



A STUDY ON RISK FACTORS AND COMPLICATIONS OF POLYCYSTIC OVARIAN SYNDROME (PCOS)

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ABSTRACT

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder affecting women of reproductive age, involving pathways that produce metabolic, reproductive, cardiovascular and dermatologic effects. As per 2003 Rotterdam criteria, the symptoms like oligo-or anovulation, hyper-androgenism, polycystic ovarian morphology on transvaginal ultrasonography are used to establish a definitive diagnosis. The exact cause is still unknown and may be caused by genetic, hormonal, and environmental factors. In this present observational study, we have evaluated the risk factors and associated complications in patients of PCOS in a tertiary care hospital in Karimnagar, Telangana. A total of 103 female PCOS patients were enrolled for duration of 6 months by following inclusion and exclusion criteria of the study after seeking their consent. The study results revealed that most of the females of the 21-30 age group, with 52%, were diagnosed with PCOS. Most of the patients reported abnormalities in lifestyle factors such as 66% of physical inactivity, 34.9% of inadequate sleep, 55.3% of stress, and 58.2% of unhealthy diet. 31% of patients were reported overweight. The present study reveals that most of the patients were found to have a high percentage of acne, hirsutism, and hair thinning; menstrual cycle irregularities such as oligomenorrhea and amenorrhea, which are clinical factors of hyperandrogenism; and 9.7% of females were found to have a positive family history of PCOS, which reveals genetic predisposition. This study also finds that 54.1% of females with infertility and 18.7% of females with miscarriage, which are complications of PCOS, if the disease is untreated or neglected.

Key words: PCOS, Polycystic ovary syndrome, hirsutism, infertility, acne, risk factors, menstrual irregularities.

INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is a complex disorder affecting the 10-13% of women of reproductive age, and it is routinely described as the most common endocrinological disorder (Unfer et al., 2024). World Health Organization estimates that PCOS affected 116 million women (3.4%)

worldwide in 2012. In India, experts claim 10% of women are affected by PCOS, yet no proper published statistical data on the prevalence of PCOS in India is available (Ashraf et al., 2023). PCOS, by the nature of the disease, adversely influences the fertility and reproductive health of the affected women; moreover, with its association with other lifestyle diseases (Kheirollahi et al., 2025). It is characterized by a constellation of symptoms including irregular menstrual cycles, hyperandrogenism, and polycystic ovarian morphology, and is associated with a range of metabolic disturbances such as insulin resistance, obesity, and inflammation (Ebernella et al., 2024). It describes a condition where at least one ovary has an ovarian volume greater than 10 mL and at least one ovary has an estimated ten small cysts, with diameters ranging from 2 to 9 mm, develop (Lim et al., 2012). The revised consensus Rotterdam criteria, which incorporate clinical, biochemical, and ultrasound findings or elevated anti-mullerian hormone (AMH) levels, provide a standardized diagnostic framework for PCOS. While the precise etiology remains elusive, genetic, epigenetic, and environmental factors are implicated in the pathogenesis of PCOS. Recognizing the heterogeneity of PCOS, researchers have increasingly focused on identifying distinct phenotypic subpopulations within the syndrome. These PCOS phenotypes, characterized by specific combinations of clinical and biochemical features, offer a more nuanced understanding of the disorder (Ebernella et al., 2024). The pathophysiology of PCOS is complex and poorly understood. Hyperandrogenism and hyperinsulinemia underpin the clinical symptoms, diagnosis and treatment targets of PCOS. The exact cause for PCOS is still unknown. It can be caused by genetic, hormonal, and environmental factors (Legro et al., 2013). In this present observational study, we have evaluated the risk factors and associated complications in patients of PCOS in a tertiary care hospital in Karimnagar, Telangana.

METHODS

This observational cross sectional study was conducted in inpatients units of Government District Hospital/Mother and child healthcare hospital in the Obstetrics &Gynaecology department with PCOS condition. The present study was conducted for a duration of 6 months from July-December, 2025 by following the prospective observational study designs. Data was collected from 103 patients diagnosed with PCOS by following inclusion and exclusion criteria of the study after seeking their consent.

INCLUSION CRITERIA:

- Patients with confirmed diagnosis of PCOS
- Age range : 13 to 50 years
- Risk factors associated with the conditions like obesity, hormonal imbalance (increased androgens), sedentary lifestyle, stress, irregular sleep patterns ,irregular menstrual cycles.

EXCLUSION CRITERIA:

- Pregnancy and lactating women
- Conditions like congenital adrenal hyperplasia.

SOURCE OF DATA: Patient chart review

STUDY PROCEDURE:

This observational study was initiated at single centre by selecting the PCOS patients based on Inclusion and exclusion criteria of the study. Patients were enrolled in this study based upon demographic details &Laboratory details.The study commenced with an extensive literature review and meticulous preparation of the research protocol to establish a strong theoretical foundation and clear methodological framework. Following this, a structured data collection form was designed to ensure systematic and consistent recording of relevant variables. Data were collected over six months from patient case notes and included demographic details, social history, risk factors, and severity scoring. Once the form was finalized, data collection was undertaken carefully, adhering to

the predefined inclusion and exclusion criteria. The collected data was analyzed based on the predetermined parameters like age, gender, severity of disease etc.

RESULTS

The present study was conducted in the Karimnagar Government General Hospital within a period of 6 months from July to December, 2025. Data was collected from 103 female PCOS patients by following inclusion and exclusion criteria of the study. The collected data was analyzed assigned based on the predetermined criteria and was as follows.

Assessment of PCOS cases on the basis of age criteria:

Among the 103 women who participated in this study, 27 (26%) were between the ages of 13 and 20, 53 (52%) were between the ages of 21 and 30, 19 (18.4%) were between the ages of 31 and 40, and 4 (3.8%) were between the ages of 41 and 50 reflecting the women age group between 21-30 years are more prone for PCOS (table 1).

Table 1: Age criteria

AGE (in years)	No. of patients	Percentage (%)
13-20	27	26%
21-30	53	52%
31-40	19	18.4%
41-50	4	3%

DISTRIBUTION OF PATIENTS BASED ON BMI

As shown in table-2, overweight is one of the main risk factor for the PCOS accounting 31% of total cases collected where as 53 (51.4%) patients have normal weights.

Table 2: Distribution of patients based on BMI (body mass index)

S.No	BMI Category	Weight Classification	No. of patients	Percentage (%)
1	Below 18.5	Underweight	18	17.4%
2	18.5-24.9	Normal weight	53	51.4%
3	25-29.9	Overweight	32	31%

EVALUATION OF MENSTRUAL CYCLE IRREGULARITY

Severe menstrual cycle irregularities are the most common symptom in PCOS womens. The study results reflecting that out of 103 female patients with PCOS, 5 (4.8%) women were having polymenorrhea, 8 (7.7%) women were with a regular cycle, 48 (46%) women were having oligomenorrhea, and 42 (41%) women were having amenorrhea (Table 3).

Table 3: Evaluation of Menstrual Cycle Irregularity

S.NO	Cycle length	Menstrual cycle patterns	No. of patients	Percentage
1	<21 days	Polymenorrhea	5	4.8%
2	21-35 days	Regular cycle	8	7.7%
3	>35 days	Oligomenorrhea	48	46%
4	Absence of periods for months	Amenorrhea	42	41%

ASSESSMENT OF MENSTRUAL BLEEDING PATTERNS IN PCOS

The present data results reveals that out of 103 females patients with PCOS, 10 (9.7%) females were having scanty bleeding, and 36 (34.9%) females were having heavy bleeding (Figure 1).

FIG. 1: Menstrual bleeding patterns in PCOS patients
EVALUATION OF SEVERITY OF ACNE IN PCOS

In this study we have used Global Acne Grading System (GAGS) scale (Kinda et al., 2020) to assess and to quantify the severity of acne. The results revealed that out of 103 patients involved in this study, 79 patients are having acne condition. As shown in figure-2, out of 79 women acne patients identified, 32 (40.5%) are having mild acne, 40 (50.6%) are having moderate acne, and 7 (8.8%) are having severe acne.

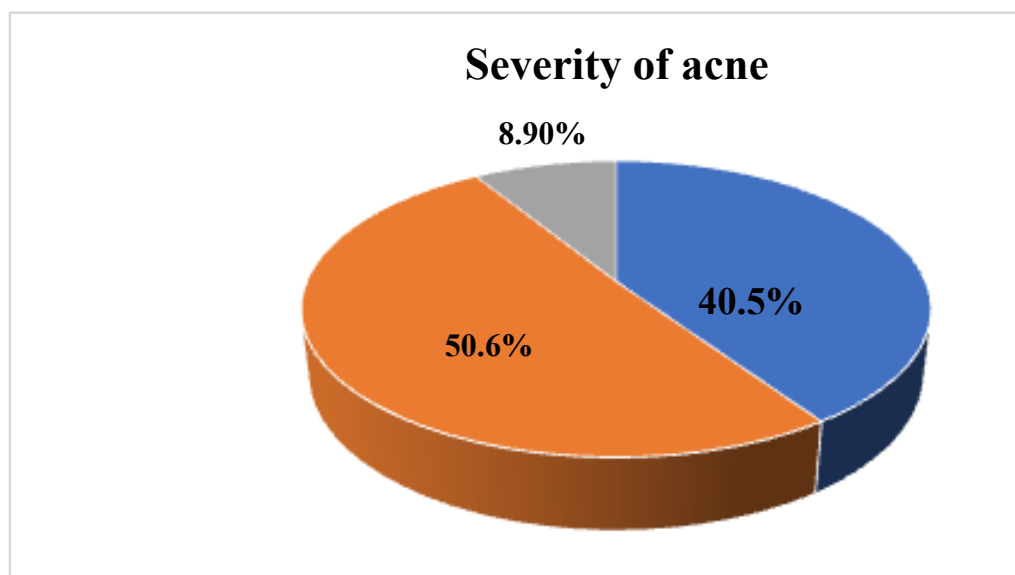
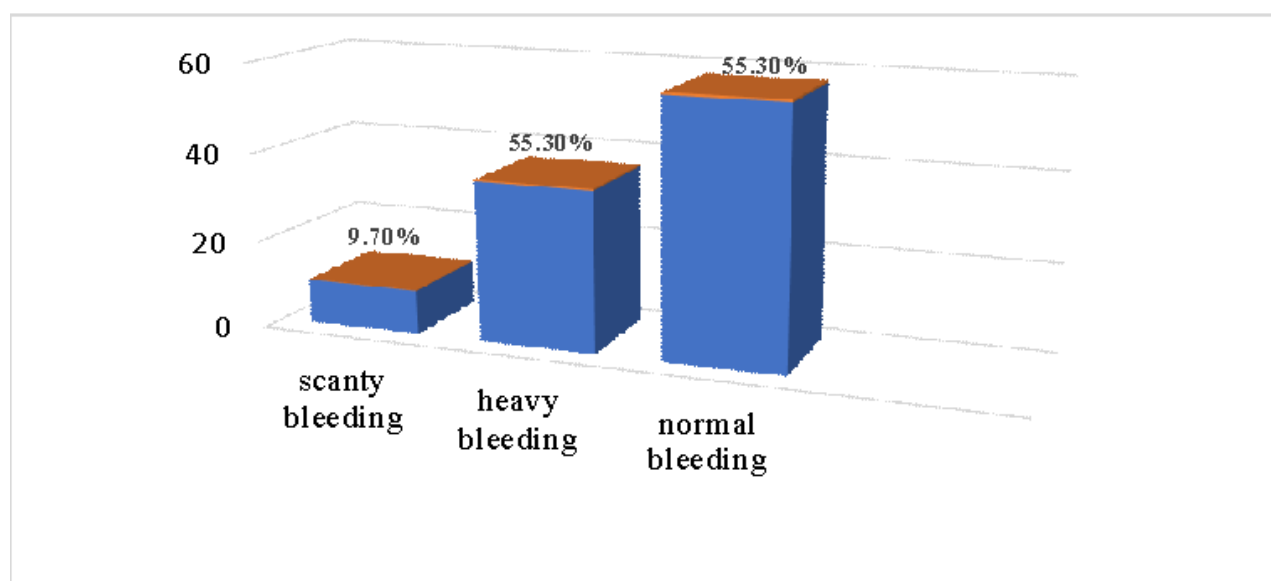


FIG. 2 Assessment of severity of acne among PCOS patients

ASSESSMENT OF SEVERITY OF HIRSUTISM USING THE FERRIMAN-GALLWEY SCORING SYSTEM

In this study, Ferriman-Gallwey scoring system was used to evaluate and quantify that Hirsutism in PCOS womens (Ferriman, 1961). Analysis of the study results indicates out of 103 female PCOS patients, 32 (31%) females are having severe hirsutism, 13 (12.6%) females are having moderate hirsutism, and 7 (6.7%) females are having mild hirsutism as showed in figure 3.



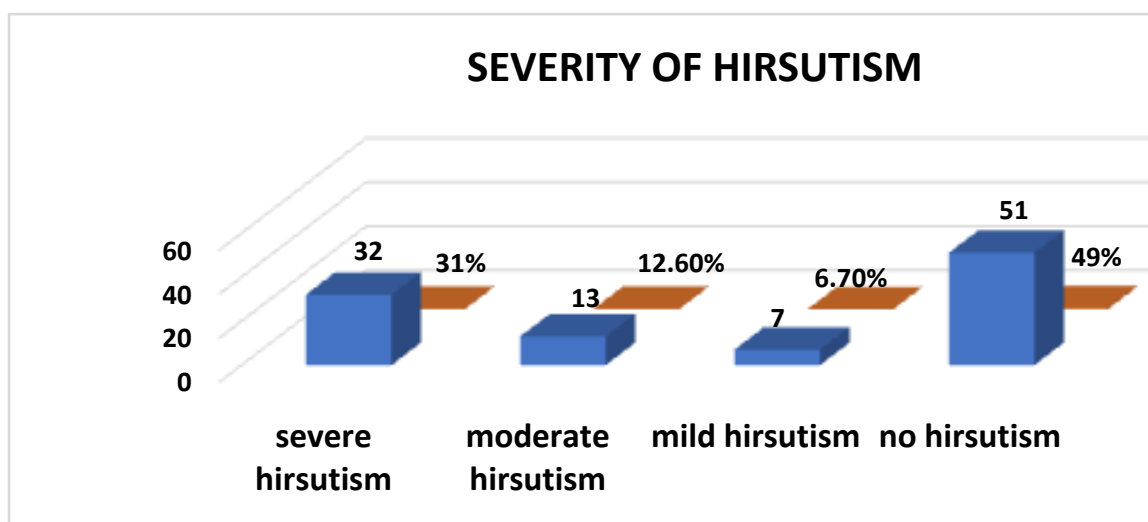


FIG 3: Assessment of Hirsutism among PCOS Women

HAIR THINNING ANALYSIS IN PCOS PATIENTS

The most common complaint with PCOS patients is hair thinning. As shown in table 4, the study results indicates that out of 103 patients, 78 women were having hair thinning and they are categorized as 42 (53.8%) women were having mild hair thinning, 33 (42.3%) women were having moderate and 3 (8.3%) women were having severe hair thinning. Almost 76% of women involved in this were complained about hair thinning.

TABLE 4: Evaluation of grading of hair thinning among PCOS patients

GRADE	SEVERITY OF HAIR THINNING	NO. OF PATIENTS	PERCENTAGE (%)
Grade I	Mild	42	53.8%
Grade II	Moderate	33	42.3%
Grade III	Severe	3	3.8%

FAMILY HISTORY OF PCOS AND DIABETES MELLITUS

As shown in table 5, the present study results revealed that patients with a family history of PCOS were 10 (9.7%), and those with a family history of diabetes mellitus were 40 (38.8%).

TABLE 5: Distribution of family history of PCOS and DM

FAMILY HISTORY	PRESENCE OF HISTORY		ABSENCE OF FAMILY HISTORY	
	No. of patients	Percentage	No. of patients	Percentage
Polycystic ovarian syndrome	10	9.7%	93	90.2%
Diabetes mellitus	40	38.8%	63	61.1%

HISTORY OF DIABETES MELLITUS (DM) IN PCOS PATIENTS

The study results show that, out of 103 patients, the percentage of patients with DM was 26.20% and the percentage of patients without DM was 73.7%.

Table 6: Summarizing the distribution of DM among PCOS patients

History of DM	No. of patients	Percentage
Patients with DM	27	26.2%
Patients without DM	76	73.7%

ASSESSMENT OF COMPLICATIONS IN PCOS

The present study shows that out of 48 married women in a total of 103, 26 (54.1%) of the women were having infertility and 9 (18.7%) of the women were having miscarriages history (table 7).

TABLE 7: Illustrating complications of PCOS

Complications	Number of patients	Percentage
Infertility	26	54.1%
Miscarriage	9	18.7%

DISTRIBUTION OF SLEEP PATTERNS

As showed in table 8, it was confirmed that 34.9% of PCOS womens experienced with irregular sleep patterns.

Table 8: Distribution of Sleep Patterns in PCOS Patients

Sleep pattern	Number of patients	Percentage
Irregular (≤ 5 hrs)	36	34.9%
Regular	67	65%

DISTRIBUTION OF STRESS

The Perceived Stress Scale (PSS) is widely considered the gold standard instrument for measuring stress perception (Cohen, 1983; Monroe, 2008). Analysis of PSS scale in this study revealed that out of 103 PCOS patients, 57 (55.3%) women were having stress, and they are classified as follows: 22 (38.5%) women were having mild stress, 28 (49.1%) women were having moderate stress, and 7 (12.2%) women were having severe stress (Table 9).

Table 9: Illustrating Stress among PCOS women

Stress severity	No. of patients	Percentage
Mild	22	38.5%
Moderate	28	49.1%
Severe	7	12.2%

ROLE OF JUNK FOOD CONSUMPTION AND PHYSICAL INACTIVITY IN PCOS

From collected data, out of 103 PCOS patients, 60(58.2%) womens are confirmed as junk food eaters, and 68 (66.1%) womens were as not undergoing ant kind of physical activity (figure 4).

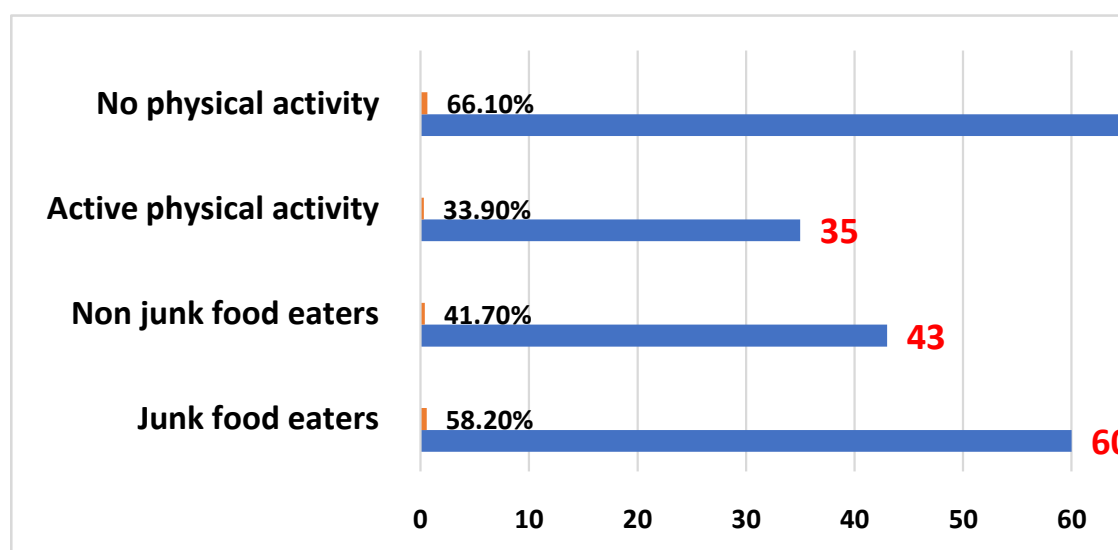


FIG 4: JUNK FOOD EATERS AND PHYSICAL ACTIVITY

PHENOTYPES OF PCOS

Based on the Rotterdam Criteria, PCOS is categorized as four different phenotypes. In the present study most of the patients reported with phenotype A 50 (48.5%) and D 39 (37.8%), and the less common phenotype C 8 (7.7%) was followed by the least common phenotype B.6 (5.8%).

Table 10: Evaluation of Phenotypes of PCOS

Types of phenotypes	Number of patients	Percentage
Phenotype A (OD+HA+PCOM)	50	48.5%
Phenotype B (OD+HA)	6	5.8%
Phenotype C (HA+PCOM)	8	7.7%
Phenotype D (OD+PCOM)	39	37.8%

(OD-Oligo/anovulation; HA-Hyperandrogenism; PCOM-Polycystic ovarian morphology)

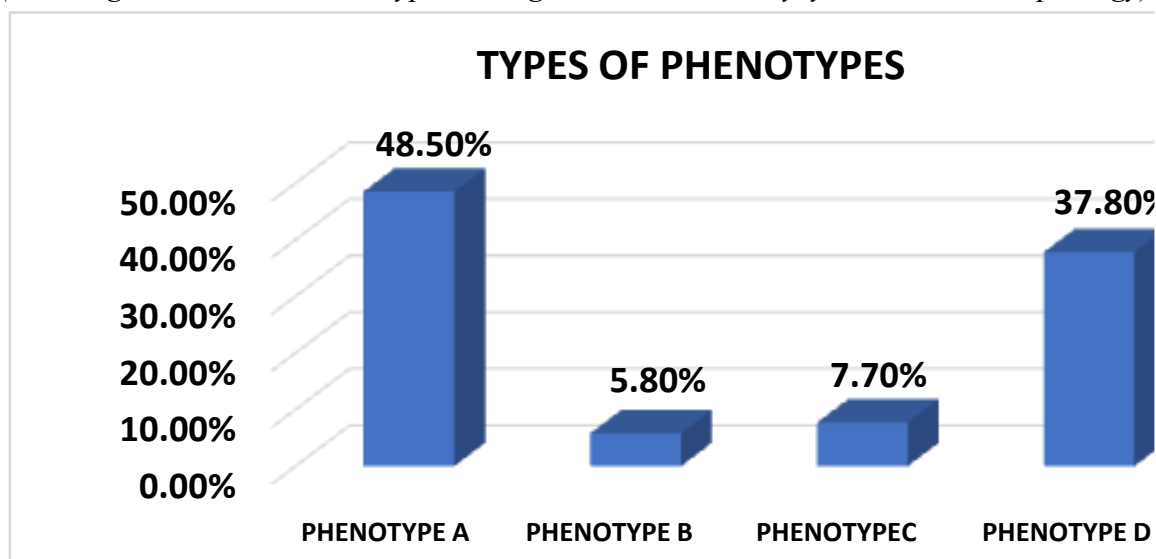


FIG 5: GRAPHICAL REPRESENTATION OF TYPES OF PHENOTYPES

DISCUSSION

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder affecting women of reproductive age, involving pathways that produce metabolic, reproductive, cardiovascular and dermatologic effects. Diagnosis is based on the Endocrine Society Clinical Practice Guideline (ESCPG) and the 2003 Rotterdam criteria, which requires the symptoms like oligo-or anovulation, hyper-androgenism, polycystic ovarian morphology on transvaginal ultrasonography to establish a definitive diagnosis. The exact cause is still unknown. It can be caused by genetic, hormonal, and environmental factors (Legro et al., 2013). In this present observational study, we have evaluated the risk factors and associated complications in patients of PCOS in a tertiary care hospital in Karimnagar, Telangana. A total of 103 female PCOS patients were enrolled in this study. The present study results revealed that women's age group between 21-30 years (53 females, 52%) are more prone to affect with PCOS (table 1) as similar to the reports of Gul et al., (2014). The primary cause of this was ovarian hyperstimulation, which is known to happen in middle age and has a higher occurrence during active reproductive cycle stages (Gul et al., 2014).

BMI plays a significant role in the clinical presentation and severity of PCOS. PCOS is commonly associated with overweight and obesity. As shown in table 2, 31% of PCOS women are identified as overweight reflecting that high BMI values are the one of the most important etiological factors as the risk associated with BMI may exceed this PCOS associated risk as reported by the Ipsita and Subha, (2024).

PCOS is often associated with irregular menstrual cycles, and weight fluctuations can further impact the regularity of periods (Lim et al., 2012). In this current study, we found most of the PCOS women are having irregular menstrual cycles. Among them, 48 (46%) patients were having oligomenorrhea, and 42 (41%) women were having amenorrhea, 8 (7.7%) were with a regular cycle, and 5 (4.8%) women were having polymenorrhea (table 3). These abnormalities were attributed to chronic anovulation, which is a hallmark sign of PCOS. As shown in figure 1, we found that out of 103 females with PCOS, 10 (9.7%) females were having scanty bleeding, and 36 (34.9%) females were having heavy bleeding.

Acne is one of the common dermatological symptoms of PCOS. This acne severity is categorized based on the Global Acne Grading System (Kinda et al., 2020) as acne is one of the symptoms of hyperandrogenism. In this current study, out of 103 patients, according to etiological factor and pathophysiological factor, most of the individuals have moderate levels. 40 (50.6%) of women with acne were observed, and about 32 (40.5%) are having mild acne, and only 7 (8.8%) of women are having severe acne (figure 2).

Hirsutism is an abnormal amount of terminal hair in a male pattern distribution in women and is the main clinical indicator of hyperandrogenism among PCOS individuals (Teede et al., 2018). As showed in figure 3, 32 (31%) females are reported with severe hirsutism, 13 (12.6%) females are reported with moderate hirsutism indicating the association of hirsutism in these patients. It shows the role of increased androgen levels in the worsening of dermatological symptoms, causes significant impacts body image and physiological well-being, highlighting the need for immediate evaluation and treatment.

In this study, we found that 76% of PCOS women were reported with hair thinning condition with 36% of patients identified with moderate to severe hair thinning. These results were similar to the reports of Sonya et al., (2020).

PCOS is always associated with metabolic syndrome. Insulin resistance (IR) is common in PCOS patients. IR has been reported in approximately 50–80% of women with different phenotypes of PCOS. As similar to the reports of Bil et al., (2016), we found that more than 26% PCOS patients developed diabetes. We also found that 38.8% of patients having a family history of diabetes, which explains the genetic predisposition of PCOS, which plays a major role in the development of PCOS by disturbing the insulin signalling pathway, androgen synthesis, and folliculogenesis. We also found that 9.7% of patients were reported with a positive family history of PCOS (table 5-6). In this study we also found that 60 (58.2%) patients are consuming junk food, which is an unhealthy diet that aggregates insulin resistance and hyperandrogenism. Moreover, we found that 66% of patients accepted and reported their physical inactivity. This sedentary lifestyle is recognized as a major risk factor that increases symptoms of PCOS (figure 4).

Infertility was one of the main symptoms originally attributed to the PCOS according to the first description (Stein and Levanthal, 1935). In a large population of 1,741 women affected by PCOS, primary infertility was reported in 50% of women, while secondary infertility was reported in 25% of women (Balem, 1995). In this we found that 54.1% of patients had a history of infertility and 18.7% as miscarriages, which is one of the major complications of PCOS.

The study reveals that 34.9% of women reported inadequate sleep (less than 5 hrs per day), which may lead to hormonal imbalance, increased appetite, and insulin resistance and further worsen the PCOS symptoms. These results were similar to the reports of Moran et al., (2015).

Stress per se is known to intensify the pathogenesis of PCOS and aggravate its complications. Cumulative stress developed over a course of time can cause hyperactivity of the hypothalamus-pituitary-adrenal axis and lead to its dysregulation (Yildiz and Azziz, 2007). Stress is a common lifestyle factor in PCOS. In this study, perceived stress scale scores revealed that 57 patients (50%) reported stress in which 61.9% of patients reported as moderate to severe stress level and this significant higher scores among PCOS women is because of women having PCOS often feel they have more stress to handle in life compared to other healthy women of their age and that the circumstances they face while interacting with the environment are far beyond their capacity to cope up with (Jibly et al., 2023).

Based on the Rotterdam Criteria (Lizneva et al., 2016), in this study we found the prevalence of phenotypes A, B, C, D were 48.5%, 5.8%, 7.7%, 37.8% respectively (table 10). In contrast, Garimna et al., (2019) reported the prevalence of phenotypes A, B, C, and D were 67.7%, 11%, 17.7%, and 3.6%, respectively.

CONCLUSION:

The current study confirms that polycystic ovarian syndrome (PCOS) is a multifactorial condition caused by disturbances in the lifestyle, hormonal, metabolic, clinical, and hereditary factors. In this current study, most of the females of the 21-30 age group, with 52%, were diagnosed with PCOS. Most of the patients reported abnormalities in lifestyle factors such as 66% of physical inactivity, 34.9% of inadequate sleep, 55.3% of stress, and 58.2% of unhealthy diet. 31% of patients were reported overweight. The present study reveals that most of the patients were found to have a high percentage of acne, hirsutism, and hair thinning; menstrual cycle irregularities such as oligomenorrhea and amenorrhea, which are clinical factors of hyperandrogenism; and 9.7% of females were found to have a positive family history of PCOS, which reveals genetic predisposition. And also the current study findings revealed that 54.1% of females with infertility and 18.7% of females with miscarriage, which are complications of PCOS, if the disease is untreated or neglected.

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