



Influence of Core Stability Swiss Ball Exercises on Strength and Endurance among Sedentary Men

P. Balaji¹, Dr. D. Rajkumar² & Dr. P. Karthikeyan³

¹Research Scholar, Division of Physical Medicine and Rehabilitation, Annamalai University, Chidambaram, Tamilnadu, India.

²Professor and Head, Department of Physiology, Annamalai University, Chidambaram, Tamilnadu, India.

³Assistant Professor, Department of Physical Education and Sports Sciences, Annamalai University, Chidambaram, Tamilnadu, India.

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Abstract

The purpose of the study was to find out the influence of core stability swiss ball exercises on leg strength and cardio respiratory endurance among sedentary men. To achieve this purpose of the study, thirty sedentary men working in various departments at Annamalai University, Annamalainagar, Chidambaram, Tamilnadu, India were selected as subjects at random. The selected subjects were divided into two equal groups of fifteen subjects each, such as core stability swiss ball exercises group and control group. The group I underwent swiss ball exercises for three days per week for twelve weeks. Group II acted as control who did not participate any special training programmes apart from their regular routine office works as per their nature of designation. The following variables namely leg strength and cardio respiratory endurance were selected as criterion variables. All the subjects of two groups were tested on selected dependent variables at prior to and immediately after the training programme. The analysis of covariance (ANCOVA) was used to analyze the significant difference, if any among the groups. The .05 level of confidence was fixed as the level of significance to test the "F" ratio obtained by the analysis of covariance, which was considered as an appropriate. The results of the study revealed that there was a significant difference among core stability swiss ball exercises group and control group on leg strength and cardio respiratory endurance. And also it was found that there was a significant improvement on leg strength and cardio respiratory endurance due to core stability swiss ball exercises.

Keywords: Core Stability, Swiss Ball, Strength, Endurance, Sedentary Men.

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Introduction

Core stability relates to the bodily region bounded by the abdominal wall, the pelvis, the lower back and the diaphragm, spinal extensor muscle and its ability to stabilise the body during movement. The main muscles involved include the transversus abdominis, the internal and external obliques, the quadratus lumborum and the diaphragm, erector spinae and multifidus lumbar. The diaphragm is the main muscle of breathing in the human body and so breathing is important in providing the necessary core stability for moving and lifting. It is the action of these muscles contracting together upon the incompressible contents of the abdominal cavity (i.e. the internal organs or viscera) that provides support to the spine and pelvis during movement. Core stabilization exercise links to the most effective abdominal training and increases ones strength and stamina. Core strengthening exercise program aims to improve stabilization and support to the spine providing the muscles of arms and legs.

Core stability is the ability of body to control the whole range of motion of a joint thereby not creating deformity, neurological deficits, or incapacitating pain. Core stability is the strengthening of the corset of muscle surrounding the back and abdomen. Strengthening the core is essential to prevent all forms of injury around the lower back areas. When all these muscles contract together, they keep the spine in its most stable position (the neutral zone) & aid in preventing injury. They are known to contract prior to any limb movement & so they function in keeping the centre, or core of the body rigid during all movement. Recent evidence has found that in people with low back pain these muscles fails to contract before limb movement & so the spine is vulnerable to injury. Thus retraining these muscles to contract at the right time is the fundamental theory of core stability.

An exercise ball, also known as a Swiss Ball, is a ball constructed of soft elastic with a diameter of approximately 35 to 85 centimeters (14 to 34 inches) and filled with air. The air pressure is changed by removing a valve stem and either filling with air or letting the ball deflate. It is most often used in physical therapy, athletic training and exercise. It can also be used for weight training. A primary benefit of exercising with an exercise ball as opposed to exercising directly on a hard flat

Correspondence

P. Balaji

E-mail: balaji4949@gmail.com, Ph.+9186088 60900

surface is that the body responds to the instability of the ball to remain balanced, engaging many more muscles. Those muscles become stronger over time to keep balance. Most frequently, the core body muscles — the abdominal muscles and back muscles — are the focus of exercise ball fitness programs. A major benefit of using an unstable surface is the ability to recruit more muscle units without the need to increase the total load. The greatest benefit of moving an exercise onto an unstable surface is achieving a greater activation of the core musculature, exercises such as curl-up or push-up performed on an exercise ball. An unstable surface increases activation of the rectus abdominus and allows for greater activity per exercise when compared to a stable surface. Performing standard exercises, such as a push-up, on an unstable surface can be used to increase activation of core trunk stabilizers and in turn provide increased trunk strength and greater resistance to injury.

Methodology

The purpose of the study was to find out the influence of core stability swiss ball exercises on leg strength and cardio respiratory endurance among sedentary men. To achieve this purpose of the study, thirty sedentary men working in various departments at Annamalai University, Annamalainagar, Chidambaram, Tamilnadu, India were selected as subjects at random. The selected subjects were divided into two equal groups of fifteen subjects each, such as core stability swiss ball exercises group and control group. The group I underwent swiss ball exercises for three days per week for twelve weeks. Group II acted as control who did not participate any special training programmes apart from their regular routine office works as per their nature of designation. The following variables namely leg strength

and cardio respiratory endurance were selected as criterion variables. All the subjects of two groups were tested on selected dependent variables namely leg strength and cardio respiratory endurance at prior to and immediately after the training programme by using leg lift with dynamometer and Cooper's 12 min run / walk test respectively. The analysis of covariance (ANCOVA) was used to analyze the significant difference, if any among the groups. The .05 level of confidence was fixed as the level of significance to test the "F" ratio obtained by the analysis of covariance, which was considered as an appropriate.

Training Programme

For core stability swiss ball exercises group underwent their training programme as three days per week for twelve weeks. Training was given in the evening session. The training session includes warming up and limbering down. Every day the workout lasted for 45 to 60 minutes approximately. The subjects underwent their training programmes as per the schedules under the strict supervision of the investigator. During experimental period control group did not participate in any of the special training.

Analysis of the Data

The influence of core stability swiss ball exercises on leg strength and cardio respiratory endurance were analyzed and presented below.

The analysis of covariance on leg strength of pre and post tests for core stability swiss ball exercises group and control group was analysed and presented in Table I.

Table I. Ancova on leg strength of pre and post test for core stability swiss ball exercises group and control group

Test	Core Stability Swiss Ball Exercises Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
Pre Test							
Mean	92.73	92.60	Between	0.13	1	0.13	0.18
S.D.	0.77	0.93	Within	20.53	28	0.73	
Post Test							
Mean	95.73	92.80	Between	64.53	1	64.53	21.04*
S.D.	0.88	0.75	Within	85.87	28	3.07	
Adjusted Post Test							
Mean	95.68	92.86	Between	59.18	1	59.18	265.51*
			Within	6.02	27	0.22	

* Significant at .05 level of confidence.

(The table values required for significance at .05 level of confidence for 1 and 28 and 1 and 27 are 4.20 and 4.21

respectively).

The table I shows that pre-test means on leg strength of core stability swiss ball exercises group and control group are 92.73 and 92.60 respectively. The obtained “F” ratio of 0.18 for pre -test means is less than the table value of 4.20 for df 1 and 28 required for significance at .05 level of confidence on leg strength. The post-test means on leg strength of core stability swiss ball exercises group and control group are 95.73 and 92.80 respectively. The obtained “F” ratio of 21.04 for post-test means is more than the table value of 4.20 for df 1 and 28 required for significance at .05 level of confidence on leg strength. The adjusted post-test means

on leg strength of core stability swiss ball exercises group and control group are 95.68 and 92.86 respectively. The obtained “F” ratio of 265.51 for adjusted post-test means is more than the table value of 4.21 for df 1 and 27 required for significance at .05 level of confidence on leg strength. The results of the study indicated that there was a significant difference between the adjusted post-test means of core stability swiss ball exercises group and control group on leg strength. The pre, post test mean values of core stability swiss ball exercises group and control group on leg strength were graphically represented with Figure I.

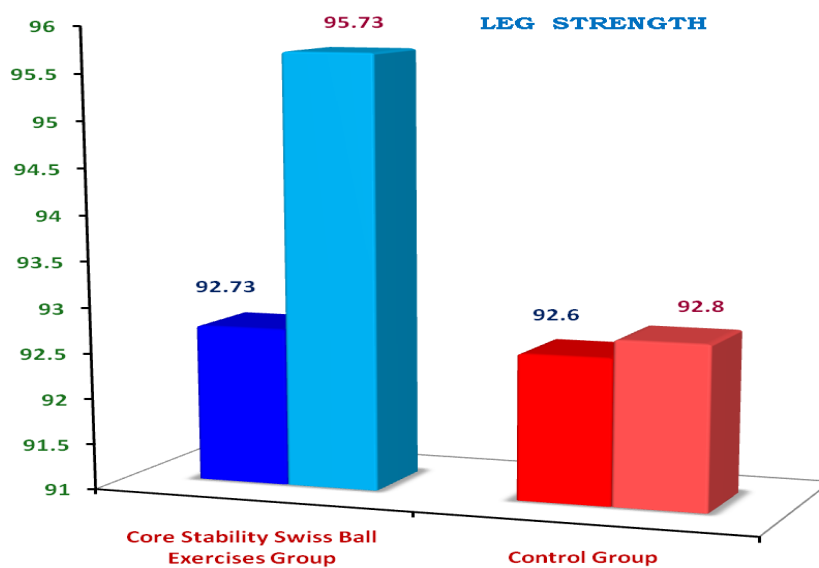


Figure I. Pre and post test data on leg strength

The analysis of covariance on cardio respiratory endurance of pre and post tests for core

stability swiss ball exercises group and control group was analysed and presented in Table II.

Table II. Ancova on cardio respiratory endurance of pre and post test for core stability swiss ball exercises group and control group

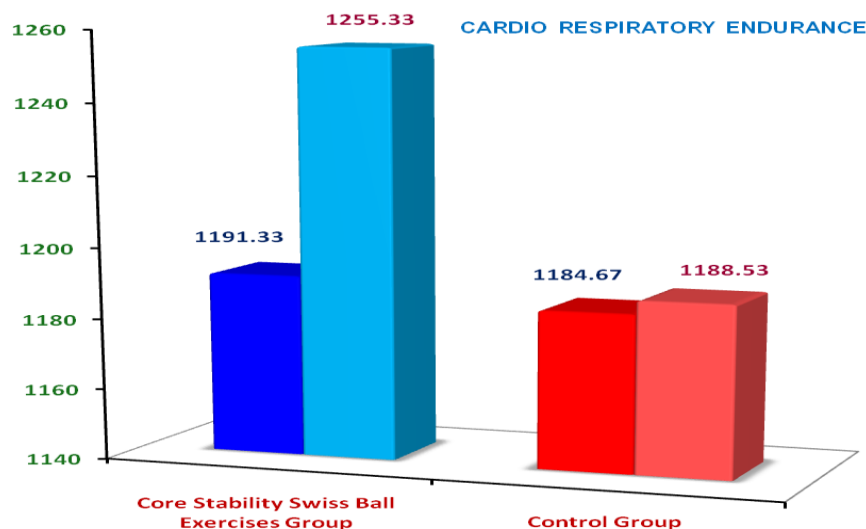
Test	Core Stability Swiss Ball Exercises Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
Pre Test							
Mean	1191.33	1184.67	Between	333.33	2	333.33	0.92
S.D.	16.28	23.34	Within	10146.67	28	362.38	
Post Test							
Mean	1255.33	1188.53	Between	33466.80	2	33466.80	19.81*
S.D.	20.29	19.28	Within	47291.87	28	1689.00	
Adjusted Post Test							
Mean	1252.22	1191.67	Between	26609.10	2	26609.10	147.74 *
			Within	4862.98	27	180.11	

* Significant at .05 level of confidence.

(The table values required for significance at .05 level of confidence for 2 and 28 and 2 and 27 are 3.34 and 3.35 respectively).

The table II shows that pre-test means on cardio respiratory endurance of core stability swiss ball exercises group and control group are 1191.33 and 1184.67 respectively. The obtained "F" ratio of 0.92 for pre -test means is more than the table value of 4.20 for df 1 and 28 required for significance at .05 level of confidence on cardio respiratory endurance. The post-test means on cardio respiratory endurance of core stability swiss ball exercises group and control group are 1255.33 and 1188.53 respectively. The obtained "F" ratio of 19.81 for post-test means is more than the table value of 4.20 for df 1 and 28 required for significance at .05 level of confidence on cardio respiratory endurance.

The adjusted post-test means on cardio respiratory endurance of core stability swiss ball exercises group and control group are 1252.22 and 1191.67 respectively. The obtained "F" ratio of 147.74 for adjusted post-test means is more than the table value of 4.21 for df 1 and 27 required for significance at .05 level of confidence on cardio respiratory endurance. The results of the study indicated that there was a significant difference between the adjusted post-test means of core stability swiss ball exercises group and control group on cardio respiratory endurance. The pre, post test mean values of core stability swiss ball exercises group and control group on cardio respiratory endurance were graphically represented with Figure II.

**Figure II.** Pre and post test data on cardio respiratory endurance

Results

1. There was a significant difference between core stability swiss ball exercises group and control group on leg strength.
2. There was a significant difference between core stability swiss ball exercises group and control group on cardio respiratory endurance.
3. There was a significant improvement on selected criterion variables namely leg strength and cardio respiratory endurance due to twelve weeks of core stability swiss ball exercises.

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