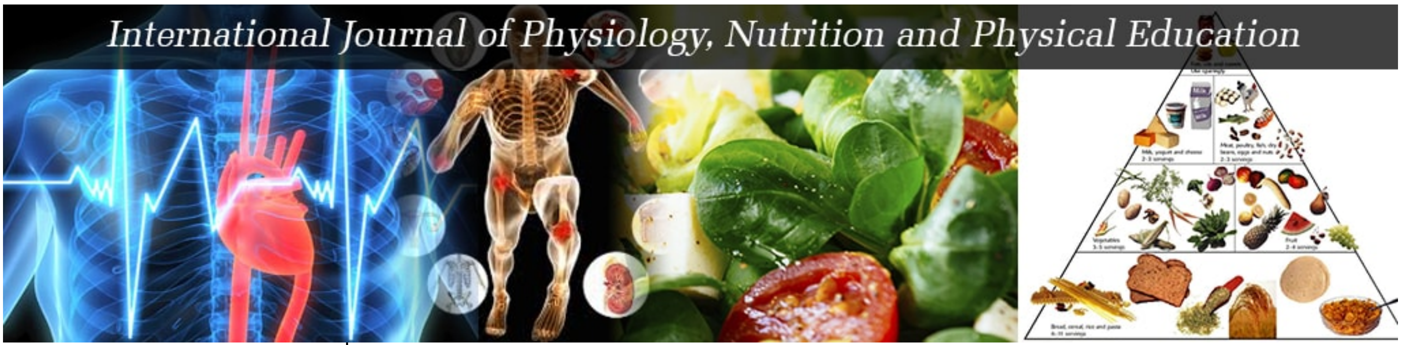

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Comparative study of vital capacity between swimmers and long distance runners

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Abstract
For the purpose of study 10 Swimmers and 10 long distance runners were selected who had represented at National level. The subjects were Females and the age group of subjects was ranging between 18-24 years. Data was collected on 10 swimmers and 10 long distance runners of Maharashtra. The necessary data was collected through the administration of standardize instruments for the measurement of chosen variables. The data was collected at that time which was convenient to the subjects. The data was analyzed and compared with the help of statistical procedure in which mean, standard deviation, DF and 't' test were used to compare the data. The statistical analysis of data shows that the vital capacity of long distance runners and swimmers was found statistically significant with regard to FVC(L), FEV(1), FEV1/FVC%, PEF (L/S), FEF 25-75 (L/S) where the swimmers had performed better than the long distance runners. If we look into the physiological status of both the categories both have almost similar profile and requirement as per the requirement of their games.

Keywords: FVC, FEV, PEF, FEF

Introduction

Lung volume is fairly well predicted on the basis of age, height and weight, but lung volumes which are greater than predicted have been repeatedly observed in swimmers. This characteristic of swimmers has, largely, been attributed to genetic endowment, or to increased values for inspiratory mouth pressure implying that swimmers can distend their lungs more than non-swimmers. However, longitudinal studies have suggested that swimming itself may be responsible for the increased lung size and recent reports of normal inspiratory mouth pressure in swimmers, have suggested that the large lung volume found in swimmers is not due to increased inspiratory muscle strength. Increased lung size in association with normal lung mechanics can occur with environmental or hormonal stress, including swimming, exposure to high altitude, hypoxia and in subjects with high levels of circulating growth hormone.

Respiration is a physical process by which living organisms take in oxygen from the surrounding medium and emit carbon dioxide. The term respiration is also used to refer to the liberation of energy, within the cell, from fuel molecules such as carbohydrates and fats, carbon dioxide and water. The main aim of respiration is to provide oxygen to the tissues and to remove carbon dioxide from the tissues. In order to achieve this objective, there must be inflow and outflow of air from the atmosphere to the lungs alveoli and vice versa. The transport of oxygen from the atmosphere to the cells and the transport of carbon dioxide from the tissues to the atmosphere is referred to as 'external inspiration' while the reaction of oxygen within the cell and the resultant formation of carbon dioxide within the cell is known as internal inspiration. The gases must diffuse between alveoli and blood, oxygen and carbon dioxide must be transported in the blood and body fluids to and from the cells. There must be proper regulation of inspiration in order to maintain adequate ventilation. William and Terry (2002) [13] - They conducted a study to determine if pulmonary function or exercise performance could be changed by Power lung by specifically training the respiratory muscles using a power lung resistance device and the results showed positive changes in pulmonary function. Daniel *et al*. (2003) - He has reported that young swimmers have longer lung volumes and a greater cardio respiratory functional capacity than other children.

Selection of Subjects

For the purpose of study 10 Swimmers and 10 long distance runners were selected who had represented at National level. The subjects were Females and the age group of subjects was ranging between 17-25 years.

Collection of DAta

Data was collected on 10 swimmers and 10 long distance runners of Maharashtra. All the subjects had represented their states at national level. The necessary data was collected through the administration of standardize instruments for the measurement of chosen variables. The data was collected at that time which was convenient to the subjects.

Methodology and Procedure

Each subject performed a deep inhalation followed by a forceful exhalation into the mouthpiece tube of Spirometer until all air was expelled. The subject then performed a normal inhalation to complete the maneuver. System automatically calculated the actual values and displayed the same on screen. If the investigator was satisfied with the test then save the data if not then test was repeated again. The system automatically retained the best test. Follow the above maneuver Real Time Flow/Volume & Volume/Time graphs were plotted and printed and then the above mentioned variables were recorded. Each subject came for two times after every trial their vital capacity was noted the subject was thanked for their co-operation.

Criterion Measures

FVC: Forced Vital Capacity was measured in liters, FEV1: Volume was exhaled after 1 sec. in liters, FEVI/FVC %: It was measured in liters, PEF (L/S): Peak expiratory flow rate was measured in liters per second and Forced Expiratory Flow 25–75% or 25–50%.

Statistical Techniques

The data was analyzed and compared with the help of statistical procedure in which mean, standard deviation, DF and t test was used to compare the data.

Findings of the study

Mean, S.D. of the selected dimensions of was swimmers and long distance runners computed. Its results have been depicted in table 1 and table 2.

Table 1: Mean and standard deviation of 5 dimensions of long distance runners

Sr. No.	Variable	Units	Long distance runners	
			Mean	**S.D.**
1	FVC	liters/second	3.65	0.102
2	FEV(1)	liters/second	3.05	0.067
3	FEV1/FVC%	liters/second	86.72	0.547
4	PEFR(L/S)	liters/second	9.26	0.141
5	FEF 25-75	liters/second	4.62	0.072

The table 1 and fig. 1 shows the mean and standard deviation values of 5 dimensions of Long Distance Runners. These values were recorded as variable wise, FVC 3.565 and 0.1039, FEV (1) 3.05 and 0.067, FEV1/FVC% 86.72 and 0.547, PEF (L/S) 9.26 and 0.141, FEF 25-75 4.62 and 0.072 respectively.

Table 2: Mean and standard deviation of 5 dimension of swimmers.

Sr. No.	Variable	Units	Swimmers	
			Mean	S.D.
1	FVC	liters/second	3.91	0.354
2	FEV(1)	liters/second	3.38	0.289
3	FEV1/FVC %	liters/second	86.34	0.653
4	PEFR (L/S)	liters/second	9.75	0.511
5	FEF 25-75	liters/second	4.83	0.167

Table 2 and fig. 2 reveals that mean and standard deviation values of 5 variables of Swimmers were recorded as FVC (L) 3.91and 0.354, FEV(1) 3.38 and 0.289, FEV1/FVC% 86.34 and 0.653, PEFR (L/S) 9.75and 0.511, FEF 25-75 4.83 and 0.167 respectively.

Table 3: Comparative Analysis of FVC (L) between Long distance runners and Swimmers

Group	Number	Mean	S.D.	df	't' value
Long distance runners	10	3.569	0.111	18	0.006
swimmers	10	3.903	0.355		

*Significance at .01 level Tabulated 't' value 2.88 (18)

Table 3 presents the data pertaining to mean and standard deviation values with regard to long distance runners on the FVC (L) variable which were recorded 3.569 and 0.111 respectively, whereas in the case of swimmers the same were recorded 3.903 and 0.355 respectively and were found to be statistically significant results, because calculated t-value 0.006 was more than tabulated t-value (2.88) at 0.01 level where the swimmers shows higher FVC (L) value in comparison to long distance runners

Table 4: Comparative Analysis of FEV1 (L) between Long Distance Runners and Swimmers

Group	Number	Mean	S.D.	df	't' value
Long distance runners	10	3.09	0.075	18	0.006
swimmers	10	3.36	0.289		

* Significant at .01 level Tabulated 't' value 2.88 (18)

The perusal of table 4 that the mean and standard deviation values of long distance runners on the FEV(1) variable were recorded as 3.09 and 0.075 respectively where as in case of swimmers the same were recorded as 3.36 and 0.289 respectively. There has been significant difference between long distance runners and swimmers at .01 level where calculated 't' value 0.006* is less than tabulated 't'-value 2.88.

Table 5: Comparative Analysis of FEV (1) /FVC% between Long Distance Runners and swimmers

Group	Number	Mean	S.D.	df	't' value
Long distance runners	10	86.83	0.54	18	0.045
swimmers	10	86.33	0.63		

*Significant at .01 level Tabulated 't' value 2.88(18)

Table 5 indicates that the mean and standard deviation values of long distance runners on the FEV(1)/FVC% were recorded as 86.83 and 0.554respectively where as in case of swimmers the same were recorded 86.33 and 0.63 respectively, there has been slight difference between long distance runners and swimmers. Calculated 't' value 0.045 is less than tabulated 't' value 2.88. No significant difference was observed where the mean value shows that the long distance runners are better than the swimmers in this parameter.

Table 6: Comparative Analysis of PEF (L/S) between Long Distance Runners and swimmers

Group	Number	Mean	S.D.	df	't' value
Long distance runners	10	9.26	0.141	18	0.007
swimmers	10	9.77	0.513		

*Significant at .01 level Tabulated 't' value 2.88 (18)

The perusal of table 6 shows that mean and standard deviation value with regard to long distance runners on PEF (L/S) variable were recorded 9.26 and 0.141 respectively where as in case of swimmers the same were recorded as 9.77 and 0.513 respectively. There has been significant difference between long distance runners and swimmers where swimmers performed better than their counterparts long distance runners because calculated 't' value is 0.007* is less than tabulated 't' value 2.88.

Table 7: Comparative Analysis of FEF 25-75 between Long Distance Runners and Swimmers

Group	Number	Mean	S.D.	Df	't' value
Long distance runners	10	4.677	0.71	18	0.015*
swimmers	10	4.823	0.169		

*Significant at .01 level Tabulated 't' value 2.88 (18)

Table 7 indicates the mean and S.D. values with regard to swimmers on FEF 25-75 variable were recorded 4.677 and 0.71 respectively whereas in case of long distance runners the same were recorded as 4.823 and 0.169. There has been significant difference between long distance runners and Swimmers, where the swimmers have performed better than long distance runners. Calculated 't' value 0.015* is less than tabulated 't' value 2.88.

Discussion of the findings

The statistical analysis of data shows that the vital capacity of long distance runners and swimmers was found statistically significant with regard to FVC(L), FEV(1), FEV1/FVC%, PEF (L/S), FEF 25-75 (L/S) where the swimmers had performed better than the long distance runners. If we look into the physiological status of both the categories both have almost similar profile and requirement as per the requirement of their games. The major difference among both the groups is of resistance and their training. In this variable the swimmers had out performed to long distance runners. Swimmers have to tackle with water resistance and because of this all vital capacity parameters have been affected. Thus it can be concluded that resistance and training of individual play important role in vital capacity. From the results it is further suggested that to raise the performance of long distance runners should undergo through maximum resistance training factor has to be considered. If we do resistance exercise or training it will result in increase of size of heart and lungs. These findings suggest that swimmers may have achieved greater lung volumes than either runners or control subjects, not because of greater inspiratory muscle strength, or differences in height, fat free mass, alveolar distensibility, age at start of training or sternal length or chest depth, but by developing physically wider chests, containing an increased number of alveoli, rather than alveoli of increased size. However, in this cross-sectional study, hereditary factors cannot be ruled out, although we believe them to be less likely. Selecting taller players vital capacity of players will be more and they will be able to supply more of oxygen to different body parts and the energy production from the body cells will be increased thus the performance of players will be increased. However, there are many other contributing factors e.g. comfortable life style, dieting habit, physiological and social attitude towards physical activity contribute a lot to make long distance runners better in variables on FVC (L), FEV(1), FEV1/FVC%, PEF (L/S), FEF 25-75 (L/S) These findings are in agreement with the findings of Marton *et al*. 1979, Kaufman *et al*. (1974) [11], Grimby & Sodarholm (1963) [10].

References

1. Zinman R, Gaultier C. Maximal static pressures and lung volumes in young female swimmers: one year follow-up. Pediatr Pulmonol 1987;3:145-148.
2. Malik SL, Singh IP. Ventilatory capacity among highland Bods: a possible adaptive mechanism at high altitude. Ann Hum Bioi 1979;6:471-476.
3. Cunningham EL, Brody JS, Jain BP. Lung growth induced by hypoxia. J Appl Physiol 1974;37:362-366.
4. American Thoracic Society. Lung function testing: Selection of reference values and interpretative strategies. American Review of Respiratory Discussion 1991;144:1202-1218.
5. Astrand P-O. Experimental Studies of Physical Working Capacity in Relation to Sex and Age, Copenhagen: Munksgaard 1952.
6. Belman MJ, Mittman C. Ventilatory muscle training improves exercise capacity in chronic obstructive pulmonary disease patients, American Review of Respiratory Discussion 1980;121:273-280.
7. Cerny. Breathing pattern during exercises in young black and Caucasian subjects, Journal of Applied Physiology 1987;62(6):2220-3.
8. Dempsey J, Hanson P, Pegelow D, Caremont A, Rankin J. Limitations to exercise capacity and endurance: pulmonary system, Canadian Journal of Exercise Physiology 1982;7(1):4-13.
9. Eaton T, Withy S, Garrett JE *et al*. Spirometry in primary care practice: the importance of quality assurance and the impact of spirometry workshops. Chest 1999;116:416-423.
10. Grimby G, Soderholm B. Spirometric studies in normal subjects. Acta Medical Scandinavica 1963;173:199-206.
11. Kaufmann DA, Swenson EW, Fencl J, Lucas A. Pulmonary function of marathon runners. Medical Science and Sports Exercise 1974;6:114-117.
12. Kenney RA. Physiology of Aging: A Synopsis Chicago: Year Book Medical Publishers 1982.
13. William Amoneute E, Terry Dubier L. The effect of respiratory muscle training on VO_2 max, the ventilatory threshold and pulmonary function, Journal of Exercise Physiology (online) 2002, 5(2).