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EFFICACY OF GAME SPECIFIC TRAINING IN COMBINATION WITH PLYOMETRIC TRAINING PERFORMED IN DIFFERENT SURFACE CONDITIONS ON SPIKING OF YOUNG VOLLEYBALL PLAYERS

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Abstract:

The purpose of the study was to examine the efficacy of game specific training in combination with plyometric training performed on different surface conditions on spiking skill among young volleyball players. To achieve the purpose of the study, forty-five male volleyball players aged between 15 and 18 years were selected and randomly divided into three equal groups of fifteen subjects each. Group-I underwent combined game specific training with plyometric training on sand surface, Group-II underwent combined game specific training with plyometric training on firm surface, and Group-III served as the control group. The experimental groups underwent training for a specified training period, while the control group did not participate in any special training programme. Spiking skill was selected as the dependent variable and assessed before and after the training programme. The collected data were statistically analyzed using paired 't' test, Analysis of Covariance (ANCOVA), and Scheffe's post hoc test at 0.05 level of significance.

The results revealed significant improvement in spiking skill among the experimental groups. The obtained paired 't' ratios for sand surface training and firm surface training groups were 18.41 and 29.43 respectively, which were higher than the required table value of 2.15. The percentage of improvement observed was 28.06% for the sand surface training group and 38.22% for the firm surface training group, whereas the control group showed only 1.43% improvement. The adjusted post-test mean values through ANCOVA were 13.01 for the sand surface group, 15.00 for the firm surface group, and 9.13 for the control group. The obtained 'F' ratio of 109.70 was significant at 0.05 level. Scheffe's post hoc test further indicated that the firm surface plyometric training group showed superior improvement in spiking skill compared to the sand surface plyometric training group.

Key Words: Game Specific Training, Plyometric Training, Sand Surface, Firm Surface, Spiking Skill and Volleyball Players

Introduction:

To date, studies assessing the influence of playing surface type on physical performance abilities have yielded conflicting results. During competitive games, Andersson et al., (2008) observed similar running (e.g., sprint number, high-intensity running and total covered distance) and technical (e.g., standing tackles) patterns on artificial turf (AT) compared to natural grass (NG). Moreover, single sprint (Gains et al., 2010) as well as jumping and agility performances (Hughes et al., 2013; Stone et al., 2014) appear to be similar on AT and NG. On the other hand, the effect of playing surface on repeated sprint ability (RSA) is equivocal (Stone et al., 2014).

Volleyball - An Overview:

Though volleyball was originally invented to be a recreational game; it has now developed into a high competitive sport, requiring a high degree of fitness. The requisite level of fitness will vary depending upon the level of competition. Participation in top-notch competitive volleyball requires that a person should be in a state of optimum fitness.

From the above statement, it is evident that these components of performance are essential for volleyball players. Nicholls recommends power, speed, agility, coordination, flexibility, muscular and cardio-respiratory endurance and concentration as well as quick thinking and reaction time are the factors basic to performance in volleyball (Nicholls, 1919).The ingredients of success volleyball players are power, speed, and judgment of the distance and space concentration training, agility, flexibility, peripheral vision and ability to remain high up for a sufficiently long period. Quickness is the prime necessity in the modem volleyball both in attack and in defence (Smith, 1982).

Need of Specific Conditioning for Volleyball Players:

Volleyball games typically have short bursts of play that require start and stop action. Cardio exercises to improve endurance should include volleyball drills that mimic the bursts of stamina needed in a volleyball game. The circuit training helps to condition a volleyball player's technique to improve spiking, blocking and serving. Starting a workout routine that includes high intensity integral training with a variety of cardio equipment and strength training will also help to improve endurance and fitness. Volleyball players can use integral training to condition them for quick volleyball maneuvers through bursts of intense exercises and drills (Balakrishnan, 2007).

Importance of Plyometric Training for Volleyball Players:

A vertical jump is a complex movement that requires the coordination of several muscles in the trunk, arms and legs (Charoenpanicha et al., 2013). Knowing that each player performs more than 250 jumps in a volleyball match of five sets

(Martinez, 2017;Vlantes & Readdy, 2017), jumping ability has been identified as one of the key determining factors of high performance in volleyball (Stanganelli et al., 2008). In fact, several studies have shown that vertical jump test results are indicative of the performance level of an athlete (e.g., (Lidor & Ziv, 2010; Ziv & Lidor, 2010; Smith, Roberts & Watson, 1992; Palao, Manzanares & Valadés, 2014)). For example, Ziv and Lidor (2010), in a review concerning vertical jump in female and male volleyball players, noted that better-performing teams were comprised of players with high vertical jumps (Tsoukos et al., 2018).

Effect of Training on Different Playing Surfaces:

Training is given in many ways and it is mainly based on the nature and requirement of sports. Singh (1994) found in his study that the sand jump training combined with the weight training improves the jumping ability of basketball players. Impellivzzeri, et al. (2008) conducted the study with an aim to compare the effects of plyometric training on sand versus a grass surface on muscle soreness, vertical jump height and sprinting ability. They found that plyometric training on sand improved both jumping and sprinting ability and induced less muscle soreness. Yigit, Semih S. (1998) conducted a study on physical and physiological alterations that occurred in male high school and college students as a result of a 6-week endurance training program on road and sand. Both treatment groups showed a similar significant increase in vertical jump. The 12-min run/walk was significantly increased in sand runners. This study shows that a 6-week sand running program may result in the most physiological and performance changes in young men.

Methodology:

Selection of the Subjects:

To achieve the purpose of the study, forty-five male volleyball players aged between 15 and 18 years were selected as subjects. The selected subjects were randomly divided into three equal groups of fifteen subjects each. Group-I underwent combined game specific training with plyometric training on sand surface, Group-II underwent combined game specific training with plyometric training on firm surface, and Group III served as the control group.

Before the training programme, all subjects underwent a minimum strength requirement test which included five push-ups, five squat thrusts, standing long jump, and jumping rope for 30 seconds as recommended by Voight and Draovitch (1991). The selected subjects were medically examined by a qualified physician and confirmed to be physically fit to participate in the training programme.

Selection of Variables:

Independent Variables:

- Combined game specific training with plyometric training in Sand surface
- Combined game specific training with plyometric training in Firm surface

Dependent Variables:

- Spiking

Experimental Design and Statistical Technique:

The experimental design used in this study was random group design involving 45 subjects, who were divided at random in to three equal groups of fifteen subjects each. All the three groups were selected from the same population. No effort was made to equate the groups prior to the commencement of the experimental treatment. The data collected from the three experimental groups on selected dependent variables was statistically analyzed by paired 't' test to find out the significant differences if any between the pre and post test on spiking percentage of changes was calculated to find out the chances in selected dependent variables due to the impact of experimental treatment.

The data collected from the three 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). The pre test means of the selected dependent variables was used as a covariate. 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.

Analysis of Spiking Skill (SS):

The results of various statistical techniques applied to know the impact of plyometric exercise performed in sand and firm surface conditions on spiking skill of volleyball players is displayed in table 1.

Table 1: Percentage (%) of Improvement and 't' Test (Paired) Results on Spiking Skill of Sand and Firm Surface Plyometric Training as well as Control Group

Group	Tests	N	Group's Mean	SD	M.Diff	Obtained 't' - Ratio	%
Combined Sand Surface Plyometric and Game specific Training	Pre	15	9.53	1.06	3.53	18.41*	28.06
	Final		13.06	1.09			
Combined Firm Surface Plyometric and Game specific Training	Pre	15	9.40	1.24	5.60	29.43*	38.22
	Final		15.01	1.30			
Control (CG)	Pre	15	9.26	1.27	0.13	0.26	1.43
	Final		9.13	1.18			

Table value for df 14 is 2.15(*significant)

The calculated mean values of initial (pre) and final test data on spiking skill of volleyball players belongs to plyometric exercise performed in sand and firm surface condition group's differ clearly, as combined sand surface plyometric and game specific training and combined firm surface plyometric and game specific training group's resultant 't' ratio values (18.41 &29.43) are more than table(df14=2.15) value needed. Due to combined sand surface plyometric and game specific training and combined firm surface plyometric and game specific training, 28.06% and 38.22% of improvement in spiking skill was observed.

In the below given table 2, the applied ANCOVA statistics results on spiking skill of sand and firm surface plyometric training groups and control group participants are put on view.

Table 2: Derived ANCOVA Results on Spiking Skill of Sand and Firm Surface Plyometric Training as well as Control Group

Mean Score	Combined Sand Surface Plyometric and Game Specific Training	Combined Firm Surface Plyometric and Game Specific Training	Control (CG)	SoV	SS	df	MS	Derived 'F' Ratio
Adjusted	13.01	15.00	9.13	B	260.25	2	130.12	109.70*
				W	48.63	41	1.18	

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

The adjusted (posttest) spiking skill mean values, derived through ANCOVA statistics for sand surface plyometric training (SSPT=13.01) and firm surface plyometric training (FSPT =15.00) as well as control groups (CG=9.13) participants are resulted in 'f' ratio value of 109.70. It proved that the combined sand surface plyometric and game specific training and combined firm surface plyometric and game specific training as well as control group's (CG) adjusted(posttest) mean values on spiking skill vary noticeably, as the 'F' ratio value (109.70) for df 2 & 41(3.23) is found significant.

In the below given table 3 the applied Scheffe's Test statistics results on spiking skill of sand and firm surface plyometric training groups and control group participants are put on view.

Table 3: Derived Scheffe's Test Results on Spiking Skill of Sand and Firm Surface Plyometric Training as well as Control Group

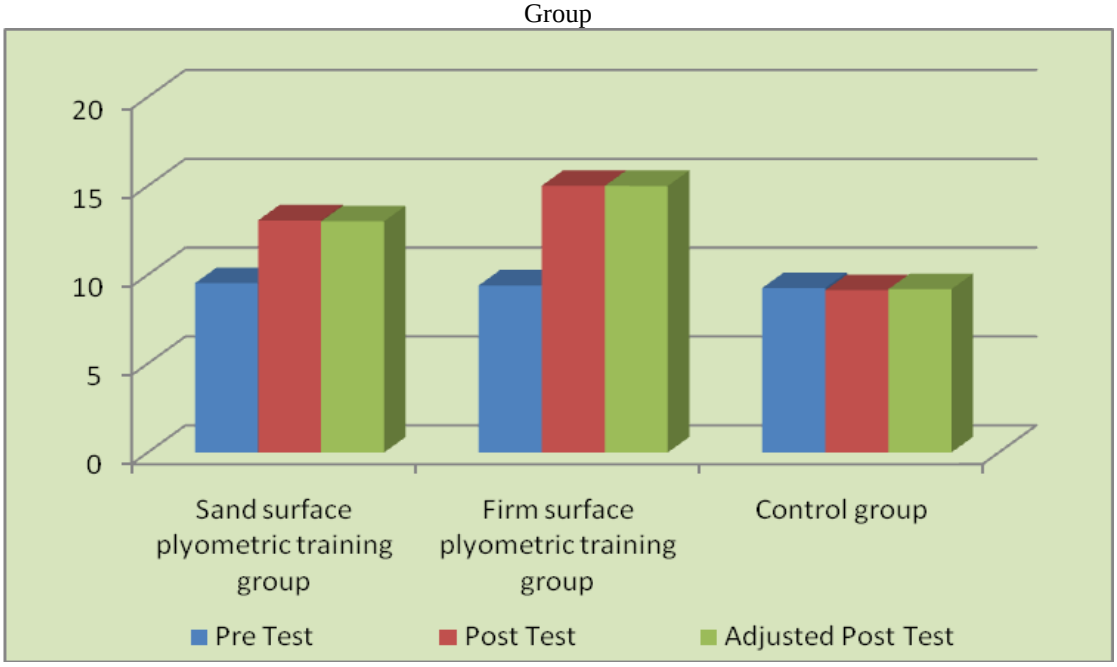
Variable	Combined Sand Surface Plyometric and Game Specific Training	Combined Firm Surface Plyometric and Game Specific Training	Control (CG)	MD	CI
Spiking Skill	13.01	15.00		1.99*	1.11
	13.01		9.19	3.82*	1.11
		15.00	9.19	5.81*	1.11

*Significant (.05)

The post hoc (Scheffe's) analysis make obvious that due to sand surface plyometric training (SSPT= 3.82) and firm surface plyometric training (FSPT= 5.81) training the participant's spiking skill was improved remarkably. Though, combined firm surface plyometric and game specific training is better to combined sand surface plyometric and game specific training since the difference between these means (MD) (1.99) is better to the calculated CI (1.11) value.

The below screening figure(I), shows the serving skill mean scores of chosen sand surface plyometric training (SSPT) and firm surface plyometric training (FSPT) as well as control groups (CG) participants.

Figure 1: Figure Screening is Spiking Performance Mean Scores of Sand and Firm Surface Plyometric Training as well as Control Group



Conclusion:

Due to combined sand surface plyometric and game specific training and combined firm surface plyometric and game specific training, 28.06% and 38.22% of improvement in spiking skill was observed. Though, firm surface plyometric training (FSPT) is better to sand surface plyometric training (SSPT)

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