***Original Research Article***

**TO ASSESS THE IMPACT OF PHARMACIST’S INTERVENTION ON KNOWLEDGE OF ADOLESCENT GIRLS REGARDING POLYCYSTIC OVARIAN SYNDROME AT DIFFERENT SCHOOLS OF KALABURAGI CITY**

**Abstract:**

**Aims:** Polycystic ovarian syndrome (PCOS) is a common endocrinopathy affecting 116 million women globally (3.4%). In India, one in 10 women is affected. Often mistaken for a pubertal issue, PCOS leads to gynecological problems and is a leading cause of infertility. Health education, particularly for adolescent girls, is crucial for awareness, early detection, and prevention. **Objective:** This study aimed to assess knowledge and evaluate the impact of an educational intervention on PCOS awareness among adolescent girls. **Study Design:** A pre-post prospective educational interventional study was conducted among 862 adolescent girls (12–16 years) from high schools in Kalaburagi city. A pre-test was conducted, followed by a two-week educational intervention on PCOS. After 14 days, a post-test using the same questionnaire was administered. Data were collected using a structured form and analyzed with IBM SPSS 20.0. A P-value < 0.05 was considered significant. **Results:** Among 862 participants, 314 (36.4%) were 15 years old, and 744 (86.3%) were from urban areas. 755 (87.6%) had no prior knowledge of PCOS. Among the 107 informed participants, 58 (54.2%) learned from family, 27 (25.2%) from doctors, 23 (21.5%) from the internet, and 14 (13.1%) from friends. A statistically significant improvement (P < 0.001) in knowledge was observed, with a mean increase of 51.06% post-intervention.

**Conclusion:** Our study highlights a significant lack of PCOS awareness among adolescent girls. However, the educational intervention effectively improved knowledge, underscoring the importance of structured health education programs, empowering young individuals with essential health information is vital for their well-being.Keywords: PCOS, PCOD, endocrinopathy, gynecological, adolescents, infertility Obstetrics and gynecology.

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**Introduction:**

Polycystic ovarian syndrome (PCOS) was first described by Hippocrates in 377–460 BC as “women whose menstruation is less than 3 days or meager are robust, with a healthy complexion and a masculine appearance; yet they are not concerned about bearing children nor do they become pregnant”.[1] PCOS is a heterogeneous, multisystem endocrinopathy in women of reproductive age with the ovarian expression of various metabolic disturbances and a wide spectrum of clinical features such as obesity, menstrual abnormalities, and hyperandrogenism.[2] It was originally described in 1935 by Stein and Leventhal as a syndrome.[3] The etiology of PCOS remains incompletely understood.[4] the current concept of the pathogenesis of PCOS is the unbalanced release of FSH and LH by the pituitary and insulin resistance.[5]  Girls with low birth weight as well as a family history of diabetes mellitus, premature birth, cardiovascular disease, hypertension, hormonal imbalance, genetic problem, endocrine disease, weakened immune system, environmental factors, and toxin effect are at risk for developing PCOS.[6] For the diagnosis of PCOS, the Rotterdam criteria are widely used worldwide, and its use is also recommended by the Endocrine Society in 2013, the American Academy of Family Physicians (AAFP) Guidelines in 2016, and the International Evidence-based Guideline for the assessment and management of polycystic ovary syndrome 2018.[7] PCOS is a never-ending hyperandrogenic condition that has so many vital short-period and long-period complications.[8] The short-term complications of PCOS include menstrual irregularities, hyperandrogenism, insulin resistance, hyperinsulinemia, obstructive sleep apnea, dyslipidemia, oligoovulation, and anovulation.[9] Long-term complications include heart disease, diabetes, and metabolic syndrome. Moreover, women with PCOS have a threefold increase in the risk of developing endometrial cancer compared to women without PCOS.[10] This syndrome is a leading cause of infertility, accounting for about 20% of cases and a higher miscarriage rate compared to other sub-fertile women.[2] In addition to the gynaecological, endocrine, and metabolic features of PCOS many mental complications are also associated with this condition.[11] A Brazilian research study concluded that 58% of women with PCOS exhibited at least one psychiatric disorder.[12] Thus, women with PCOS should be diagnosed early, treated correctly, and followed up carefully to avoid these detrimental effects.[1]

**Need for study**

PCOS is a leading endocrinological disorder.[13] Over 7 million individuals suffer from PCOS. That figure exceeds the combined totals for breast cancer, osteoarthritis, neurological disorders, and lupus.[14] It is one of the most common disorders, yet most neglected, conditions affecting one in 15 women worldwide.[15] According to a study by PCOS Society, one in every 10 women in India has PCOS. And out of every 10 women diagnosed with PCOS, six are teenage girls.[6] Some females reach menarche as early as 8-9 years. Due to lack of awareness, many menstrual problems including PCOS remain unidentified and untreated, especially among the rural population.[16] Thus, adolescents are more prone to health risks due to hormonal imbalances, lifestyle changes, and lack of knowledge.[17] The disease can be overlooked until severe complications arise, most commonly infertility, the point at which most patients seek medical attention secondary to difficulty conceiving.[18] This makes them humiliated and lowers their self-confidence, as a result, their social and interpersonal relationships are hampered.[11] Late diagnosis and no timely measures increase the risk of many gynecological cancers such as endometrial, ovarian, and breast cancers.[19] The lifetime risk of endometrial cancer that has been estimated in these women is 2.7 times more than that in women without this syndrome.[20] The societal taboos that prevent free discussion of the subject, particularly among the young group, are the main reason why research on teenagers' reproductive concerns remains limited.[21] Improving awareness and understanding of PCOS is regarded as a crucial first step in the management of the syndrome.

**AIM OF THE STUDY AIM & OBJECTIVES**

• To assess the knowledge and determine the effect of educational intervention among adolescent girls regarding PCOS

**OBJECTIVES**

• To assess the level of awareness and knowledge regarding PCOS among high school students.

• To improve the knowledge about PCOS among high school students.

• To enhance PCOS awareness and knowledge among high school students

• To find out the association between pre-test knowledge regarding PCOS and selected demographic variables

**MATERIALS AND METHODS**

Study Procedure: -

The present educational interventional study was conducted among adolescent girls of higher secondary schools in Kalaburagi city to determine the knowledge and assess the effectiveness of structured teaching programs regarding PCOS using Questionnaires. The study was initiated after the approval from Institutional Review Board (IRB). Students were given an assent form which was explained by their class teacher regarding the importance of study. A questionnaire was prepared from previously published articles, textbooks, and various guidelines and was validated by IRB. For the study we considered different medium high schools of Kalaburagi city and the questionnaire was made available in two languages, English and Kannada as medium instructions by the schools. The questionnaire was divided into two parts: the first part of the questionnaire consists of information seeking demographic data which includes name, age, standard, school, and information regarding attainment of menarche and whether they previously heard about PCOS/PCOD with the source of information. The second part contains 20 knowledge-based questions in a multiple-choice pattern regarding PCOS. Each correct answer was awarded a score of ‘1’ and ‘0’ if wrong or unanswered respectively. The maximum score was 20. After the data collection, a pre-test was conducted by administering the questionnaires regarding PCOS. After the pre-test, the students were educated by using ppt presentation, one-to-one interaction, and distribution of PCOS information leaflets. After 14 days, the post-test was conducted on the same subjects by using the same structured knowledge questionnaire. Finally, the collected data from different schools was compiled and analyzed by using Microsoft Excel, SPSS-20 and subjected to the relevant statistical test for additional analysis. A parametric test, often known as the student-paired t-test, was employed to assess knowledge. After the data had been evaluated, thesis writing began.

**RESULTS**

The study assessed the impact of pharmacist intervention on adolescent girls knowledge regarding Polycystic Ovarian Syndrome (PCOS) across 13 different schools in Kalaburagi city. A total of 949 adolescent girls participated in the pre-test phase. However, 87 participants were absent on the post-test day, leaving 862 girls for the final analysis.

**Table No.1: Depicting the details of age, medium of school, class, area of residence, attainment of menarche, prior source of information regarding PCOS**

|  |  |  |  |
| --- | --- | --- | --- |
| **Demographic details** |  | **Number of adolescent girls** | **Percentage** |
| **Age in years** | **Age interval**  **12 years**  **13 years**  **14 years**  **15 years**  **16 years**  **Total** | 15  168  280  314  85  **862** | 1.7  19.5  32.5  36.4  9.9  **100.0** |
| **Total** | 862 | 100.0 |
| **Medium of School** | **English**  **Kannada**  **Urdu** | 546  171  145 | 63.4  19.8  16.8 |
| **Total** | 862 | 100.0 |
| **Class** | **8th**  **9th**  **10th** | 215  296  351 | 24.9  34.4  40.7 |
| **Total** | 862 | 100.0 |
| **Area of residence** | **Urban**  **Rural** | 744  118 | 86.3  13.7 |
| **Total** | 862 | 100.0 |
| **Attainment of menarche** | **Yes** | 92  551  121 | 10.6  63.9  14.0 |
| **10 – 11**  **12 – 13**  **14 – 15** |
| **No** | 98 | 11.3 |
| **Total** | 862 | 100.0 |
| **Prior information** | **Yes** | 58  27  23  14 | 54.2  25.2  21.5  13.1 |
| **Family members**  **Doctors**  **Internet/mass media**  **Friends** |
| **No** | 755 | 87.6 |

The age distribution of participants showed that the majority (36.4%) were 15 years old, followed by 32.5% aged 14 years, 19.5% aged 13 years, 9.9% aged 16 years, and only 1.7% aged 12 years.

Regarding the medium of instruction, most adolescent girls (63.4%) belonged to English-medium schools, while 19.8% were from Kannada-medium schools, and 16.8% were from Urdu-medium schools.

The academic level of participants indicated that 40.7% were studying in the 10th standard, followed by 34.4% in the 9th standard and 24.9% in the 8th standard.

In terms of residential background, the majority (86.3%) of participants resided in urban areas, while 13.7% belonged to rural areas.

Menstrual history analysis revealed that 88.6% of the adolescent girls had attained menarche, with the majority (72.1%) experiencing it between the ages of 12 and 13 years.

Awareness about PCOS/PCOD was found to be significantly low among participants. Out of 862 adolescent girls, 87.6% had no prior knowledge about PCOS, while only 12.4% had some awareness. Among those who were aware, the primary source of information was family members (54.2%), followed by doctors (25.2%), internet/mass media (21.5%), and friends (13.1%).

**Table No.2: Comparison of knowledge score with demographical profile of adolescent girls**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Demographical**  **Profile** | **Categories** | **Number of girls** | **Pre-Test**  **Mean ± SD** | **Mean %** | **Test- values**  **P-value** |
| **Age** | 12 | 15 | 6.67 ± 2.74 | 33.35% | **F = 4.501**  **P =0.001, HS** |
| 13 | 168 | 6.33 ± 2.52 | 31.65% |
| 14 | 280 | 7.32 ± 3.00 | 36.60% |
| 15 | 314 | 7.43 ± 3.06 | 37.15 |
| 16 | 85 | 7.42 ± 2.99 | 37.10 |
| **Study class** | 8th std. | 215 | 6.49 ± 2.59 | 32.45% | **F = 13.797**  **P =0.000, HS** |
| 9th std. | 296 | 7.62 ± 2.94 | 38.10% |
| 10th std. | 351 | 7.54 ± 3.16 | 37.7% |
| **Residential area** | Urban | 744 | 7.68 ± 2.86 | 38.40% | **F = 17.153**  **P =0.000, HS** |
| Rural | 118 | 6.27 ± 2.93 | 31.35% |
| **Source of information** | Doctors | 27 | 9.92 ± 2.85 | 49.60% | **F = 24.756**  **P =0.000, HS** |
| Friends | 14 | 8.35 ± 2.23 | 41.75% |
| Family members | 58 | 8.75 ± 3.16 | 43.75% |
| Internet/mass media | 23 | 11.08 ± 2.64 | 55.50% |
| No sources | 755 | 6.86 ± 2.81 | 34.30% |
| **Attainment of menarche** | Yes | 764 | 7.34 ± 3.01 | 36.6% | **t = 4.786**  **P =0.000, HS** |
| No | 98 | 5.98 ± 1.92 | 29.9% |

Age: Adolescent girls aged 12 and 13 had significantly lower knowledge of PCOS compared to those aged 14, 15, and 16 (P<0.001).

Study class: 8th standard girls demonstrated lower knowledge of PCOS compared to 9th and 10th standard girls, showing a statistically significant difference (P<0.001).

Residence: Rural adolescent girls had significantly lower knowledge of PCOS compared to urban girls (P<0.001).

Source of Information: A highly significant difference in knowledge scores was observed based on the source of information (P<0.001).

Menarche: A highly significant difference in knowledge scores was found based on the attainment of menarche (P<0.001).

**Table No.3: Comparison of knowledge scores of PCOS between Pre and Post-test**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **knowledge scores** | **Categories** | **Pre-test** | | **Post-test** | |
| No. | % | No | % |
| **0—4** | **Poor** | 163 | 18.9 | 0 | 0.0 |
| **5—9** | **Moderate** | 521 | 60.4 | 93 | 10.8 |
| **10—14** | **Adequate** | 172 | 20.0 | 288 | 33.4 |
| **15—20** | **Excellent** | 6 | 0.7 | 481 | 55.8 |
| **Total** | **---** | **862** | **100.0** | **862** | **100.0** |
| **Mean ± SD** | **----** | **7.16 ± 2.95** | | **14.63 ± 3.72** | |
| **Diff. of mean** | **---** | **7.47 (51.06%)** | | | |
| **Paired t-test and p-value** | **t = 28.53, P = 0.0001, HS** | | | | |

The study reveals that adolescent girls aged 12 and 13 had significantly lower knowledge of PCOS compared to those aged 14, 15, and 16 (P<0.001). Similarly, 8th standard students had lower knowledge than 9th and 10th standard students (P<0.001). Rural adolescent girls demonstrated significantly lower knowledge of PCOS compared to urban girls (P<0.001). Additionally, knowledge scores were significantly associated with the source of information about PCOS (P<0.001) and the attainment of menarche (P<0.001).

**Figure No.1: Bar diagram represent comparison of mean knowledge score of PCOS**

**between Pre and Post-test**

**Table No.4: Area-wise mean, SD and mean percentage of girls of pre-test and post-test knowledge score regarding PCOS**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Area of knowledge score** | **Max score** | **Pre-test** | | | **Post –test** | | | **Paired t-test and P-value** |
| **Mean** | **SD** | **Mean%** | **Mean** | **SD** | **Mean%** |
| **Anatomy & physiology** | **4** | **1.62** | **1.32** | **40.5%** | **3.12** | **1.54** | **78.0%** | **t = 21.83**  **P = 0.000, HS** |
| **Risk factors and causes** | **2** | **0.85** | **0.42** | **42.5%** | **1.61** | **0.45** | **80.5%** | **t = 27.13**  **P = 0.000, HS** |
| **Clinical manifestations** | **3** | **1.02** | **0.43** | **34.0%** | **1.82** | **0.63** | **60.7%** | **t = 13.73**  **P = 0.000, HS** |
| **Management** | **5** | **1.65** | **1.13** | **33.0%** | **3.52** | **1.34** | **70.4%** | **t = 23.52**  **P = 0.000, HS** |
| **Prevention & complications** | **3** | **0.98** | **0.31** | **32.7%** | **2.30** | **0.93** | **76.7%** | **t = 30.17**  **P = 0.000, HS** |
| **General aspects** | **3** | **1.01** | **0.45** | **33.7%** | **2.26** | **0.85** | **75.3%** | **t = 31.41**  **P = 0.000, HS** |
| **Overall** | **20** | 7.16 | **2.95** | **35.8%** | **14.63** | **3.72** | **73.15%** | **t = 28.53**  **P = 0.000, HS** |

The study reveals that, among the different areas of knowledge on PCOS, the lowest scores were observed in the clinical manifestations section, while the highest scores were seen in the risk factors and causes section. A statistically highly significant improvement (P<0.001) was observed in all areas of knowledge between the pre-test and post-test. The post-test mean scores were significantly higher across all areas compared to the pre-test scores. This indicates that the standardized structured teaching program on PCOS was effective in enhancing knowledge across all assessed domains.

**Figure No.2: Multiple bar diagram shows area wise mean, SD and mean percentage of girls of pre-test and post-test knowledge score regarding PCOS**

**Discussion**

Adolescence brings significant physiological and psychological changes, yet many girls lack proper guidance on menstrual health due to societal restrictions. PCOS is a growing concern, and to our knowledge, this is the first educational intervention study of its kind in Kalaburagi.

Our study found that younger adolescents (ages 12-13) had lower PCOS awareness than older girls (ages 14-16), aligning with previous studies by Mohammed HAA et al. (2016) and Batra B et al. (2018). Similarly, 8th-grade students had significantly lower knowledge compared to 9th and 10th graders. Rural girls also demonstrated lower awareness than urban girls, consistent with findings by Sayed SLME et al. (2020).

Regarding the medium of instruction, girls from English-medium schools had higher knowledge scores than those from Kannada and Urdu mediums, a previously unexplored aspect. Additionally, 87.6% of participants lacked prior PCOS awareness, with family being the most common source of information, aligning with studies by Salama AM et al. (2019) and Sindhu S et al. (2021).

Our study also found a significant association between menarche and knowledge scores—adolescents who had attained menarche demonstrated higher pre-test knowledge. This relationship has not been previously explored, marking a unique contribution of our study.

It's worth noting that our results align with a similar study conducted by Rawat S et al., (2017), where a mean difference of 11.42 was reported, the pre and post-test mean score were 11.13 and 22.5 and the t value was 23.45. Another study done by Varughese Ak et al., (2018) shows a mean difference between pre and post-test was 9.91, the pre-test mean was 13.5 and post-test mean was 23.16 and the t value was 14.15. While the magnitude of improvement differs, these studies demonstrate the positive impact of educational interventions on knowledge scores.

Overall, our study underscores the critical role of structured educational programs in enhancing PCOS awareness among adolescent girls, particularly in addressing disparities based on age, educational background, and residential area.

**Conclusions:**

In summary, PCOS is a prevalent concern among adolescent females following puberty, with the potential to lead to serious health-related issues and impact reproductive health when left untreated. This study underscores a significant gap in PCOS awareness among adolescents, indicating a broader lack of understanding within the population. This deficit in knowledge may deter affected individuals from seeking timely medical intervention. However, the study also offers a ray of hope, demonstrating that early detection and prevention of PCOS-related complications are achievable through educational initiatives aimed at adolescent girls. Our educational program proved effective in equipping adolescent girls with the necessary knowledge to recognize and address PCOS. Prior to the program, a mere 12.4% of the 862 participants were acquainted with PCOS, leaving 87.6% unaware of the condition. In Post educational intervention, there was a notable increase in PCOS knowledge scores. The mean post-test scores significantly exceeded the pre-test score across all variables, with an impressive overall mean difference of approximately 51.06% (7.47). This signifies the positive impact of pharmacist-led initiatives.

In light of these findings, it is evident that pharmacists are well-positioned to bridge the awareness gap and by leveraging their expertise in patient education and outreach, pharmacists can contribute significantly to the overall well-being of the community, particularly in addressing health issues like PCOS. The study findings underscore that when armed with the right information, adolescents are better equipped to make informed choices, seek timely medical intervention, and ultimately achieve better health outcomes.

Recommendation & Future Outlook:

1. Prevalence Study: Conducting studies to assess the prevalence of PCOS among adolescent students would offer critical insights into the epidemiology of PCOS within this vulnerable population, helping healthcare providers develop targeted strategies for early diagnosis and management.
2. Identifying High-Risk Adolescents: Implementing screening surveys to identify adolescents at high risk for PCOS can lay the groundwork for preventive healthcare initiatives, including lifestyle modifications and early medical interventions.
3. Studies in Adult Women: Extending this research to adult women could reveal how knowledge and intervention strategies evolve across different life stages, contributing to better long-term reproductive and metabolic health outcomes.
4. Government Initiatives: Government-led awareness programs aimed at schools and communities could enhance early detection rates and improve health literacy regarding PCOS, ultimately reducing the burden of the condition on healthcare systems.
5. Further Research: Larger, multi-center studies are essential to validate the findings of pharmacist-led educational interventions and to explore their effectiveness across various demographics and healthcare settings. These studies could guide future policy and clinical practice aimed at improving adolescent health.

**CONSENT**

Informed consent was obtained from the parents or legal guardians of all adolescent participants involved in this study. The consent included approval for participation and publication of the study findings. A copy of the signed consent forms is available for review by the journal’s editorial office upon request.

**ETHICAL APPROVAL**

All authors hereby declare that this study was reviewed and approved by the, Institutional Review Board (IRB) and conducted in accordance with the ethical standards of the 1964 Declaration of Helsinki. The ethical approval reference number is IRB003/PP/2022-23. A copy of the ethical approval document is available for review by the journal’s editorial office upon request.

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