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EFFECTIVENESS OF SURYANAMASKAR V/S TREADMILL TRAINING ON FITNESS IN OVERWEIGHT AND OBESE WOMEN

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ABSTRACT

Background of the study: Prevalence of Obesity has increased in the past years, which has led to many co-morbidities There are many preventive measures as well as treatment methods to avoid or cure these complications. It is proved that Suryanamaskar gives beneficial effect on weight management as well as improving physical fitness. It is also stated in literature that Treadmill Training reduces weight and improves fitness. Hence the objective of the study was to find out whether Suryanamaskar or Treadmill Training is a reliable approach towards physical fitness. **Methodology:** In this comparative experimental study design, 35 overweight and obese women were selected. Exercise training was monitored and participants were instructed to do the exercises for 5 days/week for 6 weeks inside the campus. Body compositions like Weight, BMI and Circumferences, Muscle Endurance and Cardio Respiratory Fitness were measured before and after the exercise protocol. **Result:** The study showed Suryanamaskar to be more effective than Treadmill Training in weight management and overall physical fitness. Mean Circumferences specifically around the Forearm, Hip and Thigh in the Suryanamaskar group were reduced significantly (1.37 ± 0.5), (3.34 ± 1.72) and (2.31 ± 0.6) respectively, than the Treadmill group (0.96 ± 0.71), (1.84 ± 1.17) and (1.75 ± 1.1). Mean Muscle Endurance was also improved significantly, (4.5 ± 1.2) in Suryanamaskar group than (2.7 ± 1.2) in Treadmill group, as $P < 0.01$. Weight, BMI and Cardio Respiratory Fitness showed significant improvement in Suryanamaskar group more than Treadmill group in 6 weeks. **Conclusion:** Suryanamaskar, being a holistic approach, proved to be more beneficial than Treadmill

Training. As it is cost effective and flexible in timings and venue, it can be easily practiced in community.

KEYWORDS: Overweight, Obesity, Weight, BMI, Circumferences, Muscle Endurance, Cardio Respiratory Fitness (CRF), Suryanamaskar (SN), Treadmill (TM).

INTRODUCTION

Overweight and Obesity are defined as abnormal or excessive fat accumulation that may impair health. Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m^2).[1] Prevalence of Overweight and Obesity is rising globally. They have become the most common health conditions.[2] There are several causes of Obesity which makes the management more complex. Some evidence suggests that a major determinant of Obesity is not only increased calorie intake, but also lack of physical activity.[2] Fat accumulation, especially in the abdominal adipose tissue is a major contributor to the development of numerous chronic diseases like Type 2 Diabetes Mellitus, Coronary Artery Disease (CAD), Metabolic Syndrome (Increased Blood Pressure, Increased Blood Sugar Levels, Abnormal Cholesterol and Triglyceride Levels and Abdominal Obesity) Cardio Vascular Accident (CVA), Insomnia, Osteoarthritis, and increased incidence of certain forms of Cancer.[3]

It is the matter of greatest importance to deal with nearly all elements or aspects which can reduce body weight and obesity related co-morbidities. The purpose should be improving overall physical health rather than reducing only the body weight.[2] Various methods are being used for weight management and overall physical fitness like Circuit Training, Aerobics and Pilates, Yoga, Pranayama, Gymnastics, Swimming, Home Based Protocol,[4] or simply Diet and Lifestyle Modifications, and in some cases Medications are also required. As most of the methods require a standard set up, Yoga, being more convenient as it is independent of time, place and equipments, is being used in the project. Yoga is one form of traditional physical activity that is used for health promotion. It is also gaining increasing popularity therapeutically.[5] Although, Yogic techniques are mild in nature, they can keep a person at its optimum health, when used regularly and accurately. One round of Suryanamaskar (SN) consists of 12 steps designed in such a way that it enhances strength and flexibility in our muscles and joints. Breathing is also adjusted as per the posture and the movement done while attaining the posture. Therefore SN helps increase blood circulation,

which has an influence on the endocrine system.[6] On the other hand. Walking is the most accessible and easily regulated exercise that improvises health and physical fitness, specially, the Cardio Respiratory Fitness (CRF). The specific role of Treadmill (TM) training, that is, walking, the most common form of exercise, has been addressed only minimally.[2] The motor driven TM has been used since long to provide a standard and reproducible performance on work.[7]

Clinical observations suggest that TM may reduce body weight and improve cardiovascular endurance while, SN may reduce body weight, improve flexibility, and enhance physical fitness.[2] Therefore this study tries to search, among the two, SN and TM, for an optimal approach towards management of obesity and enhancement of various parameters of physical fitness like Muscle Endurance and CRF.[2]

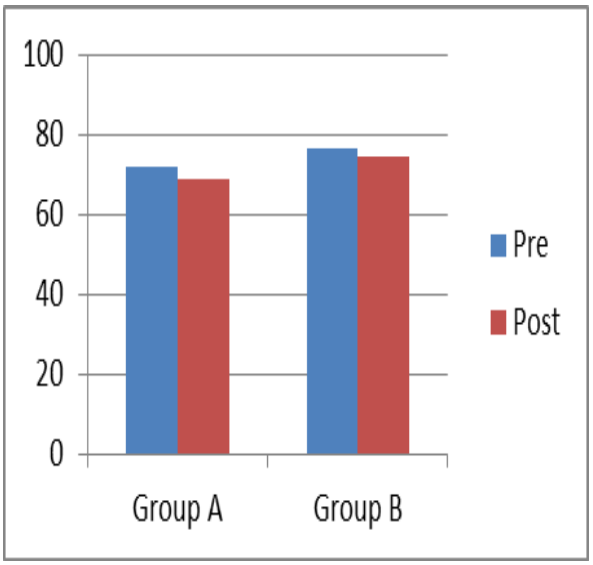
MATERIALS AND METHODS

In this pre-post comparative experimental study design, 35 participants were included. Ethical approval was obtained from the Institutional sub ethical committee. Written informed consent was taken from all participants. They were divided randomly by chit method in two groups. There were 18 participants in Group A (SN group) and 17 participants in Group B (TM group). 2 samples from SN group and 1 from TM group didn't complete 6 weeks of participation so they were considered as dropouts. So there were 16 participants in SN group and 16 in TM group. Persons from the age of 20-45 years, BMI more than 25 Kg/m^2 and those who were ready to participate in the study for 6 weeks were included whereas persons having Blood Pressure more than 180/120 mm of Hg, diabetics requiring insulin, pregnant and post menopausal females were excluded from the study. Informed written consent was taken from all the participants. Weight was measured using a digital weighing machine with minimal clothes and height was measured using a stadiometer. BMI was calculated by the formula Weight (Kg)/Height (m^2). Circumferences were measured using a measuring tape at the bulkiest portion of Forearm, Arm, Waist, Hip, Thigh and Calf. Muscle Endurance was measured using Sit Ups test. VO2 max was calculated using Step Test, which stated CRF. All these measures were recorded before and after the intervention. SN group participants were instructed to complete 10 sets/day for 5 days/week in the 1^{st} week, incrementing by 5 sets each week, hence 35 sets/day for 5 days of 6^{th} week. Similarly, TM group participants were instructed to complete 10 minutes/day for 5 days/week in the 1^{st} week, incrementing by 5 minutes each week, hence 35 minutes/day for 5 days of 6^{th} week. Intensity of exercise was

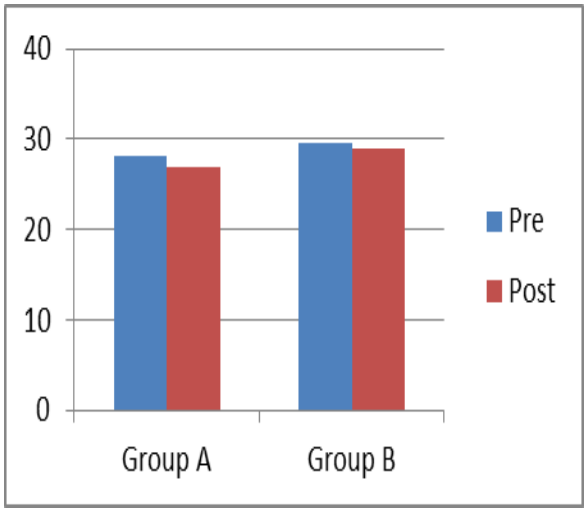
assessed by Modified Borg's Scale with Rate of Perceived Exertion (RPE) level between 7 and 9. Both the trainings began with 5 minutes of warm up exercises, which included mild stretching of upper and lower limbs and ended with 5 minutes of cool down exercises which included meditation exercise and breathing exercises, at each session.

RESULTS

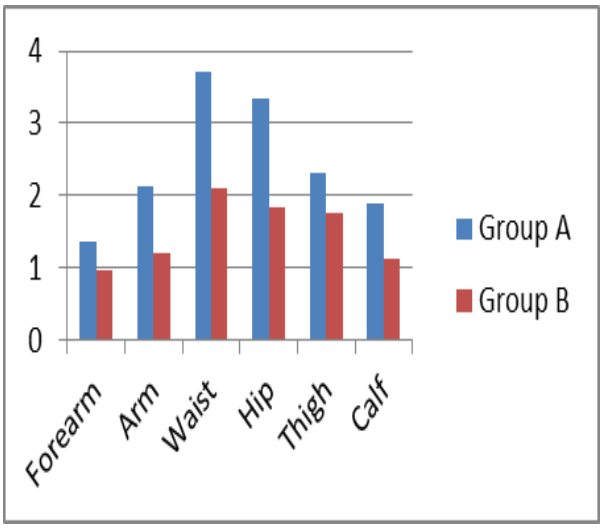
In this study, Weight and BMI in females was significantly reduced in both groups after 6 weeks of training, more in SN group (Graph 1 and 2). It has been observed that nearly 3 Kg weight has been lost in SN group and 2 Kg weight in TM group within 6 weeks. Difference between two groups was statistically non significant but clinically significant. Mean difference of Circumferences of the Forearm, Arm, Waist, Hip, Thigh and Calf, of both SN and TM groups were shown (Graph 3), where SN showed more significant reduction in Circumferences - Forearm, Hip and Thigh along with significant increase in Muscle Endurance at the end of the intervention (Graph 4) (P value < 0.05). CRF was improved in both the groups, but it was statistically non-significant (Graph 5). All data were expressed as Mean ± Standard Deviation. A paired t test was used to compare the data before and after 6 weeks of exercise training, within the group, whereas t test was used to compare the data between the two groups. P values less than 0.05 were considered to be statistically significant.



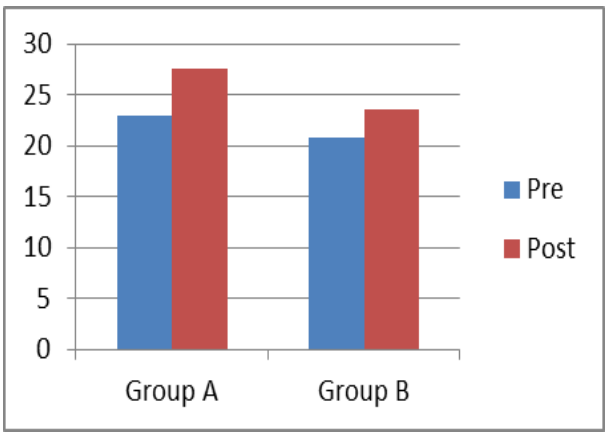
Graph 1: Pre and Post Weight (kg) of Group A (SN) and Group B (TM).



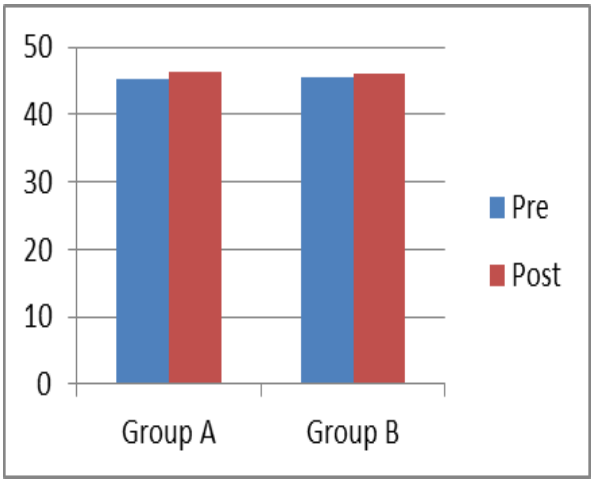
Graph 2: Pre and Post BMI of Group A (SN) and Group B (TM).



Graph 3: Difference in various Circumferences (cm) in Group A (SN) and Group B (TM)



Graph 4: Pre and Post Muscle Endurance (Rep/min) of Group A (SN) and Group B (TM).



Graph 5: Pre and Post VO_2 Max (ml/min/kg) of Group A (SN) and Group B (TM).

DISCUSSION

Exercise training, as a management of obesity, has been proved to be beneficial in clinical field and several studies have examined it as a therapeutic intervention to improve the outcome. This study examined the gradual effect of SN and TM training in participants who were Overweight and Obese. It also showed that post exercise training of SN and TM resulted in positive changes on weight management, reduction in BMI and Circumferences and improvement of Muscle Endurance and CRF.

SN is a dynamic set of series of stretches with forward and backward direction, which is linked with breathing, and with rhythmic positive and negative pressure changes in the viscera that stimulate the various visceroreceptors. The topsy-turvy postures like Parvatasana (Inverted V) helps increase blood flow to the head, relieves the anti-gravity muscles and also helps in proper positioning of the viscera which often shows sign of slackening (Visceroptosis), which burns the fat around the hips and waist. That is why all the systems work at the optimum level. It mobilizes the stored or accumulated fat by increasing the blood circulation.[9] Intensity of the exercise was increased by 5 sets every week, which helped increase the cardiovascular endurance.[6]

Walking at 4 mph for 30 minutes burns an approximate of 270 calories. Participants under Treadmill group performed the activity for 5 days in a week, where duration of the training was increased by 5 minutes every week. Our resting metabolic rate (RMR) (the number of calories burned at rest) depends predominantly on the amount of muscle we have. The more muscle, the higher the metabolic rate.[10]

SN helps toning the muscles that is, reducing the body fat and preserving the muscle fibres, whereas TM reduces body fat by burning calories. Hence SN has proved to be more effective in reducing Weight and so BMI along with Circumferences.

SN is a smooth graded exercise, of all the joints and muscles, from one posture to the final static state. The final static state is achieved not through forcible jerky movements, but through slow dynamic movements, that gradually change to static states, therefore the risk of injury or overstraining of the muscles and ligaments is considerably reduced.[9] The muscle endurance would be increasing because of metabolic adaptations like low blood lactate levels which delays development of fatigue, increased fat oxidation which ensures energy is maintained and exercise can thus be carried out, and increased mitochondrial size and number and mitochondrial enzymes due to the repeated contractile activity of the muscle.[2] In SN, the steps are done in a sequence, that keeps certain group of muscles at rest, in one Asana, and brings into active operation the opposite group of muscles of the whole body in the next Asana. That is, each posture has a counter-posture, thus assuring an activation of the antagonist group of muscles. For example, exercises causing extension of the spine are followed by those that flex the spinal muscles.[9]

Although repetitive contractile activity is seen in TM training as well, it is limited to a few structures only, mainly the lower extremities. Also, there is frequent activation of both agonist and antagonist group of muscles, for a shorter period of time.

Endurance is the ability to perform a task repeatedly, with maintained speed, and with minimal fatigue, for a longer period of time.[9] Hence muscle endurance is improved with SN more because of the generalized involvement of all the muscles and the sufficient duration of repeated contractile activity of the muscles, which avoids fatigue and thus improves endurance.

In SN, breathing is kept as natural as possible, and is not pressurized or encouraged to be stopped or to go into hyperventilation. If a person is hyperventilated, it is supposed to resort to relaxed postures (Savasana). This is a major reason why fatigue does not usually occur.[9] Physical inactivity combined with obesity increases the risk of developing cardiovascular and other critical obesity related diseases.[2]

CRF is best pronounced by VO_2 Max. It reflects the oxygen delivery to the exercising muscles by the circulatory and pulmonary system. It depends on maximal Cardiac Output and the ability of a skeletal muscle to derive oxygen. Hence it boosts the ability to exercise for a longer duration.

All the effects observed were the consequences of either SN or TM only, as diet restriction and lifestyle modifications of the participants were not taken into consideration. This was our limitation of the study which can be further effective in physical fitness. Further study can be done using long term treatment and also assessing follow up effect.

CONCLUSION

The data suggests that both the exercise training i.e., SN and TM were equally effective in reducing Weight, BMI and Circumferences thereby improving the Muscle Endurance and CRF in women with overweight and obesity. Our study revealed that SN proved better clinical significance but not statistical significance when compared with TM.

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