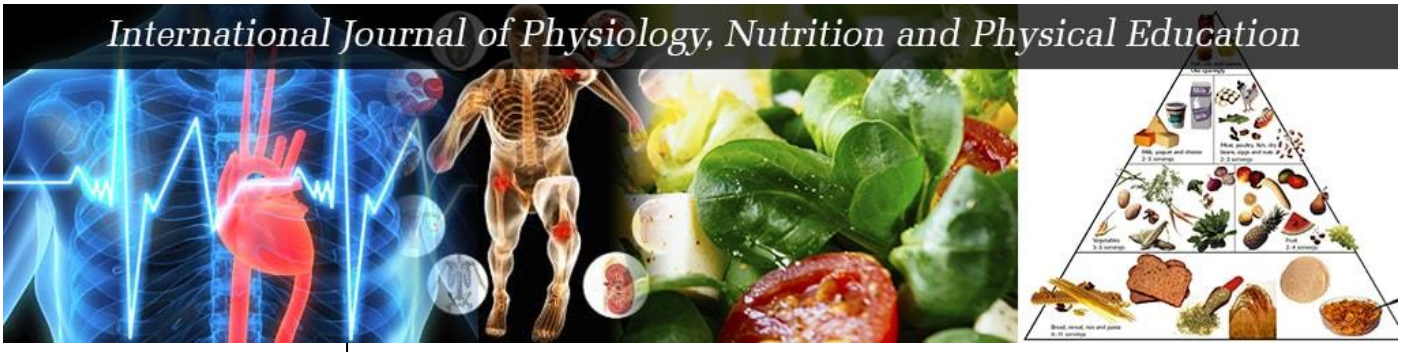

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Efficacy of functional core training and slide board training on selected range of motion parameters among young active men

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Abstract
The objective of this study was to examine the efficacy of functional core training and slide board training on selected range of motion parameters among young active men. To achieve the purpose of the study forty five active men were randomly assigned into experimental group I (n=15), experimental group II (n=15) and control group (n= 15) and their age ranged between 20 and 25 years. The experimental groups underwent functional core training and slide board training for three sessions per week in 12 weeks. The subject's Range of motion parameters such as knee flexion and hip flexion was measured by Goniometer. The pre and post test data of both the groups were collected and statistically examined by applying analysis of covariance. Results of the study show that the range of motion of knee flexion and hip flexion significantly improved (P<0.05) in experimental group compared with the control one. In contrast, control subjects did not show any significant alteration in these parameters and also there was no significant difference between the treatment groups. The functional core training and slide board training programme may be recommended to improve the range of motion of knee flexion and hip flexion and it may contribute to enhance range of motion level young active men.

Keywords: Functional core training, slide board training, knee flexion and hip flexion

Introduction
"Core stability" describes the ability to control the position and movement of the central portion of the body. Core stability training targets the muscles deep within the abdomen which connect to the spine, pelvis and shoulders, which assist in the maintenance of good posture and provide the foundation for all arm and leg movements. The core is the link between the lower and upper body**.** The core transfers forces and power between the lower body and the upper body. For optimal performance the core needs to be solid, to avoid energy leaks within the kinetic chain. A dysfunctional core that ineffectively transfers forces will put more strain on the limb muscles and tendons, resulting in overuse injuries. A solid core keeps the back healthy, helps to maintain good posture, improves the balance, enhances performance and prevents injuries. A strong core will help throw a ball further and can even help you to change direction faster (Kibler, 2006) [3].

Slide boards have been used by speed skaters and hockey players for years and years now and are becoming ever more popular in fitness facilities today. The slide board develops lateral speed, agility, coordination, balance, and explosive power. Slide boards are intended to improve the strength, endurance, and stability of the hip and hip stabilizers. This type of cross-training is a great way to get the cardiovascular training done all while reducing the risk of hip injuries**.**

The slide board provides effective rehab for both the upper and lower body. Using the board for upper body injuries requires putting the booties on the hands. It is a functional training device that is becoming a popular addition to conditioning and rehabilitation programs (Reese and Lavery, 1991) [4]. Slide boards incorporate an integral skill of many sports: lateral agility and power. Slide board exercise requires the use of the hip adductors and abductors (Reese and Lavery, 1991) [4]. Slide boards can be used to develop and maintain aerobic conditioning and aid in numerous sport-related skills.

Motion of the human body is not isolated to one muscle or tissue moving in one specific direction. It is a complex event involving agonist and antagonist structures that work together to create changes in position and stabilizes the body in all three directional planes of motion. Regardless the type of sport it is essential to have core strength and trunk stability to maximize performance and prevent injury, especially in active daily living. The main objective of the study was to examine the effectiveness of functional core and slide board training on selected range of joint motion parameter in young active men.

Research design and methods

The study was formulated as a true random group design, consisting of a pre-test and post-test. Forty five (N=45) young active men from Chennai city were selected as subjects at random and their ages ranged from 20 to 25 years. The subjects were randomly assigned to three equal groups of fifteen subjects each. The exercise groups underwent functional core training and slide board training for three sessions per week in 12 weeks. The subject's Range of motion parameters such as knee flexion and hip flexion was measured by Goniometer. The pre and post test data of both the groups. The pretest and post test scores were subjected to statistical analysis using Analysis of Covariance (ANCOVA) to find out the significance among the mean differences, whenever the 'F' ratio for adjusted test was found to be significant; Scheffe's post hoc test was used. In all cases 0.05 level of significance was fixed to test hypotheses.

Training programme

Functional Core: All subjects performed 10 minutes of warm-up exercise, which comprised flexibility exercises, involving a range of motion exercises to all joints of the upper and lower limbs and trunk. Each training session was supervised by the study investigators and certified fitness trainers in the Fitness Center. Crunches, Oblique Crunches, the Plank, Oblique Plank, Single Leg Bridging, Controlled roll ups, Hamstring Raises, Superman, Static Straight Legs, Lowering and Raising Legs, Hundreds and Wall squats.

Slide Board Training: The protocol for slide board training included a 10 minute warm-up period, a session lasting between 15-20 minutes, and a 10 minute cool down period. The sessions were held three days per week for 12 weeks. The Reebok Slide Trainer was used for this study. The Slide Trainer consists of a 6-foot portable board that has a durable slide surface, a nonskid backing, angle bumpers, to enable the participant to maintain the proper biomechanical alignment, and booties which are nylon and slip over any type of tennis shoe or cross-trainer. Finally, the Reebok Slide Trainer has unique graduated end ramps (10-degree angle) that minimize the impact on the ankle, knee, and hip joints. Speed skater, Single-Leg Mountain Climbers, Double-Leg Mountain Climbers, Double-Leg Pike Forward Lunge, Reverse Lunge, Side Lunge and Fly to Pushups.

The initial intensity was fixed at 60–65%. The intensity of the exercise was gradually increased, once in every two weeks. The intensity was fixed between 65% and 70% during 3-4 weeks, 70% and 75% during 5-6 weeks, 75% and 80% during 7-8 weeks, 80% and 85% during 9-10 weeks and 85% and 90% during 11-12th weeks. The subjects were asked to perform each exercises and 60 seconds rest was given as the recovery between sets. The number of sets was gradually increased once in two weeks along with the intensity. The training was given under the direct supervision of the investigator.

Results

Analysis of Covariance on range of motion of pretest and posttest means for functional core training and slide board training group and control group have been analyzed separately and presented table-1.

Table 1: Analysis of Covariance on Range of motion parameters

Variables	Test	EG - I	EG - II	CG	SV	SS	DF	MS	F
Knee Flexion	Pre Test	128	130	126	B	104.84	2	52.42	1.05
					W	2087.07	42	49.69	
	Post Test	134	137	129	B	498.71	2	249.36	6.37*
					W	1643.60	42	39.13	
	Adjusted	134	135	130	B	187.71	2	93.86	14.15*
					W	271.88	41	6.63	
	Mean Gain	6	7	3					
Hip Flexion	Pre Test	113	113	112	B	17.24	2	8.62	1.05
					W	343.33	42	8.17	
	Post Test	119	118	112	B	397.73	2	198.87	34.59*
					W	241.47	42	5.75	
	Adjusted	119	118	113	B	297.95	2	148.97	43.89*
					W	139.18	41	3.39	
	Mean Gain	6.3	5.3	0.9					

*Significant at 0.05level of confidence for 2 and 41 (DF) = 3.21, 2 and 42 =3.22

An examination of table - 1 indicated that the obtained pretest F-value on Knee Flexion and Hip Flexion was 1.05 and it was lesser than the required table F-value of 3.22. Hence the knee flexion and hip flexion before start of the respective treatments were found to be insignificant at 0.05 level of confidence for the degrees of freedom 2 and 42. Thus, this analysis confirmed that the random assignment of subjects into three groups were successful.

The obtained posttest F value of 6.37 and 34.59 was greater than the required table F value of 3.22. Hence the posttest means value of functional core training and slide board training on knee flexion and hip flexion were found to be significant at 0.05 level of confidence for the degrees of freedom 2 and 42. The results proved that knee flexion and hip flexion were significantly improved moderately than the control group of the sample populations.

The obtained adjusted posttest F value of 14.15 and 43.89 was higher than the required table F value of 3.23. Hence the adjusted posttest means value of functional core training and slide board training on knee flexion and hip flexion were

found to be significant at 0.05 level of confidence for the degrees of freedom 2 and 41. The results confirmed that functional core training and slide board training on knee flexion and hip flexion were produced significant difference among the groups.

In order to find out the superiority effects among the experimental and control groups the Scheffe's post hoc test were administered. The outcomes of the same are presented in the table 2.

Table 2: Scheffe's Confidence Interval Test on Range of motion parameters

Variables	EXP.GP 1	EXP.GP 2	C G	MD	CI
Knee Flexion	134	135	-	1	2
	134	-	130	4*	2
		135	130	5*	2
Hip Flexion	119	118	-	1	2
	119	-	113	6*	2
		118	113	5*	2

*Significant

The multiple comparisons showed in Table 2 proved that there existed significant differences between the adjusted means of functional core training with control group (4 and 6), slide board training with control group (5 and 5). Hence the comparison was significant. Further, there was no significant difference between functional core and slide board training (1and1) at 0.05 level of confidence with the confidence interval value of 2. The adjusted posttest mean deference of experimental and control group value graphically represented in the figure 1.

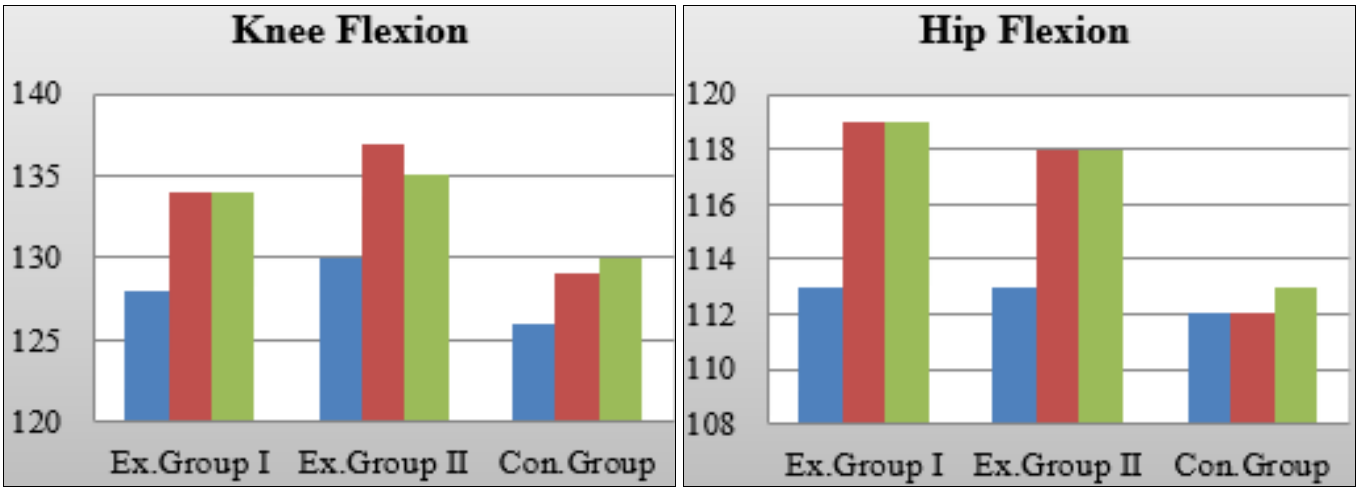

Fig1: Bar Diagram Showing the Adjusted Post Test Means of Range of motion parameters

Discussion

Based on statistical analysis experimental group significant improved on selected range of motion parameters due to effect of 12 weeks of functional core training and slide board training. Optimal core stability exists when the musculature is able to control the trunk to a point that allows optimal transfer of torque to the terminal segments of the extremities (Kibler, Press, Sciascia, 2006) [3], the study conducted by Sekendiz, Cug and Korkusuz, (2009) founded that Swiss-ball core strength training increases trunk flexion/extension of sedentary women. The study conducted by Cug Mutlu (2012) [2] Swiss ball training showed that a significant effect on knee proprioception. Baldon, *et al*., (2012) [1] pointed out that functional stabilization training significantly increased knee flexor torques. The finding of the study in agreement with the above said studies.

Conclusions

It was concluded that experimental treatment improved on selected range of motion parameters due to the effect of functional core training and slide board training among young active men. The control group did not improve selected criterion variable. Core stability is the ability of body to control the whole range of motion of joint thereby functional core training and slide board training will enable the individual to achieve optimum gains in knee hip range of motion**.**

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