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Effects of 12 -week home - based aerobic exercise on insulin resistance and body composition among polycystic ovary syndrome

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Abstract--Background: Polycystic ovary syndrome (PCOS) is a common endocrine disorder that is characterized by menstrual irregularity and elevated serum androgens, and is often accompanied by insulin resistance. Materials & Methods: In these 12- week prospective study included 86 patients diagnosed with PCOS, aged 24 to 32 years. Exercise are with choice of participants within aerobics. The pre and post assessment were taken to measure the fasting glucose, fasting insulin, HOMA-IR and body composition. Result: The HOMA-IR baseline was 1.24(±0.63) which decreased to 0.86(±0.36) after 12 weeks. The Body composition baseline BMI (kg/m²), Waist circumference, Waist Hip ratio, Neck circumference and Body fat percentage was 28.44 (±2.05), 82.56 (±3.43), 0.87 (±0.06), 32.16 (±2.57), and 37.79 (±3.15) was significantly reduced to 27.49(±2.01), 81.16(±3.56), 0.86 (±0.07), 31.97 (±2.43) and 36.55 (±3.36) after the exercise programme (p<0.00001). In contrast, paired T-test analysis showed no such significant difference for variables Hip circumference when compared with the post test. Conclusion: The home-based aerobic exercise programme reduced HOMA-IR, and body composition. Although more research on the effects of aerobic exercises in PCOS is needed, these findings support aerobic exercise's effectiveness in reducing inflammation and enhancing insulin sensitivity in these patients.

Keywords--PCOS, Insulin resistance, aerobic exercise, body composition.

Introduction

Polycystic ovary syndrome (PCOS) is one of the common reproductive system disorders with a prevalence estimated to be between 5 and 10% among women in the child-bearing period¹. The Rotterdam criteria, the internationally accepted diagnostic criteria for PCOS, requires any two of the following three criteria; oligo- or anovulation, clinical and/or biochemical hyperandrogenism, and polycystic ovaries, with the exclusion of other aetiologies that may mimic PCOS². PCOS is underpinned by insulin resistance (IR) and has significant cardio-metabolic features including hypertension, dyslipidaemia, vascular dysfunction, obesity, and increased risk of metabolic syndrome and type 2 diabetes³. PCOS can also have a significant negative impact on health-related quality of life and mental wellbeing, with women reporting higher levels of anxiety and depression compared to women without PCOS⁴. Physical activity and structured exercise in the general population delivers metabolic, cardiovascular, and psychological benefits at population level, alone or in combination with dietary changes⁵. The present study is to know the effect of 12-week Home based aerobic exercise on the body composition and Insulin Resistance

Aim and Objective

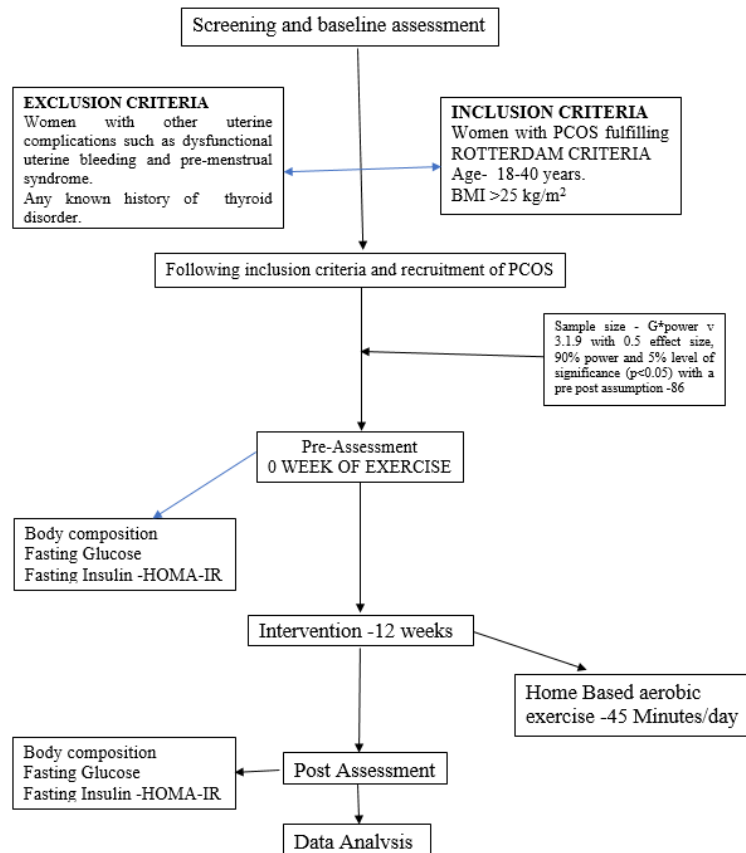
To investigate the effect of a 12-week home-based aerobic exercise programme on body composition, insulin resistance index in PCOS.

Methodology

Study setting: The study will be conducted at the community base within Karnataka.

Study design and duration: This prospective intervention study (pre, post comparison in single group) conducted for a period of 12 Weeks. Institutional Ethical Committee (IEC) approved (E-242)

Flow Chart



Result and Discussion

Table 1: shows the comparison of body composition pre and post exercise. From paired t test, Weight, BMI, Waist Circumference, Waist Hip ratio, Neck Circumference and Body Fat is significantly less in post data as compared to pre data. But there is no significant difference between pre and post-test for Hip Circumference.

Table 2: Shows the comparison of Blood glucose profile, From paired t test, Fasting Glucose (mg/dl), Fasting Insulin (μ U/mL), HOMAIR is significantly more in pre-test as compared to post-test.

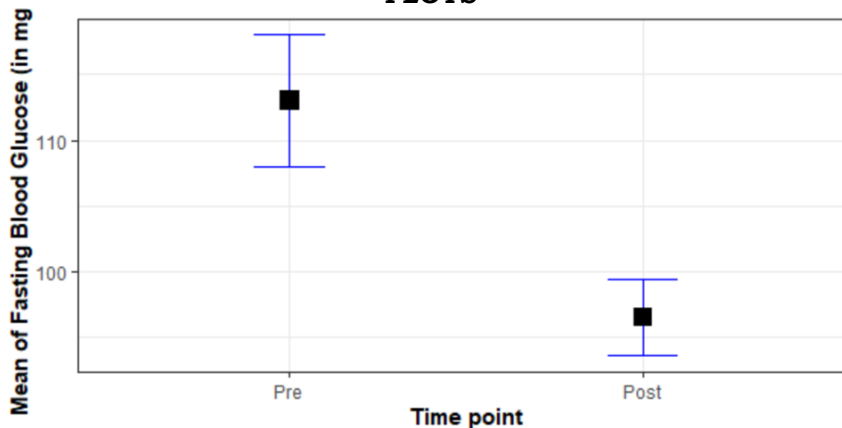
Table 1: Comparison of Body Composition variables over time

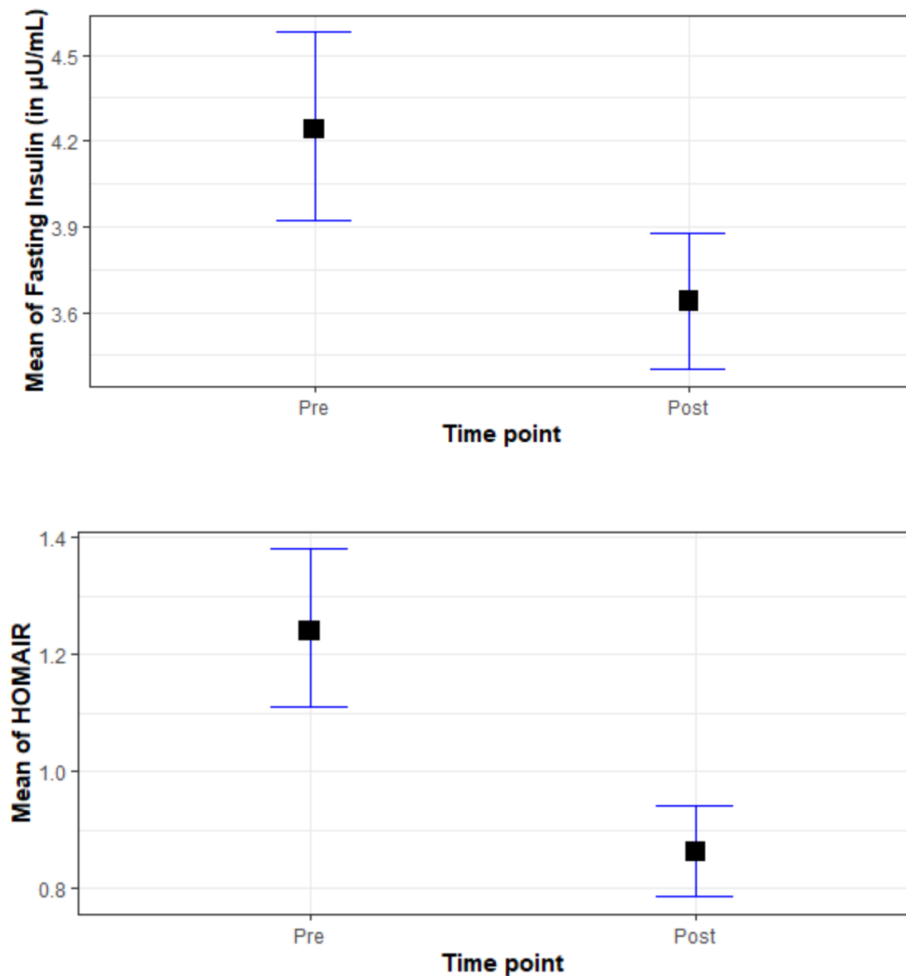
	Time point		p-value
	Pre	Post	
Weight (in Kg)	70.42±8.12	68.02±7.86	<0.00001*
BMI (Kg/m ²)	28.44±2.05	27.49±2.01	<0.00001*
Waist Circumference (cm)	82.56±3.43	81.16±3.56	<0.00001*
Hip Circumference (cm)	95.15±4.98	94.91±4.74	0.06411
Waist Hip ratio	0.87±0.06	0.86±0.07	<0.00001*
Neck Circumference (cm)	32.16±2.576	31.97±2.43	0.00349*
Body Fat (%)	37.79±3.15	36.55±3.36	<0.00001*

Table 2: Comparison of Blood Glucose profile variables over time

	Time point		p-value
	Pre	Post	
FBS	112.85±24.66	96.45±13.8	<0.00001*
Insulin	4.24±1.61	3.64±1.19	0.001013*
HOMA-IR	1.24±0.63	0.86±0.36	<0.00001*

PLOTS





Discussion

PCOS - reproductive system disorders with a prevalence - 5 and 10% among women in the child-bearing age. Approximately over 60% of patients with PCOS are insulin resistant and obese. Furthermore, 20–40% of PCOS patients have evidence of insulin resistance. The aim of this study was to investigate the effect of aerobic exercise on insulin resistance and Body composition among PCOS. This was in agreement with the study of Sir-Petermann *et al.* and El Mkaem *et al.*⁸, who found a significant difference in both groups regarding the glucose level, whereas in contrast to our result, they found an increased insulin level in the pre assessment compared with the post assessment. In our study, insulin resistance calculated by HOMA was found to be significantly reduced post-test ($P = 0.01$), and also significantly reduced within comparison post-test ($P = 0.05$). Bhattacharya, Lin *et al.*, and Villuendas *et al.*⁹ showed that PCOS patients have higher HOMA results and less tolerance to glucose. These results were supported by Bunt *et al.*¹¹, who found that both the physical activity behaviour and the physical activity level were significantly and directly related to the insulin sensitivity. The results of this study agreed with results obtained by Strong *et*

*al.*¹², who found that overweight youth who participate in a structured exercise program can significantly improve their insulin resistance. The results of this study agreed with results obtained by Taghavi *et al.*¹⁴, who studied twenty obese PCOS patients aged 15–30 years who underwent a 12-week aerobic training program. After the 12-week training program, they revealed a significant reduction in body weight and the percentage of body fat.

Conclusion

Aerobic exercise has potent effect in women with PCOS by its direct effect on improving insulin resistance through mitochondrial biogenesis and by improving glucose tolerance and insulin action. Also, aerobic exercise helps in weight reduction, which decreased lipolysis, resulting in decreased plasma free fatty acids, which in turn improves insulin-mediated glucose uptake.

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