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Compare The Effectiveness Of Continuous Aerobic Training And Circuit Interval Training On Obese Women With Polycystic Ovarian Syndrome (Pcos) For Improving Their Anthropometric Measures And Quality Of Life

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Anthropometric measure, Continuous Aerobic Training , Circuit Interval Training , PCOS and Quality of life.

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Abstract

Background: PCOS is an endocrine condition characterized by ovarian cysts, anovulation and endocrine changes. It can be diagnosed through the Rotterdam Criteria. Obesity is the main risk factor for PCOS. Exercise is an effective therapeutic strategy for PCOS. It improves anthropometric measures and quality of life in obese women with PCOS. Objective: To compare the effectiveness of Continuous Aerobic Training and Circuit Interval Training on obese women with PCOS for improving their Anthropometric measures and Quality of Life. Methodology: 62 patients fulfilling the selection criteria were included in this study. Two groups 31 participants in each group were allocated using Simple randomization procedures (a computer-generated list). Anthropometric measures were accessed by using BMI, Waist-to-hip ratio and waist-to-height ratio while quality of life was measured through the WHOQOL BREF questionnaire. Two readings were taken at baseline and post- treatment at day 42. Results: There was a significant difference within both groups. Circuit Interval training was significantly better in improving BMI, WHOQOL BREF QUESTIONNAIRE Total Score and its sub-domains such as Physical and Psychological domain but for the Waist-to-height ratio, Waist-to-hip ratio, WHOQOL BREF Questionnaire Environmental Domain both training were equally effective and for WHOQOL BREF Questionnaire Social Domain was more superior but no

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any significant difference. For depression, duration and frequency of menstruation Circuit Interval Training was superior.

INTRODUCTION

A diverse endocrine condition ,Polycystic ovary syndrome (PCOS) is characterized by ovarian cysts, anovulation, and endocrine changes , drastically affect a woman's life (1). There are various problems related to PCOS like ovulatory dysfunction, infertility, endometrial hyperplasia or cancer, mood disorders like depression, anxiety, obstructive insomnia, obesity, diabetes Type 2,hypertension , cardiovascular disorders , and hypercholesteremia. PCOS has physical signs of hyperandrogenism like hirsutism, acne, hoarseness of voice, and male pattern baldness (2).

For diagnosis of PCOS, Rotterdam criteria is mostly used , 2 out of 3 criteria must be positive for PCOS diagnosis. The three criteria are 1- Oligomenorrhea or Amenorrhea, 2- Hyperandrogenism and 3- Polycystic varies in the ultrasound (3).

Between 6% to 26% of population worldwide are believed to have PCOS (4).The estimated rate of PCOS ranges from 3% to 10%, however in particular racial/ethnic and geographic subpopulations, this percentage is unreliable because small sample sizes, selection bias, and a lack of cross-study comparability are the primary constraints in the majority of the studies done globally (5).

Family history , Genetic Preposition , Obesity , Chronic low grade inflammation , Reproductive age , Type 2 Diabetes , Thyroids Disorders and Sedentary lifestyle and poor eating habits have a significant role in the onset and course of PCOS, are thought to be the root cause of PCOS , worsening clinical appearance badly (6). PCOS has a greater risk to develop metabolic syndrome, hepatic steatosis, cerebrovascular accidents, subfertility, obstetric complications, endometrial atypia or carcinoma, possibly ovarian malignancy and psychosexual disorders (7).

First-line treatments for PCOS are lifestyle changes (diet, exercise, and behavioral interventions) and medicines including mucolytic agents, HMG-CoA reductase inhibitors , thiazolidinediones , sodium-glucose cotransporter-2 inhibitors , dipeptidyl peptidase-4 inhibitors , glucose-like peptide-1 receptor agonists , and some supplements (8).

Additionally, novel cosmetic techniques like electrolysis,photo epilation laser or non-laser and use of topically applied eflornithine for facial hirsutism associated with PCOS, Alter gut microbiome treatment including probiotics (live micro-organisms), prebiotics (source of food for healthy gut bacteria), symbiotic, inositol treatment, non-pharmacological therapy like acupuncture and herbal medicine like- Cinnamon Flaxseeds, Chasteberry, Liquor ice , Berberine and many others. Flavonoids, flavanones and other (9).

Exercise a helpful therapeutic and supportive strategy for PCOS patients managing weight and affecting the levels of the hormones testosterone and androstenedione, insulin signaling ,tissue fibrosis , addressing problems like obesity and metabolic syndrome , it benefits PCOS women by improving their quality of life , anthropometric measures and fertility and psychological health(25-28).Combining aerobic and Swiss ball exercises strengthens muscles, prevents loss of lean muscle mass, lowers obesity, and improves insulin sensitivity and disease-related hyperandrogenism in PCOS patients(29). Continues Aerobic training and Intermittent Aerobic training cause reduction in anthropometric measures and improves hormonal balance in women with PCOS (10).

The purpose behind my research is to compare circuit interval training with continuous aerobic physiotherapy among them which technique will proof more impactful and beneficial on body composition and psychological health which in return improves quality of life of obese women with PCOS.

HYPOTHESIS:

Null Hypothesis:

There is no any significant difference between outcomes of both techniques (Circuit Interval Training Vs Continuous Aerobic Training) for

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improving anthropometric measures and quality of life in Obese women with PCOS.

Alternative Hypothesis:

.There is significant difference between outcomes of both techniques (Circuit Interval Training Vs Continuous Aerobic Training) for improving anthropometric measures and quality of life in Obese women with PCOS.

OPERATIONAL DEFINATIONS:

PCOS:

PCOS , an endocrine condition , is characterized by a number of symptoms like menorrhagia , hyperandrogenism , and abnormal ovaries cysts. PCOS can cause as infertility , obesity, type 2 diabetes , and other metabolic and hormonal syndromes.

Anthropometric measures:

Anthropometric measurements are a group of physical measurements and evaluations of human body includes BMI, waist to hip ratio and waist to height ratio etc , use to assess many facets of a person's body size, shape, and composition in a variety of disciplines, such as anthropology, healthcare, and nutrition.

Quality of life:

The term quality of life (QOL)is a multifaceted notion refers to an individual's total sense of contentment, well-being and fulfillment, in all aspects of their existence, includes physical, mental, emotional, and social well-being, can be influenced by a variety of events like health, financial situation, interpersonal interactions, and other factors can be among them..

Circuit interval training:

Circuit interval training or circuit training or interval training in which a set of exercises that combines aerobic conditioning and strength training, carried out in a particular order, with brief intervals of high-intensity work, followed by brief periods of rest.

Continuous Aerobic Training:

Continuous aerobic training is a steady-state cardio training, includes activities, such as running, cycling, swimming, or brisk walking, for an extended period without resting interval.

MATERIALS AND METHODS:

This study was a single-blind, randomized clinical trial done at Lady Aitchison Hospital in Lahore. The purpose was to see which method is better at improving body measurements and quality of life for obese women with PCOS—circuit interval training or standard physiotherapy with aerobic exercise. The study lasted six months and got ethical approval from King Edward Medical University. A total of 62 women between 18 and 35 years old were included (11). They had PCOS based on the Rotterdam criteria, a BMI between 25 and 35 kg/m² (12), and met other eligibility requirements. These women were selected randomly using a computer-generated list to split them into two groups. Group A received standard physiotherapy with continuous aerobic training, and Group B had circuit interval training. The process was designed to keep the allocation hidden so that neither the participants nor the researchers knew who was in which group until the end.

Data were collected at the start of the study and again after 6 weeks. Both groups had the same warm-up routine that included deep breathing, stretching, and 10 minutes of low-intensity cycling, followed by cool-down exercises. Group A had continuous aerobic training involving 30 minutes of stationary cycling and a set of 10 strengthening exercises. The intensity and number of repetitions increased each week—from 60–65% of max heart rate and 3 reps in the first week, up to 65–80% of max heart rate and 12 reps by the sixth week. Group B did circuit interval training, which included 10 minutes of cycling followed by a circuit of 10 exercises.

These exercises were squats, lunges, high knee hops, rope skipping, planks, mountain climbers, crunches, pelvic tilts, quadruped arm-leg movements, and jumping jacks. Each circuit was followed by a 10-second break. The intensity and number of circuits also increased over time, starting with one circuit at 60–70% of max heart rate in the first week and increasing to four circuits at 65–85% of max heart rate by the sixth week. The study measured body measurements like BMI, waist-to-hip ratio, and waist-to-height ratio.

Quality of life was assessed using the WHOQOL-BREF questionnaire. All data were analyzed using SPSS-26. First, they checked if the data followed a normal pattern. Then, they used the Wilcoxon signed-rank test to compare changes within each group. They used the Mann-Whitney U test to

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compare between the two groups. For those who dropped out, they used intention-to-treat analysis to ensure the results were reliable. The main goals were to check how body measurements and quality of life changed. Other important results included how long and often menstruation occurred, and how much depression was reported. The study wanted to show that improving body measurements can lead to better quality of life for women with PCOS who are overweight.

RESULTS

The findings revealed that for anthropometric measures, baseline values were equal across groups. Post-treatment analysis showed that Circuit Interval Training (CIT) was superior to Continuous Aerobic Training (CAT) in reducing BMI, although the difference was not statistically significant. For waist-to-height ratio and waist-to-hip ratio, both interventions were equally effective, with no significant differences observed.

For quality of life (QOL) outcomes measured by the WHOQOL-BREF questionnaire, CIT demonstrated significantly greater improvement than CAT in the total score, as well as in the physical and psychological domains. In the social domain, no significant difference was observed, but CIT showed superiority with a higher median score. In the environmental domain, both interventions were equally effective.

As p value was less than 0.05 ($p<0.05$) showing that there was significant difference between post treatment WHOQOL BREF Questionnaire Total Score values of both groups with median of post treatment WHOQOL BREF Questionnaire Total Score of group1 was 282(263 to 313) and post treatment WHOQOL BREF Questionnaire Total Score of group 2 was 331(282 to 357).So, Circuit Interval Training (group 1) was significantly more effective than Continuous Aerobic Training (group 2) for WHOQOL BREF Questionnaire Total Score for quality of life.

Regarding secondary outcomes (depression, duration of menstruation, and frequency of menstruation), both interventions showed improvements; however, patients reported CIT to be more effective overall.

Figure 1 Age in group 1 (Continuous Aerobic Training)

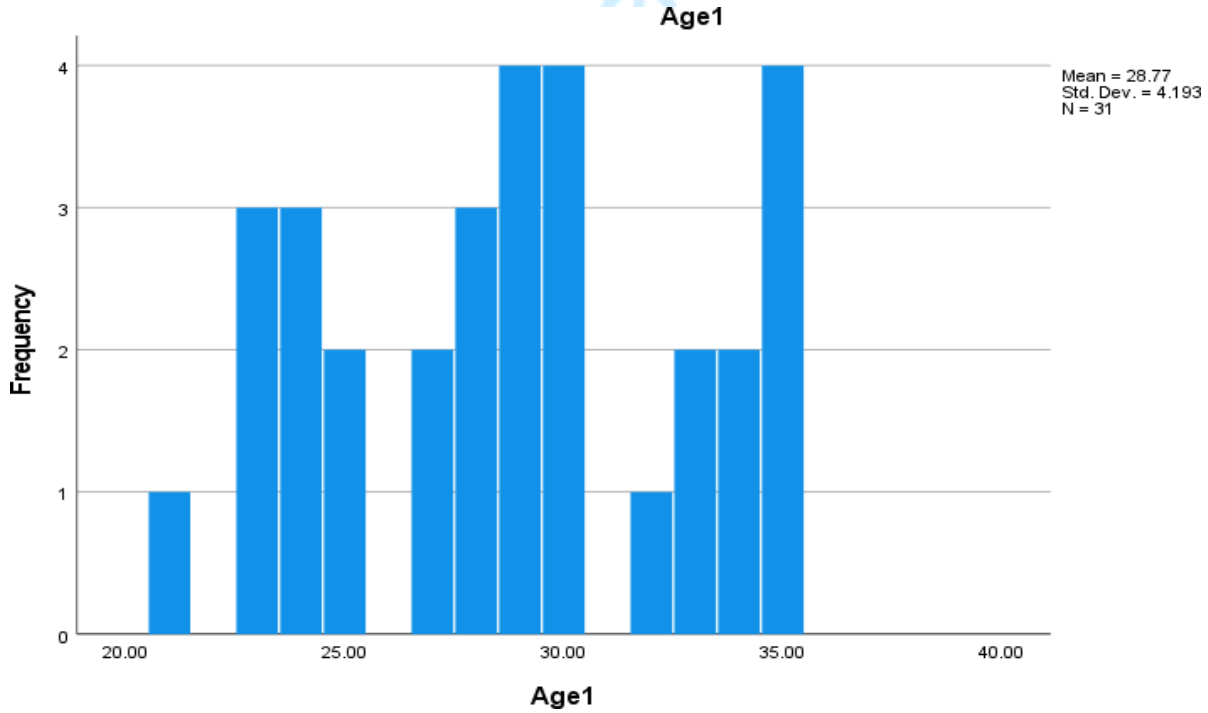

Figure 1 HISTOGRAM OF AGE IN CONTINOUS AEROBIC TRAINING

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Figure 2 Age in group 2 (Circuit interval Training)

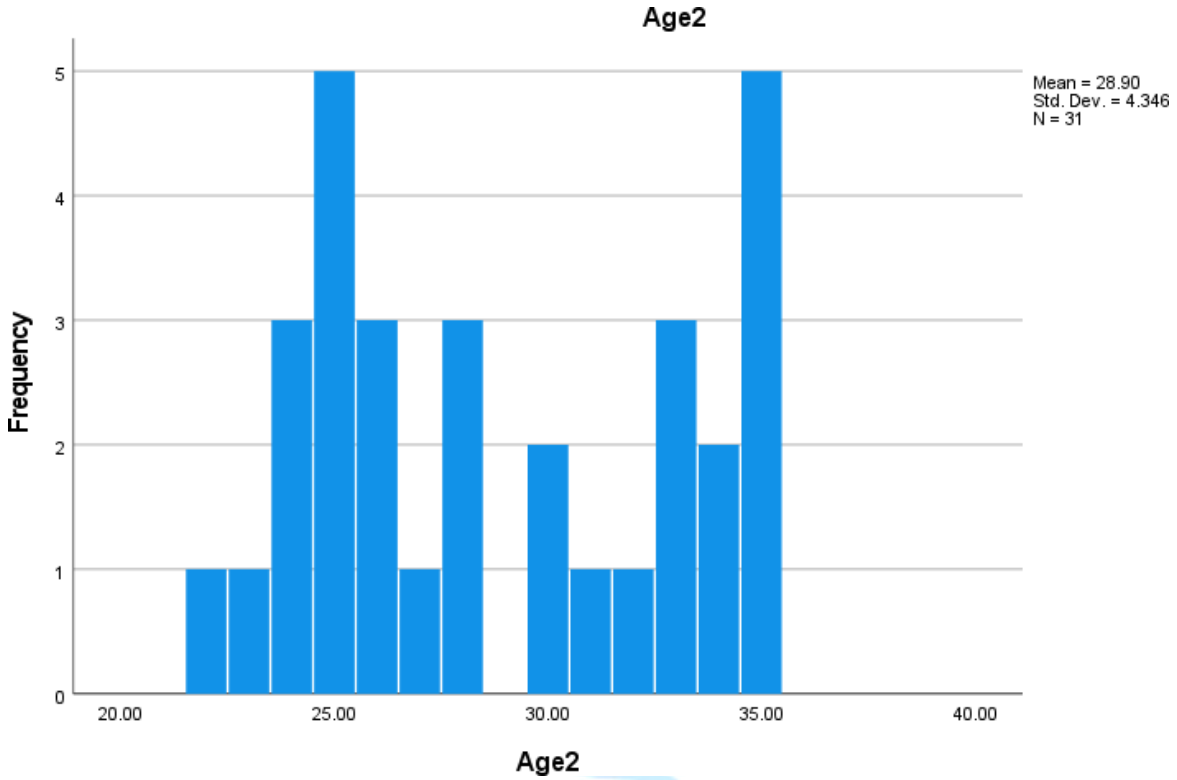

Figure 2 HISTOGRAM OF AGE IN CIRCUIT INTERVAL TRAINING

Normality of data :

Table 1 Kolmogorov-smimov test of BMI , WAIST TO HEIGHT RATIO , WAIST TO HIP RATIO and WHOQOL BREF QUESTIONNAIRE TOTAL SCORE

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Pretreatment BMI(kg per meter square)	.153	62	.001
Post treatment BMI(kg per meter square)	.144	62	.003
Pretreatment Waist to height ratio	.224	62	.000
Post treatment Waist to height ratio	.213	62	.000
Pretreatment Waist to hip ratio	.192	62	.000
Post treatment waist to hip ratio	.143	62	.003
Pretreatment WHOQOL BREF Total Score	.163	62	.000
Post treatment WHOQOL BREF Total Score	.156	62	.001

Table 2 Kolmogorov-smimoy test of Sub Domains of WHOQOL BREF QUESTIONNAIRE

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Pretreatment WHOQOL BREF Physical Domain Score	.139	62	.005
Post treatment WHOQOL BREF Physical Domain Score	.204	62	.000
Pretreatment WHOQOL BREF Psychologic Domain Score	.173	62	.000

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Post treatment WHOQOL BREF Psychologic Domain Score	.142	62	.003
Pretreatment WHOQOL BREF Social Domain Score	.134	62	.008
Post treatment WHOQOL BREF Social Domain Score	.163	62	.000
Pretreatment WHOQOL BREF Environmental Domain Score	.188	62	.000
Post treatment WHOQOL BREF Environmental Domain Score	.157	62	.001

BETWEEN GROUP ANALYSIS

Table 5 Mann Whitney U Test for BMI:

Descriptive Statistics

	N	Percentiles 25th	50th (Median)	75th
Pretreatment BMI(kg per meter square)1	31	30.0000	31.0000	33.0000
Pretreatment BMI(kg per meter square)2	31	29.0000	31.0000	33.0000

Test Statistics

	Pretreatment BMI(kg per meter square)
Mann-Whitney U	436.000
Wilcoxon W	932.000
Z	-.632
Asymp. Sig. (2-tailed)	.527

Post treatment Comparison

Descriptive Statistics

	N	Percentiles 25th	50th (Median)	75th
Post treatment BMI(kg per meter square)1	31	28.0000	30.0000	31.0000
Post treatment BMI(kg per meter square)2	31	25.0000	29.0000	30.0000

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Test Statistics

Post treatment BMI(kg per meter square)

Mann-Whitney U	265.000
Wilcoxon W	761.000
Z	-3.059
Asymp. Sig. (2-tailed)	0.07

a. Grouping Variable: Group

Table 6 Mann Whitney U Test for WHOQOL BREF Questionnaire Total Score:

Baseline Comparison

Descriptive Statistics

	N	Percentiles 25th	50th (Median)	75th
Pretreatment WHOQOL BREF Total Score1	31	156.0000	176.0000	201.0000
Pretreatment WHOQOL BREF Total Score2	31	106.0000	182.0000	207.0000

Test Statistics

Pretreatment WHOQOL BREF Total Score

Mann-Whitney U	479.000
Wilcoxon W	975.000
Z	-.021
Asymp. Sig. (2-tailed)	.983

a. Grouping Variable: Group

Post treatment Comparison

Descriptive Statistics

	N	Percentiles 25th	50th (Median)	75th
Post treatment WHOQOL BREF Total Score1	31	263.0000	282.0000	313.0000
Post treatment WHOQOL BREF Total Score2	31	282.0000	331.0000	357.0000

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Test Statistics

Post treatment WHOQOL BREF Total Score

Mann-Whitney U	256.500
Wilcoxon W	752.500
Z	-3.170
Asymp. Sig. (2-tailed)	.002

a. Grouping Variable: Group

DISCUSION

The present study aimed to compare the effectiveness of Circuit Interval Training (CIT) and Continuous Aerobic Training (CAT) in improving anthropometric measures and quality of life (QOL) among obese women with polycystic ovary syndrome (PCOS). The findings demonstrated that both interventions led to significant improvements in anthropometric measures—BMI, waist-to-height ratio, and waist-to-hip ratio indicating that structured exercise plays a crucial role in the management of obesity-related complications in PCOS. However, CIT showed greater superiority in improving BMI, while no significant difference was observed between the two groups for waist-related measures.

These results align with previous research supporting the role of exercise in improving anthropometric and metabolic health in PCOS. Lu et al. reported that both running and functional high-intensity interval training effectively improved body fat percentage and aerobic fitness in inactive females, suggesting that different exercise modalities can produce beneficial outcomes (13). Similarly, Kumari et al. found that an 8-week structured exercise program in obese women with PCOS significantly improved weight, BMI, waist-to-hip ratio, blood pressure, and cardiorespiratory fitness (14). Systematic reviews and meta-analyses have further highlighted that high-intensity and strenuous exercise programs are particularly effective in enhancing body composition, insulin sensitivity, and cardiorespiratory fitness in PCOS, with a minimum of 120 minutes of vigorous exercise per week recommended for meaningful outcomes.

In the current study, CIT was more effective than CAT in improving BMI, consistent with Seo et al., who reported that circuit interval training significantly reduces BMI in overweight adults. However, waist-to-hip and waist-to-height ratios improved equally in both groups, which corresponds to findings by Guo et al., who observed no significant differences between high-intensity interval training and moderate continuous training for fat loss outcomes despite HIIT being generally more time-efficient (15). Likewise, Mohammedi et al. demonstrated that eight weeks of HIIT improved anthropometric, metabolic, and cardiovascular indices in women with PCOS, reinforcing the value of interval-based training (16).

Beyond anthropometric improvements, quality of life outcomes provided compelling evidence in favor of CIT. Both interventions improved WHOQOL-BREF scores, but CIT demonstrated significantly greater improvements in the total score as well as in the physical and psychological domains. Although the social and environmental domains did not show significant between-group differences, CIT produced slightly higher median values, suggesting a trend toward greater benefit. These findings are consistent with Benetti-Pinto et al., who showed that BMI is inversely correlated with QOL in women with PCOS, particularly affecting physical, psychological, and environmental dimensions (1). By more effectively reducing BMI, CIT may exert downstream benefits on these QOL domains.

The superiority of CIT in improving QOL may be attributed to its physiological effects on skeletal muscle lipid metabolism, which enhances insulin sensitivity, improves body composition, and helps regulate menstrual cycles. These improvements can reduce depression and restore menstrual regularity, thereby addressing two of the most common psychosocial and reproductive challenges faced by women with PCOS (17). The present study also found that secondary outcomes, including depression, duration, and frequency of menstruation,

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improved more in the CIT group, further supporting this mechanism.

Our results are supported by Philbois et al., who compared moderate-intensity continuous training and HIIT in PCOS patients and concluded that both are beneficial, but HIIT may produce greater cardiometabolic and psychosocial adaptations. Similarly, Nunes et al. reported that high-intensity interval training was more effective than combined training in reducing visceral fat and inflammatory markers in obese women, further reinforcing the potential of interval-based training approaches (18). Overall, the current study demonstrates that while both exercise modalities are effective, Circuit Interval Training offers superior benefits in terms of BMI reduction and quality of life improvements, particularly in the physical and psychological domains. These findings emphasize the importance of incorporating structured, progressive, and varied training regimens in physiotherapy management for obese women with PCOS.

CONCLUSION

The result of this study concluded that both Circuit Interval Training and Continuous Aerobic Training were significantly effective in improving anthropometric measures (BMI , Waist to height ratio and Waist to hip ratio) ,Quality of life (WHOQOL BREF Questionnaire total score and its physical , psychological , social and environmental domain score) and Secondary outcomes (depression , duration and frequency of menstruation) . However on comparison it was concluded that for BMI Circuit Interval Training was more superior than Continuous Aerobic Training but for Waist to height ratio and Waist to hip ratio both techniques were equally effective .For WHOQOL BREF Questionnaire total score and for Physical Domain and Psychological Domain of WHOQOL BREF Questionnaire ,Circuit Interval Training was significantly more effective than Continuous Aerobic Training but for Environmental Domain of WHOQOL BREF Questionnaire both trainings were equally effective and for Social Domain of WHOQOL BREF Questionnaire there was no technique significantly more effective but Circuit Interval Training was superior as it had greater median value.For depression , duration and frequency of menstruation Circuit Interval Training was superior.

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