

COMPARISON OF CARDIO VASCULAR ENDURANCE AND RESTING PULSE RATE AMONG STATE LEVEL TRIATHLON ATHLETES, SWIMMERS, CYCLISTS AND RUNNERS

¹ Y.Madhusudhana Rao

¹ Lecturer in Physical Education, SS&N College, Narasarao Pet, India

Abstract:

The purpose of this study is to compare cardio vascular endurance and resting pulse rate among state level men athletes from triathlon, swimming, cycling and running events. For this purpose thirty triathlon athletes, thirty swimmers, thirty cyclists and thirty runners were randomly selected. The selected athletes were assessed for their health related fitness and physiological variables using standard tests. Hence, random group design was employed in the present study.

The collected data on selected health related physical fitness and physiological variables were statistically analysed using ANOVA. In all cases 0.05 level was fixed to test the hypothesis.

Key Words: Cardio Vascular Endurance and Resting Pulse Rate

1. INTRODUCTION

Sport is an institutionalized competitive activity that involves vigorous physical exertion or the use of relatively complex physical skills by individuals whose participation is motivated by a combination of the intrinsic satisfaction associated with the activity itself and the external rewards earned through participation. (Coakley, Jay J., 1998)

Cardio respiratory Endurance

Cardio respiratory endurance is the ability of the body's circulatory and respiratory systems to supply fuel during sustained physical activity.

Cardio - Vascular Endurance is the ability of the heart, blood vessels, blood and respiratory system to supply oxygen and fuel to the muscles at a steady rate for a considerable length of time. (P.J.Strukic, 1981)

Cardio vascular endurance may be defined as the ability of lungs and heart to transport an adequate amount of oxygen to the working muscles.

One's capacity of doing work for a prolonged period of different from another one can work for a long period but other does not. Endurance is a term that denotes prolonged sustained or repetitive activity.

Cardio vascular endurance is characterized by moderate contraction of large muscle groups for relatively long periods of time, during which maximal adjustment of the cardio respiratory system are necessary as in sustained swimming, climbing and the like. When the many muscles are worked hard, the circulatory and respiratory systems are heavily loaded because these two systems directly support the muscle work. (P.J.Strukic, 1981)

IMPORTANCE OF PULSE RATE

The pulse rate or heart rate varies greatly among different people and in the same person under different situations. The American Heart Rate Association accepts as normal range from 50 to 100 beats per minute. Some endurance athletes with very strong and efficient hearts have a rate as low as 45 beats per minute. Eugene Bannister the great miller, had a resting pulse rate of only 38 beats per minute. Women have heart rates 5 – 10 beats faster than men. This is primarily due to their size. The average rate is 72 beats per minute but the rate can accelerate to 220 per minute. Regular participation in endurance activity such as jogging, cycling and distance swimming can be done to reduce the pulse rate. Good cardio respiratory condition would be indicated by a pulse rate of 60 for women and 50 for men. The lesser pulse rate given good performance for all the sports and games.

II. STATEMENT OF THE PROBLEM

The purpose of this study was to comparison of cardio vascular endurance and resting pulse rate among state level triathlon athletes, swimmers, cyclists and runners

III. DELIMITATIONS

The study was confined to the state level athletes between the age at 18 to 25 years.

The following health related physical fitness components and physiological variables were selected for the study.

IV. DEPENDENT VARIABLES

1. Cardio vascular endurance
2. Resting Pulse Rate

INDEPENDENT VARIABLES

1. 30 Triathlon athletes
2. 30 Swimmers
3. 30 Cyclists
4. 30 Runners

5.LIMITATIONS

Certain factors like food habits, life style, climatic conditions, sports background of the athletes, which might have an effect on the results of the study, could not control and treated as limitations of the study.

6. SELECTION OF SUBJECTS

Athletes who have regularly participated in competition in the events of triathlon, swimming, cycling and running from the Andhra Pradesh were selected for this study. From each event thirty subjects were selected for this study. The subjects were in the age group of 18 to 25 years. The mean age of the subjects was 20.23 with standard deviation of ± 1.82 . They were well experienced in their athletic events

V. CRITERION MEASURES

- a. Cardiovascular endurance was assessed through Harvard Step Test for 3 minutes 15 seconds and scores recorded in terms of physical efficiency index.
- b. Resting pulse rate was measured through palpation method and scores recorded in beats per minute.

8.STATISTICAL TECHNIQUES

In order to test the differences between the four groups of athletes in their health related physical fitness components and physiological variables, one way analysis of variance (ANOVA) was applied .

When F ratio was found significant, that Scheffe's post hoc test was used to find out the paired mean significant difference. (Thirumalaisamy, 1997) .

9. RESULTS ON CARDIO RESPIRATORY ENDURANCE

Analysis of Descriptive Statistics

The comparison of health related physical fitness component Cardio respiratory Endurance is presented in Table I through descriptive statistics mean, standard deviation, minimum and maximum among different categories of state level athlete, namely, triathlon, swimmers, cyclists and runners.

Table I
DESCRIPTIVE STATISTICS SHOWING MEAN AND STANDARD DEVIATION, MINIMUM AND MAXIMUM SCORES ON CARDIO RESPIRATORY ENDURANCE

	Categories of State Level Athletes			
	Triathlon	Swimmers	Cyclists	Runners
Mean	81.66	80.81	84.08	82.39
Std Dev	3.07	2.95	2.67	3.12
Minimum	75.38	75.00	79.76	76.53
Maximum	86.71	87.20	88.75	88.75

The comparison on health related physical fitness component Cardio respiratory Endurance presented in Table I proved that obtained mean for Triathlon athletes was 81.66 with standard deviation of ± 3.07 . The minimum score was 75.38 and the maximum score was 86.71.

The health related physical fitness status of Swimmers as presented in Table I mean was 80.81 with standard deviation ± 2.95 . The minimum score was 75.00 and maximum score was 87.20.

Cyclists' health related physical fitness status on variable Cardio respiratory Endurance is shown in Table I. The results proved that obtained mean was 84.08 with standard deviation ± 2.67 . The minimum score was 79.76 and the maximum score was 88.75.

The levels of health related physical fitness component Cardio respiratory Endurance among Runners proved the obtained mean was 82.39 with standard deviation ± 3.12 . The minimum score was 76.53 and the maximum was 88.75.

The obtained mean values among Triathlon, swimmers, cyclists and runners on health related physical fitness variable Cardio respiratory Endurance is presented through bar diagram for better understanding of the results.

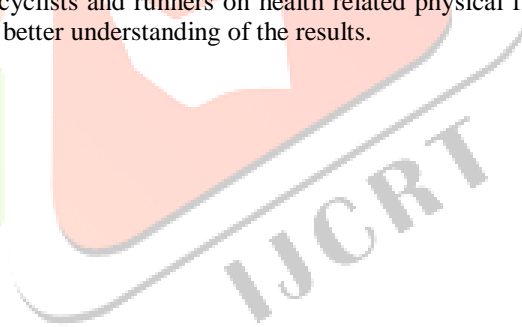
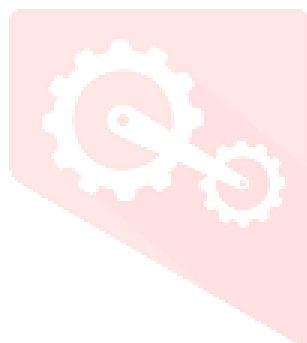
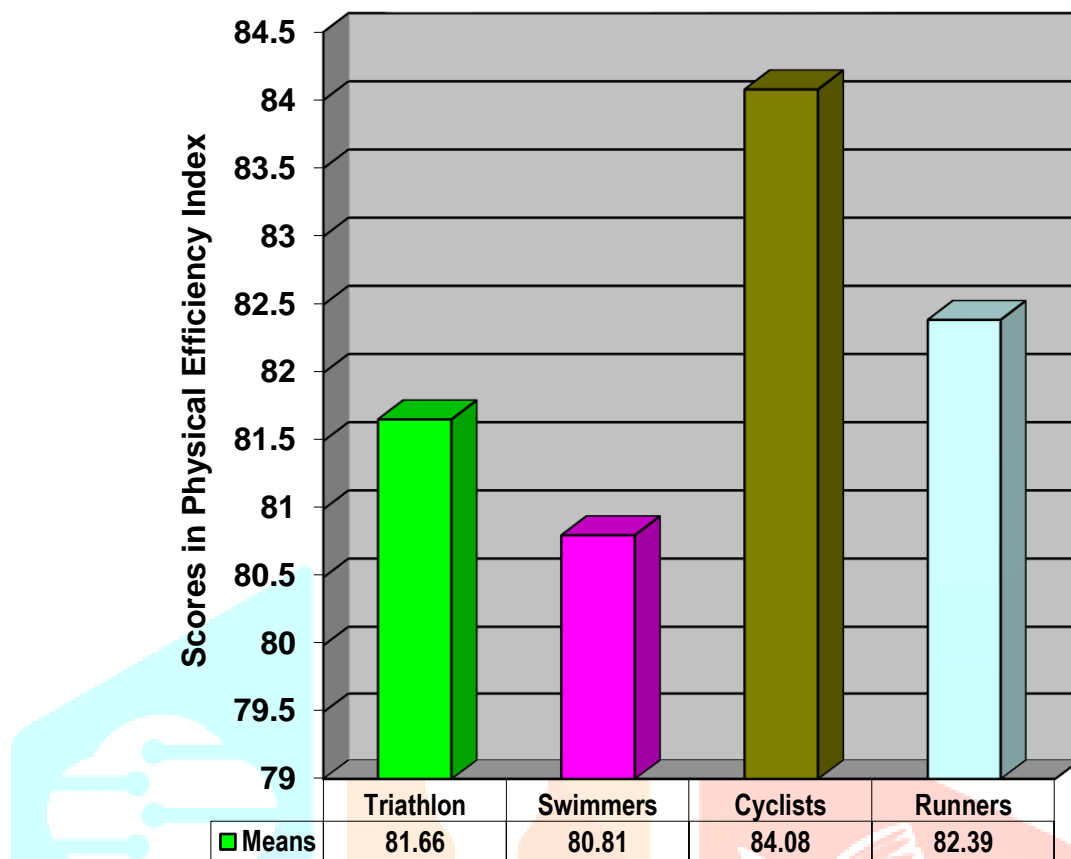


Figure I

BAR DIAGRAM SHOWING MEAN VALUES OF DIFFERENT CATEGORIES OF STATE LEVEL ATHLETES ON HEALTH RELATED PHYSICAL FITNESS VARIABLE CARDIO RESPIRATORY ENDURANCE



Analysis of Variance (ANOVA)

The health related physical fitness levels on Cardio respiratory Endurance among Triathlon, swimmers, cyclists and runners of state level athletes were differed as shown through the descriptive statistic presented in Table I To test statistical significance of the difference of the obtained data were subjected to ANOVA.

The obtained data on health related physical fitness variable Cardio respiratory Endurance among different categories of athletes, namely, Triathlon, swimmers, cyclists and runners was subjected to statistical analysis using ANOVA and the results were presented in Table II.

Table II

SHOWING THE ANALYSIS OF VARIANCE ON THE MEANS OBTAINED FROM DIFFERENT CATEGORIES OF STATE LEVEL ATHLETES ON HEALTH RELATED PHYSICAL FITNESS VARIABLE CARDIO RESPIRATORY ENDURANCE

Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Between	173.96	3	57.99	6.63*
Within	1014.07	116	8.74	
Total	1188.03	119		

Table F-ratio at 0.05 level of confidence for 3 and 116 (df) =2.68 .

* Significant at 0.05 level

The analysis of variance results presented in Table II shows that the obtained F value 6.63 was greater than the required F value of 2.68 to be significant at 0.05 level. Hence, it was found that there were significant differences among different categories of state level athletes.

Post Hoc Analysis

Since significant differences were obtained the data were further subjected to post hoc analysis using Scheffe's confidence interval and the results are presented in Table III.

Table III

Multiple Comparison of Paired Means of different categories of State level Athletes on Health Related Physical Fitness component Cardio respiratory Endurance

Triathlon	Swimmers	Cyclists	Runners	MEAN DIFF	C.I
81.66	80.81			0.85*	0.61
81.66		84.08		2.42*	0.61
81.66			82.39	0.72*	0.61
	80.81	84.08		3.27*	0.61
	80.81		82.39	1.58*	0.61
		84.08	82.39	1.70*	0.61

* Significant at 0.05 level.

The results presented in Table III showed that the paired mean comparisons of the following were significant as the obtained mean differences were greater than the required confidence interval value of 0.61 on health related physical fitness component Cardio respiratory Endurance

- Swimmers Vs Triathlon (MD: 0.85)
- Cyclists Vs Triathlon (MD: 2.42)
- Runners Vs Triathlon (MD: 0.72)
- Cyclists Vs Swimmers (MD: 3.27)
- Runners Vs Swimmers (MD: 1.58)
- Cyclists Vs Runners (MD : 1.70)

RESULTS ON RESTING PULSE RATE

Analysis of Descriptive Statistics

The comparison of physiological variable Resting Pulse Rate is presented in Table III through descriptive statistics mean, standard deviation, minimum and maximum among different categories of state level athlete, namely, triathlon, swimmers, cyclists and runners.

Table III

DESCRIPTIVE STATISTICS SHOWING MEAN AND STANDARD DEVIATION, MINIMUM AND MAXIMUM SCORES ON RESTING PULSE RATE

	Categories of State Level Athletes			
	Triathlon	Swimmers	Cyclists	Runners
Mean	64.77	66.67	68.80	66.70
Std Dev	1.76	2.55	2.23	2.85
Minimum	61.00	62.00	63.00	61.00
Maximum	69.00	71.00	72.00	72.00

The comparison on physiological variable Resting Pulse Rate presented in Table III proved that obtained mean for Triathlon athletes was 64.77 with standard deviation of ± 1.76 . The minimum score was 61.00 and the maximum score was 69.00.

The physiological status of Swimmers as presented in Table III mean was 66.67 with standard deviation ± 2.55 . The minimum score was 62.00 and maximum score was 71.00.

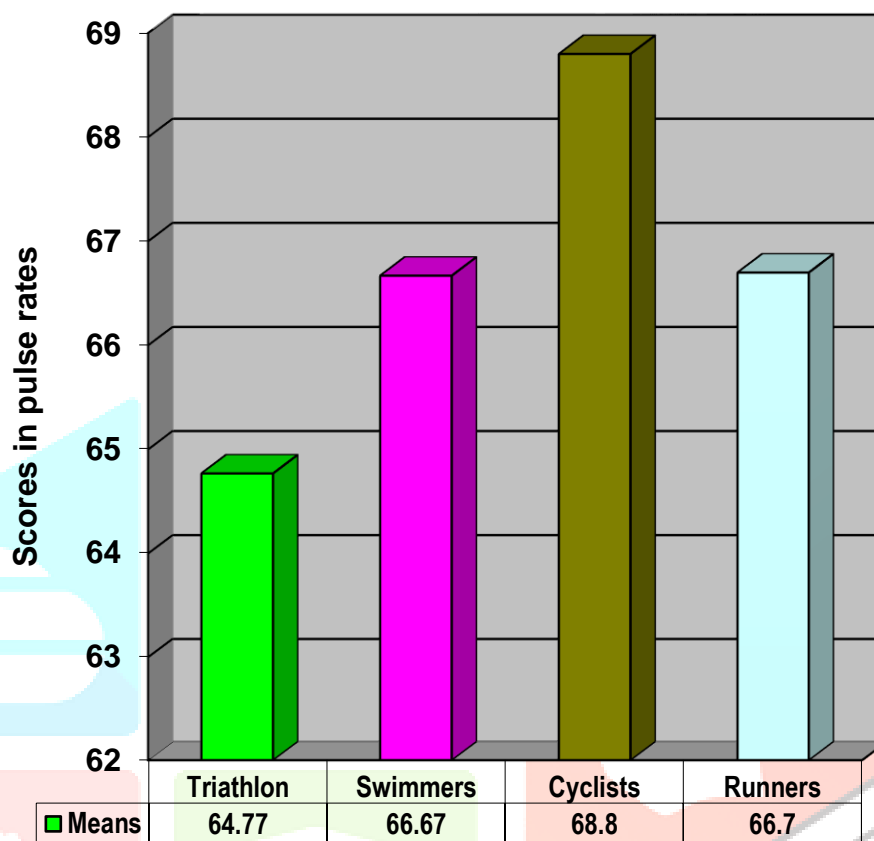
Cyclists' physiological status on variable Resting Pulse Rate is shown in Table III. The results proved that obtained mean was 68.80 with standard deviation ± 2.23 . The minimum score was 63.00 and the maximum score was 72.00.

The levels of physiological variable Resting Pulse Rate among Runners proved the obtained mean was 66.70 with standard deviation ± 2.85 . The minimum score was 61.00 and the maximum was 72.00.

The obtained mean values among Triathlon, swimmers, cyclists and runners on physiological variable Resting Pulse Rate is presented through bar diagram for better understanding of the results.

Figure II

BAR DIAGRAM SHOWING MEAN VALUES OF DIFFERENT CATEGORIES OF STATE LEVEL ATHLETES ON PHYSIOLOGICAL VARIABLE RESTING PULSE RATE



Analysis of Variance (ANOVA)

The physiological levels on Resting Pulse Rate among Triathlon, swimmers, cyclists and runners of state level athletes were differed as shown through the descriptive statistic presented in Table III To test statistical significance of the difference of the obtained data were subjected to ANOVA.

The obtained data on physiological variable Resting Pulse Rate among different categories of athletes, namely, Triathlon, swimmers, cyclists and runners was subjected to statistical analysis using ANOVA and the results were presented in Table IV.

Table IV

SHOWING THE ANALYSIS OF VARIANCE ON THE MEANS OBTAINED FROM DIFFERENT CATEGORIES OF STATE LEVEL ATHLETES ON PHYSIOLOGICAL VARIABLE RESTING PULSE RATE

Source of Variance	Sum of Squares	df	Mean Squares	Obtained F
Between	244.33	3	81.44	14.33*
Within	659.13	116	5.68	
Total	903.47	119		

Table F-ratio at 0.05 level of confidence for 3 and 116 (df) =2.68 .

* Significant at 0.05 level

The analysis of variance results presented in Table IV shows that the obtained F value 14.33 was greater than the required F value of 2.68 to be significant at 0.05 level. Hence, it was found that there were significant differences among different categories of state level athletes.

Post Hoc Analysis

Since significant differences were obtained the data were further subjected to post hoc analysis using Scheffe's confidence interval and the results are presented in Table V.

Table V

Multiple Comparison of Paired Means of different categories of State level Athletes on Physiological variable Resting Pulse Rate

Triathlon	Swimmers	Cyclists	Runners	MEAN DIFF	C.I
64.77	66.67			1.90*	0.49
64.77		68.80		4.03*	0.49
64.77			66.70	1.93*	0.49
	66.67	68.80		2.13*	0.49
	66.67		66.70	0.03	0.49
		68.80	66.70	2.10*	0.49

* Significant at 0.05 level.

The results presented in Table V showed that the paired mean comparisons of the following were significant as the obtained mean differences were greater than the required confidence interval value of 0.49 on physiological variable Resting Pulse Rate

Swimmers Vs Triathlon	(MD: 1.90)
Cyclists Vs Triathlon	(MD: 4.03)
Runners Vs Triathlon	(MD: 1.93)
Cyclists Vs Swimmers	(MD: 2.13)
Cyclists Vs Runners	(MD : 2.10)

The following paired mean comparisons were not significant as the obtained mean differences were less than the obtained confidence interval value of 0.49 on physiological variable Resting Pulse Rate.

Swimmers Vs Runners (MD: 0.03)

VI. CONCLUSIONS

Within the limitations and delimitations of the study, the following conclusions were drawn.

1. It was concluded that there was significant differences on namely, cardio respiratory endurance, among state level men triathlon athletes, swimmers, cyclists and runners. The post hoc analysis proved that cyclists were significantly better than triathlon, swimmers, and runners.
2. It was concluded that there was significant differences on resting pulse rate, among state level men triathlon athletes, swimmers, cyclists and runners. The post hoc analysis proved that triathlon athletes were significantly better than swimmers, cyclists and runners on physiological variable, resting pulse rate.

VII. REFERENCES

- Dallam, George M. (2008). *Championship Triathlon Training*. Human Kinetics. p. 286.
- Davis, B. et al. (2000) *Physical Education and the Study of Sport*. UK: Harcourt Publishers Ltd.
- Donald K. Mathew, (1981) *Measurement in Physical Education* Philadelphia: W.B. Saunders company, P. 5
- Finch, Michael (2004). *Triathlon Training*. Human Kinetics. p. 71.
- Shamal Kaloy, (2007), *Exercise Physiology*, New Delhi: Friends Publications, PP 1-2.
- Anderson and Behm (2004) "Maintenance of EMG activity and loss of force output with instability"
Journal of Strength and Conditioning Research . 18 (3) pp. 637-40.
- Andris Rode, Prof Roy J. Shephard, "A comparison of physical fitness between Igloodik inuit and Volochanka nGana