### EFFECT OF CONTINUOUS TRAINING AND INTERVAL TRAINING ON SELECTED HEMATOLOGICAL VARIABLES AMONG TNPESU MEN STUDENTS

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# ABSTRACT

The aim of this study was to finding out the effect of Continuous Training and Interval training on Hemoglobin, Red Blood Cell Count and White blood cell count among university men students. To achieve the purpose of the study (n=45) TNPESU university men students were selected as subject at random from Chennai, Tamilnadu, India. The age ranged of the subject is between 18 to 25 years. The subject was divided into three group namely Experimental group I, Experimental group II, and Control group III. Experimental group I underwent to Continuous training, Experimental group II underwent to Interval training and group III act as a Control group they did not participate in any of the training programme other than their regular activates. The data was collected from three groups' pre and post of the experimental period. The raw data on Hemoglobin, Red Blood Cell Count and White blood cell count was statistically analyzed by using Analysis of Covariance (ANCOVA). Scheffe's post hoc test was applied to determine the significant differences between the paired adjusted means. In all the cases 0.05 level of significance was fixed. The result of the study showed that there was as significantly improvement was found in Hemoglobin, Red Blood Cell Count and White blood cell count among the experimental group when compared with control group.

*Keywords:* Continuous Training, Interval Training, Hemoglobin, Red Blood Cell Count and White blood cell count.

# **INTRODUCTION**

Continuous training as the name implies, involves continuous activity, without rest intervals. This has varied from high intensity, Continuous activity of moderate duration to low-intensity activity of an extended duration, i.e. long, slow distance training is probably the most widely used from of endurance conditioning for jogger who want to stay in condition for health-related purpose, the athlete who participate in team sports and endurance trains for general condition, and the athlete who wants to maintain his endurance condition during the off-season (Ajmer Singh, 2003).

The key to success in interval training is utilizing the proper intensity of exercise followed by a rest interval (Fox & Mathews, 1974). The rest interval prevents accumulation of fatigue products permitting more intensive workouts with the additional pain of fatigue. The

theoretical metabolic profile for exercise and rest intervals stressing anaerobic metabolism, fast glycolysis and phosphogen system is based on the knowledge of which energy systems predominate during exercise and time 9 of substrate recovery. By choosing appropriate exercise intensities, exercise duration and rest interval, the appropriate energy systems can be trained (Baechle, 1994).

Blood is considered a tissue consisting of Red blood corpuscles (Erythrocytes), White blood corpuscles (Leukocytes), platelets and liquid plasma. It is a carrier for gas, oxygen, carbon dioxide, metabolites, and products of digestion, hormones, enzymes and clotting factor. A 70 kg individual has a blood volume about six liters (85ml/kg) about one twelfth of the body weight and about three liters of plasma (45ml/kg) (Ramakrishnan, Prasannan, & Rajan, 1980).

Hemoglobin is a protein complex found in the red blood cell. A single red blood cell contains about 250 million hemoglobin molecules. Hb binds with oxygen. Every molecule of hb can bind with 4 molecules of oxygen. Thus, each RBCs can bind with up to billions of oxygen molecules. In normal healthy males, the Hb ranges from 14.0 to 18.0 gms.100 ml1.of blood and from 12.0 to 16.0 gms.100 ml-1 (Sandhya, 1999).

# **Experimental Design & Methodology**

To achieve the purpose of the presented study, forty five men students were selected randomly (simple random sample) from the TNPESU University Chennai, Tamilnadu, India. Their age ranged between 18 to 25 years. The selected subject was divided into three group namely Experimental group I, Experimental group II, and Control group III. Experimental group I underwent to Continuous training, Experimental group II underwent to Interval training and group III act as a Control group they did not participate in any of the training programme other than their regular activates. Training was given for twelve weeks and alternative days in a week. The data was collected from four groups' pre and post of the experimental period and raw data was statistically analyzed by using Analysis of Covariance (ANCOVA). Scheffe's post hoc test was applied to determine the significant differences between the paired adjusted means. In all the cases 0.05 level of significance was fixed.

# **Data Analysis & Results**

#### TABLE-I

## ANALYSIS OF COVARIANCE OF DATA ON HEMOGLOBIN BETWEEN PRE AND POST TEST OF CONTINUOUS TRAINING GROUP, INTERVAL TRAINING GROUP AND CONTROL GROUP

Test	CTG	ITG	CG	SOV	SS	Df	MS	F-ratio	
Pre-test									
Mean 13.18 13.37 13.23 B.M 0.30 2 0.150 0.20									
SD(±)	1.23	1.42	1.64	W.G	11.36	42	0.27	0.29	
Post-test									
Mean 13.73 13.91 13.00 B.M 6.95 2 3.47							10.00*		
SD(±)	1.11	1.32	1.42	W.G	7.64	42	0.18	19.09	
Adjusted post-test									
<b>B.S</b> 6.22 2 3.11								(7.10*	
Iviean	15.79	15.85	13.02	W.S	1.89	41	0.05	07.18*	

\*significant at 0.05 level of confidence. The table values required for significance at 0.05 level of confidence for 2 & 42 and 2 & 41 are 3.22 and 3.23 respectively.

The table I shows that the pre-test mean values on continuous training group, interval training group and control groups are 13.18, 13.37 and 13.23 respectively. The obtained 'F' ratio 0.55 for pre-test scores was less than the table value, 3.22 for degrees of freedom 2 and 42 required for significance at 0.05 level of confidence on hemoglobin. The post-test mean values on continuous training group, interval training group and control groups are 13.73, 13.91 and 13.00 respectively. The obtained 'F' ratio 19.09 for post-test scores was greater than the table value 3.22 for degrees of freedom 2 and 42 required for significance at 0.05 level of confidence on hemoglobin. The adjusted post-test means of continuous training group, interval training group and control groups and control groups are 13.79, 13.83 and 13.02 respectively. The obtained 'F' ratio of 67.18 for adjusted post-test means was greater than the table value of 3.23 for degrees of freedom 2 and 41 required for significance at 0.05 level of confidence on hemoglobin. The result of the study indicates that there was a significant difference among the adjusted post-test means of continuous training group and control groups

and control group on hemoglobin. Since the obtained 'F' ratio value was significant further to find out the paired mean difference, the Scheffe's test was employed and presented in table II.

#### TABLE-II

# SCHEFFE'S POST HOC TEST FOR THE DIFFERENCES BETWEEN PAIRED ADJUSTED POST TEST MEANS OF HEMOGLOBIN

Interval Training Group	Continuous Training Group	Control group	MD	CI
-	13.79	13.02	0.77*	
13.83	-	13.02	0.81*	0.20
13.83	13.79	-	0.04	

\*Significant at 0.05 level of confidence.

The table II shows that the mean difference values between continuous training group & control group, interval training group & control group, interval training group & continuous training group, are 13.83, 13.79 and 13.02 respectively which are greater than the confidence interval value 0.20 at 0.05 level of confidence. The results of the study showed that there were a significant difference between continuous training group & control group, interval training group & control group, interval training group & control group.

#### TABLE – III

### ANALYSIS OF COVARIANCE OF DATA ON RED BLOOD CELL COUNT BETWEEN PRE AND POST TEST OF CONTINUOUS TRAINING GROUP, INTERVAL TRAINING GROUP AND CONTROL GROUP

Test	CTG	ITG	CG	SOV	SS	Df	MS	F-ratio
Pre-test								
Mean	5.53	5.52	5.54	B.M	0.01	2	0.002	0.01
SD(±)	0.76	0.82	0.97	W.G	7.36	42	0.18	0.01
	Post-test							
Mean	5.95	5.93	5.93	B.M	3.38	2	1.69	12 20*
SD(±)	0.59	0.65	0.82	W.G	5.82	42	0.14	12.20
Adjusted post-test								
<b>B.S</b> 3.50 2 1.75							24.06*	
Mean	5.95	5.94	5.55	W.S	2.87	41	0.07	24.90*

\*significant at 0.05 level of confidence. The table values required for significance at 0.05 level of confidence for 2 & 42 and 2 & 41 are 3.22 and 3.23 respectively.

The table III shows that the pre-test mean values on continuous training group, interval training group and control groups are 5.53, 5.52 and 5.54 respectively. The obtained 'F' ratio 0.01 for pre-test scores was less than the table value, 3.22 for degrees of freedom 2 and 42 required for significance at 0.05 level of confidence on red blood cells count (RBC). The post-test mean values on continuous training group, interval training group and control groups are 5.95, 5.93 and 5.36 respectively. The obtained 'F' ratio 12.20 for post-test scores was greater than the table value 3.22 for degrees of freedom 2 and 42 required for significance at 0.05 level of confidence on red blood cells count (RBC). The adjusted post-test means of continuous training group, interval training group and control groups are 5.95, 5.94 and 5.35 respectively. The obtained 'F' ratio of 24.96 for adjusted post-test means was greater than the table value of 3.23 for degrees of freedom 2 and 41 required for significance at 0.05 level of confidence on red blood cells count (RBC). The result of the study indicates that there was a significant difference among the adjusted post-test means of continuous training group and control groups and control groups training group, interval training group on red blood cells count (RBC).

#### TABLE-IV

## SCHEFFE'S POST HOC TEST FOR THE DIFFERENCES BETWEEN PAIRED ADJUSTED POST TEST MEANS OF RED BLOOD CELL COUNT

Interval Training Group	Continuous Training Group	Control group	MD	CI
-	5.95	5.95	0.60*	
5.94	-	5.35	0.58*	0.24
5.94	5.95	-	0.01	

\*Significant at 0.05 level of confidence.

The table IV shows that the mean difference values between continuous training group & control group, interval training group & control group, interval training group & continuous training group, are 5.94, 5.95 and 5.35 respectively which are greater than the confidence interval value 0.24 at 0.05 level of confidence. The results of the study showed that there were a significant difference between continuous training group & control group, interval training group & control group on red blood cells count (RBC). From that it can be clearly noticed that continuous training group responded to the training with more positive influences of red blood cells count (RBC) when compared with the interval training group. The interval training group responded better when compared with the control group.

#### TABLE-V

## ANALYSIS OF COVARIANCE OF DATA ON WHITE BLOOD CELL COUNT BETWEEN PRE AND POST TEST OF CONTINUOUS TRAINING GROUP, INTERVAL TRAINING GROUP AND CONTROL GROUP

Test	CTG	ITG	CG	SOV	SS	Df	MS	F- ratio
Pre-test								
Mean	8960	8973.3 3	8966.7	B.M	1333.3	2	666.67	0.004
SD(±)	86.34	89.23	93.45	W.G	6858.66	42	1633.59	
Post-test								
Mean 9600 9533.3 3 8933.3 B.M 4044.44 2 2022.22 9						9.98*		
SD(±)	81.97	82.08	91.12	W.G	8506.67	42	2025.68	
Adjusted post-test								
Maan	9606.6	9526.6	8022.2	B.S	4059.89	2	2029.45	52 40*
Mean	9	3	8933.3	W.S	1585.19	41	3866.18	52.49*

\*significant at 0.05 level of confidence. The table values required for significance at 0.05 level of confidence for 2 & 42 and 2 & 41 are 3.22 and 3.23 respectively.

The table V shows that the pre-test mean values on continuous training group, interval training group and control groups are 8960, 8973.33 and 8966.7 respectively. The obtained 'F' ratio 0.004 for pre-test scores was less than the table value, 3.22 for degrees of freedom 2 and 42 required for significance at 0.05 level of confidence on white blood cells count (WBC). The post-test mean values on continuous training group, interval training group and control groups are 9600, 9533.33 and 8933.3 respectively. The obtained 'F' ratio 9.98 for post-test scores was greater than the table value 3.22 for degrees of freedom 2 and 42 required for significance at 0.05 level of confidence on white blood cells count (WBC). The adjusted post-test means of continuous training group, interval training group and control groups are 9606.69, 9526.63 and 8933.3 respectively. The obtained 'F' ratio of 52.49 for adjusted post-test means was greater than the table value of 3.23 for degrees of freedom 2 and 41 required for significance at 0.05 level of confidence on white blood cells count (WBC). The result of the study indicates that there was a significant difference among the adjusted post-test means of

continuous training group, interval training group and control groups and control group on white blood cells count (WBC).

#### TABLE-VI

# SCHEFFE'S POST HOC TEST FOR THE DIFFERENCES BETWEEN PAIRED ADJUSTED POST TEST MEANS OF WHITE BLOOD CELLS COUNT

Interval Training Group	Continuous Training Group	Control group	MD	CI
-	9606.69	8933.33	673.36*	
9526.64	-	8933.33	593.31*	182.40
9526.64	9606.69	-	80.05	

\*Significant at 0.05 level of confidence.

The table VI shows that the mean difference values between continuous training group & control group, interval training group & control group, interval training group & continuous training group, are 9526.64, 9606.69 and 8933.33 respectively which are greater than the confidence interval value 182.40 at 0.05 level of confidence. The results of the study showed that there were a significant difference between continuous training group & control group, interval training group & control group on white blood cells count (WBC). From that it can be clearly noticed that continuous training group responded to the training with more positive influences of white blood cells count (WBC) when compared with the interval training group and control group. The interval training group responded better when compared with the control group.

## **Discussion on findings**

The result of the study indicates that there was significant improvement on selected hematology variables such as haemoglobin, red blood cells count (RBC) and white blood cells count (WBC) due to the effect of twelve weeks continuous training and interval training among college men students when compared to control group. Rýzková, Labudová, & Šmída, (2018) investigated the effect of a 10-week aqua fitness program with the inclusion of high intensity interval training on selected biological and motor parameters of female college students. Aqua fitness with inclusion of HIIT can offer significant benefits in physical fitness of female college students.

# Conclusion

The experimental group college men students showed significant improvement on selected hematological variables such as hemoglobin, red blood cell count and white blood cell count due to the effect of twelve weeks continuous training and interval training. The control group university men students did not show significant improvement in any of selected variables.

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