

## Effect of Different Depth Levels of Sand Training on Physical Variables of Team Sports Athletes

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### Abstract

The purpose of this study was to the effect of different depth levels of sand training on physical variables of team sports athletes. Total 60 male students were selected randomly as subjects who were used to play regularly in the sports and games from Pondicherry. The age group of the subjects was between 13-14 years. The subjects were divided into four groups, each group consisting of 15 subjects. Group-1undergone 2cm depth sand training (2CMSDG), Group-2was undergone 4cm depth sand training (4 CMSDG) and Group-3 was undergone 6cm depth sand training (6 CMSDG) Group-4 was control group (CG) did not participate in any specific training. The experimental groups were undergone training of sprinting, own body weight exercises and jumping exercises for three alternate days in a week for totally 12 weeks. This study was restricted to selected physical fitness variables such as Balance, Agility and strength Endurance, Leg Strength, Leg power and Abdominal Strength. These variables were tested pre and post data. The data were examined by applying analysis of Co-variance and LSD post hoc test and the level of significance was set at 0.05 levels. Based on the analysis of statistical results, it was clearly evident that 2cm depth sand training (2CMSDG), 4cm depth sand training (4CMSDG), 6cm depth sand training (6CMSDG) had significantly improved the physical variables such as balance, agility and strength endurance, leg strength, leg power and abdominal strength when compared to control group. 6CMSDG had better improvement in balance, agility and strength endurance, leg strength and leg power than the other training group, similarly the 4CMSDG group had better improvement in leg strength and leg power compared with 2CMSDG and Control group. 2CMSDG group had better in leg strength and leg power than the control group. The abdominal strength was improved by 4CMSDG and 6CMSDG than the control group.

**KEYWORDS:**Balance, Agility and strength endurance, Leg strength, Leg power, abdominal strength, depth sand training, sprinting, own body weight exercises, jumping exercises.

### Introduction

Sand is a great training tool for improving speed and agility. It provides resistance that challenges muscles, helping to make to faster and more explosive. The constant shifting under feet engages small stabilizer muscles that improve balance and reduce the risk of injury. Sand training gives an excuse to work out in the great outdoors. (John M. Cissik July 29, 2012) Soft sand training surfaces can offer a higher energy cost and lower impact training stimulus when compared to firmer training venues such as grass and red soil etc. However sand training research to data has been conducted over a limited range of exercise type and performance outcomes, with the practical implications for applied sport

setting such as team sports largely unknown. Sand can burn up to two and half times more calories than the same training on solid surfaces. With numerous scientific studies backing it up, sand training is a great way to gain the edge over the competition. Sand running increases the intensity of training and builds strength because of the resistance they offer when running. Sand has a strengthening effect as well as boosting the athletes' power and is ideal for athletes who depend on high running speeds. To reduce the possibility of injury sand training should be conducted once the athlete has a good solid base of strength and endurance. The importance of sand surface training knowledge must have for any coach, athlete, parent, fitness enthusiast, or therapist looking to enhance their training knowledge and add an effective tool to their current training methodology.

### **Aim of the Study**

The aim was to establish whether different depth sand training is an appropriate exercise for training the physical fitness variables such as balance, agility and strength endurance, leg strength, leg power and abdominal strength that it produces an overload on the athlete with inducing better changes in these variables.

The other aim was to establish that, which depth sand training is the best improvement in variables than other depth sand training.

### **Statement of the Problem**

To find out the effect of different depth levels of sand training on physical variables of team sports athletes.

### **Materials and Methods**

#### **Selection of subjects**

The subjects were chosen from Government higher secondary schools, Pondicherry. The subjects were randomly assigned to four groups. Group-1 as 2cm depth sand training group (2CMSDG), Group-2 as 4cm depth sand training group (4CMSDG), Group-3 as 6cm depth sand training group (6CMSDG) and Group-4 was control group (CG). Each group consisted of 15 athletes. The age of the subjects was 13-14 years. All the subjects had good physical fitness and had been participated in regular school sports activities.

#### **Selection of the Variables**

*Independent variables:* The physical exercises training consists of sprinting, own body resistance training and jumping exercises on three different depths of sand training methods which were named as 2cm Sand training, 4cm Sand training and 6cm Sand training selected as independent variables.

*Dependent variables:* The physical fitness variables such as balance, agility and strength endurance, leg Strength, leg power and abdominal strength were taken for consideration as dependent variables.

### Test Administration

Sl.No.	Physical variables	Test items	Units of Measurement
1.	Balance	Star excursion balance test	Percentage
2.	Agility and Strength Endurance	30 Seconds endurance jump test	Numbers
3.	Leg Strength	Wall sit leg strength test	Minutes
4.	Leg Power	Sargent vertical jump test	Centimeter
5.	Abdominal Strength	Straight leg lift test	Seconds

### Training Programme

The training program was employed for all experimental groups for 12 weeks, the training sessions are weekly three alternate days of Monday, Wednesday and Friday between 5 pm to 6 pm, each session consisting of 60 minutes per session including warming up and warming down. The training load was progressively increased 5% from 60% of 1RM to 85% of 1RM, the intensity was increased once in two weeks. The volume, sets per repetition was progressively increased one to four weeks as 1x3 repetitions, five to eight weeks as 2x3 repetitions and nine to twelve weeks as 3x3 repetitions respectively. For all weeks rest intervals between the exercises 30 to 60 seconds and between the set was constant to 5 minutes. The exercises selected for this study are short sprinting exercise, own body weight exercise and jumping exercises. The control group did not taken part any specific training during these intervention periods.

### Statistical Techniques

The ANCOVA was used as a statistical tool to find out the effective mean difference among the experimental groups of 2cm Sand training, 4cm Sand training, 6cm Sand training and Control group were taken for consideration as dependent variables on Balance, Agility and strength endurance, Leg Strength, Leg power and Abdominal strength. LSD post hoc test was applied to know the significant difference between the group interventions. Results were reported as the mean  $\pm$  SD of all observations, and the level of significance was set at  $p < 0.05$ .

### Results and Discussion

**Table-1**

**Analysis of Covariance on Physical Fitness Variables of 2cmsdg, 4cmsdg, 6cmsdg And Cg**

Variables	Adjusted Post-test Mean				df	Sum of Squares	Mean Squares	F-ratio
	2CMSDg	4CMSDg	6CMSDg	CG				

<b>Balance</b> (Percentage)	96.266	96.198	100.909	88.287	B 3 W 55	1183.933 662.365	394.644 12.043	<b>32.770*</b>
<b>Agility and Strength Endurance</b> (Numbers)	40.981	44.352	46.981	38.752	B 3 W 55	584.117 206.819	194.706 3.760	<b>51.779*</b>
<b>Leg Strength</b> (Minutes)	1.088	1.204	1.201	0.939	B 3 W 55	0.692 0.215	0.231 0.004	<b>58.849*</b>
<b>Leg Power</b> (Centimeters)	16.442	18.299	21.276	13.717	B 3 W 55	446.689 59.118	148.896 1.075	<b>138.524*</b>
<b>Abdominal Strength</b> (Seconds)	46.915	50.081	51.406	42.198	B 3 W 55	747.368 2529.775	249.123 45.996	<b>5.416*</b>

\*significance at 0.05 levels,

(The table value required for 0.05 level of significance with df 3 & 55, 56 is 2.775, 2.772)

It is evident from above table that adjusted posttest means of 2cmSDG, 4cmSDG, 6cmSDG and CG Balance, were 96.266, 96.198, 100.909, 88.287 percentages found to be significant with an F value of 32.770 at the table value 2.775. Similarly for Agility and Strength Endurance adjusted posttest means were 40.981, 44.352, 46.981, 38.752 numbers found to be significant with an F value of 51.779, for Leg strength adjusted posttest means were 1.088, 1.204, 1.201, 0.939 minutes found to be significant with an F value of 58.849, for Leg power adjusted posttest means were 16.442, 18.299, 21.276, 13.717 centimeters found to be significant with an F value of 138.524 and for the Abdominal strength adjusted posttest means were 46.915, 50.081, 51.406, 42.198 seconds found to be significant with an F value of 5.416 than the table value 2.775. Therefore, LSD posttest was applied to find out significant difference between the adjusted posttest means of groups are presented in the table-2.

**Table-2**

**LSD POST HOC TEST FOR 2CMSDG, 4CMSDG, 6CMSDG AND CG OF THE ADJUSTED POST-TEST MEANS OF PHYSICAL FITNESS VARIABLES**

Variables/ Groups	Adjusted Post-test means				Mean Difference s	Confidence Interval
	2CMSDG	4CMSDG	6CMSDG	CG		
<b>Balance (Seconds)</b>	96.266	-	100.909	-	<b>4.642*</b>	3.634
	96.266	-	-	88.287	<b>7.979*</b>	
	-	96.198	100.909	-	<b>4.710*</b>	

	-	96.198	-	88.287	<b>7.911*</b>	
	-	-	100.909	88.287	<b>12.622*</b>	
<b>Agility and Strength Endurance (Numbers)</b>	40.981	44.352	-	-	<b>3.371*</b>	2.031
	40.981	-	46.981	-	<b>6.000*</b>	
	40.981	-	-	38.752	<b>2.229*</b>	
	-	44.352	-	38.752	<b>5.600*</b>	
	-	-	46.981	38.752	<b>8.299*</b>	
<b>Leg Strength (Seconds)</b>	1.088	1.204	-	-	<b>0.116*</b>	0.066
	1.088	-	1.201	-	<b>0.112*</b>	
	1.088	-	-	0.939	<b>0.149*</b>	
	-	1.204	-	0.939	<b>0.265*</b>	
	-	-	1.201	0.939	<b>0.262*</b>	
<b>Leg Power (Centimeters)</b>	16.442	18.299	-	-	<b>1.856*</b>	1.086
	16.442	-	21.276	-	<b>4.833*</b>	
	16.442	-	-	13.717	<b>2.726*</b>	
	-	18.299	21.276	-	<b>2.977*</b>	
	-	18.299	-	13.717	<b>4.582*</b>	
	-	-	21.276	13.717	<b>7.559*</b>	
<b>Abdominal Strength</b>	-	50.081	-	42.198	<b>7.883*</b>	7.103
	-	-	51.406	42.198	<b>9.208*</b>	

\* Significant at 0.05 level.

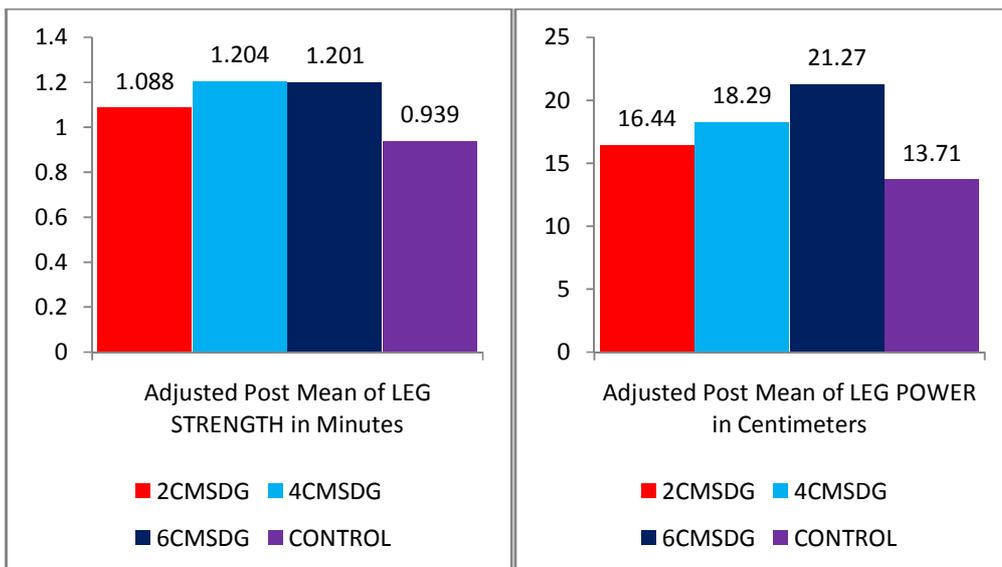
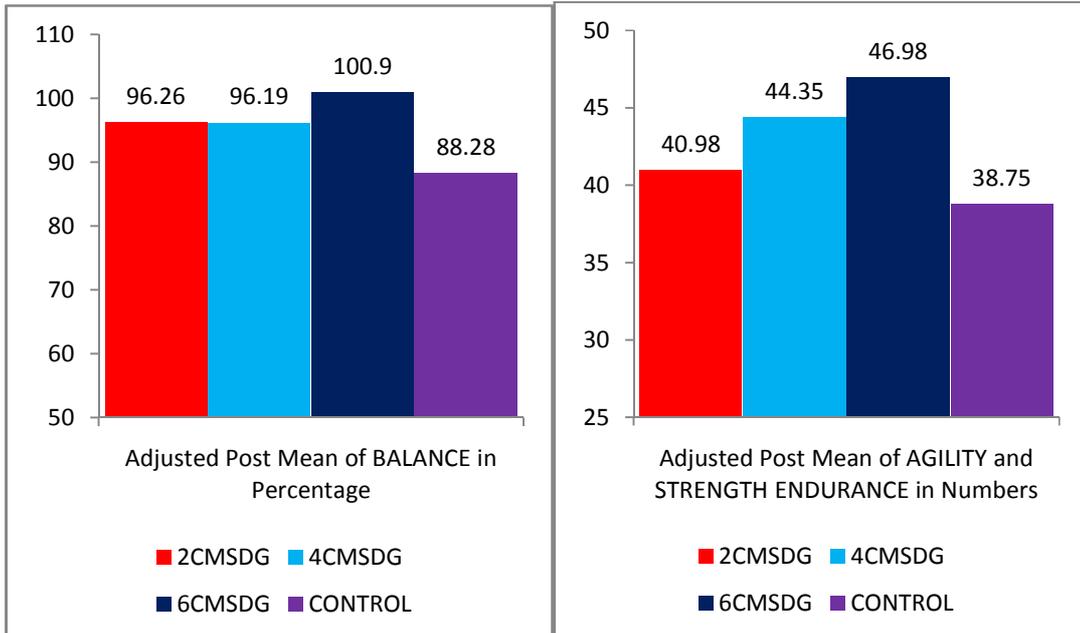
The results were found from the above table that, there is significant difference in Balance between 2CMSDG with 6CMSDG and CG. Similarly there is significant difference between 4CMSDG with 6CMSDG and CG. Similarly there is significant difference between 6CMSDG with 2CMSDG, 4CMSDG and CG. There is no significant difference between 4CMSDG and 2CMSDG groups.

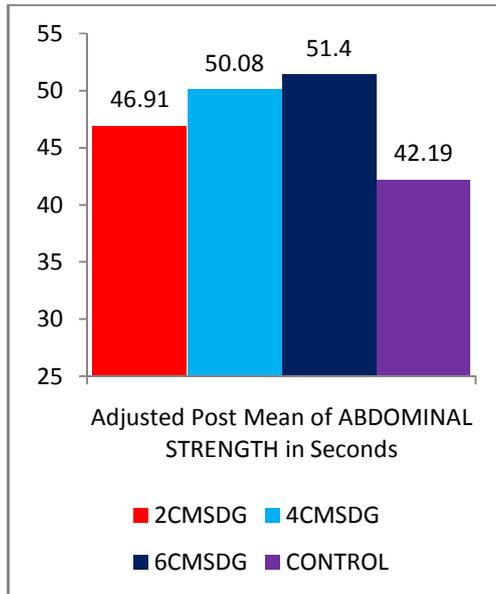
The results were found from the above table that, there is a significant difference in Agility and Strength endurance between 2CMSDG with 4CMSDG, 6CMSDG and CG. Similarly there is a significant difference between 4CMSDG with 2CMSDG and CG. Similar significant result was found between 6CMSDG with 2CMSDG and CG.

The results were found from the above table that, there is a significant difference in Leg strength between 2CMSDG with 4CMSDG, 6CMSDG and CG. Similarly there is a significant difference between 4CMSDG with 2CMSDG and CG. Similar significant result was found between 6CMSDG with 2CMSDG and CG. There is no significant difference found between 4CMSDG and 6CMSDG.

The results were found from the above table that, there is a significant difference in Leg power between 2CMSDG with 4CMSDG and 6CMSDG and CG. Similarly there is a significant difference between 4CMSDG with 2CMSDG, 6CMSDG and CG. Similar significant result was found between 6CMSDG with 2CMSDG, 4CMSDG and CG.

The result of abdominal strength was found that there were significant changes between 4CMSDG and 6CMSDG than the control group. And there was no significant difference in abdominal strength endurance among the experimental groups.





### Conclusions

1. From the results it was concluded that, all experimental group had significantly improved physical variables than the control group.
2. From the results it was also concluded that, 6cm Sand depth training was better in balance than 2cm Sand depth training, 4cm Sand depth training and Control group. Similarly 4cm Sand depth training was better in balance than Control group. The 2cm Sand depth training was improved in balance than Control group.
3. It was concluded that, 4cm Sand depth training was better in Agility and Strength endurance than 2cm Sand depth training and Control. Similarly 6cm Sand depth training was better in Agility and Strength endurance than 2cm Sand depth training and Control.
4. The results also concluded that 4cm Sand depth training was better in Leg strength than 2cm Sand depth training and Control group. Similarly 6cm Sand depth training was better in Leg strength than 2cm Sand depth training and Control.
5. The result showed that 4cm Sand depth training was better in Leg Power than 2cm Sand depth training and Control. Similarly 6cm Sand depth training was better in Leg Power than 2cm Sand depth training, 4cm Sand depth training and Control group.
6. The result revealed that 4cm Sand depth training group and 6cm Sand depth training group had improved in abdominal strength than control group.
7. There was no significant result found in abdominal strength among the experimental groups.

### Recommendations

1. 6cm depth sand training is the best training method to improve balance, agility and strength endurance, leg strength, leg power and abdominal strength.
2. 4cm depth sand training is also best training method to improve agility and strength endurance, leg strength, leg power and abdominal strength.
3. 2cm Sand depth training is also better training to improve leg strength and leg power.

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