Analysis of Selected Anthropometric Characteristics among International Handball Players

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ABSTRACT

The purpose of the present study was to analyse the differences in selected anthropometrical characteristics among Handball players of India, Kazakhistan Pakistan and Uzbekistan. The under - 19 years boys were chosen as subjects, with playing experience of 6.62 (±2.22) years. The data were collected during International Handball Federation - Men's Asian Continental Challenge Trophy held at Jawaharlal Nehru Indoor stadium, Chennai, from 7 to 10 January 2011. Body weight, height, arm length, arm span, leg length, hand length, hand span, palm length and palm span were selected as anthropometrical variables, for this study. The collected data was statistically analysed by using analysis of variance. In case of significance of mean difference observed, to find out which pair of group mean was significant, among others, the Tukey HSD test, was applied.

The result reveals that there were significant differences between the four countries on the variables of body weight, height, palm length and palm width of the Handball players, of these countries.

INTRODUCTION

Anthropometric measurements relevant to human movement gained formal recognition, as a discipline, with the inauguration of the International Society for Advancement of Kinanthropometry, in 1986. Anthropometrists of all continents have participated in several major multidisciplinary studies that are being or have been conducted to assess the physical characteristics of people. Kinanthropometry has been defined as the quantitative interface between human structure and function (Ross, Drinkwater, Bailey, Marshall, Leahy, 1980). This interface is examined through the measurement and analysis of age, body size, shape, proportion, composition and maturation, as they relate to gross body function. Previous reports have shown that body structure and morphological characteristics are important determinants of performance in many sports and certain physical impressions such as

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body composition (body fat, body mass, muscle mass) and physique (somatotype) can significantly influence athletic performance (Carter, 1970; Duquet & Carter, 2001).

Handball has developed from a number of similar games, which were in existence at the start of the 20th century. More than one hundred and thirty five countries are affiliated to the International Handball Federation. Handball is a sport that consists of activities of all possible loco motion and thus great skill level and physical demands necessarily influence the anthropometrical characteristics. On the other hand, for a modern model of a Handball player, the pronounced longitudinal dimensions such as stature, arm span, hand spread and length are necessary (Skoufas, 2003). Such an anthropometric profile plays a supportive role in helping athletes perform under actual competitive conditions (Srhoj, 2002).

Handball is one of the Olympic sport which generally requires a high standard of preparation, in order to complete the 60 minutes of competitive play and to achieve success. In this game, movement patterns are characterised as intermittent and change continuously, in response to different offensive and defensive situations. Anthropometric factors and morphological characteristics can influence the effectiveness of such responses, as has been observed in other sports (Deng, 1990). Therefore, anthropometric profiles may contribute to understanding of the suitability of players, for the sport of Handball, particularly at a high standard of play. The purpose of the present study was to analyse the differences in selected anthropometrical characteristics among Handball players of India, Kazakhistan, Pakistan and Uzbekistan.

METHODOLOGY

To achieve the purpose of this study, fifty--six players, from four Asian continental countries, were measured in International Handball Federation - Men's Asian Continental Challenge Trophy, held at Nehru Indoor stadium, Chennai, from 7 to 10 January, 2011. Fourteen players from each country namely India, Kazakhistan, Pakistan and Uzbekistan were chosen as subjects, for this study. The age of the subjects was under-19 years boys, and 6.62 (±2.22) years of playing experience. The investigators reviewed the available scientific literature pertaining to the game of Handball and Anthropometry from books, journals, periodicals and e-resources articles. Resulting from the review of literature and discussion with the experts, and considering the feasibility criteria of the study, the following anthropometrical variables, namely body weight, height, arm length, arm span, leg length, hand length, hand span, palm length and palm width, were selected as a anthropometrical variables, for this study. To make study more scientific, the reliability of the instruments and data was established. All measurements were taken by the investigators. The investigators were trained and qualified level- -one anthropometrists of International Society for the Advancement of Kinanthropometry (ISAK). The standardized testing protocol was used to collect the relevant

data and test description is presented hereunder in a nutshell. To test the significance of the mean difference among the players of the four countries, namely India, Kazakhistan, Pakistan and Uzbekistan, on criterion measures of selected variables, One-way Analysis of Variance was used. In case of significance of mean difference observed on the criterion measures, to find out which pair of group is high among the others Tukey HSD Post-Hoc Test was applied.

Anthropometric Variables and Testing Methods

S.No	Variables	Equipment needed	Test description	Measuring units
1	Body weight	Electronic weighing machine	The player just stands on the weighing machine with minimal movement with hands by their side. Shoes and excess clothing should be removed.	Kilogram
2	Height	Stadiometer	The stretch stature method requires the subject to stand with the heels together and the heels, buttocks and upper part of the back touching the scale. The head, when placed in the frankfort plane, need not be touching the scale.	Centimeter
3	Arm length	Segmometer	The arm length measurement from acromiale to datylion is made from the point of the shoulder to the tip of the middle finger.	Centimeter
4	Arm span	Lufkin Anthropometric tape	Facing away from the wall, with back and buttocks touching the arms are stretched out horizontally. Measure from one furthermost finger tips to the others.	Centimeter
5	Leg length	Segmometer	The leg length measured from the Iliospinale laterale to the standing surface.	Centimeter
6	Hand length	Small sliding calliper	The Hand length measurement is taken as the shortest distance from the marked Midstylion line to the Dactylion.	Centimeter
7	Hand span	Flat surface and ruler	Hand span was measured from the tip of the thumb to the tip of the little finger with all fingers are outstretched as far as possible.	Centimeter
8	Palm length	Small sliding calliper	The palm length measure between the distance between the distal flexion crease at the wrist and the proximal flexion crease of the middle finger.	Centimeter
9	Palm width	Small sliding calliper	The Palm width measure from the edge of the hand on one side, across the palm to the edge of the hand on the other side, at the level of the metacarpophalangeal joints, with the fingers parallel and extended.	Centimeter

Table-1 : Mean and Standard Deviation Values of Asian Country-Wise Classification of Anthropometric Characteristics Among Handball Players.

No.	Variables	India		Kazakhistan		Pakistan		Uzbekistan	
		Mean	SD(±)	Mean	SD(±)	Mean	SD(±)	Mean	SD(±)
1	Body weight	68.71	6.11	84.57	10.93	68.14	7.36	79.50	8.19
2	Height	179.25	4.00	189.07	3.75	178.75	7.59	184.57	9.09
3	Arm length	84.32	2.44	85.96	3.88	82.43	3.74	83.64	4.49
4	Arm span	181.03	6.19	187.78	5.63	182.96	7.82	183.96	9.98
5	Leg length	102.36	2.76	106.9	4.02	104.46	4.50	104.78	5.63
6	Hand length	19.86	1.03	20.17	0.89	19.57	0.87	19.64	1.15
7	Hand span	22.25	1.23	22.07	0.87	22.71	1.05	22.57	1.45
8	Palm length	11.28	0.67	11.60	0.73	10.89	0.59	11.53	0.77
9	Palm width	10.14	0.53	10.64	0.41	9.48	0.50	10.50	0.43

Table 1 shows the mean and standard deviation values of selected anthropometric characteristics, among the Handball players, in relation country-wise.

The general, observation of players with reference to the countries confirm that the Kazakhistan players were better in selected parameters, namely body weight, height, arm length, arm span, leg length, hand length, palm length and palm width then the other countries; but, Pakistani players had shown lower values in some parameters namely body weight, height, arm length, hand length and palm width.

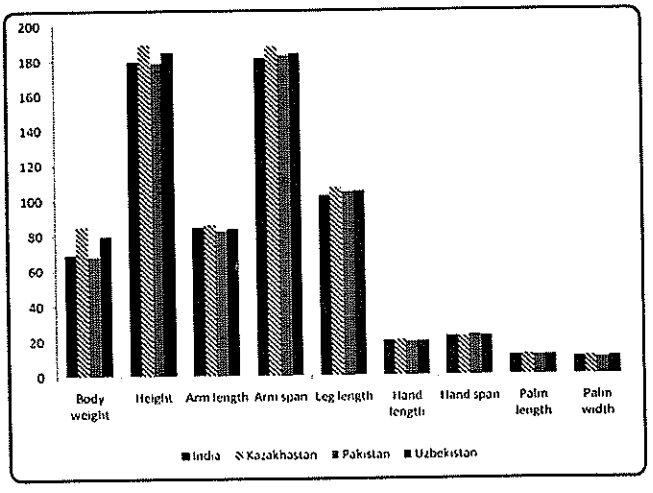

Fig-I : Mean values of country-wise classification among the International Handball Players.

Table-2 : Analysis of Variance of Selected Anthropometric Characteristics among Four Countries of Handball Players.

S.No.	Variables	Group	S.S	df	MS	F
1	Body weight	B	2774.482	3	924.827	13.29*
		W	3619.500	52	69.606	
2	Height	B	999.946	3	333.315	7.82*
		W	2217.107	52	42.637	
3	Arm length	B	91.375	3	30.458	2.20
		W	718.679	52	13.821	
4	Arm span	B	338.478	3	112.826	1.95
		W	3005.054	52	57.789	
5	Leg length	B	147.013	3	49.004	2.58
		W	986.732	52	18.976	
6	Hand length	B	3.121	3	1.040	1.06
		W	51.161	52	0.984	
7	Hand span	B	3.621	3	1.207	0.88
		W	71.589	52	1.377	
8	Palm length	B	4.371	3	1.457	3.00*
		W	25.268	52	0.486	
9	Palm width	B	11.191	3	3.730	16.49*
		W	11.766	52	0.226	

*Significant at 0.05 level of confidence

*F 0.05 (3, 52) = 2.78

It was evident from Table 2 that variability existed among the Handball players in country-wise classification on body height, weight, palm length and palm width.

From the result of One-way Analysis of Variance on anthropometric characteristics, among the four countries namely India, Kazakhistan, Pakistan and Uzbekistan, are presented in Table 2. It can be seen that the calculated F value of body weight (F = 13.29), height (F = 7.82), palm length (F = 3.00), and palm width (16.48), among the four groups, were greater than the Table value of 2.78, indicating that there was a significant difference ($P<0.05$) for the degree of freedom (3, 52), at 0.05 level of confidence. Since the F value was significant, the Tukey HSD Post Hoc Test was further computed to find out which pair of group was high among the others and the results are tabulated in the Table 3.

Table-3: Tukey HSD Post-Hoc Test for Mean Differences between the Countries of Selected Anthropometric Characteristics of Handball Players.

S.No.	Variable	India	Kazakhistan	Pakistan	Uzbekistan	MD	CI
1	Body weight	68.71	84.57	—	—	15.86*	8.39
		68.71	—	68.14	—	0.57	
		68.71	—	—	79.50	10.79*	
		—	84.57	68.14	—	16.43*	
		—	84.57	—	79.50	5.07	
		—	—	68.14	79.50	11.36*	
2	Height	179.25	189.07	—	—	9.82*	6.57
		179.25	—	178.75	—	0.5	
		179.25	—	—	184.57	5.32	
		—	189.07	178.75	—	10.32*	
		—	189.07	—	184.57	4.5	
		—	—	178.75	184.57	5.82	
3	Palm length	11.28	11.60	—	—	0.32	0.70
		11.28	—	10.89	—	0.39	
		11.28	—	—	11.53	0.25	
		—	11.60	10.89	—	0.71*	
		—	11.60	—	11.53	0.07	
		—	—	10.89	11.53	0.64	
4	Palm width	10.14	10.64	—	—	0.5*	0.48
		10.14	—	9.48	—	0.66*	
		10.14	—	—	10.50	0.36	
		—	10.64	9.48	—	1.16*	
		—	10.64	—	10.50	0.14	
		—	—	9.48	10.50	1.02*	

From Table 3, it can be observed that there was a significant mean difference in body weight between India and Kazakhistan players (15.86); India and Uzbekistan (10.79); Kazakhistan and Pakistan (16.43); and Pakistan and Uzbekistan players (11.36). Rest of the comparison showed no significant mean difference. In height, there was a significant mean difference between India and Kazakhistan players (9.82); and Kazakhistan and Pakistan (10.32) mean difference was observed. Rest of the comparison showed no significant mean difference. Kazakhistan and

Pakistan players (0.71) showed the significant mean differences, between the team, in the palm length; rest of the comparison showed no significant mean difference. In palm width, there was a significant mean difference between India and Kazakhistan players (0.5); India and Pakistan (0.66); Kazakhistan and Pakistan (1.16); and Pakistan and Uzbekistan (1.02). But rest of the comparison showed no significant mean difference.

The findings reveal that Handball players of Kazakhistan showed greater body segments than all other countries. Previous reports have shown that body structure and morphological characteristics can determine the selection of participants, in many sports. Results of cross-sectional anthropometric studies have tended to suggest that certain physical factors, including body composition (body fat, body mass, muscle mass) and physique, (somatotype) significantly influence athletic performance (Carter, 1984). The knowledge of the physical characteristics of Handball players could provide insight into those individual factors which influence the players' performance in the game. Anthropometric characteristics are very relevant for Handball players because the game of Handball entails physical contact in which specific physiques, with a high level of strength and power, may provide an advantage. The physical characteristics of Handball players are considered for the choice of players, to implement the game plan. In Handball, tall athletes are required for this game, as their height has a positive influence on all longitudinal body dimensions. Tall athletes are superior in space coverage with their limbs and they have an advantage in power production, as regards the leverage of body systems.

CONCLUSION

The results demonstrate that a number of significant differences in anthropometric characteristics exist between Asian Continental countries :

1. The result reveals that there were significant differences between the four countries on the following factors namely body weight, height, palm length and palm width among the Handball players.
2. The result also indicates that there were no significant differences between the four countries on the following anthropometric factors namely arm length, arm span, leg length, hand length and hand span among the Handball players.
3. The findings also reveal that Kazakhistan country players were better in all selected anthropometric parameters than the other countries, baring the hand span.
4. Pakistan players were shortest among the four countries. They were shortest in height, less in body weight, arm length, hand length and palm width.

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