



A STUDY ON VO₂ AT ANAEROBIC THRESHOLD OF DIFFERENT SPORTS PERSONS

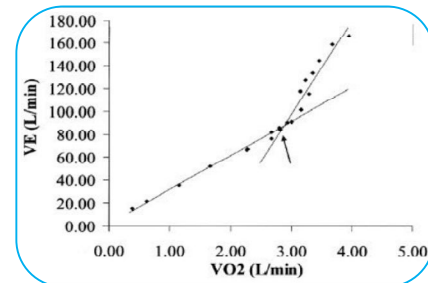
Ashwini K. N.¹ and Prof. Kishore Kumar C. K.²

¹Assistant Professor, DOS in Physical Education and Sports Sciences, KSWAWU, Vijayapura.

²Registrar and Director of Physical Education, Department of PG Studies and Research in Physical Education, Mangalore University.

ABSTRACT

Now a days, sports is fiercely competitive event, several factors affect the sports life such as anatomy and physiology, biomechanics, sports training and coaching, sports medicine, nutrition, growth and development, sociology, computer application and psychology and so on. To achieve at international level in the field of sports there should be a spotting of talent, fitness and scientific method of training. The purpose of the present study was to examine, analyze and compare Vo₂ at Anaerobic Threshold of different sports persons. To achieve the purpose total 60 subjects were selected from three different sports that was 20 from Long Distance Running, 20 from Hockey, 20 from Judo. The Vo₂ at Anaerobic Threshold was selected as variable. The CPET unit was used to assess the relative peak VO₂ of the selected subjects by breath-to-breath analysis. In the result showed the significant difference found between hockey and judo players related to Vo₂ at Anaerobic Threshold.



KEYWORDS: Vo₂ at Anaerobic Threshold, Long Distance Running, Hockey and Judo.

INTRODUCTION

Regularly participating in sports and sports training makes several differences in the physiological status of a person. The body changes its many physiological functions for adaptation to the exercise. Various physiological variables influence the sports performance. The anaerobic threshold (AT) was determined to occur at the break point between the increase in the carbon dioxide output and VO₂ (V-Slope) or the point at which the VE/VO₂ reached the minimum value and began to rise without a concomitant rise in VE/VCO₂. (Wasserman et al., 1973). AT is expressed as VO₂ (mL/kg/min) or percentage of VO₂max and compared with VO₂max, is better correlated to athletic endurance performance (Jones et al., 2000, Sarma and Levine, 2016). It usually occurs at 45% to 65% of VO₂max in healthy untrained subjects (Balady et al., 2010, Myers et al., 2015) and at a higher percentage (close to 90% of VO₂max) in highly endurance-trained athletes (Sarma and Levine, 2016). Long distance running is form of continuously running over a minimum distance of 3 kilometers. Competitive judo demands high-intensity intermittent actions, in which optimal physical attributes are necessary in order to achieve technical-tactical development and success in combat. Actually, high training loads, which require successful and coordinated actions, are applied to judokas in order to achieve high sport's performance. The game of hockey at the top level is essentially a low-intensity activity, interspersed with varying bouts of high intensity activity (Lythe and Kilding, 2011). The successful player requires

muscular endurance, strength, power, skill, psychomotor attributes and cardiovascular fitness (Reilly & Borrie, 1992).

OBJECTIVE OF THE STUDY:

The objective of the study was to examine and compare the VO₂ at Anaerobic Threshold of Long-Distance Runners, Judo and Hockey players.

HYPOTHESIS OF THE STUDY:

It was also hypothesized that there would be significant difference in VO₂ at Anaerobic Threshold among Long-Distance Runners, Judo and Hockey Players.

METHODOLOGY:

To achieve the purpose of the study total 60 university level and national level represented male players were selected, in which 20 from Long Distance Event, 20 from Hockey and 20 from Judo sport. The mean age of the subjects were 22 years. The mean value of height and weight was 171.54 and 64.6 and respectively. The Relative Peak VO₂ was selected as variable for the study. The CPET with treadmill breath-to-breath analysis was done to measure the selected variable. The protocol was fixed individually on the basis of their fitness level with the help of exercise physiology expert. Proper warm up and recovery was also given. The gas calibration and volume calibration were done before testing each subject. The mask was sanitized thoroughly before using by each subject.

ANALYSIS:

To analyze the data descriptive statistical techniques i.e., mean, Std. Deviation, minimum, maximum, ANOVA and Post hoc tests were used with the help of SPSS version 28.1.

Descriptive statistics with regard to VO₂ at Anaerobic Threshold (ml/min) level among Long Distance Runners, Judo and Hockey players have been presented in table - 4.8

Table 1
Mean, SD, Minimum and Maximum values of Vo₂ at Anaerobic Threshold level of Long-Distance Runners, Judo and Hockey Players.

Name of the Groups	N	Mean	Std. Deviation	Minimum	Maximum
Long Distance Runners	20	2520.85	259.84	2046	2895
Judo Players	20	1873.30	378.18	1355	2913
Hockey Players	20	2265.40	328.77	1658	2745

The table - 1 shows the mean and SD values of Long-Distance Runners, Judo and Hockey players with regard to VO₂ at Anaerobic Threshold (ml/min) as 2520.85 ± 259.84, 1873.30 ± 378.18 and 2265.40 ± 328.77 respectively. Minimum value of Long-Distance Runners, Judo and Hockey players with regard to VO₂ at Anaerobic Threshold (ml/min) as 2046, 1355 and 1658 respectively. Maximum values of Long-Distance Runners, Judo and Hockey players with regard to VO₂ at Anaerobic Threshold (ml/min) as 2895, 2913 and 2745 respectively. The graphical representation of mean scores of VO₂ at Anaerobic Threshold (ml/kg/min) has been depicted in figure - 1.

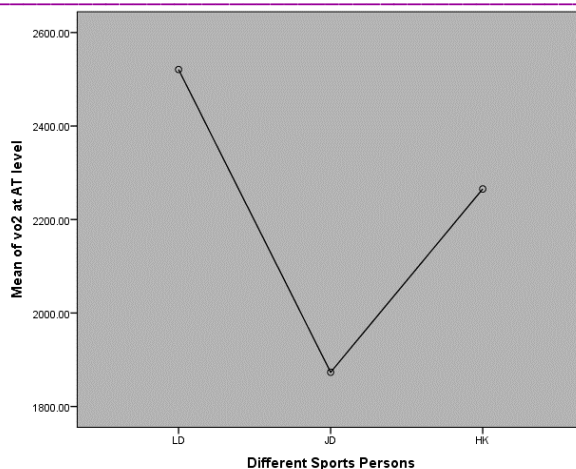


Figure 1 – Graphical representation of Mean, Minimum and Maximum values of Vo₂ at Anaerobic Threshold level (ml/min) of Long-Distance Runners, Judo and Hockey Players.

Analysis of Variance (ANOVA) results with regard to Vo₂ at Anaerobic Threshold (ml/min) among Long Distance Runners, Judo and Hockey players have been presented in table – 2

**Table - 2
Analysis of Variance of Vo₂ at Anaerobic Threshold (ml/min) of Long-Distance Runners, Judo and Hockey Players.**

Source of Variance	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4255454.10	2	2127727.05	20.034	.000*
Within Groups	6053807.55	57	106207.15		
Total	10309261.65	59			

*Significant at 0.05 level

The table 2 describes that statistically significant differences (p<0.05) existed among Long Distance Runners, Judo and Hockey players with regard to Vo₂ at Anaerobic Threshold (ml/min). Since, the obtained ‘F’ ratio 20.034 (0.00) was found statistically significant. Therefore, Tukey’s Post hoc was applied to find out the degree and direction of differences among selected groups. Result of post hoc test has been presented in table – 3

**Table - 3
Post hoc analysis of Vo₂ at Anaerobic Threshold (ml/min) among Long-Distance Runners, Judo and Hockey Players.**

Groups (I)	Groups (J)	Mean Difference (I-J)	Std. Error	Sig.
Long Distance Running	Judo	647.55*	103.06	.000
Judo	Hockey	392.1*	103.06	.042
Hockey	Long Distance Running	255.45*	103.06	.001

*Significant at 0.05 level

Table 3 showed the mean value of Long-Distance Runners was 2520.85 and Judo players was 1873.30 with the mean difference of 647.55. The p-value (Sig.).000 showed (p<0.05) significant differences between both the group on the variable Vo₂ at Anaerobic Threshold (ml/min). While comparing the mean values the Long-Distance Runners showed higher Vo₂ at Anaerobic Threshold than Judo players.

The mean value of Judo players was 1873.30 and Hockey players was 2265.40 with the mean difference 392.1. The p-value (Sig.) .042 showed ($p < 0.05$) significant differences between both the group on the variable Vo₂ at Anaerobic Threshold (ml/min). While comparing the mean values the Hockey players showed higher Vo₂ at Anaerobic Threshold (ml/min) than Judo players.

The mean value of Hockey players was 2265.40 and Long-Distance Runners was 2520.85 with the mean difference 255.45. The p-value (Sig.) .001 showed ($p < 0.05$) significant differences between both the group on the variable Vo₂ at Anaerobic Threshold (ml/min). While comparing the mean values, the Long-Distance Runners showed higher Vo₂ at Anaerobic Threshold than Hockey players.

DISCUSSION:

It has been observed that the Long-Distance Runners had highest value that is 69.26 % of VO₂ Peak in related to Vo₂ at Anaerobic Threshold followed by Hockey 64.33% of VO₂ Peak and Judo Players 59.51 % of VO₂ Peak.

In all the three selected sports, the Vo₂ at Anaerobic Threshold also plays a vital role to fulfil the demand of the sports at high level. Anaerobic Threshold is considered an important criterion in assessing aerobic endurance. Because of the difference in the metabolic systems in which energy is obtained during exercise, the intensity of exercise corresponding to Anaerobic Threshold must be known for the interpretation of performance and the preparation of the scientific training program. Exercise intensity corresponding to Anaerobic Threshold varies according to the physical conditioning of athlete. (Helgerud et al., 2001, Wagner 1996). Hence, the Vo₂ at Anaerobic Threshold level was found significantly different in all the three selected sports. Whereas the in long-distance runner and Hockey players were found significantly higher than the Judo players, it is because of the intensive activity is more in long distance and hockey sports as compare to Judo sports. The HIIT training improves the anaerobic threshold level (Sarkar et al., 2019), and Vo₂ at Anaerobic Threshold directly influences and define the performance of different sport performance with other factors (Souza et al., 2018, Mascherini et al., 2010., Zinner et al., (2015).

The significance difference found among Long Distance Runners, Hockey and Judo Players related to Vo₂ at Anaerobic Threshold. Hence, the hypothesis was accepted.

CONCLUSIONS:

On the basis of the findings of the study the following conclusions were drawn;

1. Significant difference was observed among Long-Distance Runners, Judo and Hockey Players with respect to VO₂ at Anaerobic Threshold.
2. The Long-Distance Runners showed higher value related to VO₂ at Anaerobic Threshold (ml/min) followed by Hockey and Judo Players.

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