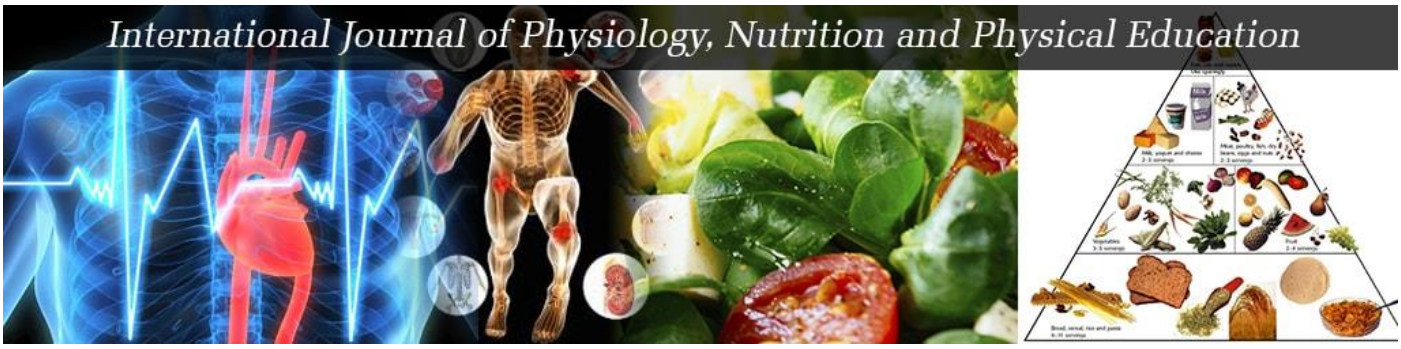

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A comparative study on maximal oxygen consumption in relation to body composition of athletes and non-athletes

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Abstract
The present study was stated as "A comparative study on maximal oxygen consumption in relation to body composition of athletes and non-athletes" purpose of the study was to find out if there any relationship between body composition and maximal oxygen consumption. The athlete subjects of this study was selected from the students of B.P. Ed course and the non-athlete subjects were from the students of other courses in the University of Kalyani. The age, height, weight was determined as personal data. Percentage of body fat was estimated through girth measurement method which after finding percentage body fat, the fat mass, lean body mass was calculated as other component of body composition. Maximal oxygen uptake capacity was determined by using Queens College Step Test. From collected data analyzed through applied proper statistical procedure and presented in tabular form. The mean value of fat percentage, F.M. & LBM were 12.70+_6.16,7.70+_4.74 and 50.50+_3.16 respectively for athlete group and 17.30+_5.13, 10.50+_4.25, 51+_3.93 respectively for non-athlete group. The significance difference was found in VO2max of athlete and non-athlete group. But there were no significant difference in percentage body fat, fat mass and lean body mass. The significant relation was found between vo2max and LBM. The 'r' value was 0.4467.

Keywords: Maximal oxygen consumption, body composition, athlete, non-athlete

Introduction
In the last few decades sports have gained tremendous popularity all over the globe. The popularity of sports is still increasing at a few pace and happy trend is likely to continue in the future also. When all looks at the history of the Modern Olympic Games has increased steadily. In addition to Olympic sports indigenous sports have also become popular in each Country. Several new sports like sky-diving, skating, motor racing have also come into existence and are quite popular with the masses. Keeping in mind the aims, organization, and means of sports activities the sports are classified into several area like performance sports, physical education, rehabilitation sports, fitness and leisure sports, Adventure sports etc. the area performance sports has gained much more publicity and importance than the other areas.

Objective of the Study
The objective of the study was to find out the relationship between body composition and maximum oxygen uptake capacity (vo2max0 of athletes and non-athletes.
To observe and compare the vo2max of athletes and non-athletes group.
To observe and compare the percentage of body fat & lean body mass of athlete group and non- athlete group.

Hypothesis
1. It was hypothesized that there may be any relationship between body composition and oxygen uptake capacity (vo2max).
2. It was hypothesized that there may be significant different in vo2max of athlete and non-athletes group.
3. It was hypothesized that there may be significant difference in body fat percentage of athletes and non-athletes group.

Methodology

Athlete subjects were selected from B.P.Ed. Course 2005-06 under the dept. of physical education of Kalyani University. Both groups ten subjects were selected randomly all of them were under 21-25 year's age bar. As they were regular physical activity, were considered as athlete. The non-athlete subjects were selected randomly from a hotel of K.U. They were considered as non-athletics because they were not under regular physical activity.to get the require information and data the following tests and measurements were taken.

1. Measurement of personal data
   - Age
   - Height
   - Weight
2. Body composition
   - Right upper arm
   - Abdomen
   - Right fore arm
3. Maximum oxygen uptake capacity

Analysis and Interpretation of data

Personal data

The Mean and SD of height, weight and age of athlete & non-athlete groups are calculated from the raw scores using appropriate statistical formula and are presented in below.

Table 1: Mean and SD of personal data- Height, Weight, Age

Personal data	Athlete Group		Non-Athlete Group	
	Mean	SD	Mean	SD
Height(cm)	167.50	3.82	164.8	6.68
Weight(kg)	58.20	6.30	61.6	5.30
Age(year)	25.00	1.89	22.7	1.42

The data appear in Table-1 show that the average height of the athletes are 3cms more than non-athletes. But average weight of the athletes are 3.5 kg less than the non-athletes and the average age of the athlete are 2 years more than non-athlete group.

Maximal Oxygen consumption (vo2max)-

The maximal oxygen consumption was determined using Queens College Test or pulse rate test. The means and SD of vo2max is presented in Table-2.

Table 2: Mean and SD Maximal Oxygen Consumption

Maximal Oxygen Consumption(Vo2Max ml kg1min1)	M/SD	Athletes	Non-Athletes
	Mean	50.70	47.20
	SD	4.07	3.24

It observed from table-2 that average Vo2max of athletes and higher (3.5 ml kg1 min1) than the non-athletes.

Body composition

The percentage of body fat estimated from girth measurement method and fat mass &lean body mass are calculated using algebraic formula in Table-3.

Table 3: Mean & SD of Fat percentage, FM, LBM

Body composition items	Athletes Group		Non-Athletes Group	
	Mean	SD	Mean	SD
Fat percentage	12.70	6.16	17.30	5.13
FM(kg)	7.70	4.74	10.50	4.25
LBM(kg)	50.50	3.16	51.00	3.93

It's observed from the table-3 the percentage of body fat, fat mass and lean body mass all are higher in case of non-athletes than that of athletes by 4.5%, 3 kg, and 0.5 kg respectively.

Table 4: Comparison of Means &'t' value of vo2max of athlete and non-athlete groups

Variable	Athlete group (N=10)	Non-athlete group (N=10)	M1-M2	't'
Max.VO2	50.7+-4.07	47.20+-3.24	3.5	2.125*

*= To be significant at 0.05level of confidence, required' value=2.101

When DF=18. It appears from that two means are different and the table-4 difference in statistically significant. It also indicates that athletes are significantly higher in their aerobic capacity than the non-athletes. Since athletes are in regular physical activity, it is expected that their aerobic capacity would be better than non-athletes.

Table 5: Comparison mean of percentage of body fat among athlete and non-athlete group

Variable	Athletes Group (N=10)	Non-athletes Group (N=10)	Mean diff. M1-M2	't'
Percentage of body fat	12.7+_6.16	17.3+_5.13	4.6	1.814

It observed that non-athletes have more body fat than the athletes. The obtained value, the different between the groups on body fat is 1.814, which is not significance at 0.05 level.

Table 6: Comparison of mean of fat mass between athletes and non-athletes groups

Variable	Athletes Group (N=10)	Non-athletes Group (N=10)	Mean diff. M1-M2	't'
Fat Mass(kg)	7.70+_4.74	10.50+_4.25	2.80	1.390*

It appears from the table that average fat mass of non-athletes is higher by 2.80 kg than athletes. 't' value is not significant at 0.05 level, the magnitude of difference is around 26.6%.

Table 7: Comparison Means of LBM of athlete and non-athlete groups

Variable	Athletes Group (N=10)	Non-athletes Group (N=10)	Mean diff. M1-M2	't'
LBM (kg)	50.50+_3.16	51.00+_3.93	0.50	0.313

The difference between mean of two groups is very low and 't' values is also not significant at any level of confidence.

Table 8: Coefficient of Correlation between maxvo2 & percentage body fat

Group	Max.VO2	Percentage of body fat	r
Athletes (N=10)	M=50.70	M=12.70	-0.073
Non-athletes (N=10)	M=47.20	M=17.30	-0.120

No significant correlation is found between Max.vo2 & percentage of body fat of neither for athlete group nor for non-athlete group. The 'r' value in both the groups is negative almost nearly zero etc. may be due to small size.

Table 9: Coefficient of Correlation between maxvo2 & LBM

Group	Max.VO2	LBM(kg)	r
Athletes (N=10)	M=50.70	M=50.50	-0.2280
Non-athletes (N=10)	M=47.20	M=51.00	-0.4240

The co-efficient of correlations present in table-9 between max.vo2 and LBM is not significant for any group. The value of 'r' is positive for both the groups but not significant.

Table 10: Coefficient of Correlation of combined vo2max & percentage body fat

Vo2max	Percentage of body fat	Co-efficiency correlation(r)
M= 48.94	M= 15.02	-0.2120

*= significant at 0.05 level, required 'r' value is 0.4451 for N=20

The 'r' value shown in the table in negative but not highly. So it is not not significant at 0.05 level.

Table 11: Coefficient of Correlation of vo2max & LBM

Vo2max	LBM	Co-efficiency correlation(r)
M= 48.94	M= 50.76	0.4467*

It may be observed from the above table that co-efficient of correlation 'r' is significant between maxvo2 and LBM. It proved that LBM positively influence the max. Aerobic capacity or maximum oxygen consumption.

Conclusion

1. Mean max vo2 was higher in athlete than their non-athlete counterpart also there was significant difference in vo2 max between two groups.
2. There was no significant difference in percent of body fat, fat mass and lean body mass between athletes and non-athletes.
3. There was no significant relationship between max. Vo2 and percent body fat neither among athletes nor among non-athletes.
4. Max. Vo2 was not significantly related with fat mass and LBM in case of athlete and non-athlete groups.
5. Combined Vo2 Max was insignificantly related to combine LBM but not significantly related with combined percent body mass.

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