Original Article

The Effect of High Intensity Interval Training and Resistance Training in Altering Body Composition of Obese Postmenopausal Women

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Abstract

Background: This study was designed to evaluate the effectiveness of High Intensity Interval Training (HIIT) and Resistance training (RT) on obese postmenopausal women in altering body composition.

Purpose: To compare the effectiveness of High Intensity Interval Training and Resistance Training in altering body composition of post-menopausal women

Materials and Methods: Twenty obese postmenopausal women randomly selected from Poongothai hospital , karur were divided into two groups using concealed envelope method. Group "A" was given HIIT three times a week and Group "B" was given RT three times a week for four weeks. Body mass index (BMI), Waist Circumference (WC), Waist Hip Ratio (WHR) were used to evaluate body composition at two intervals (pre and post intervention).Study period:October 2022 to June 2023.

Results: Statistical analysis show that there is a significant change within the group for BMI, WC, and WHR pre and post intervention with a $p<0.0001$ for both groups A and B. The mean value of HIIT group was 30.2 using BMI, 92.90 using WC, 0.92 using WHR, whereas the mean values of RT was 30.4 using BMI, 93.0 using WC, 0.94 using WHR As a result, the findings are not statistically as the differences were small.

Conclusion: According to the findings, obese postmenopausal women who took part in the HIIT Group shows considerable reduction in body composition than RT Group.

Key Word: Obesity, Abdominal, Body Mass Index, Waist circumference, Interval Training, High-Intensity.

Introduction

Menopause, which signifies the end of menstrual periods, is described as happening 12 months following the last menstrual period.[1] According to research by Lovejoy et al., visceral adipose tissue considerably expanded throughout the menopausal transition starting 3–4 years before menopause, and this progression of belly fat corresponded with the gradual decline in serum estrogen over time.[2] Women frequently worry a lot about the menopause. The fear of gaining weight is one of the most significant. After

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menopause, it is common for weight growth to be accompanied when the proportion of fat in the body rises and a simultaneous shift in the distribution of fat from peripheral areas towards increasing intra-abdominal depots.[3,4] In fact, it is generally known that women in this stage of life are three times more likely to have metabolic syndrome and obesity than they were before menopause.[5] Main causes of menopausal body composition changes are ethnicity, epigenetic changes, genetic predisposition, Low SHBG levels, relative hyperandrogenemia, and rapid hypoestrogenemia unhealthy dietary habits, minimal physical activity, drugs (like insulin and steroids) and diseases changes in adipose tissue metabolism are linked to aging and the menopause transition, which may help explain why body fat builds up after menopause.[6] Although there are wide variations in average weight gain, 20% of women who go through this transition period gain 10 pounds or more[7] However, greater visceral and abdominal subcutaneous adipose tissue deposition is linked to menopause.[2] Gaining abdominal obesity raises the risk of breast, colon, and endometrial malignancies in post-menopausal women. The obesity's general prevalence in Punjab has been noticed as 72.43%.[8]HIIT is a form of high-intensity interval training. Of physical activity that features brief, strong spurts activity alternating with rest or low-intensity exercise.[9] Exercise carried out at an intensity of >65% of maximum capacity is referred to as HIT.[10] Resistance training refers to working out your muscles against an opposing force, such as using dumbbells, resistance bands, exercise machines, or even just your own bodyweight. The mass index of a person (BMI); waist circumference, waist-to-hip ratio were used to evaluate body composition.[11, 12]

Aim

To evaluate the effectiveness of High intensity interval training and Resistance training in altering body composition of obese postmenopausal women.

Material and Method

It was an experimental feasibility study. A Total of 20 obese post -menopausal women who met the requirements for inclusion and exclusion were sourced from Poongothai hospital, Karur. Convenient sampling was used in the study.

Inclusion criteria:

- Age: 45 to 60 years
- Sex: Postmenopausal Women
- Body mass index (BMI): Obese: BMI >30 kg/ m2

Exclusion criteria:

- Hypertension.
- Hepatic and renal disease.
- Diabetes mellitus types 1 and 2.
- Psychosis.
- Thyroid condition.
- Dyslipidemia.
- Usage of drugs affecting weight, e.g., thyroid dietary supplements, central nervous system depressants, and diuretics
- Chronic Neurological Conditions
- Joint Inflammation at Lower Limb
- Recent Fracture
- A weight decrease of at least 5 kg over the previous 6 months.
- Psychosocial contraindications

Outcome measures:

- Body mass index (BMI)
- Waist Circumference (WC)
- Waist Hip Ratio (WHR)

Procedure

Before beginning the intervention, the individuals were educated about the study and a formal written informed consent was obtained from them. The participants were then separated into two groups Group A (HIIT group) and Group B (RT group) using convenient sampling. Each group consists of 10 participants. Assessment was performed at baseline and after 4 weeks of study.

Group A - High Intensity Interval Training Group

Group A was given Cycling HIIT for 30 min, Monday, Wednesday, and Friday for a period of four weeks. Before and after performing HIIT some warm up stretches are performed (Leg Swings, Heel Toe Walk, Shoulder Stretch, cat-cow stretch, chest stretch).

Protocol:

- Minutes of medium resistance warming up
- High resistance pedaling for 20 seconds, then low resistance pedaling for 40 seconds. 5 times in a row.
- 30 seconds of high-intensity pedaling is followed by 30 seconds of low-intensity recuperation. 5 times in a row.
- High resistance for 20 seconds, followed by low resistance for 40 seconds of recovery. 5 times in a row.
- High resistance for 30 seconds, then low resistance for 30 seconds of recuperation. 5 times in a row.
- For the final five minutes of stretching, slow your pace and use medium resistance.

Group B - Resistance Training Group

For four weeks, the resistance training was done thrice every week (Monday, Wednesday, Friday), lasting 30 minutes total with 5 minutes for initiation and wind-down and 20 minutes of the primary activity. Static stretching was a part of the warm-up and cool-down. Additionally, there were several workouts in the resistance training program. The resistance exercise's level of difficulty was gradually increased from 40% to 50%. Maximum of one repeat (1RM) with rate of perceived effort of 11–12 in weeks 1–4

Protocol:

Basic Squat

- Crouch with your butt back straight and legs bent.
- You may maintain your knees behind your toes by primarily keeping your weight evenly distributed between both heels.
- Achieve the squat's lowest possible point, pause, then stand back up and perform the same exercise again.
- Core, glutes, hamstrings, and quadriceps are the muscles worked.

Modified Pushup

- Put your hands below your shoulders, knees underneath your hips, and in a knelt position to begin.
- Slowly drop yourself to the ground while maintaining a 45-degree angle at the back of your elbows.
- Return to the beginning posture by pushing yourself up.
- Repetition till the appropriate number of times.
- Bicep and triceps muscles, the shoulders, back, chest region, and core muscles are targeted.

Reverse Grip Double Arm Row

- Bringing both of your legs closer, Sit back and squat slightly. While contracting the abdominal region and glutes.
- Weights will be held by arms that will be extended out in front of the body, palms upward.
- Draw your elbows back, drag them gently past your hips to feel your chest and shoulders contract, and then controllably go back to your starting place.
- Upper body, triceps, back, and shoulders are the muscles worked.

Full Body Roll Up

- Begin by supine raising the arms beyond the level of your head.
- Breathe in as you raise your arms and start to tuck the chin towards the chest. Breathe out while you lift up and across every part of your body. Maintaining the legs straight, your abdomen tight, and lowering yourself to your toes.
- Repeat utilizing your abdominals to lift and lower yourself slowly and without using your strength.
- Core, shoulders, and back muscles are the focus of this exercise.

Dumbbell Deadlift

- To begin, Place your lower extremities halfway apart as you upright and your weights facing in the direction of your thighs.
- As you make a soft bend to your knees and descend the dumbbells to the floor, contract your abdominal muscles and maintain a flat back.

- To lift and come back to an upright position. Contract the glutes and activate the hamstrings.
- The muscle groups that this exercise targets are: Glutes and Hamstrings

Forward Lunge With Bicep Curl

- Step forward with both of your feet approximately hip-width wide with high standing. Utilizing one's right leg, take a big step forward while bringing the rear knee all the way to the ground. At the bottom of the lunge, perhaps both of your legs are supposed to be approximately 90 degrees flexed.
- During the lunge's descent, hold weights onto your shoulders to complete the bicep curl. Then to go back to the position of beginning, push off your leading foot.
- Quads, glutes, hamstrings, and biceps are the muscle groups that are targeted

Shoulder Overhead Press

- When you first stand, stand with hip width wide. Bring your elbows out to the side to maintain the arms-at-the-goalpost position. With a directly back and tight abs, you'll hold your elbows at shoulder level.
- Lift dumbbells straight up until your arms are parallel to the ground. Return with control and gradually to the starting position.
- Shoulders are the targeted muscle groups

Bird Dog

- Crouch on all fours on an exercise mat.
- Extend the opposing leg far behind you while extending one arm long and contracting your abs.
- Continue on the opposite side.
- Target Muscles: Low Back and Abdominals

Plank

- Lay down on the floor with your forearms parallel to the surface to start your elbows should be the distance between your hands.
- Maintain a straight body through the top of your head to your toes in a straight line by engaging your core and pressing all the way down to the elbows, clench your glutes and pull the navel into your spine.
- Hold for 30 seconds to 1 minute.
- This exercise targets: the core/abdominals, shoulders, upper back, pectoral, arms, and legs

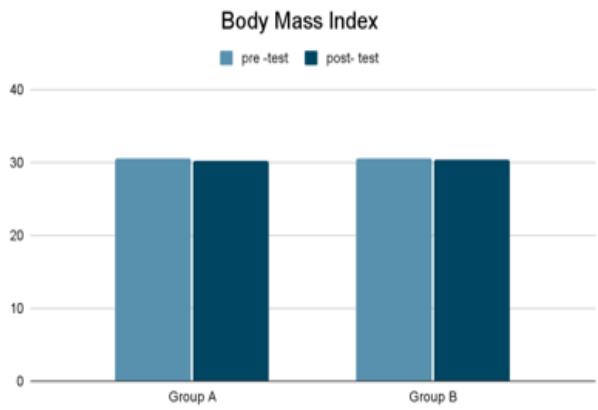
Leg Raise

- Lie flat on your back with your legs aligned.
- Maintaining a straight posture, raise your legs all the way to the roof until your butt is raised off the ground.
- Gently reposition your legs so that they are slightly above the floor. Hold on for a second.
- You may strengthen your cores and oblique's

Glute Bridge

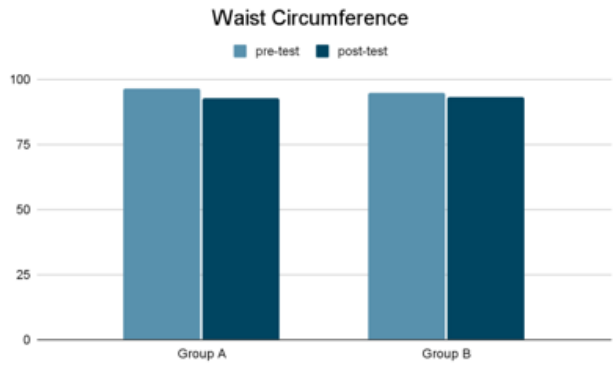
- Place your feet flat on the floor with your knees bent while lying on your back. Make sure your heels are 6 to 8 inches from your glutes and that your toes are pointed straight ahead. Your palms should be facing up.
- Slowly elevate your hips while squeezing your core and using your glutes.
- Be careful not to arch your back as you lift your hips as possible. Elevating the hip region till torso an even path beginning with your shoulder up to your knee is necessary for a complete glute bridge.
- Squeeze your glutes as hard as you can once you've reached the top of the glute bridge, then hold for a few seconds.
- Without letting up on the strain in your glutes and core, slowly lower your hips back to the ground.
- Tighten your abdominal and glute muscles

Data Analysis



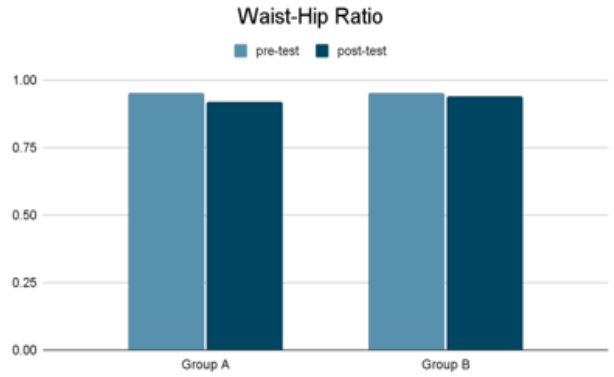
Graph No. 1

Interpretation: Graph no. 1 shows that values are extremely statistically significant



Graph no .2

Interpretation: Graph no 2 shows that the values are extremely statistically significant



Graph no.3

Interpretation: Graph No.3 shows that the value is extremely statistically significant.

Result

It was discovered that there is a substantial difference between pre-test and post – test results after statistical examination of the quantitative data. There is significant difference within the groups yet there was no apparent difference among the groups.

- Comparing the pre-test and post-test values of HIIT using BMI, WC, and WHR. The mean value of pre-test was 30.6 and the post-test was 30.2 using BMI, the pre- test and post-test mean values were 96.30 and 92.90 using WC, the pre-test and post-test mean values were 0.95 and 0.92 using WHR. As a result, the findings are considered statistically significant when the p value is <0.0001.
- Comparing the pre-test and post-test values of RT using BMI, WC, and WHR. The mean value of pre-test was 30.57 and the post-test was 30.4 using BMI, the pre-test and post-test mean values were 94.70 and 93.00 using WC, the pre-test and post-test mean values were 0.95 and0.94 using WHR. As a result, the findings are considered statistically significant when the p value is <0.0001.
- Comparing the post-test values of HIIT and RT groups, the mean value of HIIT group was 30.2 using BMI, 92.90 using WC, 0.92 using WHR, whereas the mean values of RT was 30.4 using BMI, 93.0 using WC, 0.94 using WHR. p-value is 0.24 using BMI, 0.96 using WC, 0.22 using WHR. As a result, the findings are not statistically significant.

This shows that both HIIT group and RT group are statistically significant within the groups but not between the groups.

Discussion

In the current study, High Intensity Interval Training and resistance based exercise in postmenopausal individuals with obesity in altering body composition was examined. Both interventions improved body composition (BMI, WC, and WHR), But HIIT increased the proportion of fat mass reduction. Moreover, in short duration abdominal fat mass was reduced only in HIIT groups, and were substantially different from RT.Wewege et al. discovered that HIIT & MICT training improved FM and waist size while not having any changes in body weight. Furthermore, they demonstrated that while MICT training and HIIT exercises were equally effective, HIIT exercise needed about 40% less time. Maillard et al.'s (2018).[13] meta-analysis concentrated on the benefits of HIIT on total FM of the body and (intra)-abdominal reduction, HIIT is also a time-effective way to reduce abdominal and visceral FM. Socha et al. were able to indicate that a period of eight weeks of exercise with resistance substantially decreases the percentual body fat in women beyond the age of 50.

Gillen et al. (2013) after a 6-week low-volume HIIT exercise (10 seconds at 90% of one's maximal Heart rate variability, then a 60-second period of relaxation), Dexa scans disclosed a decrease rises in leg lean muscle mass and degrees of abdomen and general adiposity.

Jonathan D Bartlett et al., Stated that High-intensity interval training's higher level of enjoyment may be useful for boosting exercise adherence. Dupuit et al Particularly for postmenopausal women, cycling HIIT appears to be more beneficial than running, and training regimens lasting more than 8 weeks should be recommended, with three sessions per week.

Our result has shown that High intensity interval training and resistance training both has significant effect on body composition but High Intensity Interval Training reduces composition of the body in lesser period of time whereas resistance training need more duration to show significant response

Limitations:

1. Patients is trained via online meeting
2. Metabolic outcomes could have been added

Recommendations:

1. Further studies are recommended to consider other potential risk factors
2. Follow up with large sample size may be more commendable

Conclusion

According to the findings, individuals in HIIT Group are better than individuals in RT Group in altering body composition in short duration as HIIT is found to be more enjoyable and is a quick approach to decrease body fat deposits, particularly visceral and abdominal fat mass. Taking that into account that following menopause, resistance training can enhance quality of life and muscle performance, hence it is recommended to implement High intensity interval training and Resistance training.

Ethical Clearance: Taken from institutional ethical committee 03/ 022/ 2022/ ISRB/ SR/ SCPT.

Funding: Self

Conflict of Interest: Nil

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