Comparative Analysis on Selected Anthropometric and Motor Fitness Variables between Secondary and Higher Secondary Students

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ABSTRACT *The purpose of the present study was to compare the selected anthropometric and motor fitness variables namely Height, Weight, Body Mass Index (BMI), Speed, Agility, Explosive strength and Cardio-respiratory endurance (VO2max) between Secondary and Higher Secondary level Students. The study was conducted on 60 school level male students [30 Secondary level Students and 30Higher Secondary level Students]. They were randomly selected from Rampurhat Railway Adarsha Vidya-Mandir (R.R.A.V.M), Rampurhat, Birbhum, West Bengal. The age of subjects ranged between 14-18 years. In the present study Height, Weight, BMI, Speed, Agility, Explosive strength and Cardio-respiratory Endurance (VO2max) were chosen as the variables for the study. All the variables were measured using standard tests. Descriptive Statistics and independent t-test were used to calculate the data. The result of the study showed that there was significant difference between Secondary and Higher Secondary level Students in comparison to their Height, Weight, B.M.I, explosive strength and VO2max.*

INTRODUCTION

Anthropometric and Motor Fitness Ability are essential not only in terms of general health but also as a special physical requirement for competitive sports certain highly specialized and demanding occupation. It is universally accepted that success in various activities of games and sports mainly depends upon the Physical Fitness of its participants.

Anthropometric measurements are used to assess the size, shape and composition of the human body. To fully assess the status of the human body we need to utilize various anthropometric measurement, which includes systematic measurement of the size, shape and composition of the human body. This is a fairly easy term to recall if you remember that the prefix 'anthropo' refers to 'human' and 'metric' refers to 'measurement'. Anthropometric measurements are useful in many fields. For example, athletes understand that the body size and composition are important factors in sports performance. Sports coaches can also use these measurements to monitor an athlete's body to ensure they stay in peak physical shape.

Health care professionals rely on body measurements to evaluate a subject's overall health. For example, body mass index, (BMI) is a measurement of a person's weight-to-height ratio. Health care providers, insurance companies and government agencies use BMI to determine if a person is underweight, overweight or obese.

The AAHPERED Youth Physical Fitness Test has tremendously gained in importance and has been recognized as one of the major Physical Fitness Test. Variables such as strength, endurance, speed, power, flexibility, cardio-vascular endurance seem to play an important role to determine success in sports. Physical fitness is the basic need for participation in games and sports. The fitness level of various physical fitness components is most important to choose the sports event. The purpose of the present study is to compare the Anthropometric and Motor fitness variables between Secondary and Higher Secondary Students and thereby have a conclusion on how those variables changes with age.

Objective:

Comparative study of some Selected Anthropometric and Motor fitness variables between Secondary and Higher Secondary Students.

Methodology:
Subjects:

Sixty (60) School level male students were randomly selected from Rampurhat Railway Adarsha Vidya-Mandir, Rampurhat, Birbhum, W.B. including thirty (30) Secondary students(S) and thirty (30) Higher Secondary students(HS). The age of the students ranged between 14-16($\pm$1) and 16-18($\pm$1) years respectively.

Variables:

Anthropometric components namely weight, height and BMI and Motor Fitness components namely Speed, Agility and VO_2max were selected as the parameters for the study.

Test and Criterion Measures:

All the variables were measured by using standard test.

Statistics:

Descriptive Statistics and independent t-test were used to calculate the data. The level of significance was set at 0.05.

RESULTS :

The result of the study showed that the Higher Secondary Students were significant than the Secondary level Students by Weight (4.228), Height(4.418), BMI(2.559), SBJ(2.185) respectively. But VO2max (4.145) of Secondary Students were significantly better than the Higher Secondary level Students. There is no significant difference between the Secondary and Higher Secondary level students with respect to Speed (0.894) and Agility (1.887).

The results obtained from the present study can be summarized as follows –
1. Weight(S) < Weight (HS)
2. Height(S) < Height (HS)
3. BMI (S) < BMI (HS)
4. SBJ (S) < SBJ (HS)
5. Agility (S) > Agility (HS)
6. Speed (S) > Speed (HS)
7. VO2 (S) > VO2 (HS)
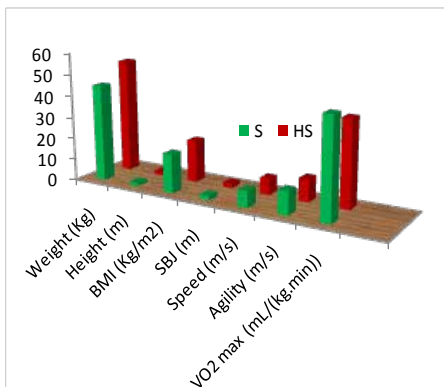
Figure 1: 3-D bar diagram of the obtained result.

Table 1

Group Statistics					
	Group	N	Mean	Std. Deviation	Std. Error Mean
Weight	S	30	45.2333	8.74025	1.59574
	HS	30	53.6667	6.55656	1.19706
Height	S	30	1.5757	0.07829	0.01429
	HS	30	1.6537	0.05678	0.01037
BMI	S	30	18.0777	2.44933	0.44718
	HS	30	19.6283	2.23887	0.40876
SBJ	S	30	2.0100	0.17311	0.03160
	HS	30	2.0987	0.13935	0.02544
Speed	S	30	7.6430	0.45806	0.08363
	HS	30	7.5377	0.45457	0.08299
Agility	S	30	10.9020	0.72640	0.13262
	HS	30	10.6010	0.48553	0.08865
VO2	S	30	46.0340	4.24857	0.77568
	HS	30	40.1540	6.50636	1.18789

Discussion:
According to medical science height and weight increases accordingly (for a healthy person i.e. a person having a well-defined physique and who is not under any kind of medical attention) up to a certain age and then it remains stagnant for a prolonged time period with irregular fluctuation from the mean value and then after a age both falls. The results obtained in column 1 and 2 are in accordance as both category subjects are in adolescence and the higher secondary students have their mean age greater than the secondary students. Generally up to age 16 ($\pm$1) heights grow more than weight hence a lower BMI is obtained. After that weight increase dominates over the height increase. The BMI value however indicates that Higher Secondary students are healthier than the Second-

ary students. Result obtained in point 3 is thus in accordance.

Standing broad jump (SBJ) is the parameter which needs enormous muscular strength (especially of leg). So, SBJ values for higher secondary students must be greater than the Secondary students. Point 4 is in agreement with the above analysis.

Table 2

	Mean Diff.	Std. Error Diff.	t ratio	Sig. (2-tailed)
Weight	8.43333	1.99483	4.228	0.0001
Height	0.07800	0.01766	4.418	0.0001
BMI	1.55067	0.60585	2.559	0.013
SBJ	0.08867	0.04057	2.185	0.033
Speed	0.10533	0.11782	0.894	0.375
Agility	0.30100	0.15952	1.887	0.064
VO2	5.88000	1.41872	4.145	0.0001

Agility decreases as one switches from Secondary to the Higher Secondary students case (Result 5). Agility or nimbleness is the 'rapid whole body movement with change of velocity or direction in response to a stimulus'. It is a combination of static and dynamic balances, co-ordination, speed, reflexes, strength and endurance. A greater muscular strength is required for a greater agility which is more likely in a Higher Secondary student, which is in contradiction with the result obtained. The cause behind such anomaly is that Agility is not the function of Strength and Endurance only but also depends on a major proportion on both static and dynamic balances and reflexes which is more likely in a Secondary student. This is in agreement with the result.

Speed is generally a function of agility and height. The first parameter favors the Secondary students to have a greater value of speed while the factors of height become more advantageous to Higher Secondary students. So it appears to us in the present study (result mentioned in point 6) that agility dominates over height factor in determining speed if the former parameters are only marginally greater than each other.

VO_2max is the maximum rate of Oxygen consumption as measured during incremental exercise which reflects the aerobic physical fitness of the individual, is an important determinant of their endurance capacity during prolonged, sub-maximal exercise. VO_2max is measured by

$$VO_2\text{max} \sim 15.3*(HRmax/HRrest)$$

and is expressed in the unit of mL/(kg.min). Generally it is argued that while trained subjects probably are supply limited, untrained subjects can indeed have a demand limitation. Age, sex, fitness, training, changes in altitude can affect the VO_2max. In our study sex, altitude, training parameters has not been changed. Age has been taken as

the intentional variable and fitness is the random variable in our subjects. With age VO_2max pass through a maximum value. Agility values and speed of secondary students indicate that they must have higher VO_2max value and as age increases fitness will decrease and also the values of VO_2max will. This matches with the result obtained in point 7.

Conclusion:

In summary we have found that Higher Secondary students are healthier than the Secondary students while the Secondary students have higher speed and agility. Our study reveals that to be a successful athlete one should undergo routine training from the very childhood since ageing destroys performance level. Fitness variables must be kept within optimum level. Variables which decrease with age and are very fundamental in determining an athlete`s success must be checked and kept in control through proper training, routine exercises and maintaining balanced diet.

REFERENCES:

[1] R.A. Faldu, International J. of Health, 15, pp 12-15(2014).

[2] Barry L. Johnson and Jack K. Nelson (1988),*Practical Measurement for Evaluation in Physical Education* (New Delhi: Surjeet Publication).

[3] Davis B., Physical Education and Study of Sports. Harcourt Publishers, Spain, 121-22 (2000)

[4] Gallahue D. L. and Ozmun J. C. Understanding Motor Development , Infants, Children Adolescents, Adults, 6th ed. Mc Grow- Hill, New York, USA (2006).

[5] Lidor R. and ZivG. Physical and Physiological Attribute of Female Volleyball players: A Review, Journal of Strength and Conditioning Research, 24(7), 1963-73(2010).

[6] Chowdhury.M-(2015) Analysis of Selected Motor Fitness Components between Basketball and Kho-Kho Players.

[7] Clake HH and Clarke DH (1987).*Application of Measurement to Physical Education*.Printice Hall, Inc., Englewood Cliffs, New Jersey.

[8] Verma, J .P., A (2000)*Text Book on Sports Statistics*, Venus Publication , Gwalior, India

[9] International Journal of Scientific Research.2(7): 442-444

[10] Babu PM and Reddy MSS (2014),*Comparative Analysis Of Speed And Agility Among University Players Of Different Disciplines.*

[11] International Journal of Health, Physical Education and Computer Science in Sports.13(1): 8

[12] Wagner P. D. (2000) . "New ideas on limitations to VO2 max" , Exercise and Sport Science Reviews 28 (1) : 10-4.

[13] Noakes , Tim (2003) , The Lore of Running . (4th edition) Oxford University Press ISBN 0-87322-959-2.