

Effect of Graded Plank Protocol on Core Stability in Sedentary Dentists

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ABSTRACT

Background: Plank training can be an effective exercise to improve the core stability. The aim of the current study was to study the effect of graded plank protocol on core stability in sedentary dentists.

Methodology: This was an experimental study done on 50 participants; they were given the intervention for 6 weeks, 3 days/week. Simple random sampling was done on sedentary dentists of, Rural Dental Collage PIMS. 50 sedentary dentists as measured from IPAQ with mean age (in years) 22.7 ± 0.8 , who scored <3 on dynamic abdominal endurance test, participated were given graded plank exercise protocol for the period of 6 week 4 days per week on non consecutive days and the participants were assessed at the start of 1st week and reassessed at the end of 6th week using the outcome measure

Result: The mean values pre unilateral hip bridging endurance test in sec was 20.6 ± 11.50 . The mean values of post unilateral hip bridging endurance test in sec were 30.44 ± 13.53 . There was significant difference between pre and post values of unilateral hip bridging endurance test.

Conclusion: this study concluded that 6 week graded plank protocol was effective for improving the core stability in sedentary dentists.

Keywords: Plank, Sedentary Dentists, Physical Activity, Unilateral Hip Bridging, Dynamic Hip Endurance Test.

INTRODUCTION

Physical activity is any body movement produced by skeletal muscle that

requires energy. Physical fitness refers to a physiological state of well being that allows one to meet the demand of daily living or that provides the basis for sport performance or both.¹

Those who do not exercise have been termed as sedentary. No exercise behaviors can be differentiated into sedentary behavior and light intensity activity in that sedentary behavior is sitting, lying down, and expending very little energy. And light-intensity activity can be standing, self-care exercises, and slow walking, which require low energy use². Increasing rate of sedentary lifestyle, results in the once strong muscle system which is conscientious for maintain the posture and movement increasingly become more in active, which negatively impinges weakened lumbar core stability in many individuals.³

Core stability is the ability of the person to stabilize their core muscles. The term core has been used to refer to the trunk especially the lumbopelvic region of the body. The stability of the lumbopelvic region is critical to provide a basis for movement of the upper and lower extremities, to support loads and to protect the spinal cord and nerve root. Transverses abdominis, multifidus, internal and external oblique, rectus abdominis, erector spinae, diaphragm these are the major muscles that are involved in core stability. Latissimus dorsi, gluteus maximus and trapezius are the minor muscles that are involved.⁴

The plank is an isometric core strength exercise that involves the person to maintain a position similar to push up for the maximum possible time. The plank exercise estimate and strengthens the stability of the core muscles. Core muscle stability is crucial for preventing injuries to the knee joints, hip joints, and the lumbar spine. Moreover, core muscle stability relieves back pain by maintaining proper position for posture and gait.⁵

Low back pain and extremity injuries are known to be risk factors for poor core stability. Lower back pain complain is very commonly seen in dentists. A study conducted on prevalence and risk factor for low back pain among dentist was shown to be 70% prevalence.⁶

There have been studies done on plank exercises in athletes.⁷ However, very less literature is available regarding effect of plank exercise in sedentary dentists. Moreover this study will test the effect of a simple and time saving graded protocol which will be individually tailored and may provide benefit to improve core stability and might lead to prevention of back pain. Therefore the purpose of this study is to see the effect of graded plank on sedentary dentist.

As low back pain prevalence is more in dentists it can be the reason of weak core⁸ so plank can be a useful method to improve core stability and reduce back pain. The prevalence of posture related problems in dentists is very high. As numbers of dental patients are increasing so the time sitting in chair of the dentists is increasing. Dentists require lot of precision so take long time for treatment. Bad posture during the dental procedure is totally a risk factor in increasing prevalence of musculoskeletal problems⁹. As dentists are sedentary in nature as they sit on chair for a longer time so after working for a longer time they adopt bad posture which leads to weak core muscles in them. As plank exercise improves core stability so plank is given as an intervention in this.

Procedure and Outcome Measure:
An approved by the IEC at Dr. A.P.J. Abdul Kalam College of Physiotherapy at Pravara Institution of Medical Sciences. The dentists from Rural dental college were screened for sedentary lifestyle on the bases of International Physical Activity Questionnaire (IPAQ). 50 dentists from Rural Dental College, both males and females with low score in International Physical Activity Questionnaire (IPAQ) and willing where included in the study. Dentists with recent abdominal surgery, trauma, chronic orthopedic condition where excluded from the study. The 50 dentists were then assessed for two outcome measures Dynamic Abdominal Endurance Test and Unilateral Hip Bridging Endurance Test. Dynamic abdominal endurance test is a test that checks the endurance of the abdominal. It consists of 5 grades. Normal (5): hands behind neck, until scapula clear. Good(4): arms crossed over chest, until scapula clear table. Fair (3): Arms straight, until scapula clear table. Poor (2): arms extended, towards knee , until scapula is lifted from table. Trace(1): unable to raise more than head off table.¹⁰

In Unilateral hip bridging endurance test subjects are told to perform a double-leg hip bridge, and once a neutral spine and pelvis position are achieved the subject are instructed to extend one knee (randomly determined) so their leg will be straight and their thighs will be parallel to one another. The test is terminated once the patient is not able to maintain neutral pelvic position. UHBE test was developed to clinically assess core stability.¹¹

All subjects were tested before the beginning of the core-stabilization- training program (pretest) and immediately after the conclusion of the 6-week program (posttest). After this each participant has received the intervention as follows:

INTERVENTION

The exercise was given to the participants 4 times a week for 6 weeks.

1. The plank is started in the plank exercise position. This is parallel to the ground with your trunk straight and rigid, resting your weight on your toes and forearms. You should not be sagging or bending.
2. Lie face down with legs extended and elbow bent and directly under shoulder. Feet should be hip width apart. The participants are asked to contract their abdominal muscles, and then tuck their toes to lift the body keeping the forearm on the ground.
3. Start with 15-20 sec hold. Till the participant feels comfortable the plank should be held initially.
4. The second week of plank hold will be multiplied by 1.5 times of the first week and then it will be continued to be multiplied it in subsequent weeks.



RESULT

DATA ANALYSIS

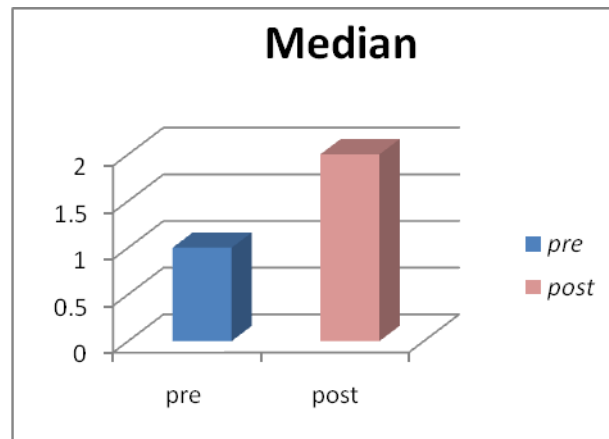
A. DEMOGRAPHIC

AGE: 50 Participants were taken who fulfilled the criteria. The mean age of participant's $\pm 22.7 \pm 0.8$

B. PRE AND POST DYNAMIC ABDOMINAL ENDURANCE TEST

The median of pre intervention dynamic endurance test in study population is 1. The median for post intervention dynamic endurance test in study population is 2.

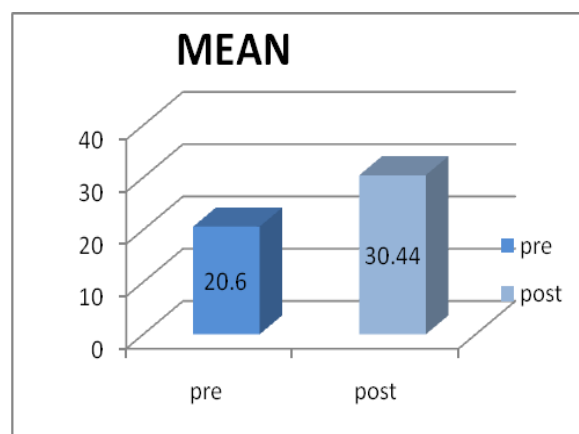
	Pre	Post
Median	1	2



C. COMPARISON OF PRE and POST UNILATERAL HIP BRIDGING ENDURANCE TEST.

Unilateral hip bridging endurance test was outcome measure in this study. The mean of pre intervention of unilateral hip bridging endurance test is 20.6 ± 11.50687461 . The mean of post intervention of unilateral hip bridging endurance test is 30.44 ± 13.53930032 . The variance of pre unilateral hip bridging endurance test is 132.4. The variance of post unilateral hip bridging endurance test is 183.3. The value of z test is -3.916001141. The p value is < 0.001 . The comparison of pre and post intervention scores suggests that the study is extremely significant

	PRE	POST
MEAN	20.6	30.44
VARIANCE	132.4	183.3
STANDARD DEVIATION	11.506874	13.539300
Z TEST	-3.916001141	
P VALUE	< 0.001	



DISCUSSION

The present study was aimed to observe the effectiveness of graded plank protocol in sedentary dentists to check the improvement in core stability. Musculoskeletal pain in dentist may be due to static faulty posture and lack of core strength and stability. According to the study conducted by Vishwas Madaan et. al students musculoskeletal pain in dentists is mainly due to repetitive work movements, working in static posture and have less core strength. 78 % dental interns in the study reported pain in lower back and hands as they have more strained position and prolonged static posture. Musculoskeletal disorder are often are the direct result of failure by dentists to maintain neural posture in their daily work. In that study about 80% of dental professionals had a complain of upper body and back may be due to prolonged strained posture.¹² As dentist have awkward posture which leads to bad posture as they adapt shorting position which leads to pain and damage so the prevalence of low back pain is high in dentists it might may be because of weak core and bad posture.

The present study was conducted on interns of Rural Dental College which included 50 participants that fit in inclusion criteria. The results of the study came out be positive as the time of the unilateral hip bridging in dentists increased. This showed that the study was extremely significant. . A previous study was done by P.W. Hodges et.al on core stability exercise which were performed in participants with chronic low back pain in that they stated that there are many exercises which have been developed as components of core stability some of them include Pilates exercise, exercise with lumbar spine and pelvis in neutral position, Swiss ball exercise and many more. But the key feature varies between lumbopelvic position in neural and on closed chain task and resisted movements. And in plank lumbopelvic position is in neutral it is a closed chain task which might be a reason

that plank helps in reducing low back with improving core stability¹³.

A study was done by Min Yong Eom et al effect of exercise on transverse abdominis on bridging exercise. In that they stated that bridging is generally done in patients with lower back pain and it stabilizes transverse abdominis internal oblique, external oblique and erector spinae muscle¹⁴. Unilateral hip bridging is one of the variations of bridging which stabilizes same muscles as that of bridging. So unilateral hip bridging was taken as an outcome measure in your study. As plank also strengthens transverse abdominis, rector abdominis, and erector spine.¹⁵ it might be the reason that the hold time of unilateral hip bridging endurance test was increased in our study after 6 weeks graded plank protocol.

Usually in sedentary individuals abdominal muscles are undertrained. According to an article by Sarah L. Strand et al on norms for an isometric muscle endurance test. If the abdominals are under trained they would be the weak-link in the abdominal plank and therefore can produce discomfort due to fatigue earlier than if they were adequately trained.¹⁶ Dynamic abdominal endurance test is a test that checks the endurance of the abdominals.¹⁰ Abdominal consists of external oblique, internal oblique , rectus abdominis and transverse abdominis. Dynamic abdominal endurance consists of 5 grades¹⁰. The present study reported in the improvement in the grade of dynamic abdominal endurance test. Dynamic abdominal endurance test utilizes following muscles external oblique, internal oblique, rectus abdominis and transverse abdominis. Graded plank also involves the activation of transverse abdominis, rector abdominis, and erector spine¹⁵. This result might be attributed due to involvement of similar muscles in graded plank and dynamic abdominal endurance test. As the participants were sedentary this may have lead to dramatic improvement in dynamic

abdominal endurance test in the present study.

In conclusion it can be stated that graded plank protocol can be an effective and time saving strategy to improve core stability and help in prevention of low back pain in sedentary dentists.

CONCLUSION

Results of the present study revealed that graded plank exercise has shown significant improvement in core stability in sedentary dentist for 6 weeks, 4 days per week on non consecutive days.

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