Compressive analysis of polycystic ovarian syndrome in female students of Kursk from India, Malaysia and Africa.

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Abstract

Background: Polycystic Ovary Syndrome (PCOS) is a prevalent endocrine disorder affecting reproductive-aged women, characterized by hyperandrogenism, ovulatory dysfunction, and polycystic ovarian morphology [1,2]. Beyond fertility concerns, PCOS has been associated with metabolic syndrome, insulin resistance, cardiovascular risk, and significant psychosocial distress [4,10,12]. The condition also profoundly affects health-related quality of life (HRQoL), with symptoms such as hirsutism, obesity, and menstrual irregularities contributing to psychological burden, especially among adolescents and women in culturally sensitive contexts [6,9,16].

Materials and Methods: This study employed a systematic literature review of peer-reviewed articles published between 1996 and 2023. Databases searched included PubMed, Scopus, and Web of Science using keywords such as "PCOS", "quality of life", "metabolic syndrome", and "psychological distress". A total of 16 key studies were included based on relevance, methodological rigor, and population diversity [1–16]. Data were extracted on diagnostic criteria, metabolic and psychological outcomes, and HRQoL assessments including validated instruments like SF-36 and PCOSQ [13,15].

Results: Findings indicate that PCOS is strongly associated with reduced HRQoL across multiple domains, particularly emotional well-being, body image, and social functioning [8,14]. Hirsutism was identified as the most impactful symptom on HRQoL in Iranian and South Asian populations [6,9]. Adolescents with PCOS reported greater psychosocial distress compared to their peers [11,16]. Furthermore, variations in diagnostic criteria (NIH, Rotterdam, AES) influenced prevalence estimates and clinical management strategies [7]. Several studies reported a bidirectional relationship between metabolic dysfunction and mental health deterioration [5,12].

Conclusion: PCOS significantly impairs both physical and mental health, with profound effects on quality of life that extend beyond reproductive concerns. Addressing PCOS requires a multidisciplinary approach that includes not only medical and hormonal management but also psychosocial support and culturally sensitive counseling. Future research should focus on individualized interventions targeting both metabolic and psychological outcomes to improve long-term health in women with PCOS.

Keywords: *Polycystic Ovary Syndrome (PCOS)**, Health-Related Quality of Life (HRQoL)**, Metabolic Syndrome**, Psychological Distress**, Women's Health.*

1.0 Introduction

Polycystic ovary syndrome (PCOS) is a common endocrine disorder that affects approximately 8–20% of women of reproductive age. A combination of reproductive, metabolic, and psychological symptoms, such as menstrual irregularities, elevated androgen levels, enlarged ovaries with multiple cysts, insulin resistance, obesity, and infertility characterizes it. Additionally, individuals with PCOS face increased risks of developing comorbid conditions, including type 2 diabetes, abnormal lipid profiles, and cardiovascular disease. Although there is no single diagnostic test for PCOS, the condition is typically identified through a combination of a detailed medical history, physical examination, hormone testing, and pelvic ultrasound imaging.
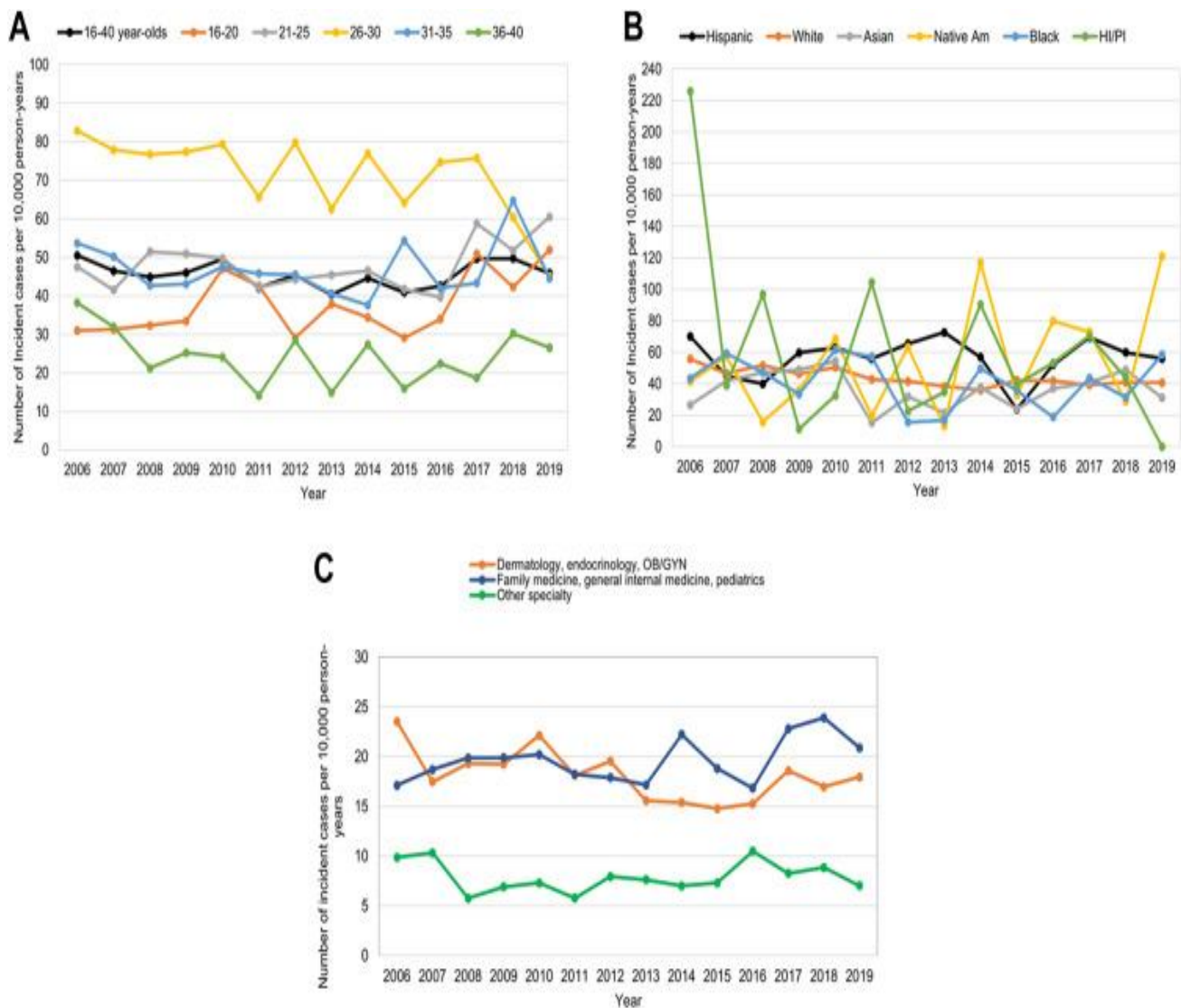
Although the exact cause of polycystic ovary syndrome (PCOS) is still not fully understood, it is believed to result from a complex interaction between genetic factors and environmental conditions. Estimates of global prevalence vary considerably, ranging from 5% to 18%, with Europe reporting an average of 276.4 cases per

100,000 people. In the United States, PCOS is among the most commonly diagnosed endocrine disorders in women of reproductive age. According to the World Health Organization (WHO), approximately 116 million women worldwide—representing about 3.4% of the female population—are affected by this condition. In India, reported prevalence rates range from 9.13% to 22.5%, depending on the population and methodology used in different studies. Concerningly, nearly 50% of affected individuals either go undiagnosed or experience delays in diagnosis.

Management of PCOS often focuses on reducing insulin levels and suppressing excessive androgen production in the ovaries, which in turn helps improve sex hormone–binding globulin (SHBG) levels—a key target in therapeutic strategies. Research has shown that the thecal cells in women with PCOS tend to produce higher levels of testosterone, progesterone, and 17-hydroxyprogesterone compared to those without the condition. While obesity is commonly associated with PCOS, it is not a necessary criterion for diagnosis.

2.0 Materials and Methods

Aim:

This study aims to investigate the prevalence and characteristics of Polycystic Ovarian Syndrome (PCOS) among female university students of reproductive age in Kursk, specifically those originating from Malaysia, India, and African countries. The research focuses on identifying associated risk factors, the proportion of students exhibiting symptoms, methods of diagnosis, management approaches, and the condition's demographic impact.

A cross-sectional study involved 50 female students aged 19 to 25, representing Malaysia, India, and Africa. Data was collected using a structured questionnaire designed around the Rotterdam criteria, assessing PCOS symptoms, potential causes, effects on daily life, and treatment modalities.

Inclusion Criteria:

1. Female students aged 19–25 fall within the reproductive age group.
2. Participants originating from Malaysia, India, or countries within the African continent.
3. Individuals who have experienced the onset of menstruation (menarche).
4. Participants who voluntarily agreed to provide informed consent.

Exclusion Criteria:

1. Male participants and individuals outside the specified age range.
2. Respondents with incomplete or missing questionnaire data.
3. Individuals are unable to give informed consent.
4. Participants not representing the designated geographic regions (Malaysia, India, and Africa).

3.0 Literature review

3.1 Introduction to Polycystic Ovarian Syndrome

Polycystic ovarian syndrome (PCOS) is a complex endocrine condition commonly characterized by elevated androgen levels and persistent anovulation, affecting between 6% and 20% of women in their reproductive years. Symptoms often emerge during adolescence and may resemble typical pubertal developments such as irregular periods, acne, and ovulatory disturbances, which can complicate early diagnosis. In adult populations, the Rotterdam criteria are widely accepted for diagnosis; however, alternative guidelines have been established for diagnosing PCOS in adolescents due to the overlap with normal pubertal changes (3).

In adolescents, diagnostic criteria primarily include irregular menstruation, visible signs of excess androgens (e.g., hirsutism, acne), or elevated androgen levels in blood tests. Pelvic ultrasound findings, while common in adult diagnosis, are not essential for adolescent assessment. Before confirming a diagnosis, adolescents showing clinical symptoms like oligomenorrhea or amenorrhea alongside signs of androgen excess may be labelled as "at risk" for PCOS. Management for both at-risk and diagnosed individuals involves health education, lifestyle changes, and targeted medical treatment. Pharmacologic approaches may include insulin-sensitizing agents like metformin, hormonal contraceptives, anti-androgens like spironolactone, and topical or systemic therapies for managing acne and hirsutism. Comprehensive care also involves screening for comorbidities and ensuring structured follow-up with transition plans for adult endocrinological care (6).

A deeper grasp of PCOS pathogenesis supports earlier identification of at-risk individuals, which is crucial for initiating timely, personalized treatment to reduce the risk of long-term complications and improve quality of life during adolescence (5).

The female reproductive system, specifically the hypothalamic–pituitary–ovarian (HPO) axis, plays a fundamental role in fertility by integrating internal hormonal cues and external environmental factors. Epigenetic influences during fetal development shape the brain and reproductive cells, impacting health across generations. PCOS disrupts the HPO axis due to excessive androgens and irregular ovulation, leading to symptoms such as unwanted hair growth, cycle irregularity, infertility, and chronic anovulation. Ongoing hyperandrogenism interferes with hormonal feedback mechanisms, resulting in elevated luteinizing hormone (LH) levels and early stimulation of follicular development. Although the disorder emerges around puberty, most clinical studies focus on adults, potentially creating bias toward more severe presentations due to selective referrals. Experimental models, including animal studies and in vitro experiments, continue to shed light on the intricate mechanisms involved in PCOS development. New findings increasingly point to a neuroendocrine basis, emphasizing the need for integrated, multidisciplinary research and treatment strategies.

PCOS is influenced by both intrinsic ovarian dysfunction—such as abnormal steroid hormone synthesis—and external contributors like elevated insulin levels. The ovarian morphology typical in PCOS includes a

higher number of developing follicles and the premature arrest of follicle growth at the antral stage (5–8 mm). The characteristic ultrasound image of a PCOS ovary—enlarged with multiple small follicles aligned peripherally in a "string of pearls" appearance—indicates prolonged androgen exposure. Similar ovarian changes are also noted in other conditions, such as congenital adrenal hyperplasia and in individuals undergoing female-to-male gender transition. Disruptions in hormonal and cellular signalling that govern follicular maturation are thought to play a significant role in the ovarian abnormalities seen in PCOS.

The process of follicle development begins with primordial follicles, which are formed during fetal life and consist of immature oocytes encased by pregranulosa cells. These early follicles remain dormant until puberty, although maternal hormones influence the ovarian environment during gestation. While knowledge about early follicle development in prepubertal and early pubertal ovaries remains limited, available data suggest a higher frequency of abnormal, non-developing follicles in younger ovaries—a pattern not seen in mature ovaries. The clinical importance of these differences is still not fully understood.

3.2 Risk Factors for Polycystic Ovarian Syndrome

Hormones such as insulin and androgens play vital roles in regulating physiological processes. When present in elevated levels, both can significantly contribute to the development of polycystic ovary syndrome (PCOS).

Androgens, which are primarily responsible for male physical traits like body hair growth, may interfere with ovulation during the menstrual cycle. This interference can lead to several PCOS-related symptoms, including excessive hair growth (hirsutism), acne, and hair thinning or baldness in a male-pattern distribution. Insulin, essential for metabolizing food and regulating body weight, can also play a role in PCOS. Excessive insulin may cause insulin resistance, a condition where the body's cells become less responsive to insulin, increasing the likelihood of developing PCOS.

There is also strong evidence indicating a genetic predisposition to PCOS, as the condition often runs in families. Although the precise hereditary mechanisms are not yet fully understood, the presence of hormonal imbalances or a family history of type 2 diabetes may increase the likelihood of PCOS.

In addition to its reproductive manifestations, PCOS is often accompanied by metabolic disturbances such as obesity, abnormal lipid profiles, high blood pressure, and impaired glucose metabolism. These factors collectively increase the risk of developing type 2 diabetes and potentially cardiovascular disease (CVD). While some studies suggest a link between PCOS and CVD, inconsistencies in definitions and methodologies have led to varying conclusions. Recent genetic analyses, including Mendelian randomization studies, have even questioned whether PCOS directly causes heart disease or stroke.

Despite these uncertainties, assessing cardiovascular risk in individuals with PCOS remains an important component of clinical care. Lifestyle changes, including dietary improvements and increased physical activity, can help improve metabolic health and reduce CVD risk. Pharmacological options such as statins

may be considered for patients at higher risk to manage elevated lipid levels. Additional medications like metformin and glucagon-like peptide-1 (GLP-1) receptor agonists have shown promise in improving insulin sensitivity and may further help reduce cardiovascular risk in this population. Nonetheless, further research is needed to determine the most effective strategies for managing CVD risk in patients with PCOS.

PCOS is one of the most common hormonal disorders in women of reproductive age, with global prevalence estimates ranging from 5% to 13%. High androgen levels, ovulatory irregularities, and distinctive ovarian morphology mark the condition. Clinically, it presents with a range of symptoms, including infertility, complications during pregnancy, insulin resistance, obesity, acne, mood disturbances, and excessive hair growth. Different diagnostic criteria have been developed to categorize PCOS subtypes, with the combination of hyperandrogenism and disrupted ovulation considered classic indicators.

Alongside its reproductive effects, PCOS is frequently associated with metabolic conditions such as dyslipidemia, obesity, high blood pressure, and metabolic syndrome—all of which raise the risk of type 2 diabetes and cardiovascular disease. Therefore, comprehensive screening for CVD risk factors is essential in the management of PCOS patients.

Women affected by PCOS often exhibit unfavorable lipid profiles, including elevated low-density lipoprotein (LDL) cholesterol and triglycerides and decreased high-density lipoprotein (HDL) cholesterol levels. Insulin resistance, a central feature of PCOS, contributes to impaired glucose tolerance and persistent hyperinsulinemia. Moreover, hypertension appears to be more common in PCOS, and while it is often linked to obesity, it can also occur independently of body mass index (BMI).

This review underscores the association between PCOS and increased cardiovascular risk, highlighting the importance of integrated screening and prevention efforts. It draws on recent literature, especially meta-analyses and studies indexed in PubMed, to offer updated insights into the pathophysiology of PCOS-related cardiovascular complications and provide clinical recommendations for evaluating and managing cardiovascular risk in this population.

Given the strong connection between PCOS and metabolic dysfunction, clinicians should prioritize cardiovascular risk screening in addition to addressing reproductive concerns such as infertility and menstrual irregularities. A growing body of evidence supports the classification of PCOS as a risk-enhancing factor for CVD, warranting the implementation of personalized strategies aimed at reducing long-term health consequences.

3.3 Females experiencing symptoms

Polycystic ovary syndrome (PCOS) often begins to show clinical signs during adolescence, commonly through irregular menstrual cycles and the presence of multiple ovarian cysts. While the standard diagnostic guidelines, including androgen excess, menstrual irregularities, and ultrasound-detected

polycystic ovaries, are widely used, these may not always be suitable for adolescent populations due to the evolving nature of the condition. Many features of PCOS may not become fully apparent until later in life, complicating early diagnosis.

Both genetic factors and environmental exposures play pivotal roles in PCOS development. Although the genetic components are relatively well defined, environmental contributors—such as poor dietary habits, reduced physical activity, insulin resistance, and obesity—also significantly influence the onset and progression of the syndrome.

Mental health challenges are also common among individuals with PCOS, with a marked increase in the prevalence of depression—particularly among those who are obese, a condition frequently associated with PCOS. Research estimates that between 40% and 60% of women with PCOS are classified as obese. Interestingly, adolescents with PCOS may display some protection from certain metabolic abnormalities, although genetic factors strongly modulate their symptoms and lab findings.

In summary, PCOS represents a multifactorial disorder shaped by hereditary and lifestyle-related influences. Though early signs often emerge during teenage years, diagnosing PCOS during this stage remains challenging due to variability in symptom expression. Effective treatment and management require a deep understanding of the interplay between genetic risk, behavioural factors, and metabolic health.

Mental health concerns such as anxiety, depression, and dissatisfaction with body image are frequently reported among women diagnosed with PCOS. Physical symptoms like irregular periods, infertility, acne, and hirsutism often intensify these psychological burdens. Feelings of diminished femininity and the stigma surrounding infertility can lead to significant emotional distress. For example, a study by Li et al. found that some participants with PCOS expressed depressive symptoms and even suicidal thoughts, highlighting the importance of integrating mental health care with reproductive treatment plans. Research suggests that up to 40% of women with PCOS may experience depression, especially in early adulthood. However, there remains limited data on the extent of suicidal ideation in this group, suggesting a need for further investigation.

In addition, body image dissatisfaction is frequently cited by individuals with PCOS. Physical features such as excess hair, acne, and weight gain contribute to lower self-esteem and heightened anxiety. Qualitative studies have emphasized that these women often perceive their physical appearance as unstable or unfamiliar, which can intensify psychological distress and contribute to feelings of identity loss.

A person's belief in their ability to manage health—self-efficacy—has been identified as a protective factor against psychological distress. High levels of emotional self-regulation are associated with better coping outcomes, whereas low self-efficacy can amplify stress. Moreover, poor psychological health can negatively influence self-efficacy, creating a feedback loop. Conversely, strong self-efficacy promotes disease acceptance and fosters better emotional outcomes for individuals with PCOS. Therefore, addressing

psychological resilience and emotion regulation is key to improving health-related quality of life in this population.

Beyond internal struggles, women with PCOS often face external social pressures, particularly within family and cultural contexts. In these scenarios, family support plays a vital role in shaping emotional responses to challenges like infertility. The intense desire for parenthood may cause some women to withdraw from discussions related to reproduction, and even well-intended comments from family members can deepen feelings of inadequacy or shame.

Understanding how family interactions, social networks, and emotional health intersect is critical for creating effective support strategies. There is an urgent need for comprehensive and patient-centred intervention programs focused on emotional well-being. To design such initiatives, it is essential to explore how women with PCOS experience psychological distress, regulate emotions, seek support, and approach professional mental health care.

Despite growing interest in the psychological burden of PCOS, current research still lacks sufficient focus on how affected individuals cope emotionally, use support systems, and pursue mental health services. This study seeks to address that gap using a descriptive phenomenological method, employing in-depth interviews to explore the emotional, social, and psychological dimensions of life with PCOS. The goal is to inform the development of scientifically grounded and highly tailored psychological interventions that meet the specific needs of women facing this condition.

Hirsutism, or excessive body hair growth in women, affects an estimated 5% to 15% of the female population. The modified Ferriman–Gallwey (mFG) scoring system is commonly used to assess the severity of hirsutism, with scores influenced by factors such as ethnicity and age. Acne, another common symptom, typically arises during puberty as a result of increased androgen levels, affecting up to 80% of teenagers. Persistent or treatment-resistant acne should prompt evaluation for underlying hormonal disorders, particularly hyperandrogenism. Hormonal assessments may include bioavailable testosterone or the free androgen index (FAI), while direct testing for free testosterone is generally discouraged due to inaccuracy.

It's important to note that not all individuals with elevated androgens will present with hirsutism, though the majority—approximately 80% to 90%—of those with hirsutism have an underlying androgen disorder. PCOS is generally diagnosed by ruling out other conditions, including nonclassic congenital adrenal hyperplasia, Cushing's syndrome, elevated prolactin levels, and androgen-secreting tumours.

3.4 Diagnosis of Polycystic Ovarian Syndrome

The **Rotterdam criteria** remain the most widely recognized and utilized framework for diagnosing polycystic ovary syndrome (PCOS). Since PCOS is a diagnosis made by excluding other conditions,

thorough clinical evaluation and diagnostic testing are essential for individuals exhibiting suggestive symptoms—even if initial test results fall within normal ranges.

According to the Rotterdam criteria, a diagnosis of PCOS is established when **two out of the following three criteria** are met, provided that other potential diagnoses have been excluded:

1. **Menstrual irregularities** are defined as cycles occurring more than 35 days or fewer than 21 days apart (more than three years after menarche), having fewer than eight menstrual periods annually, or experiencing any single cycle exceeding 90 days.

2. **Evidence of hyperandrogenism**, which may be observed clinically (e.g., acne, hirsutism, androgenic alopecia) or detected through biochemical testing.

3. **Polycystic ovarian morphology**, as visualized via transvaginal ultrasound, or elevated levels of anti-Müllerian hormone (AMH), can serve as an alternative to imaging when clinical criteria are inconclusive. However, the use of AMH in adolescents is not recommended due to diagnostic limitations in that age group.

In cases where a concurrent endocrine disorder, such as hypothyroidism, is identified, the associated condition should be managed first. Only after stabilization should a reassessment be made to determine if PCOS remains a valid diagnosis.

Recommended Initial Laboratory Investigations

For patients presenting with menstrual disturbances or signs of hyperandrogenism, the following baseline investigations are advised. These should ideally be conducted during the **early follicular phase** (between days 2 and 4 of the menstrual cycle), unless the patient is experiencing amenorrhea:

- **Serum prolactin**
- **Thyroid-stimulating hormone (TSH)**
- **Gonadotropins**: Luteinizing hormone (LH), follicle-stimulating hormone (FSH), and estradiol
- **β-human chorionic gonadotropin (β-hCG)** to rule out pregnancy
- **17-hydroxyprogesterone (17-OHP)** to exclude nonclassic congenital adrenal hyperplasia
- **Androgen levels**, including total testosterone, calculated free testosterone, or free androgen index (FAI), optionally with measurements of androstenedione or dehydroepiandrosterone sulphate (DHEAS)
- **Pelvic imaging** via transvaginal ultrasonography or, when appropriate (in individuals more than eight years post-menarche), serum AMH as an alternative imaging marker

These investigations support the differentiation of PCOS from other endocrine conditions with similar presentations and ensure an accurate diagnosis based on established criteria.

3.5 Global Perspectives and Methodological Considerations

Due to the multifaceted nature of polycystic ovary syndrome (PCOS), a substantial and expanding body of scholarly literature has been produced, encompassing its epidemiological patterns, underlying mechanisms, diagnostic criteria, and treatment modalities. However, the depth and breadth of this literature often complicate traditional systematic review approaches. In this context, bibliometric analysis has emerged as a powerful tool for objectively assessing scientific outputs and identifying emerging research trends through statistical and mathematical modelling.

Although bibliometric techniques are increasingly utilized across various medical fields, limited research has applied these methods to PCOS. Notably, just one prior study has addressed PCOS through a bibliometric lens, focusing on data limited to a three-year window. The present study undertook a comprehensive bibliometric investigation to build upon this foundation, evaluating PCOS-related publications over ten years (2012–2021). This analysis aimed to quantitatively and qualitatively assess the body of work while forecasting future research directions and thematic hotspots.

Despite the increasing volume of PCOS research, a holistic global view integrating quantitative metrics with socioeconomic and gender-related factors remains largely unexplored. An extensive literature evaluation from 1900 to 2014 was conducted using the Web of Science database to bridge this gap. The analysis employed scientometric methodologies, economic comparison tools, and density equalizing map projections to visualize publication trends and collaborative networks.

The findings indicated a total of 6,261 publications specifically related to PCOS, along with 703 documented international research collaborations. The United States led in both overall publication volume and the extent of international partnerships. From a socioeconomic perspective, the U.S. also topped productivity metrics when adjusted for gross domestic product per capita, followed by the United Kingdom, Italy, and Greece. When adjusted for population, Scandinavian countries and Greece showed a particularly strong presence in PCOS-related outputs.

Gender-based analyses further highlighted a significant involvement of female researchers in PCOS studies, especially within the most research-active nations. This investigation represents the first attempt to map the global PCOS research landscape in this manner, differentiating it from other gynecological fields and underscoring the predominance of contributions from economically developed countries.
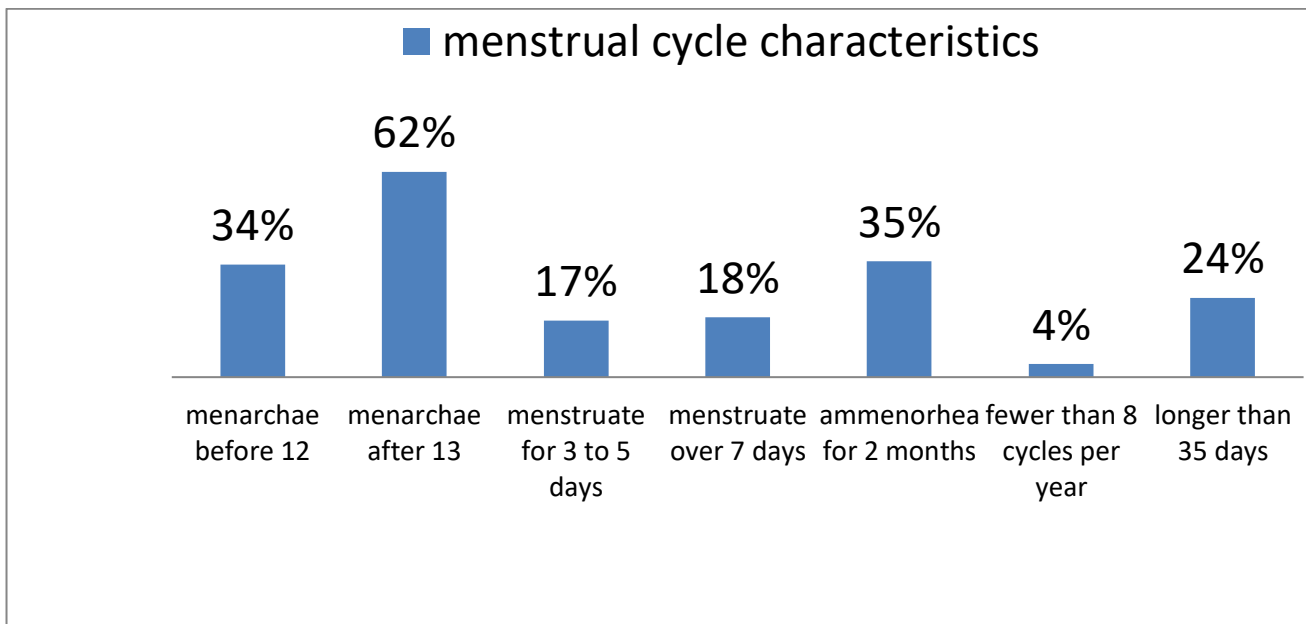
4.0 Results

1. Demographic data

*Table 1. Age range between Malaysian students, Indian students, and African students*

	MALAYSIAN STUDENTS	INDIAN STUDENTS	AFRICAN STUDENTS
19-23YEARS	60.4%	50.3%	40.4%
24-25 YEARS	40.6%	50.7%	60.6%

Figure1. Characteristics of menstrual cycle from India, Malaysia and Africa

Approximately 34% of female participants reported experiencing menarche before the age of 12, whereas 62% indicated onset between the ages of 13 and 17. Regarding menstrual duration, most (57%) reported cycles lasting between three and five days, which is considered within the normal range, while 18% reported menstruation extending beyond seven days. Additionally, 35% of respondents experienced amenorrhea lasting for two months, 4% reported having fewer than eight menstrual cycles annually, and 24% experienced cycles exceeding 35 days in length.

Figure 2. Menstrual cycles accompanied with pain, females with regular and irregular menstrual cycle.
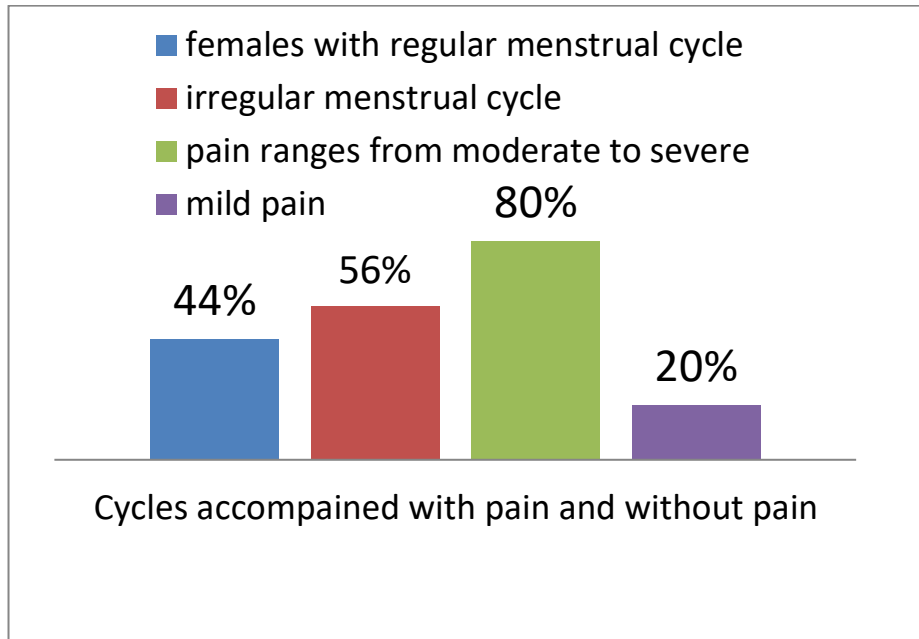
Among the participants, 44% reported having regular menstrual cycles, while 56% experienced irregular cycles. Regarding menstrual pain, 80% described the intensity as ranging from moderate to severe, whereas 20% reported only mild discomfort.

Table 2. Females with regular menstrual cycle, irregular menstrual cycle, pain accompanied with cycles

MENSTRUAL CYCLE CHARACTERISTICS	FEMALES EXPERIENCING PAIN, REGULARITY OF CYCLE
FEMALES WITH REGULAR MENSTRUAL CYCLE	44%
IRREGULAR MENSTRUAL CYCLE	56%
TOTAL	100%

Figure 2: female population of the Kursk region, survey conducted from India, Malaysia, Africa
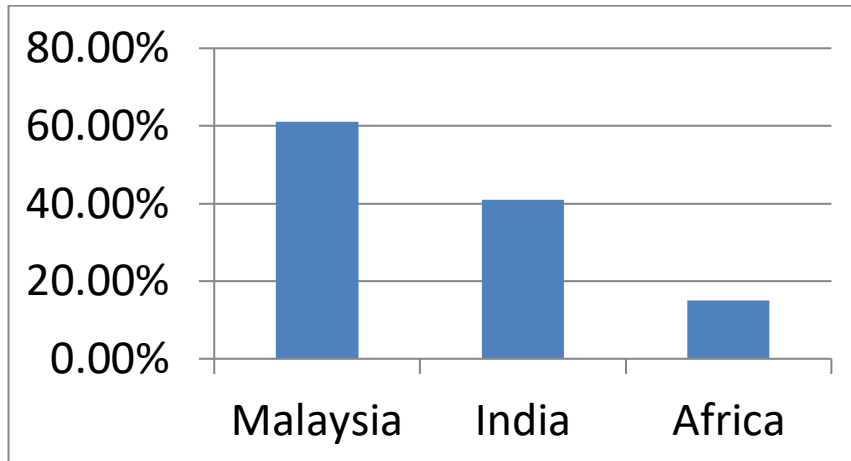
61% females from Malaysia were affected with pcos, 40% from indian population diagnosed with pcos, and 15% female population from Africa was diagnosed with pcos.

Table 3. Females diagnosed with pcos from Malaysia

NUMBER OF FEMALES DIAGNOSED WITH PCOS FROM MALAYSIA	**60%**
NOT DIAGNOSED	40%
NUMBER OF FEMALES DIAGNOSED WITH PCOS FROM INDIA	40%
NOT DIAGNOSED	60%
TOTAL	100%

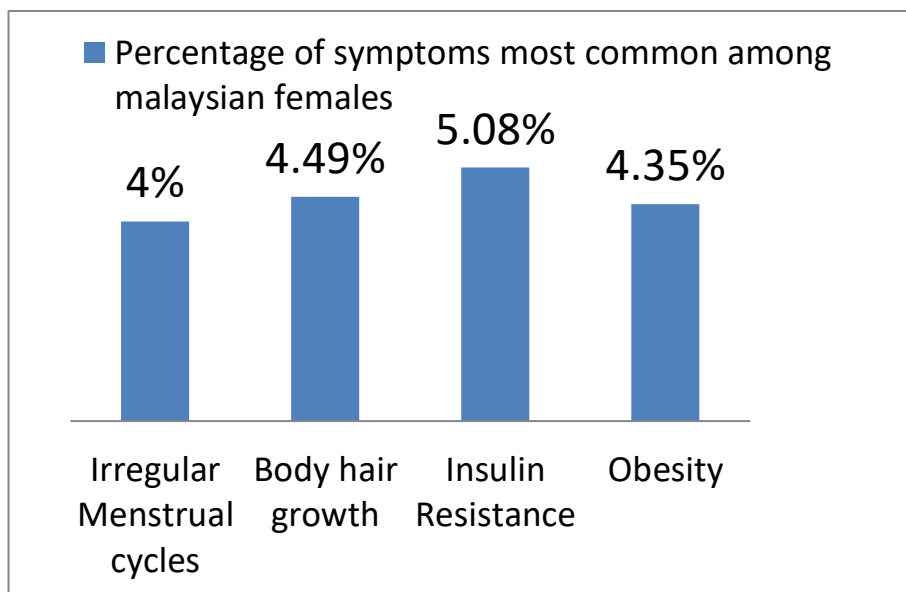*Table 4. Females diagnosed with pcos from India.*

NUMBER OF FEMALES DIAGNOSED WITH PCOS FROM INDIA	**40%**

NOT DIAGNOSED	60%
TOTAL	100%

Table 5. Females diagnosed with pcos from Africa.

NUMBER OF FEMALES DIAGNOSED WITH PCOS FROM AFRICA	15%
NOT DIAGNOSED	85%
TOTAL	100%

*Figure 3: symptoms experienced by Malaysian females.*

4% experienced Irregular menstrual cycles, 4.49% had body hair growth, 5.08% had Insulin Resistance and 4.35% had Obesity.

Figure 4: symptoms experienced by Indian females.
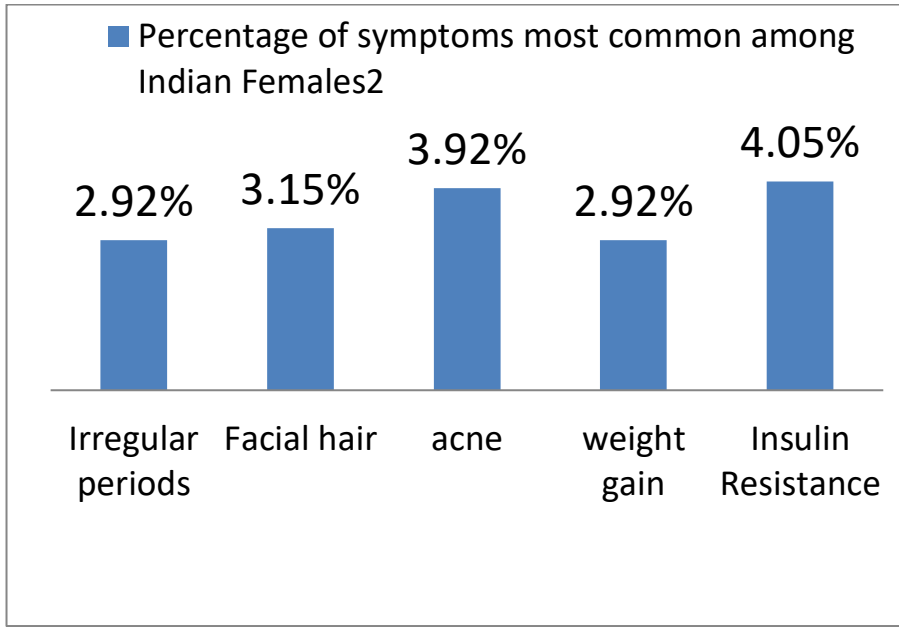
2.92% Experienced Irregular menstrual cycles, 3.15% had facial hair, 3.92% had acne, 2.92% had weight gain while 4.05% had insulin resistance.

Figure 5: females experienced symptoms from africa.
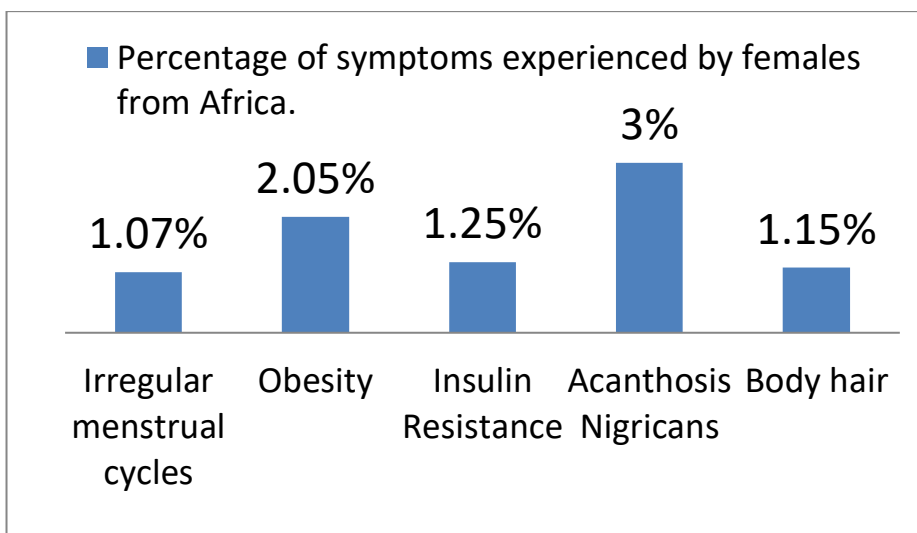
1.07% had Irregular menstrual cycles, 2.05% had obesity, 1,25% had insulin resistance, 3% had acanthosis Nigricans, and 1.15% had body hair.

Table 6: other symptoms female had from India, Malaysia and Africa that have been diagnosed with pcos

OTHER SYMPTOMS INCLUDE	PERCENTAGE OF FEMALES EXPERIENCING
THINING OF HAIR ON HEAD	8.45%
PELVIC PAIN	6.23%
SLEEP APNEA	5.06%

Figure 6. According to the Ferriman-Gallwey hirsutism score, hair present on different areas of body among Indian, Malaysian and African students.

MALAYSIAN FEMALES WITH FERRIMAN GALLWEY SCORE	INDIAN FEMALE WITH FERRIMAN GALLWEY SCORE	AFRICAN FEMALES WITH FERRIMAN GALLWEY SCORE
60.4% HAIR PRESENT ON BODY AREAS	50.3% HAIR PRESENT ON BODY AREAS	40.6% HAIR PRESENT ON BODY AREAS
40.6% HAIR NOT PRESENT ON BODY AREAS	50.7% HAIR NOT PRESENT ON BODY AREAS	60.4% HAIR NOT PRESENT ON BODY AREAS
100%	100%	100%

Table 7: females and population from malaysia had 60.4% hair present, from india had 50.3% present hair on body areas whereas african females had 40.6% present body hair.

On the Ferriman-Gallwey score, including hair present on different parts of the body, Malaysian females scored a score of 9, Indian females scored a score of 6, while Indian females scored less than 5.
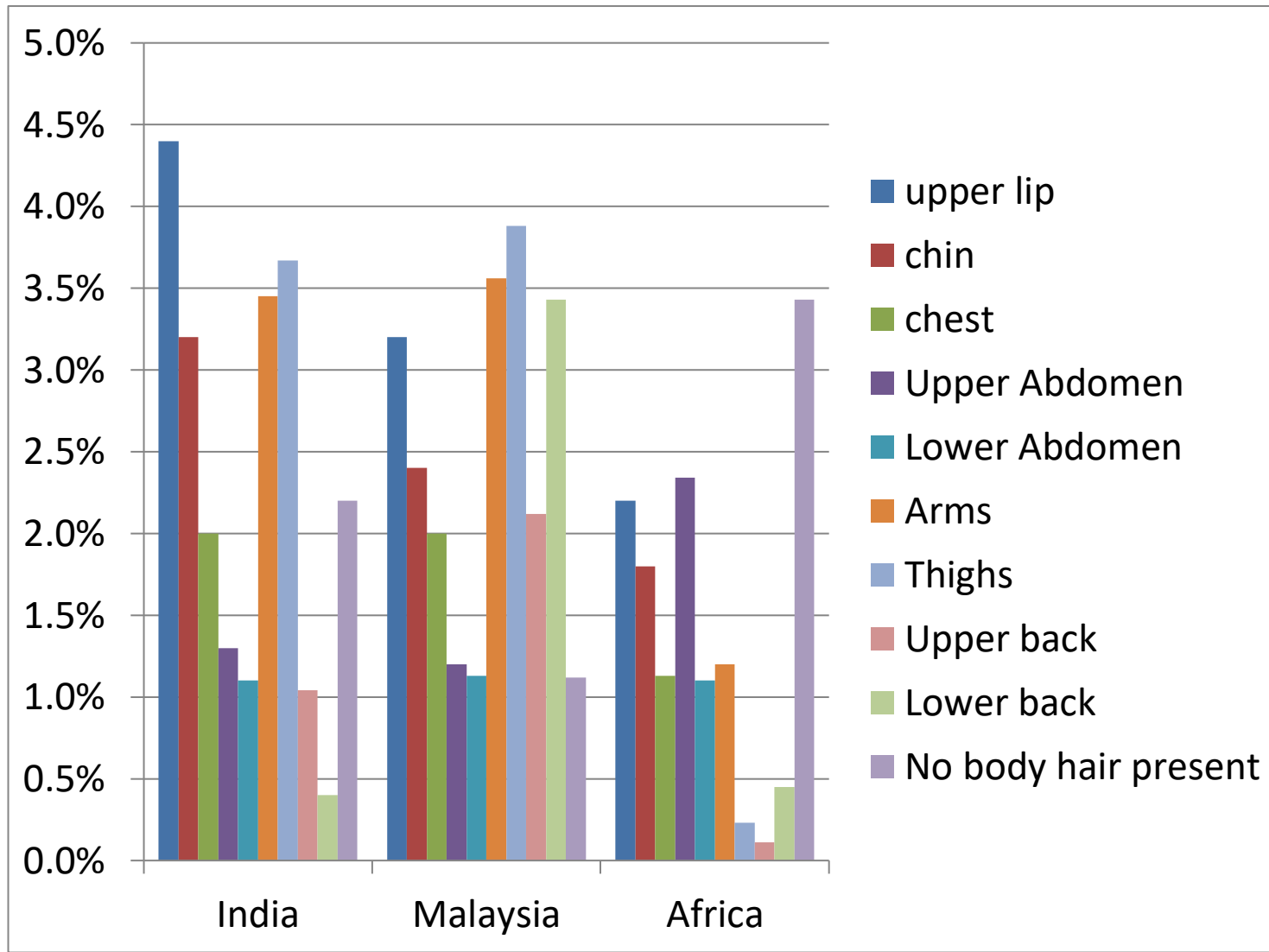

Figure 7: Females with first-degree relative of pcos(mother, sister, daughter), who has been diagnosed with pcos

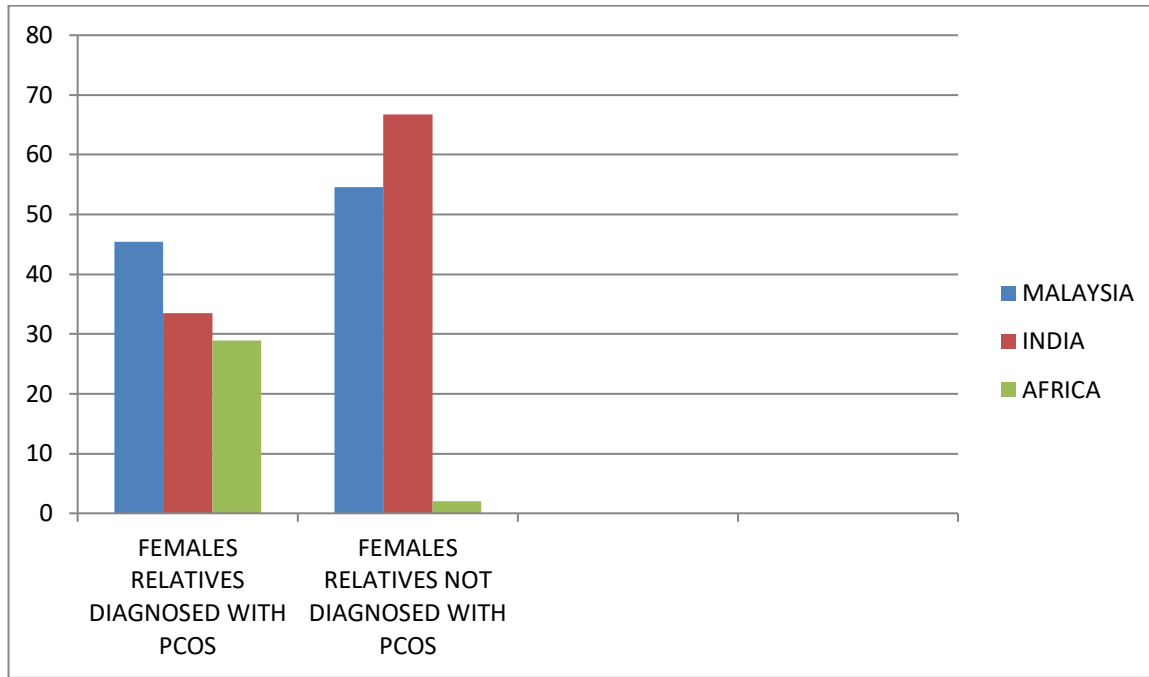|	FIRST DEGREE RELATIVE DIAGNOSED WITH PCOS	FIRST DEGREE RELATIVE NOT DIAGNOSED WITH PCOS
MALAYSIA	45.4%	54.6%
INDIA	33.5%	66.8%
AFRICA	28.9%	71.1%
TOTAL	100%	100%

Figure 7 indicates the number of females who had their first-degree relative diagnosed with pcos: 45.4% in Malaysia, 33.5% in India, and 28.9% in Africa.

Table 8: Risk factors for pcos, family history of type 2 diabetes mellitus, hypertension among Malaysian females

FEMALES HAD FAMILY HISTORY OF TYPE 2 DIABETES MELLITUS	45.3%
FEMALES HAD FAMILY HISTORY OF HYPERTENSION	40.4%
FEMALES WHO DIDN'T HAD FAMILY HISTORY OF BOTH	20.3%
TOTAL	100%

Table 9: Among Indian females

FEMALES HAD FAMILY HISTORY OF TYPE 2 DIABETES MELLITUS	55.6%
FEMALES HAD FAMILY HISTORY OF HYPERTENSION	35.3%
FEMALES WHO DIDN'T HAD FAMILY HISTORY OF BOTH	10.2%

TOTAL	100%

Table 10: Among African females

FEMALES HAD FAMILY HISTORY OF TYPE 2 DIABETES MELLITUS	45.4%
FEMALES HAD FAMILY HISTORY OF HYPERTENSION	15.3%
FEMALES WHO DIDN'T HAD FAMILY HISTORY OF BOTH	60.3%
TOTAL	100%

Table 8, 9, 10 indicates females who had a family history that could be a risk factor for PCOS, among Malaysian, Indian and African females.

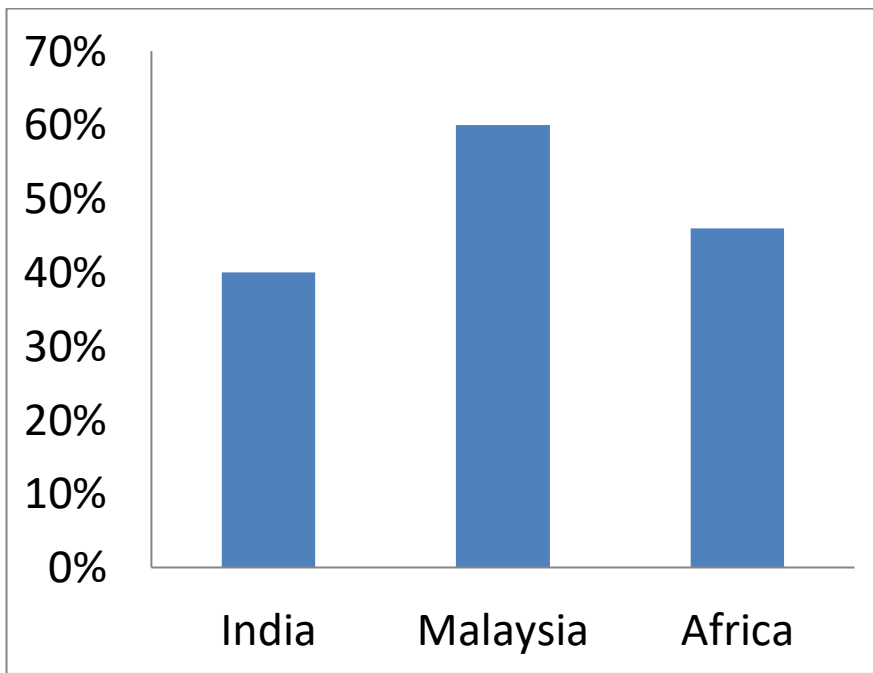*Figure 8. Eating habits among females and not maintain a healthy diet.*

Figure 8 indicates, eating habits of Malaysian females that was 60% of Malaysian females consumed un healthy food, 40% of Indian females consumed unhealthy food while 42% of African females consumed unhealthy food.

MALAYSIAN POPULATION	INDIAN POPULATION	AFRICAN POPULATION
60% CONSUMED UNHEALTHY FOOD	40% CONSUMED HEALTHY FOOD	42% CONSUMED UNHEALTHY FOOD
40% CONSUMED HEALTHY FOOD	60% CONSUMED UN HEALTHY FOOD	58% CONSUMED HEALTHY FOOD
TOTAL- 100%	TOTAL-100%	TOTAL-100%

Figure 9: females engaging in physical activities from Malaysia, India and Africa.

**Females engaging in physical activities**
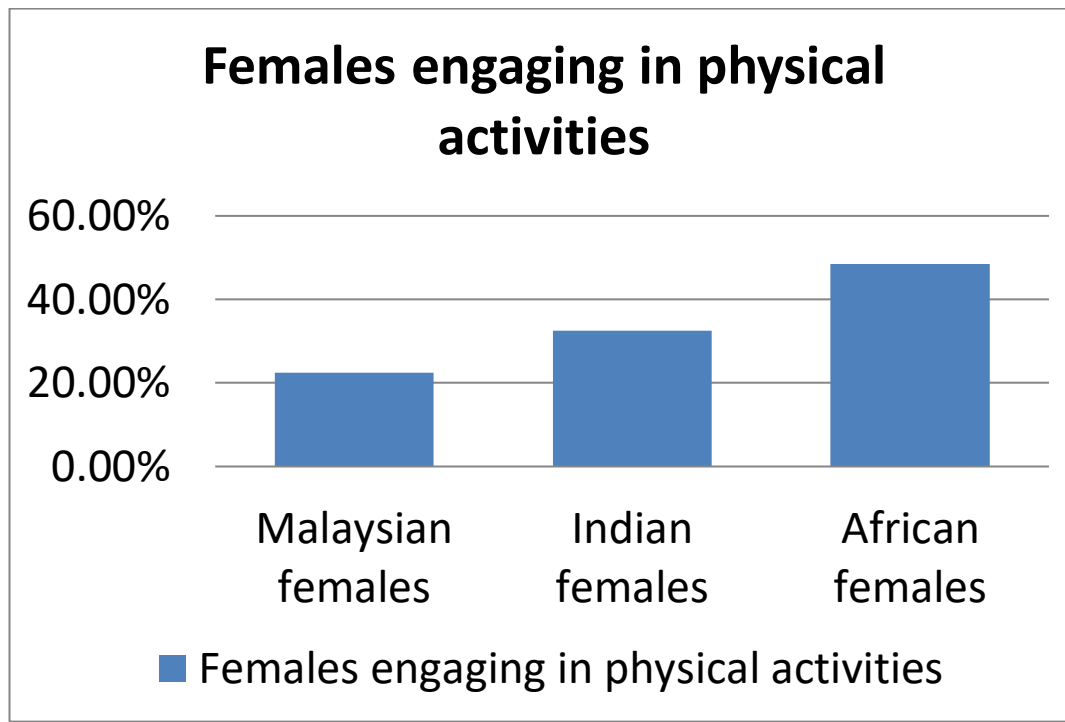
Females engage in physical activities like sports, gym, and dancing. 22.45% of Malaysian females indulge in physical activities, 32.45% of females indulge in physical activities, and 48.44% of females from Africa perform activities.

Table 12: Females engaging in physical activity

	FEMALES ENGAGING IN PHYSICAL ACTIVITIES	FEMALES NOT PERFORMING PHYSICAL ACTIVITIES	TOTAL
MALAYSIAN FEMALES	22.45%	77.5%	100%
INDIAN FEMALES	32.45%	67.55%	100%
AFRICAN FEMALES	48.44%	51.56%	100%

Figure 10: Females who had undergone diagnostic tests for pcos.
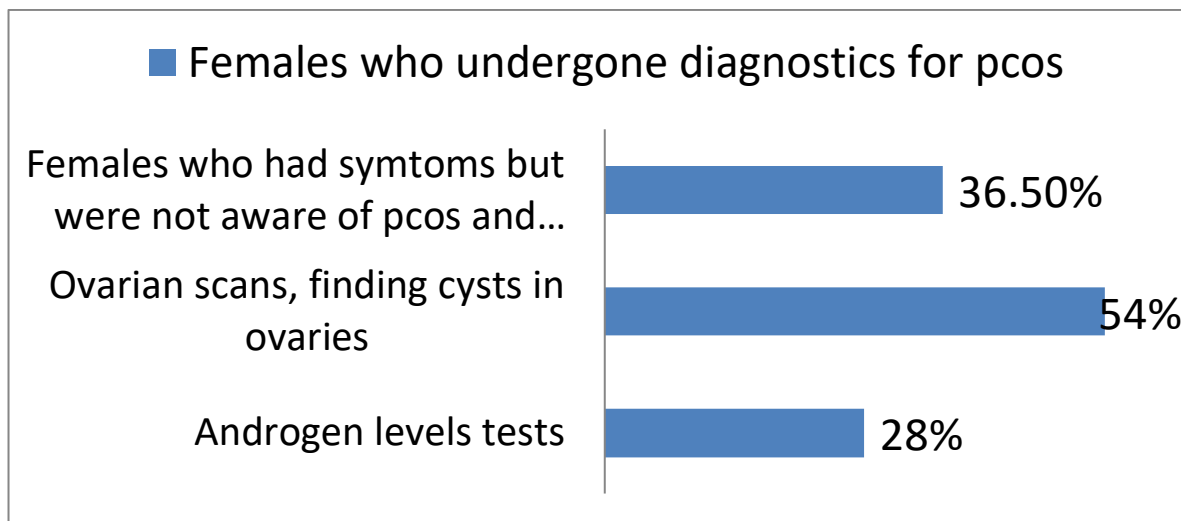
Represents diagnostics of pcos which female performed and females who had symptoms but were not aware of PCOS.

Table 13: Females from Malaysia, India and Africa perommed diagnostic tests for pcos and were aware or not that they had symptoms.

	FEMALES WHO HAD SYMPTOMS BUT WERE NOT AWARE OF PCOS	FEMALES UNDERGONE OVARIAN SCANS, FINDING	FEMALES UNDERGONE ANDROGEN LEVEL TESTS

		CYSTS IN OVARIES	
MALAYSIAN FEMALES	12.2%	20.4%	10.3%
INDIAN FEMALES	7.2%	10.4%	5.4%
AFRICAN FEMALES	16.7%	20.6%	13.2%

Table 13 indicates that 12.2% of Malaysian females had symptoms but were not aware of PCOS, 20.4% underwent ovarian scans, and 10.3% had androgen-level tests. In Indian women, 7.2% were not aware of PCOS, 10.4% underwent ovarian scans, and 5.4% had androgen-level tests. In African females, 16.7% were not aware of PCOS, 20.6% underwent ovarian scans, and 13.2% had androgen-level tests.

Table 14: Effect of pcos on daily life, physical and mental health.

	MALAYSIAN FEMALES	INDIAN FEMALES	AFRICAN FEMALES
AFFECT OF PCOS ON MENTAL HEALTH	30%	40%	30%
AFFECT OF PCOS ON PHYSICAL HEALTH	70%	60%	70%
TOTAL	100%	100%	100%

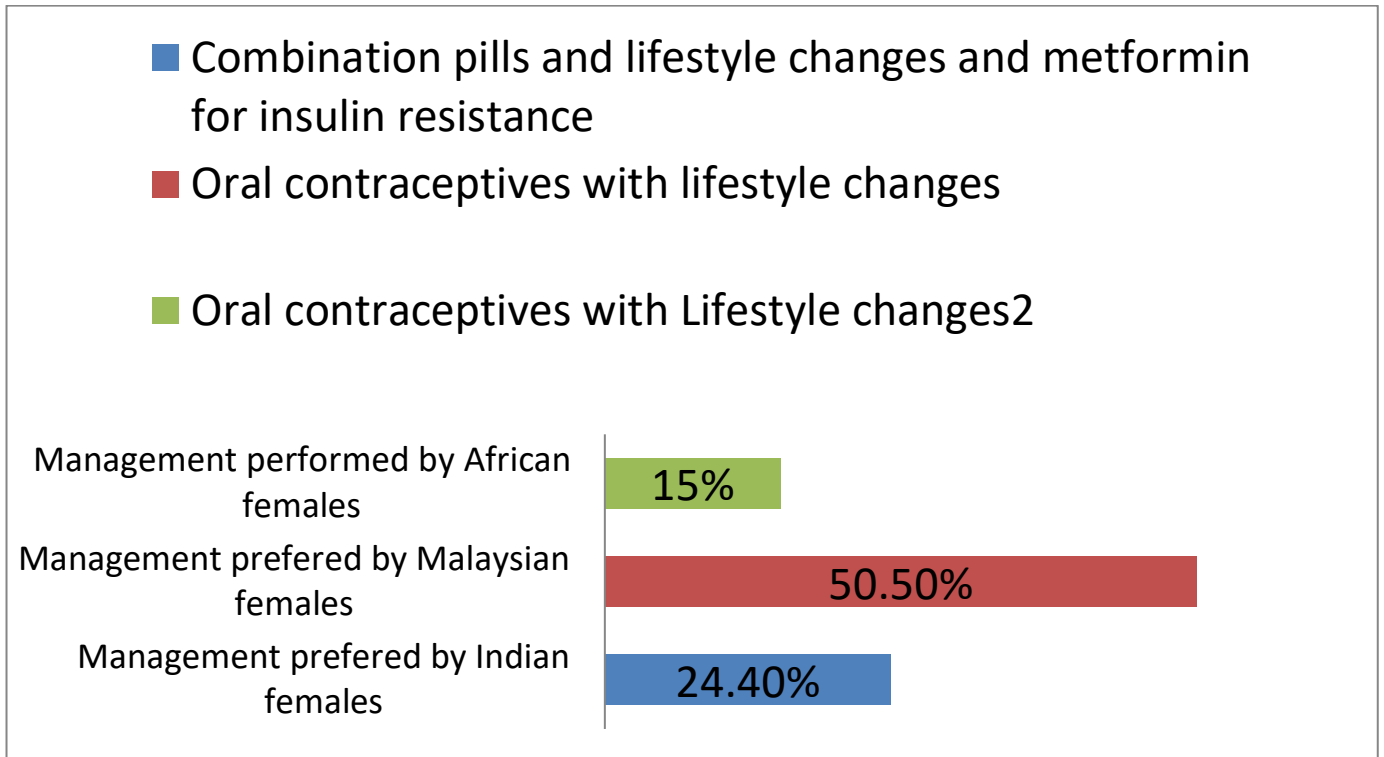*Figure 10: Management and treatment of pcos preffered among females*

Figure 10: Indicates 50.50% of Malaysian females preferred Oral contraceptives and Lifestyle changes, 24.40% of Indian females preferred Combination pills and lifestyle changes with metformin for insulin resistance, and 15% African females preferred oral contraceptives with lifestyle modifications.

Table 11: Treatment preference among females.

	MALAYSIAN FEMALES	INDIAN FEMALES	AFRICAN FEMALES	TOTAL
TREATMENT PREFERRED BY FEMALES	50.50%	24.40%	15%	90%

5.0 Conclusion

The majority of females diagnosed with PCOS were from Malaysia, representing 61% of cases, with an average age of 23 years. This was followed by 41% from India and 15% from Africa. Common symptoms reported included irregular menstrual cycles, obesity, and hirsutism. Risk factors for PCOS in these populations were associated with genetic predisposition, including a family history of type 2 diabetes mellitus and cardiovascular diseases, particularly when a first-degree relative had been diagnosed with PCOS. Additionally, Malaysian women were more likely to report poor eating habits and lower levels of physical activity compared to their Indian and African counterparts.

PCOS is characterized by a range of symptoms, including menstrual irregularities, elevated androgen levels, polycystic ovaries, insulin resistance, obesity, infertility, and an increased risk of other health complications. There is no single diagnostic test for PCOS; diagnosis is typically based on a combination of medical history, physical examination, laboratory tests, and pelvic ultrasound, according to the Rotterdam criteria, which require at least two of the following: irregular menstrual cycles, hyperandrogenism, and polycystic ovarian morphology.

Treatment for PCOS focuses on alleviating symptoms and reducing associated health risks. Approaches include lifestyle changes such as weight management and exercise, medication to regulate menstrual cycles and control excess androgens, fertility treatments, and cosmetic interventions for hirsutism.

Early diagnosis and comprehensive treatment are crucial to addressing the wide-ranging impacts of PCOS. Although PCOS cannot be cured, effective management can provide significant symptomatic relief. Women with PCOS also face an increased risk of complications during pregnancy, making proactive monitoring and management essential throughout the perinatal period.

6.0 Recommendations

Recommendations for the Malaysian population emphasize maintaining a balanced lifestyle, integrating healthy eating habits and regular physical activity, as key aspects of managing PCOS. Individuals in India are advised to focus on lifestyle changes that incorporate more physical activity. In African populations, dietary habits should be adjusted, focusing on correcting and limiting unhealthy food choices.

• Additionally, correcting sleep patterns is crucial for maintaining a balanced lifestyle. Improvements in sleep and lifestyle changes may positively impact health-related quality of life in women with PCOS, enhancing metabolic, androgenic, and biochemical markers, and leading to improvements in clinical outcomes such as restored ovulation and menstrual regularity.

• Since PCOS is a syndrome characterized by multiple symptoms, maintaining a healthy lifestyle with specific dietary restrictions—such as following a hypocaloric diet, reducing dairy and caffeine intake—along with consistent physical activity, can improve quality of life and help alleviate symptoms.

• It is recommended to regularly monitor cardiovascular risk factors, metabolic issues, and mental health for all women diagnosed with PCOS.

• A personalized treatment approach should be developed, considering each patient's symptoms, health goals, and overall health status. Timely diagnosis and thorough management are critical in addressing the diverse effects of this chronic condition.

• Women with PCOS should avoid foods that may exacerbate inflammation, including:

- Fried foods (such as French fries, chips, fried chicken, or fish)
- Saturated fats (like butter and margarine)

- Red meats (including hamburgers, roast beef, steaks, processed meats, and hot dogs)

- Processed snacks (such as cakes, cookies, candies, and pies)

- Sugary cereals (like instant oatmeal and granola)

- Sugary drinks (including sodas, sweetened teas, and sports drinks)

- Alcoholic beverages

- Refined carbohydrates (such as white bread, pizza crust, pasta, and rolls)

- White rice

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