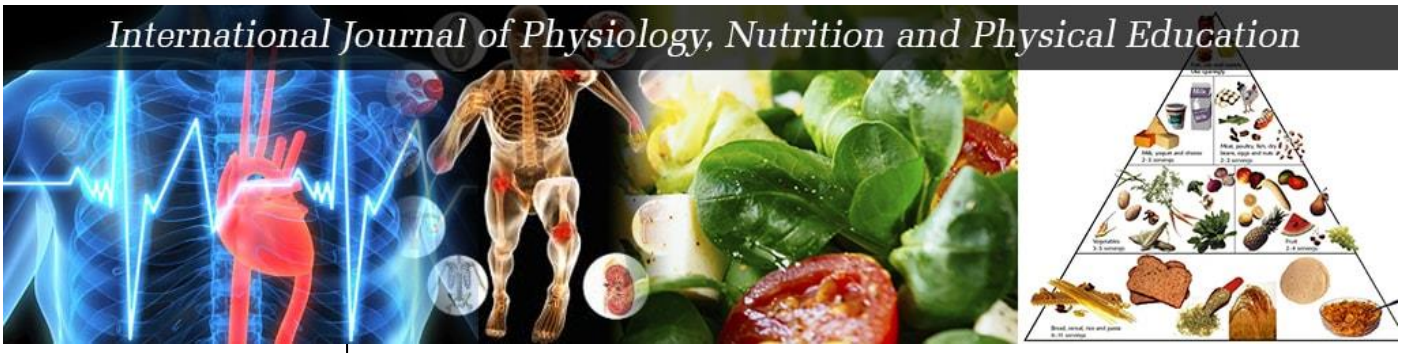

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Impact of submaximal and maximal training on pulse rate and endurance among college level football players

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Abstract
This paper aimed to find out the impact of submaximal and maximal training on pulse rate and endurance among college level football players for the purpose of the study, forty-five men football players were selected randomly as subjects and divided in to three groups namely submaximal and maximal training group, and control group of fifteen subjects in each groups and the subject's ages ranged from 18-27 years. All the subjects were tested on selected variables prior to and immediately after the training period. The selected criterion variables such as endurance was measured by Copper's 12 min/walk test and resting pulse rate was measured by palpation technique. The analysis of covariance (ANCOVA) were used to find the significant difference if any, among the experimental and control groups on selected criterion variables. In all the cases, 0.5 level of confidence was fixed to test the significance, which was considered as an appropriate. Since there were three groups involved in this study the Scheffe's test was used as post-hoc test. Results proved that there were significant improvements in the variables such as endurance and pulse rate due to training on the experimental groups. Participation in submaximal and maximal training resulted in a significant development in the endurance and pulse rate on experimental groups when compared to control group.

Keywords: Submaximal and maximal training, endurance, pulse rate

Introduction

Submaximal exercise

An exercise bout in which the energy requirement is greater than that which can be supplied aerobically at VO2max is called submaximal exercise. Submaximal aerobic exercise is any physical activity where the intensity or workload of a particular exercise is increased at a steady rate, but only works the body up to 85 percent of the maximum heart rate. The human body is very adaptable. The greater the demands made on it, the more it adjusts to meet those demands. Over time, immediate, short-term adjustments translate into long-term changes and improvements. When breathing and heart rate increase during exercise, for example, the heart gradually develops the ability to pump more blood with each beat. Then, during exercise, it doesn't have to beat as fast to meet the cells' demands for oxygen. The goal of physical training is to produce these long-term changes and improvements in the body's functioning.

Maximal aerobic exercise

Maximal aerobic exercise is any physical activity or exercise capacity is the maximum amount of physical exertion that an athlete can sustain. An accurate assessment of exercise capacity requires that maximal exertion is sufficiently prolonged to have a stable (or steady state) effect on the circulation and that the pattern of athlete response is consistent above 85 percent when exertion is repeated. The highest intensity, greatest load or longest duration exercise of which an individual is capable is called maximal exercise. An incremental exercise to maximum bout consists of a series of progressively increasing work intensities that continue until the individual can do no more.

Resistance training comprises of weight lifting and power lifting, in which resistance exercise used in training becomes the competition tool, and body building, in which resistance exercise training is used to create an idealized physique. Additionally, resistance training has become integral part of training in other sports such as football, track and field, and tennis. while sports depend on specific talents and characteristics, such as strength, explosiveness, power,

endurance capabilities, and agility, ideally these sports also depend on a training process that develops and maximizes such talents. Resistance training is a primarily ingredient in that process becomes paramount Fartlek is a Swedish term that means "run as you feel" or "Speed play". One way of doing it is to cover as much as distance as an athlete can in forty to sixty minutes. Fartlek training is much easier for experienced runners than for novice runners, because novice runners often don't know how to change the pace. Fartlek running is an enjoyable free from method of training involving running at varying speed over varied turnout. Fartlek is a variation of faster and relatively slower speed runs, variety of change of pace and change of terrains. This sort of method of training should be a part of training program for better understanding of the environment or terrain, changes in the running paces and prepare an athlete to run in a group.

Methodology

For the purpose of the study, forty-five men football players were selected randomly as subjects and divided in to three groups namely submaximal and maximal training group and control group of fifteen subjects in each groups and the subject's ages ranged from 18-27 years. All the subjects were tested on selected variables prior to and immediately after the training period. The selected criterion variables such as endurance was measured by Copper's 12 min/walk test and resting pulse rate was measured by palpation technique. The analysis of covariance (ANCOVA) were used to find the significant difference if any, among the experimental and control groups on selected criterion variables. In all the cases, 0.5 level of confidence was fixed to test the significance, which was considered as an appropriate. Since there were three groups involved in this study the Scheffe's test was used as post-hoc test.

Results and discussion

Table 1: Analysis of Covariance on Endurance and Pulse Rate

		Submaximal training	Maximal training	Control group	SOV	Sum of squares	df	Mean square	'F' ratio
Endurance	Pre -test Mean	2473.33	2462.67	2446.67	B	5404.04	2	2702.22	0.90
	S.D.	59.00	58.12	46.09	W	125760.00	42	2994.29	
	Post -test Mean	2488.67	2541.33	2382.00	B	197693.33	2	98846.7	18.36*
	S.D.	53.03	64.90	95.56	W	2261186.67	42	5385.40	
	Adjusted post-test Mean	2477.58	2539.75	2394.67	B	156089.13	2	78044	25.31*
					W	126417.37	41	3083.35	
Pulse rate	Pre -test Mean	80.07	80.93	79.47	B:	50.98	2	25.49	1.19
	S.D.	4.95	3.24	4.94	W:	831.60	42	19.80	
	Post-Test Mean	80.67	78.27	80.20	B:	48.58	2	24.29	1.23
	S.D.	4.67	3.31	5.14	W:	828.67	42	19.73	
	Adjusted post-test Mean	79.48	78.16	81.50	B:	82.67	2	41.34	25.54*
					W:	66.36	41	1.62	

(* Significant, the table at .05 level of confidence with df 2 and 42 and 2 and 41 were 3.23 and 3.21 respectively)

Table I shows that the pre -test 'F' ratio value of 0.90 on endurance was lesser than the required table value of 3.23 hence it was insignificant. The post –test 'F' ratio value of 18.36 was greater than the required table value of 3.23 hence it was significant. The adjusted post -test 'F' ratio value of 25.31 was greater than the required table value of 3.21 hence it was significant with df 2 and 41 at .05 level of confidence.

Table I also shows that the pre -test 'F' ratio value of 1.19 on pulse rate was lesser than the required table value of 3.23 hence it was insignificant. The post –test 'F' ratio value of 1.23 was lesser than the required table value of 3.23 hence it was insignificant. The adjusted post -test 'F' ratio value of 25.54 was greater than the required table value of 3.21 hence it was significant with df 2 and 41 at .05 level of confidence.

The above statistical analysis showed that there was development in endurance after the training. It also showed that there was no development in resting pulse rate after the training. Further to determine which of the paired means has a significant improvement, Scheffe'S test was applied and which is presented in table II.

Table 2: Scheffe's Test for the Difference between the Adjusted Post-Test Mean of Endurance and Pulse Rate

	Submaximal training group	Maximal training group	Control group	Mean Difference	Confidence interval
Endurance	2477.58		2394.67	82.91*	62.82
	2477.58	2539.75		62.17	62.82
		2539.75	2394.75	145.08*	62.82
Pulse Rate	79.48		81.50	2.02*	1.45
	79.48	78.16		1.32	1.45
	79.48		81.50	3.34*	1.45

*Significant at .05 level of confidence

Table II indicated that submaximal and maximal training group better than the control group, and there was no significant difference between submaximal and maximal training group on improving endurance.

Table II also indicated that submaximal and maximal training group better than the control group, and there was no significant difference between submaximal and maximal training group on improving pulse rate.

Conclusion

1. There were significant improvements in the variables such as endurance and pulse rate due to training on the experimental groups.
2. Participation in submaximal and maximal training resulted in a significant development in the endurance and pulse rate on experimental groups when compared to control group.

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