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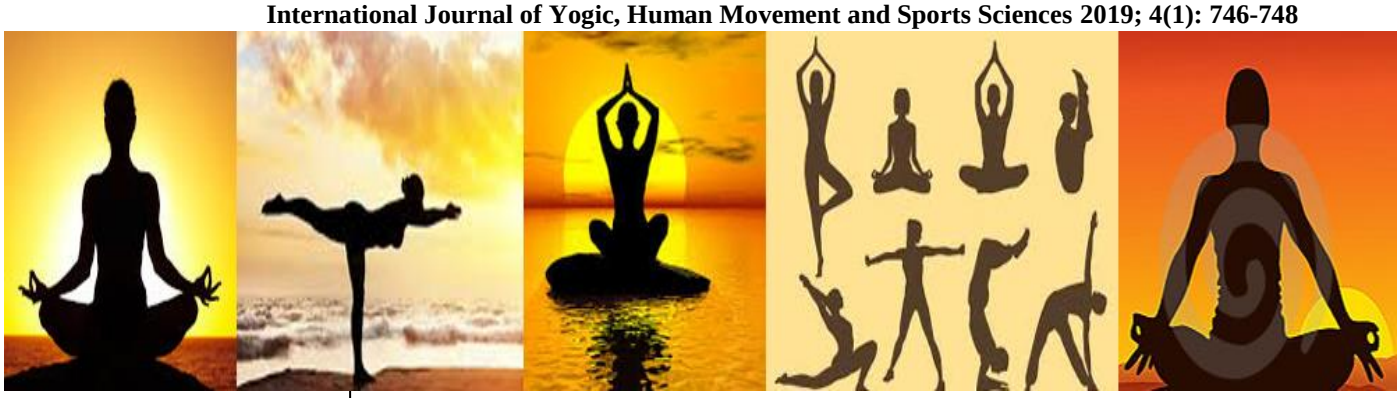

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Analysis of pulmonary variables among different topography University athletes

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Abstract
The present study aims to investigate the pulmonary functions of different topography Indian university athletes. To achieve the purpose of the study 160 male athletes from four regions of India such as South, North, East and West consist of 10 athletes in each category like sprinters, middle distance runners, jumpers and throwers from different topography namely plain, hills and coastal athletes selected at random. The VO_{2MAX} and breath holding time were selected as pulmonary variables and the selected variables are tested by using Harvard step test and Hold the breath in a minute. The collected data on dependent variables statistically tested by using 4X4 factorial design to find the main and interaction effects. The scheffs post hoc test used to find the paired mean difference, when the main and interaction effects found significant. The level of significance was fixed at 0.05. The results on VO_{2MAX} on factor A (Different Athletes) and factor B (Different Region) significant with middle distance runners and sprinters, jumpers, throwers. The results of breath holding time on factor A (Different Athletes) and factor B (Different Region) found significant. The interaction effect on selected dependent variables shows significant. The study concluded that the VO_{2MAX} similar among different category athletes whereas the same was differ at topography. The breath holding time varies on different category athletes and topography too.

Keywords: Athletes, topography, VO_{2MAX} and breath holding time

Introduction
The young endurance trained athletes have three main physiological determinants of endurance performance are believed to be maximal oxygen consumption, exercise economy and the exercise intensity at which a high fraction of the maximal oxygen consumption can be sustained, as typically defined by the 'lactate threshold' (Hagberg, 1983; Joyner, 1993) [4, 6]. Exercise economy measured as the steady state oxygen consumption while exercising at specific sub-maximal exercise intensity below the lactate threshold. Among endurance athletes, exercise economy is an important determinant of endurance performance (Morgan *et al.* 1989) [8], particularly in groups that are more homogeneous than heterogeneous in VO_{2MAX} (Morgan *et al.* 1989) [8]. Maximal oxygen consumption establishes the upper limit of maximal energy production through oxidative phosphorylation and is generally considered to be a primary determinant of endurance exercise performance among young endurance trained athletes (Joyner, 1993; Coyle, 1995) [6, 1]. VO_{2MAX} declines approximately ten per decade after age 25–30 years in healthy sedentary adults of both sexes (FitzGerald *et al.* 1997) [5]. Endurance performance and VO_{2MAX} are strongly and positively related in groups of highly trained and competitive distance runners varying in age. Moreover, reductions in endurance exercise performance with age are closely associated with corresponding decreases in VO_{2MAX} (Fuchi *et al.* 1989; Marcell *et al.* 2003) [3, 7]. Indeed, VO_{2MAX} and breath holding time was the best analytical variables to find the difference among various topography athletes in India.

Methodology
To achieve the purpose of the study 160 male athletes from four regions of India such as South, North, East and West zones consist of 10 athletes in each category like sprinters, middle distance runners, jumpers and throwers from different topography namely plain,

hills and coastal athletes selected at random. The VO_{2MAX} and breath holding time were selected as pulmonary variables and the selected variables are tested by using Harvard step test and Hold the breath in a minute. The unit of measurement of VO_{2MAX} was ml/kg/min and the breathy holding time in $1/100^{th}$ second. The collected data on dependent variables statistically tested by using 4X4 factorial design to find the main and interaction effects. The Factor A denotes the category of the athletes such as sprinters, middle distance runners, jumpers and throwers and the factor B denotes the different topography such as South, North, East and West zone of Indian Universities. The scheffs post hoc test was used to find the paired mean difference, when the main and interaction effects found significant. The level of significance was fixed at 0.05.

Results

Table 1: Mean values of factor A and Factor B on VO_{2MAX} and breath holding time

VO_{2MAX} (ml/kg/min)				Breath Holding Time (Seconds)			
Factor A	**Mean**	**Factor B**	**Mean**	**Factor A**	**Mean**	**Factor B**	**Mean**
Sprinters	2.69	North	2.61	Sprinters	71.73	North	72.33
Jumpers	2.84	South	2.80	Jumpers	69.48	South	69.33
Throwers	2.53	East	3.22	Throwers	73.40	East	70.25
Mid. Dis. Runners	3.52	West	2.74	Mid. Dis. Runners	66.38	West	69.07

Table 2: The Main and Interaction Effects of Factor A and Factor B on VO_{2MAX}

Source of Variance	Sum of Squire	Degrees of Freedom	Mean Square	F. Ratio
Factor – A	22.72	3	7.57	47.51*
Factor – B	0.43	3	0.14	0.91
AXB	4.56	9	0.51	3.61*
Error	23.10	144	0.61	
Total	50.81	159		

*Significance at 0.05.

Table 3: The Main and interaction effects of factor A and Factor B on breath holding time

Source of Variance	Sum of Squire	Degrees of Freedom	Mean Square	F. Ratio
Factor – A	1108.57	3	369.52	255.70*
Factor – B	261.67	3	87.22	60.36*
AXB	33.16	9	3.68	2.55*
Error	208.10	144	1.45	
Total	1611.49	159		

*Significance at 0.05.

The results on pulmonary variables among different topography athletes shows that the VO_{2MAX} have significant difference among sprinters, middle distance runners, jumpers and throwers whereas there was no significant difference among different topography. The paired mean differences and the simple effect interpretation on VO_{2MAX} show that the sprinters, middle distance runners, sprinters, and jumpers have no significant difference. In view of topography the north zone and south zone paired mean have significant difference on VO_{2MAX}.

The results on breath holding time on factor A and factor B shows that there was a significant difference found on main and interaction effects. The paired mean differences and the simple effect interpretation on breath holding time on paired mean of athletes and topography found significant. Among athletes, the throwers have greater breath holding time when compare with sprinters, jumpers and middle distance runners. The comparison on breath holding time among different topography also found significant in favour of north zone athletes when compare with south, east and west zone athletes.

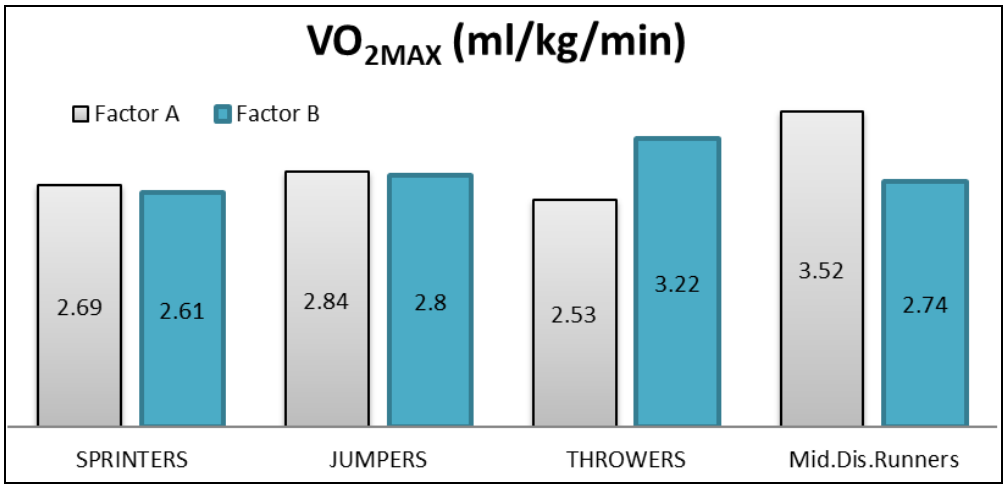

Fig 1: The Bar Diagram of Mean Values of VO_{2MAX} of Factor A and Factor B

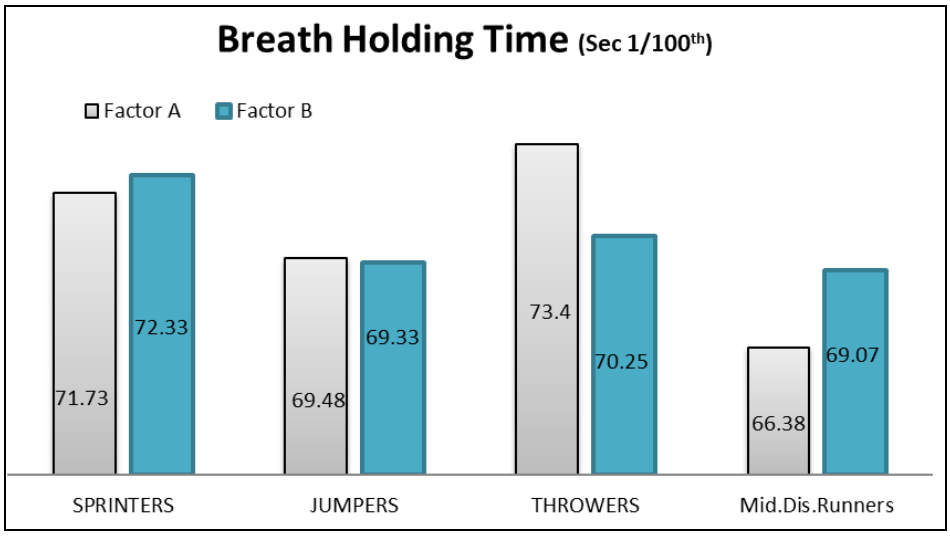

Fig 2: The bar diagram of mean values of breath holding time of factor A and Factor B

Discussion

The results on pulmonary variables such as VO_{2MAX} and breath holding time were in line with previous finding and it shows that the Masters Endurance athletes are capable of remarkable athletic and physiological functional performance, thereby representing a uniquely positive. However, endurance exercise performance decreases during middle age and declines at an even more rapid rate in older age. The available data indicate that decreases in VO_{2MAX} are the most clear and consistent contributor to these declines in performance (Marcell *et al.* 2003) [7]. The difference in topography decreases in VO_{2MAX} in endurance exercise trained adults are mediated by reductions in maximal cardiac output and maximal arteriovenous O_2 difference, With reductions in both maximal stroke volume and heart rate contributing to the former. The present study also have similarity and contrast on the selected pulmonary variables among athletes in the different topography of Indian University Athletes.

Conclusion

Based on the results of the study concluded that the middle distance runners have greater VO_{2MAX} when compare with sprinters, Jumpers and Throwers. There was no significant difference among the different topography athletes on $VO_{2MAX.}$ There was a significant difference found among athletes and regions on breath holding time. The throwers have greater breath holding time when compare with sprinters, jumpers and middle distance runners and the north zone athletes have greater breath holding time when compare with east, west and south zone athletes on breath holding time.

Recommendation

From the study outcome it will recommended that the pulmonary variables among athletes in the different topography of India have greater impact and need more attention to improve performance to attain higher-level achievements.

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