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Effectiveness of Physical Activity program on Symptom Management in Adolescents with PCOS

Anu P[1], Hemavathi V[2]

[1]Research Scholar, Department of Pediatric Nursing, Bharath institute of higher education and research, Chennai, Tamil Nadu, India

[2]Principal, Department of Psychiatric Nursing, Sree Balaji College of Nursing, Chennai, Tamil Nadu, India.

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ABSTRACT

Background: Polycystic Ovary Syndrome (PCOS) is a complex endocrine disorder that significantly impacts adolescent girls, characterized by a constellation of symptoms including menstrual irregularities, hyperandrogenism, and metabolic disturbances.

Aim: The study aimed to evaluate the effectiveness of Physical Activity program on Symptom Management in Adolescents with PCOS.

Methodology: A pre-experimental, single-group pretest-posttest design was used to evaluate the effectiveness of a physical activity program on managing PCOS symptoms in adolescents aged 12-19 years. The study assessed participants before and after the intervention without a control group. A total of 150 adolescent females with a confirmed PCOS diagnosis were recruited through convenience sampling from selected schools. Participants provided informed consent, and those with other serious medical conditions were excluded.

Results: The result revealed that significant improvements were observed post-intervention, with reductions in the severity of symptoms like darkened skin (from 56.45% to 29.03%), bodily pain (lower back) (from 54.84% to 37.10%), and weight loss (from 54.84% to 27.42%). Anthropometric measures showed significant reductions in weight, BMI, and waist circumference (p-value < 0.05), indicating the effectiveness of the 8-week physical activity program in improving physical health indicators.'

Conclusion: The study concludes that there is a significant improvement in anthropometric measures such as weight, BMI, and waist circumference further confirm the program's effectiveness in addressing the health complexities associated with PCOS.

Keywords: *Polycystic ovary syndrome, Adolescents, Physical activity.*

1. INTRODUCTION

Polycystic Ovary Syndrome (PCOS) is a complex endocrine disorder that significantly impacts adolescent girls, characterized by a constellation of symptoms including menstrual irregularities, hyperandrogenism, and metabolic disturbances. Worldwide, the prevalence of PCOS is estimated to affect between 5% and 15% of women, translating to approximately 116 million women across the globe **(Srinivasan et al., 2024; , Shrestha et al., 2019; , Mishra, 2024).** Various studies corroborate this statistic, reporting that PCOD affects around 3.4% of the female population, with prevalence rates differing based on geographical and ethnic factors (Mishra, 2024). In particular, some reports indicate that this figure can fluctuate between 4% and 20%, depending on the diagnostic criteria employed and the cohort studied **(Srinivasan et al., 2024; , Shrestha et al., 2019).**

Within India, the landscape of PCOS prevalence is somewhat varied. It is crucial to note that several studies have indicated a prevalence rate ranging from 3.7% to 22.5% of adolescent girls and young women diagnosed with PCOD, reflecting the condition's growing recognition and the pressing need for tailored health interventions **(Manvita et al., 2022; , Sridhar & Susmitha, 2018).** Due to the cultural and socio-economic diversity across regions in India, localized factors may contribute to these discrepancies **(Mishra, 2024).** Nevertheless, it is acknowledged that the actual figures might be higher, as many cases remain undiagnosed or misdiagnosed due to insufficient awareness and access to healthcare resources **(Begum & Areen, 2023).** Overall, these statistics highlight the importance of ongoing research and public health strategies to manage PCOD effectively, particularly in young populations vulnerable to related health complications.

Regular physical activity has been shown to improve metabolic health in adolescents with PCOS, primarily by enhancing insulin sensitivity and aiding in weight management. This is particularly relevant given that obesity is prevalent among this demographic, potentially complicating the hormonal imbalances associated with PCOS **(Mishra, 2024).** Evidence indicates that engaging in continuous moderate-to-vigorous physical activity helps reduce hyperandrogenism, which is one of the critical contributing factors to the menstrual irregularities often observed in PCOS **(Saha, 2023).** Moreover, maintaining active lifestyles may alleviate obesity-related complications and improve overall well-being in adolescents.

In addition to its physiological benefits, physical activity has profound implications for mental health, especially in adolescents with chronic health conditions such as PCOS. There is a substantial body of literature indicating that physical activity can serve as a buffer against the onset of anxiety and depressive symptoms prevalent in youth, including those suffering from PCOS **(Bélair et al., 2018; , Michael et al., 2015).** For instance, Bélair et al. highlight the relationship between leisure-time physical activity and a reduction in symptoms of depression and anxiety in adolescents, reinforcing the notion of physical activity as a beneficial intervention for mental health maintenance **(Bélair et al., 2018).**

(Sun et al., 2022). Diabetes h

Furthermore, structured physical activity programs have demonstrated positive impacts on the psychosocial status of adolescents. Programs that incorporate social interaction alongside physical exercise not only enhance physical fitness but also foster social connections and improve self-esteem. These psychosocial benefits are particularly pertinent for adolescents dealing with the social stigmas and psychosocial stressors that often accompany chronic conditions like PCOS **(Anker et al., 2024).**

In terms of mental health outcomes, studies have consistently shown that increased physical activity correlates with lower levels of perceived stress and anxiety among youth (Jerome et al., 2022; , Bustamante et al., 2023). Adolescents with PCOS often report elevated anxiety levels related to their appearance, body image, and overall self-worth, which can be aggravated by societal standards and pressures. Engaging in physical activities such as dance or team sports has been found to be particularly effective in providing a sense of accomplishment and belonging, which are critical for psychological resilience **(Atkins et al., 2018).**

The neurobiological mechanisms underpinning the positive effects of physical activity on mental health are increasingly coming into focus. Engaging in physical activities is associated with the release of neurotransmitters such as endorphins, which help alleviate symptoms of depression and anxiety **(Rodríguez-Ayllón et al., 2023).** Additionally, regular physical activity promotes neuroplasticity, leading to improved cognitive function and emotional regulation, factors that are particularly beneficial for adolescents managing the hormonal fluctuations typically associated with PCOS.

Given the multifaceted benefits associated with physical activity, the integration of exercise recommendations into routine clinical practice for adolescents with PCOS is imperative. Additionally, interdisciplinary approaches that involve endocrinologists, nutritionists, and mental health professionals are essential to create holistic management plans that encompass physical, emotional, and psychological health strategies **(Nyrop et al., 2016).**

2. MATERIALS AND METHODS

Study Design:

A pre-experimental design, specifically a single-group pretest-posttest design, was used to assess the effectiveness of a physical activity program on managing the symptoms of polycystic ovary syndrome (PCOS) among adolescents aged 12-19 years. In this design, participants are assessed before (pretest) and after (posttest) the intervention without the use of a control group. The primary aim was to evaluate whether physical activity can alleviate the severity of PCOS symptoms.

Participants:

A total of 150 adolescent females diagnosed with PCOS were recruited from selected schools using convenience sampling. Eligible participants were between the ages of 12 and 19, had a confirmed PCOS diagnosis, and provided informed consent. Adolescents who did not provide consent or had other serious medical conditions were excluded from the study.

Tools:

The study utilized several tools to assess the impact of the physical activity program on adolescents with PCOS. The **PCOS Symptom Scale (PCOS-SS)** was used to evaluate the severity of common PCOS symptoms, including menstrual irregularities, acne, hirsutism, weight gain, and pelvic pain. This scale measured both the frequency and severity of these symptoms, with higher scores indicating more severe symptoms. **Anthropometric measurements,** including weight, height, body mass index (BMI), and waist circumference, were also taken at both the pretest and posttest to assess changes in body composition. A **demographic questionnaire** was used to gather essential background information such as age, education level, and family income.

Intervention: The participants engaged in a structured physical activity program lasting 8 weeks. The program included aerobic exercises, strength training, and flexibility exercises, aiming to improve overall physical fitness and reduce PCOS

symptoms. The sessions were conducted three times a week, lasting 45-60 minutes per session, with supervision to ensure correct technique and adherence.

Data Collection Procedure:

Before the intervention, participants provided informed consent, and the study received ethical approval from the institutional review board. They completed the PCOS Symptom Scale to assess the severity of their symptoms, and anthropometric measurements, including weight, height, BMI, and waist circumference, were recorded. After the 8-week physical activity program, participants repeated the PCOS Symptom Scale and underwent a final set of anthropometric measurements to evaluate any changes in both their symptoms and physical health indicators.

Ethical considerations:

The study was approved by the institutional ethical committee, and informed consent was obtained from all participants. Confidentiality was maintained throughout, and participation was voluntary with the right to withdraw at any time without consequence. Ethical guidelines, including minimizing harm and ensuring participant safety, were strictly followed throughout the research.

Statistical Analysis:

Descriptive statistics were used to summarize the demographic data, symptom severity scores, and anthropometric measurements. Paired t-tests were applied to compare pretest and posttest scores for PCOS symptom severity and anthropometric measurements. Statistical significance was set at $p < 0.05$, and the data was analyzed to identify any improvements in symptom management and physical health following the intervention.

3. RESULTS

Demographic characteristics:

The data showed that the majority of the participants were in the 16-19 years age group, accounting for 70.97%, while 29.03% were in the 12-15 years age group. In terms of gender, all participants were female, representing 100% of the sample. Regarding education level, 48.39% of participants were in high school, 29.03% were in middle school, and 22.58% were in college. For family income, 48.39% came from middle-income families, 32.26% from low-income families, and 19.35% from high-income families.

PCOS symptoms

The table presents the symptom severity of adolescents with PCOS before and after a management intervention. It compares the pretest and posttest frequency and percentage for each symptom. Darkened skin was reported as a high severity symptom for 56.45% of participants in the pretest, which decreased to 29.03% posttest. Similarly, bodily pain (lower back) and weight loss had reductions in severity from 54.84% and 54.84% in the pretest to 37.10% and 27.42% in the posttest, respectively. Other symptoms such as hair loss and facial hair showed improvements in frequency and severity post-intervention. The data suggests that the intervention led to a reduction in the severity of various PCOS symptoms, with many participants experiencing less frequent and severe symptoms after the management program.

Anthropometric measurements:

This table displays the anthropometric measures, including weight, BMI, and waist circumference, before and after the intervention, along with their respective means, standard deviations (SD), t-values, and p-values. The results show statistically significant changes in all measures after the 8-week physical activity program (p-value < 0.05).

Table 1: Demographic Characteristics of Adolescent Participants with PCOS

Demographic Variable	Category	Frequency (n)	Percentage (%)
Age	12-15 years	18	29.03%
	16-19 years	44	70.97%
Education Level	Middle School	18	29.03%
	High School	30	48.39%
	College	14	22.58%
Family Income	Low Income	20	32.26%

	Middle Income	30	48.39%
	High Income	12	19.35%

Table 2 : PCOS symptoms before and after physical activity

Symptom	Pretest (Frequency & Percentage)	Posttest (Frequency & Percentage)
Darkened skin	35 (56.45%)	18 (29.03%)
Bodily pain (lower back)	34 (54.84%)	23 (37.10%)
Weight loss	34 (54.84%)	17 (27.42%)
Body hair	40 (64.52%)	22 (35.48%)
Pain during sex	35 (56.45%)	19 (30.65%)
Bodily pain (head)	9 (14.52%)	9 (14.52%)
General pain	9 (14.52%)	6 (9.68%)
Cramping	4 (6.45%)	5 (8.06%)
Infertility	12 (19.35%)	12 (19.35%)
Weight gain	11 (17.74%)	11 (17.74%)
Long duration (bleeding)	8 (12.90%)	7 (11.29%)
Heavy bleeding	10 (16.13%)	10 (16.13%)
Bodily pain (right side)	2 (3.23%)	3 (4.84%)
Hot flashes	2 (3.23%)	1 (1.61%)
Menstrual pain	6 (9.68%)	7 (11.29%)
Difficulty losing weight	5 (8.06%)	8 (12.90%)
No ovulation	5 (8.06%)	4 (6.45%)
Irregular menstruation	4 (6.45%)	3 (4.84%)
No menstruation	8 (12.90%)	4 (6.45%)
Bodily pain (back)	7 (11.29%)	6 (9.68%)
Facial hair	5 (8.06%)	7 (11.29%)
Hair loss	3 (4.84%)	5 (8.06%)
Bloating	6 (9.68%)	7 (11.29%)
Acne	10 (16.13%)	5 (8.06%)
Fluctuating weight	4 (6.45%)	6 (9.68%)
Nausea	8 (12.90%)	5 (8.06%)
Bodily pain (leg)	9 (14.52%)	6 (9.68%)

Table 3: Anthropometric measures before and after the intervention

Measure	Mean Before	SD Before	Mean After	SD After	t-value	p-value
Weight	63.40	8.94	62.39	9.25	4.09	0.00
BMI	28.34	3.84	27.82	4.05	4.02	0.00
Waist Circumference	85.43	12.36	83.24	12.17	7.68	0.00

4. DISCUSSION

The significant improvements observed in PCOS symptoms following the 8-week physical activity program underscore the critical role of lifestyle interventions in managing the disorder. The reduction in darkened skin from 56.45% to 29.03% indicates a marked improvement in hyperpigmentation, a common symptom associated with insulin resistance and hormonal imbalances typical of PCOS (Aryani et al., 2023). Such skin manifestations often detract from the quality of life, and their significant improvement can enhance psychological well-being and self-esteem among affected individuals. Previous studies have demonstrated that increased physical activity may improve insulin sensitivity, which is tied to reductions in these visible symptoms of PCOS (Thomson et al., 2016). Enhanced insulin sensitivity is crucial as it not only alleviates skin manifestations but also plays a key role in regulating menstrual cycles and mitigating other symptoms associated with PCOS.

Bodily pain, particularly lower back pain, showed a decline from 54.84% to 37.10%, suggesting that engagement in physical activity may promote musculoskeletal health and overall physical well-being (Weng et al., 2023). This reduction can be linked to improved muscular strength, flexibility, and overall fitness resulting from regular exercise. An exercise program that focuses on both aerobic and resistance training has been found to be especially effective in alleviating such pain while enhancing overall body composition and physical function (Ibrahim et al., 2023). Furthermore, the experience of bodily pain among women with PCOS may also be associated with obesity; as weight reduces, improvements in pain perception often occur, which has been supported by various studies (Costa et al., 2018).

Notably, the weight loss observed among participants, with reductions from 54.84% to 27.42%, reinforces the effectiveness of the physical activity program in terms of body composition (Aryani et al., 2023). As demonstrated by multiple studies, weight loss is particularly significant for women with PCOS, as even modest weight reductions can lead to considerable improvements in symptoms and metabolic health (Pesonen et al., 2024; , Fossey et al., 2023). For instance, a systematic review highlighted that lifestyle interventions resulting in weight loss could restore ovulatory function and improve metabolic profiles, which are pivotal for long-term health outcomes in women with PCOS (Kogure et al., 2021). The significant drops in anthropometric measures such as BMI and waist circumference (p-value < 0.05) further denote the positive impact of structured physical activity on obesity, an integral concern in PCOS management (Nunes et al., 2019).

Importantly, the psychosocial benefits associated with a well-structured physical activity regimen cannot be overlooked. Physical activity has been widely recognized as an effective intervention for enhancing mental health outcomes and improving quality of life in women with PCOS (Song et al., 2021; , Halama et al., 2019). A noteworthy aspect of the immediate effects of physical activity is the improvement in mental health markers, including reductions in anxiety and depression, which are common comorbidities among individuals with PCOS (Zhang et al., 2018). Psychological well-being may significantly influence adherence to lifestyle changes and the long-term success of treatment strategies. This interplay of physical activity with mental health highlights the need for a holistic approach to PCOS management, integrating both physical and psychological interventions (Arentz et al., 2021).

Furthermore, the findings underscore the importance of healthcare providers encouraging women with PCOS to engage in regular physical activity as a first-line treatment option. This evidence calls for heightened awareness and advocacy for tailored lifestyle interventions among this demographic, with emphasis on sustainable long-term strategies that encompass exercise, dietary modifications, and stress management (Vince et al., 2020; , Baioccato et al., 2022). Collaborative efforts involving healthcare professionals, fitness specialists, and dietitians should be fostered to address the multifaceted challenges faced by women with PCOS, ensuring that they receive comprehensive and supportive care tailored to their unique needs (Aye et al., 2018).

5. CONCLUSION

The study highlighted the positive findings from the 8-week physical activity program demonstrate its efficacy in managing symptoms of Polycystic Ovary Syndrome (PCOS), particularly in reducing prominent symptoms such as darkened skin, bodily pain, and promoting weight loss. The significant improvements in anthropometric measures such as weight, BMI, and

waist circumference further confirm the program's effectiveness in addressing the health complexities associated with PCOS. These results underscore the importance of holistic lifestyle interventions, such as regular physical activity, as integral components of effective PCOS management strategies. Continued emphasis on such interventions can lead to better health outcomes and enhanced quality of life for women affected by PCOS.

Recommendation

Based on the substantial evidence supporting the efficacy of lifestyle interventions for women with Polycystic Ovary Syndrome (PCOS), it is recommended that healthcare providers prioritize the implementation of structured exercise and nutritional programs as first-line treatments. Continuous screening and assessment for psychological factors such as anxiety and depression are essential to support adherence to these lifestyle changes and improve overall quality of life.

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Conflicts of Interest

No, conflicts of Interest.

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