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# **Literature Review: Polycystic Ovarian Syndrome, Stress and Symptom Severity**

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**Literature Review: Polycystic Ovarian Syndrome, Stress and Symptom Severity**

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### **Abstract**

Polycystic ovarian syndrome is the most common endocrine disorder that affects women. The focus on inflammatory PCOS will be the basis of understanding how hormonal imbalances are due to inflammatory diets, stress, and environmental factors that impact symptom severity. The objective of this paper was to provide a systematic review that would determine if symptom severity was associated with psychological stress on polycystic ovarian syndrome (PCOS). It is important to note that PCOS does not have a cure but symptom severity may only be treated, this is due to the cause being unknown and PCOS being used as an umbrella term for issues related to the ovaries and reproductive cycle. As a result, the most commonly suggested findings were to improve diet, improve exercise habits, and seek psychological help if feeling distressed by the symptoms of PCOS.

*Keywords:* PCOS, polycystic ovarian syndrome, stress, distress, obesity, hirsutism, infertility, anxiety, depression, psychosocial, physiological, and oxidative stress

### **Literature Review: Polycystic Ovarian Syndrome, Stress and Symptom Severity**

Polycystic ovarian syndrome (PCOS) affects women at all stages of life and stress equally plays a role in finding the root of this cause. PCOS is a complex disorder that has various physical, reproductive, and psychological effects but is distinguishable through its impact on the ovaries due to increased production of androgens (Duncan, 2014). Symptom onset begins for women at the reproductive age and continues on depending on the severity. Being the endocrine disorder that is most common in women, polycystic ovarian syndrome affects women globally at high rates (Liu, 2021). Based on incident cases reported among 194 countries, in the year 2017 alone 1.55 million cases were identified (Liu, 2021). Typically affecting primarily Andean Latin America, Caribbean, and Asian Pacific women, a large portion of those affected by PCOS come from low and middle income backgrounds (Liu, 2021). However, there are four key types of PCOS that exist: insulin-resistant PCOS, pill-induced PCOS, inflammatory PCOS, and hidden PCOS (Devi, 2021). The focus on inflammatory PCOS will be the basis of understanding how hormonal imbalances are due to inflammatory diets, stress, and environmental factors that impact symptom severity (Devi, 2021).

Polycystic ovarian syndrome and physiological stress correlate to one another due to environmental and psychosocial impacts (Cipkala-Gaffin, 2012). It is important to note that PCOS does not have a cure but symptom severity may only be treated, this is due to the cause being unknown and PCOS being used as an umbrella term for issues related to the ovaries and reproductive cycle. The diagnosis of polycystic ovarian syndrome can come from further diagnosis of related conditions that may impact the severity of PCOS. Stress however is broken into three categories: metabolic, psychological, and oxidative, all forms that influence inflammatory PCOS symptoms (Devi, 2021). Inflammatory PCOS will be the subject of this

paper as it is due to inflammation in the body that prevents ovulation, produces androgens, and causes hormonal imbalances (Devi, 2021). Typical factors of inflammatory PCOS are due to stress, toxic environmental factors, or an inflammatory diet (Devi, 2021). Psychological stress is classified as a symptom or sign of PCOS, however it is considered to also play a role in the cause of the condition (Cipkala-Gaffin, 2012).

Stress plays various roles in polycystic ovarian syndrome among premenopausal women. Specifically, diagnosing polycystic ovarian syndrome has been a challenge due to the various impacts on reproductive and metabolic functions (Papalou, 2016). The significance of stress on PCOS can be further refined to metabolic stress that not only impacts psychological stress, long term health implications, but also various chronic illnesses (Papalou, 2016).

Most often, PCOS is misdiagnosed due to the varying symptoms that occur and is often undertreated (Hatoum, 2023). While 20% of women will likely catch their PCOS on an ultrasound scan and 7% will have the basic symptoms and characteristics, PCOS is a relevant issue to the overall population of women (Duncan, 2014). However, due to inflammatory PCOS being influenced by stress and diet, the emphasis on symptom severity impacts various basic lifestyle functions of women living with polycystic ovarian syndrome. To further investigate the connotations related to physiological stress and polycystic ovarian syndrome, the focus shifts to challenge if physiological stress increases the symptom severity of PCOS and how to treat it. The objective of this paper is to address the connections made between PCOS and stress and its results of hirsutism, infertility, obesity, anxiety, depression, and health impacts.

### **Methods**

In order to refine the necessary journals to report on behalf of stress and polycystic ovarian syndrome, a systematic approach was taken to review all journals. Using the databases of

Web of Science, PubMed, and Google Scholar, a systematic view was conducted to find the appropriate resources. Key words such as “stress”, “PCOS”, “polycystic ovary syndrome”, “anxiety”, “depression”, “psychosocial”, “physiological”, “distress”, and “oxidative stress” were determined to be the main indicators of what journals were to be selected. Such limits imposed included any article in English only and to be available through online search to ensure accessibility and completeness.

### **Eligibility Criteria**

Based upon the three search engines, each database provided a limited quantity of available resources. In total, the initial search among all three databases came to 20,034 journal articles available based on the search of “PCOS and stress and symptom severity.” Web of Science provided 12 journals based on the three keyword searches, PubMed followed with 22 available journals, and Google Scholar provided 20,000 articles. After refining the eligibility criteria to only include PCOS, stress, distress, and and psychological, after this each search engine simplified its results. Specifically, PubMed began with 22 total available articles and thus reduced its overall total to 9 available journals. Web of Science began with 12 total journals and was thus shortened to 2 available articles. However, Google Scholar lowered from an initial 20,000 articles to 1,190. In total after refining four keywords, there were a total of 1,201 available journals to review.

### **Title Searches**

To further focus on the relevant journals, additional filters were included. Any selected article could not be limited to “mental health”, “anxiety” or “depression” alone with PCOS in the title. All selected titles must include “stress”, “distress”, or “psychological” in the title in addition to “PCOS” or “polycystic ovary syndrome” if anxiety or depression were to be included

in the title. In addition to this, all journals had to be published within the years of 2000 to 2024 to include the most recent information relevant to modern technology and findings of polycystic ovarian syndrome. Based upon each filter, 100 journals were then selected based only upon the title. Of these 100 journals, 7 were from PubMed, 2 were from Web of Science, and 90 were from Google Scholar.

### **Hirsutism and Infertility**

One common struggle many women with PCOS face is infertility. Specifically, the inability to have children has resulted in various forms of psychosocial stress that impaired overall social relationships of women with PCOS (Basirat, 2019). Due to symptoms of obesity and hirsutism, women with PCOS experienced infertility stress that was due to social pressure as a result of hirsutism (Basirat, 2019). Hirsutism is a symptom of PCOS that results in excess hair growth in areas of the body that is due to the terminal male pattern growth because of androgenicity in the pilosebaceous gland (Glintborg, 2009). As a result of social impacts, the constraint of hirsutism made women living with PCOS experience more mental health impacts and also reported feeling less feminine than those without (Basirat, 2019). In addition to this, women who were experiencing infertility as a result of PCOS had self-reported higher levels of depression in comparison to women who experienced infertility and did not have PCOS (Basirat, 2019). As a result, the suggestion of additional psychosocial support from infertility specialists would be helpful for infertile women with PCOS.

### **Emotional Stress**

Due to the psychosocial stress of infertility that many women have experienced, the psychological stress of finding a partner and getting married resulted in varying levels of stress. Those who reported finding a partner, getting married, or having a sexual partner were



experiencing emotional stress due to a negative impact related to age and the duration of their PCOS illness (Zangeneh, 2012). These negative impacts are in correlation to having lower self-esteem, psychological distress, and a more negative self-image due to physical appearance because of obesity and hyperandrogenism (Zangeneh, 2012). Due to psychological distress, it was recommended to improve dietary habits and medication (Zangeneh, 2012).

Adolescent women dealing with psychological stress are impacted on their quality of life (Khafagy, 2020). Specifically, the severity of stress was independent of hirsutism and obesity due to personal features that perceived stress in a more aggressive form than others not associated with physical features (Khafagy, 2020). Psychosocial stress within PCOS adolescents was rather noted to be tiring or threatening their well-being due to the feeling of being unable to positively manage stress (Khafagy, 2020). When compared to an overall global prevalence, the confirmation of a PCOS diagnosis leads to negative impacts on emotional well-being and psychological well-being (Elsenbruch, 2006). Overall, a common trend with PCOS patients is the experience of distress affecting the quality of life, emotional distress, and sexual dissatisfaction (Elsenbruch, 2006).

### **Anxiety and Depression**

Women dealing with PCOS have reported higher levels of anxiety and depression than women without PCOS (Alamri, 2022). One thing to note was the educational level and psychological burden. Those with PCOS and lower education reported having higher levels of depression and psychological distress than women who attended university, however anxiety and stress was not significantly attributable to education levels (Alamri, 2022). In addition to this, the study based in Saudi Arabia noted that women were more likely to be depressed in comparison to men, in addition to this psychological distress that resulted in anxiety, stress, and depression

were common within PCOS women (Alamri, 2022). However, the conclusion came to a basis that stress was the overall dominating psychological distress that was seen in PCOS patients when compared to anxiety and depression (Alamri, 2022).

On the contrary, in a Euro-American population study anxiety and depression based on sociodemographic characteristics had different results. Upon women with PCOS and the controls, there was no significant difference when it came to results and income, employment, as well as education (Sulaiman, 2017). However, in women with PCOS the most prevalent psychological burden was anxiety when compared to the general population (Sulaiman, 2017). Mostly attributed to the pathogenesis of PCOS, the exact reasoning behind physiological disturbance could not be determined but is proposed to be due to high insulin levels and androgen imbalances that lead to mood disturbances (Sulaiman, 2017). To overall improve and reduce psychological distress among the PCOS population, psychological counseling within primary care providers and OBGYN clinics was suggested (Sulaiman, 2017).

### **Obesity**

When a woman is struggling with obesity and PCOS, it is most likely due to the rate of which insulin is broken down. Due to the metabolic side of hormone production, when there are high rates of insulin being produced it correlates to easier weight gain and difficulty to lose weight (Duncan, 2014). Since insulin is an anabolic hormone and is used for energy storage, it creates a cycle in which weight and insulin will affect most women with PCOS and will most likely experience it to individualistic levels (Duncan, 2014). As a result, the way to cope with PCOS symptoms and weight gain, some providers will suggest androgenic pills if the woman is not actively trying to conceive or get pregnant (Duncan, 2014). Another proposed method to help

PCOS is avoiding refined carbohydrates, not skipping meals, and eating regular small and healthy meals and regular exercise (Duncan, 2014).

In the literature, overweight and obese PCOS women have been noted to have positive correlations related to their overall quality of life when well-being and psychological well-being are the appropriate coping mechanisms suggested (Oberg, 2020). When compared to those pursuing weight loss, the group pursuing these personal changes were more likely to be more socially desirable (Oberg, 2020). However, it is noted that in older women anxiety and depression scores were also relatively higher in women who were obese in comparison to those with lower BMI scores when compared to a control group (Karjula, 2017). Interestingly enough, women who were premenopausal were also the women with the highest overall anxiety score that was contributed by psychological distress but not correlated to BMI scores (Karjula, 2017).

### **Health Impacts**

As a result of a combination of factors, PCOS has been a common link to impact how women perceive themselves, have psychological implications, and also impact reproductive functions. When compared to healthy women, cortisol levels were found to be elevated significantly due to stress (Benjamin, 2023). To propose early intervention and the possibility of preventing further stress, the idea of screening for cortisol and DHEA was suggested to be markers to help any burdens associated with PCOS (Benjamin, 2023). In order to provide the appropriate resources for stress management, screening and follow ups were recommended for those in the study due to significant stress markers in women with PCOS and for preventable stress in women susceptible to PCOS (Benjamin, 2023).

Polycystic ovarian syndrome impacts various women due to its common links with other health related conditions. Insulin resistance, obesity, diabetes, and metabolic syndrome are likely

to occur in combination with PCOS (Nawrocka-Rutkowska, 2022). Typical symptoms include hirsutism, difficult to treat acne, irregular menstruation and infertility (Nawrocka-Rutkowska, 2022). Further consequences of such metabolic disorders can be seen through cardiovascular disorders, arterial hypertension, and estrogen-dependent cancers (Nawrocka-Rutkowska, 2022). While PCOS individually affects women in various ways, the symptoms that occur and further develop are unique to each individual. However, stress plays its own role in the development of how each metabolic disorder can impact the individual.

Polycystic ovarian syndrome can be identified by polycystic ovaries, hyperandrogenism, or anovulation, in which women of childbearing age have elevated levels of testosterone, insulin concentrations, and high stress responses (Hassan, 2023). In comparison to women without PCOS, appearance may differ due to the impacts PCOS has on other bodily functions. Specifically, women who were higher in age, BMI, and levels of hirsutism were more likely to have a lower quality of life score associated with stress and BMI levels (Marschalek, 2023). However, PCOS affects women in numerous ways outside of stress alone.

Stress is impacted by environmental and genetic factors that begin during the prenatal stage and continue into adulthood (Diamanti-Kandarakis, 2006). Metabolic abnormalities are thus aggravated by stress factors that impact women with PCOS (Diamanti-Kandarakis, 2006). Breaking it down to physiological stress, PCOS women are generally more prevalent to developing anxiety due to high levels of stress, in addition to depression, when compared to non-PCOS women (Sulaiman, 2017). As a result, metabolic and physiological stress impact the body in various ways. Due to emotional disturbances, the psychological burdens exist at higher rates among those with polycystic ovary syndrome, in the possible result of increased luteinizing

hormone secretion (Sualiman, 2017). Due to an increase in cortisol, stress plays a major role in how PCOS is impacted.

Due to the menstrual cycle being controlled by hormones and processes occurring within the uterus, any disruption in this system will cause an impact. Respectively, with high levels of stress, elevated levels of cortisol levels may occur in some PCOS women which can lead to a result of outcomes. Inflammation, obesity, oxidative stress, and diabetes are just a few examples of how endocrine functions, reproduction, and immune regulations may be bothered (Rajalakshmi, 2023). However, cortisol levels contribute to insulin resistance in correlation to polycystic ovary syndrome.

### **Discussion**

As management and forms of psychological stress, simple recommendations are suggested as a form of personal care and habits. Most commonly found in every literature reviewed suggested the implementation of exercise in daily routines, refining carbohydrates from the typical diet, and also seeking psychological counseling. To note, psychological counseling was recommended to be implemented by primary care providers or gynecologists rather than the PCOS patient. While, there were no significant associations of BMI and PCOS stress symptom severity, a higher BMI was linked to lifestyle factors that were attributable to insulin resistance. In addition to this, symptom severity depended on age range, ethnicity/race, and also depending on the form of metabolic or reproductive stress. In the literature, most case-control studies noted that PCOS women had indeed higher levels of emotional, psychological, and infertility stress in most aspects of life in comparison to healthy women. Also in uncertainty, is if the quality of life is overall impacted within women with PCOS as the literature did suggest this hypothesis but was not confirmed.

Limitations in the literature and research conducted was due to the length of time each study took place during. Most prevalent literature took place in the time frame of 2014-2017 with most recent literature reflecting on previous studies or lacking new evidence. In addition, anxiety and depression was the most common form of literature to be found in the methods, most other forms of psychological stress, distress, or other mental health issues were not as common. While Andean Latin American and Caribbean women were mentioned to have the highest overall prevalence of PCOS, there was not much literature to support these groups or their rates of psychological distress. In addition to this, there are no current studies found to be related only to U.S. women who have PCOS and psychologic related stress. This is due to PCOS being understudied and a lack of data for the U.S. alone.

### **Conclusion**

Different studies within different countries had all varying results in terms of education, income level, BMI results, and employment. The common psychosocial distress symptoms were common among all studies that resulted in anxiety and stress being the largest psychological stressors. Depression was a self reported measurement that was also high among women with PCOS, however, psychological stress was prevalent among all PCOS patients. In addition to this, conclusions could not be made to state that obesity correlated to psychological stress.

Sociodemographic factors also varied among Euro-American, South Asian, Indian, and Saudi Arabian women studied in various case control studies.

There are still various questions unanswered as to the causes of PCOS, however symptom severity can partially be attributed to psychological stress in terms of self perception. A balanced diet and exercise is overall recommended to help subside potential symptoms, but psychological

distress does not have a simple remedy. To further answer these questions, solutions have not yet been discovered but are encouraged to be further researched.

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