COMPARISON OF EFFICACY OF MYOINOSITOL/D-CHIRO INOSITOL VERSUS MYOINOSITOL/METFORMIN IN THE MANAGEMENT OF POLY CYSTIC OVARIAN SYNDROME

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ABSTRACT

Aim: The main aim of this study is to compare the efficacy of Myoinositol/D-Chiro inositol versus Myoinositol/Metformin in the management of poly cystic ovarian syndrome.

Materials & Methods: This was a prospective study and the study participants in the group-A (30 participants) were prescribed with Myoinositol/D-Chiro inositol whereas the study participants in the group-B (30 participants) were prescribed with Myoinositol/Metformin. Females at reproductive age who were diagnosed with PCOS were included in the study where as females who had their menarche less than 3 years, older than 45 years of age, amenorrhea of menopause, pregnancy, fibroids and patients who had a known condition of hyperglycaemia, hyperthyroidism, hypothyroidism and cardiovascular diseases diagnosed without PCOS were excluded from this study.

Results: In this study, majority of the subjects with PCOS were in the age group 21-25yrs (51.7%). Most of the subjects with PCOS were observed with irregular menstrual cycles (91.7%), painful periods (45%), acne/oily skin (61.7%), alopecia (60%), hirsutism (56.7%), weight gain (93.3%), mood swings (85%), behavioural changes (63.3%), headache/dizziness (16.6%), fatigue (58.3%), sleep disturbances (63.3%) and mental disturbance about the condition (58.3%). The mean days between menstruation of group A subjects before and after treatment were found to be 153 **(**± 93.33) days and 40 (±16.4) days respectively with a mean difference of 113 days where as the mean days between menstruation of group B subjects before and after treatment were 144 **(**±91.33) days and 77 (±17.05) respectively with a mean difference of 67 days.

Conclusion: The group-A subjects showed a significant improvement in the regulation of menstrual cycle within short duration after the treatment with Myoinositol/D-Chiro inositol when compared with the group-B subjects who were prescribed with Myoinositol/Metformin.

Keywords: Metformin, Myoinositol, Poly Cystic Ovarian Syndrome.

INTRODUCTION

Poly Cystic Ovarian Syndrome (PCOS) is the most common disorder in females during their reproductive age. Women with PCOS may experience excess male hormone (androgen) levels, menstrual cycle irregularities (infrequent or prolonged) and/or small cysts on one or both ovaries [1]. It may be morphological (polycystic ovaries) or biochemical (hyperandrogenemia) in nature. Hyperandrogenism is a clinical indicator of PCOS that leads to follicular development inhibition, micro cysts in the ovaries (leads to infertility), anovulation and menstrual changes [2].PCOS can be expressed as an oligogenic disorder in which the interconnection of number of genetic and environmental factors decide the diverse, clinical and biochemical phenotype [3]. Genetic, environmental factors, neuroendocrine derangement, poor dietary choices and physical inactivity might be the risk factors for this condition [4].

PCOS is a complex disorder that influences a minimum of 7% of adult women [5]. According to the National Institutes of Health Office of Disease Prevention, PCOS affects approximately 5 million women in their reproductive age [6]. United States Research pointed that 5-10% of females of age 18 to 44 years were affected by PCOS, making it the most frequent endocrine abnormality among women of fertile age [7]. PCOS rate have been raised from 4 to 20 % in several areas of the world [8]. In India, the prevalence of PCOS extends from 3.7 to 22.5 % based on the study population and the norms used for the diagnosis [9]. Various treatment strategies were available for the management of PCOS with various outcomes. In this study, we made an attempt to compare the efficacy of Myoinositol/D-Chiro inositol versus Myoinositol/Metformin in the management of poly cystic ovarian syndrome.

MATERIALS AND METHODS

This was a prospective study carried out at Helios Hospital, Rajahmundry. After getting the ethical clearance from institutional ethics committee (Approval no: GSPRJY-IEC/Pharm.D/2021/10) and with the prior permission from the above mentioned hospital, data collection was done by strictly adhering to the inclusion and exclusion criteria. From the enrolled patients the data was collected from the relevant resources in a suitably designed data collection form. Patients who were recruited in the study were divided into two groups (Group-A&B). The study participants in the group-A (30 participants) were prescribed with Myoinositol/D-Chiro inositol and the study participants in the group-B (30 participants) were

prescribed with Myoinositol/Metformin. Females at reproductive age who were diagnosed with PCOS were included in this study. Females who had their menarche less than 3 years, older than 45 years of age, amenorrhea of menopause, pregnancy, fibroids and patients who had a known condition of hyperglycaemia, hyperthyroidism, hypothyroidism and cardiovascular diseases diagnosed without PCOS were excluded from this study.

Drugs Prescribed in the Study

Myoinositol/D-Chiro inositol Oral tablet

Chemical Name: Myoinositol 550mg + D-Chiro inositol 13.28mg

Chemical Formula: Myoinositol is described chemically as: cis-1,2,3,5-trans-4,6-cyclohexanehexol. Its empirical formula is $C_6H_{12}O_9$. D-Chiro inositol is described chemically as: cis-1,2,4-trans-3,5,6-cyclohexanehexol. Its empirical formula is $C_6H_{12}O_6$ [10].

Mechanism of Action

Myoinositol and D-Chiro-inositol may modulate steroid biosynthesis and work in an opposite manner. Particularly, Myoinositol induce estrogen production, while D-Chiro-inositol has a role in the synthesis of androgens. D-Chiro-inositol regulate the ovarian function by increasing the testosterone biosynthesis in thecal cells and reduces its conversion to estradiol by decreasing the aromatase enzyme in granulosa cells and regulate the insulin activity majorly on non-ovarian tissue. Myoinositol regulates the glucose metabolism mainly on ovary and improve ovarian function. These two inositol isoforms are designed in 40:1 ratio for the multitarget effects. Inositol helps in balancing the neurotransmitters including serotonin and dopamine in the brain.

Myoinositol/Metformin Oral tablet

***Chemical Name*:** Myoinositol 600mg + Metformin 500mg

Chemical Formula: Myoinositol is described chemically as: cis-1,2,3,5-trans-4,6-cyclohexanehexol. Its empirical formula is $C_6H_{12}O_9$. Metformin is described chemically as: 3-(diaminomethylidene)-1,1-dimethylguanidine. Its empirical formula is $C_4H_{11}N_5$..

Mechanism of Action

Metformin is an antidiabetic medicine which helps to regulate the hormones in PCOS by balancing insulin levels. This effect leads to more regular menstruation and ovulation cycles.

Myoinositol is a naturally occurring messenger which ensures proper binding of insulin to its receptor and regulates the signalling gut follows the binding process. It improves body response to insulin and improves the hormone balance [11].

STATISTICAL ANALYSIS

Statistical analysis was done by using the statistical software Statistical Package for Social Sciences (SPSS version 21.0). Mean and standard deviations were calculated, and t test was performed in order to obtain the p values at 95% confidence interval ($p \leq 0.05$). The statistically significant values were denoted with an asterisk (*).

RESULTS AND DISCUSSION

Table 1 represents the group wise categorisation of subjects recruited in the study based on age. The mean age of the group-A subjects was found to be 23.77 (±3.52) years whereas the mean age of the group-B subjects was found to be 22.77 (±3.24) years and the overall mean age of the study participants was found to be 23.27 (±3.39) years. In this study, majority of the subjects with PCOS were in the age group 21-25yrs (51.7%).

Table 1: Group wise categorisation of subjects recruited in the study based on age

Age (in years)	Group-A (%)	Group-B (%)	Total (%)
≤20	5 (16.7)	10 (33.3)	15 (25)
21-25	17 (56.7)	14 (46.7)	31 (51.7)
26-30	7 (23.3)	6 (20)	13 (21.7)
31-35	1 (3.3)	0 (0)	1 (1.6)
Total	**30 (100)**	**30 (100)**	**60 (100)**

Table 2 represents the group wise categorisation of subjects recruited in the study based on clinical parameters. In this study, majority of the subjects with PCOS were observed with irregular menstrual cycles (91.7%), painful periods (45%), acne/oily skin (61.7%), alopecia (60%), hirsutism (56.7%), weight gain (93.3%), mood swings (85%), behavioural changes (63.3%), headache/dizziness (16.6%), fatigue (58.3%) and sleep disturbances (63.3%).

Table 2: Group wise categorisation of subjects recruited in the study based on clinical parameters

Clinical parameter	Condition of clinical parameter	Group-A (n=30) (%)	Group-B (n=30) (%)	Total (n=60) (%)
Irregular menstrual cycles	Yes	27 (90)	28 (93.3)	55 (91.7)
	No	3 (10)	2 (6.7)	5 (8.3)
Painful periods	Yes	12 (40)	15 (50)	27 (45)
	Sometimes	7 (23.3)	4 (13.3)	11 (18.3)
	No	11 (36.7)	11 (36.7)	22 (36.7)
Alopecia	Yes	18 (60)	18 (60)	36 (60)
	Sometimes	2 (6.7)	6 (20)	8 (13.3)
	No	10 (33.3)	6 (20)	16 (26.7)
Acne/oily skin	Yes	19 (63.4)	18 (60)	37 (61.7)
	Sometimes	1 (3.3)	3 (10)	4 (6.6)
	No	10 (33.3)	9 (30)	19 (31.7)
Hirsutism	Yes	18 (60)	16 (53.3)	34 (56.7)
	No	12 (40)	14 (46.7)	26 (43.3)
Weight gain	Yes	26 (86.7)	30 (100)	56 (93.3)
	No	4 (13.3)	0 (0)	4 (6.7)
Mood swings	Yes	25 (83.3)	26 (86.7)	51 (85)
	Sometimes	2 (6.7)	0 (0)	2 (3.3)
	No	3 (10)	4 (13.3)	7 (11.7)
Headache/dizziness	Yes	5 (16.7)	5 (16.7)	10 (16.6)
	Sometimes	8 (26.6)	5 (16.6)	13 (21.7)
	No	17 (56.7)	20 (66.7)	37 (61.7)
Behavioural changes	Yes	20 (66.7)	18 (60)	38 (63.3)
	Sometimes	7 (23.3)	2 (6.7)	9 (15)
	No	3 (10)	10 (33.3)	13 (21.7)
Fatigue	Yes	16 (53.3)	19 (63.4)	35 (58.3)
	Sometimes	6 (20)	4 (13.3)	10 (16.7)
	No	8 (26.7)	7 (23.3)	15 (25)
Sleep disturbances	Yes	18 (60)	20 (66.7)	38 (63.3)
	Sometimes	4 (13.3)	0 (0)	4 (6.7)
	No	8 (26.7)	10 (33.3)	18 (30)
Mentally disturbed	Yes	15 (50)	20 (66.7)	35 (58.3)
	Sometimes	1 (3.3)	0 (0)	1 (1.7)
	No	14 (46.7)	10 (33.3)	24 (40)

Table 3 represents the group wise categorisation of subjects recruited in the study based on duration of suffering with PCOS. In this study, the duration of suffering for most of the subjects with PCOS was observed to be <1 year (60%).

Table 3: Group wise categorisation of subjects recruited in the study based on duration of suffering with PCOS

Duration of suffering with PCOS	Group-A (%)	Group-B (%)	Total (%)
<1 year	18 (60)	18 (60)	36 (60)
1-3 years	9 (30)	10 (33.4)	19 (31.7)
4-6 years	2 (6.7)	1 (3.3)	3 (5)
7-9 years	1 (3.3)	1 (3.3)	2 (3.3)
Total	**30 (100)**	**30 (100)**	**60 (100)**

Table 4 represents the group wise categorisation of subjects recruited in the study based on abnormalities in the menstrual cycle. In this study, most of the subjects were observed with painful periods along with prolonged cycles and abnormal heavy flow (18.4%).

Table 4: Group wise categorisation of subjects recruited in the study based on abnormalities in the menstrual cycle

Abnormalities in menstrual cycle	Group-A (%)	Group-B (%)	Total (%)
Painful periods +Prolonged cycles	2 (6.7)	3 (10)	5 (8.3)
Painful periods +Prolonged cycles + Abnormal heavy flow	7 (23.4)	4 (13.3)	11 (18.4)
Painful periods +Prolonged cycles + Abnormal heavy flow + Spotting	1 (3.3)	1 (3.3)	2 (3.3)
Painful periods +Prolonged cycles + Abnormal heavy flow + Flow between the cycles	1 (3.3)	1 (3.3)	2 (3.3)
Painful periods +Prolonged cycles + Flow between the cycles	3 (10)	1 (3.3)	4 (6.7)
Painful periods +Abnormal heavy flow	1 (3.3)	5 (16.8)	6 (10)
Painful periods + Abnormal heavy flow + Spotting	2 (6.7)	1 (3.3)	3 (5)
Painful periods + Spotting	2 (6.7)	2 (6.8)	4 (6.7)
Painful periods + Spotting + Flow between the cycles	1 (3.3)	1 (3.3)	2 (3.3)
Prolonged cycles	1 (3.3)	1 (3.3)	2 (3.3)
Prolonged cycles + Abnormal heavy flow	3 (10)	1 (3.3)	4 (6.7)
Prolonged cycles +Spotting	2 (6.7)	4 (13.3)	6 (10)

Prolonged cycles +Spotting + Flow between the cycles	1 (3.3)	1 (3.3)	2 (3.3)
Prolonged cycles + Flow between the cycles	2 (6.7)	2 (6.8)	4 (6.7)
Abnormal heavy flow	1 (3.3)	1 (3.3)	2 (3.3)
No Abnormality	0 (0)	1 (3.3)	1 (1.7)
Total	**30 (100)**	**30 (100)**	**60 (100)**

Table 5 represents the mean days between menstruation before and after the treatment of the subjects recruited in the study. The mean days between menstruation of group A subjects before and after treatment were found to be 153 **(**± 93.33) days and 40 (±16.4) days respectively with a mean difference of 113 days where as the mean days between menstruation of group B subjects before and after treatment were 144 **(**±91.33) days and 77 (±17.05) respectively with a mean difference of 67 days.

Table 5: Mean days between menstruation before and after the treatment of the subjects recruited in the study

Groups	Before treatment	After treatment	p-value
Group-A	153 **(**± 93.33)	40 (±16.4)	<0.0001*
Group-B	144 **(**±91.33)	77 (±17.05)	0.0002*

**indicates statistically significant*

CONCLUSION

The group-A subjects showed a significant improvement in the regulation of menstrual cycle within short duration after the treatment with Myoinositol/D-Chiro inositol when compared with the group-B subjects who were prescribed with Myoinositol/Metformin. It is the responsibility of the clinical pharmacist to create awareness regarding the management of polycystic ovarian syndrome which may benefit the patients with better therapeutic outcomes.

ABBREVIATIONS

PCOS: Poly Cystic Ovarian Syndrome; LH: Luteinising Hormone; FSH: Follicle-Stimulating Hormone.

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CONFLICT OF INTEREST

None

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