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ASSESSMENT OF ISOLATED AND PARALLEL CORE STRENGTH AND MOBILITY TRAINING IMPACT ON SELECTED BIOMOTOR VARIABLES OF SOCCER PLAYERS

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ABSTRACT

The purpose of this study was to examine the effect of isolated and parallel core strength and mobility training on selected biomotor variables of soccer players. To achieve the purpose of this study forty men soccer players from Acharya Nagarjuna University, Guntur, Andhra Pradeah, India, was selected as subjects and their age ranged from 20 to 25 years and they were divided into four equal groups of ten each (n=10) at random. Experimental group-I underwent core strength training, experimental group-II underwent mobility training and experimental group-III underwent parallel core strength and mobility training and group-IV acted as control. The training regimen lasted for twelve weeks for 3 days per week and 1 session of 90 minutes daily morning. The selected dependent variables were assessed using standard tests and procedures, before and after the training regimen. Analysis of covariance was used to determine the significant difference existing between pretest and posttest on selected dependent variables. The analysis of data revealed that twelve weeks of isolated and parallel core strength and mobility training have significantly improved the selected biomotor variables of soccer players.

Key Words: *Core strength training, Mobility training, Biomotor variables & Soccer players*

INTRODUCTION

Soccer is the most popular sport in the world, and as a result of its immense popularity, numerous studies have been undertaken to better understand the essential qualities necessary of a soccer player. Over the last two decades, soccer game is becoming more and more athletic and players' ability to perform a variety of strong and explosive activities, such as jumping, running, tackling, turning, kicking and changing tempo, has become critical in many game circumstances (Reilly, Bangsbo & Franks, 2000; Castagna et al., 2003). Because it has been previously reported in notational game analyses, these concerns are becoming increasingly important to optimal performance not only in adults but also in young players in the modern football approach (Stroyer, Hansen & Klausen, 2004; Castagna et al., 2003). High-speed running, for example, accounts for up to 3% of total distance travelled in children's games

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(Castagna et al., 2003), and the game's most vital moments, such as surrendering goals, scoring goals, or winning ball possession are all dependent on it (Reilly, Bangsbo & Franks, 2000). Such explosive actions are crucial for soccer performance and must be cultivated separately from aerobic power with the right training stimulus (Helgerud et al., 2001).

Core stability and core strength have been subject to research since the early 1980s. It is a hot topic in the fitness industry. Athletes and trainers are beginning to understand the importance of this factor after years of ignoring it, or underestimating it. Core muscles are composed of the abdominal muscles (both superficial and deep), the lumbar region, or lower back, and the thoracic and cervical region of the spine (mid & upper). These areas serve to provide stability, support, and a solid base for the rest of the body to function maximally. Strong tight core is a solid foundation through which power generated in one region of the body is transferred to another. Core strength training is a term that focuses its attention on building the strength of the muscles of the body so that the entire body is supported and balanced. The core is the center of gravity in the body around the center of the abdomen. This is the focal point of movement and balance, without which, we cannot expect to have a lean and graceful body. The reason for core strength training has become so popular is because when the core muscles are in shape, the entire body carries itself differently.

Mobility training involves exercises, which aim to stretch muscles and their connective tissues. It is muscle and the tissues which surround and attach muscle to bone that limit the range of movement of the various joint actions which facilitate the running and hurdling actions. The activities which stretch these muscles are often referred to as stretching, flexibility or suppleness excises, the aim of each exercise being to stretch to the limit of the range of movement, often referred to as the position, and to seek to improve the range by stretching at and beyond this point. There are a number of techniques used in performing flexibility exercises to increase the range of movement. The simplest and safest is the active or slow stretch method. Consequently, the aim of the present study was to compare the isolated and parallel core strength and mobility training for differences in their effectiveness on selected biomotor variables of soccer players.

METHODOLOGY

Subjects and Variables

To achieve the purpose of this study forty men soccer players from *Acharya Nagarjuna University, Guntur, Andhra Pradeah, India*, during the academic year 2022-2023 was selected as subjects and their age ranged from 20 to 25 years. The selected subjects were randomly assigned to experimental and control groups of 10 each. Experimental group-I performed core strength training, group-II performed mobility training, group-III performed parallel core strength and mobility training and group-IV acted as control. Control group was restricted to participate in any specific training programme. The selected dependent variables such as explosive power, muscular strength and flexibility were assessed using standard tests and procedures, before and after the training regimen. The instruments used for testing the

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dependent variables were standard and reliable as they were purchased from the reputed companies. The variables and tests used are presented in table-1.

Table 1: Dependent Variables and Test

SL. No.	Variables	Tests / Instruments	Unit of Measurement
1.	Explosive Power	Standing broad Jump	Centimeters
2.	Muscular strength	Bent Knee Sit-ups	Number
3.	Flexibility	Sit and reach test	Centimeters

Training Protocol

Training programme was administered to the soccer players for twelve weeks with three training units per week. Experimental group-I underwent core strength training, experimental group-II underwent mobility training and experimental group-III underwent parallel core strength and mobility training. The subjects of group-I performed 6 core strength exercises for the period of 12 weeks. The subjects of group-II performed 6 mobility exercises for the period of 12 weeks. Whereas, the subjects of group-III performed core strength training (*6 exercises*) for the first six weeks and mobility training (*6 exercises*) for the remaining six weeks in parallel. The training intensity was progressively increased once in two weeks. The control group did not participate in any specialized training during the period of study.

Experimental Design and Statistical Technique

The experimental design used in this study was random group design involving 40 subjects, who were divided at random into four groups of ten subjects each. The data collected from the four groups prior to and post experimentation on selected dependent variables were statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since four groups were involved, whenever the obtained 'F' ratio value was found to be significant for adjusted post test means, the Scheffe's test was applied as post hoc test to determine the paired mean differences, if any. In all the cases the level of confidence was fixed at 0.05 for significance.

RESULTS

The data collected on selected biomotor variables before and after twelve weeks of isolated and parallel core strength and mobility training is statistically analyzed by analysis of covariance and the results are presented in table-II.

Table – II: **Analysis of Covariance on Selected Biomotor Variables of Experimental and Control Groups**

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	Core strength training group	Mobility training group	Parallel training group	Control group	S o V	Sum of Squares	Df	Mean squares	'F' ratio
Explosive Power	1.68	1.74	1.83	1.52	B	0.86	3	0.29	58.00*
					W	0.16	35	0.005	
Muscular strength	35.91	30.78	32.82	27.17	B	614.07	3	204.69	36.49*
					W	196.41	35	5.61	
Flexibility	39.83	44.68	48.09	34.17	B	898.66	3	299.55	47.52*
					W	212.91	35	6.08	

(The required table value for significance at 0.05 level of confidence with df 3 & 35 is 2.87)
**Significant at .05 level of confidence*

The obtained 'F' ratio value for the adjusted post-test means on speed, explosive power, muscular strength and flexibility of core strength training, mobility training, parallel core strength and mobility training and control groups are 44.63, 58.00, 36.49 and 47.52 respectively which are greater than the required table value of 2.87 for the degrees of freedom 3 and 35 at 0.05 level of confidence. Hence, it was concluded that significant differences exist between the adjusted post test means of core strength training, mobility training, parallel core strength and mobility training and control groups on selected biomotor variables.

Since, the obtained 'F' ratio value in the adjusted post test means is found to be significant, the Scheffe'S test is applied as post hoc test to find out the paired mean difference, and it is presented in table-III.

Table –III: **Scheffe's Post Hoc Test for the Differences among Paired Means of Experimental and Control Groups**

Variables	Core Training	Mobility Training	Parallel Training	Control Group	Mean Difference	Confidence Interval
Explosive Power	1.68	1.74			0.06	0.09
	1.68		1.83		0.15*	
	1.68			1.52	0.16*	
		1.74	1.83		0.09*	
		1.74		1.52	0.22*	
			1.83	1.52	0.31*	
Muscular strength	35.91	30.78			5.13*	3.11
	35.91		32.82		3.09	
	35.91			27.17	8.74*	
		30.78	32.82		2.04	
		30.78		27.17	3.61*	
			32.82	27.17	5.65*	
Flexibility	39.83	44.68			4.85*	3.24
	39.83		48.09		8.26*	

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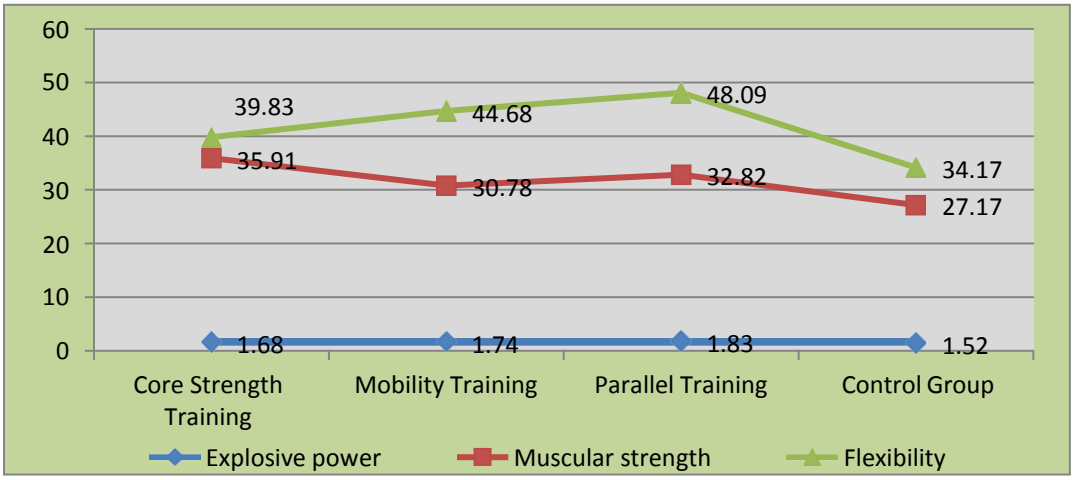
	39.83			34.17	5.66*	
		44.68	48.09		3.41*	
		44.68		34.17	10.51*	
			48.09	34.17	13.92*	

**Significant at .05 level of confidence*

Table-III shows the mean differences between the experimental groups and also between the experimental and control groups on explosive power, muscular strength and flexibility. The Scheffe's post hoc analysis proved that when comparing the experimental groups with control group significant mean differences exists between them on selected biomotor variables. Since, the mean differences were higher than the confident interval values at .05 level of significance. When comparing the experimental groups it shows significant mean differences between them in some comparisons and insignificant differences on other comparisons.

Figure-I: **Diagram Showing the Adjusted Post Test Mean Values on Selected Biomotor Variables**



DISCUSSION

The result of the present study are also in agreement with the studies conducted by Burke (2000) who compared 2 methods of delivering the same proprioceptive neuromuscular facilitation (PNF) flexibility exercise protocol: one manual and the other machine. Both training groups had significant improvements on trunk flexion and right hip flexion. Concentric, eccentric torque and range of motion (ROM) are changed after chronic stretching programs (Nittoli, 1995). Optimal method of stretching will improve hip flexion range of motion. Static stretching of the hamstring produced the greatest increases in both passive and active hip flexion ROM (Sundquist, 1996). Strength differences can occur with an acute exposure to partial ROM resistance exercise, also provides insight into joint action duration in the execution of full ROM and partial ROM resistance exercise (Mookerjee & Ratamess, 1999). Core strength training may be able to increase range of

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motion of a number of joints of inactive older individuals possibly due to an improvement in muscle strength.

Core strength training may be an effective training method for improving performance in runners (Sato & Mokha, 2009). Nine-week strategic core strengthening exercise program increases trunk stability and in turn improves vertical jump parameter in volleyball players (Sharma, Geovinson & Singh, 2012). Core strength training is widely used in the strength and conditioning, health and fitness, and rehabilitation industries with claims of improving performance and reducing the risk of injuries (McGill, 2001; Olmsted, et al., 2002). Martuscello et al., (2013) suggested that strength and conditioning specialists should focus on implementing core-specific exercises, to adequately train the core muscles in their athletes and clients. Swiss ball training may positively affect core stability without concomitant improvements in physical performance in young athletes (Stanton, Reaburn & Humphries, 2004).

CONCLUSIONS

The result of this study demonstrated that, core strength training, mobility training, parallel core strength and mobility training has significant impact on explosive power, muscular strength and flexibility of soccer players. It is also concluded that parallel core strength and mobility training is better than isolated core strength and mobility training in improving the selected biomotor variables. Research findings on core strength and mobility training were reviewed. The investigator prepared to offer opinions based on the strength of collective studies. Most improvements are observed when core strength training was combined with mobility training. It appears that parallel core strength and mobility training may be superior to isolated core strength and mobility training in improving biomotor variables.

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