Inclusion Criteria
- Female patients aged 18 to 35 years.
- Diagnosed with or exhibiting symptoms of hormonal imbalances, such as irregular menstruation, acne, hirsutism, weight gain, or fertility issues.
- Patients who had been diagnosed with PCOS or uterine fibroids through clinical evaluation or ultrasound.
- Willingness to participate in the study and provide informed consent.

Exclusion Criteria
- Women with a history of chronic diseases unrelated to hormonal imbalances, such as diabetes, cardiovascular diseases, or thyroid disorders.
- Pregnant or lactating women.
- Patients on long-term hormonal treatments for other conditions (such as hormone replacement therapy).

Data Collection
A total of 330 female patients, aged 18 to 35, were recruited based on specific inclusion and exclusion criteria. The collection process began with structured interviews, where each patient provided detailed information about their medical history, reproductive health, and lifestyle factors, including diet, physical activity, and stress levels. These interviews were followed by the administration of a standardized questionnaire, which gathered information on menstrual cycle regularity, symptoms of PCOS (such as acne, weight gain, and hirsutism), and symptoms of uterine fibroids (such as heavy menstrual bleeding and pelvic pain). In addition to the interviews, clinical assessments were performed for all patients. Physical examinations were conducted to identify any visible symptoms of PCOS, and ultrasound imaging was used to confirm the presence of ovarian cysts or uterine fibroids. For cases where more accurate imaging was required, transvaginal ultrasounds were performed. Blood samples were collected to evaluate hormone levels, including estrogen, progesterone, testosterone, luteinizing hormone (LH), follicle-stimulating hormone (FSH), and insulin levels. Fasting glucose and insulin resistance tests were also conducted to assess any metabolic issues, particularly in patients with PCOS. The height and weight of each patient were recorded to calculate their Body Mass Index (BMI), which helped determine any relationship between BMI, hormonal imbalances, and the development of PCOS or fibroids. All data collected during the study, including clinical findings and hormonal profiles, were stored securely, ensuring patient confidentiality and compliance with ethical guidelines. This comprehensive approach allowed for an in-depth analysis of the relationship between hormonal imbalances and reproductive health conditions in young Pakistani women.

Data Analysis
Descriptive statistics were used to summarize the demographic data of the patients, including age, BMI, and clinical history. The prevalence of PCOS and uterine fibroids was also calculated. Hormonal levels were compared between patients with PCOS, patients with uterine fibroids, and patients with no diagnosed conditions to identify any significant hormonal differences.

RESULTS

Data were collected from 330 patients aged 18 to 35, who presented symptoms of hormonal imbalances. Of the total sample, 190 women (57.6%) were diagnosed with Polycystic Ovary Syndrome (PCOS), and 90 women (27.3%) were diagnosed with uterine fibroids. The remaining 50 women (15.1%) exhibited symptoms of hormonal imbalance but were not diagnosed with either PCOS or fibroids. Below is a breakdown of key findings from the study, including hormonal profiles, clinical characteristics, and the prevalence of metabolic disturbances. Among the 190 women diagnosed with PCOS, elevated androgen levels were observed in 75% of cases, with average testosterone levels of 60 ng/dL, well above the normal reference range (15-50 ng/dL). Insulin resistance, measured through fasting insulin levels, was present in 65% of these patients, with a mean fasting insulin level of 20 µU/mL (normal range: 2-19 µU/mL). Of the 90 women diagnosed with uterine fibroids, 80% exhibited higher-than-normal estrogen levels, averaging 350 pg/mL (normal range: 20-300 pg/mL). Progesterone levels were found to be low in 60% of the fibroid patients, with a mean value of 4 ng/mL (normal luteal phase range: 5-20 ng/mL). The 50 women without PCOS or fibroids also showed signs of hormonal imbalance, though less pronounced. Elevated estrogen levels were observed in 30% of this group, and 20% showed mild insulin resistance.

Table 1: Prevalence of Hormonal Imbalances

Group	Sample Size	Elevated Hormone	Hormone Type	Percentage (%)	Mean Hormone Level	Normal Range
PCOS	190	Androgens	Testosterone	75	60 ng/dL	15-50 ng/dL
PCOS	190	Insulin Resistance	Fasting Insulin	65	20 µU/mL	2-19 µU/mL
Uterine Fibroids	90	Estrogen	Estrogen	80	350 pg/mL	20-300 pg/mL
Uterine Fibroids	90	Low Progesterone	Progesterone	60	4 ng/mL	5-20 ng/mL
Non-PCOS/Fibroids	50	Elevated Estrogen	Estrogen	30	-	-
Non-PCOS/Fibroids	50	Mild Insulin Resistance	Fasting Insulin	20	-	-

The average BMI for the PCOS group was 29.5 kg/m², indicating a trend towards overweight and obesity. In contrast, the fibroid group had an average BMI of 26.8 kg/m², placing many women in the overweight category. The non-PCOS/fibroid group had an average BMI of 24.5 kg/m², which falls within the normal range. In the PCOS group, 85% of the women reported irregular menstrual cycles, with an average cycle length of 45 days.

Table 2: Clinical Characteristics

Group	BMI (kg/m²)	Menstrual Irregularities (%)	Average Cycle Length (Days)	Physical Symptoms (Acne, Hirsutism, etc.)
PCOS	29.5	85% Irregular Cycles	45	Acne (60%), Hirsutism (65%)
Uterine Fibroids	26.8	70% Heavy Bleeding	>7 Days	Pelvic Pain (55%), Frequent Urination (40%)
Non-PCOS/Fibroids	24.5	-	-	-

Table 3: Metabolic Disturbances

Group	Insulin Resistance (%)	Type 2 Diabetes (%)	Abnormal Lipid Profile (%)	LDL (mg/dL)	HDL (mg/dL)
PCOS	65%	25%	60%	150	40
Uterine Fibroids	35%	0%	45%	-	-

In the fibroid group, 70% reported heavy menstrual bleeding, with 60% experiencing periods lasting longer than seven days. Acne and hirsutism were common among the PCOS group, affecting 60% and 65% of patients, respectively. In the fibroid group, 55% reported pelvic pain and pressure, and 40% experienced frequent urination due to the size and location of the fibroids. As mentioned, insulin resistance was significantly more prevalent in the PCOS group (65%) than in the fibroid group (35%). Among the PCOS patients with insulin resistance, 25% had developed Type 2 diabetes, while none of the fibroid patients exhibited diabetes. Abnormal lipid profiles were more common in the PCOS group, with 60% of patients having elevated LDL cholesterol levels (mean value: 150 mg/dL; normal: <100 mg/dL) and low HDL levels (mean value: 40 mg/dL; normal: >50 mg/dL). In the fibroid group, 45% of patients had elevated cholesterol, though not as severely as in the PCOS group.

Table 4: Ultrasound Findings

Group	Ultrasound Findings	Percentage (%)	Average Cysts/Fibroids	Cyst/Fibroid Size
PCOS	Multiple Ovarian Cysts	85%	12 Cysts/Ovary	-
PCOS	Increased Ovarian Volume	-	11 mL (normal: 5-9 mL)	-
Uterine Fibroids	More than one fibroid	70%	-	4 cm (10% > 7 cm)

Table 5: Statistical Analysis

Analysis Type	Correlation (r)	Significance (p)	Predictors	Odds Ratio (OR)	Significance (p)
Correlation Analysis	PCOS: 0.65	<0.01	Elevated Testosterone	4.2	<0.01
Correlation Analysis	Fibroids: 0.72	<0.01	Elevated Estrogen, Low Progesterone	4.8 (Estrogen), 3.0 (Progesterone)	<0.01, <0.05
Regression Analysis	-	-	Insulin Resistance (PCOS)	3.5	<0.05

DISCUSSION

The findings of this study highlight the significant role that hormonal imbalances play in the development of Polycystic Ovary Syndrome (PCOS) and uterine fibroids in young Pakistani women. With 57.6% of the sample diagnosed with PCOS and 27.3% with uterine fibroids, it is evident that these conditions are highly prevalent and can severely impact the reproductive and overall health of this population. The study's results suggest a complex relationship between hormonal dysfunctions, metabolic disturbances, and the manifestation of these reproductive conditions. The high prevalence of PCOS in this study aligns with existing research that points to androgen excess and insulin resistance as key contributors to the syndrome. Elevated testosterone levels were observed in 75% of PCOS patients, with a significant portion also exhibiting insulin resistance (65%). These findings are consistent with the well-established link between hyperandrogenism and insulin resistance in the pathophysiology of PCOS. Insulin resistance, in particular, is thought to exacerbate androgen production, leading to many of the symptoms observed in PCOS patients, such as hirsutism, acne, and menstrual irregularities.

Furthermore, 85% of the PCOS patients in this study experienced irregular menstruation, which further underscores the impact of hormonal imbalances on the menstrual cycle. These results indicate the need for a more comprehensive approach to managing PCOS, focusing on addressing both androgen excess and insulin resistance. Lifestyle modifications, such as improved diet and increased physical activity, in combination with pharmacological interventions like insulin sensitizers, could be beneficial for managing the condition in this population. The study also revealed that 80% of women with uterine fibroids had elevated estrogen levels, indicating the hormone's critical role in the development and growth of fibroids. The average estrogen levels in this group were notably higher than the normal reference range, which is consistent with other studies showing that fibroid growth is estrogen-dependent. Additionally, low progesterone levels were observed in 60% of fibroid

patients, suggesting that the imbalance between estrogen and progesterone might further contribute to fibroid development. Heavy menstrual bleeding and pelvic pain were common symptoms among fibroid patients, with 70% reporting menorrhagia and 55% experiencing pelvic pain. These symptoms significantly affected the quality of life of the women, as reflected by the high rates of fatigue (55%) and reported difficulty in managing daily activities (60%). This highlights the importance of early detection and management of uterine fibroids to prevent these symptoms from severely impacting the patient's well-being. The study also uncovered notable metabolic disturbances, particularly among PCOS patients. Insulin resistance and elevated cholesterol levels were more prevalent in the PCOS group, with 60% of these patients showing abnormal lipid profiles. This is concerning given the established link between PCOS and increased risk of metabolic syndrome, Type 2 diabetes, and cardiovascular disease. These findings underscore the need for early metabolic screening and management in young women diagnosed with PCOS to prevent long-term health complications. Moreover, the study found that both PCOS and fibroid patients experienced significant psychological distress. Depression and anxiety were reported in 50% of PCOS patients and 35% of fibroid patients, indicating the emotional toll of these conditions. The physical symptoms of PCOS, such as hirsutism and acne, can negatively impact body image and self-esteem, while the chronic pain and discomfort associated with fibroids can lead to social withdrawal and decreased quality of life. This calls for a holistic treatment approach that not only addresses the physical symptoms but also the psychological and emotional well-being of the patients. While this study provides valuable insights into the relationship between hormonal imbalances, PCOS, and uterine fibroids, there are some limitations to consider. First, the sample was drawn from a convenience sample of patients attending gynecological clinics, which may not fully represent the broader population of young Pakistani women. Second, the cross-sectional nature of the study limits our ability to draw causal inferences between hormonal imbalances and the development of PCOS and fibroids. Longitudinal studies would be useful to track the progression of hormonal changes and the onset of these conditions over time.

CONCLUSION

It is concluded that hormonal imbalances play a significant role in the development of PCOS and uterine fibroids in young Pakistani women, with elevated androgen levels and insulin resistance contributing to PCOS, and high estrogen levels linked to fibroid growth. Early detection and comprehensive management of these conditions are crucial to prevent long-term metabolic and reproductive complications. Addressing both the physical and psychological impacts is essential for improving the overall quality of life in affected women.

REFERENCES

1. Aslam, M. ., Iqbal, H. ., & Jabeen, S. . (2025). Prevalence and Risk Factors of Polycystic Ovary Syndrome (PCOS) Among Adolescent Girls in Urban and Rural Pakistan. *Biological and Clinical Sciences Research Journal*, *6*(4), 50–53. https://doi.org/10.54112/bcsrj.v6i4.1642
2. Teede HJ, Misso ML, Costello MF, et al. Recommendations from the international evidence-based guideline for assessing and managing polycystic ovary syndrome. Hum Reprod. 2018;33(9):1602–18.
3. Bozdag G, Mumusoglu S, Zengin D, et al. The prevalence and phenotypic features of polycystic ovary syndrome: a systematic review and meta-analysis. Hum Reprod. 2016;31(12):2841–55.
4. Nisar N, Sohoo NA. Frequency of polycystic ovary syndrome (PCOS) and its associated risk factors among female medical students of a public sector university in Pakistan. J Ayub Med Coll Abbottabad. 2019;31(4):602–6.
5. Asim M, Nawaz M, Iftikhar A, et al. Lifestyle risk factors associated with PCOS among undergraduate students in Lahore. J Pak Med Assoc. 2020;70(5):843–7.
6. Kausar S, Gull S, Haider J, et al. Polycystic ovary syndrome and its association with body mass index among adolescent girls in Pakistan. Rawal Med J. 2021;46(3):670–4.
7. Ahmed K, Javed A, Farooq N. Prevalence of PCOS in young women and its association with BMI and lifestyle factors in urban Pakistan. Pak J Med Health Sci. 2020;14(4):692–6.

8. Jabeen R, Rehman R, Mehmood K, et al. The psychological impact of polycystic ovary syndrome on adolescent girls in Pakistan. Cureus. 2021;13(7):e16310.
9. Legro RS, Arslanian SA, Ehrmann DA, Hoeger KM, Murad MH, Pasquali R, Welt CK; Endocrine Society. Diagnosis and treatment of polycystic ovary syndrome: An Endocrine Society clinical practice guideline. J Clin Endocrinol Metab. 2013;98:4565–92. doi:10.1210/jc.2013-2350.
10. Azziz R. Polycystic ovary syndrome. Obstet Gynecol. 2018;132(2):321–36. doi:10.1097/AOG.0000000000002698.
11. Zhu J, Chan YM. Fertility issues for patients with hypogonadotropic causes of delayed puberty. Endocrinol Metab Clin North Am. 2015;44:821–34. doi:10.1016/j.ecl.2015.07.009.
12. Chen YH, Heneidi S, Lee JM, Layman LC, Stepp DW, Gamboa GM, et al. MiRNA-93 inhibits GLUT4 and is overexpressed in adipose tissue of polycystic ovary syndrome patients and women with insulin resistance. Diabetes. 2013;62:2278–86. doi:10.2337/db12-0963.
13. Ifeanyi OE, Uzoma OG. A review on fibroid and heptoglobin. Int J Curr Res Med Sci. 2018;4(8):1–8.
14. Borahay MA, Asoglu MR, Mas A. Estrogen receptors and signaling in fibroids: Role in pathobiology and therapeutic implications. Reprod Sci. 2017;24:1235–44. doi:10.1177/1933719117698575.
15. Obeagu EI, Njar VE, Obeagu GU. Infertility: Prevalence and consequences. Int J Curr Res Chem Pharm Sci. 2023;10(7):43–50.
16. Stewart EA, Cookson CL, Gandolfo RA, Schulze-Rath R. Epidemiology of uterine fibroids: A systematic review. BJOG. 2017;124:1501–12. doi:10.1111/1471-0528.14640.
17. Jakimiuk A, Nowicka M, Bogusiewicz M. Prevalence of estrogen receptor alpha PvuII and XbaI polymorphism in the population of Polish postmenopausal women. Folia Histochem Cytobiol. 2017;45:331–8. doi:10.5603/FHC.2017.0045.
18. Wallach EE, Vlahos NF. Uterine myomas: An overview of development, clinical features, and management. Obstet Gynecol. 2004;104:393–406. doi:10.1097/01.AOG.0000136079.62513.39.
19. Jeppesen JV, Anderson RA, Kelsey TW, Christiansen SL, Kristensen SG, Jayaprakasan K, et al. Which follicles make the most anti-Müllerian hormone in humans? Evidence for an abrupt decline in AMH production at the time of follicle selection. Mol Hum Reprod. 2013;19(8):519–27. doi:10.1093/molehr/gat024.
20. Mihm M, Gangooly S, Muttukrishna S. The normal menstrual cycle in women. Anim Reprod Sci. 2011;124(3–4):229–36. doi:10.1016/j.anireprosci.2010.08.030.