

EFFECTIVENESS OF BALANCE EXERCISES TO IMPROVE BALANCE IN YOUNG OBESE ADULTS -A RANDOMIZED CONTROL TRIAL

Physiotherapy

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ABSTRACT

Background: Obesity modifies the body geometry by adding mass to different regions and it influences the biomechanics of body. Weight influences postural stability, hence lead to balance impairments.

AIM: To find out the effect of balance exercises on obese young adults.

OBJECTIVE: To compare the effectiveness of balance exercises of the experimental group with the control group.

METHOD: On the basis of inclusion and exclusion criteria 30 participants were selected. They were treated with Balance exercises for 5 days/week for 6 weeks, after that re-assessment was taken with Single Leg Stance Test and Y-Balance Test.

RESULTS: The data was analyzed using SPSS Version 26. Parametric test was used improvement was seen in group A.

CONCLUSIONS: The study concluded that balance exercises was effective for young obese adults to improve static and dynamic balance.

KEYWORDS

Body Mass Index, Obese young adults, single leg stance test, y balance test, balance exercises

1. INTRODUCTION

Good postural balance and mobility are essential for adequate performance of most daily tasks moreover recreational activities¹. Balance is a constantly adjusting process of joints and muscles, involving an integration between different systems like detecting, transmitting and processing sensorial and motor information, in the central nervous system and adapting motor responses to determine the body's posture in regard to the environment, thus maintaining one's center of gravity within the support core.²

The proportion of the children and in the general population and who are overweight and obese has doubled over the past two decades in both developed and developing countries. It is observed that 30% of obesity begins in childhood and out of that 52-80% become obese adults. The systematic review analysis shows that overweight and obesity rates in adolescents are increasing not just among the higher socio economies groups but also in the lower income groups, this suggested the need for balance and sensitive approach.³

The finding suggests that obese individuals have inadequate dynamic balance that could be however be improve by session of specific balance training.⁴

Attending balance training sessions can improve the static and dynamic and functional balance tests among obese individuals.

The prevalence of obesity is increasing quickly in young adults (18-22 yrs.) and adults (23-64 yrs.). This increasing prevalence is of important concern because the health and economic burdens of obesity are vast.⁵

Higher BMI levels are related to poorer mobility and balance. Moreover, individuals classified as being of normal weight and those classified as overweight and obesity, had greater impairments in mobility and balance.⁶

Young adults (18-25 year old) are prone to overweight and obesity during the transition from adolescence to adult in developing countries as much as in developed countries. Levels of overweight and obesity together with other cardiovascular risk factors increase with age even within this age span (18-25 years old).⁷

Obese people are less stable than healthy weight people and this reduced stability and the overall physical performance.⁸

A current systematic review of the literature concluded that multimodal Exercise program incorporating muscle strengthening, gait, balance, coordination and functional exercises led to greater beneficial effects on balance than usual exercise programs, at least in the short term. Most exercise programs lasted 3 months and met three times per week for 1 hour.⁹

NEED AND SIGNIFICANCE OF STUDY

It is observed that 30% of obesity begins in childhood and out of that 52-80% become obese adults. Furthermore, individuals classified as being of normal weight and those classified as overweight and obesity, had greater impairments in mobility and balance. Though various researchers have investigated correlation of higher BMI and balance impairments in elderly and children, correlation of BMI and balance impairments in adults have not been investigated. Hence, need of his study is to identify the effectiveness of balance exercises to improve static and dynamic balance in young obese adults.

2. AIM AND OBJECTIVE

AIM

- To find out the effect of balance exercises on young obese adults.

OBJECTIVE:

- To compare the effectiveness of balance exercises of the experimental group with the control group.:

3. HYPOTHESIS:

- NULL HYPOTHESIS [H₀]

[H₀₁] -There is no significant effect of balance exercises on static balance in young obese adults.

[H₀₂] -There is no significant effect of balance exercises on dynamic balance in young obese adults.

- ALTERNATIVE HYPOTHESIS [H₁]

[H₁₁] There is a significant effect of balance exercises on static balance in young obese adults.

[H₁₂] There is a significant effect of balance exercises on dynamic balance in young obese adults.

4. METHODOLOGY

4.1 Method

Study Design: Randomized controlled trail

Sample Technique: Simple random sampling

Sample Size: 30 Participants

Study population: Young obese individuals (male and female)

Study Setting: Nootan College of Physiotherapy OPD, Visnagar

Intervention Duration: 6 weeks

4.2 Selection criteria :

INCLUSION CRITERIA: -

BMI > 24.9 kg/m²

Age: 18-25 years

EXCLUSION CRITERIA: -

Neurological diseases and disorders

Musculoskeletal disease and disorders

Recent surgery (6 months)

Recent injuries (6 months)
Recent cardiac event (6 months)

4.3 Materials:

Pen
Pencil
Stopwatch
Measure tap
Marker
Chair
Therapeutic ball
Wobble board
Rope
Thera band
Dumbbells

PROCEDURE OF DATA COLLECTION:

The research was approved by the ethics committee of SK University, Visnagar. CTRI number was CTRI/2021/03/032266. Firstly all subjects were educated about the study processes and the patients were asked to give their consent and permit participation in this study. After the participants consent, they were enrolled in the study. The subjects were randomly divided into 2 groups by lottery method. Group-A was Experimental and Group-B was the control group. After dividing them into the groups, assessment and baseline data of the subjects were taken. Pre assessment was done with single-leg stance test and y-balance test for the measurement static and dynamic balance. After the completion of all measurement Experimental group receive balance exercises. Control group is without any treatment. This protocol is given for 5 day/week for 6 weeks. Outcomes measures of both groups were collected after 6 weeks.

INTERVENTION

5 days per week
30minutes per day
Duration of dynamic balance exercises – 10-15 minutes
Duration of static balance exercises of week 1, 4& 5 - 30-45 seconds
Duration of static balance exercises of week 2&3- 10 repetitions
During all the exercises participants will asked to remain as stable as possible

PROTOCOL

Week 1- STATIC EX- Standing with eyes open and close Sitting with eyes open and close (on firm and soft surfaces e.g., foam, sand grass)
DYNAMIC EX- Sitting on a therapeutic ball with arm movement

Week 2- STATIC EX- Forward and side Lunges (on firm and soft surfaces e.g., foam, sand grass)

DYNAMIC EX- Sitting on therapeutic ball as sifting the body weight, rotating the trunk, moving the head or arms

Week 3- STATIC EX- Mini and full Squats (on firm and soft surfaces e.g., foam, sand grass)

DYNAMIC EX- Standing on Wobble board attempt to maintain equal weight distribution

Week 4- STATIC EX- Tandem stance with eye open and close (on firm and soft surfaces e.g., foam, sand grass)

DYNAMIC EX- Standing on Wobble board with position of arm from out to the side to above the head

Week 5- STATIC EX- Single leg stance with eye open and close (on firm and soft surfaces e.g., foam, sand grass)

DYNAMIC EX- Stepping (small steps to high steps)

Week 6- STATIC EX- Single leg stance with resisted shoulder extension using elastic resistance

DYNAMIC EX- Hopping, Rope jumping, Skipping

OUTCOME MEASURES:

(a) SLST

Description: a measure of the capability to stand on one leg and hold stability

Device: stopwatch

Technique: Participants starts with standing as each hands on hips followed via lifting one leg off the floor and stand unsupported. Start time while foot is lifted off the floor and stop when foot makes contact with the ground, stance foot moves or hands leaves the hips.

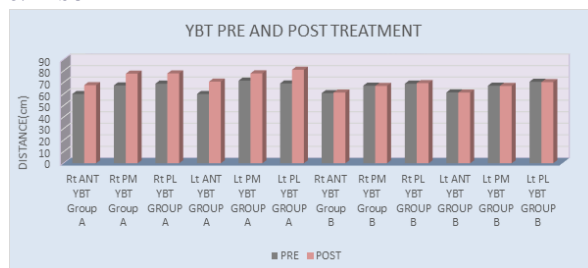
(b) YBT

description: a measure to evaluate dynamic stability.

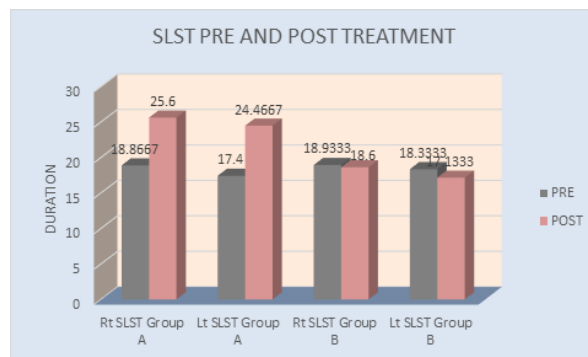
Gear: degree tape, marker, scoring sheet, pen

technique: after performing suitable warm up, participants stand on one leg whilst trying to reach out in 3 direction as far as possible with other lower limb.

5. RESULT



Graph 5.1: Comparison of YBT between Group A and B



Graph 5.2: Comparison of SLST between Group A and B

Experimental group A that undergone intervention showed significant difference in score of pre and post outcome measure of SLST of both Rt ($p=0.003$) and Lt ($p=0.001$) leg and also in score of YBT in all 3 directions as ANT, PM, PL ($p=0.003, 0.002, 0.0043$) of Rt leg and ($p=0.005, 0.044, 0.031$) of Lt leg.

6.DISCUSSION

Stability is a continuously adjusting system of joints and muscle tissue, related to an integration among extraordinary structures like detecting, transmitting and processing sensorial and motor information, inside the CNS and adapting motor responses to dictate the frame's posture in regard to the environment, therefore keeping one's middle of gravity inside the aid core.²

The share of the children and in the fashionable population and who're obese and obese has doubled over the last 2 decades in both advanced and developing countries. It's determined that 30% of weight problems starts in adolescence and out of that fifty two-80% turn out to be obese adults.

The prevalence of weight problems is rising briskly in teens (18- 22 yrs.) and adults (23-sixty four years). This increasing occurrence is of critical issue due to the fact the fitness and economic burdens of obesity are wide.⁶

Better BMI stages are associated with poorer mobility and stability. Moreover, people categorized as being of regular weight and those categorized as obese and weight problems, had more impairments in mobility and balance.⁷

Obesity modifies the body geometry by adding mass to different parts and it influence the biomechanics of ADLs. Weight affect postural stability, in both the genders.¹

Over-weight, Central obesity and overall muscular fitness are strongly related with balance deficiencies within the aged.

Greave et al. investigated a positive correlation among postural instability and BMI. This study observed greater shifts in both lateral and anteroposterior directions by obese participants in order to maintain stability. Adapted response to perturbations was seen at an increases of 20% in body mass.

Unfortunately, the addition force neccerary to continue postural

control may not be available to obese people. Impairment in balance capacity increases the risk of falls for obese people. Further the incidence of falls rises with body mass. The limited available research also suggested that although alone may positively influence postural balance, weight loss in conjunction with strength and balance training may be the most effective treatment to improve balance capacity in overweight and obese.

7. CONCLUSION

In this study, Group A showed significant improvement in score of single leg stance test and y balance test that indicates balance exercises proved beneficial in terms of improvement in static and dynamic balance in compared to group B.

[7.1] LIMITATION

1. The study includes treatment period of 6 weeks only.
2. The study involves small sample size.

[7.2] SUGGESTIONS AND RECOMMENDATIONS

1. The study can be done with longer treatment duration.
2. Further studies can be done using the same intervention procedures along with weight loss management in all age group.
3. Further studies can be taken up with different intervention parameters for improving balance, coordination and gait.

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LIST OF ABBREVIATIONS USED

1. BMI: Body Mass Index
2. SLST: Single Leg Stance Test
3. YBT: Y-Balance Test
4. SPSS: Statistical Package of Social Science
5. Rt- Right
6. Lt- Left
7. ANT- Anterior
8. PM- Posteromedial
9. PL- Posterolateral

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