Analysis of Different Surfaces Specific Training Impact on Leg Strength of College Level Men Beach Volleyball Players

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ABSTRACT

The purpose of the study is to analyze the different surfaces specific training impact on leg strength of college level men beach volleyball players. To achieve the purpose, the investigator selected forty five male beach volleyball players from Puducherry state, India as subjects in the age of 19 years to 23 years. They were randomly assigned into three groups of 15 subjects each. Group-I underwent plyometric training in sand surface, group-II underwent plyometric training in firm surface, and group-III acted as control. The chosen Dependent variable explosive power was assessed by conducting sergeant jump test. The data collected from the three groups on leg strength was statistically examined by using paired 't' test. Further, the pre and post test data collected from 3 groups were analyzed by analysis of covariance (ANCOVA). The Scheffe's post hoc test was applied to find out the paired mean differences, whenever the adjusted post test means 'F' ratio value was found to be significant. The level of confidence was fixed at 0.05 level for significance. Due to sand surface plyometric training (SSPT) and firm surface plyometric training (FSPT), 8.52% and 5.95% of improvement in leg strength was observed. Though, sand surface plyometric training (SSPT) was superior to firm surface plyometric training (FSPT).

Key Words*: Specific training, Leg strength, Beach volleyball players*

INTRODUCTION

The beach game is great for improving indoor skills/game. Whatever weaknesses are, players get to work on them a ton. Unlike the 6 person game, players touch the ball in every rally, and with just two of players covering the court, players learn to read and anticipate much better. Dealing with the sun and wind helps players be more adaptable. Player height is less important outdoors, ball control and skill is most important. Players get to be outside in the sun, often in beautiful settings. It is a great way to improve players jump, as there are just two of them to block and hit every rally. Communicating effectively is essential in the sport, and the game helps players to grow stronger. Most top level coaches encourage their players to play as much as they can on the beach.

This technical adaptation can, in turn, impact on the physical demands of beach volleyball, as repetitively overcoming the initial lack of fixed resistance before a skill is performed, requires exerting additional effort, increasing the energy cost of performing such tasks (Binnie et al., 2014). Players perform 219.0 ±7.4 jumps per beach volleyball match between them (Turpin et al., 2008), while each player also needs to cover a larger playing surface, and this additional effort can impose considerable stresses to the players' bodies.

Physical fitness is the result of an individual's assessment of their level of strength, speed, power, endurance, agility, and flexibility. It is important for a variety of games and sports. Physical fitness is the capacity to perform delayed, diligent work and recover to a similar state of health in a short period of time. Physical fitness relies upon a few factors, for example, heredity, sterile living nourishment and body move of a person. Among these body moves ever play exercises, in an unexpected way. Physical fitness includes two related ideas: general fitness (a condition of health and prosperity) and explicit fitness (ability to perform explicit parts of games or occupations). Distinctive games gave to do the body activities, in an unexpected way.

The essential requirement for participating in any sporting activity is physical fitness. In addition to physical fitness, motor skills like strength, speed, endurance, and flexibility are necessary for success in sports. Sports coaches and trainers place a strong emphasis on helping players develop their motor skills and physical fitness, a concept called as conditioning. An effective conditioning program is the cornerstone of a sports person's whole training regimen. There are two types of physical fitness: general fitness and specialty fitness. The term "general fitness" describes the motor skills—such as speed, strength, flexibility, endurance, and coordination—that are necessary for any athlete, regardless of their activity. Every sport has higher-than-average motor skill requirements. The enhanced degree of motor skills attained by the athlete that is necessary for the particular sport is known as specialized fitness.

The three main components of specific fitness in volleyball are coordination, strength, and speed. Athletes who receive fitness training are better prepared to handle the psychological and physiological obstacles they may encounter during their professional sports careers. A player with a certain level of fitness can execute the unique movements needed for the sport, which a non-athlete cannot do in their daily life. However, general fitness is a major factor in specialized fitness, which is why, in order to thrive, a sportsperson must place equal emphasis on general and specific fitness. Exercise and physical activity should be the first part of the training program because they are the two main requirements for athletes.

Beach volleyball is a very demanding sport which is played outdoors usually under difficult conditions such as high temperature, wind even rain. The number of matches played per day (2 up to 5) during the weekend tournament and the fact that both players touch the ball in almost every phase of the game are factors of extra

difficulty. Furthermore, volleyball performance (jumps, dives and other sport-specific drills) on sand makes beach volleyball more demanding than indoor volleyball. Consequently, the purpose of the study is to analyze the different surfaces specific training impact on leg strength of college level men beach volleyball players.

METHODOLOGY

Subjects & Variable

To achieve the purpose, the investigator selected forty five male beach volleyball players from Puducherry, India as subjects in the age of 19 years to 23 years. They were randomly assigned into three groups of 15 subjects each. Group-I underwent plyometric training in sand surface, group-II underwent plyometric training in firm surface, and group-III acted as control. The leg strength of beach volleyball players was assessed by conducting leg press test.

Training Programme

A 12-week plyometric training program was prepared using three training sessions/week. Group-I performed plyometric training in sand surface, group-II performed plyometric training in firm surface. Training volume ranged from 90 foot contacts to 120 foot contacts per session. Since, it is a quality session with the emphasis on high speed of movement for every repetition, sufficient recovery was given between exercises, sets and sessions. Rest interval of 1:1 between each exercise, 1:3 between sets and one day between plyometrics sessions was given in order to allow the neromuscular system to recover. All the two experimental groups were performed the same volume, intensity and frequency of plyometric training however they performed this training in different surfaces such as sand and firm surfaces respectively.

Statistical Technique

The data collected from the three experimental groups on leg strength 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 changes in leg strength due to the impact of experimental treatment. The data collected from the 3 groups prior to and post experimentation on leg strength were 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 to test the significance.

RESULT

The results of various statistical techniques applied to know the impact of plyometric exercise performed in sand and firm surface conditions on leg strength of beach volleyball players is displayed in tables-1-3.

Table – 1: Percentage (%) of Improvement and 't' Test (Paired) Results on Leg Strength of Sand and Firm Surface Plyometric Training & Control Group

Group	Tests	N	Group's Mean	SD	M.Diff	Obtained 't'ratio	%
Sand Surface Plyometric Training	Pre	15	66.5333	3.83344	5.667	9.461*	8.52%
	Final		72.2000	3.68782			
Firm Surface Plyometric Training	Pre	15	66.1333	3.39888	3.933	9.135*	5.95%
	Final		70.0667	4.19977			
Control (CG)	Pre	15	65.7333	4.99238	0.933	3.287*	1.42%
	Final		64.8000	5.45370			

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

The calculated mean values of initial (pre) and final test data on leg strength of beach volleyball players belongs to plyometric exercise performed in sand and firm surface condition group's differ clearly, as sand surface plyometric training (SSPT) and firm surface plyometric training (FSPT) group's resultant 't' ratio values (9.461&9.135) are more than table(df14=2.15) value needed. Due to sand surface plyometric training (SSPT) and firm surface plyometric training (FSPT), 8.52% and 5.95% of improvement in leg strength was observed. In the below given table-2, the applied ANCOVA statistics results on leg strength of sand and firm surface plyometric training groups and control group participants are put on view.

Table – 2: Derived ANCOVA Results on Leg Strength of Sand and Firm Surface Plyometric Training & Control Group

Mean Score	Sand Surface Plyometric Training	Firm Surface Plyometric Training	Control (CG)	SoV	SS	df	MS	Derived 'F' ratio
Adjusted	71.798	70.067	65.202	B	348.733	2	174.367	54.495*
				W	131.187	41	3.200	

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

The adjusted (post test) leg strength mean values, derived through ANCOVA statistics for sand surface plyometric training (SSPT=71.798) and firm surface plyometric training

(FSPT =70.067)as well as control groups (CG=65.202) participants are resulted in 'f' ratio value of 54.495. It proved that the sand surface plyometric training (SSPT) and firm surface plyometric training (FSPT) well as control group's (CG) adjusted (post test) mean values on leg strength vary noticeably, as the 'F'ratio value(54.495) for df 2 & 41(3.23) is found significant.

In the below given table-3, the applied Scheffe's Test statistics results on leg strength of sand and firm surface plyometric training groups and control group participants are given.

Table – 3: Derived Scheffe's Test Results on Leg Strength of Sand and Firm Surface Plyometric Training & Control Group

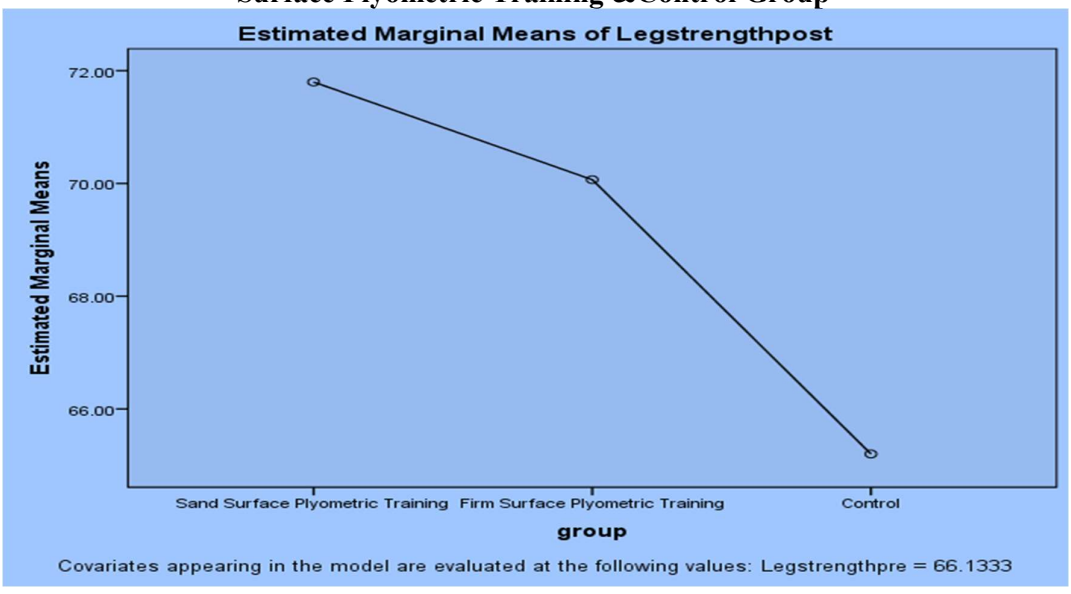
Variable	Sand Surface Plyometric Training (SSPT)	Firm Surface Plyometric Training (FSPT)	Control (CG)	MD	CI
Leg Strength	71.798	70.067		1.732*	1.660
	71.798		65.202	6.597*	1.660
		70.067	65.202	4.865*	1.660

**Significant (.05)*

The post hoc (Scheffe's) analysis make obvious that due to sand surface plyometric training (SSPT= 6.597) and firm surface plyometric training (FSPT= 4.865) training the participant's leg strength was improved remarkably. Though, sand surface plyometric training (SSPT) was superior to firm surface plyometric training (FSPT) since the difference between these means (MD) (1.732) are above the calculated CI (1.660) value.

The below screening figure(1), shows the leg strength 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 Shows the Leg Strength Mean Scores of Sand and Firm Surface Plyometric Training &Control Group



DISCUSSION

Amrinder et al. (2014) demonstrated that short-term plyometric training on sand/non-rigid surfaces produce similar improvements in strength endurance, balance, and agility as on firm surfaces, but induce significantly less muscle soreness. Shrikant and Mankar (2020) demonstrated that all training treatments elicited significant ($p < 0.05$) improvement in all tested variables, but the sand plyometric training group produced improvements in vertical jump performance and leg strength that were significantly greater than the land and control groups. Bishop (2003) came to the conclusion that sand jumping skills in seasoned beach volleyball players can be evaluated using land-based examinations. According to Ramlan et al. (2018), volleyball players on grass and concrete surfaces significantly improved their post-test squat and countermovement jumps after four weeks of plyometric training. Muscle soreness was lower in the sand group than in the grass group, according to Impellizzeri et al. (2008).

Sand plyometric exercise reduced muscular pain and enhanced jumping and sprinting abilities. While the sand surface shown a bigger improvement in squat jump performance, a grass surface appears to be superior in improving countermovement jump performance. Plyometric training on wooden and synthetic surfaces significantly improves vertical and horizontal jumping performance in healthy adult male volleyball players, according to Cimenli et al. (2016). According to OjedaAravena et al. (2022), rugby seven players' vertical leap displacement and lower body power were enhanced by performance connected to the counter movement jump with arms on softer surfaces following four weeks of plyometric training.

CONCLUSION

Due to sand surface plyometric training (SSPT) and firm surface plyometric training (FSPT), 8.52% and 5.95% of improvement in leg strength was observed. Though, sand surface plyometric training (SSPT) was superior to firm surface plyometric training (FSPT). In order to maintain optimal training levels and take advantage of the potential benefits, it is suggested that sand surface plyometric training sessions not be missed by beach volleyball players. Sand surface plyometric training has been proven to increase muscle strength which is essential to beach volleyball players.

REFERENCE

Amrinder, S., Sakshi, G., & Sandhu Jaspal Singh, (2014) Effect of Plyometric Training on Sand Versus Grass on Muscle Soreness and Selected Sport-Specific Performance Variables in Hockey Players, Journal of Human Sport & Exercise, 9(1):.59-67.

Binnie MJ, Dawson B, Arnot MA, Pinnington H, Landers G, Peeling P. (2014). Effect of sand versus grass training surfaces during an 8-week pre-season conditioning programme in team sport athletes. *J Sport Sci*., 32(11):1001-1012.

Bishop, D. (2003) A Comparison between Land and Sand-Based Tests for Beach Volleyball Assessment. Journal of Sports Medicine and Physical Fitness, 43(4), 418-423.

Cimenli, O., Koc, H., Cimenli, F., Kacoglu, C., (2016) Effect of an Eight-Week Plyometric Training on Different Surfaces on the Jumping Performance of Male Volleyball Players, Journal of Physical Education and Sport, 16(1): 162-169.

Impellizzeri, FM, Rampinini, E, Castagna, C, Martino, F, Fiorini, S, and Wisloff, U. (2008) Effect of Plyometric Training on Sand Versus Grass on Muscle Soreness and Jumping and Sprinting Ability in Soccer Player, *British Journal of Sports Medicine*, 42: 42-46.

Ojeda-Aravena A, Azocar-Gallardo J, Campos-Uribe V , Baez-San Martín E, Aedo-Munoz EA and Herrera-Valenzuela T, (2022) Effects of Plyometric Training on Softer Vs. Harder Surfaces on Jump - Related Performance in Rugby Sevens Players, Frontiers in Physiology,25 (13): 1- 9.

Ramlan, M. H., Pitil, P. P., & Wahed, W. J. E. (2018) Effects of Plyometric Training on Grass Surface and Concrete Surface on Jumping Performance among Volleyball Athletes. Malaysian Journal of Movement, Health & Exercise, 7(2), 127-134.

Shrikant S Mankar A., (2020) Comparative Study of Effect of Sand and Land Plyometric Training on Speed and Explosive Power among Basketball Players, Journal of Sports Science and Nutrition, 1(2): 37- 39.

Turpin JPA, Cortell JM, Chinchilla JJ, Cejuela R, Suarez C. (2008). Analysis of jump patterns in competition for elite male beach volleyball players. *Int J Perform Anal Sport*, 8(2):94-101.