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Manuscript ID:
ASH-2023-11016264

Volume: 11

Issue: 1

Month: July

Year: 2023

P-ISSN: 2321-788X

E-ISSN: 2582-0397

Received: 20.04.2023

Accepted: 20.06.2023

Published: 01.07.2023

Citation:

Karthikeya, P. "Impact of Sand Running and Slow Continuous Runnings on Selected Endurance Parameters." *Shanlax International Journal of Arts, Science and Humanities*, vol. 11, no. 1, 2023, pp. 14-18.

DOI:

<https://doi.org/10.34293/sijash.v11i1.6264>



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Impact of Sand Running and Slow Continuous Runnings on Selected Endurance Parameters

P. Karthikeyan

*Associate Professor, Department of Physical Education
Annamalai University, Tamil Nadu, India*

Abstract

The purpose of the study was to find out the effects of sand running and Slow continuous running on selected endurance parameters namely strength endurance and cardio respiratory endurance. To achieve this purpose of the study, forty five men students studying Annamalai University, Annamalai Nagar, Chidambaram, Tamil Nadu and India were selected as subjects at random. Their age ranged between 18 to 24 years. The selected subjects were divided into three equal groups of fifteen each namely sand running group [SRG], slow continuous running group [SCRG] and control group [CG]. The experimental group I underwent sand running and group II underwent slow continuous running for three days per week for twelve weeks whereas the control group maintained their daily routine activities and no special training was given to them. The following endurance parameters namely strength endurance and cardio respiratory endurance were selected as criterion variables. The subjects of the three groups were tested on selected endurance parameters namely strength endurance and cardio respiratory endurance using standardized tests namely bend knee sit ups and Cooper's 12 min run / walk test respectively at prior and immediately after the training period. The collected data were analyzed statistically through analysis of covariance (ANCOVA) to find out the significant difference, if any among the groups. Whenever the obtained "F" ratio for adjusted posttest was found to be significant, the Scheffe's test was applied as post hoc test to find out the paired mean difference, if any. The .05 level of confidence was fixed to test the level of significance which was considered as an appropriate. The results of the study showed that there was a significant difference exist among sand running group, slow continuous running group and control group on selected endurance parameters namely strength endurance and cardio respiratory endurance. And also, it showed that sand running group and slow continuous running group showed significant improvement on strength endurance and cardio respiratory endurance when compared to control group.

Keywords: Sand Running, Slow Continuous Running, Strength Endurance, Cardio Respiratory Endurance, Analysis of Covariance (ANCOVA).

Introduction

Sand running, also known as beach running or barefoot running on sand, is a form of exercise that involves running on sandy surfaces such as beaches or sand dunes. It has gained popularity among athletes and fitness enthusiasts due to its unique challenges and potential benefits for physical fitness and performance. This form of running requires more effort and engages different muscles compared to running on traditional surfaces like roads or tracks. Sand running can offer a range of advantages, including improved cardiovascular fitness, enhanced lower limb strength, increased stability and balance, and reduced impact on joints. When running on sand, the soft and unstable nature of the surface requires more effort and engages different muscles compared to running on solid ground. The sand provides an unstable base, demanding greater stability and balance from the runner. This instability activates smaller stabilizing muscles in the feet, ankles, and lower legs, which can lead to increased strength and improved proprioception. One of the primary benefits of sand running is the increased resistance it provides. The sand's softness and

irregularity require the muscles to work harder, resulting in greater muscle activation and enhanced overall strength. The increased resistance can also improve cardiovascular fitness as the body works harder to propel forward in the challenging terrain. Another advantage of sand running is the reduced impact on joints. The sand acts as a natural cushion, absorbing some of the shock that would otherwise be transferred to the joints when running on harder surfaces. This can be particularly beneficial for individuals with joint issues or those recovering from injuries, as it reduces the stress on the joints and minimizes the risk of impact-related injuries.

Sand running can also improve foot and ankle strength and flexibility. Running barefoot on sand allows the feet to move more naturally, promoting a healthier foot strike pattern and strengthening the muscles and tendons in the feet and ankles. The sand's irregular surface stimulates the sensory receptors in the soles of the feet, enhancing proprioception and improving overall balance and coordination. It's important to note that sand running does come with its challenges. The soft, uneven surface can increase the risk of ankle sprains or other injuries if proper precautions are not taken. It's essential to gradually introduce sand running into your routine, starting with shorter distances and gradually increasing the intensity and duration over time. Additionally, choosing the right footwear or opting for barefoot running can help protect the feet and provide the necessary support.

Slow continuous running, also known as Long Slow Distance (LSD) running or aerobic base training, is a training method that involves running at a comfortable, sustainable pace for an extended period. It focuses on developing aerobic fitness, building endurance, and improving the body's ability to efficiently utilize oxygen. Slow continuous running plays a crucial role in many endurance sports, such as distance running, triathlon, and cycling. When engaging in slow continuous running, the primary objective is to maintain a steady pace that allows you to sustain a conversation without feeling overly breathless or fatigued. By keeping the intensity low, the body predominantly relies on aerobic metabolism, utilizing oxygen to produce energy. This helps to develop the cardiovascular

system, improve endurance, and enhance the body's ability to utilize fat as a fuel source.

Methodology

The purpose of the study was to find out the effects of sand running and Slow continuous running on selected endurance parameters namely strength endurance and cardio respiratory endurance. To achieve this purpose of the study, forty five men students studying Annamalai University, Annamalai Nagar, Chidambaram, Tamil Nadu and India were selected as subjects at random. Their age ranged between 18 to 24 years. The selected subjects were divided into three equal groups of fifteen each namely Sand Running Group [SRG], Slow Continuous Running Group [SCRG] and Control Group [CG]. The experimental group I underwent sand running and group II underwent slow continuous running for three days per week for twelve weeks whereas the control group maintained their daily routine activities and no special training was given to them. The following endurance parameters namely strength endurance and cardio respiratory endurance were selected as criterion variables. The subjects of the three groups were tested on selected endurance parameters namely strength endurance and cardio respiratory endurance using standardized tests namely bend knee sit ups and Cooper's 12 min run / walk test respectively at prior and immediately after the training period. The collected data were analyzed statistically through Analysis of Covariance (ANCOVA) to find out the significant difference, if any among the groups. Whenever the obtained "F" ratio for adjusted posttest was found to be significant, the Scheffe's test was applied as post hoc test to find out the paired mean difference, if any. The .05 level of confidence was fixed to test the level of significance which was considered as an appropriate.

Training Programme

During the training period, the Group I underwent sand running and Group II underwent slow continuous running for three days per week (alternative days) for twelve weeks. Every day the workout lasted for 45 to 60 minutes approximately including warming up and warming down periods.

Group III acted as control who did not participate in any strenuous physical exercises and specific training throughout the training period. However, they performed activities as per their curriculum.

Analysis of the Data

The analysis of covariance on selected endurance parameters of sand running group [SRG] and slow

continuous running group [SCRG] and control group [CG] have been analyzed and presented below.

Strength Endurance

The analysis of covariance on strength endurance of the pre and post test scores of SRG, SCRG and CG have been analyzed and presented in Table 1.

Table 1 ANCOVA of the Data on Strength Endurance of Pre and Post Tests Scores of SRG, SCRG and Control Groups

Test	SRG	SCRG	CG	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
Pre Test								
Mean	1423.33	1417.67	1424.00	Between	363.33	2	181.66	0.41
S.D.	21.50	19.91	19.25	Within	18436.66	42	438.96	
Post Test								
Mean	1585.33	1464.00	1425.80	Between	208159.51	2	104079.75	397.48*
S.D.	4.99	18.18	19.43	Within	10997.73	42	261.85	
Adjusted Post Test								
Mean	1584.86	1465.14	1425.14	Between	207088.71	2	103544.35	446.62*
				Within	9505.40	41	231.83	

* Significant at .05 level of confidence

(The table values required for significance at .05 level of confidence for 2 and 42 and 2 and 41 are 3.222 and 3.226 respectively).

The adjusted post-test means of SRG, SCRG and CG are 1584.86, 1465.14 and 1425.14 respectively. The obtained "F" ratio of 446.62 for adjusted post-test means is greater than the table value of 3.226 for df 1 and 42 required for significance at .05 level of confidence on strength endurance.

Since, three groups were compared whenever the obtained "F" ratio for the adjusted post test was found to be significant, the Scheffe's test was applied as post hoc test to find out the paired mean differences, if any and it was presented in table I- A

Table 2 The Scheffe's Test for the Differences between Paired Means on Strength Endurance

SRG	SCRG	CG	MD	CI
1584.86	1465.14		119.72*	14.10

1584.86		1425.14	159.72*	14.10
	1465.14	1425.14	40.00*	14.10

* Significant at .05 level of confidence

The table 2 A showed that the mean difference values between SRG and SCRG, SRG and CG and SCRG and CG on strength endurance were 119.72, 159.72 and 40.00 respectively which were greater than the required confidence interval value 14.10. The results of the study showed that there was a significant difference between SRG and SCRG, SRG and CG and SCRG and CG on strength endurance.

Cardio Respiratory Endurance

The analysis of covariance on cardio respiratory endurance of the pre and post test scores of SRG, SCRG and CG have been analyzed and presented in Table II.

Table 3 ANCOVA of the Data on Cardio Respiratory Endurance of Pre and Post Tests Scores of SRG, SCRG and Control Groups

Test	SRG	SCRG	CG	Source of Variance	Sum of Squares	df	Mean Squares	Obtained 'F' Ratio
Pre Test								
Mean	1423.33	1417.67	1424.00	Between	363.33	2	181.66	0.41
S.D.	21.50	19.91	19.25	Within	18436.66	42	438.96	
Post Test								
Mean	1585.33	1464.00	1425.80	Between	208159.51	2	104079.75	397.48*
S.D.	4.99	18.18	19.43	Within	10997.73	42	261.85	
Adjusted Post Test								
Mean	1584.86	1465.14	1425.14	Between	207088.71	2	103544.35	446.62*
				Within	9505.40	41	231.83	

* Significant at .05 level of confidence

(The table values required for significance at .05 level of confidence for 2 and 42 and 2 and 41 are 3.222 and 3.226 respectively).

The adjusted post-test means of SRG, SCRG and CG are 50.62, 46.19 and 43.33 respectively. The obtained “F” ratio of 52.145 for adjusted post-test means is greater than the table value of 3.226 for df 2 and 41 required for significance at .05 level of confidence on cardio respiratory endurance.

Since, three groups were compared whenever the obtained “F” ratio for the adjusted post test was found to be significant, the Scheffe’s test was applied as post hoc test to find out the paired mean differences, if any and it was presented in table II- A.

Table 4 The Scheffe’s Test for the Differences between Paired Means on Cardio Respiratory Endurance

SRG	SCRG	CG	MD	CI
50.62	46.19		4.43*	1.83
50.62		43.33	7.29*	1.83
	46.19	43.33	2.86*	1.83

* Significant at .05 level of confidence

The table 4 showed that the mean difference values between SRG & SCRG, SRG & CG & SCRG & CG on cardio respiratory endurance were 4.43, 7.29 and 2.86 respectively which were greater than the required confidence interval value 1.83. The results of the study showed that there was a significant difference between SRG and SCRG, SRG & CG and SCRG and CG on cardio respiratory endurance.

Discussion on Findings

The results of the study showed that there was a significant difference among SRG, SCRG and CG on strength endurance and cardio respiratory endurance. And also, it was showed that there was a significant change on strength endurance and cardio respiratory endurance due to sand running and slow continuous running. Sand running, a form of exercise performed on unstable terrain, was found to significantly enhance both strength endurance and cardiorespiratory endurance. The unstable surface of the sand provides a greater challenge to the muscles and cardiovascular system, leading to adaptations and improvements in these parameters. Sand running requires greater muscle activation and coordination, resulting in enhanced strength endurance. The increased resistance and altered biomechanics of sand running also demand greater cardiovascular effort, leading to improved cardiorespiratory endurance.

Slow continuous running, characterized by a steady-state intensity and moderate pace, also demonstrated a significant impact on strength endurance and cardiorespiratory endurance. This finding suggests that consistent aerobic exercise, such as slow continuous running, can positively influence muscular and cardiovascular adaptations. The prolonged duration and moderate intensity of slow continuous running promote an efficient energy system utilization, enhancing both strength endurance and cardiorespiratory endurance.

Conclusions

1. The results of the study showed that there was a significant difference among sand running group, slow continuous running group and control group on strength endurance and cardio respiratory endurance.
2. And also it was showed that there was a significant change on strength endurance and cardio respiratory endurance due to sand running and slow continuous running.

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Author Details

Dr. P. Karthikeyan, Associate Professor, Department of Physical Education, Annamalai University, Tamil Nadu, India, **Email:** karthi_pe@yahoo.co.in