



# Polycystic Ovary Syndrome (PCOS) and Infertility

Hitashi Shawani, Shruti Singh

<sup>1</sup>PhD Sociology, Amity Institute of Social Sciences, Amity University, Noida, Uttar Pradesh, India; <sup>2</sup>Associate Professor, Amity University, Noida, Uttar Pradesh, India.

## ABSTRACT

**Introduction:** Polycystic ovary syndrome (PCOS) is characterized by a variety of reproductive and metabolic symptoms that affects 4–18% of reproductive-age women, depending on the diagnostic criteria used. PCOS is characterized by hormonal deregulation, insulin resistance, and metabolic disorders, all of which raise the risk of infertility, type 2 diabetes, and cardiovascular disease (CVD) while also lowering quality of life. Women with PCOS have higher levels of body dissatisfaction and are more likely to develop mood swings, anxiety, and eating disorders. PCOS remains undiagnosed, in part due to the variety of phenotypes exhibited by this disorder, despite its prevalence and consequences for sexual, metabolic, and psychological health.

**Aims:** The aim of the study was to determine the true prevalence rate of PCOS patients in both urban and rural India, as well as to link the disorder's symptoms to lifestyle changes.

**Methodology:** The participants are all exposed to the same climatic conditions, with only man-made shifts distinguishing the urban and rural populations. From the urban and rural populations, a total of 1068 young girls between the ages of 18 and 24 were able to participate in the study.

**Result:** The participants were automatically age matched, and they all shared the same climatic conditions.

**Conclusion:** A larger sample size and a controlled prospective study would be able to shed light on the disease's prevalence as well as other environmental factors that contribute to PCOS manifestation in the Indian population.

**Key Words:** Correlated, Characterized, Preponderance, Prevalence, Pathophysiology, Polycystic

## INTRODUCTION

Polycystic ovary syndrome (PCOS) is characterized by a variety of reproductive and metabolic symptoms that affects 4–18% of reproductive-age women, depending on the diagnostic criteria used. PCOS is characterized by hormonal deregulation, insulin resistance, and metabolic disorders, all of which raise the risk of infertility, type 2 diabetes, and cardiovascular disease (CVD) while also lowering quality of life. Women with PCOS have higher levels of body dissatisfaction and are more likely to develop mood swings, anxiety, and eating disorders. PCOS remains undiagnosed, in part due to the variety of phenotypes exhibited by this disorder, despite its prevalence and consequences for sexual, metabolic, and psychological health.

## Literature review

### Infertility

Infertility affects at least 12% of couples worldwide today (Seyede Batool Hasanpoor-Azghdy).<sup>1</sup> Infertility has significant social and personal consequences for affected couples, resulting in a diminished sense of well-being. These social and personal ramifications are closely correlated with the cultural and/or religious context of the affected women, according to the findings of several medical anthropological studies conducted over the last decade. Fertility disorders, such as polycystic ovary syndrome (PCOS), may cause a variety of psychosocial issues, all of which affect female identity. PCOS is the most common endocrine disorder affecting female fertility. It was first identified in 1935 and has been the subject of extensive research since then, despite the

### Corresponding Author:

Dr. Shruti Singh, Associate Professor, Amity University, Noida, Uttar Pradesh, India.

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fact that its aetiology and pathophysiology are still unknown. Previous PCOS study has been performed in a medical or clinical environment and has neglected to investigate women's personal experiences with the syndrome. With a few exceptions, studies of the experience of PCOS sufferers from a specific cultural context were largely ignored. One of the most daunting aspects of studying PCOS is the wide range of signs, clinical manifestations, and biological manifestations.<sup>2</sup> Infertility due to chronic anovulation and menstrual irregularities such as amenorrhoea or oligomenorrhea, obesity with a preponderance of fat in the upper body region, and several dermatological features such as seborrhoea, alopecia, acne, or hirsutism as a result of incessant hyperandrogenism are all on the spectrum. Both of these symptoms not only lead to the heterogeneous phenotype of PCOS, but can have a significant impact on the affected women's quality of life and female identity. Studies of women with hirsutism, obesity, amenorrhoea, and infertility (all of which are common symptoms of PCOS) show that their inability to adhere to idealized 'feminine' standards of appearance and behaviour causes significant discomfort and anxiety. Infertility, in particular, is a source of psychosocial distress. Infertility is a life problem for many affected couples, and it affects women's quality of life more than men's. Distress, depression, anxiety, sexual problems, marital and social maladjustment, and low self-esteem are the most common psychosocial issues that arise as a result of infertility.

## PCOS

PCOS can be found in women of various ethnic backgrounds all over the world. PCOS is thought to affect up to 20% of women, but not all women show symptoms, seek medical help, or receive an accurate diagnosis. It's difficult to find literature on how PCOS affects women of various cultural backgrounds in terms of their quality of life or female identity. PCOS and its symptoms are seen through the lenses of various cultural traditions, values, and principles. The increasing number of immigrant women seeking infertility care in Europe necessitates a comprehensive study of the impact of cultural and religious factors on PCOS symptom perception.

Categorization PCOS affects women of childbearing age in equal numbers regardless of race, although the signs and symptoms may vary. The "Rotterdam Criteria" are still the most commonly used method for diagnosing PCOS; its prevalence is up to five times higher than when described by the NIH criteria. The classic type of the syndrome identified by Stein and Leventhal in 1935 affects about a third of patients. PCOS is a broad term that is clinically identified by menstrual dysfunction, chronic anovulation, and hyperandrogenism. The diagnosis criteria for PCOS were established by three major consensuses, which are summarized below:

Fertility and Sterility, a Rotterdam ESHRE/ASRM-sponsored PCOS Consensus Workshop Group (2003) Two out of three conditions must be met: 1) Polycystic ovaries on ultrasound; 2) Clinical symptoms of hyperandrogenism; 3) Oligoovulation or anovulation Polycystic ovaries are classified as having at least one ovary with 12 or more follicles with diameters of 2 - 9 mm and/or ovarian size > 10 ml, as defined by the Rotterdam Criteria in 2003. Other medical conditions that may induce chronic anovulation and androgen overload should be ruled out as well, including: • Hyperprolactinemia/hyperthyroidism; • Congenital adrenal hyperplasia, both classical and non-classical types.<sup>3</sup>

The ESHRE/ASRM-Sponsored PCOS Study in Thessaloniki (2006) The Androgen Excess and PCOS Society (AE-PCOS) published its stance on polycystic ovary syndrome diagnosis in 2006. This association states that androgen excess must be present, either in the form of clinical symptoms or biochemical hyperandrogenism. As a result, two of the following criteria will be needed to diagnose the syndrome: 1) On ultrasound, oligo and/or anovulation, as well as polycystic ovaries; 2) Evidence of androgen excess in the clinic or in the laboratory.

To arrive at these criteria, the researchers looked at the condition as an androgen overload disorder with the following main features: menstrual or ovulatory dysfunction, hyperandrogenemia, clinical hyperandrogenism, and polycystic ovary. Furthermore, the association claimed that the phenotypes that result from the combination of such characteristics have insulin resistance and risk of metabolic disorders as a group, but not necessarily individually.

According to the literature, infertility appears to be a multifaceted health issue that occurs not only as a result of health issues affecting the fallopian tubes, ovaries, and endometrium, but also as a result of contemporary lifestyle choices, such as the higher average age of people who marry, stress, a non-conducive legal framework for assisted reproduction, and so on.

Childbearing and childrearing are incredibly significant activities in a person's life, and they are intimately linked to the overall goals of happiness and family integration. It is generally accepted that a child brings human life to a close and satisfies the individual's need for reproduction. Human fertility is sadly poor as compared to other animal species.

According to recent World Health Organization (WHO) reports, approximately 8-10 percent

of couples are experiencing infertility issues. This means that 50-80 million people around the world are having difficulty forming a family. Infertility affects around 5 million people in the United States, although it affects about 14% of people in Europe.

People used to have no influence over their fertility, and couples who couldn't have children had little choice but to accept it. Assisted Reproduction, on the other hand, has improved the likelihood of providing solutions to the issue, despite the fact that infertility is a relatively common problem that affects the souls of couples affected.

Human eggs were successfully fertilized in the laboratory for the first time in 1978. The first child born using this method was a watershed moment for infertile couples because it provided a potential solution to their dilemma. In the United States, the first effective conception by Assisted Reproduction occurred in 1981, prompting a rapid increase in the use of this procedure and the establishment of specialized centers.

**Environmental factors and infertility:** The role of environmental factors in the etiology of infertility has been emphasized. Infertility has been linked to toxins such as glues, volatile organic solvents, or silicones, as well as physical agents, chemical dusts, and pesticides.

Other potentially unsafe workplace environmental exposures, such as chlorinated hydrocarbons and fumicides, have also been related to an increased risk of spontaneous miscarriage in women. As a result, individuals who come into close contact with or are exposed to such chemicals have a high risk of developing primary or secondary infertility, depending on the situation.

### **Infertility and weight gain:**

Weight loss and excessive weight gain with a body mass index (BMI) greater than 27 kg/m<sup>2</sup> can lead to ovarian dysfunction. Excess weight has also been linked to treatment effectiveness and assisted reproductive technology outcomes.

Estrogen is produced by fat cells and primary sex organs, so a high body fat or obesity state induces an increase in estrogen production, which the body interprets as birth control, reducing the likelihood of becoming pregnant. In addition, a lack of body fat leads to inadequate estrogen development and, as a result, anovulatory cycle menstrual disturbances. Early childhood nutrition has been related to a significant factor in later fertility.<sup>4</sup>

**Age and Infertility:** Fertility decreases as people get older. Female fertility peaks between the ages of 18 and 24, then starts to decrease after the age of 27, and decreases at a slightly faster rate after the age of 35. An average woman's ovarian reserve is 12 percent at 30 years old and just 3% at 40 years old. Age accounts for 81 percent of ovarian reserve variation, making it the most significant factor in female infertility. Younger couples are more likely than older couples to experience ovulatory dysfunction.

### **Infertility and lifestyle:**

A person's fertility may be affected by their lifestyle choices. Infertility is linked to tobacco use and alcohol use. To-

bacco use disrupts folliculogenesis, embryo transport, endometrial receptivity, endometrial angiogenesis, uterine blood flow, and uterine myometrium. Although some damage is permanent, quitting smoking will help you avoid more harm. Smokers are 60% more likely than non-smokers to be infertile. Smoking decreases the odds of a live birth from IVF by 34% and raises the chances of an IVF pregnancy miscarrying by 30%.

### **Hormonal Imbalance and Infertility:**

The pituitary gland, which regulates most other hormonal glands in the human body, is regulated by the hypothalamus via the release of gonadotrophin releasing hormones. As a consequence, changes in the hypothalamus' chemical signals may influence the pituitary gland, ovaries, thyroid, and mammary gland, resulting in hormonal abnormalities. Hyperthyroidism, hypothyroidism, polycystic ovary syndrome, and hyperprolactinemia are hormonal disorders that impair ovulation. A significant cause of anovulation is a hormonal imbalance. If a woman's hormones are out of whack, she won't be able to generate enough follicles to produce an ovule.

### **Psychological impact of infertility: depression, anxiety, and distress:**

The accuracy of self-report tests is one of the key challenges in determining the levels of distress in women with infertility. It's likely that women "fake it" to appear emotionally healthier than they really are. It's also likely that women feel more hopeful before starting infertility therapy, which is when the majority of distress tests are taken. In some early research, infertile women did not show any major variations in anxiety or depression symptoms compared to fertile women. A systematic psychological interview was used in a 2004 report. Prior to their first infertility clinic visit, 122 women were interviewed, and the findings were startling: 40% of the women were diagnosed with anxiety, depression, or both. These results have been confirmed by subsequent studies. Volgsten and colleagues found a 31% prevalence of psychiatric symptoms, with major depression being the most prevalent. In a major Danish study of 42 000 women who received ART and were screened for depression before starting therapy, 35% tested positive for depression. Another research found that 39 percent of 174 women seeking infertility therapy meet the requirements for major depressive disorder. In one of the largest studies to date, infertility clinics in northern California measured 7352 women and 274 men. Significant symptoms of depression were reported by 56 percent of women and 32 percent of men, while significant symptoms of anxiety were reported by 76 percent of women and 61 percent of men. Not unexpectedly, infertility patients consistently show substantially more anxiety and depression symptoms than fertile people,

according to recent studies. Clomiphene, leuprolide, and gonadotropins, which are used to treat infertility, have been related to psychiatric symptoms like anxiety, depression, and irritability. As a result, it's difficult to tell the difference between the psychological influence of infertility and the medication's side effects when evaluating symptoms in women in the middle of care. As a result, research that included measurements of these symptoms before starting treatment or after stopping it could be more reliable than studies that only looked at women during their menstrual cycles.

The longer a patient is in care, the more likely they are to experience depression and anxiety symptoms. When compared to those without a history of treatment, patients with one treatment failure had significantly higher levels of anxiety, and patients with two treatment failures had significantly higher levels of depression. However, studies have shown that the more depressed an infertile woman is, the less likely she is to begin infertility treatment and the more likely she is to leave it after just one cycle. Researchers have also discovered that, despite a favourable prognosis and the financial means to pay for care, the most common explanation for discontinuation is psychological.

### Ovarian functional problem and infertility

Ovarian dysfunction may result in infertility due to a lack of eggs in the ovaries or a complete blockage of the ovaries. Anovulatory cycles may be caused by ovarian dystrophy (physical damage to the ovaries or ovaries with numerous cysts) and luteinized unruptured follicle syndrome (LUFS), in which the egg may have matured properly but the follicle failed to burst or burst without releasing the egg. PCOS, or polycystic ovarian syndrome, is a genetic condition that accounts for up to 90% of anovulation cases. PCOS causes the ovaries to produce excessive quantities of androgens, especially testosterone, resulting in amenorrhea or oligomenorrhea.

High levels of luteinizing hormone (LH) and low levels of follicle-stimulating hormone (FSH) result from increased androgen development in PCO, preventing follicles from producing mature eggs. While not all women with PCOS experience these symptoms, hyperandrogenism can lead to obesity, facial hair, and acne. Insulin resistance, which is linked to type 2 diabetes, is also a risk factor for PCOS.<sup>5</sup>

Endometriosis, pelvic adhesions, pelvic inflammatory diseases caused by Chlamydia, tubal occlusion, and tubal dysfunction are tubal (ectopic) and peritoneal causes that play a role in infertility. Tubal and peritoneal causes have a similar prevalence. Endometriosis is a benign disease that induces adhesions between the uterus, ovaries, and fallopian tubes, preventing the egg from being moved to the tube and resulting in infertility.

**Infertility diagnosis:** Both male and female partners are considered major contributors in any infertility work-up and are examined as such, particularly if the woman is over 35 years old or if either partner has identified infertility risk factors. Before subjecting the female partner to any costly yet intrusive examination, male factors must be eliminated.

**Physical Examination and Medical History:** A full medical history and physical examination of both partners is the first step in any infertility evaluation. The diagnosis of hyperprolactinemia is usually made based on the presence of oligomenorrhea, amenorrhea, or galactorrhea. Smoking, cannabis, substance and alcohol misuse, and caffeine intake are all variables that could expose the cause or causes of infertility. Menstrual history and any drugs taken, as well as a profile of the patient's general medical and mental health, can all be used to help assess which tests are necessary. Fasting plasma prolactin tests can also be obtained to rule out hyperprolactinemia.

### Prevalence of PCOS:

Polycystic ovary syndrome (PCOS) is a genetically complex endocrine condition with complicated pathophysiology and unclear aetiology. The National Institutes of Health/National Institute of Child Health and Human Disease, the European Society for Human Reproduction and Embryology/American Society for Reproductive Medicine or the 'Rotterdam Criterion,' and the Androgen Excess and PCOS Society have all previously offered diagnostic criteria for PCOS. The use of different endocrine or clinical criteria for each diagnosis of PCOS can have an effect on the estimate of PCOS occurrence and prevalence rates, masking the severity of the issue.

## METHODOLOGY

### Subject collection

The subjects for the retrospective study were selected at random from two areas with contrasting lifestyles: Delhi NCR for urban residents with a "sedentary" lifestyle and Manesar for rural residents with an "active" lifestyle. Sedentary people are those who spend less than 10% of their energy on moderate- and high-intensity exercise, as described by industrialisation and urbanisation. The participants are all exposed to the same climatic conditions, with only man-made shifts distinguishing the urban and rural populations. From the urban and rural populations, a total of 1068 young girls between the ages of 18 and 24 were able to participate in the study.

Based on the available literature on predisposing factors for PCOS, a self-administered survey questionnaire was developed. If the subjects had ever been diagnosed with the syndrome and had received some therapy in the previous 12



months, they were listed as affected. Those who reported at least one Rotterdam criterion were labelled as symptomatic, while those who did not reported any symptoms were labelled as controls. The Rotterdam Criteria, established by ESHRE/ASRM in 2004, distinguishes PCOS from other androgen excess or associated conditions by excluding all of the following: clinical and/or biochemical hyperandrogenism, oligo-ovulation or anovulation, and polycystic ovaries.

Anthropometric information was included in the questionnaire, with a focus on their routine physical activity, daily diet, stress sensitivity, and family history. The completed questionnaires were scrutinized for duplicity and completeness before being analyzed. For analysis, the data was entered into Microsoft Excel. In addition, doctors (Doctors Survey) were personally interviewed to gain an understanding of the current medical situation in India regarding PCOS diagnosis and care.<sup>6</sup>

### Statistical analysis

The findings were based on cross-sectional data collected at the start of the study. The independent effects of the factors that cause PCOS on the outcome of interest, polycystic ovarian syndrome, were investigated using logistic regression models. For weighting and sampling design, standard errors of odds ratios were adjusted. BMI, type of diet, physical activity, family history, and stress level were the categorical covariates studied. The z test was used to compare the prevalence of the disease in the urban and rural populations, taking into account all other variables. To compare the group means with respect to the characteristics, Fisher's test was used, and a p-value of 0.05 was considered statistically important.

## RESULTS

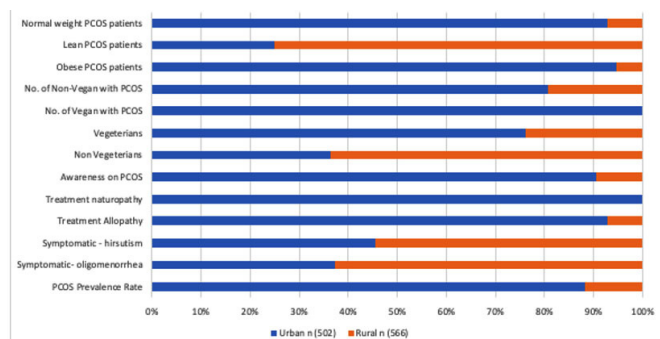
### Prevalence of PCOS: Urban and rural

Based on the self-administered questionnaire, we found that the prevalence rate of PCOS in India is about 6% (Z test score – 5.92, 95 percent Confidence Interval (95 percent CI); p 0.05). It's also worth noting that the incidence rate in urban areas is higher (8.9%, n = 502) than in rural areas (1 percent, n = 566). According to the survey, 90.24 percent of girls in urban areas were aware of PCOS, while only 8.34 percent of those in rural areas were.

Table 1 clearly shows a univariate study of the baseline characteristics of the total sample population. Since only those between the ages of 18 and 24 were included in the study, the participants were automatically age-matched, and they all shared the same climatic conditions.

**Table 1: Baseline characteristics of the urban and rural respondents.**

|                             | Urban   |       | Rural   |       |
|-----------------------------|---------|-------|---------|-------|
|                             | n (502) | %     | n (566) | %     |
| PCOS Prevalence Rate        | 45      | 8.9   | 6       | 1     |
| Symptomatic- oligomenorrhea | 51      | 10.1  | 86      | 15.35 |
| Symptomatic – hirsutism     | 10      | 1.9   | 12      | 2.1   |
| Treatment Allopathic        | 26      | 5.8   | 2       | 3.4   |
| Treatment naturopathy       | 4       | 9     | Nil     | Nil   |
| Awareness on PCOS           | 453     | 90.24 | 47      | 8.34  |
| Non Vegetarians             | 285     | 56.78 | 497     | 88.75 |
| Vegetarians                 | 144     | 28.68 | 45      | 8.03  |
| No. of Vegan with PCOS      | 20      | 3.4   | 0       | Nil   |
| No. of Non-Vegan with PCOS  | 25      | 4.98  | 6       | 1.071 |
| Obese PCOS patients         | 18      | 40    | 1       | 16.7  |
| Lean PCOS patients          | 1       | 2.3   | 3       | 50    |
| Normal weight PCOS patients | 26      | 57.8  | 2       | 33.4  |



### PCOS vs. influencing factors

45 of the 502 participants in the urban study appeared to have PCOS. With 18 obese (27.6 3.68 kg/m<sup>2</sup>), 1 slim (17.8 kg/m<sup>2</sup>), and 26 non-obese (22.1 3.55 kg/m<sup>2</sup>) patients, the average BMI was 26.5 0.4 kg/m<sup>2</sup>. There were 6 patients with PCOS among the 566 rural subjects with an average BMI of 21.53 2.34 kg/m<sup>2</sup>. 1 obese (26.6 kg/m<sup>2</sup>), 3 lean (18.45 3.78 kg/m<sup>2</sup>), and 2 non-obese (19.55 3.64 kg/m<sup>2</sup>) patients were assigned to the study. According to World Health Organization (WHO) 2000 guidelines, PCOS patients were graded as obese or lean based on their BMI.

A person with a BMI of 18–24 was considered natural. Those over the age of 24 were labelled fat, and those under the age of 18 were labelled lean. In the sample cohorts, 40 percent of PCOS cases in the urban population and 16.6% of PCOS cases in the rural population were obese, respectively.

In the area, 315 girls out of 502 reported doing some sort of physical activity on a daily basis, with 41 girls reporting doing yoga on a daily basis. In the rural area, 250 of the 566 girls walked a long distance (around 3 km) every day, which was considered a steady physical activity. While none of them claimed to have PCOS, only 18 of them displayed symptoms. In addition, 235 urban girls walked every day as a means of exercise; three of them were affected, and 40 were symptomatic. PCOS was discovered in 2% of the study population who did not engage in any physical activity. It was also discovered that, despite their knowledge, the urban population consumed a poor quality diet.

According to the study, 6% and 1% of the urban and rural PCOS populations, respectively, were stressed. We were able to classify 84 and 103 participants from the urban and rural populations, respectively, who had at least one symptom as defined by the Rotterdam Criteria, based on the survey response sheets. 2.5 percent of the symptomatic urban population had affected mothers, and 13.64 percent had affected sisters. In the symptomatic rural population, 7.14 percent of respondents had an infected mother, and nearly 12.06 percent of sisters had been affected.

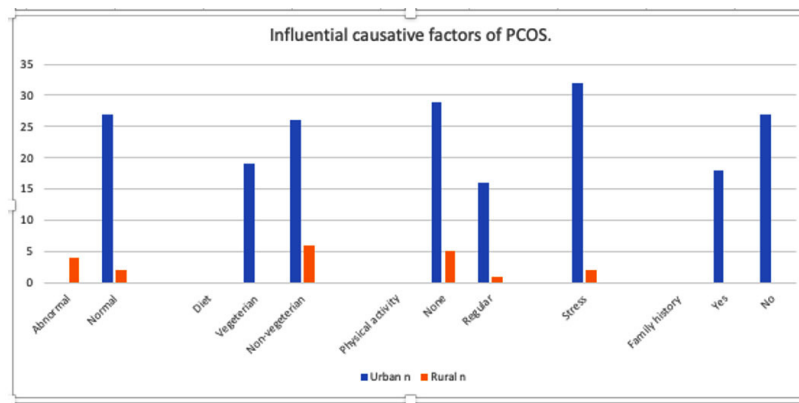
### A multivariate analysis of the variables that affect PCOS

The odds ratio was determined to determine the relationship between the possible factors that contribute to the manifestation of PCOS disorder and is depicted in Fig. 1. BMI, physical activity, family background, type of diet (vegetarian or non-vegetarian), and stress factor were all factors considered. The strongest link was discovered to be family history. The type of diet consumed appears to be a factor in the development of the condition. A natural BMI is achieved by a combination of a healthy diet and regular physical activity.

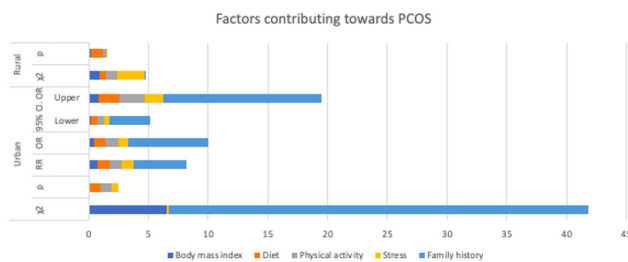
The occurrence of PCOS was used as the dependent variable in a Chi-Square test with Yates correction (Table 2). Fisher's test was used step-by-step to see whether the variables contribute differently to PCOS symptoms in the rural and urban populations, and p-values >0.05 were considered negligible (Table 3). Family history has been found to play a significant role in the development of PCOS. Physical activity and diet were found to have the least correlation with PCOS, while maintaining a healthy BMI appeared to be significant.

**Table 2: Influential causative factors of PCOS.**

| Risk factors towards PCOS | Urban |   | Rural |   | p-Value |
|---------------------------|-------|---|-------|---|---------|
|                           | N     | % | n     | % |         |
| <i>BMI</i>                |       |   |       |   |         |
| Abnormal                  | 18    | 4 | 4     | 1 | 0.0916  |
| Normal                    | 27    | 5 | 2     | 0 |         |
| <i>Diet</i>               |       |   |       |   |         |
| Vegeterian                | 19    | 4 | 0     | 0 | 0.6833  |
| Non-vegeterian            | 26    | 5 | 6     | 1 |         |
| <i>Physical activity</i>  |       |   |       |   |         |
| None                      | 29    | 6 | 5     | 1 | 0.155   |
| Regular                   | 16    | 3 | 1     | 0 |         |
| <i>Stress</i>             | 32    | 6 | 2     | 0 | <0.001  |
| <i>Family history</i>     |       |   |       |   |         |
| Yes                       | 18    | 4 | 2     | 0 | <0.001  |
| No                        | 27    | 5 | 4     | 1 |         |

**Table 3: Multivariate analysis of factors contributing to PCOS.**

| Factors contributing towards PCOS | $\chi^2$ | Urban  |            |       | $\chi^2$ | P      | Rural   |            |       |
|-----------------------------------|----------|--------|------------|-------|----------|--------|---------|------------|-------|
|                                   |          | P      | 95% CI. OR |       |          |        | P       | 95% CI. OR |       |
|                                   |          |        | Lower      | Upper |          |        |         | Lower      | Upper |
| Body mass index                   | 6.505    | 0.0094 | 0.22       | 0.79  | 0.9303   | 0.219  | 0.058   | 1.77       |       |
| Diet                              | 0.013    | 1      | 0.5188     | 1.793 | 0.5238   | 1      | 0.048   | 15.73      |       |
| Physical activity                 | 0.0072   | 0.8726 | 0.571      | 2.054 | 0.9197   | 0.2343 | 0.02877 | 2.138      |       |
| Stress                            | 0.2189   | 0.587  | 0.405      | 1.576 | 2.312    | 0.0786 | 0.0303  | 0.9576     |       |
| Family history                    | 35.095   | <0.00  | 3.436      | 13.31 | 0.0202   | <0.0   | 0.374   | 12.12      |       |



## DISCUSSION

The current study is the only population-based epidemiological study on PCOS in India that has been properly planned. The study's nature circumvented the potential drawbacks of screening PCOS patients in a hospital setting. The aim of the study was to determine the true prevalence rate of PCOS patients in both urban and rural India, as well as to link the disorder's symptoms to lifestyle changes.

We discovered a fascinating finding from our research: the prevalence of the disease is lower in rural areas than in urban areas. However, the rural population may have fewer PCOS cases due to a lack of understanding or minimal or no exposure to junk foods, pollution, and other endocrine disruptors. Furthermore, girls in rural areas do not rely on labor-saving devices or vehicles for household work, which helps them maintain a safe BMI.

Furthermore, it was discovered that 20% of the rural population was symptomatic but had not yet seen a doctor. There

was hirsutism in 11% of them, and oligomenorrhea in 69.5 percent of them, which was left undiagnosed. Similarly, 6.37 percent of urban residents reported being symptomatic. In addition, 19.6% of them have hirsutism and 59.8% have oligomenorrhea.

Unfortunately, many doctors are unaware of the disorder, and many do not conduct the requisite diagnostic tests or understand that PCOS has far-reaching and potentially fatal implications. Doctors in the same region reported to treat 25–30 PCOS patients each month, and all of the patients were from upper or middle-class families, according to a mini survey conducted with them (Doctors Survey). Patients that come in complaining of irregular cycles, obesity, or acne are said to be the most common. Doctors conclude that heritability and lifestyle adaptations are the main causes of the disease, and that therapy has resulted in a 40% change in the condition of women.

The delayed diagnosis and inadequate treatment, according to the patients, was extremely stressful. When they present with symptoms, they are first checked for other conditions, which allows the condition to manifest in several ways before a definitive diagnosis is made. According to an ethnographic study conducted in Mumbai, India, the majority of physicians, medical practitioners, and patients regard PCOS as a result of modern middle-class women's structural vulnerability to lifestyle changes.<sup>7</sup>

It's worth noting that the number of obese women in cities is higher than in rural areas. Diet and physical activity

help to maintain a person's BMI. Despite the fact that the rural population claims to consume a 100% non-vegetarian diet, obesity is low among them. This may be attributed to a higher level of exercise among them as compared to the urban population. Stress levels also play a role in BMI to some degree.

As a result of the constant health stresses of globalization and economic liberalization, middle-class urban women are more vulnerable than rural women who live a conventional lifestyle. The higher prevalence of PCOS among India's higher socio-economic urban population has been attributed to sedentary lifestyles, access to high-calorie foods, and machineries for all housework. The strongest and most significant link between the condition and family history has been discovered. As a result, more genetic research is needed to fully understand the genetic pathology of this complex syndrome.

### CONCLUSION

Another causal factor found in our survey was that the majority of those with PCOS lived in close proximity to cell towers or sewage. An alarming 45.34 percent of the symptomatic in the urban population lived near a cell tower or sewage drain, and about 26.26 percent of the symptomatic in the rural population had a similar exposure. A larger sample size and a controlled prospective study would be able to shed light on the disease's prevalence as well as other environmental factors that contribute to PCOS manifestation in the Indian population.

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**Source of Funding:** Nil

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