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EFFECT OF STATIC AND DYNAMIC CORE STRENGTH TRAINING IN COMBINATION WITH SOCCER SPECIFIC TRAINING ON MUSCULAR STRENGTH ENDURANCE AMONG COLLEGE WOMEN SOCCER PLAYERS

Rojida Bogie
Research Scholar, Department of Physical Education, Annamalai University,
Dr. S. Alagesan
Research Guide, Associate Professor, Department of Physical Education, Annamalai University,
E Rajan
Research Scholar, Department of Physical Education, Annamalai University,
B Nalini
Research Scholar, Department of Physical Education, Annamalai University

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Abstract

The aim of this study was to analyze the effect of static and dynamic core strength training in combination with soccer specific training on muscular strength endurance among college women soccer players. To attain these objectives, 45 college women soccer players in the age of 18-25 years from Lilong Haoreibi College, Lilong Manipur, India during the academic year 2023-2024 were preferred. The chosen subjects (N=45) were classified into three equivalent groups of fifteen participants each (n=15) at random. Group-I was assigned static core strength training in combination with soccer specific training, group-II was assigned dynamic core strength training in combination with soccer specific training and group-III was control. They did these 2 trainings for 12 weeks. All 3 groups were measured before and immediately after 12weeks of training period on muscular strength endurance by using standardized test items. The data obtained were analyzed by paired 't' test to know the differences if any between the two testing periods. Additionally, magnitude of variation was also calculated. In addition, ANCOVA was also applied. When the adjusted 'F' was greater, Scheffe's test was applied. To test the obtained results the significance level 0.05 was chosen. As a result of static core strength training with soccer specific training and dynamic core strength training with soccer specific training the muscular strength endurance (MSE) of soccer players was significantly enhanced.

Key words: Static and dynamic core strength training, soccer specific training, muscular strength endurance, women soccer players

Introduction

Soccer is the world's most popular sport with the Federation of the International Football Association (FIFA) estimating that more than 270 million people are actively involved in the sport worldwide. In recent years, there has been a remarkable expansion in and acceptance of sports science, and specifically strength and conditioning (S&C), within soccer. This discipline is

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recognized as a valid area of scientific and professional practice, with strength and conditioning practitioners becoming key members of the multidisciplinary coaching team.

Soccer is characterized as an intermittent sport with repeated bouts of high-intensity activity. Therefore, for training to suit the physical demands of the game, emphasis should be placed on the ability to repeatedly execute high-intensity activities with short rest periods. High-intensity training has been reported to induce greater improvements in both aerobic and anaerobic capacity compared with continuous training involving the same mechanical work and duration. In addition to this, high-intensity training modalities require approximately half the time of traditional continuous methods and are more likely to enhance player motivation and adherence and increase the time for technical and tactical practices. It is evident that aerobic and anaerobic capacities are determinants of successful soccer performance. The best method for improving these qualities is through static and dynamic core strength training in combination with soccer specific training. The purpose of this study is to find out the effect of static and dynamic core strength training in combination with soccer specific training on selected bio motor, physiological and skill performance variables among college women soccer players.

Soccer is a very dynamic sport and it is the sport base for the epistemology of performance (Raiola, 2020ab); in which players must constantly adapt to the game situations. As a result, the tension and effort during the game changes, depending on the action on the field and the core and biomechanics and fast movement (D'Elia et al., 2020, Raiola et al., 2020). For this reason, aerobic power is a key element for a soccer player. It allows for improved recovery capacity (Izzo et al., 2020abc), especially after very intense efforts. Aerobic power is defined as the amount of oxygen that can be used by our body in the unit of time during progressive and increasing physical activity, until it is exhausted. It is closely related to heart rate, which can be derived in terms of heart beats per minute. An athlete's aerobic and anaerobic capacity can determine the outcome of competition (Rankovic et al., 2010) and therefore it is important to assess the athletes' ability within these areas.

Through the study of science and various sports training, researchers have developed a greater understanding on how the human body reacts to exercise, training and many other stimuli. The effect of static and dynamic core strength training in combination with soccer specific training on muscular strength endurance of soccer players are needful research goal and it has drawn the investigator's attention. Therefore, the intention of this study was to find out the effect of static and dynamic core strength training in combination with soccer specific training on muscular strength endurance among college women soccer players.

METHODOLOGY

Subjects and Variable

To attain these objectives, 45 college women soccer players in the age of 18-25 years from Lilong Haoreibi College, Lilong Manipur, India during the academic year 2023-2024 were preferred. The chosen subjects (N=45) were classified into three equivalent groups of fifteen participants each (n=15) at random. Group-I was assigned static core strength training in combination with soccer specific training, group-II was assigned dynamic core strength training in combination with soccer specific training and group-III was control. All 3 groups were assessed before and immediately after 12 weeks of training period on muscular strength endurance by conducting Bent knee sit-ups test.

Training Programme

A sufficient warm up was performed by the subjects before undergoing core strength and game specific training sessions. Concentration was given to stretching, striding, jogging and

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common mobility exercises particularly concerning the involved joints in the designed core strength and game specific training. Warm down activities were completed after the completion of every sessions. All participants were advised not to begin any specific training during this 12-week period except their day-to-day activities. Prior to the study, procedures and guidelines were presented orally and in written form. Subjects agreeing to participate signed an institutionally approved consent form. The three experimental groups were trained at the similar time during the morning, weekly 3- days, throughout the study. Throughout the training period, all of them were in direct administration and were educated on how to do these exercises.

The static and dynamic core strength training in combination with soccer specific training group subjects took part in a 12-week training program performing a variety of exercises designed. Following a series of familiarization sessions, all participants completed a battery of standardized physical fitness tests and laboratory tests in the same order for the subsequent analyses of generic training adaptations on muscular strength endurance. The testing procedures were repeated at the conclusion of the 12 weeks intervention period.

Statistical Procedures

The data collected from the experimental and control groups on muscular strength endurance was statistically analyzed by paired 't' test to find out the significant differences if any between the pre and post test. Further, percentage of changes was calculated to find out the alterations in muscular strength endurance due to the impact of experimental treatment.

Further, the data collected from the three groups prior to and post experimentation on muscular strength endurance was statistically analyzed to find out the significant difference if any, by applying the analysis of covariance (ANCOVA). Since three 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 level for significance.

Results

The collected pre and post test muscular strength endurance (MSE) data of static and dynamic core strength training in combination with soccer specific training & control groups are analyzed statistically as in Table -1.

Table – 1: Paird't' Test Results and % of Improvement on Muscular Strength Endurance of Static and Dynamic Core Strength Training with Soccer Specific Training & Control groups

Group	Test	N	Mean	SD	DM	't' - ratio	%
Static Core Strength Training with Soccer Specific Training	Pre	15	29.33	3.56	3.87	10.28*	13.19
	Post	15	33.20	4.06			
Dynamic Core Strength Training with Soccer Specific Training	Pre	15	30.00	2.59	6.07	7.25*	20.23
	Post	15	36.07	3.01			
Control	Pre	15	30.47	3.46	0.14	0.35*	0.46
	Post	15	30.33	3.20			

*Table value for df 14 is 2.15(*significant)*

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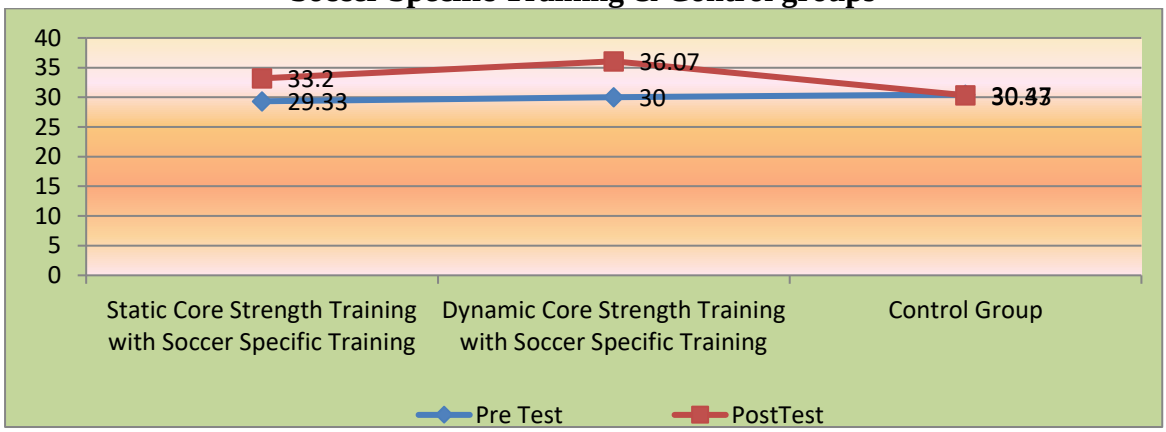
The collected pre and post test muscular strength endurance (MSE) values of two treatment (static and dynamic core strength training in combination with soccer specific training) groups vary obviously as the found 't' values of static core strength training in combination with soccer specific training (10.28) as well as dynamic core strength training in combination with soccer specific training (7.25) groups were more than table value (df 14 = 2.15).

Performing static core strength training with soccer specific training leads to 13.19% of improvement in muscular strength endurance (MSE) whereas performing dynamic core strength training with soccer specific training leads to 20.23% of improvement in muscular strength endurance (MSE) of football players.

The pre and post test mean on muscular strength endurance of static and dynamic core strength training with soccer specific training & control groups are pesented in figure-I.

Figure-I: Diagram showing the Pre and Post Test mean on Muscular Strength Endurance of Static and Dynamic Core Strength Training with Soccer Specific Training & Control groups



The chosen football player's muscular strength endurance (MSE) performance of static and dynamic core strength training in combination with soccer specific training & control groups were analyzed by ANCOVA statistics, and exhibited in Table –2.

Table – 2: ANCOVA Results on Muscular Strength Endurance of Static and Dynamic Core Strength Training with Soccer Specific Training & Control Group's

	Static Core Strength Training with Soccer Specific Training	Dynamic Core Strength Training with Soccer Specific Training	Control	SoV	SS	df	MS	'F' ratio
Adjusted Mean	34.27	36.57	28.76	B	424.35	2	212.18	45.92*
				W	189.43	41	4.62	

*(Table value for df 2 & 41 is 3.23)*Significant (.05 level)*

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The applied ANCOVA calculation established that the adjusted (post test) means (static core strength training with soccer specific training group=34.27, dynamic core strength training with soccer specific training group = 36.57 & CG=28.76) of football player's muscular strength endurance (MSE)of all three chosen groups differs from each other, because the resultant adjusted (post test) mean 'F' value (45.92) is better than 3.23 (Table value for *df 2 & 41* =3.23).

As the static and dynamic core strength training in combination with soccer specific training & Control group's adjusted (post test) means 'F' value (F= 45.92) is significant, Scheffe's statistics was also used as in Table -3.

Table –3: Scheffe's Test Conclusion on Muscular Strength Endurance of Static and Dynamic Core Strength Training with Soccer Specific Training & Control groups

Variable	Static core strength with soccer specific training	Dynamic core strength with soccer specific training	Control	MD	CI
Muscular Strength Endurance	34.27	36.57		2.30*	1.99
	34.27		28.76	5.51*	1.99
		36.57	28.76	7.81*	1.99

**Significant (.05)*

The applied Scheffe's statistics confirmed that due to static core strength training with soccer specific training (5.51), as well as dynamic core strength training with soccer specific training (7.81) the football player's muscular strength endurance (MSE) was improved to a great extent. Though, dynamic core strength training with soccer specific training was much better than static core strength training with soccer specific training since the mean difference (2.30) is more than 1.99 (CI value).

Discussion

As a result of static core strength training with soccer specific training and dynamic core strength training with soccer specific training the muscular strength endurance (MSE) of soccer players was significantly enhanced. The above findings can also be substantiated by observations made by renowned experts in the science of sports training. Research on the effect of core strength training on health and fitness determinants revealed that core strength training, like other types of exercise, positively affects physical performance and number of health parameters. Training of the trunk or core muscles for enhanced health, rehabilitation, and athletic performance has received renewed emphasis. In recent years, fitness practitioners have increasingly recommended core stability exercises in sports conditioning programs. Greater core stability may benefit sports performance by providing a foundation for greater force production in the upper and lower extremities. Authors have claimed that resistance exercises performed on unstable equipment are specific to sports skills because of the balance, proprioception, and core stability required to perform these exercises successfully (Bigatton, 2002; Boyle, 2004; Chek, 1999). Therefore, performing resistance exercises on unstable equipment will make an individual to enhance the performance of sports skills.

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). Core strength training may be an effective training

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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 (Sharma et al., 2009). 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.

Conclusion

Performing static core strength training with soccer specific training leads to 13.19% of improvement in muscular strength endurance (MSE) whereas performing dynamic core strength training with soccer specific training leads to 20.23% of improvement in muscular strength endurance (MSE) of soccer players. Though, dynamic core strength training with soccer specific training was much better than static core strength training with soccer specific training for the enhancement of muscular astrenghth endurance. Therefore, in order for exercise physiologists and trainers to create successful training protocols for women soccer players, a more complete understanding of core strength training with soccer specific training is essential. Hence, to continue optimal training state and get advantages of the possible benefits, it is recommended that, football players should not miss combined core strength training with soccer specific training sessions in their regular workout.

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