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Original Research Article

A population-based study on the common androgenic symptoms in PCOS and its management

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ABSTRACT

The aim of this population-based study is to comprehensively investigate the prevalence, severity, and management of common androgenic symptoms in individuals with Polycystic Ovary Syndrome (PCOS). By analyzing a diverse population sample, this study aims to provide valuable insights into the understanding and effective management of androgenic symptoms associated with PCOS. In the endocrine disorder known a PCOS, the ovaries produce an excessive number of androgens, which are male sex hormones that are typically present in women in modest amounts. The disorder known as polycystic ovarian syndrome is characterized by an abundance of small cysts (fluid-filled sacs) produced by the ovaries. Google forms-based survey data was gathered to better understand recent trends among female patients. In order to understand the pattern of androgenic symptoms in PCOS patients, the obtained replies were examined and analyzed. According to this study, hirsutism, alopecia, and acne are the most typical androgenic symptoms experienced by women. Common treatments for these symptoms include taking biotin supplements, applying minoxidil topically for alopecia, and utilizing over-the-counter acne drugs such benzoyl peroxide and salicylic acid. Additionally, drugs that reduce testosterone are used to treat hirsutism. These results underline how crucial it is to identify and treat androgenic symptoms in women because they can significantly affect both physical appearance and general wellbeing.

1. Introduction

Hyperandrogenism (abnormally high androgen levels) and chronically abnormal ovarian function are two symptoms of polycystic ovarian syndrome. Also known as the Stein-Leventhal syndrome, PCOS. The most prevalent hormonal problem in women who are menstruation is PCOS, which affects around one in fifteen women (6–8%). The syndrome, which includes signs and symptoms of hyperandrogenism like acne, hirsutism in 60% to 70% of cases, male pattern baldness, menstrual disturbances (oligomenorrhea or amenorrhea), and dark and velvety skin (Acanthosis nigricans), was first identified 75 years ago based on the abnormal appearance of the ovaries. About half of the women who are affected by the syndrome are obese. Hyperandrogenemia is predominantly a biochemical manifestation of the illness, while polycystic ovaries are a somatic symptom. The clinical symptom of PCOS known as hyperandrogenism, which can limit follicular development, microcysts in the ovaries, anovulation and menstrual changes.[1] Ovulation, menstruation, hairy, and acne disorders are caused by androgen hyperactivation, indicating that hyperandrogenism is not just a clinical hallmark of PCOS but also a significant risk factor.[2] Two of the following three clinical criteria—oligomenorrhoea, hyperandrogenism, and polycystic appearance of the ovaries on transvaginal ultrasonography—must be present in order to make the diagnosis. These consensus criteria have

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undoubtedly made it possible to plan and carry out appropriate research that are focused on the syndrome's various characteristics and have strong external validity.[3] According to estimates from the World Health Organization (WHO), PCOS may affect as many as 116 million women worldwide (3.4%). There are few statistics available on PCOS prevalence in India. Maharashtra has a 22.5% prevalence rate for PCOS, according to the National Health Portal of India. Teenagers were included in a prior South Indian survey that found an incidence of 9.13%. However, those investigations used different PCOS diagnosis standards.

1.1. How are PCOS and androgenic symptoms intertwined?

A woman needs to have two out of the three PCOS characteristics—clinical and/or biochemical androgen excess, oligo- or anovulation, and polycystic ovarian morphology (PCOM) on ultrasound—in order to be given the diagnosis. As high androgen levels are the most recurrent trait in people with PCOD, hyperandrogenism is a key characteristic of PCOS. In hyperandrogenic PCOS, elevated levels of testosterone (T), androstenedione (A4), dehydroepiandrosterone sulfate (DHEAS), as well as the enzyme needed to turn pro-androgens into bioactive androgens, 3-hydroxysteroid dehydrogenase (3-HSD), can all be found in the serum. Excess androgens are produced by diseases like hyperinsulinemia and insulin resistance because they lower levels of the sex hormone binding globulin, which in turn causes a rise in free androgens and unfavorable metabolic profiles. Because of elevated LH levels, which in turn boost ovarian androgen synthesis, women who are exposed to high doses of androgens experience poor follicular growth. The proliferating ovarian theca cells brought on by the LH: FSH imbalance promote steroidogenesis, which in turn induces hyperandrogenism in PCOS women.[4]

1.2. Management and lifestyle modifications of PCOS

A multidisciplinary strategy is used to manage PCOS, including dietary adjustments, medication, and occasionally surgical intervention. A key part of PCOS care is lifestyle changes, which can help with symptoms and lower the chance of long-term consequences.[5–8]

Lifestyle modifications for PCOS typically include the following:

1. Weight management: Insulin resistance is a common symptom of PCOS in women and can cause weight gain and make it difficult to lose weight. PCOS symptoms like irregular menstrual periods, hirsutism, and acne can be reduced by losing even a minor amount of weight (5–10% of body weight). To manage weight, combine a balanced diet with regular exercise and calorie restriction.
2. Exercise: In PCOS patients, exercise can boost ovulation, improve metabolic parameters, and reduce insulin resistance. It is advised to engage in regular exercise at least five days a week for at least 30 minutes each time.
3. Diet: For women with PCOS, a balanced diet high in fiber, protein, and healthy fats is advised rather than one low in refined carbohydrates. In particular, a low-glycemic-index diet can help with insulin resistance and ease PCOS symptoms.
4. 4.Stress management: Stress can exacerbate PCOS symptoms, so it's important to learn relaxation techniques like yoga, meditation, and deep breathing.

In addition to lifestyle modifications, medication is often prescribed to manage symptoms of PCOS. The medication options include:[9]

Hormonal contraceptives can help regulate menstrual periods and lessen PCOS symptoms like hirsutism and acne. Hormonal contraceptives include birth control pills.

1. Metformin: As an insulin-sensitizing drug, metformin can assist women with PCOS reduce insulin resistance, which in turn improves ovulation and metabolic parameters.
2. Anti-Androgens: Spironolactone, an anti-androgen, can help women with PCOS by reducing the signs of hirsutism and acne.

When medicine and lifestyle changes are ineffective, surgical intervention may be considered. Small holes are drilled into the ovaries during ovarian drilling surgery in order to decrease androgen production and enhance ovulation. The removal of the ovaries may be considered in more serious situations.[10–15]

In general, managing PCOS requires a complex strategy that includes dietary changes, medication, and, occasionally, surgical intervention. Lifestyle changes, such as controlling your weight, exercising, eating right, and managing your stress, are essential to PCOS management and can help you feel better and lower your chance of developing long-term issues.

2. Materials and Methods

This is a survey-based study that included 200 adolescent young girls and women aged between 15 and 52 years. Demographic details including age, height, weight, symptoms and information necessary for the study were collected from all the participants after obtaining informed consent. The sample size of 200 women was determined based on power analysis and the previous studies investigating androgenic symptoms in women with PCOS. It is anticipated that this sample size will provide sufficient

statistical power to detect significant association between demographic variables and androgenic symptoms. [16–19]

This was a prospective observational study that was carried out among Asian women in Karnataka, India, from March 2023 to May 2023. The participants were simply chosen from a variety of social media sites, including Facebook and WhatsApp.

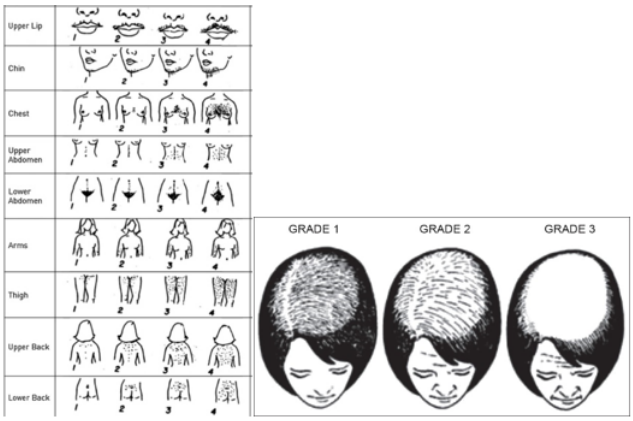

Fig. 1:

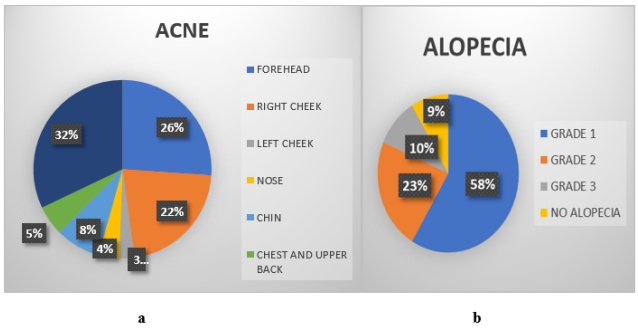

Fig. 2:

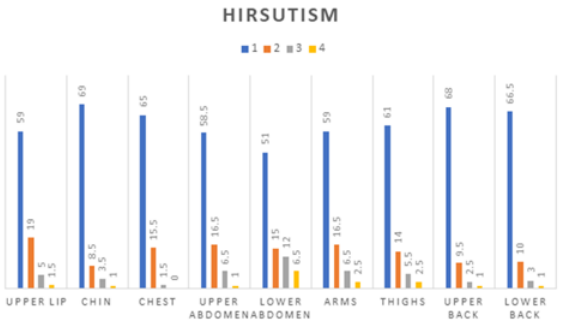

Fig. 3:

Table 1: General parameters

Parameter	Variable	Number of participants (n= 200)
BMI (kg/m2)	Under weight	19%
	Normal	57%
	Over weight	24%
How regular are periods	Normal +/- 2day variation in Cycles	81%
	Irregular > 20 days	15.5%
Abnormal duration of cycles	Frequent <24 day cycles	10%
	Normal 24-38day cycle	75%
	Infrequent >38day cycle	10.5%
Do you have any skin condition characterized by dark, velvety patches in body folds and creases?	Yes	13%
	No	62.5%
	Yes	0.5%
Are you diagnosed with Diabetes?	No	93%
	Maybe	3.5%

Table 2: Period pattern

Parameter	Variable	Number of participants (n = 200)
How regular are your periods	Normal +/- 2day variation in cycle	81%
	Irregular > 20 days	15.5%
	Absent menses (no cycles)	1.5%
Abnormal duration of cycles	Frequent < 24day cycle	10%
	Normal 24-38day cycle	75%
	Infrequent > 38day cycle	10.5%

Table 3: Life style modifications

Parameter	Variable	Number of participants (n= 200)
Did you do any lifestyle modifications after diagnosis. if yes, specify	No lifestyle modifications	51.5%
	Including exercise in daily routine	5.5%
	Yoga	4%
	Brisk walk	5%
	Sedentary lifestyle	1.5%

Table 4: ACNE

Parameter	Variable	Number Of Participans (N= 200)
ACNE	Forehead	26 %
	Right cheek	22 %
	Left cheek	3 %
	Nose	4 %
	Chin	8 %
	Chest and upper back	5 %
	No acne	32%

Table 5: Hirsutism

Parameter	Variable	Number of Participants (n= 200)
Upper lip	1	59%
	2	19%
	3	5%
	4	1.5%
Chin	1	69%
	2	8.5%
	3	3.5%
	4	1%
Chest	1	65%
	2	15.5%
	3	1.5%
	4	0%
Upper abdomen	1	58.5%
	2	16.5%
	3	6.5%
	4	1%
Lower abdomen	1	51%
	2	15%
	3	12%
	4	6.5%
Arms	1	59%
	2	16.5%
	3	6.5%
	4	2.5%
Thighs	1	61%
	2	14%
	3	5.5%
	4	2.5%
Upper back	1	68%
	2	9.5%
	3	2.5%
	4	1%
Lower back	1	66.5%
	2	10%
	3	3%
	4	1%

Table 6: Alopecia

Parameter	Variable	Number of participants (n= 200)
Alopecia	Grade 1	58 %
	Grade 2	23 %
	Grade 3	10 %
	No Alopecia	9 %

3. Results and Discussion

By analyzing the responses obtained, we concluded that the major androgenic symptoms observed in study population were Acne, Hirsutism and Alopecia.

Out of the 200 respondents, a notable proportion of 26% exhibited acne on their forehead, while a significant portion of 22% had acne on their right cheek. In contrast, only a small proportion of 3% reported acne on their left cheek. However, it is worth mentioning that 32% of the population did not report any acne on their body. The next major androgenic symptom Hirsutism was most commonly seen on lower abdomen of 6.5% followed by arms and thighs of 2.5% each and there was absence of hirsutism on the chest region. Alopecia was the third most common androgenic symptom where the majority, accounting for 58% of the respondents, reported grade 1 alopecia, indicating mild hair loss. A significant proportion of 23% reported grade 2 alopecia, which suggests moderate hair loss. Additionally, 10% of the participants reported grade 3 alopecia, indicating severe hair loss. It is worth noting that 9% of the participants did not report any alopecia. These findings highlight that grade 1 was the most prevalent and grade 3 was the least common.

Since there are few medications that may effectively treat all the symptoms of polycystic ovarian syndrome (PCOS), the focus of treatment is mostly on symptom management. The most prevalent symptoms of PCOS, including infertility, hirsutism (excessive hair growth), menstruation problems, and obesity, are now being treated by two primary medications. These treatments include using metformin, changing one's lifestyle to lose weight, and medical or surgical procedures to do so.

To treat all of the PCOS symptoms at once might be difficult, especially when hirsutism and anovulatory infertility are involved. In certain situations, some treatments may be ineffective or inappropriate. For instance, anti-androgens may be dangerous to a male embryo if pregnancy occurs, and oral contraceptives may prevent ovulation.

The management of anovulatory infertility or long-term maintenance medication to reduce PCOS-related symptoms such hirsutism, menstrual abnormalities, and obesity are the two primary areas of PCOS treatment due to the complexity of clinical care.

According to the response provided from 200 respondents, the distribution of BMI (body mass index) categories are as follows: 19% of individuals fall under the “underweight” category, 57% fall within the “normal” weight range, and 24% are classified as “overweight.” These percentages indicate the prevalence of different weight categories based on the BMI which is determined by dividing a person’s height in meters by the square of their weight in kilos. (Refer Table 1)

Regarding the regularity of menstrual cycles, the data suggests that approximately 81% of individual experience cycles with a normal duration, which may vary within a range of plus or minus 2 days. On the other hand, approximately 15.5 % of individuals have irregular menstrual cycles that extend beyond 20 days.

When it comes to the duration of menstrual cycles, the data shows that approximately 10% of individuals experience frequent cycles lasting less than 24 days. Around 75% of individuals have cycles with a normal duration ranging between 24 and 38 days. Additionally, approximately 10.5% of individuals have infrequent cycles that last longer than 38 days. (Refer Table 2)

These statistics provide insights into the prevalence of different BMI categories and the regularity and duration of menstrual cycles among the population under consideration. It is specific to a particular population and may vary based on factors such as age, health conditions, and individual differences.

The presence of a skin condition characterized by dark, velvety patches in body folds and creases in 13 individuals. A majority of 62.5% reported not having this skin condition. Only 0.5% of respondents are diagnosed with diabetes, while 93% reported not being diagnosed with diabetes. A small percentage of 3.5% responded with "Maybe" regarding their diabetes diagnosis. It is important to consult healthcare professionals for accurate diagnosis and guidance. Treating the underlying causes of acanthosis nigricans, such as insulin resistance or hormonal imbalances, may help reduce the appearance of the dark patches. Regular monitoring of blood sugar levels and maintaining a healthy lifestyle are beneficial for overall skin health and diabetes management.

Hirsutism is a condition characterized by excessive hair growth in areas where it is typically seen in males but not females. On Examining the data, we observe the following patterns:

On the upper lip, the majority of respondents (59%) reported having grade 1 hirsutism, indicating minimal hair growth. 19% had grade 2, 5% had grade 3, and only 1.5% had grade 4, representing more significant hair growth in this area. For the chin, 69% of respondents reported grade 1 hirsutism, while 8.5% had grade 2, 3.5% had grade 3, and merely 1% had grade 4 hair growth. This suggests that the majority experienced minimal hair growth on the chin. Regarding the chest area, 65% reported grade 1 hirsutism, 15.5% had grade 2, 1.5% had grade 3, and no respondents reported grade 4 hair growth. This indicates that excessive hair growth on the chest was relatively uncommon among the surveyed individuals. Moving to the upper abdomen, 58.5% had grade 1 hirsutism, 16.5% had grade 2, 6.5% had grade 3, and 1% had grade 4. Similarly, for the lower abdomen, the majority (51%) experienced grade 1 hirsutism, with decreasing percentages as the hair growth severity increased. Concerning the arms and thighs, the majority of respondents experienced grade 1 hirsutism (59% and 61%, respectively), while the percentages decreased for higher grades. This indicates that excessive hair growth on the arms and thighs was not widespread among the surveyed individuals. For the upper and lower back, a similar trend was observed, with the majority reporting grade 1 hirsutism (68.5% and 66.5% respectively), followed by decreasing percentages for higher grades.

Overall, the data suggests that grade 1 hirsutism, representing minimal hair growth, is the most common across all body areas. Higher grades of hair growth, indicating more severe hirsutism, were reported by smaller percentages of the participants. It is important to note that hirsutism can have various underlying causes, and individuals experiencing excessive hair growth should consult with healthcare professionals for proper evaluation, diagnosis, and management options tailored to their specific situation.

The distribution of acne in different parts of the face and body areas. The forehead stands out as the most affected region, with 26 individuals reporting acne. The right cheek follows closely behind, with 22 individuals experiencing acne, while only 3 individuals reported acne on the left cheek. The nose and chin also had acne cases, with 4 and 8 individuals respectively reporting acne in these areas. Acne occurrence was relatively low on the chest and upper back, with only 5 individuals reporting acne. On the positive side, 32 respondents stated that they did not have acne. These findings highlight the variability in acne prevalence across different facial and body areas, with the forehead and right cheek being the most commonly affected. Proper skincare and dermatological advice are crucial in managing acne and maintaining healthy skin

The distribution of different grades of alopecia from the data collected by 200 respondents. Grade 1 alopecia was reported by 58 individuals, grade 2 by 23 individuals, and grade 3 by 10 individuals. Nine respondents reported no alopecia. These findings indicate varying levels of hair loss within the surveyed population, with grade 1 being the most prevalent and grade 3 the least common.

The data on whether the respondents included lifestyle modifications showed 51.5% with no lifestyle modifications after their diagnosis. However, a small percentage of individuals made specific lifestyle changes. Approximately

5.5% included exercise in their daily routine, 4% practiced yoga, 5% engaged in brisk walking, and 1.5% continued with a sedentary lifestyle. These findings indicate that while the majority did not make lifestyle modifications, a subset of individuals implemented various activities such as exercise, yoga, and brisk walking in response to their diagnosis. (Refer Table 3)

Based on the research conducted using a questionnaire-based survey the common androgenic symptoms observed were:

1. Acne
2. Alopecia
3. Hirsutism

4. Conclusion

This study concludes that the most common androgenic symptoms experienced by women are acne, alopecia, and hirsutism. To cope with these symptoms, common management methods include using over-the-counter acne medications like benzoyl peroxide and salicylic acid, taking biotin supplements, and applying minoxidil for alopecia. Additionally, androgen suppressing medications are used for managing hirsutism. These findings emphasize the importance of recognizing and addressing androgenic symptoms in women, as they can have a significant impact on physical appearance and well-being. Further research is needed to explore alternative approaches and refine existing management strategies for these symptoms.

5. Abbreviations

1. PCOS: Polycystic ovarian syndrome
2. PCOM: Polycystic ovarian Morphology
3. HSD: Hydroxysteroid Dehydrogenase
4. DHEAS: Dehydroepiandrosterone Sulphate
5. LH: Leutinizing Hormone
6. FSH: Follicle Stimulating Hormone
7. BMI: Body Mass Index
8. OTC: Over The Counter

6. Source of Funding

None.

7. Conflict of Interest

There are no conflicts of interest.

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