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Correlation between back muscle endurance and strength in job going workers

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Abstract
Background: The human back is the large posterior area of the human body, rising from the top of the buttocks to the back of the neck and the shoulders. It is the surface of the body opposite from the chest. The vertebral column runs the length of the back and creates a central area of recession. The breadth of the back is created by the shoulders at the top and the pelvis at the bottom.
Aim: To Find out Correlation between back muscle strength and back muscle endurance in job going workers.
Methodology: Study Design: Cross-sectional study Study Setting: Madhav University, stuti physiotherapy clinic Ahmadabad Sampling Technique: Convenient Sampling Study Population: job going workers Study Sample: 60 Study Duration: 15 days
Results: There is positive correlation between the strength and endurance of back flexors and extensors muscles in job going workers.
Conclusion: It can be concluded that there is positive correlation between the strength and endurance of back flexors and extensors muscles in job going workers.

Keywords: back muscle strength, endurance, and job going workers

Introduction

The human back is the large posterior area of the human body, rising from the top of the buttocks to the back of the neck and the shoulders. It is the surface of the body opposite from the chest. The vertebral column runs the length of the back and creates a central area of recession. The breadth of the back is created by the shoulders at the top and the pelvis at the bottom.

Endurance (also related to sufferance, resilience, constitution, fortitude, and hardiness) is the ability of an organism to exert itself and remain active for a long period of time, as well as its ability to resist, withstand, recover from, and have immunity to trauma, wounds, or fatigue. It is usually used in aerobic or anaerobic exercise. The definition of 'long' varies according to the type of exertion – minutes for high intensity anaerobic exercise, hours or days for low intensity aerobic exercise. Training for endurance can have a negative impact on the ability to exert endurance strength. unless an individual also undertakes resistance training to counteract this effect.

Low back pain is becoming increasingly common because back becomes deconditioned through lack of use, cumulative effects of repetitive minor injuries and natural process of aging. The bones of the spine provide the supporting frame for the back. Connected to this frame is an intricate system of muscles and ligaments that increase the strength and stability of the spine, arms and legs.

The abdominal muscles and back muscles are key components of this muscular network, and provide the strength to keep the body upright and for movement. When these core muscles are in poor condition, additional stress is applied to the spine as it supports the body, and back injury or back pain is more likely.

"To Find Out Correlation between Trunk Muscle Strength and Endurance In Normal Young Individuals"

The muscles of the trunk are active whether one is sitting, standing, lifting, or rolling over in bed. Adequate endurance of trunk muscles is necessary to good health.

The trunk muscles are physiologically suited to provide low levels of activity for long periods of time. These muscles are physiologically postural muscles, being rich in type I fibers, which, uncharacteristically, have larger diameters than the type II fibers.

Although trunk flexor and extensor muscles are physiologically postural muscles, they are active throughout most activities, including quiet standing.

Aim & Objectives

Aim

To Find out Correlation between back muscle strength and back muscle endurance in job going workers.

Objectives

To assess the endurance of back flexors and extensors in job going workers, To assess the strength of back flexors and extensors in job going workers, To correlate the strength and endurance of back muscles in job going workers.

Hypothesis

This study hypothesize that there is a strong correlation between endurance and strength in back muscles.

Review of Literature

1. Nicolaisen T, *et al*. 1985; 17(3). "Trunk strength, back muscle endurance and lowback trouble". The strength and endurance of the trunk muscles was studied in relation to the extent of earlier low back pain. The main findings were that the endurance time of trunk extensors was shorter in

group I compared to II and III and trunk muscle strength were independent. Differences in distribution of ST and FT muscle fibres as suggested as an explanation of the endurance difference.
2. Journal of Rehabilitation Research and Development Vol. 34 No. 4, October 1997; Pages 440-447; "Endurance of trunk muscles in persons with chronic low back pain: Assessment, performance, training"; This paper examines some methods to objectively test endurance of trunk flexor and extensor muscles in static and dynamic situations, and presents results of endurance testing in persons with chronic LBP compared to non-impaired cohorts. Self-perception of fitness affects some test results. Methods for increasing endurance are discussed along with benefits observed from training programs
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Methodology

Study Design: Cross-sectional study
Study Setting: Madhav University, stuti physiotherapy clinic Ahmadabad
Sampling Technique: Convenient Sampling
Study Population: job going workers
Study Sample: 60
Study Duration: 15 days

Criteria for Selection

Inclusion Criteria

- Job going workers
- Age group between 20 to 40 years
- Subjects of male
- Those are willing to participate

Exclusion Criteria

- Individuals with present Low back pain
- Individuals with any associated condition
- Hospitalization patient
- Patient with sudden injury
- Patient with disc prolapsed
- Any neuritis patient

Materials Used In the Study

- Pen
- Paper
- Stopwatch
- Plinth
- Stabilization belt

Method

In this study we were taken 60 job workers within the age of 20 to 40 years, the workers were well informed regarding the study being performed and consents were taken from individual subjects & in this study we need around 15 days.

1. To assess the strength of back flexors
   - The patient will be asked to perform curl up, and the number of repetitions per min will be recorded
2. To assess the endurance of back flexors
   - The patient will be asked to perform curl ups and maintain the position, the duration of hold in seconds will be recorded.
3. To assess the strength of back extensors
   - The patient will be asked to lie in prone, and brought out of the plinth up to umbilical level, patient's legs will be stabilized at thigh and then will be asked to perform extension, and the number of repetitions per min will be recorded.
4. To assess the endurance of back extensors
   - The patient will be asked to perform extension as per mentioned above and maintain the position, the duration of hold in seconds will be recorded.

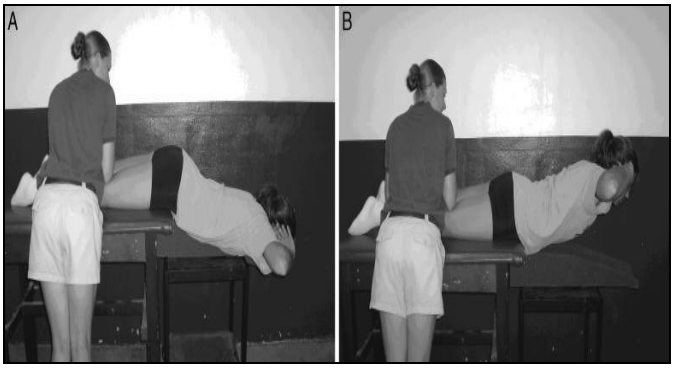

Fig 1

Results

The strength and endurance of back flexors and extensors were assessed. Statics were performed using the software graph prism, we were performed using correlation test.
First of all we take mean difference between the strength of back flexors & extensors.
Then we take mean difference between the endurance of back

flexors & extensors and then correlation between the strength and endurance of back flexors and last we correlate between the strength & endurance of back extensors.

Table 1: Mean difference between the endurance of trunk flexors and extensors

	Endurance of flexors	Endurance of extensors
Mean	35.45	61.53
Standered deviation	21.70	32.65

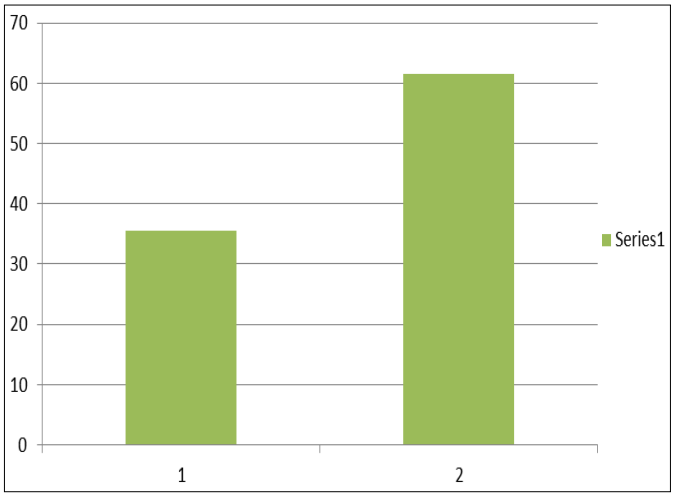

Fig 1

Table 2: Mean difference between the strength of trunk flexors and extensors

	Strength of flexors	Strength of extensors
Mean	19.65	27.54
Standered deviation	7.85	16.42

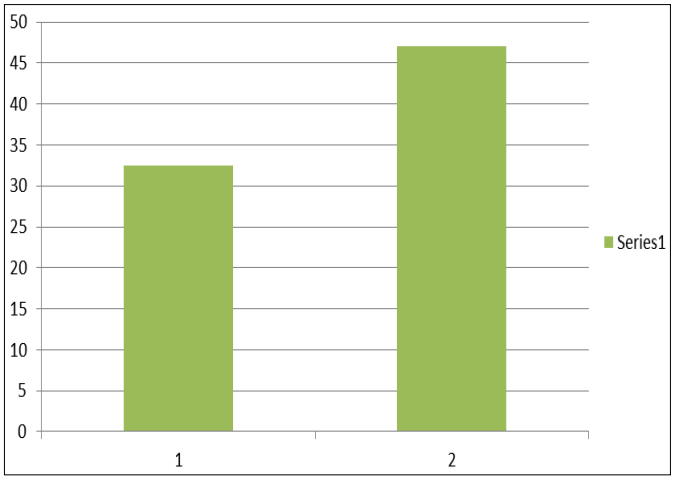

Fig 3

Table 3: Correlation between the strength and endurance of Trunk Flexors

	Strength	Endurance	P value
Mean	23.59	66.2	<0.0001
SD	9.22	32.27	

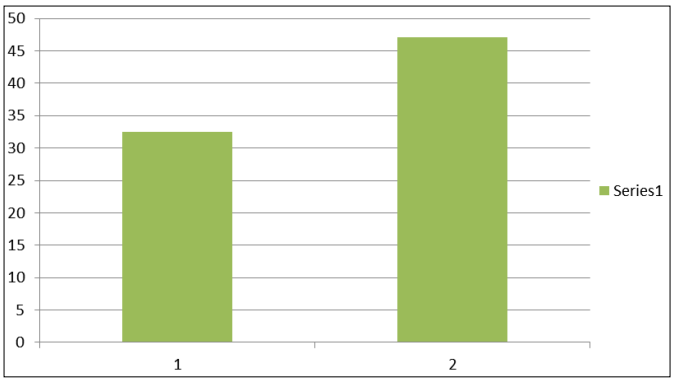

Fig 4

There is significant positive correlation between the strength and endurance of trunk flexors

Discussion

The human back is the large posterior area of the human body, rising from the top of the buttocks to the back of the neck and the shoulders. It is the surface of the body opposite from the chest. The vertebral column runs the length of the back and creates a central area of recession. The breadth of the back is created by the shoulders at the top and the pelvis at the bottom.

The central feature of the human back is the vertebral column, specifically the length from the top of the thoracic vertebrae to the bottom of the lumbar vertebrae, which houses the spinal cord in its spinal canal, and which generally has some curvature that gives shape to the back. The ribcage extends from the spine at the top of the back (with the top of the ribcage corresponding to the T1 vertebra), more than halfway down the length of the back, leaving an area with less protection between the bottom of the ribcage and the hips. The width of the back at the top is defined by the scapula, the broad, flat bones of the shoulders.

The spine is bordered by several groups of muscles, including the intertransversarii muscles, which facilitate movement between the individual vertebrae, and the multifidus spinae, which facilitate the movement of the spine as a whole.

Other muscles in the back are associated with the movement of the neck and shoulders. The trapezius muscle, which is named from its trapezium-like shape, runs between the neck, the anterior chain, the two shoulders, and the thoracic vertebra, T12. The large latissimus dorsi make a triangle from the shoulder to the hip.

Physical fitness is a general state of health and well-being and, more specifically, the ability to perform aspects of sports or occupations. Physical fitness is generally achieved through correct nutrition, moderate-vigorous physical activity, exercise and rest.

It is a set of attributes or characteristics seen in people and which relate to the ability to perform a given set of physical activities. Regarding specific function, fitness is attributed to personnel who possess significant aerobic or anaerobic ability, i.e. strength or endurance. Muscle strength: It is the ability of contractile tissue to produce tension and a resultant force

Based on the demands placed on muscle. It is the greatest measurable force that can be exerted by a muscle group to overcome resistance during a single maximum effort.

Muscle endurance: It is the ability of the muscle to contract repeatedly against a load, generate and sustain tension, and resist fatigue over an extended period of time.

Low back pain is becoming increasingly common because back becomes reconditioned through lack of use, cumulative effects of repetitive minor injuries and natural process of aging. The bones of the spine provide the supporting frame for the back. Connected to this frame is an intricate system of muscles and ligaments that increase the strength and stability of the spine, arms and legs.

The abdominal muscles and back muscles are key components of this muscular network, and provide the strength to keep the body upright and for movement. When these core muscles are in poor condition, additional stress is applied to the spine as it supports the body, and back injury or back pain is more likely.

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\Although trunk flexor and extensor muscles are physiologically postural muscles, they are active throughout most activities, including quiet standing.

Adequate spinal stability is important in prevention and treatment of low back pain injury. Stability is achieved through co-activation of trunk muscles; therefore any form of treatment training trunk muscles has been postulated beneficial to provide stability.

Poor endurance of trunk muscle may induce strain on passive structure of lumbar spine and hence result in low back pain. Muscle been identified as a potential source of low back pain as failure to protect passive structure from excessive loads may result in damage to pain sensitive structure and produce pain.

Balanced, healthy functioning of the musculoskeletal system requires that muscles be able to exert force or torque (measured as strength), resist fatigue (measured as muscular endurance), and move freely through a full range of motion (measured as flexibility). Because of this, strength, endurance and flexibility are viewed as important dimensions of health related fitness

The purpose of the study was to find out whether there is any correlation between the strength and endurance of individual trunk flexors and endurance. Here in this study we had taken a sample of 60 to measure the strength and endurance of muscles. The score was analyzed using Pearson correlation test. The results had shown positive correlation between the strength and endurance and mean of trunk extensor's strength and endurance is greater than trunk flexors. Poor endurance of the trunk muscles may induce strain on the passive structures of the lumbar spine, leading eventually to low back pain. Evidence suggests that muscle endurance is lower for people with low back pain than for individuals without low back pain.

Core Stability- 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 hip complex in order to stabile the spine, pelvis and kinetic chain during functional movement. Transversus Abdominus, Multifidus, Diaphragm and pelvic floor muscle are the main muscle. These muscles are also known as the 'core' or 'power house' muscles and provide a solid base upon which all other muscle can work upon to initiate movement.

The values of extensor group of muscle is greater than of flexor group as extensor group of muscles are antigravity muscles is the role played by trunk muscles. In healthy individuals the tension of these muscles stabilizes the trunk during sitting, standing, movement and physical work. As a result of pain symptoms and spinal movement limitation there results in a disappearance of trunk muscles out of inactivity that results in a reduction in their strength. The endurance of the muscles of the lumbar spine. Composition of muscles at various levels of the spine: for research shows that in the direction from the chest part to the lumbar there occurs an increase in the percentage of fast contracting muscle fiber of the extensors. This is confirmed by Holstrom and Moritz 35 who consider that the magnitude of the maxi- mum moment of strength does not strongly correlate with muscle endurance. One of the chief reasons for fatigue during isometric contraction is the impeded flow of blood through the vessels of the working muscles. Nicolaisen T, *et al*. 1985; 17(3). "Trunk strength, back muscle endurance and low-back trouble". The strength and endurance of the trunk muscles was studied in relation to the extent of earlier low back pain. The main findings were that the endurance time of trunk extensors was shorter in-group I compared to II and III and trunk muscle strength were independent. Differences in distribution of Slow Twitch and Fast Twitch muscle fibers as suggested as an explanation of the endurance difference.

Conclusion

It can be concluded that there is positive correlation between the strength and endurance of back flexors and extensors muscles in job going workers.

Summary

Physical fitness is the ability to perform aspects of sports or occupations. It is not necessary that if a person with good strength may have good endurance or vice-versa therefore this study was conducted find out whether there is any relation between strength and endurance of individual trunk muscle group.

60 subjects were taken for this study as per convince. Strength was measured in repetition per min and endurance was measured as hold in sec for both trunk flexors and extensors muscles.

The data was then tabulated and subjected to statistical analysis by Pearson correlation test. After analyzing the data, these were the following results:

- There is positive correlation between the strength and endurance of trunk flexors

- There is positive correlation between the strength and endurance of trunk extensors
- Mean of trunk extensor's strength and endurance were greater than trunk flexors.

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