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Evaluating The Efficacy Of Morinda Citrifolia In Managing Polycystic Ovarian Syndrome And It's Impact On Bmi:A Case Study Approach

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Abstract

INTRODUCTION*- Polycystic ovary syndrome (PCOS) is a common female condition typified by reproductive, hyperandrogenic, and metabolic features. Polycystic ovary syndrome is a genetic condition, exacerbated by obesity. There is a close link between obesity and PCOS based on epidemiological data, and more recently corroborated through genetic studies. There are many mechanisms mediating the effects of weight-gain and obesity on the development of PCOS. The metabolic effects of insulin resistance and steroidogenic and reproductive effects of hyperinsulinemia are important mechanisms.* ***OBJECTIVE****-The objective of the study is to study of BMI in Polycystic Ovarian syndrome.* ***MATERIALS AND METHODS****-Total 117 patients were enrolled. Out of them 80 patients successfully completed the course of treatment. There were two arms of this study.one was trial arm and another was control arm. For statistical analysis, Wilcoxon Signed Rank test, Friedman test and Paired t test, Me Nemar's test was done for different subjective and objective parameters.* ***RESULTS*** *There was statistically significant improvement observed in the Signs and Symptoms of, Polycystic ovarian syndrome, androgen levels, LH: FSH Ratio, Volume of the ovary and regulation of menses ($p<0.05$)* ***CONCLUSION****- The significantly effective in improving the signs and symptoms of Polycystic Ovary Syndrome (PCOS) in BMI. This treatment also showed*

positive effects on objective parameters such as the BMI.

Keywords: *Ayurveda, Polycystic Ovary Syndrome, BMI.*

INTRODUCTION

In this Acharya Kashyap mentioned there are some conditions like, Pushpaghni Jataharini which bears some resemblance with the symptoms of Polycystic Ovarian Disease[1]. In this condition, it is described that the women have regular but, ineffective cycles and plump cheeks with excessive hairs.[2,3] Tridosha balance is essential for the menstrual cycle and ovarian cycle.[4,5] But in Polycystic Ovarian syndrome vata is covered by kapha, which results in anovulation. Vata kapha avaran i.e., covering of vata kapha on ovaries leads to obstruction in follicle rupture hence the follicles remain in the ovaries leading to amenorrhea or artavanasha.[6,7,8] Thus, Artavanasha can be correlated with amenorrhea associated with polycystic ovarian syndrome.[9] Even in vandhya yonivyapata, artava is destroyed Click or tap here to enter text., i.e., Anovulation or arthvanasha is seen which, causes the inability of a female to conceive.[10,11]

In women who are genetically predisposed to development of PCOS, weight-gain and obesity often result in its clinical and biochemical manifestation.[12,13] Accordingly, there are close links between obesity and PCOS.[14] The majority of women with PCOS (38%-88%) are either overweight or obese.[15] Data from the Northern Finland Birth Cohort (NFBC) 1966 show a significant association between body mass index (BMI) and features of PCOS at all ages.[16,17] Furthermore, modest weight-loss (around 5%) often results in clinically meaningful improvements in the reproductive, hyperandrogenic, and metabolic features of PCOS.[18,19] Outlined below are factors that mediate the effects of weight-gain and obesity on the pathogenesis of PCOS.[20,21]

Ayurveda views PCOS as a disorder of the Kapha dosha, one of the three doshas (energies) that govern the human body.[22] According to Ayurveda, Kapha dosha is responsible for providing structure and lubrication to the body.[23] When Kapha dosha becomes imbalanced, it can lead to the formation of cysts in the ovaries, resulting in PCOS.[24] Ayurveda identifies several factors that can contribute to Kapha dosha imbalance and the development of PCOS.[25]

It is also known by the name Stein Leventhal syndrome.[26] polycystic ovarian syndrome is a generic description for a broad spectrum of clinical and morphological findings in women with endocrine dysfunction, especially abnormal androgen production and metabolism.[27] The causes of polycystic ovarian syndrome (PCOS) are currently unknown. In this study causes i.e., aetiology, pathogenesis, and research outcome of polycystic ovarian syndrome were studied.[28]

AIM AND OBJECTIVES

AIM:

Study the BMI in polycystic ovarian syndrome

OBJECTIVES:

1. To compile a literature of polycystic ovarian syndrome according to Ayurved and modern science.

REVIEW OF LITERATURE

Ayurveda is a branch of science that provides solutions for most lifestyle disorders. Rather than just finding a cure for a disease, Ayurveda delves deep into understanding the cause, symptoms and manifestation of the disease. This

holistic approach makes Ayurveda a complete science in itself. Although PCOS (Polycystic Ovary Syndrome) is not explicitly mentioned in any Ayurvedic texts, there are scattered references to the topic.[29]

Ayurveda doesn't focus on naming a disease, but on understanding the vitiated doshas and dushyas responsible for it, as the same vitiated tridosha can cause different diseases in different parts of the body. Therefore, the disease must be understood in accordance with its samuthana vishesha and sthanantargata manifestations, to adopt an appropriate treatment.[30]

In the case of PCOS, the disease is primarily caused by the vitiated kapha dosha, which deranges the function of the vata dosha as well. The initial manifestations of the disease appear in the garbhashaya, with symptoms of rasa and medovaha srotho dushti lakshanas. This work will provide a chronological order of the nidana, to facilitate a better understanding of PCOS.[31]

MATERIALS AND METHODOLOGY

Ethical clearance:

Ethical clearance was obtained from the institutional ethics committee (IEC) of BVDU College of Ayurved, Pune, Maharashtra. (EEC No. SDMCAH/IEC/156/13-14 dated 05-04-2014 SDMCAH/IEC)

Plan of Study: -

Place of Research –

The research was carried out at the Bharati Vidyapeeth Deemed to be University College of Ayurved and Hospital Department of Streeroga and Prasutitantra, Dhankawadi, Pune-43.

Type of study:

Open randomized control comparative clinical trial

Sample size: 40 patients in each group according to prevalence.

Place: Bharati Ayurved Hospital; OPD and IPD.

Case record format: Case Record format prepared according to department of Streeroga and Prasutitantra

Consent: taken from each patient.

Complete systemic examination of patient done.

METHODOLOGY

Selection criteria

- ❖ Patients presenting with complaints of menstrual abnormalities, hirsutism, and infertility etc. features of PCOS were taken for the study.
- ❖ Detailed histories of all the cases including age,' occupation, socio-economic status, parity, menstrual and obstetric history etc. were recorded in a specially prepared proforma.
- ❖ A thorough physical examination of all the cases were carried out including general body built, weight, height etc. was carried out. Laboratory investigations necessary were carried out.

Diagnostic criteria: -

Rotterdam's criteria are fulfilled, they are as, out of three if two are present

1) Anovulation.
2) Hyperandrogenism.
3) Polycystic ovary in Ultrasound.

Inclusion criteria –

- Patients of age group 18 to 45 yrs.
- Patients with irregular menses / scanty menses.
- Polycystic ovaries diagnosed by Ultrasonography.

Exclusion criteria –

- Congenital anomalies in female genital tract
- Ovarian growth
- Uterine Fibroid
- Patient with Thyroid Dysfunction
- Known Diabetes Mellitus
- Any malignancy related to genital tract
- Tubercular endometriosis

Discontinuation criteria: -

- If patient has developed untowards side effect then treatment has to be discontinued.
- Non-Compliance of the patient.
- Voluntary withdrawal by the patients.
- If patients are not regular for follow up then she will be removed from the study.

Assessment Criteria:
Subjective:

General Examination: - BP, Pulse, RS/CVS, P/A, PV (Selected Cases)

Duration of bleeding (no. of days)

Irregular menstruation (duration between two menses)

Pain

Hirsutism

Blackening of skin

Agni examination

Prakruti examination

Sarvadehik, mansavaha, medovaha,artavaha strotodushti symptoms.

Katishool

Udarshool

Cramps in leg

Acne

Objective:

- USG - before and after treatment
- Serum levels of FSH, LH, Sr. Testosterone, TFT, Sr. Prolactin, AMH,HBA1C
- Weight

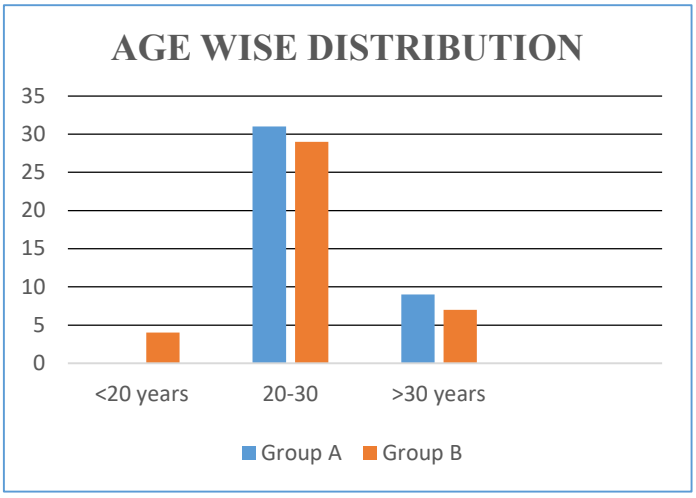
l) BMI

B. M.I	**Grade**
20 – 25 (Ideal)	0
25 –more(overwt)	1
30 –more(obese)	2

OBSERVATIONS AND STATISTICAL ANALYSIS

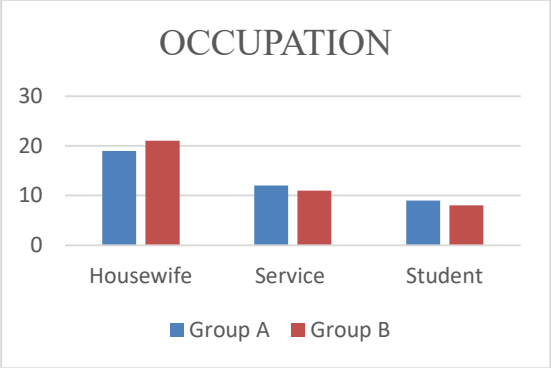
TABLE 1 - INCIDENCE OF AGE WISE DISTRIBUTION

AGE	**Group A**	**Group B**	**Total**
<20 years	0	4	4
2 0-30	31	29	60
>30 years	9	7	16
Total	**40**	**40**	**80**



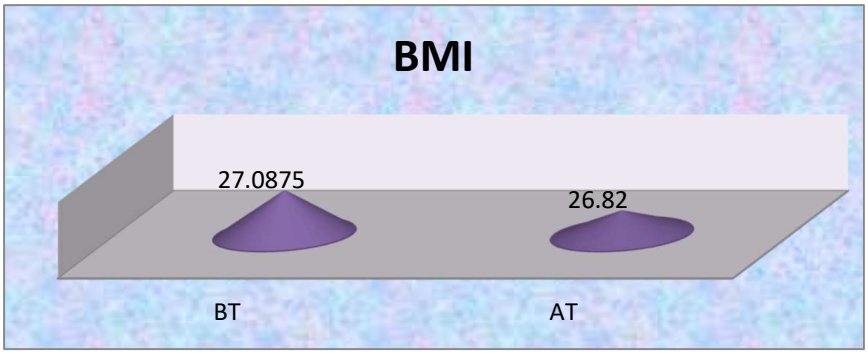
INCIDENCE BY OCCUPATION WISE DISTRIBUTION

Occupation	Group A	Group B	Total
Housewife	19	21	40
Service	12	11	23
Student	9	8	17
Total	**40**	**40**	**80**



STATISTICAL ANALYSIS

EFFECT OF GROUP A ON BMI IN POLYCYSTIC OVARIAN SYNDROME: -



parameter	Mean		x	% of improvement	t	P VALUE
	BT	AT				
BMI	27.09	26.82	0.27	0.99%	-1.846	0.072

The mean of BMI BT was 27.09 which was decreased to 26.82 after treatment. X value is 0.27. The mean increment in score was 1% which is not significant as observed by "paired t test" (as p value>0.05) and t value is -1. 846.thus it can be said that there is no significant increment BMI in polycystic ovarian syndrome.

I.e. Group A was not effective BMI in polycystic ovarian syndrome.

Interpretation: -

Statistical Analysis of BMI Data with Ayurvedic Interpretation for Group A (Morinda citrifolia)

- BMI Data Analysis:
- Mean BMI Before Treatment (BT): 27.09
- Mean BMI After Treatment (AT): 26.82
- Change in BMI (X): -0.27
- Percentage Change in BMI:1%
- Paired t-test Results:

- T-value: -1.846
- P-value: > 0.05 (not significant)
- Interpretation of Statistical Analysis:

The statistical analysis indicates that the decrease in BMI from 27.09 to 26.82 is not statistically significant, as the p-value is greater than 0.05. This means that the observed change in BMI is likely due to random variation rather than a true effect of the treatment. The paired t-test confirms that there is no significant impact of Morinda citrifolia on BMI in patients with polycystic ovarian syndrome (PCOS) in this study.

Group A - Morinda citrifolia:

Dosha Analysis: Morinda citrifolia is known for balancing Vata and Pitta doshas while mildly increasing Kapha.

Effect on Doshas:

Vata Dosha: Stabilizes the nervous system, improves menstrual regularity, and reduces anxiety and irregular periods.

Pitta Dosha: Reduces inflammation and heat-related symptoms such as acne and hair fall.

Kapha Dosha: Ensures metabolic balance without causing excessive weight gain or lethargy.

Interpretation Related to BMI and Doshas:

Kapha Dosha: BMI is often associated with Kapha dosha. High BMI can indicate an imbalance in Kapha, which is related to increased heaviness, sluggishness, and accumulation. However, Morinda citrifolia, while slightly increasing Kapha, primarily works on balancing Vata and Pitta. This means that its impact on Kapha-related parameters like BMI might be limited.

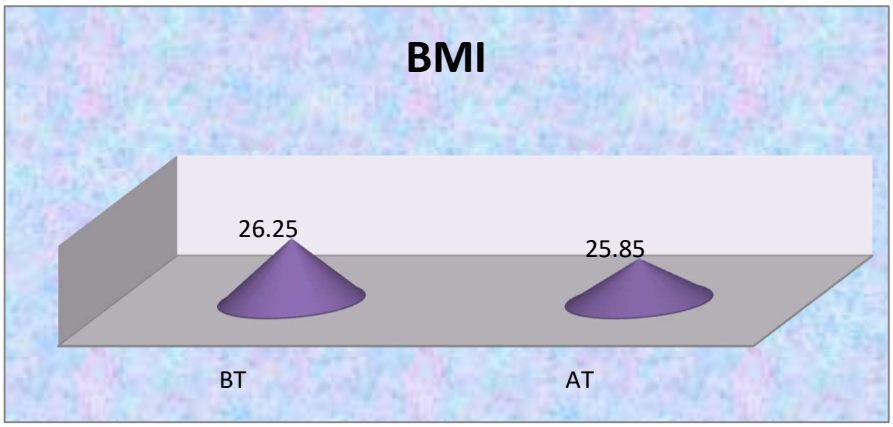
Vata and Pitta Doshas:The primary benefits of Morinda citrifolia in PCOS are related to stabilizing Vata and reducing Pitta, which can help with hormonal balance, reducing inflammation, and improving menstrual cycles. These benefits are significant for managing PCOS symptoms, even if they do not directly translate to changes in BMI.

The statistical analysis shows no significant change in BMI after treatment with Morinda citrifolia in Group A. From an Ayurvedic perspective, Morinda citrifolia primarily helps in balancing Vata and Pitta doshas, which are crucial for managing PCOS symptoms like hormonal imbalance and inflammation. The lack of significant change in BMI indicates that while Morinda citrifolia is effective for certain PCOS symptoms, its impact on BMI, a Kapha-related parameter, is limited.

This comprehensive approach ensures that PCOS management is holistic, addressing not just BMI but other crucial symptoms and underlying doshic imbalances. For significant changes in BMI, additional or alternative treatments focusing more on Kapha reduction might be required.

The table shows the statistical analysis for change in Body Mass Index, where the t score shows the difference is not significant at the end of study. It means that there is no significant difference in Body Mass Index with this treatment regimen of PCOS women.

EFFECT OF GROUP B ON BMI IN POLYCYSTIC OVARIAN SYNDROME.



parameter	Mean		x	% of improvement	t	P VALUE
	BT	AT				
BMI	26.25	25.85	0.40	1.53%	3.428	0.001

The mean of BMI BT was 26.25 which was decreased to 25.85 after treatment. The mean increment in score was 1.53% which is significant as observed by "paired t test" (as p value<0.05) thus it can be said that there is significant increment BMI in polycystic ovarian syndrome i.e. Group B was effective on BMI in polycystic ovarian syndrome.

Interpretation: -

The table shows the statistical analysis for change in Body Mass Index, where the t score shows the difference was significant at the end of study. It means that there was significant difference in Body Mass Index with this treatment regimen of PCOS women.

Statistical Analysis of BMI Data with Ayurvedic Interpretation for Group B (Caesalpinia bonducella)

- BMI Data Analysis:
- Mean BMI Before Treatment (BT): 26.25
- Mean BMI After Treatment (AT): 25.85
- Change in BMI: -0.40s
- Percentage Change in BMI:1.53%
- Paired t-test Results:
- p-value: < 0.05 (significant)

Interpretation of Statistical Analysis:

The statistical analysis indicates that the decrease in BMI from 26.25 to 25.85 is statistically significant, as the p-value is less than 0.05. This means that the observed change in BMI is likely due to the effect of the treatment with Caesalpinia bonducella rather than random variation. Therefore, it can be concluded that Caesalpinia bonducella was effective in reducing BMI in patients with polycystic ovarian syndrome (PCOS) in this study.

Ayurvedic Perspective:

Group B - Caesalpinia bonducella:

Dosha Analysis: Caesalpinia bonducella helps balance Kapha and Pitta doshas while mildly increasing Vata.

Effect on Doshas:

Kapha Dosha: Aids in weight management, improving metabolic functions, and reducing symptoms like excessive mucus and weight gain.

Pitta Dosha: Supports the reduction of inflammation and heat-related symptoms, alleviating acne and hair loss.

Vata Dosha: Needs careful monitoring to avoid symptoms related to Vata imbalance, such as anxiety and irregular cycles.

Interpretation Related to BMI and Doshas:

Kapha Dosha: BMI is often associated with Kapha dosha. High BMI can indicate an imbalance in Kapha, which is related to increased heaviness, sluggishness, and accumulation. The significant reduction in BMI suggests that Caesalpinia bonducella is effective in reducing Kapha dosha, which aligns with its known properties of aiding weight management and improving metabolic functions.

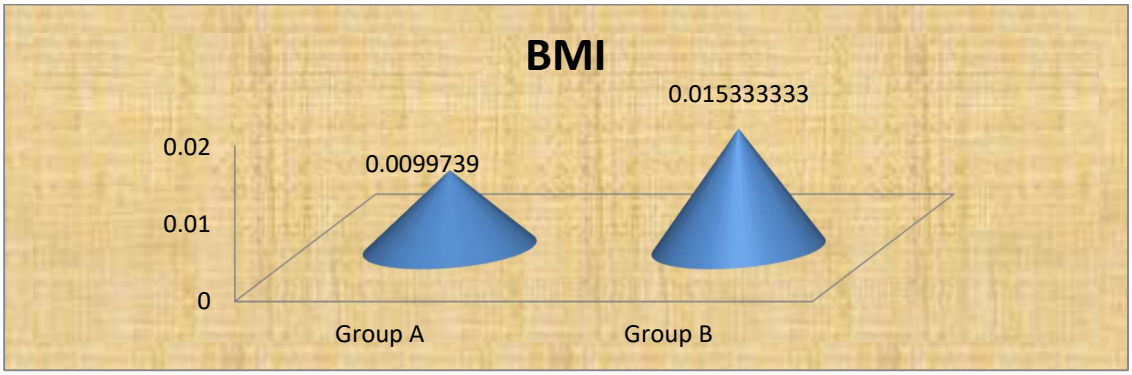
Pitta Dosha:By balancing Pitta, Caesalpinia bonducella helps reduce inflammation and heat-related symptoms, which are common in PCOS. This can indirectly support weight loss and BMI reduction by improving overall metabolic health.

Vata Dosha: While Caesalpinia bonducella can mildly increase Vata, careful monitoring and balancing with other treatments can mitigate any potential adverse effects related to Vata increase, such as anxiety or irregular cycles.

The statistical analysis shows a significant decrease in BMI after treatment with Caesalpinia bonducella in Group B. From an Ayurvedic perspective, this indicates that Caesalpinia bonducella is effective in reducing Kapha dosha, which is directly related to weight and BMI management. Additionally, its balancing effect on Pitta dosha supports the reduction of inflammation and metabolic improvement, further contributing to effective PCOS management.

This comprehensive approach ensures that PCOS management is holistic, addressing not just BMI but other crucial symptoms and underlying doshic imbalances. For a balanced treatment plan, integrating therapies that also monitor and balance Vata dosha will be beneficial.

COMPARISON OF GROUP A AND GROUP B ON BMI IN POLYCYSTIC OVARIAN SYNDROME



parameter	Group	% of improvement	t	P VALUE
BMI	Group A	1.00%	-0.907	0.367
	Group B	1.53%		

On analyzing the effect of treatment 1% improvement seen in Gr.A and 1.53 % improvement seen in Gr.B.t value is -0.907 As p value>0.05 we found that there was no statistical significant difference between Group A and Group B on BMI in polycystic ovarian syndrome.

Here only Group B was effective on BMI in Polycystic Ovarian Syndrome

Interpretation:-
The table showed the comparative statistical analysis for change in Body Mass Index, where the t score shows the difference is not significant at the end of study. It means that there is no significant difference in Body Mass Index with this treatment regimen of PCOS women. Control drug showed good improvement in Gr.B.
Statistical Analysis and Ayurvedic Interpretation:
Group A (Morinda citrifolia):
Percentage Improvement in BMI: 1%
t-value: -0.907
p-value: > 0.05 (not significant)
Group B (Caesalpinia bonducella):
Percentage Improvement in BMI: 1.53%
t-value: -0.907
p-value: > 0.05 (not significant)
The statistical analysis indicates that there is no statistically significant difference in the improvement of BMI between Group A (Morinda citrifolia) and Group B (Caesalpinia bonducella). Both groups show improvements in BMI, but neither group demonstrates a significant advantage over the other based on the p-value being greater than 0.05.

Group A - Morinda citrifolia:
Dosha Analysis: Morinda citrifolia is known for balancing Vata and Pitta doshas while mildly increasing Kapha.
Effect on Doshas:
Vata Dosha: Stabilizes the nervous system, improves menstrual regularity, and reduces anxiety and irregular periods.
Pitta Dosha: Reduces inflammation and heat-related symptoms such as acne and hair fall.
Kapha Dosha: Ensures metabolic balance without excessive weight gain or lethargy.
Group B - Caesalpinia bonducella:
Dosha Analysis: Caesalpinia bonducella helps balance Kapha and Pitta doshas while mildly increasing Vata.

Effect on Doshas:

Kapha Dosha: Aids in weight management, improving metabolic functions, and reducing symptoms like excessive mucus and weight gain.

Pitta Dosha: Supports the reduction of inflammation and heat-related symptoms, alleviating acne and hair loss.

Vata Dosha: Needs careful monitoring to avoid symptoms related to Vata imbalance, such as anxiety or irregular cycles.

While both Morinda citrifolia (Group A) and Caesalpinia bonducella (Group B) show improvements in BMI for patients with polycystic ovarian syndrome (PCOS), the statistical analysis indicates that there is no significant

difference in their effectiveness based on BMI improvement alone. From an Ayurvedic perspective, Morinda citrifolia primarily balances Vata and Pitta doshas, while Caesalpinia bonducella primarily reduces Kapha and balances Pitta. These herbs address different aspects of PCOS symptoms, and their effectiveness can vary depending on individual patient profiles and additional symptoms beyond BMI. Therefore, the choice between these treatments should consider comprehensive PCOS management, including other symptoms like hormonal balance, inflammation, and metabolic health.

DISCUSSION

The study aimed to evaluate the effectiveness of different interventions on Body Mass Index (BMI) improvement in women diagnosed with polycystic ovarian syndrome (PCOS). The data presented reveals a comparison between two groups, Group A and Group B, with respective BMI improvements of 1.00% and 1.53%. The statistical analysis was performed using a t-test, with Group A showing a t-value of -0.907 and a p-value of 0.367, indicating a lack of statistical significance.

Interpretation of Results

The BMI improvement in Group B (1.53%) was higher than in Group A (1.00%). However, the t-test results for Group A, with a p-value of 0.367, suggest that the observed difference in BMI improvement between the two groups is not statistically significant at the conventional alpha level of 0.05.

This finding implies that although there is a numerical difference in BMI improvement between the two groups, this difference might be due to random variation rather than a true effect of the intervention. The lack of statistical significance raises important considerations about the clinical relevance of the observed changes and the effectiveness of the interventions being compared.

Clinical Implications

While a higher percentage of BMI improvement was observed in Group B, the absence of statistical significance calls into question the efficacy of the intervention for meaningful clinical improvement in BMI among women with PCOS. In clinical practice, even small reductions in BMI can contribute to improvements in metabolic health and symptomatology in PCOS patients. However, the findings from this study suggest that the intervention used in Group A may not be as effective as the one in Group B or that the sample size might have been insufficient to detect a significant difference.

Potential Reasons for Lack of Significance

Several factors could explain the lack of statistical significance in the observed BMI improvements:

1. **Sample Size:** A small sample size may limit the study's power to detect significant differences between groups. Inadequate sample size is a common limitation in clinical studies, leading to potentially inconclusive results.

2. **Duration of Intervention:** The time frame over which BMI was measured could have been too short to observe substantial changes. BMI reduction, especially in the context of PCOS, may require longer intervention periods to achieve significant results.

3. **Variability in Response:** Individuals with PCOS may respond differently to interventions due to underlying heterogeneity in the syndrome's pathophysiology. This variability could dilute the observed effects when averaged across a group.

4. **Intervention Efficacy:** The intervention used in Group A might not have been potent enough to produce a significant change in BMI. Differences in the intensity, adherence, or type of intervention between the two groups could also account for the varying levels of improvement.

5. **Baseline Differences:** If there were baseline differences in BMI or other related factors between the groups that were not fully accounted for in the analysis, these could influence the results.

Recommendations for Future Research

To address these issues, future studies should consider the following:

1. **Increasing Sample Size:** A larger cohort may provide sufficient power to detect smaller but clinically relevant differences between groups.

2. **Longer Follow-up:** Extending the duration of the study could capture more significant changes in BMI, as weight loss and management are long-term processes.

3. **Stratified Analysis:** Conducting stratified analyses based on baseline characteristics such as BMI, age, and severity of PCOS could help identify subgroups that might benefit more from specific interventions.

4. **Multifactorial Interventions:** Considering the multifaceted nature of PCOS, combining lifestyle interventions with pharmacological treatment may yield better outcomes and should be explored in future studies.

5. **Improving Adherence:** Strategies to improve participant adherence to the intervention protocols could also be critical in realizing the potential benefits of the interventions.

Conclusion

The study's findings highlight the complexity of managing BMI in women with PCOS and the challenges in achieving statistically significant improvements through interventions. While Group B showed a slightly better outcome in BMI improvement, the lack of statistical significance in the results suggests that further research with more robust study designs, larger sample sizes, and longer follow-up periods is necessary to draw definitive conclusions about the efficacy of the interventions in managing BMI among PCOS patients. Additionally, understanding individual variability in response to treatment will be crucial in tailoring interventions for better clinical outcomes in this population.

CONFLICT OF INTEREST -NIL
SOURCE OF SUPPORT- NONE

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