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Effect of Stair Climbing on Selected Endurance Parameters among Football Players

S. Newton* and S. Senthilvelan**

*Assistant Professor, **Associate Professor, Department of Physical Education and Sports Science, Annamalai University, Annamalai Nagar, Chidambaram-608 002, Tamilnadu, India

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*Corresponding Author

Tel : +91-9994-442341
Fax : +91-4146-220514

Email: newton.au11@gmail.com

Abstract

Objective: The purpose of the study is to find out the effects of stair climbing on selected endurance parameters such as cardio respiratory endurance and muscular endurance among football players.

Methods: Thirty male football players aged between 18 to 25 years, studying in the Department of Physical Education and Sports Science, Annamalai University were selected. The subjects were divided into two equal groups of fifteen subjects each, namely stair climbing group and control group. The stair climbing group was trained for three alternative days in a week for twelve weeks. Set per exercise per session at 60 to 80% with a progressive increase in load with the number of weeks. Cardio respiratory endurance and muscular endurance were selected as criterion variables.

Statistics: Cardio respiratory endurance and muscular endurance were tested before (pre) and after (post) the training programme for both experimental and control group by using cooper's 12 minutes run/walk test and Bent knee sit-ups respectively. ANCOVA was used to find out the significant difference if any between the groups

Results: The results of this study indicate that the stair climbing group has significantly improved the selected dependent variables namely cardio respiratory endurance and muscular endurance. However control group did not show any improvement on the selected variables as it was not involved in any of the specific training program

Conclusion: The result of this study shows that, the stair climbing programme has significant improvement on selected endurance parameters such as cardiorespiratory endurance and muscular endurance among football players as compared to control group.

Key Words: Stair Climbing, Cardio respiratory Endurance, Muscular Endurance

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Introduction

Sports pervade society to such an extent that it has been described by many as a microcosm of society. Training and conditioning enables an athlete to complete at a higher level and prepares him for other events by getting fit and strong and by improving his skills. A training individual is in a better state of physical fitness than the individual who follows a sedentary and inactive life [8].

Stair climbing exercise convergent and at the same time provides aerobic conditioning strength and endurance. Stair climbing is beneficial for cross-training. This activity can be combined with running, swimming, cycling and rowing for excellent results; it doesn't require any expensive or specific equipment and can be carried out at any time of the day [9]

From the above information, the aim of stair climbing is to raise the special conditions: techniques, tactics and physical condition as well as the spiritual attributes indispensable in effectively participating in football games to the highest possible level.

Hence the purpose of the study was to find out the effect of stair climbing on selected endurance parameters such as cardio respiratory endurance and muscular endurance among football players from the Department of Physical Education and Sports Science, Annamalai University.

Methodology

To achieve this purpose, thirty football players were selected from the Department of Physical Education and Sports Sciences, Annamalai University in the age group of 18 to 25 years were selected as subjects at random with their consent. The selected subjects were divided into two equal groups of fifteen subjects each, namely stair climbing group and control group. The selected criterion variables were assessed using standard tests and procedures before and after the training regime.

Cardio respiratory endurance and muscular endurance were tested before (pre) and after (post) the training program for both experimental and control group by using cooper's 12 minutes run/walk test and Bent knee sit-ups respectively.

The selected subjects had undergone the stair climbing for twelve weeks with three days per week in alternate days. Stair claiming exercise group after a warm up for 5 minutes underwent climbing stairs having 18 steps with vertical height of 3 meters with variation of slow, medium, high, medium and slow speed walk and sprint alternatively and finished with cool down exercises. The control group did not participate in any specialized training programme during the period of study.

Statistical Analysis

ANCOVA was used to find out the significant differences in cardio respiratory endurance and muscular endurance between stair climbing group and control group. Cardio respiratory endurance and muscular endurance were tested before (pre) and after (post) the training program for both experimental and control group by using cooper's 12 minutes

run/walk test and Bent knee sit- ups respectively. They were statistically significant at 0.05 level of confidence.

Results of the Study

The descriptive analysis of data collected on selected cardio respiratory endurance and muscular endurance parameters before and after twelve weeks of stair climbing program is presented in Table-1

Table – 1: Analysis of Covariance on selected cardio respiratory endurance and muscular endurance parameters of stair climbing and control groups

| Variables | Test | Stair Climbing Group | Control Group | Source of Variance | SS | df | Mean Square | 'F' Ratio | |
|------------------------------|--------------------|----------------------|---------------|--------------------|---------|---------|-------------|-----------|--------|
| Cardio respiratory Endurance | Pre test | Mean | 2475 | 2458 | Between | 0.03745 | 1 | 0.03745 | 0.520 |
| | | S.D | 151.20 | 104.5 | Within | 2.017 | 28 | 0.07202 | |
| | Post test | Mean | 2572 | 2515 | Between | 1.391 | 1 | 1.391 | 13.807 |
| | | S.D | 92.64 | 61.84 | Within | 2.821 | 28 | 0.101 | |
| | Adjusted Post test | Mean | 2576 | 2492 | Between | 87631.4 | 1 | 87631.4 | 53.94* |
| | | | | | Within | 43862.1 | 27 | 1624.5 | |
| Muscular Endurance | Pre test | Mean | 27.63 | 27.40 | Between | 48.133 | 1 | 48.133 | 3.44 |
| | | S.D | 1.64 | 2.09 | Within | 391.33 | 28 | 13.976 | |
| | Post test | Mean | 31.75 | 27.08 | Between | 307.2 | 1 | 307.2 | 22.25 |
| | | S.D | 1.25 | 1.25 | Within | 386.67 | 28 | 13.81 | |
| | Adjusted Post test | Mean | 31.75 | 27.11 | Between | 157.21 | 1 | 157.21 | 95.79 |
| | | | | | Within | 44.31 | 27 | 1.64 | |

(The table value required for significant at .05 levels with df 1 and 28; and 1 and 27 are 4.20 and 4.215 respectively)

The results of this study indicate that the stair climbing group has significantly improved the selected dependent variables namely cardio respiratory endurance and muscular endurance. However control group did not show any improvement on the selected variables as it was not involved in any of the specific training program. It is inferred from the results of the present study that all the dependent variables were significantly improved due to the influence of stair climbing program.

Discussion

In the present study, a significant increase was predicted on endurance in the stair climbing group. Such an improvement is consistent with previous exercise training literature [9] and may appear unexceptional. However, it is noteworthy that this improvement in cardio- respiratory fitness was associated with relatively low volumes of exercise.

Stair climbing training of approximately 6 minutes per day resulted in a similar improvement in maximum oxygen conception as walking for 45 min per day [4]. Furthermore, continuing this level of training by a further 4-6 weeks has been shown to further improve and in the case of very unfit men by as much as 25% [6].

It therefore appears short bouts of endurance training performed at the high end of the intensity zone recommended for cardio respiratory conditioning can elicit similar improvements in Vo_2max as endurance training performed at low-moderate intensities for longer durations. The duration of the training bout may therefore be relatively insignificant to the overall training effect of a programme designed to improve cardio-respiratory fitness relative to the frequency and especially, the intensity of training [9]

The result of the study may be supported with various literatures on findings as follows. Boreham et al [1] revived the

effects of eight weeks of stair climbing on Vo_2max , blood lipids, and homocysteine healthy young women. Relative to controls, the stair climbing group displayed a 17.1% increase in Vo_2max and a 7.7% reduction in low density lipoprotein cholesterol ($p < 0.05$) over the training period. The study confirms that accumulating short bouts of stair climbing activity throughout the day can favorably alter important cardio-vascular risk factors in young women.

Colin A. G. Boreham et al., [2] investigated that Daily Stair Climbing Exercise in Previously Sedentary Young Women, for this purpose. Twenty-two healthy female volunteers were randomly assigned to control or stair-climbing groups. Stair climbers then underwent a 7-week stair climbing program, progressing from one ascent per day in week 1 to 6 ascents per day in weeks 6 and 7, using a public access staircase (199 steps). Relative to the insignificant changes in the control group, the stair climbing group displayed a rise in HDL cholesterol concentration ($P < 0.05$) and a reduced total: HDL ratio ($P < 0.01$) over the course of the program. V_{th} and HR during the stair-climbing test were also reduced, as was blood lactate (all $P < 0.01$). A short-term stair climbing program can confer considerable cardiovascular health benefits on previously sedentary young women, lending credence to the potential public health benefits of this form of exercise.

Endurance exercise training results in profound adaptations of the cardio respiratory and neuromuscular systems that enhance the delivery of oxygen from the atmosphere to the mitochondria and enable a tighter regulation of muscle metabolism. The effect of endurance training on the key parameters of aerobic fitness and attempts to relate these changes to the adaptations found in the body's physiological systems with training. The importance of improvements in the aerobic fitness parameters to the enhancement of endurance performance is highlighted, as are the training methods that

may be considered optimal for facilitating such improvements [8].

Hagberg JM [5] proposed that continued exercise training may slow the rate of decline of VO_2 max. The individuals in this age range can increase their VO_2 max in response to training and that their adaptive capacity. It also appears that older persons may require a lower relative training intensity to elicit increases in VO_2 max. Thus it appears that older persons can minimize the reduction in VO_2 max that occurs as they age if they maintain high levels of physical activity and that they retain the ability to adapt to exercise training.

Ditza Gross et al, [3] conducted a study on effect of training on strength and endurance. It was concluded that quadriplegics are predisposed to the development of inspiratory muscle fatigue due to reduced muscle strength and reduction in endurance and inspiratory muscle training increases both strength and endurance and protects against fatigue.

Conclusion

The result of this study shows that, the stair climbing program has significant improvement on selected endurance parameters such as cardio respiratory endurance and muscular endurance among football players as compared to control group.

References

[1] Boreham, C. A. G., et al.2005. Training effects of short bouts of stair climbing on cardiorespiratory fitness, blood

lipids, and homocysteine in sedentary young women, Br J Sports Med 39:590-593.

- [2] Colin, A. G. Boreham, et al. 2000. Training Effects of Accumulated Daily Stair-Climbing Exercise in Previously Sedentary Young Women, Preventive Med. 30: 277-281.
- [3] Ditza Gross et al, 1980. The effect of training on strength and endurance of the diaphragm in quadriplegia, The Amer J Med. 68: 27-35.
- [4] Duncan, et al. 1991. *Women walking for health and fitness - how much is enough?* J Amer Med Associ 266: 3295-3299
- [5] Hagberg, J.M.1987. Effect of training on the decline of VO_2 max with aging. Fed Proc. 5:1830-3.
- [6] Ilmarinen, J et al 1979. Training effects of stair climbing during office hours on female employees. Ergonomics 22: 507-16.
- [7] Jenold S. Petrofsky and Ralph Stacy.2004. The effect of training on endurance and the cardiovascular responses of individuals with paraplegia during dynamic exercise induced by functional electrical stimulation, Euro J Appl Physiol Occup Physiol. 64: 487-492.
- [8] Jones, A.M and Carter H.2000. The Effect of Endurance Training on Parameters of Aerobic-Fitness. Sports Med. 29: 373-386.
- [9] Pollock, M L., et al., 1998. The recommended quantity and quality of exercise for developing and maintaining cardio respiratory and muscular fitness, and flexibility in healthy adults. Med. Sci Sports Exer. 30: 975-991.