Original Article

Is Myo-inositol better than Metformin for treatment of PCOS Overweight Patients?

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Abstract

Objective: In PCOS patients, the mean BMI was compared between Myo-inositol and Metformin.

Methodology: This *Randomized Control Trial* was conducted at Department of Gynaecology and Obstetrics, P.A.E.C General Hospital, Islamabad, from May 24, 2017 to Nov 24, 2017. To choose a volunteer for the study, non-probability sequential sampling was utilized. All women diagnosed with PCOS having age between 15 and 40 were included in our study. There were two groups of participants: one group got myoinositol 1 gm twice a day, and the other group received 250 mg metformin pill thrice a day for the duration of the experiment. After three months of medication treatment, the patients were contacted for a follow-up, and all of their baseline measures were retaken. Comparisons between baseline and post-treatment BMI were made. Student & independent sample t-test was applied. P-value 0.05 was deemed significant.

Results: The research comprised a total of 152 patients. Patients were an average of 27.4 years old, with a standard deviation of 7.6. Significantly better efficacy of my-inositol in terms of BMI (t= -9.89, P=0.000, C.I=95%) than Metformin in polycystic ovary syndrome patients was found.

Conclusion: Myo-inositol was more effective than Metformin at reducing BMI consistently in polycystic ovary syndrome.

Keywords: Polycystic Ovary Syndrome, Myoinositol, Metformin

Introduction

Hyperandrogenism and polycystic ovaries are the hallmarks of the polycystic ovarian syndrome (PCOS), a prevalent heterogeneous endocrine condition.[1] According to the European Society for Human Reproduction and Embryology/American Society for Reproductive Medicine guidelines, the prevalence of PCOS ranges from 15% to 20%, depending on which criteria are used to determine whether or not the condition is present.[2]

The polycystic ovarian syndrome manifests as anovulatory irregularities, menstrual irregularities, and signs of hyperandrogenism. A malfunctioning hypothalamic-pituitary-ovarian axis (HPO) may contribute to PCOS, however the exact cause is unknown. PCOS is characterised by abnormal gonadotropin production. Ovarian dysfunction may cause this, however it is more likely a symptom of the disorder than the cause. There are numerous biochemical signs of PCOS, including an increased plasma testosterone level.[3]

It is estimated that between 4% and 8% of women of reproductive age are affected with PCOS, according to the NIH/NICHD criteria. Recently, several research teams have shown that the prevalence of PCOS differs according to the diagnostic criteria utilized.[4]

PCOS has been linked to a wide range of health issues. Many PCOS symptoms are preceded by weight gain.[5] It has been proven that adopting a healthy lifestyle may help women lose weight, reduce belly fat and lower testosterone, and improve insulin resistance to decrease hirsutism.[6] PCOS was found in 28.3% of obese women seeking weight loss treatment. However, in a general population, the incidence of PCOS was not significantly different between obese and non-obese individuals. 8.2% of women with PCOS were underweight or normal weight; 9.8% were overweight; 9.9% were moderately obese; 12.4% were severely obese. A higher incidence of PCOS has been associated to obesity, however the impact was minimal.[7]

PCOS was found in 28.3% of obese women seeking weight loss treatment. However, in a general population, the incidence of PCOS was not significantly different between obese and non-obese individuals. 8.2% of women with PCOS were underweight or normal weight; 9.8% were overweight; 9.9% were moderately obese; 12.4% were severely obese. A higher incidence of PCOS has been associated to obesity, however the impact was minimal.[8]

A standard antiepileptic medicine, valproic acid, has been linked to polycystic ovary syndrome in women with epilepsy when used to treat epilepsy, bipolar disorder, and migraines. Menstrual irregularities, polycystic ovarian morphology, and increased testosterone levels are just a few of the symptoms. Women with epilepsy who were given lamotrigine instead of valproic acid had decreased BMI, fasting insulin levels, and testosterone levels. As a result, while examining the research on the connection between epilepsy, bipolar illness, and PCOS, it is necessary to consider the confusing effects of medication.[9]

The aim of the study to compare the frequency of mean BMI in individuals with PCOS to Myoinositol and Metformin.

Methodology

This Randomized Control Trial study was conducted at Department of Gynaecology and Obstetrics, P.A.E.C General Hospital, Islamabad from May 2017 to Nov 2017. Using the WHO calculator, 152 people were selected for the study. Eighty-percent power and a five-percent significance level characterize this test. Group 1 was expected to have a population of 28.57 percent[1], while group 2 was expected to have 48 percent.[1] A method known as consecutive non-probability sampling was used.

Inclusion & Exclusion Criteria: All women diagnosed with PCOS having age between 15 and 40 were included in our study. Patients with known hypersensitivity to Myoinositol, Thyroid diseases (including Cushing's syndrome), or Diabetes Mellitus were ruled out of our research because of their medical conditions.

After obtaining institutional ethical committee approval, the sample was collected from outdoor patients. The patient signed an informed consent form. Women who satisfied the requirements for inclusion received medical attention. Myoinositol or Metformin was given to the patients in random order.

Basic medical and gynecological history and comprehensive physical examination of the patient were made, including Body Mass Index (BMI). Women were observed by pelvic ultrasonography for polycystic ovaries. Those assigned to the Myoinositol group took 1 g of Myo-inositol twice daily. In contrast, those assigned to the metformin group took a pill containing 250 mg of Metformin three times daily. After three months of medication treatment, the patients were contacted for a follow-up, and all of their baseline measures were retaken. Each study group's baseline BMI was compared to the BMI at the end of three months of therapy.

SPSS version 17 was used to analyze the data on a computer. As a Qualitative variable (parity and marital status), frequency and percentages have been calculated. A standard deviation from the Numerical mean data like age and body mass index (BMI) will be used to calculate the standard deviation. The BMI of the two groups was compared using a Student t-test. Stratification was used to regulate age, parity, and marital status variables. The post-stratification factors were calculated via independent sample t-test.

Results

The research comprised a total of 152 patients. Patients between the ages of 15 and 30 accounted for 51% of the total, while those aged 31 and 40 accounted for 49%. Patients were an average of 27.4 years old, with a standard deviation of 7.6. 43 (28%) of the patients were single, whereas 109 (72%) were married. For 99 out of the patients, the parity was 1, whereas, for 53 out of the patients, the parity was 1.

The mean pre-treatment weight was 64.7 Kg±2.66 SD, and the mean post-treatment weight was 56.8Kg±2.61 SD. Similarly, mean pre-treatment height was $5.2m^2\pm0.39$ SD, and mean post-treatment height was $5.3m^2\pm0.39$ SD. Overall regular menstrual cycle was found in 33 (21.7%), while an irregular menstrual cycle was found in 119(78.3%). Overall mean BMI was 25.3 kg/m^2 ±1.91SD, as shown in Table I.

Among all the patients who had ≥ 1 parity (N=99), Group A patients had 28.07±1.87SD BMI, while in Group B, BMI was 28.08±1.94SD at baseline. After three months of intervention, all the patients who had ≥1 parity Group A had 25.74±1.90 SD BMI and 27.19±1.40 SD (P=0.0.04). A significant difference in BMI of Group A was found from baseline 28.22±1.880 SD to 3 months after treatment 24.28±2.031SD (P=0.000), as shown in Table II.

Among all the single patients (N=43), Group A patients had 26.06±2.58 SD BMI while Group B 27.74±1.92BMI was SD at baseline. After three months of intervention, all the patients who were single Group A had 24.74±1.90SD BMI, and Group B had 26.19±1.40SD (P=0.177) as shown in Table III.

Discussion

PCOS has been linked to diabetes type 1, type 2, and gestational diabetes. The NIH/NICHD criteria were used to screen 85 Caucasian women with type 1 diabetes for PCOS by Escobar-Morreale et al. [10] Of these ladies,

PCOS was found in 16 of them (18.8 percent). Codner et al. then used the ESHRE/ASRM criteria to test for PCOS in 42 women with type 1 diabetes and 38 age- and BMI-matched controls. A PCOS relative risk of 15.4 (95 percent confidence interval [CI] 2.2–110.2; P0.0001) was seen in the type 1 diabetes group, compared to a control group prevalence of 2.6%. Women with type 2 diabetes have an 82% chance of developing polycystic ovary syndrome (PCOS). According to the NIH/NICHD criteria, 26.7 percent of patients with type 2 diabetes have PCOS. 15 of the 94 women (16 percent) with gestational diabetes and 6 of the 94 women (6.4

Table I: Demographic characteristic (n=152)

Demographic variables	(N)	%
Age		
15-30 years	78	51%
31-40 years	74	49%
Marital status		
Single	43	28%
Married	109	72%
Parity		
No live birth	53	35%
≥ 1 live birth	99	65%
Mean ± Standard deviation		
Age		27.4±7.6
Pre-treatment weight (Kg)		64.7±2.66
Pre-treatment height(m^2)		5.2±0.39
Post-treatment weight		56.8±2.61
Post-treatment height		5.3±0.39
Overall BMI		25.3±1.91

Table II: Stratification of BMI with respect to age & Comparison of BMI in both interventional groups

BMI	Age groups	N	Interventional Groups		P-value
			Group A	Group B	
Baseline	**15-30 years**	78	25.89±2.58	28.11±1.92	0.65
	31-40 years	74	25.86±2.51	28.04±1.92	
After three months	**15-30 years**	78	23.89±2.31	27.19±1.50	0.005
	31-40 years	74	23.43±2.22	28.02±1.63	
Comparison of BMI					
Baseline			28.22±1.880	27.93±1.95	0.354
After three months			24.28±2.031	27.47±1.93	0.000

Table III: Stratification of BMI in both interventional groups with respect to marital status & parity

BMI	Marital status	N	Group A	Group B	P-value
	Single	43	26.06±2.58	27.74±1.92	0.568
Baseline	**Married**	109	25.80±2.51	28.74±1.90	
After three months	**Single**	43	24.74±1.90	26.19±1.40	0.177
	Married	109	23.43±1.91	28.02±1.63	
Stratification concerning parity					
Baseline	No parity	53	28.07±1.87	28.08±1.94	0.987
	≥1	99	26.00±2.47	25.81±2.58	
After three months	No parity	53	25.74±1.90	27.19±1.40	0.04
	≥1	99	23.88±1.91	25.02±1.63	

percent) without gestational diabetes (P=0.03) had PCOS confirmed as a diagnosis.

PCOS is more common in children who have a variety of risk factors found in adults as compared to our study where 51% fall under 15-30 age group.[11] High birth weight in girls born to overweight mothers, congenital virilization, and low birth weight are all prenatal variables that might affect a girl's health and development. Late childhood risk factors include early pubarche, atypical central precocious puberty, obesity syndromes, angioedema of the aorta, and metabolic syndrome. Adolescents with consistently irregular menstruation and these risk factors should strongly suspect PCOS.[12]

The average BMI did not change significantly between pre- and post-treatment, according to our study. When metformin was compared to myoinositol, we observed a significant decrease in waist circumference (P = 0.011), whereas a pilot study conducted in Italy in 2019 found that BMI decreased significantly after three months of treatment, but remained significantly higher than controls.[13]

Another research found a modest rise in average body weight in the myoinositol group but a substantial decrease in importance in the metformin group (P = 0.047).[14]

However, in other research, Metformin did not affect the waist circumference. Another relevant study found no difference in waist circumference between the myoinositol and control groups, in line with Romualdi et al.'s findings, in comparison we observed a significant decrease in waist circumference (P = 0.011).[15] Despite this, Ortega-González et al. found that Myo-inositol treatment increased waist circumference.[16] Women with waist circumferences more than 35 inches are at increased risk of cardiovascular disease because of their altered metabolic function. In our research, waist circumference was not considered to be a variable.

Overweight and obese women with polycystic ovarian syndrome (PCOS) were evaluated in comparative research with three different diets: diet alone, diet combined with Metformin, and diet combined with myoinositol (MYO) (PCOS). One of three PCOS treatment groups was randomly assigned to each of 27 overweight or obese women with polycystic ovary syndrome (PCOS). Metformin had a significant impact on the reduction of body weight, BMI, waist, and hip circumferences in all groups. Metformin increased weight loss in obese PCOS patients, while MYO reduced symptoms and improved body composition when used

to restore regular menstrual cycles, which was similar to our study results.[17]

A study conducted in India in the year 2021 found that giving infertile PCOS women a 4-gram dosage of the insulin sensitizer myoinositol improved metabolic, hormonal, and reproductive results. [18]

Patients with PCOS who took Myoinositol and Metformin together at Jawahar Lal Nehru Memorial Medical College had a considerable improvement in their clinical profile, with a reduction in the amount of each drug they were taking.[19] Female PCOS patients' cholesterol, HDL and LDL cholesterol, and postprandial insulin levels were all improved by a combination of Metformin (as well as MI and DCI), which the researchers discovered to have a synergistic effect. PCOS sufferers may benefit from using a variety of medications. According to research done in Lebanon, the combination of MI and DCI may improve the metabolic profile in PCOS. Weight reduction may be aided even more by using the drug metformin.[20]

Monterrey, Nuevo León found that myoinositol treatment reduced the HOMA index and other metabolic and hormonal parameters in patients with insulin resistance linked to polycystic ovarian syndrome and infertility. It has been found that consuming Myo-inositol, compared to Metformin for 12 weeks, had positive metabolic effects in PCOS patients with hyperinsulinism and normoinsulinism.[21]

In a 2019 efficacy and safety trial conducted at Nalanda Medical College India, Myoinositol was a safe and effective therapy option for PCOS patients. There were no adverse effects reported in the standard dosages. Patients with PCOS who are more likely to adhere to their treatment plan have better outcomes in managing their metabolic parameters.[22]

Conclusion

Myo-inositol was more effective than Metformin at reducing BMI consistently in polycystic ovary syndrome.

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