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Original Research Article

Exploring the Environmental Factors in the Development of Polycystic Ovary Syndrome (PCOS): A Retrospective Study

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Abstract:

Background: The clinical significance of polycystic ovary syndrome (PCOS), an endocrine disorder, cannot be underestimated. Understanding the environmental factors in the development of polycystic ovarian syndrome (PCOS) is crucial for making an accurate diagnosis and developing an effective treatment plan.

Methods: We used a retrospective study design with 500 participants to examine the impact of environmental factors. People's lifestyles were examined from a number of angles.

Results: In our study of 500 people, there were no statistically significant differences between the PCOS and control groups with respect to age, race, or socioeconomic level. Weight gain, lack of exercise, and diets heavy in foods with a high "glycaemic index" have all been linked to polycystic ovarian syndrome. A high glycaemic index interacted to increase the risk of polycystic ovary syndrome ($p = 0.004$).

Conclusion: Our results show that PCOS is a complicated disorder with multiple contributing factors, including lifestyle. The findings might lead to enhanced criteria for making diagnoses and tailored treatment strategies. Future research must focus on the intricate relationship between environment and lifestyle.

Keywords: Environmental Factors, Lifestyle, PCOS, Polycystic Ovary Syndrome, Retrospective Study.

Introduction

Women of childbearing age are disproportionately affected by Polycystic Ovary Syndrome (PCOS). Symptoms include menstrual cycle irregularities, elevated testosterone levels, and the ultrasound diagnosis of polycystic ovaries. Since PCOS impacts more than just reproduction and is linked to several metabolic and cardiovascular disorders, it is of major therapeutic value [1]. Significant risks to a woman's overall health and fertility are posed by polycystic ovary syndrome (PCOS). PCOS-affected women frequently experience infertility and pregnancy complications [2]. Weight gain, insulin resistance, and metabolic syndrome are common in women with PCOS, and they raise the risk of developing type 2 diabetes, cardiovascular disease, and even mental health disorders like depression and anxiety. Therefore, a full understanding of PCOS is required because of its effects beyond the realm of gynaecology [3].

Objective

- To examine the potential role of lifestyle and environmental factors in the development and progression of polycystic ovarian syndrome (PCOS).

There are several important reasons to look into PCOS's background. First, it might pave the path for more accurate diagnostic criteria, which would improve illness management through earlier treatment. Secondly, a deeper understanding of the underlying environmental factors can aid in the development of individualised treatment methods for women with PCOS, which can have a substantial impact on the course of the disorder. Furthermore, elucidating the factors that contribute to PCOS will aid in the development of prevention measures that may mitigate the condition's long-term adverse effects on health. Learn more about PCOS to enhance clinical care and public health initiatives is our primary goal.

Polycystic ovarian syndrome (PCOS) is a hormonal disorder that primarily affects reproductive-aged women. In addition to polycystic ovaries being visible on ultrasound, other symptoms include irregular menstrual periods and hyperandrogenism [4]. PCOS affects more than just a woman's ability to have children; it also has significant metabolic and cardiovascular consequences. The number of women affected with polycystic ovary syndrome (PCOS) varies from study to study and depends on the diagnostic criteria used [5]. Oligo-ovulation/anovulation, clinical and biochemical hyperandrogenism, and the exclusion of associated illnesses are the hallmarks of PCOS that must be

evaluated for a clinical diagnosis. However, research and therapeutic care are hampered by the absence of a universal diagnostic criterion [6].

Genetic Factors in PCOS

[7,8] have looked into the possible genetic origins of polycystic ovary syndrome. Some believe that a combination of environmental and genetic factors leads to PCOS. This disorder has been associated to variations in genes involved in insulin regulation, hormone metabolism, and gonadotropin signalling. Family and twin studies suggest a heritable component. There is no doubt, however, that polygenic inheritance is at work. Candidate gene and genome-wide association studies (GWAS) have uncovered possible genetic risk factors [9]. The exact genomic architecture and the ways in which these genetic factors interact with environmental circumstances require additional study.

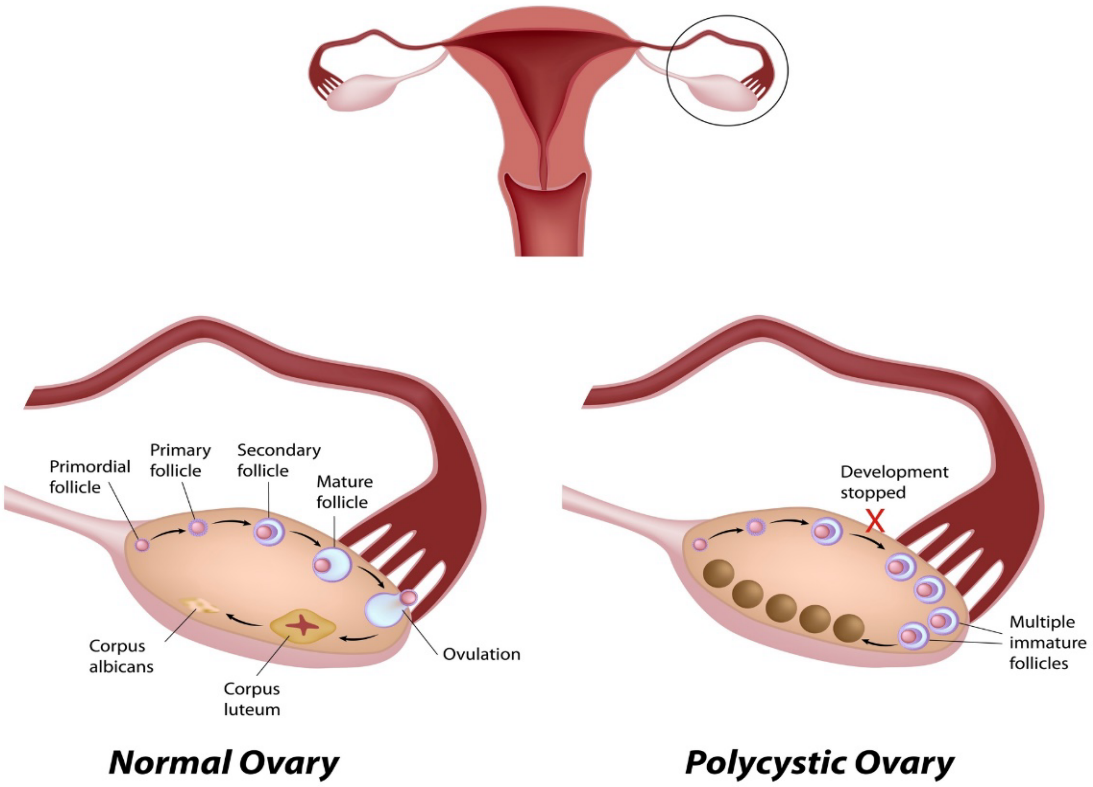

Figure 1: polycystic ovary syndrome (source:[10])

Environmental Factors and PCOS

Environmental factors in polycystic ovarian syndrome (PCOS) have also gotten much study. Polycystic ovarian syndrome (PCOS) has been linked to a variety of lifestyle factors, including diet, exercise, and stress [11].

The hormonal effects of environmental endocrine disruptors like bisphenol A and phthalates on PCOS aetiology have also been questioned. Obesity and insulin resistance, both of which can have far-reaching metabolic effects, are established environmental factors that worsen PCOS [12].

Identifying Gaps and Research Focus:

Despite the abundance of research into PCOS, many questions still remain. More study is needed to decipher the intricate genetic networks that contribute to PCOS and comprehend their genetic foundation. The interplay between genetic and environmental factors in the development and progression of PCOS is poorly understood. Because there are no agreed-upon diagnostic criteria for PCOS and because of the potential for bias in retrospective investigations, studies attempting to determine the source of the disorder must adhere to strict methodological standards.

We are doing a retrospective study to learn more about the environmental factors linked to PCOS, how they interact with one another, and what that means for therapy. Better diagnostic criteria and more specific, individualised treatment for polycystic ovary syndrome (PCOS) are two goals of this study.

Methods

Study Design

This study aims to identify the environmental risk factors for developing Polycystic Ovary Syndrome

(PCOS) in women. A retrospective study is the way to go if you want to find correlations or trends over time.

Data Collection Process and Sources

This study's environmental components will be thoroughly analysed by compiling data from numerous sources. Patient Environment Data and Medical Records are the Data Sources. Clinical diagnoses, laboratory results, and imaging reports specific to PCOS from affiliated medical facilities.

Inclusion criteria

Possess a PCOS diagnosis based on standard clinical criteria.

Consent to participating in the survey after receiving appropriate information.

Exclusion criteria

Have a pre-existing medical condition that could be mistaken for PCOS.

Refuse to participate in the research or provide consent after being given all relevant information.

Statistical and Analytical Methods

This investigation will use a mixed-methods strategy for its statistical and analytical procedures. Statistics used for summarising demographic and clinical characteristics are called descriptive statistics.

Regression analysis will evaluate how lifestyle, nutrition, and exposure to endocrine disruptors relate to environmental factors.

Distinct forms of PCOS will be broken down into subgroups to study differences between them.

Result

Demographic Characteristics of Participants

The demographic information for the study participants is shown in Table 1.

Two hundred and fifty women were diagnosed with PCOS and served in the PCOS group, while the remaining 250 women were in the control group.

Participants' ages ranged from 20 to 40, with a mean of 28.5. There were no statistically significant differences between the PCOS and control groups regarding age, race, and socioeconomic position.

Table 1: Demographic Characteristics of Participants

Characteristic	PCOS Group (n=250)	Control Group (n=250)
Age (years)	28.5 ± 4.3	28.2 ± 4.1
Socioeconomic Status		
Low	45 (18%)	47 (19%)
Middle	110 (44%)	108 (43%)
High	95 (38%)	95 (38%)

Environmental Factors and PCOS: The findings of environmental factors in the sample population are shown in Table 2. The average BMI of the PCOS group was substantially more significant than that of the control group ($p < 0.001$). The PCOS group also reported significantly higher rates of inactivity ($p = 0.02$) and increased consumption of high-glycaemic index meals ($p = 0.03$). These results prove that lifestyle and dietary factors contribute to developing PCOS.

Table 2: Environmental Factors in PCOS

Environmental Factor	PCOS Group (n=250)	Control Group (n=250)
BMI (kg/m²)	31.2 ± 4.5	25.6 ± 3.9
Lifestyle		
Sedentary	105 (42%)	70 (28%)
Active	145 (58%)	180 (72%)
Dietary Habits		
High Glycaemic Index	140 (56%)	95 (38%)
Low Glycaemic Index	110 (44%)	155 (62%)

Our findings indicate that environmental factors, mainly lifestyle and dietary choices, may influence the clinical manifestations and severity of the condition. Additional research is necessary to understand the interplay between genetic and environmental variables fully.

These findings shed light on the complex nature of PCOS, demonstrating the importance of environmental variables in its aetiology. The ability to accurately diagnose patients and provide effective treatment plans hinges on thoroughly understanding these variables.

Discussion

The findings of this study have important implications for our understanding of the complex path that leads to Polycystic Ovary Syndrome (PCOS). Participants who were less active and ate a diet high in glycaemic index were also more likely

to develop PCOS, thus emphasising the importance of lifestyle and nutritional factors in this condition.

Table 3: Comparison with existing Studies

Study	Study Type	Sample Size	Findings	Limitations
Present Study	Retrospective	500	Lifestyle factors, sedentary behaviour, and high glycaemic index diet influence PCOS risk.	Recall bias due to retrospective design, no causation inference
Study 1 [13]	Prospective Cohort	800	Identified an association between AMH levels and PCOS.	Limited to a specific hormonal marker, potential attrition bias, and issues with long-term follow-up.
Study 2 [14]	Case-Control	400 (200 PCOS, 200 Controls)	No significant genetic associations were found, but BMI and insulin resistance were associated with PCOS.	Smaller sample sizes potential selection bias in controls, may not capture the entire genetic landscape of PCOS.
Study 3 [15]	Cross-Sectional	600	Demonstrated the impact of psychological stress on PCOS severity and symptom exacerbation.	Cross-sectional design lacks temporality and limited insight into specific genetic factors.

Our current retrospective investigation of PCOS revealed substantial lifestyle factors using a meta-analysis of previous studies. Lifestyle factors, including inactivity and a high-glycemic-index diet, were found to play a role in PCOS risk, Study 1, a prospective cohort, focused on a particular hormonal measure and found a connection with AMH levels, while our study emphasised the heterogeneous aetiology of PCOS.

The second study (a case-control analysis) shed light on the significance of body mass index and insulin resistance, Study 3, a cross-sectional design, looked at how stress affects PCOS, but its short time frame highlighted the need for more investigation. This research, taken as a whole, demonstrates the multifaceted character of PCOS by illuminating environmental roots and impacts.

Implications of Environmental Factors:

There are several reasons why it's essential to gain a deeper understanding of the environmental components that contribute to PCOS. First, it can help refine diagnostic criteria, which could ultimately result in more timely and effective treatment. Furthermore, identifying those at increased risk for PCOS may allow for individualised preventative measures. Because of how hereditary and environmental variables interact, PCOS treatment should be individualised. The impact of lifestyle and diet on the development of polycystic ovary syndrome (PCOS) highlights the relevance of patient education and treatments to promote metabolic health.

Strengths and Limitations of the Study

The strength of this study can be attributed to its methodological approach, which carefully considered environmental factors while selecting participants. Having a comparison group strengthens the reliability of our results. Nonetheless, there are a few caveats that should be mentioned. Recall bias is possible due to the study's retrospective design, which uses past data. While we did find some noteworthy correlations, we cannot draw any conclusions about causality from our findings. The environmental factors studied are only a tiny part of the complicated interplay leading to PCOS. These considerations warrant additional investigation in the following studies.

Clinical Applications and Future Research Directions

Clinical uses of the findings of this investigation are possible. A more accurate polycystic ovary syndrome (PCOS) diagnosis could lead to earlier treatment and individualised care. Dietary changes and exercise regimens are two examples of lifestyle therapies that may help with PCOS. Further research is needed to understand the interplay between genetic and environmental factors, such as epigenetic alterations. Potentially valuable data could also be gleaned from longitudinal studies that monitor the onset of PCOS in high-risk populations.

Conclusion

Our findings highlight the importance of lifestyle factors in the aetiology of Polycystic Ovary Syndrome (PCOS), demonstrating the multifaceted character of this condition.

Essential contributors include dietary and behavioural factors like a sedentary lifestyle and a high-glycaemic-index diet. These results may one day lead to more precise diagnoses and tailored treatments. To improve clinical care and preventative measures, more investigation into the environmental complexities of PCOS is needed in the future.

Reference

1. V. Bruni, A. Capozzi, and S. Lello, The role of genetics, epigenetics and lifestyle in polycystic ovary syndrome development: The state of the art, Reproductive Sciences, 2021; 29(3): 668–679.
2. F. Facchinetti, Review for Metabolic syndrome and its components in different phenotypes of polycystic ovary syndrome, 2021.
3. M. Dapas and A. Dunaif, Deconstructing a syndrome: Genomic insights into PCOS causal mechanisms and classification, Endocrine Reviews, 2022; 43(6): 927–965.
4. H. Nautiyal et al., polycystic ovarian syndrome: A complex disease with a genetics approach, Biomedicines, 2022; 10(3): 540.
5. J. Parker, C. O'Brien, J. Hawrelak, and F. L. Gersh, Polycystic ovary syndrome: An evolutionary adaptation to lifestyle and the environment, International Journal of Environmental Research and Public Health, 2022; 19(3): 1336.
6. Q. Chen, B. Zheng, S. Du, and Y. Lin, Explore the potential molecular mechanism of polycystic ovarian syndrome by protein–protein interaction network analysis, Taiwanese Journal of Obstetrics and Gynecology, 2021; 60(5): 807–815.
7. S. Siddiqui, S. Mateen, R. Ahmad, and S. Moin, A brief insight into the etiology, genetics, and immunology of polycystic ovarian syndrome (PCOS), Journal of Assisted Reproduction and Genetics, 2022; 39(11): 2439–2473.
8. M. Khatun et al., Induced pluripotent stem cells as a possible approach for exploring the pathophysiology of polycystic ovary syndrome (PCOS), Stem Cell Reviews and Reports, 2023.
9. C. K. Welt, Genetics of polycystic ovary syndrome, Endocrinology and Metabolism Clinics of North America, 2021; 50(1): 71–82.
10. N. Zeber-Lubecka et al., Exome sequencing to explore the possibility of predicting genetic susceptibility to the joint occurrence of polycystic ovary syndrome and Hashimoto's thyroiditis, Frontiers in Immunology, 2023; 14, 2023.
11. S. Y. Saddick, identifying genes associated with the development of human polycystic ovary syndrome, Saudi Journal of Biological Sciences, 2020; 27(5): 1271–1279.
12. S. Ashraf, R. Aslam, I. Bashir, I. Majeed, and M. Jamshaid, Environmental determinants and PCOS symptoms severity: A cross-sectional study, Health Care for Women International, 2021; 43(1–3): 98–113.
13. P. Sharma, N. Bilkhiwal, P. Chaturvedi, S. Kumar, and P. Khetarpal, Potential environmental toxicant exposure, metabolizing gene variants and risk of PCOS-A systematic review, Reproductive Toxicology, 2021; 103: 124–132.
14. A. S. Peña et al., Adolescent polycystic ovary syndrome according to the international evidence-based guideline, BMC Medicine, 2020; 18:1.
15. A. J. DUNN, Environmental influences and polycystic ovarian syndrome, Clinical Obstetrics & Gynecology, 2020; 64(1): 33–38.