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A COMPARATIVE STUDY ON RESPIRATORY EXCHANGE RATIO AMONG LONG DISTANCE RUNNERS, JUDO AND HOCKEY PLAYERS.

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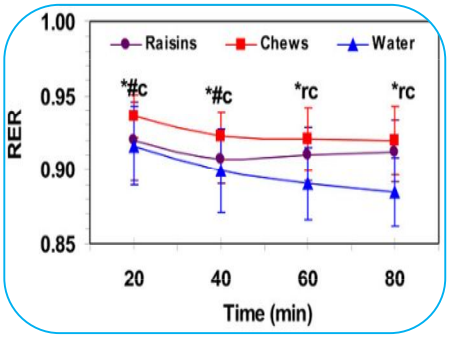
ABSTRACT



The respiratory exchange ratio (RER) is the ratio between carbon dioxide production and oxygen uptake. It is also called as gas exchange ratio. Respiratory exchange ratio (RER) is used to study human metabolism by measuring the ratio of O2 utilized and CO2 expired to estimate substrate utilization (Brooks, 1984). The purpose of the study was to compare Respiratory Exchange Ratio among Long Distance Runners, Judo and Hockey players. To achieve the purpose of the study 60 subjects were randomly selected who are participated in Inter-University competitions and national levels. In which long-distance runners were 20, judo players were 20 and hockey players were 20. The data was collected with the help of CPETby Breath-to-Breath analysis. The statistical analysis Mean, SD and ANOVA was used for the analysis of collected data. The result found that there was a significant difference among selected groups.

KEYWORDS : *Respiratory Exchange Ratio, Long Distance Runners, Judo Players and Hockey Players.*

INTRODUCTION

The respiratory exchange ratio (RER) is the ratio between carbon dioxide production and oxygen uptake. It is also called as gas exchange ratio. Respiratory exchange ratio (RER) is used to study human metabolism by measuring the ratio of O2 utilized and CO2 expired to estimate substrate utilization (Brooks, 1984). For example, if RER is 0.7, then 100% of metabolism is coming from fat and if RER is 1.0 then 100% of metabolism is coming from Carbohydrates (Brooks, 1984), though humans can achieve an RER above one when there is additional CO2 production measured from bicarbonate buffered acid (Naimark, Wasserman, &Mcllroy, 1964). RER increases during exercise owing to either the buffered lactic acid or hyperventilation (usually towards the end of exercise). (Albouaini et al., 2007).

The long-distance running is physiologically, aerobic in nature requires stamina as well mental strength. "…. Long-distance runners typically perform at around 75–85% of peak aerobic capacity, while short-distance runners perform at closer to 100% of peak" (Zinner et.al., 2015). The lactate threshold capacity in long distance runners is good it is correlate to their performance.

Judo is an unarmed combat sport. Competitive judo demands high-intensity intermittent actions, in which optimal physicalattributes 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.

Hockey has high demands in all three energy systems. The aerobic system is important during prolonged intermittent exercise, and high intensity efforts rely on the anaerobic energy systems, adenosine triphosphate phosphocreatine for the intermediate and anaerobic glycolysis for short term.

OBJECTIVE OF THE STUDY:

To examine and compare the Respiratory Exchange Ratio (RER) of Long-Distance Runners, Judo and Hockey players.

HYPOTHESIS:

The study was hypothesized that there would be significant difference in Respiratory Exchange Ratio (RER) among Long-Distance Runners, Judo and Hockey Players.

METHODOLOGY:

Selection of the Subjects:

The purpose of the study was to compare the Respiratory Exchange Ratio (RER) of Long-Distance Runners, Judo and Hockey players. To achieve the purpose of the study 60 subjects were randomly selected who are participated in Inter-University competitions and national levels. In which long-distance runners were 20, judo players were 20 and hockey players were 20.

Selection of variables:

The Respiratory Exchange Ratio was selected as Variable.

Selection of Equipment:

The CPET unit used to assess the respiratory exchange ratio by Breath-to-breath analysis.

ANALYSIS AND RESULTS:

Table 1
Mean, SD, Minimum and Maximum values of RER of Long-Distance Runners, Judo and Hockey Players.

Name of the Groups	N	Mean	Std. Deviation	Minimum	Maximum
Long Distance Runners	20	.97	.042	.91	1.04
Judo Players	20	1.02	.031	.94	1.06
Hockey Players	20	.99	.063	.79	1.05

The table – 1 depicts the mean and SD values of Long-Distance Runners, Judo and Hockey players with regard to RER as .97 ± .042, 1.02 ± .031 and .99 ± .063 respectively. Minimum value of Long-Distance Runners, Judo and Hockey players with regard to RER as .91, .94 and .79 respectively. Maximum values of Long-Distance Runners, Judo and Hockey players with regard to RER as 1.04, 1.06 and 1.05 respectively. The graphical representation of mean scores of RER has been depicted in figure – 4.6.

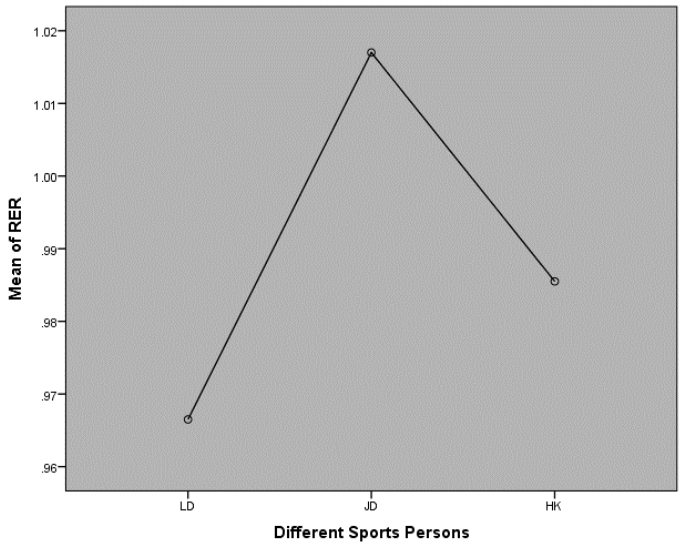


Figure 1 – Graphical representation of Mean, Minimum and Maximum values of RER of Long-Distance Runners, Judo and Hockey Players

Analysis of Variance (ANOVA) results with regard to RERamong Long Distance Runners, Judo and Hockey players have been presented in table – 2

Table 2
Analysis of Variance of RER of Long-Distance Runners, Judo and Hockey Players.

Source of Variance	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.026	2	.013	5.778	.005*
Within Groups	.128	57	.002		
Total	.154	59			

*Significant at 0.05 level

The table 4.15 explains that statistically significant differences ($p<0.05$) existed among Long Distance Runners, Judo and Hockey players with regard to RER. Since, the obtained 'F' ratio 5.778 (0.05) 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 RER among Long-Distance Runners, Judo and Hockey Players.

Groups (I)	Groups (J)	Mean Difference (I-J)	Std. Error	Sig.
Long Distance Running	Judo	.051*	.01501	.004
Judo	Hockey	.036	.01501	.099
Hockey	Long Distance Running	.019	.01501	.420

*Significant at 0.05 level

Table 3 shows the mean value of Long-Distance Runners was .97 and Judo players was 1.02 with the mean difference of 051. The p-value (Sig.).004 showed ($p<0.05$) significant differences between both the group on the variable RER. while comparing the mean values the Long-Distance Runners showed lessor RER than Judo players.

The mean value of Judo players was 1.02 and Hockey players was .99 with the mean difference .036. The p-value (Sig.).099 showed (p>0.05) no significant differences between both the group on the variable RER. while comparing the mean values the Judo players showed higher RER than Hockey players.

The mean value of Hockey players was .99and Long-Distance Runners was .97 with the mean difference .019. The p-value (Sig.) .420 showed (p>0.05) no significant differences between both the group on the variable RER. while comparing the mean values, the Long-Distance Runners showed lessor RER than Hockey players.

DISCUSSION ON FINDINGS:

The findings of this study were also agreement with the findings of Cipryan et.al., 2017, Ramos-Jimenez et al., 2008 endurance athletes showed lessor RER than sprinters, untrained. The RER indirectly related to the muscle oxidative capacity to get energy for the exercise. Training method and the nature of long-distance running is aerobic, which improves their fat oxidation capacity and lower RER allowing for athletes to use lipids more and CHO less, sparing glucose and muscle glycogen. (Bergman and Brooks 1999), hence RER significantly lower in Long Distance Runners than Hockey and Judo.

The significance difference found among Long Distance Runners, Hockey and Judo Players related to Respiratory Exchange Ratio. Hence, the hypothesis was accepted.

CONCLUSIONS:

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

1. Significant difference was observed among Long-Distance Runners, Judo and Hockey Players with respect to Respiratory Exchange Ratio.
2. Significant difference found between Long-Distance Runners and Judo Players on variable Respiratory Exchange Ratio.
3. There was no Significant difference found between Hockey and Judo Players on variable Respiratory Exchange Ratio.
4. There was no Significant difference found between Long-Distance Runners and Hockey Players on Respiratory Exchange Ratio.
5. The Judo players showed higher Value related to Respiratory Exchange Ratio followed by Hockey Players and Long-Distance Runners.

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