

BODY FAT TOPOGRAPHY AND WAIST HIP RATIO IN FEMALE HANDBALL PLAYERS¹Anju Anand Asia and ²A.B. Warkar

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ABSTRACT: The WHR was significantly lower in sport group as compared to control group. Body fat (%) did not differ significantly in the two groups. The FFM (kg) was significantly greater in the sports group. Findings of the above study could be utilized for the selection and recruitment of athletes and development of training programmes.

Key words: Handball, Waist Hip ratio, Fat Free mass, Body fat.

INTRODUCTION

Handball is a sport in which players mainly use their hands to dribble, pass and shoot the ball at the opponent's goal. It involves intermittent work with interchanges of short burst of physical efforts interspaced with brief pauses. It needs highly developed motor skills like co-ordination, speed, agility, endurance and power. (Milanese C et al., 2012). Achievement of considerable results is possible when these elements are at an optimal level. Studies have shown that physical and physiological characteristics as well as performance of the handball players are affected by anthropometric characteristics to some extent (Chaouachi A, et al., 2009; Vanjog Sing Matroja et al., 2013; Visnapuu M. et al., 2009). Similarly body size and composition affects the functional performance of these players (Milanese C, et al., 2012). Excess adipose tissue acts as a dead weight (Mcleod W.D. et al. 1983) and is inversely related to aerobic capacity and thermoregulation (Gabbett T.J. et al., 2005). Fat topography helps to assess total body fat and lean mass. Waist hip ratio is a reliable indicator of abdominal adiposity. Information on these parameters in handball players being quite limited reference values could serve as a useful indicator of physiological status and training. With this aim, the present study was undertaken to collect information on body fat characteristics and waist hip ratio in young female handball players and controls.

MATERIAL AND METHOD

Present study was conducted on eighty female subjects. The study group comprised of forty female students, who had been playing handball for 1 – 2 hours daily at least 4 – 5 times a week, since past 3 years or more, in addition they have been participating in various competitions at district and state level. The control group comprised of forty, age matched, medical college students (females) not engaged in any sports activity. Dietary pattern and socioeconomic background was similar for all subjects. Subject with any history of cardiovascular, respiratory or neuromuscular disorder was excluded from the study. Ethical clearance was obtained for this study. A written informed consent was taken from all the subjects prior to collection of data. The height of the subject was measured with the anthropometric rod; weight was measured to the nearest 0.1 kg with a portable weighing machine. BMI (Body mass index in kg/height in m²) was then calculated. Analysis of body build was based on BMI classification. Normal value being 18.50 to 24.99 kg /m². Waist circumference (cm) was measured at level of navel with subject respiring quietly, with the help of a soft measuring tape. Hip circumference was measured at intertrochanteric level. Ratio of waist circumference to hip circumference (WHR) was calculated to evaluate body fat distribution. The normal ratio is 0.8 or less in females. Girth at abdomen, right thigh and right forearm was measured using the soft measuring tape.

Duplicate measurements were taken at each site and average of readings was recorded. Using age and gender specific equations and conversion constants percent body fat was calculated (%BF) (McArdle et al., 2005). Fat Free mass (FFM) in Kg was the difference between body mass and fat mass. Fat mass (kg) is calculated as body weight X (% body fat ÷ 100). All measurements were done in morning session between 10 am to 12 noon, by the same operator to ensure consistency. The same tape was used for all measurements.

Statistical Analysis

Data was reported as mean \pm S.D. It was analyzed using students 't' test, $p < 0.05$ was considered statistically significant.

RESULTS

The sports women weighed significantly more than the control group ($p < 0.05$). (Table 1 to 4)

There was no significant difference in their height. The mean BMI was greater in sports group. The FFM was significantly greater in the players than the control group, previous studies demonstrate a greater lean mass in handball, basketball, volleyball players. (Civaz YS et al., 2012 ; Grostiaga EM, et al., 2006; Mandana Gadami, et al., 2010 ; Maria S. et al., 2002). The % body fat has not shown significant difference between the two groups. The WHR was significantly lesser in the sports group. Milanese C et al (2011) have also reported of a lower WHR in handball players.

Table-1: Age Group

Group	Age (Years)
Control	18.6 \pm 1.33 [†]
Handball Players	18.72 \pm 1.35 [†]

[†] $p > 0.05$ – Statistically not significant

Table-2: Physical Characteristics

Group	Stature (cm)	Weight (Kg)	BMI (Kg/m ²)
Control	153.72 \pm 5.15	42.62 \pm 6.07	19.14 \pm 3.46
Handball Players	156.82 \pm 7.01	46.72 \pm 7.65.*	19.76 \pm 2.09

*----- $p < 0.05$ – Statistically significant

Table-3: Waist HIP Ratio

Group	Waist Circumference (cm)	HIP Circumference (cm)	Waist HIP Ratio
Control	74.3 \pm 5.54	101.1 \pm 5.88	0.73 \pm 0.041
Handball Players	73.1 \pm 5.19	102.6 \pm 5.74	0.71 \pm 0.033 *

* $p < 0.05$

Table-4: Body Fat and Fat Free Mass

Group	% Body Fat	Fat Free Mass (Kg)
Control	16.85 \pm 6.62	34.53 \pm 3.89
Handball Players	14.86 \pm 5.03	39.69 \pm 4.48*

* ---- $p < 0.05$ - Statistically significant

DISCUSSION

Body fat characteristics were measured by the girth method; the girth measurement using prediction equation seems to be practical, rapid and is known to have an error of 2-4 % only (Murlidharan DV et al.; 1998). It demonstrated no difference in % body fat among the two groups. The fat free mass however was significantly higher in these players. This additional muscle mass could have contributed to the greater body weight. Playing handball has been known to improve bone quality and muscle mass especially in upper limbs, which are used by handball players irrespective of dexterity (Vanden Tullar, et al., 2004).

The physical effort involved in this sport, burns considerable calories, stimulates fat catabolism and decreases body fat. Conserving or increasing lean tissue maintains a high level of resting metabolism because FFM remains metabolically more active than body fat and reduces the body's tendency to store calories. This proves advantageous for the players in the long run. Mean BMI was greater in the player group, BMI although widely used, does not consider the body's proportional composition. In fact, a greater abdominal adiposity although controlling for BMI was reported by Vaz M (1999). Waist hip ratio is a better indicator of abdominal adiposity than BMI. Increase in hip circumference and a decrease in waist circumference decreases waist hip ratio. Handball players demonstrated a lower waist hip ratio suggestive of possible redistribution of fat.

CONCLUSION

To conclude, handball players had a greater lean mass and a lower waist hip ratio. Further studies on correlation between these parameters and physical capacity indices could be helpful. Data collected at intervals could be utilized by coaches during recruitment and selection of athletes for professional sports and development of training programme. Monitoring of body composition could provide valuable information to create an anthropometric profile of each individual player. It could help to prevent changes in body composition that may be detrimental to performance.

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