ISSN 1750-9823 (print)
International Journal of Sports Science and Engineering
Vol. 05 (2011) No. 03, pp. 139-144

Assessment of Physiological Parameters among Different Level of Baseball Players

Gaurav Dureja [+]

Department of Physical Education (TE&L), Post Graduate Government College, Sector-11, Chandigarh (U.T.) INDIA, 09876142317

(*Received August 7, 2011, accepted September 9, 2011*)

Abstract. Physiology is the study of functions of the human body. It is closely linked with the study of all living things in the subject of biology with the chemical reactions and behavior of cells under different conditions in biochemistry and with physics in the study of the physical reactions and movements taking place in the body. The present study was examined to determine assessment of physiological parameters among different level of baseball players. Total one hundred and twenty (N=120) male subjects were checked, out of which forty (N=40) senior national baseball players, forty (N=40) inter-varsity baseball players and forty (n=40) senior state baseball players were randomly selected for the collection of data. The age of the subjects was ranged between 20 to 30 years. Resting pulse rate was measured by counted by palpating at the wrist (radial artery) for one minute, peak flow rate was measured by using a mini Peak flow meter and vital capacity was measured by spirometer. One way Analysis of variance (ANOVA) was applied to find out the significant differences among senior national, inter-varsity and senior state baseball players. Where 'F' values found significant in ANOVA test then Tukey's post-hoc test was applied to see the mean differences among three groups. The level of significance was set at 0.05. The results revealed that on the parameter of resting pulse rate among senior national, inter-varsity and senior state baseball players was statistically found significant. Further, it is concluded that on the parameters of peak flow rate and vital capacity among senior national, inter-varsity and senior state baseball players was statistically found significant.

Keywords: resting pulse rate, peak flow rate, vital capacity, baseball players

1. Introduction

Baseball is a bat and ball sport played between two teams of nine players each and Human physiology is the bird in the house of the mechanical, physical, and biochemical functions of humans in good health, their organs, and the cells of which they are composed. The principal level of focus of physiology is at the level of organs and systems [6]. Most aspects of human physiology and animal experimentation have provided much of the foundation of physiological knowledge. Vital capacity is defined as the largest volume of air that can be exhaled followed by deepest possible inhalation [3]. Pulse rate as a wave of distension and elongation that is felt in an artery wall due to the contraction of the left ventricle forcing blood into the already full aorta. When the aorta is distended a wave passes along the walls of the arteries and can be felt at any point where artery can be pressed gently against the bone. Pulse rate can be defined as the number of pulse waves per minute felt at the radial artery [7]. The basis of peak respiratory flow for monitoring the ventilatory function were the amount of air and maximum rate of flow during an expiration followed by a deepest possible inspiration. This can be measured with a peak flow meter. Vital capacity may be defined that as it's the largest volume of air that human can exert after the maximum inhalation [1]. The present study was investigation about the differences with regard to the parameters resting pulse rate, peak flow rate and vital capacity among senior national, inter-varsity and senior state baseball players.

1.1. Objectives of the study

- To find out the significant differences among senior national, inter-varsity and senior state baseball players with regard to resting pulse rate.
- To find out the significant differences among senior national, inter-varsity and senior state baseball players with regard to peak flow rate.

[+] Corresponding author. *E-mail address*: g_dureja83@yahoo.com.

- To find out the significant differences among senior national, inter-varsity and senior state baseball players with regard to vital capacity.

1.2. Hypotheses of the study

- (H_o) There would be no significant differences among senior national, inter-varsity and senior state baseball players with regard to resting pulse rate.
- (H_o) There would be no significant differences among senior national, inter-varsity and senior state baseball players with regard to peak flow rate.
- (H_o) There would be no significant differences among senior national, inter-varsity and senior state baseball players with regard to vital capacity.

2. Method and Materials

2.1 Sample: Total one hundred and twenty (N=120) male subjects were checked, out of which forty (N=40) senior national baseball players, forty (N=40) inter-varsity baseball players and forty (n=40) senior state baseball players were randomly selected for the collection of data. The age of the subjects was ranged between 20 to 30 years.

2.2 Tools: **Resting pulse rate** was measured by counted by palpating at the wrist (radial artery) for one minute. The score was expressed in terms of number of pulse beats per minute (Lawrence et al., 1971). The test was conducted in the morning 07:00 hrs. When the subjects were at rest. Total number of pulse beats per minute for each subject was recorded as the score.

2.2.1 Peak flow meter: Peak flow rate was measured by using a Peak flow meter. The peak flow rate of the subject was measured by using a mini Peak flow meter. The measurement was taken of the subject in a standing position. The tester ensured that when the subject held the instrument in his hands ready for blowing the slot placed away from the hand and the flattened part of the plastic mouthpiece was horizontal. The tester also ensured that when the measurement was taken the fingers of the subject did not interfere with the free movement of the marker over the scale. The instrument measured the peak expiratory flow in liters per minute. The subject was asked to take a maximum deep breath and then air was blown into mini flow meter through the mouthpiece. The subjects were instructed to blow as hard as and as fast as possible into the mouthpiece. The action was best described as hard "huff". Best of the three trials were recorded in liters per minute. The mouthpiece was sterilized with rectified sprite after every three trials.

2.2.2 Vital capacity: Vital capacity was measured by spirometer Vital capacity was measured in liters by using dry spirometer. The spirometer was brought in zero position. The subject performs maximum inspiration and after closing the nose the air was breathed out as intensely as possible into the mouthpiece. The amount of air expired was read directly from the calibrated scale. Best of the three trials were recorded in liter per minute. The Mouthpiece was sterilized with rectified spirit after every three trials. The reading shown by the calibrated scale is seen and the vital capacity is recorded in liters.

2.3 Statistical analysis: One way Analysis of variance (ANOVA) was applied to find out the significant differences among senior national, inter-varsity and senior state baseball players. Where 'F' values found significant in ANOVA test then Tukey's post-hoc test was applied to see the mean differences among three groups. Data were analyzed using SPSS (Statistical Package for Social Science) version 18.0 The level of significance was set at 0.05.

3. Results

The results of resting heart rate, peak flow rate and vital capacity among senior national, inter-varsity and senior state baseball players are presented in tables and interpretations are given accordingly. A table-1 show that the calculated value of F-ratio is 4.41 is greater than tabulated value of 3.04 for the selected degree of freedom and level of significance. The first null hypothesis (H_0) may be rejected at .05 level of significance. It may be concluded that on the parameter of resting heart rate among Senior National, Inter-Varsity and Senior State Baseball Players was statistically found significant.

TABLE-1 Comparison of Analysis of variance (ANOVA) among Senior National, Inter-Varsity and Senior State Baseball Players with regard to Resting Heart Rate

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	622.550	2	311.275	4.41*	.014
Within Groups	8249.775	117	70.511		
Total	8872.325	119			

*Significant at 0.05 level, Table value F.o5 (2, 117) =3.04

TABLE-2 Tukey's Post-hoc test among Senior National, Inter-Varsity and Senior State Baseball Players with regard to Resting Heart Rate

Groups	N	Subset for alpha = 0.05	
		1	2
Senior National Baseball Players	40	72.40	
Inter-Varsity Baseball Players	40		69.80
Senior State Baseball Players	40		66.82

In table-2 shows that mean values of senior national baseball players are 72.40, Inter-varsity baseball players are 69.80 and senior state baseball players are 66.82 and shows that senior national baseball players have better resting heart rate as compared to their counterpart's i.e. inter-varsity and senior state baseball players (*Figure*-1). A table-3 show that the calculated value of F-ratio is 8.37 is greater than tabulated value of 3.04 for the selected degree of freedom and level of significance. The second null hypothesis (H_0) is also rejected at .05 level of significance. It may be concluded that on the parameter of peak flow rate among Senior National, Inter-Varsity and Senior State Baseball Players was statistically found significant. In table-4 shows that mean values of senior national baseball players are 654.87, Inter-varsity baseball players are 589.95 and senior state baseball players are 600.32 and shows that senior national baseball players have better peak flow rate as compared to their counterpart's i.e. inter-varsity and senior state baseball players (*Figure*-2).

TABLE-3 Comparison of Analysis of variance (ANOVA) among Senior National, Inter-Varsity and Senior State Baseball Players with regard to Peak Flow Rate

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	97314.650	2	48657.325	8.37*	.000
Within Groups	679797.050	117	5810.231		
Total	777111.700	119			

*Significant at 0.05 level, Table value F.o5 (2, 117) =3.04

TABLE-4 Tukey's Post-hoc test among Senior National, Inter-Varsity and Senior State Baseball Players with regard to Peak Flow Rate

Groups	N	Subset for alpha = 0.05	
		1	2
Senior National Baseball Players	40	654.87	
Inter-Varsity Baseball Players	40		589.95
Senior State Baseball Players	40		600.32

A table-5 show that the calculated value of F-ratio is 4.88 is greater than tabulated value of 3.04 for the selected degree of freedom and level of significance. The third null hypothesis (H_0) may be rejected at .05 level of significance. It may be concluded that on the parameter of vital capacity among Senior National, Inter-Varsity and Senior State Baseball Players was statistically found significant. In table-6 shows that mean values of senior national baseball players are 3.41, Inter-varsity baseball players are 3.53 and senior state

baseball players are 3.08 and shows that inter-varsity baseball players have better vital capacity as compared to their counterpart's i.e. senior national and senior state baseball players (*Figure*-3).

TABLE-5 Comparison of Analysis of variance (ANOVA) among Senior National, Inter-Varsity and Senior State Baseball Players with regard to Vital Capacity

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	4.446	2	2.223	4.88*	.009
Within Groups	53.227	117	.455		
Total	57.673	119			

*Significant at 0.05 level, Table value F.05 (2, 117) =3.04

TABLE-6 Tukey's Post-hoc test among Senior National, Inter-Varsity and Senior State Baseball Players with regard to Vital Capacity

Groups	N	Subset for alpha = 0.05	
		1	2
Senior National Baseball Players	40	3.41	
Inter-Varsity Baseball Players	40		3.53
Senior State Baseball Players	40		3.08

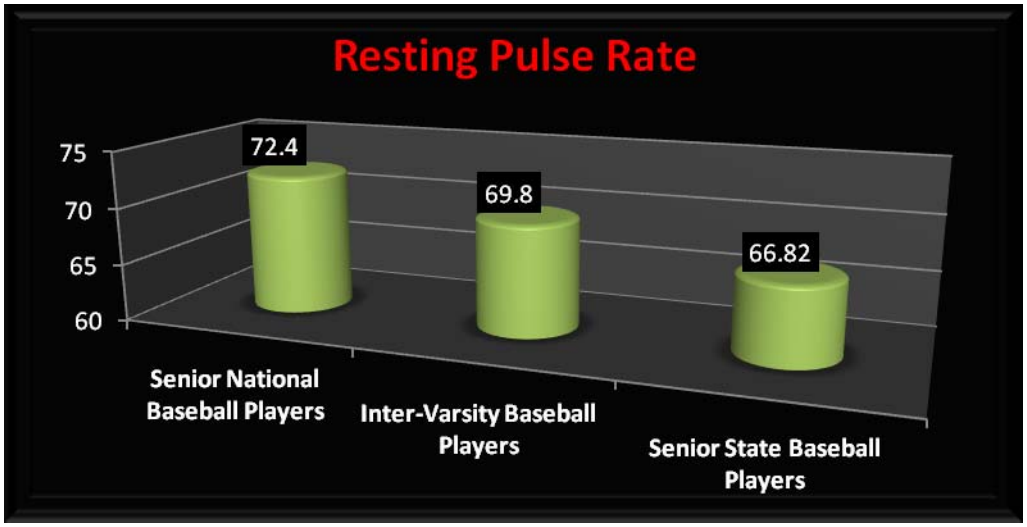

Figure-1 Graphical presentation of mean scores among Senior National, Inter-Varsity and Senior State Baseball Players with regard to Resting Heart Rate

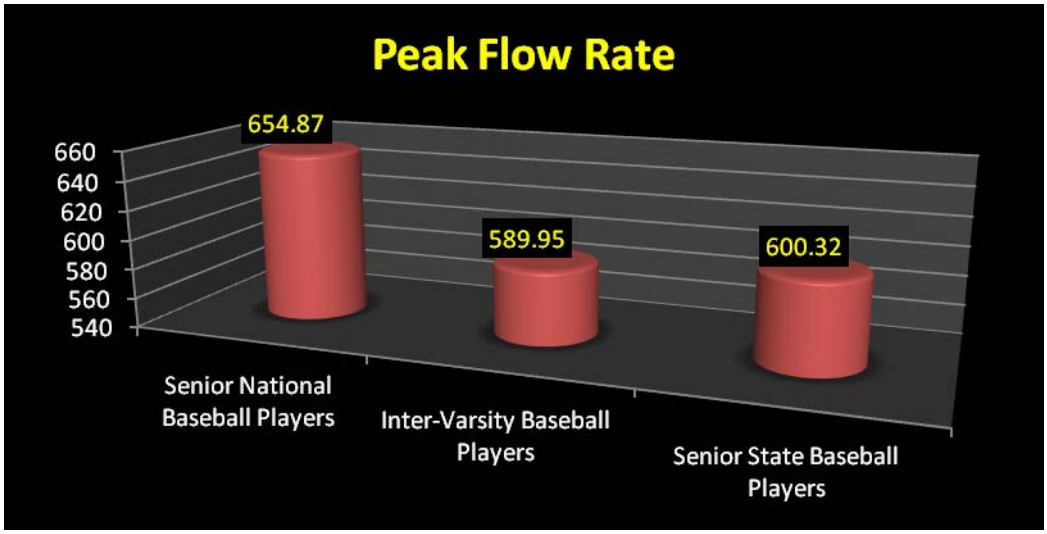

Figure-2 Graphical presentation of mean scores among Senior National, Inter-Varsity and Senior State Baseball Players with regard to Peak Flow Rate

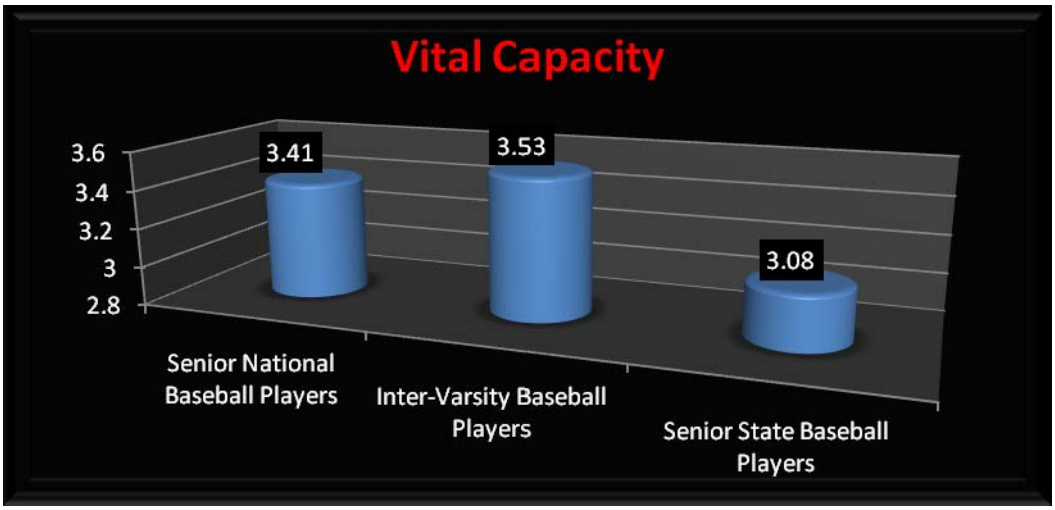

Figure-3 Graphical presentation of mean scores among Senior National, Inter-Varsity and Senior State Baseball Players with regard to Vital Capacity

4. Discussion

It is evident from the above findings that significant differences were observed among senior national, inter-varsity and senior state baseball players on the parameter of resting pulse rate. While comparing the mean values of groups it shows that senior national baseball players have performed significantly better with regard to resting pulse rate. This might be due to the higher level of the competition of the senior national baseball players. The result reveals significant differences in all the selected physiological variables among Aquatic training with weight group (ATWG), Aquatic training without weight group (ATWOG) among volleyball players [4].

But the findings with regard to parameter of peak flow rate it shows that significant difference among senior national, inter-varsity and senior state baseball players. While comparing the mean values then again senior national baseball players have better peak flow rate as compared to their counterpart i.e. inter-varsity and senior state baseball players. This might be due to the senior national baseball players having better training facilities and good coaching schedule according to their game skills. Peak oxygen uptake was higher in backs than in forwards rugby players with no significant difference in peak respiratory exchange ratio between backs and forwards rugby players [7]. On the parameter of vital capacity it shows again significant differences among senior national, inter-varsity and senior state baseball players and while comparing the mean values then Inter-varsity baseball players have edge over the senior national and senior state baseball

players. The relationship between sport activity and fitness and the physiological levels for adults in Hong Kong [2]. The Indian volleyball players have lesser value for heart rate and greater value for Vo2max than controls groups [5].

5. Conclusion

The results revealed that on the parameter of resting pulse rate among senior national, inter-varsity and senior state baseball players was statistically found significant. Further, it is concluded that on the parameters of peak flow rate and vital capacity among senior national, inter-varsity and senior state baseball players was statistically found significant.

6. References

[1] Alawy, M.H., & Abdel, A. F. *Physiology of Sport Training*. Cairo: Dar El-fikr Elaraby. 1984, pp. 281.

[2] Chan, E.W., A.V. E.Y., & Chan, B.H. Relation among Physical Activity, Physical Fitness and Self Perceived Putness in Hong Kong Adolescents. Hong Kong University. 2003, **12**: 787-797.

[3] Clarke, D. H. *Exercise Physiology*. Englewood Cliffs, N.J.: Prentice Hall Inc. 1975, pp. 159.

[4] Kamalakkannan, K., Balaji, M., Vijayaragunathan, N., & Arumugam, C. Effect of Aquatic Training with and without Weight on Selected Physiological Variables among Volleyball Players. *Indian Journal of Science and Technology*. 2010, **3** (5): 56-65.

[5] Koley, S., Singh, J., & Sandhu, J.S. Anthropometric and Physiological characteristics on Indian Inter-University Volleyball Players. *Journal Of Human Sport & Exercise*. 2010, **5** (3): 389-398.

[6] Lawrence, E., More, H., & Augustus, T, M. *Physiology of Exercise* (Saint Louis: C.V. Mosby Co, 1971.

[7] Ross, J.S., & Wilson, K.S. *Foundation of Anatomy and Physiology* (Edinburgh: The English Book Society Churchill Living Stone). 1973, pp. 151.

[8] Scott, A.C., Roe, N., Coats, A.J.S., & Piepoli, M.F. Aerobic exercise physiology in a professional rugby union team. *International Journal of Cardiology*. 2002, **87** (3): 173-177.

Corresponding Author:
GAURAV DUREJA, M.PHIL.

Gaurav Dureja, born on 10th December 1983 is P.G.D.C.A, B.P.Ed. and M.P.Ed. from Guru Nanak Dev University, Amritsar. He did his M.Phil. in Physical Education from Panjab University, Chandigarh and is currently pursuing Ph.D. in Physical Education from same University. A gold medalist in senior national and inter-varsity softball championships, he is working as Assistant Professor for postgraduate studies in the Department of Physical Education (TE&L) at Post Graduate Government College, Sector 11, Chandigarh since 19th August 2010. His area of interest is use of Information technology in physical education and sports psychology.