

Comparative Study of Metformin versus Myoinositol in the Treatment of Insulin Resistant Poly Cystic Ovarian Syndrome in Women

Jyoti Singh¹, Shabina Khan², Nayana Kumari³, Padma Rao⁴

ABSTRACT

Introduction: Polycystic ovarian syndrome (PCOS) is the most common endocrine disorder in women of reproductive age group. Prevalence worldwide is estimated to be 6-10% or even 15% when the diagnosis is based on Rotterdam Criteria. Study aimed to compare the effects of myoinositol and metformin in the treatment of menstrual irregularities e.g. Oligomenorrhoea and Amenorrhoea and Ovulation Dysfunction. Oligo-ovulation and anovulation.

Materials and method: It was a prospective and comparative study between metformin and myoinositol conducted over a period of 1 year on 120 patients (15-35 years), each group including 60 patients. Evaluation of study group to their menstrual cycle, hormonal parameters, number of pregnancies and change in BMI started at 0 and 12 weeks. The data was imported in SPSS (statistical package for the social sciences) version 23.0. Chi-square test was used for test of significance. A p value of <0.05 was considered statistically significant.

Results: Menstrual cycle regularity was assessed at 12 weeks in both the groups, found to be 50% in the metformin group (n=60) and 60% in myoinositol group (n=60). This study shows hormonal parameters such as total Testosterone, estradiol, DHEAS, LH, FSH and LH:FSH ratio were significantly decreased in both the groups after the treatment (12 weeks) (p-value<0.05). The conception rate in our study was 43% in metformin group and 31% in myoinositol group at 12 weeks. The change in BMI from 0 week to 12 weeks was found to be significant (p<0.05) in both the groups.

Conclusion: Metformin and myoinositol drugs being insulin sensitizers improved various studied parameters among PCOS patients. Metformin is marginally more efficacious than myoinositol. However, myoinositol can be a new addition in the armamentarium for the treatment of PCOS. As insulin resistance is the underlying pathology in PCOS, insulin sensitizers along with lifestyle modification should be considered as an integrative strategy which can lead to weight reduction and improvement in symptoms of PCOS.

Keywords: Metformin, Myoinositol, Insulin Resistant Poly Cystic Ovarian Syndrome,

2 out of 3 following criteria are met: - i) Oligoovulation / anovulation ii) Excessive androgen activity iii) Polycystic ovaries by ultrasound (other endocrine disorders are excluded). This syndrome was first described by Stein and Leventhal in 1931. It is a disorder characterized by excessive secretion of androgens by the ovaries, oligomenorrhoea/amenorrhoea, oligoovulation/anovulation and insulin resistance and with variable clinical manifestations that include irregular menstrual cycles, hirsutism, alopecia and acne. PCOS increases woman's risk of infertility, dysfunctional uterine bleeding, endometrial carcinoma, as well as insulin resistance, dyslipidemia and hypertension [all risk factors for cardiovascular disease (CVD)]. Other names for this syndrome include Polycystic Ovarian Disease (PCOD)/Functional Ovarian Hyperandrogenism/Stein Leventhal Syndrome. The pathogenesis of PCOS is multifactorial, with genetic and environmental factors being implicated. Insulin resistance is presumed to be caused by defects in the insulin receptor and post receptor components of the insulin signaling pathway.

Elevated insulin levels cause abnormal functioning of hypothalamic-pituitary-ovarian axis that lead to PCOS. Women with PCOS experience an increased frequency of hypothalamic GnRH pulses, which in turn results in an increase in the LH/FSH ratio.²

Metformin and myoinositol being insulin sensitizers corrects biochemical parameters i.e. insulin resistance, hormonal and lipid profile, which leads to improvement in menstrual irregularities, hyperandrogenism and infertility in PCOS women. Metformin is a hepato-selective insulin

¹Senior Resident, Department of Obstetrics and Gynaecology, Prasad Institute of medical sciences, Lucknow, Uttar Pradesh,

²Professor, Department of Obstetrics and Gynaecology, Rohilkhand Medical College and Hospital, Bareilly International University, Pilibhit Bypass Road, Bareilly, UP, ³Junior Resident (Second year), Department of Obstetrics and Gynaecology, Rohilkhand Medical College and Hospital, Bareilly International University, Pilibhit Bypass Road, Bareilly, UP, ⁴Junior Resident (Third year), Department of Obstetrics and Gynaecology, Rohilkhand Medical College and Hospital, Bareilly International University, Pilibhit Bypass Road, Bareilly, UP, India

Corresponding author: Dr. Jyoti Singh, Senior Resident, Department of Obstetrics and Gynaecology, Prasad Institute of Medical Sciences, Lucknow, Uttar Pradesh, India

How to cite this article: Singh J, Khan S, Kumari N, Rao P. Comparative study of metformin versus myoinositol in the treatment of insulin resistant poly cystic ovarian syndrome in women. International Journal of Contemporary Medical Research 2022;9(2):B13-B16.



sensitizer. It has beneficial properties of weight loss, lipid reduction and modulator of endothelial function. It improves ovarian function in insulin resistant women.³ Myoinositol (MI) is a naturally occurring substance produced in the human body that belongs to the vitamin B complex group. Of the nine different types of inositol, two have insulin-sensitizing capabilities: MI and D-chiro-inositol. This study was conducted to compare the effects of myoinositol and metformin in the treatment of menstrual irregularities e.g. Oligomenorrhea and Amenorrhea and Ovulation Dysfunction. Oligo-ovulation and anovulation.

MATERIAL AND METHODS

It was a prospective and comparative study between metformin and myoinositol conducted over a period of 1 year on 120 patients (15-35 years), each group including 60 patients. Evaluation of study group to their menstrual cycle, hormonal parameters, number of pregnancies and change in BMI started at 0 and 12 weeks.

RESULTS

Menstrual cycle regularity was assessed at 12 weeks in both the groups, found to be 50% in the metformin group (n=60)

Hormonal parameter	Before Treatment	After Treatment	p-Value
Total Testosterone (ng/ml)	99.42	50.31	<0.001
Estradiol (pg/ml)	88.19	81.43	<0.001
DHEAS (µg/dl)	363.07	257.82	<0.001
LH (mIU/ml)	15.87	7.9	<0.001
FSH (mIU/ml)	6.72	6.64	<0.05
LH:FSH Ratio	2.38	2.00	<0.05
*significant			

Table-1: Hormonal parameters before and after treatment with metformin

Hormonal parameter	Before Treatment	After Treatment	p-Value
Total Testosterone (ng/ml)	98.67	37.39	<0.001*
Estradiol (pg/ml)	85.92	92.41	<0.001*
DHEAS (µg/dl)	361.86	186.4	<0.001*
LH (mIU/ml)	15.22	8.95	<0.001*
FSH (mIU/ml)	6.93	4.96	<0.001*
LH:FSH Ratio	2.21	1.8	<0.05*
*significant			

Table-2: Hormonal parameters before and after treatment with myoinositol

Group	0 – Week	12 – Weeks	P-value
	Mean ± SD	Mean ± SD	
Metformin	27.84 ± 4.54	26.63 ± 2.52	<0.05*
Myoinositol	28.31 ± 3.54	27.31 ± 3.50	<0.05*
*significant			

Table-3: Comparison of body mass index (kg/m²)

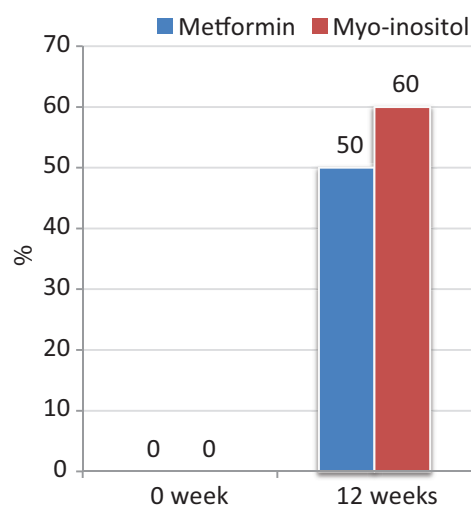


Figure-1: Comparison menstrual cycle regularity

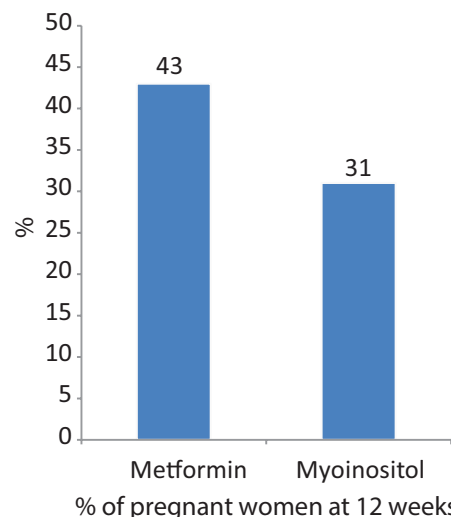


Figure-2: Comparison of number of pregnancies

and 60% in myoinositol group (n=60). This study shows hormonal parameters such as total Testosterone, estradiol, DHEAS, LH, FSH and LH:FSH ratio were significantly decreased in both the groups after the treatment (12 weeks) (p-value<0.05). The conception rate in our study was 43% in metformin group and 31% in myoinositol group at 12 weeks. The change in BMI from 0 week to 12 weeks was found to be significant (p<0.05) in both the groups. The results are presented in frequencies, percentages and mean±SD. The Chi-square test was used to compare categorical variables between the groups.

Figure-1: shows the menstrual cycle regularity. Menstrual cycle regularity was nil at 0 week in both the groups. Menstrual cycle regularity was found to be in 50% patients of metformin group and in 60% patients of myoinositol group at 12 weeks.

Table-1: shows the hormonal data before and after treatment with metformin. There was significant (p<0.05) decrease in all the hormonal parameters from 0 week to 12 weeks in metformin group

Table-2: shows the hormonal data before and after treatment with myoinositol. There was significant (p<0.05) decrease in all the hormonal parameters from 0 week to 12 weeks in myoinositol group.

Figure-2: shows number of pregnancies. The percentage of pregnant women was 43% in metformin group and 31% in myoinositol group at 12 weeks.

Table-3: shows the body mass index. BMI was 27.84 ± 4.54kg/m² at 0 week in metformin group which decreased to 26.63± 2.52kg/m² at 12 weeks. BMI was 28.31± 3.54kg/m² at 0 week in myoinositol group which decreased to 27.31± 3.50kg/m² at 12 weeks. The change in BMI from 0 week to 12 weeks was found to be significant (p<0.05) in both the groups.

DISCUSSION

The finding of the present study in terms of BMI was similar to the study by Awalekar et al (2015)⁴ in which BMI in the metformin group was reduced from a mean of 29.64 ± 3.49 to 27.13 ± 3.49 kg/m² after 3 months of treatment which was highly significant (p = 0.0001) and in myoinositol group, BMI changed from mean of 25.40 ± 6.53 to 24.40 ± 5.91kg/m² (p = 0.009). Similar results were seen in studies done by Le Donne et al (2012)⁵ and Cheang et al (2009)⁶ conducted a crossover study in which metformin was able to decrease body weight (p < 0.05) and improved menstrual cycle (<0.001).

In the present study, hormonal parameters such as total Testosterone, estradiol, DHEAS, LH, FSH and LH:FSH ratio were significantly decreased in both the groups after the treatment (12 weeks). Nabi and Guleria (2018)⁷ also reported that there was highly significant decrease in LH:FSH ratios in both the group. Myoinositol drug decreased Testosterone levels and LH:FSH significantly; whereas in metformin group, significant improvement occurred in Testosterone and LH:FSH.

In the present study, the percentage of pregnant women was

43% in metformin group and 31% in myoinositol group 20 weeks which was similar to study done by Angik.et.al⁽⁸⁾ where conception occurred in 33.33% in metformin group and 36.84% in myoinositol group. In our study, menstrual cycle regularity was achieved in 50% patients of metformin group and in 60% patients of myoinositol group after treatment (at 12 weeks) which was nil at 0 week. This finding is in agreement with the study by Leo et al (2013).⁹ Similar to the present study, Borlea et al (2019)¹⁰ found that menstrual cycle pattern normalized significantly by 54.78% at 3 months follow-up (p=0.0008) and remained stable at 6 months in metformin therapy, even though the follow-up period was lower in the present study than their study (12 weeks).

CONCLUSION

Metformin and myoinositol drugs being insulin sensitizers improved various studied parameters among PCOS patients. Metformin is marginally more efficacious than myoinositol. However, myoinositol can be a new addition in the armamentarium for the treatment of PCOS. As insulin resistance is the underlying pathology in PCOS, insulin sensitizers along with lifestyle modification should be considered as an integrative strategy which can lead to weight reduction and improvement in symptoms of PCOS.

ACKNOWLEDGEMENT

I would like to express my special thanks of gratitude to my Professor Dr. Shabina Khan who gave me the golden opportunity to do this publication, and has helped me a lot in completing this work. I came to know so many new things I am really very thankful.

REFERENCES

1. Tehrani FR, Simbar M, Tohidi M, Hesseinpanah F, Azizi F. The prevalence of polycystic ovary syndrome in a community sample of Iranian population. Iranian PCOS prevalence study. *Reproductive Biology and Endocrinology*. 2011;39:1-7.
2. Alemzadeh R, Kichler J, Calhoun M. Spectrum of metabolic dysfunction in relationship with hyperandrogenemia in obese adolescent girls with polycystic ovary syndrome. *European Journal of Endocrinology*. 2010;162(6):1093-1099.
3. Otta CF, Wior M, Iraci GS, Kaplan R, Torres D, Gaido MI, et al. Clinical, metabolic, and endocrine parameters in response to metformin and lifestyle intervention in women with polycystic ovary syndrome: a randomized, double-blind, and placebo control trial. *Gynaecological Endocrinology*. 2010;26(3):173-178.
4. Awalekar J, Awalekar C, Jadhav M, Chivate CG, Patwardhan MH. Effect of metformin and myoinositol and lifestyle modification in patients of PCOD. *Int J Biomed Res* 2015;6(09):698-704
5. Le Donne M, Alibrandi A, Giarrusso R, Lo MI, Muraca U. Diet, metformin and inositol in overweight and obese women with polycystic ovary syndrome: effects on body composition. *Minerva Ginecol*. 2012;64(1):23-9.
6. Cheang KI, Huszar JM, Best AM, Sharma S, Essah PA,

- Nestler JE. Long-term effect of metformin on metabolic parameters in the polycystic ovary syndrome. *Diab Vasc Dis Res.* 2009;6(2):110-9.
7. Nabi S, Guleria R. Comparison of Myoinositol and Metformin in Women with Polycystic Ovarian Syndrome. *Indian Journal of Clinical Practice* 2018; 29 (5).
 8. Angik R, Jajoo SS, Hariharan C, Chimote A. A comparative study of metabolic and hormonal effects of myoinositol vs. metformin in women with polycystic ovary syndrome: a randomised controlled trial. *Int J Reprod Contracept Obstet Gynecol.* 2015;4(1):189-94.
 9. Leo VD, Musacchio MC, Cappelli V, Sabatino AD, Tosti C, Piomboni P. A combined treatment with myoinositol and monacolin K improve the androgen and lipid profiles of insulin-resistant PCOS patients. *J Metabolic Syndd.* 2013;2:127.
 10. Raffone E, Rizzo P, Benedetto V. Insulin sensitizer agents alone and in co-treatment with r-FSH for ovulation induction in PCOS women. *Gynaecol Endocrinol.* 2010;26(4):275-80.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 03-12-2021; **Accepted:** 29-01-2022; **Published:** 28-02-2022