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Impact of core stability exercises on vital capacity and Vo_2Max of sedentary men

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Abstract
The purpose of the study was to find out the impact of core stability exercises on vital capacity and VO_2Max of 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 exercises group and control group. The group I underwent core stability 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 vital capacity and VO_2 Max 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 by using Spirometry and Bruce Protocol Stress 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. The results of the study revealed that there was a significant difference among core stability exercises group and control group on vital capacity and VO_2 Max. And also it was found that there was a significant improvement on vital capacity and VO_2 Max due to core stability exercises.

Keywords: Core stability exercises, vital capacity, Vo_2Max, sedentary men

1. Introduction
Core stability is essential for proper load balance within the spine, pelvis, and kinetic chain. The so-called core is the group of trunk muscles that surround the spine and abdominal viscera. Abdominal, gluteal, hip girdle, paraspinal, and other muscles work in concert to provide spinal stability. Core stability and its motor control have been shown to be imperative for initiation of functional limb movements, as needed in athletics. Sports medicine practitioners use core strengthening techniques to improve performance and prevent injury. Core strengthening, often called lumbar stabilization, also has been used as a therapeutic exercise treatment regimen for low back pain conditions. This article summarizes the anatomy of the core, the progression of core strengthening, the available evidence for its theoretical construct, and its efficacy in musculoskeletal conditions.

Core stability (or core strengthening) has become a wellknown fitness trend that has started to transcend into the sports medicine world. Popular fitness programs, such as Pilates, yoga, and Tai Chi, follow core strengthening principles. Broad benefits of core stabilization have been touted, from improving athletic performance and preventing injuries, to alleviating low back pain. The purpose of this article is to review the available evidence on the benefits of core strengthening, present relevant anatomy, and outline core stabilizing exercise principles. The core can be described as a muscular box with the abdominals in the front, paraspinals and gluteals in the back, the diaphragm as the roof, and the pelvic floor and hip girdle musculature as the bottom. Within this box are 29 pairs of muscles that help to stabilize the spine, pelvis, and kinetic chain during functional movements. Without these muscles, the spine would become mechanically unstable with compressive forces as little as 90 N, a load much less than the weight of the upper body. When the system works as it should, the result is proper force distribution and maximum force generation with minimal compressive, translational, or shearing forces at the joints of the kinetic chain.

The core is particularly important in sports because it provides ‘‘proximal stability for distal mobility’’. Core stability exercises appear to be especially important in cases of spinal instability. Gross spinal instability is an obvious radiographic displacement of vertebrae, often with associated neurologic deficit and deformity. However, functional or clinical instability is not as easily defined. Panjabi describes ‘‘clinical instability as the loss of the spine’s ability to maintain its patterns of displacement under physiologic loads so there is no initial or additional neurologic deficit, no major deformity, and no incapacitating pain’’.

2. Methodology

The purpose of the study was to find out the impact of core stability exercises on vital capacity and VO_2Max of 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 exercises group and control group. The group I underwent core stability 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 vital capacity and VO_2 Max 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 by using Spirometry and Bruce Protocol Stress 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.

2.1 Training Programme

For core stability 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.

2.2 Analysis of the Data

The influence of core stability exercises on vital capacity and VO_2 Max were analyzed and presented below.

The analysis of covariance on vital capacity of pre and post tests for core stability exercises group and control group was analysed and presented in Table I.

Table I: Ancova on Vital Capacity of Pre and Post Test for Core Stability Exercises Group and Control Group

test	Core Stability Exercises Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained ‘F’ Ratio
Pre Test							
Mean	3.67	3.69	Between	0.0026	1	0.0026	1.21
S.D.	0.05	0.04	Within	0.0605	28	0.0022	
Post Test							
Mean	3.86	3.71	Between	0.1763	1	0.1763	22.19*
S.D.	0.04	0.03	Within	0.2225	28	0.0079	
Adjusted Post Test							
Mean	3.86	3.70	Between	0.1796	1	0.1796	114.15*
			Within	0.0423	27	0.0016	

* 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 vital capacity of core stability exercises group and control group are 3.67 and 3.69 respectively. the obtained “F” ratio of 1.21 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 vital capacity. The post-test means on vital capacity of core stability exercises group and control group are 3.86 and 3.71 respectively. the obtained “F” ratio of 22.19 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 vital capacity.

The adjusted post-test means on vital capacity of core stability exercises group and control group are 3.86 and 3.70 respectively. the obtained “F” ratio of 114.15 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 vital capacity. The results of the study indicated that there was a significant difference between the adjusted post-test means of core stability exercises group and control group on vital capacity.

The pre, post test mean values of core stability exercises group and control group on vital capacity were graphically represented with Figure I.

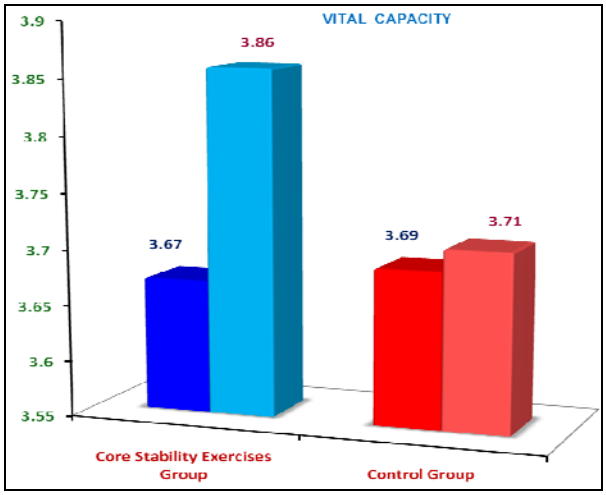

Fig 1: Pre and Post Test Data on Vital Capacity

The analysis of covariance on VO_2Max of pre and post tests for core stability exercises group and control group was analysed and presented in Table II.

Table II: Ancova on Vo2Max of Pre and Post Test for Core Stability Exercises Group and Control Group

test	Core Stability Exercises Group	Control Group	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
Pre Test							
Mean	45.93	45.67	Between	0.53	1	0.53	0.41
S.D.	1.18	1.15	Within	36.27	28	1.30	
Post Test							
Mean	52.87	46.07	Between	346.80	1	346.80	25.73*
S.D.	1.01	0.85	Within	377.47	28	13.48	
Adjusted Post Test							
Mean	52.79	46.14	Between	326.28	1	326.28	482.09*
			Within	18.27	27	0.68	

* 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 VO_2Max of core stability exercises group and control group are 45.93 and 45.67 respectively. The obtained "F" ratio of 0.41 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 VO_2Max. The post-test means on VO_2Max of core stability exercises group and control group are 52.87 and 46.07 respectively. The obtained "F" ratio of 25.73 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 VO_2Max.

The adjusted post-test means on VO_2Max of core stability exercises group and control group are 52.79 and 46.14 respectively. The obtained "F" ratio of 482.09 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 VO_2Max. The results of the study indicated that there was a significant difference between the adjusted post-test means of core stability exercises group and control group on VO_2Max.

The pre, post test mean values of core stability exercises group and control group on VO_2Max were graphically represented with Figure II.

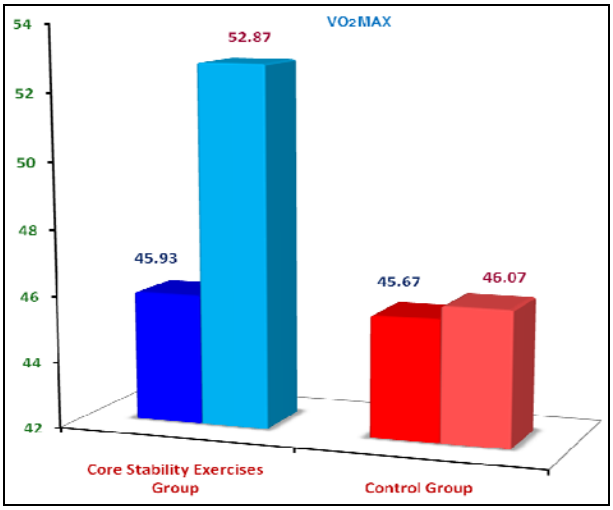

Fig 2: Pre and Post Test Data on Vo2Max

3. Results

1. There was a significant difference between core stability exercises group and control group on vital capacity.
2. There was a significant difference between core stability exercises group and control group on VO_2Max.
3. There was a significant improvement on selected criterion variables namely vital capacity and VO_2Max due to twelve weeks of core stability exercises.

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