International Journal of Engineering, Management and Humanities (IJEMH)
Volume 3, Issue 1, pp: 256-266 www.ijemh.com

# Effects of Everyday Stress Stimulating PCOS in Adult Women

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Date of Submission: 10-03-2022 Date of Acceptance: 27-03-2022

**Abstract**
Background & Aim : PCOS is a prevalent heterogeneous endocrine condition marked by erratic menstruation, hyperandrogenism, and polycystic ovaries. PCOS incidence differs according to the diagnostic criterion used, but can range between 15% and 20% where the
European Society for Human Reproduction and Embryology/American Society for Reproductive Medicine criteria have been used. Oligomenorrhea or amenorrhea, hirsutism, and sometimes miscarriage are both clinical symptoms. Type 1 diabetes, type 2 diabetes, and gestational diabetes are also risk factors for PCOS in adults. Insulin resistance affects 50%–70% of women with PCOS and is associated with a host of comorbid conditions such as cardiovascular disease, hypertension, dyslipidemia, glucose sensitivity, and diabetes. Females with PCOS are more likely to have elevated risk for endometrial carcinoma. Depression, anxiety, psychotic illness, and binge eating disorder are even more prevalent in women with PCOS. The research provides evidences, which links stress or perceived stress as a trigger for exisisting PCOS in adult women. Method : Many scientific case studies regarding stress related to PCOS were studied and one was chosen as an evidence. Result & Conclusions : Results show that tension, or stress-related stimuli, is positively correlated with triggering PCOS in women, and that stress is accompanied by hormonal shifts as a result of stress-related problems.

**Keywords:** polycystic ovary syndrome, stress, adult women , reproductive women with PCOS, tension etc.

## I. INTRODUCTION

Women's health concerns the detection, screening, evaluation and therapy of women'sspecific conditions. Polycystic Ovarian Syndrome (PCOS) is highly prevalent in women of reproductive age and potentially accounts for most endocrine conditions in this category. PCOS impacts women from birth to death, presenting a range of health hazards that can reduce quality of life while simultaneously raising morbidity and mortality rates. This disorder involves a wide variety of phenotypes that may require different therapies and have different outcomes, as well as a high degree of metabolic complexity, necessitating an urgent revision of its diagnosis. (Bellver et al., 2018). Symptoms of PCOS include hirsutism, obesity, acne, and erratic menstrual periods, both of which taint body appearance and affect psychological well-being in teenagers with PCOS by endangering their feminine characteristics. (Khafagy et al., 2020)

Furthermore, findings have shown that women with PCOS have a higher incination towards dyslipidemia, obesity, hypertension, and diabetes, which increases their risk of cardiovascular disease and metabolic syndrome. (Dokras et al., 2016) Endometrial cancer, coronary disease, dyslipidemia, and type-2 diabetes mellitus are also common among women with PCOS. (McFarland, 2012)

Several significant results were found by a group of women with PCOS who were observed for several years after wedge resection when they entered the menopause period. During this period, they had persisted in signs of PCOS, a subsequent menopause, and a greater rate of hysterectomy. What's more, there was a strong incidence of diabetes as well as hypertension, (16%) (40 %) respectively . (Carmina & Lobo,1999) . Polycystic ovary syndrome (or PCOS) is characterised by hyperandrogenism and dysfunctional menstrual cycles. Women that are diabetic seem to have an increased incidence of insulin resistance and related metabolic problems by the disease. Obesity tends to be associated with sleep difficulties, but

most trials have concentrated on tertiary level 3 or level 4 patients and might not be applicable to the general population of women with PCOS. Stress is the body's response to threatening situations whether actual or imagined. (Casarella, 2019)

According to a review of modern day studies, stress is associated with several disease pathogenesis, particularly in women with polycystic ovarian syndrome (PCOS). When you are afraid, a physical response takes place inside your body that helps you to safeguard yourself from damage. This answer is known as "fight-or-or-flight,"or-flight. many diseases are related to stress. It's a widely overlooked and little understood contributing factor to reproductive dysfunctions. Disturbed ovulation resulting from stress is common in women who's lives are stressed or perturbed . Concern is growing among researchers about stress as a factor in PCOS symptoms. (Basu et al., 2018). A range between 5% to 26% of women are diagnosed with PCOS. There are confirmed cases of PCOS from every country on earth, including Australia, China, Denmark, Greece, India, Spain, and the United Kingdom, the U.S. (Noursi, et al., 2019)

PCOS is a complex condition that affects at least 7% of adult females. PCOS affects about 5 million females of reproductive age in the United States, according to the National Institutes of Health Office of Disease Prevention. The cost of identifying and treating PCOS in the United States is estimated to be about $4 billion a year. (Obstetrics, 2011)

According to study, PCOS affects 5% to 10% of females aged 18 to 44, rendering it the most prevalent endocrine abnormality among women of reproductive age in the United States. (Ndefo et al., 2013)

This article explores the effects of stress stimulating PCOS in female of reproductive age.

**Providing a Definition**

Because of its complex and heterogeneous composition, a standard definition for PCOS does not exist. However, it is obvious to many that the condition is an endocrinopathy, and that it should be referred as PCOS, a syndrome rather than disease. PCOS (polycystic ovary syndrome) is a hormonal condition marked by hyperandrogenism and irregular menstruation. (Susan Sam, 2019 ) Despite its diversity, the disease's hallmarks are hyperandrogenism and persistent anovulation. The Rotterdam consensus states that two out of three of the following conditions are required for PCOS diagnosis: (a) oligo-ovulation or anovulation, (b) clinical and/or biochemical symptoms of hyperandrogenism, and (c) ultrasound-confirmed polycystic ovaries, as well as the exclusion of any associated disorders. PCOS has a number of metabolic effects, including an elevated likelihood of obesity, insulin tolerance, type 2 diabetes, and early atherosclerosis, in addition to its reproductive characteristics. Since they have a higher prevalence of hypertension, dyslipidemia, and visceral adiposity, often women with PCOS follow the requirements for the metabolic syndrome (MBS). Anti-Mullerian hormone, a transforming growth factor, was recently discovered to be a key to this disorder. Obesity is normal in PCOS, and it exacerbates effects while often promoting harmful health outcomes. Obesity and fat distribution are thought to play a part in the development of PCOS. About 40% of PCOS women are obese, with abdominal fat distribution. Many of the clinical symptoms of this condition, such as hyperandrogenism and insulin tolerance, are exacerbated by these improvements in the body structure. (Basu et al., 2018) PCOS is related to cardiovascular diseases, physiological and psychiatric impacts on the quality of life (such as anxiety and depression), as well as breast and endometrial cancers. PCOS has been diagnosed in as much as 20% of women with infertility disorders (including fecundity and early pregnancy loss). It is also referred to as the most frequent source of female anovulatory infertility. While there is no clear trigger for PCOS, there is proof that both environmental and genetic influences play a major role in its development. (Barthelmess & Naz,2014)

**Stress**

Stress has the potential to influence any part of your life, including your thoughts, attitudes, cognitive capacity, and physical wellbeing. No part of the body is immune. However, since people respond to stress in various ways, stress symptoms may vary. Your pulse rate rises, your breath quickens, your muscles tighten, and your blood pressure rises and even certain hormones are secreted as a result of your stress reaction. Your body's reaction to daily activities of your life is known as stress. Stress affects everybody. Stress may be beneficial to women by motivating them to accomplish significant objectives. Stress, on the other hand, may be harmful and damaging, affecting several aspects of one's existence. It is more difficult to learn and cope when tension is persistent or excessive.

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**Causes of Stress in Women**

Stress may be caused by a variety of factors. Men and women face much of the same causes of tension, including financial concerns, work stability, fitness, and interpersonal relationships. Perhaps more special to women are the many positions they fill. Women's positions in contemporary culture often involve family duties, caretaking of children and/or elderly parents, and also job commitments, among others. As expectations for these positions grow, women will feel stressed by time constraints and unmet commitments. They could experience a sense of disappointment as a result of their inability to live up to their own and others' standards. Frequently, women devote more effort to satisfying the desires of others than to nurturing their own. When women are under extreme stress, they can not really know their own needs.

**How does Stress Affects a Woman's Health?**

These health issues may occur in women who are subject to stress over an extended
period of time.

1. Anxiety and depression: Women are more likely to suffer from these symptoms than male and other neurological problems such as stress disorder and obsessive compulsive disorder.
2. Cardiovascular disorders: Blood pressure and pulse rate rise as a result of stress
3. Migraines and headaches: Women tend to have more tension headaches due to stress than males.
4. Obesity: Obesity is a condition that affects millions of Women are much more likely to add weight as a result of stress.
5. Constipation: Stress can aggravate bowel conditions such as irritable bowel syndrome.
6. Pregnancy concerns: Women that are more stressed have a more challenging time conceiving than women who are less stressed.
7. Menstrual irregularities: With rising levels of stress, polycystic ovarian syndrome becomes more serious.

**How is Stress Related to PCOS**

Stress is a significant factor in the pathogenesis of a variety of diseases. It is a prevalent

and often overlooked source of reproductive dysfunction. Anovulation caused by stress results in infertility. There are a growing number of studies indicating that tension plays a part in the manifestations of PCOS. Sleep architecture abnormalities are common in adult and teenage women with PCOS and stress issues. A research using polysomnography in obese adolescent girls with PCOS found a substantial decrease in the percentage of rapid eye movement (REM) sleep and sleep performance, as well as a substantial increase in sleep-onset latency, when compared to average weight and obese adolescent girls without PCOS. In a study of obese adult pcos women, sleep performance, defined as the amount of time spent in REM and non-REM sleep, was substantially decreased as compared to safe age-matched nonobese control women. (IF. Stein et al., 1970) Sleep latency was shown to be elevated in obese people with PCOS relative to nonobese control women in the same sample. In another analysis using polysomnography, sleep latency was shown to be increased in women with PCOS relative to controls (P =.05). (Vgontzas et al., 2001) However, the research discovered no other major variations in sleep design between females with PCOS and controls. (Erhmann & Sam, 2019) Sleep disruptions are normal in PCOS, but the majority of research to date have been restricted by small sample sizes and were performed in clinic-based surveys with referral bias and an overrepresentation of females with more serious symptoms. Nonetheless, a new meta-analysis found that adult people with PCOS have a 9.74-fold increased incidence of Obstructive Sleep Apnea (OSA) relative to women with reproductive age of comparable age. 3 Sleep disruptions are correlated with increased risk of PCOS with increasing age and adiposity, while hormonal dysfunction associated with PCOS most likely leads to the increased risk. (Ehrmann,2012)

Salivary -amylase (SAA) and cortisol have been identified as important biomarkers for stress-related shifts in the body, all of which play critical roles in metabolic homeostasis. Both are signs of sympathetic-adrenal medullary (SAM) and hypothalamic–pituitary–adrenal (HPA) axis stimulation, respectively. While the function of SAA and cortisol in stress is well understood, less is known regarding their relationship with altered body structure, a common symptom in women with PCOS. Recently, the area of PCOS analysis has seen a surge in interest. Thousands of papers have been written in the last five years on various issues and relationships associated with PCOS. (Sirmans & Pate, 2013)

Despite the elevated and rising prevalence of PCOS in the community, some factors remain unclear. Few experiments have been performed that

capture the full complexity of PCOS. Through increased knowledge of PCOS, one of the most critical facets of the condition - diagnosis - remains particularly contentious. The aetiology of this condition remains unknown. There is an urgent need for further studies into the pathogenesis of PCOS in order to ascertain the root causes. (Barthelmess & Naz,2014)

**Associated Health Conditions**

The occurrence of metabolic abnormalities and their related symptoms is one of the most common threats. There are many health consequences correlated with PCOS diagnosis, some of which are permanent. (Barthelmess & Naz,2014)

**1) Metabolic complications, obesity, and an increased risk of cardiovascular disease**

Insulin resistance (IR) is present in between 60% and 80% of all people with PCOS and in 95% of obese women with PCOS. (Carmina & Lobo,1999)

Dunaif et al. concluded in 2001 that obesity and type 2 diabetes does not trigger any deficiency in post-receptor insulin signal transduction. (Dunaif et al., 2001) Along with metabolic abnormalities, IR is associated with hyperandrogenism, anovulation, and an increased risk of cardiovascular disease. (Barbieri et al., 1983) IR is not the only metabolic condition associated with PCOS; reduced glucose resistance (IGT), gestational diabetes (GDM), and type 2 diabetes are also more prevalent. (Moran et al., 2010)

More long-term trials may be performed in the future to ascertain metabolic impacts over the patient's lifetime, not only during reproductive period. Additionally, it is important to distinguish metabolic anomalies induced by PCOS from those caused by obesity.

**2) Neurological and psychological functions**

Apart from the obvious endocrinologic and reproductive effects of PCOS, there are also significant mental wellbeing impacts. Numerous studies have shown a connection between women with PCOS and a lower health-related quality of life (Li et al., 2011). In addition to lower health-related quality of life, women with PCOS have a higher prevalence of anxiety, depression, and poor self-perception. (Deeks et al., 2011) It is suggested that all women with PCOS should seek psychiatric assessment and, if necessary, receive adequate treatment (Fauser et al.,
2011).

This is unsurprising, given that the primary phenotypes of this condition (obesity, infertility, and hirsutism) are both significant problems that will certainly induce psychiatric distress in any patient whilst often triggering pre-existing PCOS. It is necessary to confirm that these psychiatric disorders are caused by a manifestation of PCOS and not by the syndrome
itself.

**3) Cancer**

A number of reports have suggested that people with PCOS have an elevated risk of endometrial and breast cancer. (Hardiman et al., 2003) Anovulatory characteristics (unopposed oestrogen, deficient progesterone) have been shown to promote proliferative tissue development in the endometrium, ultimately contributing to carcinoma. Additional risk factors for endometrial carcinoma include obesity, insulin tolerance, and type 2 diabetes, both of which have been linked to PCOS. In women with PCOS, the chance of developing endometrial cancer is increased by two to three folds. (Chittenden et al., 2009)

**4) Infertility**

The most common reason for menstrual irregularity that results in infertility is polycystic ovary syndrome. Thirty percent of couples receiving care for infertility do so due to anovulation.

90 % of anovulation events are believed to be triggered by PCOS. (Balen & Rutherford, 2007)

PCOS patients' oogenesis is distinct from that of a typical cycling fertile individual. Individual induction from primordial to primary follicle occurs independently of gonadotropins during folliculogenesis (Peters et al., 1975) As the PI3K and FOXO3 pathways are disrupted in mice, all primordial follicles in the pool are activated, resulting in follicular deficiency and premature ovarian failure. In response to LH stimulus and insulin levels, the theca cell layer releases androgens for neighbouring granulosa cells to transform to estradiol. These two causes, LH and insulin, are particularly important for PCOS patients, as 60–80% of patients exhibit insulin resistance (IR), which can lead to hyperinsulinemia. Insulin overload in the ovaries will intensify LH's granulosa reaction, resulting in an excess of androgens at the location (Barbieri et al., 1986). LH stimulation signals stable women to begin developing follicles from the primary to the secondary follicular level. Increased LH may also result in the premature maturation of granulosa cells.

PCOS patients often conceive by assisted reproductive technologies (ART). The first procedure that is often used is ovulation induction, which is used to stimulate the growth of several follicles that would ultimately be fertile.

Clomiphene citrate (CC) is the most often prescribed agent for ovulation induction (Casper, 2009) After three months of therapy, CC has been shown to end in conception 50% of the time and 75% of the time after nine cycles.

**Management and treatment**

At the moment, there is no remedy for PCOS. Combined oral contraceptives (OCPs) are the first phase of care for people with PCOS that are not pursuing conception. These pills not only control menstruation, but they also inhibit the development of adrenal androgens. Although adopting a balanced lifestyle will not cure PCOS's features, it will aid in the management of related health problems such as obesity, cardiovascular disease, and infertility. Hirsutism, a typical form of PCOS, is often handled at the patient's discretion with OCPs in conjunction with anti-androgen therapy. Laser hair reduction is also a common method of hirsutism regulation in PCOS patients. (Rotterdam, 2003)

## II. METHOD

*Purpose of this study*

Adolescence is the stage of development during which the symptoms of PCOS occur, most notably ovulatory disturbance and hyperandrogenism. (Kaczmarek et al.,
2016) Adolescence is often a period where the prevalence of many types of mental disorders increases. Adolescent behaviours and symptoms have an impact on wellbeing and may result in adulthood disorders. Nearly half of all psychiatric illnesses in adulthood begin before the age of 18. (Kessler et al., 2007) that exacerbates the consequences of these conditions in young adults and later in life (WHO, 2017)

The aim of this research was to quantify perceived stress in young women with PCOS and to examine the connection between PCOS symptoms and the perceived stress scale (PSS) and to show the effects of stress on exisisting PCOS in women.

*Sample*

In the case group, single young females aged 11–19 years with a definitive diagnosis of PCOS (meeting the Rotterdam consensus criteria) (Rotterdam, 2003) were recruited. Two of the following three conditions had to be met: oligo/anovulation, hyperandrogenism, pathological (hirsutism or, less often, male pattern alopecia), biochemical (increased FAI or free testosterone), or ultrasound-confirmed polycystic ovaries. As a test sample, healthy single teenage girls in the same age group were recruited. Patients with a history of mental conditions, hormonal disturbances, persistent opioid usage, physical disability, alcohol misuse, or chronic crippling illness were removed.

*Materials*

This was a case-control analysis performed in two conditions at Cairo university hospitals: the first at gynecologic outpatient clinics (for the PCOS group) and the second at family medicine outpatient clinics (for the control group).

72 young women were included in the study (36 cases and 36 controls). The sample size was determined using the open epi6 programme in Epi Info ®version 7 software with an 80% power and a 95% confidence interval. Anxiety was chosen as a risk factor to investigate since the prevalence of anxiety in regular women (controls) was 8.5 %, while the prevalence of anxiety in PCOS women (cases) was 41.9 %. (Cooney et al., 2017)

*Procedure*

After taking patient registration, appropriate approval was gained from participants who voluntarily decided to participate in this research. The patients completed a predesigned standardised questionnaire that elicited information about their sociodemographic characteristics, menstrual background, lifestyle patterns, and medical history. Following that, a clinical review was conducted, which included anthropometric measurements such as weight, height, waist circumference, and body mass index (BMI). Acne was staged in the following manner: Grade 1: comedones, papules on occasion. Papules, comedones, and a few pustules are present in grade 2. Grade 3: pustules, nodules, and abscesses predominate. Cysts, abscesses, and extensive scarring characterise grade 4. (Thappa et al., 2009) The Ferriman–Gallwey score was used to stage hirsutism by examining hair development in nine different areas of the body: the upper lip, jaw, face, upper back, lower back, upper abdomen, lower abdomen, upper arms, and thighs. Hair growth was graded in each of the nine locations from 0 (no terminal hair growth) to 4 (extensive hair growth); hirsutism was graded as >8 = average, 8–15 = mild, and 15–22 = moderate. The validated Arabic version of the perceived stress scale (PSS) (Chaaya et al., 2010) was used to determine the magnitude of the previous month's stress. PSS has sufficient psychometric properties and is a reliable method for assessing psychological stress. PSS10 has a statistically significant level of reliability ($\alpha = 0.78$). (Mermelestien et al., 1983)

*Statistical Analysis*

SPSS 26.0 for Windows was used to store, tabulate, and interpret data (SPSS Inc., Chicago, IL, USA). The mean, standard deviation, and median (range)

of quantitative data were used, whereas qualitative data were represented as absolute and relative frequencies.

Samples taken independently to evaluate the two classes of naturally distributed variables, the Student's t-test was used. Where needed, percentages of categorical variables were compared using the Chi-squared test or Fisher's exact test.

Pearson's rank correlation coefficient was used to determine the association between different research variables; the (+) sign indicates direct correlation, while the (-) sign indicates inverse correlation; additionally, values close to 1 indicated high correlation, while values close to 0 indicated poor correlation. P-values greater than 0.05 were deemed statistically important (S); any less than 0.05 were considered statistically insignificant (NS).

## III. RESULT

This research analysed perceived stress as a measure for psychosocial stress in adolescents with PCOS, assessing "the extent to which difficult circumstances in one's life are rated as stressful." (Mermelestien et al., 1983) The results indicated that a slightly higher proportion of PCOS teenagers have a high level of perceived tension.

Surprisingly, the findings revealed that subjective stress severity was unrelated to obesity, hirsutism, or WC, but had only a poor association with DBP. This could indicate that teenagers with PCOS are more likely to view tension as exhausting or exceeding their capacities and endangering their well-being.

This research demonstrates that extreme PSS, which was observed in a large proportion of PCOS teenagers, is unlikely to be a result of the physical characteristics correlated with PCOS; however, it is a personal propensity to experience tension more aggressively than average people do.

The appraisal of perceived tension refers to the initial stage of the Transactional Model of Stress and Coping. Stress emerges in this initial condition of the model where a relationship between external stimuli and the client is viewed as being outside the person's ability to control, thus impairing the person's well-being. (Khafagy et al., 2020)

As shown in Table 1, the two groups surveyed were paired in terms of age, education, and profession (p value > 0.05). As seen in Table 2, there was a statistically important discrepancy between the two classes, with the PCOS community having a higher BMI, weight, waist circumference, and blood pressure. Among PSS grades and teenagers with and without PCOS, there was a statistically important gap. The majority of patients with serious PSS (75%) were shown to have PCOS (Table 3). There was a weak positive association between the PSS score and diastolic blood pressure that was statistically important (Table 4).

**Table 1**
Demographic Characteristics of the Study Groups

| **Variable** | **Patients with PCOS (n=36)** | | **Controls (n=36)** | | **P** |
|---|---|---|---|---|---|
| **Age (years)** | | | | | |
| Mean± SD | 16.888±1.326 | | 17.222±1.456 | | 0.313* |
| Range | (14–19) | | (14–19) | | |
| **Variable** | **No** | | | | |
| **Residence** | | **%** | **No** | **%** | |
| • Rural | 13 | 61.9 | 8 | 38.1 | 0.195** |
| • Urban | 23 | 45.1 | 28 | 54.9 | |
| **Occupation** | | | | | |
| No | 34 | 50 | 34 | 50 | 1.000** |
| Yes | 2 | 50 | 2 | 50 | |
| **Education** | | | | | |
| • Illiterate | 2 | 100.0 | 0 | 0.0 | 0.066** |
| • Primary | 4 | 80 | 1 | 20 | |

| | | | | |
|---|---|---|---|---|
| • Secondary | 13 | 65 | 7 | 35 |
| • High | 17 | 37.8 | 28 | 62.2 |

**Notes:** *Independent sample *t*-test. **Chi-squared test ($X^2$).

Table 2
Anthropometric Measurements, Blood Pressure and Clinical Manifestations in the Intervention and Control Groups

| **Variables** | **Patients with PCOS (n=36)** | | **Controls (n=36)** | | **p value** |
|---|---|---|---|---|---|
| | **No** | **%** | **No** | **%** | |
| **Menstrual irregularity, No (%)** | | | | | |
| • Yes | 30 | 100.0 | 0 | 0.0 | **<0.001**** |
| • No | 6 | 14.3 | 36 | 85.7 | |
| **Variables** | **Patients with PCOS (n=36)** | | **Controls (n=36)** | | **p value** |
| | **No** | **%** | **No** | **%** | |
| **Acne grade, No (%)** | | | | | |
| • I | 18 | 40 | 27 | 60 | 0.123** |
| • II | 14 | 63.6 | 8 | 36.4 | |
| • III | 2 | 66.7 | 1 | 33.3 | |
| • IV | 2 | 100.0 | 0 | 0.0 | |
| **Hirsutism, No (%)** | | | | | |
| • I | 4 | 12.1 | 29 | 87.9 | **<0.001**** |
| • II | 19 | 79.2 | 5 | 20.8 | |
| • III | 12 | 85.7 | 2 | 14.3 | |
| • IV | 1 | 100.0 | 0 | 0.0 | |
| **Weight (kg)** | | | | | |
| Mean± SD | 66.750±8.486 | | 58.027±6.742 | | **<0.001*** |
| **BMI (kg/m2)** | | | | | |
| Mean± SD | 26.064±2.851 | | 23.097±2.366 | | **<0.001*** |
| **Waist circumference (cm)** | | | | | |
| Mean± SD | 83.694±7.686 | | 74.111±8.080 | | **<0.001*** |
| **Systolic blood pressure (mm hg)** | | | | | |
| Mean± SD | 120.555±11.198 | | 111.805±10.833 | | **0.001*** |
| **Diastolic blood pressure (mm hg)** | | | | | |
| Mean± SD | 77.222±10.312 | | 70.833±7.319 | | **0.003*** |

Notes: *Independent sample t-test. **Chi-squared test (X2). Bold is statistically significant.

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**Table 3**
PSS Scores and Severity Among the Intervention and Control Groups

| Variable grade | Patients with PCOS(n=36) No | % | Controls (n=36) No | % | p value PSS |
|---|---|---|---|---|---|
| **Variable** | **Patients with PCOS(n=36)** | | **Controls (n=36)** | | **p value** |
| | **No** | **%** | **No** | **%** | |
| • Mild (n=4) | 0 | 0 | 4 | 100 | **0.050**** |
| • Moderate (n=60) | 30 | 50 | 30 | 50 | |
| • Severe (n=8) | 6 | 75 | 2 | 25 | |
| **PSS score** | | | | | |
| Mean± SD | 18.888±5.064 | | 20.416±5.061 | | 0.172* |
| Range | (11–34) | | (7–27) | | |

Notes: *Independent sample t-test. **Chi-squared test (X2). Bold is statistically significant.

**Table 4**
Correlation Between PSS Score and Different Measures

| Variable | Total PSS | | PSS Grade r | P | r | P |
|---|---|---|---|---|---|---|
| Age | | | −0.048 | 0.782 | −0.069 | 0.688 |
| Systolic blood pressure | | 0.258 | 0.129 | 0.248 | 0.146 | |
| Diastolic blood pressure | | 0.532* | 0.001 | 0.415* | 0.012 | |
| BMI | | 0.180 | 0.294 | 0.054 | 0.754 | |
| Waist circumference | | 0.238 | 0.163 | 0.116 | 0.499 | |
| Acne grade | | 0.266 | 0.117 | 0.274 | 0.106 | |
| Hirsutism grade | | 0.095 | 0.581 | 0.251 | 0.139 | |
| Duration for diagnosis | | 0.305 | 0.070 | 0.157 | 0.361 | |

**Note: ***P value ≤ 0.005 is statistically significant.

## IV. DISCUSSION

PCOS is the most common endocrine abnormality in reproductive-aged people.
Menstrual irregularity is a hallmark of PCOS, manifesting as anovulation with erratic bleeding.

Ovarian dysfunction is often linked with oligomenorrhea/amenorrhea caused by prolonged oligo/anovulation. (Sheehan, 2004) Menstruation irregularity may be debilitating, since the infrequent event often results in increased cramping associated with the heavier discharge. Numerous causes lead to the disease's pathogenesis, with tension being one of them. (M.S. ; 1993) Stress has been hypothesised to play a significant role in modulating the many clinical effects associated with PCOS. The primary neuroendocrine axis that control stress responsiveness are the HPA and SAM systems. (Smith & Vale, 2006) Salivary cortisol is a noninvasive indicator of free circulating cortisol levels and is used to assess HPA axis activation. The parotid gland secretes SAA, an enzyme that hydrolyzes starch in the oral cavity, in reaction to adrenergic action.(Smith & Vale, 2006) Suggestion of the SAM mechanism has been shown to dramatically raise SAA levels, making it a responsive measure of sympathetic behaviour. (Symons et al., 2011) Recent research revealed that both SAA behaviour and salivary cortisol levels were significantly higher in PCOS patients than in age-matched controls, implying an exaggerated reaction of the central stress stations in affected women.

## V. CONCLUSION

Both of the findings and clinical work indicate that stress, or more generally, stress related stimuli, are positively associated with changes in body composition in people with PCOS, and that stress mostly induces hormonal dysfunction as a

consequence of stress-induced psychological issues. (Basu et al., 2018)

In the future, scientists want to create animal models to further explain how stress contributes to the production of this syndrome and how these models compare to the phenotype seen in women with PCOS.

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