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## Effects of isolated and complex sand and continuous running on cardio respiratory endurance

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### Abstract

The purpose of the study was to find out the effects of isolated and complex sand and continuous running on cardio respiratory endurance. To achieve this purpose of the study, sixty men students studying in the Department of Physical Education, Annamalai University, Annamalai Nagar, Chidambaram were selected as subjects at random. The selected subjects were divided into four equal groups of fifteen subjects each, such as sand running group [SRG], continuous running group [CRG], complex sand and continuous running group [CSACRG] and control group [CG]. The group I underwent sand running programme and group II underwent continuous running programme for three days per week for twelve weeks, group III underwent sand running for first six weeks and continuous running for remaining six weeks. And Group IV acted as control who did not participate any special running programmes apart from their regular physical education activities as per their curriculum. The following variable namely cardio respiratory endurance was selected as criterion variable. All the subjects of four groups were tested on selected dependent variable by using Cooper's 12 min run / walk test at prior to and immediately after the training programme. The analysis of covariance [ANCOVA] was used to analyze the significant difference, if any among the groups. Since, four groups were compared, whenever the obtained 'F' ratio for adjusted post test was found to be significant, the Scheffe's test to find out the paired mean differences, if any. The .05 level of confidence was fixed as the level of significance to test the 'F' ratio obtained by the analysis of covariance, which was considered as an appropriate. The results of the study showed that there was a significant difference among sand running group, continuous running group, combined sand and continuous running group and control group on cardio respiratory endurance. The results of the study further showed that there was a significant change on cardio respiratory endurance due to sand running, continuous running and combined sand and continuous running.

**Keywords:** Isolated and complex training, sand running, continuous running, cardio respiratory endurance, university men students

### Introduction

Sand running, also known as beach running or running on sandy terrain, is a form of exercise that involves running on soft, uneven sand surfaces typically found at beaches. Unlike running on solid ground, sand running provides a challenging workout due to the unstable nature of the surface. The soft, shifting sand requires runners to engage additional muscles, improve balance, and develop greater lower body strength.

Sand running engages muscles that might not be activated as intensely on solid ground, leading to improved leg strength and endurance. The soft surface of sand reduces the impact on joints, making it a suitable option for individuals with joint pain or those recovering from injuries. Running on an unstable surface like sand enhances balance and stability, promoting better overall coordination. Due to the added effort required to navigate the soft terrain, sand running can burn more calories compared to running on a solid surface. Many people find the beach environment and the sound of waves relaxing, making the workout more enjoyable and refreshing.

Continuous running, also known as steady-state cardio or endurance running, refers to a form of aerobic exercise where individuals maintain a consistent, moderate intensity pace for an extended period without significant breaks. This form of running primarily targets the aerobic energy system, improving cardiovascular health, endurance, and overall fitness.

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Continuous running strengthens the heart, improves circulation, and lowers the risk of heart diseases by enhancing the efficiency of the cardiovascular system. Regular practice of continuous running increases the body's ability to sustain prolonged physical activity, leading to improved endurance levels. Continuous running burns a significant amount of calories, aiding in weight loss and weight management when combined with a balanced diet. Endurance exercises like continuous running stimulate the release of endorphins, reducing stress and promoting mental well-being. Regular aerobic exercise improves lung capacity and respiratory efficiency, enhancing overall respiratory health.

### Methodology

The purpose of the study was to find out the effects of isolated and complex sand and continuous running on cardio respiratory endurance. To achieve this purpose of the study, sixty men students studying in the Department of Physical Education, Annamalai University, Annamalai Nagar, Chidambaram were selected as subjects at random. The selected subjects were divided into four equal groups of fifteen subjects each, such as sand running group [SRG], continuous running group [CRG], complex sand and continuous running group [CSACRG] and control group [CG]. The group I underwent sand running programme and group II underwent continuous running programme for three

days per week for twelve weeks, group III underwent sand running for first six weeks and continuous running for remaining six weeks. And Group IV acted as control who did not participate any special running programmes apart from their regular physical education activities as per their curriculum. The following variable namely cardio respiratory endurance was selected as criterion variable. All the subjects of four groups were tested on selected dependent variable by using Cooper's 12 min run / walk test at prior to and immediately after the training programme. The analysis of covariance [ANCOVA] was used to analyze the significant difference, if any among the groups. Since, four groups were compared, whenever the obtained 'F' ratio for adjusted post test was found to be significant, the Scheffe's test to find out the paired mean differences, if any. The .05 level of confidence was fixed as the level of significance to test the 'F' ratio obtained by the analysis of covariance, which was considered as an appropriate.

### Cardio respiratory endurance

The analysis of covariance on cardio respiratory endurance of the pre and post test scores of sand running group, continuous running group, complex sand and continuous running group and control group have been analyzed and presented in Table I.

**Table I:** Analysis of covariance of the data on cardio respiratory endurance of pre and posttests scores of sand running, continuous running, complex sand and continuous running and control groups

test	SRG	CRG	CSACRG	CG	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
<b>Pre Test</b>									
Mean	2103.00	2108.20	2104.87	2108.20	Between	350.40	3	116.80	0.01
S.D.	71.96	96.68	150.38	88.69	Within	630088.53	56	11251.58	
<b>Post Test</b>									
Mean	2242.33	2334.47	2474.60	2105.47	Between	1085649.78	3	361883.26	48.91*
S.D.	83.04	98.15	68.27	91.69	Within	414354.40	56	7399.19	
<b>Adjusted Post Test</b>									
Mean	2242.82	2333.22	2474.47	2106.36	Between	1077422.35	3	359140.78	57.43*
					Within	343940.86	55	6253.47	

\* Significant at .05 level of confidence.

(The table values required for significance at .05 level of confidence for 3 and 56 and 3 and 55 are 2.776 and 2.78 respectively).

The table I shows that the adjusted post-test means on cardio respiratory endurance of SRG, CRG, CSACRG and CG 2242.82, 2333.22, 2474.47 and 2106.36 respectively. the obtained "F" ratio of 57.43 for adjusted post-test means is greater than the table value of 2.78 for df 3 and 55 required for significance at .05 level of confidence on cardio respiratory endurance.

The results of the study indicated that there was a significant difference between the adjusted post-test means of SRG, CRG, CSACRG and CG on cardio respiratory endurance. Since, four groups were compared, whenever the obtained 'F' ratio for adjusted posttest was found to be significant, the Scheffe's test to find out the paired mean differences and it was presented in Table II.

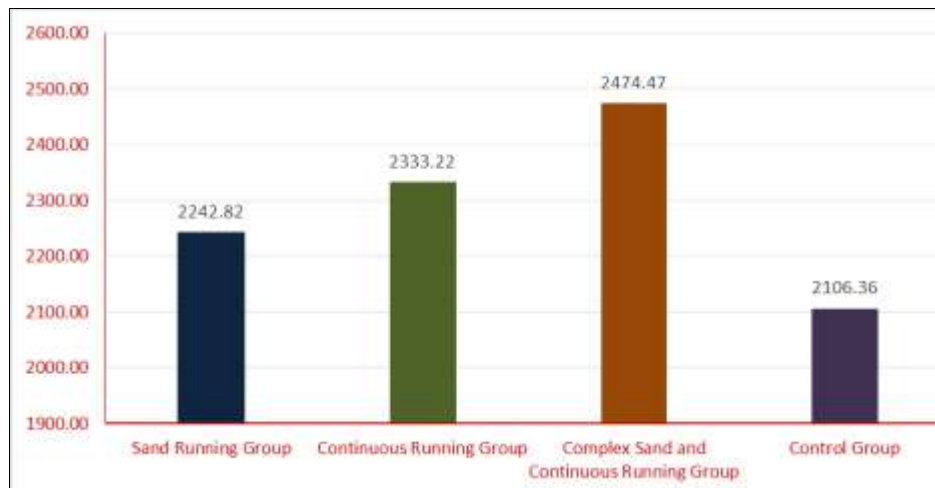
**Table 2:** The Scheffe's Test for the Differences between Paired Means on Cardio Respiratory Endurance

SRG	CRG	CSACRG	CG	Mean Differences	Confidence Interval Value
2242.82	2333.22			90.40*	80.13
2242.82		2474.47		231.64*	80.13
2242.82			2106.36	136.47*	80.13
	2333.22	2474.47		141.25*	80.13
	2333.22		2106.36	226.86*	80.13
		2474.47	2106.36	368.11*	80.13

\* Significant at .05 level of confidence.

The table II shows that the mean difference values between SRG and CRG, SRG and CSACRG, SRG and CG, CRG and CSACRG, CRG and CG and CSACRG and CG 90.40, 231.64, 136.47, 141.25, 226.86 and 368.11 respectively on cardio respiratory endurance which are greater than the

confidence interval value 80.13 at .05 level of confidence. Figure Showing the Adjusted Post Test mean values of sand running group, continuous running group, complex sand and continuous running group and control group on cardio respiratory endurance.



**Fig 1:** Cardio Respiratory Endurance

### Conclusions

1. There was a significant difference among SRG, CRG, CSACRG and CG on cardio respiratory endurance.
2. There was a significant improvement on selected criterion variables such as cardio respiratory endurance due to sand running, continuous running and complex sand and continuous running whereas the improvement was in favour of complex sand and continuous running group.

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