

Comparative study on growth status of Teen age Male Volleyball players on selected Physical and Physiological Parameters

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Abstract— The game of Volleyball was invented a long way since 1895 when W. G. Morgan hang a tennis net six feet across the Holyoke “Y” gym and volleyed a basketball bladder back and forth and named it as “mignonette. Initially, the game was managed by Indian Olympic Association and the Interstate volleyball Championship was conducted every two years between the years 1936 and 1950. The purposes of the study were to find out the relationship of growth status between the variables of U-14 years and U-19 years groups. Sixty two (62) male subjects were selected for this study. Among them, thirty one (31) male subjects for U-14 and thirty one (31) male subjects for U-19 years groups. Findings revealed that the relationship between variables of the three growth variables, relationship existed in all of the two age groups except in height and BMI of two groups.

Key Words: Volleyball, growth status, U-14 years, and U-19, BMI

I. INTRODUCTION

A. General Introduction:

The game of Volleyball was invented a long way since 1895 when W. G. Morgan hang a tennis net six feet across the Holyoke “Y” gym and volleyed a basketball bladder back and forth and named it as “mignonette “. Later Dr. L. H. Gulick and Dr. A. T. Holstead of Springfield College noted the nature of play “volling the ball” and named it as “Volleyball”.

On July 7, 1896 at Springfield College the first game of Volleyball was played

In 1900 a special ball was designed for the sports.

In 1916 in the Philippines and offensive style of passing that ball in high trajectory to be struck by another player (the set and spike were introduced).

In 1917 the game was changed from 21 to 15 points.

In 1920 three hits per side and back row attack rules were introduced.

In 1930 the first two man beach game was played.

In 1934 the approval and recognition of National Volleyball referees.

In 1947 the FIBV was found.

In 1949 the initial World Championships were held in Prague, Czechoslovakia.

In 1964, Volley was introduced two the Olympic Game in Tokyo.

In 1986 the Women’s professional Volleyball Association (WPVA) was formed.

In 1988 US men repeated the gold in the Olympics in Korea.

In 1990 the world league was created.

In 1995 the sports of Volleyball was hundred years old.

In 1996 two person beach Volleyball was added to the Olympic.

B. History of Volleyball in India:

The Y.M.C.A. College of physical education in Madras (now Chennai) first began training its students in the sport, which then eventually spread to other parts of the country. Initially, the game was managed by Indian Olympic Association and the Interstate volleyball Championship was conducted every two years between the years 1936 and 1950. In the year 1951 the Volley Federation of India was establish. After India independence, the first Indian National Championship was organized in 1952 at Chennai. The Indian volleyball team won gold medal in 1955 at the International Asian Meet held at Japan.

C. BMI & Growth:

The Body Mass Index (BMI) is a heuristic proxy from human body fat based on individuals’ weight and height. BMI does not actually measure the percentage of body fat. It was devised between 1930 and 1950 by the Belgian Polymath Adolph Quetelet during the course of developing social physics. BMI is defined as the individual’s body mass divided the square of his or her height. The formula universally used in medicine produced unit measures of kg/m^2 .

$$\text{BMI} = \{\text{Mass (in kg)}/\text{Height (in m)}^2\}$$

Growth: Growth refers to an increase in sum quantity over time. The quantity can be:

Physical (e.g. growth in height, growth in weight)

Abstract (e.g. a system becoming more complex, an organism becoming more mature)

Growth, body composition influenced by complex interactions between genetic and environmental factors, which include nutrition, exercise and other aspect of lifestyle. Growth status changes with the change of age (male up to 25 and female up to 21). Puberty is a time of rapid change in size, shape and body composition for both sexes.

$\text{Vo}_2 \text{ max}$:

$\text{Vo}_2 \text{ max}$ (also maximal oxygen consumption, maximal oxygen uptake, peak oxygen uptake or maximal aerobic capacity) is the maximum capacity of an individual’s body to transport and use oxygen during incremental exercise, which reflects the physical fitness of the individual. The name is derived from v- volume, o_2 - oxygen and max – maximum.

$V_{O_2 \max}$ is expressed either as an absolute rate in liters of oxygen per minute (l/min) or as a relative rate in millilitres of oxygen per kilogram of body weight per minute (ml/kg/min). The latter expression is often used to compare the performance of endurance sport athletes. It depends upon some factors –

- i. Type of exercise,
- ii. Intensity of load
- iii. Duration
- iv. The person (age, sex, trained, un-trained, health etc.) e.g. at rest 200-300 ml/min (male),

(Absolute unit)	During Exercise	
Untrained	Trained	
3-3.5lit/min	4.5-5lit/min	
(Relative unit)	$V_{O_2 \max} = \text{ml/min/kg}$	
At Rest-200/LBM (if 50kg)	= 4ml/min/kg	
During Exercise	Untrained	Trained
40ml/min/kg	60-80ml/min/kg	

There is a close relationship between body composition (LBM) and oxygen consumption. The greater proportion LBM, the greater the maximal oxygen consumption both absolutely and kilogram body weight.

D. Flexibility:

Flexibility or limberness refers to the absolute range of motion in a joint or series of joint, and length in muscles that cross the joint. Flexibility is variable between individuals, particularly in terms of differences in muscle length of multi-joint muscles. There are two kinds of flexibility, static and dynamic flexibility.

Static:-The range of motion about a joint is defining static flexibility.

1) Dynamic:-

This type of flexibility is defined as the opposition or resistance of a joint to motion. The structural limits to flexibility are bone, muscle, ligaments, other structures associated with the joint capsule, tendons and other connective tissues and skin. Flexibility is improved by type of exercise and stretching.

Along with strength and endurance, flexibility is also an important component of muscular performance. So Flexibility is very important of any type of activities. In volleyballs more required shoulder wrist, waist, flexibility and other flexibility of the joint.

II. METHODOLOGY

In this chapter procedures for collecting data and procedures for analysis have been discussed. This chapter deals with the subject, test, measurement, conducted; sample procedure tools used collection of data criterion measures method adopted for data collection.

A. SUBJECT:

The subjects of the present study were U-14 and U-19 district level male Volleyball players selected from Mushidabad, Basanta Sangha, Katwa Athletic Club and Tarun Sangha. Sixty two (62) male subjects were selected for this study. Among them, thirty one (31) male subjects for U-14 and thirty one (31) male subjects for U-19 years groups.

1) CRITERION MEASURES:

To conduct the present study the following measurements were taken –

- a) Age
- b) Height
- c) Weight
- d) BMI
- e) Flexibility
- f) $V_{O_2 \max}$.

2) TOOLS AND EQUIPMENT USED:

For measuring, Height, Weight, flexibility and $V_{O_2 \max}$. the following instruments and tools were used –

- a) Measuring tape (Stadiometer)
- b) Weighing Machine
- c) Flexometer
- d) Stopwatch
- e) Bench
- f) Metronome.

3) PROCEDURE OF DATA COLLECTION:

The Age, Height, Weight, Flexibility and $V_{O_2 \max}$. of the subjects were measured in the following ways-

- a) Age: Age was recorded in completed year. The evidence regarding proof of age was gathered from Birth Certificate for the respective players.
- b) Height: The height was measured on a standard scale the reading of the scale taken in nearest centimeters.
- c) Weight: The weights of the subjects were recorded by the weighing machine.
- d) BMI: BMI (Body Mass Index) was measured by using this formula

$$BMI = \frac{\text{Weight (in kg)}}{(\text{Height in meter})^2}$$

- e) Flexibility: Indirect method of flexibility was measured by sit and reach test. Hip and back flexion as well as extension of the hamstring muscles was measured through this test. The reliability of this were recorded from separate testing and correlated. A twelve (12inch) mark scale was used form a wooden box (Flexometer) and subject was directed to a long sitting position. Maximum reach by their fingertips were recorded as their flexibility.

- f) $V_{O_2 \max}$: $V_{O_2 \max}$ was measured with the help of Queen's College Step Test. The test consisted of stepping up and down on the bench (16.25" height) for 3 minutes. The cadence of 24 steps per min. is established by setting the metronome at 96 bpm. At the end of the time period the subjects remain sitting on the bench. Than we were counted pulse rate for a 15 sec. internal beginning 5sce.after the session of exercise. The score is total no. of pulse rate per minute.

To measure the $V_{O_2 \max}$ from this formula:

$$\text{Male} = \{111.33 - (0.42 \times \text{pulse rate per min.})\} \text{ ml/kg/min.}$$

III. RESULTS AND DISCUSSION

The collected data were classified and presented in this chapter in the tabular form. The raw score were arranged according to design of the study. Appropriate statistical computation was made and computed score were presented in this chapter.

Variables	U-14 Years group		U-19 Years group		't' Value
	Mean	SD	Mean	SD	
Age (Yrs.)	13.42	0.67	17.58	0.85	2.89*
Height (cm.)	152.85	10.12	167.69	7.54	5.91*
Weight (kg.)	43.19	10.70	52.32	8.29	7.41*
BMI (kg/m ²)	18.29	3.27	18.57	2.46	0.38

Table (1): Statistics of Growth Variables of two groups

Table 1 representing means, SDs and 't' values of growth variables along with age. The table reveals that the height of U-14 groups was 152.85 ± 10.12 cm (mean +SD) and for U-19 it was 167.69 ± 7.54 cm. The 't'- value of height between the two groups was 5.91, which was the greater than the table value (table value 2.00) at 0.05 level. Therefore the difference of height of the group was statistically significant, but BMI is not significant.

Variables	U-14 Years group		U-19 Years group		't'- Value
	Mean	SD	Mean	SD	
Flexibility	3.20	2.10	3.36	1.38	0.55 _{ns}
Vo _{2 max}	48.95	7.85	47.16	5.75	0.37 _{ns}

Table (2): Statistics of Flexibility and Vo_{2 max} of two groups

ns = not significant

Table no (2) representing the statistics of flexibility and Vo_{2 max} of U-14 years and U-19 years district level male volleyball players in the form of mean, SD and 't'-value. The mean and SD of the and Vo_{2 max} of U-14 and U-19 years group was 48.95, 7.85 ml/kg/min and 47.16, 5.75.75 ml/kg/min. The 't' value of the Vo_{2 max} of U-14 years and U-19 years groups was statistically not significant.

1) Table no.4 representing between variable correlations of the two groups of the study. It revealed that the relationship with age and height was significant (r = 0.369, p< 0.05 level) in U-14 year group but not in any U-19 year group.

Variables	U-14 years groups				
	Height	Weight	BMI	Vo _{2 max}	Flexibility
Age	0.369*	0.185	-0.022	-0.003	0.162
Height	1	0.732**	0.301	0.135	0.374*
Weight		1	0.866**	0.063	0.215
BMI			1		0.016
Vo _{2 max}				1	0.196
Flexibility					1

Table (3): A Correlation between the variables of U-14 year Groups

Variables	U-14 years groups				
	Height	Weight	BMI	Vo _{2 max}	Flexibility
Age	0.369*	0.185	-0.022	-0.003	0.162
Height	1	0.732**	0.301	0.135	0.374*
Weight		1	0.866**	0.063	0.215
BMI			1		0.016
Vo _{2 max}				1	0.196
Flexibility					1

Table (4): B Correlation between the variables of U-14 and U-19 year groups

Variables	U-14years group	U-19years group
Age vs. Height	0.396*	0.274

Age vs. Weight	0.185	0.604**
Age vs. BMI	-0.022	0.549**
Age vs. Vo _{2 max}	-0.003	0.155
Age vs. Flexibility	0.162	-0.090
Height vs. Weight	0.732**	0.588**
Height vs. BMI	0.301	-0.004
Height vs. Vo _{2 max}	0.135	0.573**
Height vs. Flexibility	0.374*	-0.061
Weight vs. BMI	0.866**	0.825**
Weight vs. Vo _{2 max}	0.063	0.315
Weight vs. Flexibility	0.215	-0.130
BMI vs. Vo _{2 max}	0.014	-0.007
BMI vs. Flexibility	0.016	-0.119
Vo _{2 max} vs. Flexibility	0.196	0.152

Table no.4 B Correlation between the variables of U-14 and U-19 year groups

- It revealed that the relationship with age and weight was significant (r = 0.604, p< 0.01 level) in U-19 year group but not in any U-14 year group.
- It revealed that the relationship with age and BMI was significant (r = 0.549, p< 0.01 level) in U-19 year group but not in any U-14 year group.
- It revealed that the relationship with age and flexibility was not significant in U-19 year group and U-14 year group.
- It revealed that the relationship with age and Vo_{2 max} was not significant in U-19 year and U-14 year group.
- It revealed that the relationship with height and weight was significant at both group (r= 0.732, and r= 0.558, p< 0.01 level).
- It revealed that the relationship with height and Vo_{2 max} was significant (r = 0.573, p< 0.01 level) in U-19 years group but not in U-14 year group.
- It is revealed that the relationship with height and flexibility was significant(r=0.374, p<0.05 level) in U-14 years group but not un U-19 years group.
- It is revealed that the relationship with weight and BMI was significant(r=0.866, p<0.01 level) in U-14 years group and (r=0.825, p<0.01 level) in U-19 years group
- It revealed that the relationship with weight, vo_{2 max} and flexibility were not significant in U-14 year group U-19 year group.
- It revealed that the relationship with vo_{2 max} and flexibility was not significant in U-19 year's group and U-14 year group.

IV. CONCLUSION

A. ON GROWTH STATUS:

- Mean height of U-14years group was 152.85cm and U-19 year's group was 167.69 cm. The two groups did differ in height.
- Mean weight of U-14years group was 43.19 kg and U-19 years group was 52.32 kg. The two groups did differ in weight.
- Mean BMI of U-14years group was 18.29 kg/m² and U-19 year's group was 18.57kg/m². The two groups also did differ in BMI.
- The relationship between variables of the three growth variables, relationship existed in all of the two age groups except in height and BMI of two groups.

B. ON FLEXIBILITY AND VO_2 MAX:

- 1) Mean flexibility of U-14 years group was 3.20 and U-19 years group was 3.36 .The two groups did difference in flexibility.
- 2) Mean VO_2 max of U-14years group was 48.95ml/kg/min better than U-19 years group (47.16ml/kg/min).
- 3) There was no relationship between flexibility and vo_2 max.

C. Relationship

- 1) The relationship with age and height was significant in U-14 year's group but not in U-19 year's group.
- 2) The relationship with age, weight and BMI were significant in U-19 years group but not in U-14 years group.
- 3) The relationship with height and weight was significant in both groups.
- 4) The relationship with height and VO_2 max was significant in U-19 years groups but not in U-14 years groups.
- 5) The relationship with height and flexibility was significant in U-14 years groups but not in U-19 years groups.
- 6) The relationship with weight and BMI was significant in both groups.
- 7) The relationship with other parameters was not significant in U-19 year's groups and U-14 years groups.

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