Relationship between Anthropometric Indices of All India Inter-University Level Male Netball Players

Devarishi Kumar Chaubey[1], Dr. Sudhir Rajpal[2], Dr. Rajkumar Sharma[3*]

[1]*Ph. D Scholar (Physical Education), Dr. C. V. Raman University, Kota Road, Bilaspur (Chhattisgarh) India*

[2]*Head, Physical Education, Dr. C. V. Raman University, Kota Road, Bilaspur (Chhattisgarh) India*

[3]*Chief Coach (Gymnastics), Sport Authority of India, STC Extension Dhar, Malhar Ashram, Rambagh, Tilak Path Road, Indore (M.P.) India*

Corresponding Author: **Dr. Rajkumar Sharma, Chief Coach (Gymnastics), Sport Authority of India, STC Extension Dhar, Malhar Ashram, Rambagh, Tilak Path Road, Indore (M.P.) India*

Abstract:

Background: *The relationship between anthropometric indices can be extremely important in the performance of a variety of sports. This information can be helpful to coaches in planning training sessions and making sure their athletes are at their highest level of performance.*

Aim: *The main aim of the present investigation was to establish the relationship between anthropometric indices of All India inter-university level male netball players.*

Sample: *A total of one hundred and eighty four male Netball players were selected randomly during All India Inter-university netball championships (M/W) for the present investigation.*

Variables: *Anthropometric indices assessments included height, weight, BMI, waist circumference (WC), hip circumference(HC), waist-to-height ratio (WHtR), waist-to-hip ratio (WHR), and medial upper arm circumference (MUAC).*

Statistical Techniques: *To analyse the collected data, Mean, SD, percentage and Pearson Moment Correlation coefficient were computed. BMI was calculated as the ratio of body weight to the square of height (kg/m2), WHR as the ratio of waist to hip circumference and WHtR as the ratio of waist circumference to height.*

Results: *The results of the study revealed that the male netball players of India were found to have normal values in all the anthropometric and physiological indices. The obesity symptoms were not observed among them. Significant positive correlations were observed between anthropometric and physiological indices among them.*

Conclusion: *All the selected anthropometric indices of Indian male netball players were found to be correlated together. They were also found healthy and free from cardio-vascular diseases.*

Keywords: *Male, Netball Players, All India, Inter-University, Anthropometric Indices*

1. INTRODUCTION

Anthropometric indices include waist circumference, hip circumference, waist-to-hip ratio and waist-to-height ratio. Waist circumference is a eminently sensitive and precise measure of upper body fat in young adolescents. it is also valuable to identify the overweight and obese adolescents at risk of developing metabolic complications and additionally denotes the risk factors of cardiovascular disease in children and adolescents, The waist circumference and waist-to-height ratio are the better predictors than BMI (McCarthy and, Ashwell M, 2006) .

Body Mass Index (BMI) is an easily-administered and inexpensive tool to monitor weight status. Although it is commonly used in a health-setting to classify humans as underweight, normal weight, overweight and obese (WHO, 1995). It's application in sport populations has been questioned, because it is associated with fat mass, as well as with fat free mass (Ode , et.al., 2007). It can also evaluate athlete's body weight for a given stature and thus contribute to weight control.

In studies concerning health risk, body mass index (BMI) expressed as the ratio of weight to squared height and other easily measured indices of fatness, including waist circumference (WC), waist to hip

ratio (WHR) and waist to height ratio (WHtR), are used and recommended by the World Health Organization (WHO, 2011).

Obesity increases the risk for many chronic diseases among human beings. Waist to hip ratio is an important tool to determine the overall health risk. The more weight around their waist is related to heart disease and diabetes than those with weight around their hips. One of the simplest method of measuring body fatness is calculating waist- hip ratio or relationship between waist circumference and hip circumference.

According to the University of Maryland Medical System, the lower waist- hip ratio (WHR) is better and a wider at the waist (apple-shaped body) is likely to be more prone to health problems than a wider at the hips (pear-shaped body). WHR ratio of 0.9 or less is considered safe and a ratio of 1.0 or higher is considered at risk for overweight-associated health problems. It is a useful measure of fat distribution.

Many researchers have conducted the study on body mass index of athletes and non-athletes and revealed the different statements after investigation. BMI is weakly correlates with the percentage of body fat in body builders (Jacobson, Cook and Redus, 2003). BMI is a poor index of body fatness in athletes representing different sports, since subjects with a low percentage of body fat presented BMI values up to 33 (Garrido-Chamorro *et. al.,* 2009). Mazic *et. al.* (2009) demonstrated that the more than one-fourth of basketball players despite low body fat were classified as overweight due to BMI higher than 25. BMI-based equations for predicting percent of body fat in female collegiate athletes are not appropriate for predicting individual body fat (Esco, Williford and Russel, 2011) . The BMI as a measure of body fat is inappropriate in adolescent athletes due to incorrect classification of lean subjects as overweight or obese (Etchison et.al., 2011).

However, BMI is often overlooked in studies on sport populations. There are many studies on team handball players which present data on stature and body weight, but not on BMI (Cavala & Katic, 2010; Chelly et. al., 2010; Kaloniki et.al., 2002; Mohamed, et.al., 2009 and Sibila & pori, 2009). So, the reliability of BMI have been underlined in studies with athletes participating in different sports.

BMI cannot differentiate the lean mass and fat in body composition and an increasing number of studies are reporting that the correlation between BMI and body fat percentage is different among different populations (Deurenberg, & Deurenberg-Yap, 2002; Guricci, 1998; Deurenberg, Staveren and Yap, 1998). Moreover, assessment of body composition is a better approach in the evaluation of nutritional and health status.

Few anthropometric indices such as waist circumference (WC), hip circumference (HC), medial upper arm circumference (MUAC) waist-to-height ratio (WHtR), waist-to-hip ratio (WHR) and physiological indices such diastolic and systolic blood pressures are also suggested as better indicators of obesity compared with BMI.

The purpose of the present study was to establish the relationship between BMI, waist circumference, hip circumferences, Medial upper arm circumference, waist-to-hip ratio and waist-to-height ratio of All India Inter-university level male netball players

2. METHODOLOGY

2.1. Selection of Subject

One hundred and eighty adult male Netball players from seventeen universities from different state of India were selected for the purpose of study. All the netball male players were members of respective university teams of their own state, participating in All India Inter-university male netball competition held at Guru Ghasidas Central University, Bilaspur (Chhattisgarh) and volunteered to participate for this study.

2.2. Instrumentation

All participants were contacted at the site of their staying place during championship and underwent for the measurement of physical and anthropometric variables. Oral and written informed consent was taken from all the participants, coaches and managers of the respective teams before testing them. Each measurement was repeated twice and in case of discrepancy was repeated for a third time. The detail procedure for measurement is mentioned below:

2.2.1. Weight

Purpose: Assessment of weight. Equipment: Calibrated Digital scale Procedure: the topic can stand on the platform of the balance with foot parallel. Weight are equally distributed on the foot. Minimum materials are wear by the respondent, likes vest and short. Scoring: Weight of the topic is recorded in metric weight unit by scientist. Sit and reach take a look at.

2.2.2. Height

Purpose: Measuring of standing height. Equipment: Height measurement Stand (Stadiometer). Procedure: the topic stands erect bare-footed with heels and back of the pinnacle touching the stands. The flat card-board is place informed the highest of the pinnacle for measuring of height of the respondent. Scoring: The measuring is taken to the closest cm. Administrative Suggestions: After all outer clothing and shoes were removed, body weight and height were measured to the nearest 0.1 kg and 0.1 cm, respectively, using standardized equipment.

2.2.3. Body Mass Index

Purpose: Measurement of body size. Health relation: A higher BMI is associated with a worse cardiovascular profile.. Equipment: An electronic scale and measuring tape fixed on the wall to measure weight and height respectively. BMI was calculated using the formulae BMI = kg/m^2. Scoring: A BMI greater than 25 may indicate that you are overweight, while a BMI greater than 30 generally indicates obesity.

2.2.4. Waist Circumference

Purpose: A non-elastic tape was used to measure central body fat. Health relation: A higher waist circumference is a risk factor for cardiovascular disease. Performance: The participants were asked to remove their t-shirt so that the tape could be correctly positioned. They stood erect with the abdomen relaxed, the arms at the sides and the feet together. The tester faced the participant and placed an inelastic tape around him, in a horizontal plane, at the level of the natural waist, which is the narrowest part of the torso, as seen from the anterior aspect. The measurement was taken at the end of a normal expiration. Practice and number of test trials: Two measurements were performed, not consecutively, and the mean was used in the analyses. Scoring: It was was measured to the nearest 0.1 cm at the level of the iliac crest while the subjects were at minimal respiration.

2.2.5. Hip Circumference

Hip circumference (HC) was measured to the nearest 0.1 cm at the level of the maximum extension of the buttocks in a horizontal plane. Both measurements were performed using non-stretchable tape.

2.2.6. Waist to Hip Ratio (WHR)

Purpose: To determine the ratio of waist circumference to the hip circumference. Equipment: Tape measure. Procedure: A simple calculation of the measurements of the waist girth divided by the hip girth. Waist to hip ratio = Gw / Gh, where Gw = Waist girth, Gh = Hip girth. Scoring: The measurements for the hip to waist ratio can be taken in cm or inches.

2.2.7. Waist to Height Ratio(Whtr)

Purpose: To determine the ratio of waist circumference to height. Equipment: Tape measure. Procedure: A simple calculation of the measurements of the waist girth divided by the height. Waist to height ratio = Gw / Ht, where Gw = Waist girth, Ht = Height. Scoring: The measurements for hip to height ratio can be taken in cm or inches.

2.2.8. Middle Upper Arm Circumference (MUAC)

It is the circumference of the left upper arm and is measured at the mid-point between the tips of the shoulder and elbow. To measure: Bend the left arm, find and mark with a pen the olecranon process and acromium. Mark the mid-point between these two marks. With the arm hanging straight down, wrap a MUAC tape around the arm at the midpoint mark Mid upper arm circumference (MAC) was measured at the middle of the left upper arm with a flexible steel tape Measure to the nearest 1 mm.

3. RESULTS

To assess the anthropometric indices of All India Interuniversity level male netball players, means, standard deviations and percentage were computed and data pertaining to this has been presented in Table 1. SPSS software 16.0 was used for the computation of collected data.

Table1. *Descriptive Statistics of Anthropometric Measures of All India Inter-University Level Male Netball Players*

S.No	Variables	M±SD	Standard Error	Variance
1.	Age (Yrs)	20.61 ±1.87	0.38	3.49
2.	Weight (kg.)	66.33 ±10.27	0.76	105.37
3.	Height (cm.)	177.14 ±8.89	0.66	79.01
4.	BMI (kg/m2)	20.90 ±3.31	0.244	10.92
5.	Waist Circumference (Cm.)	81.70 ±7.57	0.56	57.29
6.	Hip Circumference (Cm.)	91.33 ±7.27	0.54	52.89
7.	Mid-Upper Arm Circumference(Cm)	25.07 ±1.65	0.12	2.71
8.	Waist to Hip Ratio (WHR)	0.87±0.10	0.007	0.011
9.	Waist to Height Ratio (WHtR)	0.46±0.06	0.004	0.003

Table2. *Percentage Indication of Obesity of All India Inter-University Level Male Netball Players*

Weight Status	Mean	Standard Deviation	Frequency	Percentage
Under Weight	17.49	0.95	35	19.02
Health Weight	21.08	1.74	130	70.65
Over Weight	26.72	1.41	17	9.23
Obese	31.23	0.10	02	1.10

Table 2 reveals that 19.02% male netball players were found underweight with BMI range below 18.5. 70.65% male netball players were found in healthy weight category with BMI range 18.5 to 24.99. 9.23% male netball players were found over weight with BMI range 25-.29.99. and 1.10 per cent netball players were found obese with BMI range 30 and above.

Table3. *Relationship between Anthropometric Measures of All India Inter-University Level Male Netball Players*

Variables	BMI	WC	HC	MUAC	WHR	WHtR
Body Mass Index (BMI)	1	.441**	.488**	.351**	.183*	.309**
Waist Circumference (WC)		1	.746**	.575**	.052	.421**
Hip Circumference (HC)			1	.594**	-.087	.411**
Medial upper arm circumference (MUAC)				1	-.003	.286**
Waist –to-Hip Ratio (WHR)					1	.032
Waist-to-Height ratio (WHtR)						1

* Significant at the 0.01 level, r.01. (182)=.0.181

** Significant at the 0.05 level, r.05. (182)=0.138.

Table 2 clearly reveals that Statistically significant positive correlations were found between BMI-WC followed by HC, MUAC, WHtR and SBP, as the obtained r-value of .441, .488, .351, .309 and .243 respectively were higher than the r.01 (182)=.181. But the positive significant correlation was also observed between BMI- WHR, as obtained r-value of .183 was higher than the r.05 (182)=.138.

Statistically significant positive correlations were found between WC-HC followed by MUAC and WHtR, as the obtained r-values of .746, .575 and .421 respectively were higher than the r.01 (182)=.181. But the positive insignificant correlation was observed between WC-WHR, as obtained r-value of .052 was less than the r.05 (182) =.138.

Statistically significant positive correlations were found between HC -MUAC followed by WHtR, as the obtained r-values of .594, and .411respectively were higher than the r.01 (182) =.181. But the negative insignificant correlation was observed between HC-WHR, as obtained r-value of - .087 was less than the r.05 (182) =.138.

Statistically significant positive correlation was found between MUAC- WHtR, as the obtained r-value of .286 was higher than the required value to be significant. But the relationships between MUAC-WHR were statistically insignificant negatively, as obtained r-value of.-.003 was less than the required value to be significant.

4. DISCUSSION

The sample for study consisted of 184 All India Inter-university level male netball players age ranged 18 to 26 years and M±SD of age were 20.61 ±1.87. Descriptive statistics for Height (Ht), Weight

(Wt.), Body Mass Index (BMI), Waist Circumference (WC), Hip Circumference (HC), Waist-to-Hip Ratio (WHR), Waist-to-Height Ratio (WHtR), and Mid-Upper Arm Circumference(MUAC) were computed for All India Inter-university level male netball players . The results of the study indicated the normal values in all the anthropometric indices of male netball players. Researcher did not found any obesity symptoms among them.

BMI increased with age followed by Waist Circumference (WC), Hip Circumference (HC), Waist-to-Hip Ratio (WHR) and Waist-to-Height Ratio (WHtR), and Mid-Upper Arm Circumference (MUAC). Less than nineteen per cent male netball players were found underweight. Whereas about seventy one per cent male netball players were found in healthy. Less than ten per cent male netball players were found over weight. Very few per cent netball players were found obese.

When the inter-relationship was establish between anthropometric indices of All India Inter-university level male netball players, statistically significant positive correlations were found between BMI - WC, followed by HC, MUAC, WHR, WHtR ,DBP and SBP; between WC-HC followed by MUAC, WHR, WHtR, DBP and SBP; between HC -MUAC followed by WHtR and between MUAC- WHtR. Negative insignificant correlations were   observed between HC-WHR and   MUAC-WHR.

5. CONCLUSIONS

- Indian male netball players were found to have normal values of all the anthropometric indices

- The obesity symptoms were not observed among most of the Indian male netball players.

- Most of the Indian male netball players were found to have healthy weight status and free from health hazards.

- Positive significant correlations were observed between anthropometric indices of Indian male netball players

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