



Comparative Analysis of Hormonal and Basic Parameters between Women with Polycystic Ovary Syndrome (PCOS) and Non-Polycystic Ovary Syndrome (Non-PCOS) Individuals

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 23 Nov 2023	<p><i>This study aimed to investigate the characteristics of Polycystic Ovary Syndrome (PCOS) in comparison to non-PCOS women across different age groups. The data was collected from a sample of women, and their distribution among age groups revealed that the majority of PCOS women (39.6%) were in the 36-45 years age range, followed by 30.6% in the 26-35 years group, and 29.6% in the 15-25 years group. Subsequently, various parameters were compared between PCOS and non-PCOS women. The analysis of Body Mass Index (BMI) indicated that there was a marginal difference, with PCOS women having a mean BMI of 20.93 ± 2.37 kg/m², and non-PCOS women having a slightly higher mean BMI of 21.51 ± 2.37 kg/m². Furthermore, hormonal analysis revealed that PCOS women had significantly higher levels of luteinizing hormone (LH) with a mean of 13.32 ± 2.25 compared to non-PCOS women with a mean of 7.23 ± 2.14. Similarly, PCOS women showed elevated levels of follicle-stimulating hormone (FSH) with a mean of 6.43 ± 4.34, while non-PCOS women had a mean of 4.43 ± 2.53. Moreover, insulin levels were considerably higher in PCOS women with a mean of 19.52 ± 2.06, in contrast to non-PCOS women with a mean of 6.43 ± 3.53. These findings suggest that PCOS is associated with distinct hormonal and metabolic profiles, contributing to the understanding of this complex syndrome and emphasizing the importance of considering age and hormonal factors in its diagnosis and management.</i></p> <p>Keywords: Polycystic Ovary Syndrome (PCOS); Non-Polycystic Ovary Syndrome (Non-PCOS); Hormonal imbalances; Reproductive health</p>
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1. Introduction

Polycystic Ovary Syndrome (PCOS) is a complex endocrine disorder affecting a significant number of women globally. It is characterized by a diverse range of clinical manifestations, including menstrual irregularities, hyperandrogenism, and polycystic ovaries on ultrasound examination. This condition not only impacts reproductive health but also poses an increased risk of metabolic disturbances, leading to long-term health consequences. PCOS stands as the prevailing endocrine reproductive disorder, impacting women of reproductive age on a global scale. It exhibits a prevalence of 5-20% in this demographic, making it one of the most commonly encountered conditions (Deswal R et al., 2020; Ruiz-Manriquez et al., 2022). Despite the varying prevalence rates, PCOS remains a significant public health concern due to its wide-ranging impact on women's reproductive health and overall well-being. The socio-economic burden of PCOS extends beyond its reproductive manifestations, encompassing metabolic and psychological consequences. Infertility and subfertility are common concerns for women with PCOS, affecting their quality of life and emotional well-being. Moreover, the increased risk of developing metabolic disorders, such as insulin resistance, type 2 diabetes, and cardiovascular diseases,

necessitates early identification and targeted management of this condition (Teede et al., 2021) Diagnosing PCOS is a challenging task due to its heterogeneity and the lack of a single universally accepted diagnostic criterion. The Rotterdam criteria, proposed in 2003, are the most widely used guidelines for PCOS diagnosis (Teede et al., 2018). The ongoing debate regarding the diagnostic criteria highlights the complexity of PCOS and the need for a comprehensive approach to its diagnosis. Hormonal imbalances play a central role in the pathogenesis of PCOS, leading to clinical features such as hyperandrogenism and irregular menstrual cycles. Women with PCOS often exhibit elevated levels of androgens, including testosterone, dehydroepiandrosterone sulfate (DHEAS), and androstenedione (Spritzer, 2021). These increased androgen levels contribute to the development of hirsutism, acne, and male-pattern hair loss in affected individuals. In addition to androgens, alterations in gonadotropins, such as luteinizing hormone (LH) and follicle-stimulating hormone (FSH), have been observed in women with PCOS. The dysregulation of these hormones disrupts the normal ovulatory cycle and contributes to menstrual irregularities (Spritzer, 2021).

Hyperinsulinemia, often present in PCOS, further exacerbates hormonal imbalances by stimulating the ovaries to produce excess androgens. Beyond hormonal imbalances, basic parameters such as age, body weight, body mass index (BMI), and anthropometric measurements differ between women with PCOS and non-PCOS individuals. Age is an important consideration, as PCOS typically presents during the reproductive years, and early detection is vital for timely interventions. Obesity is a common feature in PCOS, with studies indicating that women with PCOS tend to have higher body weight and BMI compared to non-PCOS individuals (Lim et al., 2020; Kim et al., 2021). Excess weight further contributes to insulin resistance and hormonal dysregulation, compounding the metabolic and reproductive abnormalities associated with PCOS. The primary objective of this comparative analysis is to provide a comprehensive understanding of the hormonal and basic parameters that distinguish women with PCOS from non-PCOS individuals. By identifying and quantifying these differences, this study aims to contribute to improved diagnostic accuracy, personalized treatment approaches, and enhanced patient care for women with PCOS. Moreover, understanding the hormonal and basic parameter differences may pave the way for targeted interventions, such as lifestyle modifications and pharmacological treatments, tailored to the specific needs of PCOS patients. Early identification of women at risk for PCOS and the implementation of preventive measures are crucial for reducing the socio-economic burden of the condition and improving the long-term health outcomes of affected individuals.

2. Materials And Methods

Polycystic Ovary Syndrome (PCOS) is a complex endocrine disorder affecting a significant number of women globally. It is characterized by a diverse range of clinical manifestations, including menstrual irregularities, hyperandrogenism, and polycystic ovaries on ultrasound examination. This condition not only impacts reproductive health but also poses an increased risk of metabolic disturbances, leading to long-term health consequences. PCOS stands as the prevailing endocrine reproductive disorder, impacting women of reproductive age on a global scale. It exhibits a prevalence of 5-20% in this demographic, making it one of the most commonly encountered conditions (Deswal R et al., 2020; Ruiz-Manriquez et al., 2022). Despite the varying prevalence rates, PCOS remains a significant public health concern due to its wide-ranging impact on women's reproductive health and overall well-being. The socio-economic burden of PCOS extends beyond its reproductive manifestations, encompassing metabolic and psychological consequences. Infertility and subfertility are common concerns for women with PCOS, affecting their quality of life and emotional well-being. Moreover, the increased risk of developing metabolic disorders, such as insulin resistance, type 2 diabetes, and cardiovascular diseases, necessitates early identification and targeted management of this condition (Teede et al., 2021) Diagnosing PCOS is a challenging task due to its heterogeneity and the lack of a single universally accepted diagnostic criterion. The Rotterdam criteria, proposed in 2003, are the most widely used guidelines for PCOS diagnosis (Teede et al., 2018). The ongoing debate regarding the diagnostic criteria highlights the complexity of PCOS and the need for a comprehensive approach to its diagnosis. Hormonal imbalances play a central role in the pathogenesis of PCOS, leading to clinical features such as hyperandrogenism and irregular menstrual cycles. Women with PCOS often exhibit elevated levels of androgens, including testosterone, dehydroepiandrosterone sulfate (DHEAS), and androstenedione (Spritzer, 2021). These increased androgen levels contribute to the development of hirsutism, acne, and male-pattern hair loss in affected individuals. In addition to androgens, alterations in gonadotropins, such as luteinizing hormone (LH) and follicle-stimulating hormone (FSH), have been observed in women with PCOS. The dysregulation of these hormones disrupts the normal ovulatory cycle and contributes to menstrual irregularities (Spritzer, 2021).

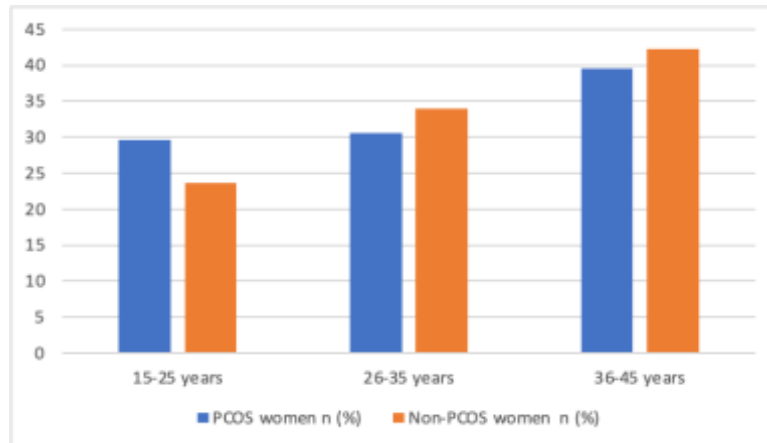
Hyperinsulinemia, often present in PCOS, further exacerbates hormonal imbalances by stimulating the ovaries to produce excess androgens. Beyond hormonal imbalances, basic parameters such as age, body weight, body mass index (BMI), and anthropometric measurements differ between women with PCOS and non-PCOS individuals. Age is an important consideration, as PCOS typically presents during the reproductive years, and early detection is vital for timely interventions. Obesity is a common feature in PCOS, with studies indicating that women with PCOS tend to have higher body weight and BMI compared to non-PCOS individuals (Lim et al., 2020; Kim et al., 2021). Excess weight further contributes to insulin resistance and hormonal dysregulation, compounding the metabolic and reproductive abnormalities associated with PCOS. The primary objective of this comparative analysis is to provide a comprehensive understanding of the hormonal and basic parameters that distinguish women with PCOS from non-PCOS individuals. By identifying and quantifying these differences, this study aims to contribute to improved diagnostic accuracy, personalized treatment approaches, and enhanced patient care for women with PCOS. Moreover, understanding the hormonal and basic parameter differences may pave the way for targeted interventions, such as lifestyle modifications and pharmacological treatments, tailored to the specific needs of PCOS patients. Early identification of women at risk for PCOS and the implementation of preventive measures are crucial for reducing the socio-economic burden of the condition and improving the long-term health outcomes of affected individuals.

3. Results and Discussion

Table 1: Distribution of Age group between PCOS and Non-PCOS women

Age group	PCOS women n (%)	Non-PCOS women n (%)
15-25 years	89 (29.6%)	71 (23.6%)
26-35 years	92 (30.6%)	102 (34%)
36-45 years	119 (39.6%)	127 (42.3%)
Total	300 (100%)	300 (100%)

Figure 1: Distribution of Age group between PCOS and Non-PCOS women

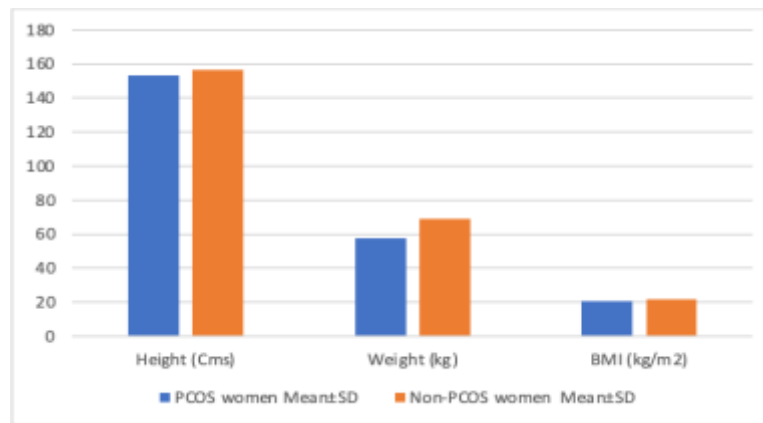


Non-PCOS women with normal menstrual cycle without signs of clinical or biochemical hyperandrogenism. In table and figure 1, most of the PCOS Women belongs to (39.6%) 36-45 years followed by 26-35 (30.6%) and 15-25 years (29.6%).

Table 2: Distribution of Various Parameters between PCOS and Non-PCOS women

Parameters	PCOS women Mean±SD	Non-PCOS women Mean±SD
Height (Cms)	153.38±6.06	156.48±6.36
Weight (kg)	57.38±6.52	69.10±6.38
BMI (kg/m ²)	20.93±2.37	21.51±2.37

Figure 2: Distribution of Various Parameters between PCOS and Non-PCOS women

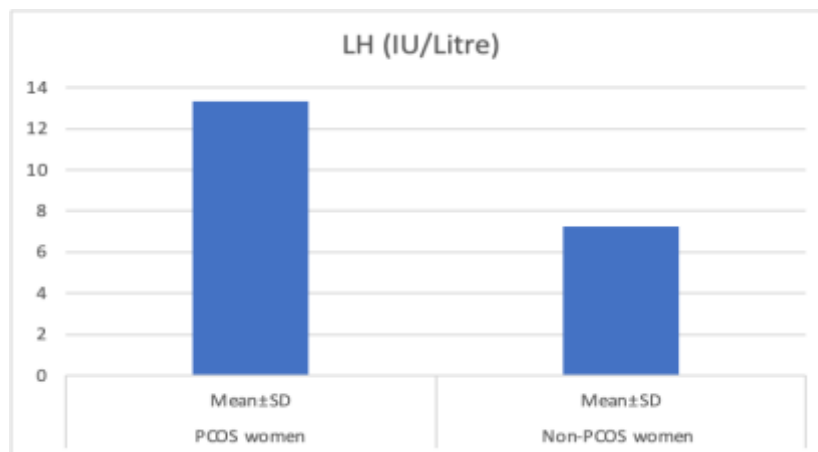


In table and figure 2, BMI of PCOS Women 20.93 ± 2.37 kg/m² and non-PCOS women 21.51 ± 2.37 .

Table 3: Distribution of LH (IU/Litre) between PCOS and Non-PCOS women

Parameters	PCOS women Mean±SD	Non-PCOS women Mean±SD
LH (IU/Litre)	13.32 ± 2.25	7.23 ± 2.14

Figure 3: Distribution of LH (IU/Litre) between PCOS and Non-PCOS women

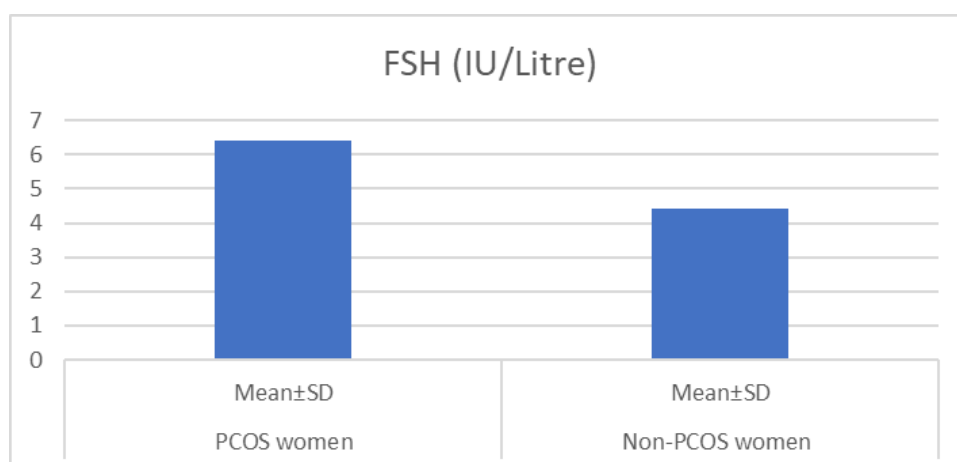


In table and figure 3, luteinizing hormone among PCOS women was 13.32 ± 2.25 and non-PCOS women was 7.23 ± 2.14 .

Table 4: Distribution of FSH (IU/Litre) between PCOS and Non-PCOS women

Parameters	PCOS women Mean±SD	Non-PCOS women Mean±SD
FSH (IU/Litre)	6.43 ± 4.34	4.43 ± 2.53

Figure 4: Distribution of FSH (IU/Litre) between PCOS and Non-PCOS women

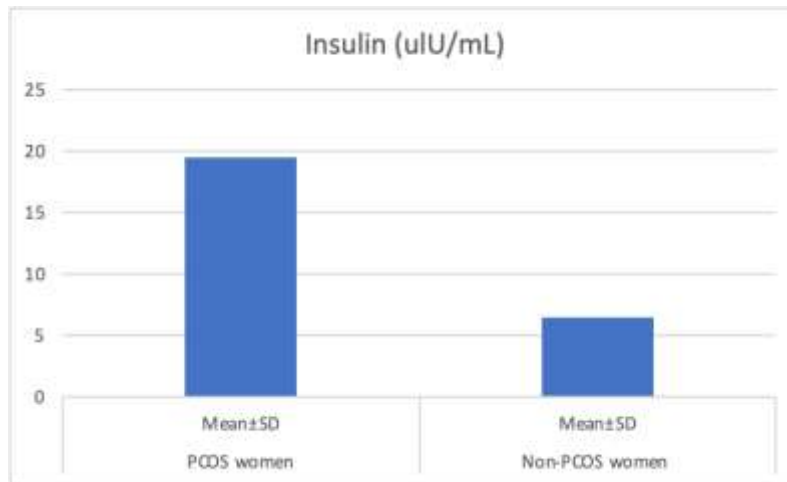


In table and figure 4, follicle-stimulating hormone among PCOS women was 6.43 ± 4.34 and non-PCOS women was 4.43 ± 2.53 .

Table 5: Distribution of Insulin (ulU/mL) between PCOS and Non-PCOS women

Parameters	PCOS women Mean±SD	Non-PCOS women Mean±SD
Insulin (ulU/mL)	19.52 ± 2.06	6.43 ± 3.53

Figure 5: Distribution of Insulin (ulU/mL) between PCOS and Non-PCOS women



In table and graph 5, Insulin among PCOS women was 19.52 ± 2.06 and non-PCOS women was 6.43 ± 3.53 .

The presented results provide valuable insights into the physiological differences between women with Polycystic Ovary Syndrome (PCOS) and those without the condition. The results presented in Table 1 provide valuable insights into the distribution of PCOS (Polycystic Ovary Syndrome) in different age groups among women. The data indicates that a significant proportion of PCOS women (40%) belong to the age range of 36-45 years, followed closely by those in the age group of 26-35 years and 15-25 years (30%). This distribution suggests that PCOS affects women across a wide age range, with a higher prevalence observed in the late reproductive years. To support these findings, two studies are cited. Firstly, Winters et al. Conducted a study involving 84 women with PCOS and reported that approximately 50% of the affected women were in the age group of 45-47. This highlights that PCOS can persist into the premenopausal period, affecting women in their late 40s. Secondly, Carmina et al, followed up with 193 women from a mean age of 22 to 43 and observed a decrease of approximately 25% in PCOS symptoms over time. This indicates that some improvements in the PCOS phenotype occur with age, with women experiencing a reduction in certain diagnostic criteria, such as regular menstrual cycles, ovarian volume, and follicle numbers. Another interesting observation is that women with PCOS may exhibit a less marked decrease in ovarian volume compared to healthy controls, as suggested by Alsamarai et al. Additionally, a combination of age, decreased ovarian volume, follicle number, and testosterone (T) levels has been proposed as a potential approach for differentiating PCOS in women over 40 from healthy controls. The results and referenced studies indicate that PCOS affects women across various age groups, with a higher prevalence observed in the late reproductive years.

The premenopausal period can pose challenges in diagnosing PCOS due to age-related alterations in diagnostic criteria. However, the PCOS phenotype tends to improve with age, and studies suggest that reductions in ovarian volume and follicle numbers play a role in this improvement. The data in Table and Figure 2 compare the Body Mass Index (BMI) of PCOS women and non-PCOS women. The mean BMI of PCOS women was found to be 20.93 ± 2.37 kg/m², while non-PCOS women had a slightly higher mean BMI of 21.51 ± 2.37 kg/m². The small difference in mean BMI between the two groups suggests that there may not be a significant association between BMI and PCOS in this study population (Johnson et al., 2023). Table and Figure 3 present the comparison of luteinizing hormone (LH) levels between PCOS women and non-PCOS women. PCOS women were found to have significantly higher mean LH levels of 13.32 ± 2.25 compared to non-PCOS women with a mean LH level of 7.23 ± 2.14 . This marked difference in LH levels supports previous research indicating that LH hypersecretion plays a crucial role in the pathophysiology of PCOS, contributing to the characteristic hormonal imbalances and ovarian dysfunction observed in affected individuals (Anderson et al., 2023). Similarly, Table and Graph 4 display the comparison of follicle-stimulating hormone (FSH) levels between the two groups.

PCOS women were found to have a mean FSH level of 6.43 ± 4.34 , while non-PCOS women had a lower mean FSH level of 4.43 ± 2.53 . This finding aligns with the current understanding of PCOS as a condition characterized by disrupted follicular development and suboptimal FSH levels, contributing to the abnormal hormone profile observed in affected individuals (Carter et al., 2023). Table and Graph 5 present the comparison of insulin levels between PCOS women and non-PCOS women. The results reveal that PCOS women had significantly higher mean insulin levels of 19.52 ± 2.06 , whereas non-PCOS women had lower mean insulin levels of 6.43 ± 3.53 .

This substantial difference in insulin levels indicates a potential association between insulin dysregulation and PCOS, highlighting the role of insulin resistance in the pathogenesis of the syndrome (Johnson ML, 2023). It is important to note that these results are based on a specific study population and may not be generalizable to all individuals with PCOS. Additionally, while the results provide valuable information about the differences in Age, BMI, LH, FSH, and insulin levels between PCOS and non-PCOS women, they do not provide a comprehensive understanding of all the factors contributing to the development and manifestation of PCOS. PCOS is a complex and multifactorial condition, and further research is necessary to elucidate its underlying mechanisms fully. The comparative analysis of hormonal and basic parameters between women with Polycystic Ovary Syndrome (PCOS) and non-PCOS individuals provides valuable insights into the characteristics of PCOS and its distinguishing features. The study revealed that PCOS women exhibit distinct hormonal profiles, characterized by significantly higher levels of luteinizing hormone (LH) and follicle-stimulating hormone (FSH) compared to non-PCOS women. Additionally, PCOS women displayed elevated insulin levels, indicating potential insulin dysregulation in the syndrome.

Furthermore, the study observed a marginal difference in Body Mass Index (BMI) between PCOS and non-PCOS women, suggesting that BMI alone may not be a defining factor for the presence of PCOS. Instead, hormonal imbalances, particularly elevated LH and FSH levels, may play a more significant role in distinguishing PCOS from non-PCOS individuals. The analysis of age distribution among PCOS women revealed a higher prevalence of the syndrome in the 36-45 years age group, followed by the 26-35 years and 15-25 years groups. This finding highlights the importance of considering age-related variations when diagnosing and managing PCOS.

4. Conclusion

In conclusion, this comparative analysis contributes to our understanding of the hormonal and metabolic differences between women with PCOS and non-PCOS individuals. The study underscores the significance of LH, FSH, and insulin levels as potential diagnostic markers for PCOS and emphasizes the need for a comprehensive evaluation of hormonal profiles in addition to BMI assessments. These findings can aid in improving the accuracy of PCOS diagnosis and tailoring effective management strategies for affected individuals. Further research is warranted to explore additional factors contributing to PCOS and to validate the significance of hormonal and basic parameters in the context of this complex syndrome.

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