Analysis of selected anthropometric parameters and physical fitness components among various age categories of Handball players

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Abstract: **The purpose of study was to find out the analysis of selected Standing Height, Body Weight, Leg Length, Arm Length, Arm span, Hand length, Hand span Speed, Muscular strength, Explosive power, Agility compents among various age categories of handball players. For this study 16 to 18 years, 19 to 21 and 22 to 24 years of male Handball players 40 each were randomly selected from, various school and college in tamilnadu. The subjects had past playing experience of at least three years in Handball and only those who had represented their respective school College were taken as subjects. The subject's age ranged between 16 and 24 years. A series of physical fitness tests was carried out on each participant. These included height assessed by stadiometer, weight assessed by weighing machine, Leg Length, Arm Length, Arm span, Hand length, Hand span assessed by small bone caliper centimeters. Speed assessed by 30mts dash, muscular strength assessed by sit-ups, explosive strength assessed by vertical jump, agility assessed by shuttle run. The collected data from the three groups of the selected variables were statistical analyzed to test the significance of the mean difference and the groups on selected criterion variables one-way analysis of variance (ANOVA) was used. In case of significance pair of group was high among others as post-hoc test, (Turkey's HSD test) was applied of mean difference observed on the criterion measure to find out which.**

Keywords: **Muscular strength, sit-upa, Explosive strength vertical jump, Handball**

INTRODUCTION

Anthropometry in physical anthropology refers to the measurement of the human individual for the purposes of understanding human physical variation. Today, anthropometry plays an important role in industrial design, clothing design, ergonomics and architecture where statistical data about the distribution of body dimensions in the population are used to optimize products. Changes in life styles, nutrition and ethnic composition of populations lead to changes in the distribution of body dimensions (e.g., the obesity epidemic), and require regular updating of anthropometric data collections. The savant Alphonse Bertillon gave his name in 1883 to a system of identification depending on the unchanging character of certain measurements of parts of the human frame.

He found by patient inquiry that several measures of physical features, along with dimensions of certain bones or bony structures in the body remain fairly constant throughout adult life. He concluded that when these measurements were made and recorded systematically every single individual would be found to be perfectly distinguishable from others. The system was soon adapted to police methods when crime fighters found value in being able to fix a person's identity. It prevented false impersonation and brought home, to any one charged with an offense, a person's responsibility for a wrongdoing. After its introduction in France in 1883 "Bertillonage," as it was called, became widely popular, and credited with producing highly gratifying results. Many countries followed suit in the adoption of the method, integrating it within their justice systems. However it was almost a decade before England followed suit when in 1894 a special committee was sent to Paris for an investigation of the methods used and results obtained with them. It reported back favorably, especially on the use of measurements for primary classification, But also recommended the adoption, in part, of the system of "finger prints" as suggested by Francis Galton, and in practice at that time in Bengal, India. From this great mass of details, soon represented in Paris by the collection of some 100,000 cards, it was possible, proceeding by exhaustion, to sift and sort down the cards till a small bundle of half a dozen produced the combined facts of the measurements of the individual last sought. The whole of the information is easily contained in one cabinet of very ordinary dimensions, and most ingeniously contrived so as to make the most of the space and facilitate the search.

Methods

The purpose of study was to find out the analysis of selected Standing Height, Body Weight, Leg Length, Arm Length, Arm span, Hand length, Hand span Speed, Muscular strength, Explosive power, Agility compents among various age categories of handball

players. For this study 16 to 18 years, 19 to 21 and 22 to 24 years of male Handball players 40 each were randomly selected from, various school and college in tamilnadu. The subjects had past playing experience of at least three years in Handball and only those who had represented their respective school College were taken as subjects. The subject's age ranged between 16 and 24 years. A series of physical fitness tests was carried out on each participant. These included height assessed by stadiometer, weight assessed by weighing machine, Leg Length, Arm Length, Arm span, Hand length, Hand span assessed by small bone caliper centimeters. Speed assessed by 30mts dash, muscular strength assessed by sit-ups, explosive strength assessed by vertical jump, agility assessed by shuttle run. The collected data from the three groups of the selected variables were statistical analyzed to test the significance of the mean difference and the groups on selected criterion variables one-way analysis of variance (ANOVA) was used. In case of significance pair of group was high among others as post-hoc test, (Turkey's HSD test) was applied of mean difference observed on the criterion measure to find out which.

TABLE – 1
DESCRIPTIVE STATISTICS OF MALE HANDBALL PLAYERS AT VARIOUS AGE CATEGORIES

S.NO:	Variables	Units	16-18 Age category		19-22 Age category		22-24 Age category	
			Mean	SD(±)	Mean	SD(±)	Mean	SD(±)
1	Height	In Centimeters	169.46	5.38	169.86	4.92	171.51	4.89
2	Weight	Kilogram	54.96	9.68	60.43	6.19	64.91	7.81
3	Leg Length	In Centimeters	98.61	4.65	99.47	5.20	100.37	4.20
4	Arm Length	In Centimeters	74.30	2.88	78.66	3.76	79.34	3.53
5	Arm Span	In Centimeters	174.13	6.77	175.13	7.29	177.83	6.19
6	Hand Length	In Centimeters	18.53	.870	18.85	.952	18.99	.914
7	Hand Span	In Centimeters	21.45	1.22	22.04	1.34	22.14	1.20
8	Speed	In Seconds	4.64	.305	4.83	.316	4.79	.367
9	Muscular Strength	One Minuets /Total number	31.96	3.78	34.33	9.78	38.66	8.26
10	Explosive Power	In Centimeters	41.73	9.51	43.73	7.075	49.13	5.99
11	Agility	In Seconds	10.84	1.50	10.59	191.23	10.59	.6488

In the Table -I shows the mean and standard deviation values of the male Handball Players at various age categories on the selected criterion variables namely height, weight, leg length, arm length, arm span, hand length and hand span for anthropometric variables and speed, muscular strength, explosive power and agility for physical fitness components variables.

TABLE -2
ANALYSIS OF VARIANCE OF SELECTED ANTHROPOMETRIC AND PHYSICAL FITNESS VARIABLES AMONG MALE HANDBALL PLAYERS AT VARIOUS AGE CATEGORIES

S:No	Variables	Source of Variation	Sum of Squares	df	Mean Square	F
1	Height	Between Groups	70.85	2	35.42	1.37
		Within Groups	2239.17	87	25.73	
2	Weight	Between Groups	1489.87	2	744.93	11.55*
		Within Groups	5609.37	87	64.47	
3	Leg Length	Between Groups	46.17	2	23.08	0.84
		Within Groups	2368.80	87	27.22	
4	Arm Length	Between Groups	449.60	2	224.80	19.25*
		Within Groups	1015.50	87	11.67	
5	Arm Span	Between Groups	219.80	2	109.90	2.39
		Within Groups	3989.60	87	45.85	
6	Hand Length	Between Groups	3.54	2	1.77	1.90
		Within Groups	81.01	87	0.93	
7	Hand Span	Between Groups	8.44	2	4.22	2.66
		Within Groups	137.84	87	1.58	
8	Speed	Between Groups	0.63	2	0.31	2.88
		Within Groups	9.52	87	0.10	
9	Muscular Strength	Between Groups	692.68	2	346.34	5.83*
		Within Groups	5168.30	87	59.40	
10	Explosive Power	Between Groups	879.20	2	439.60	7.47*
		Within Groups	5117.20	87	58.81	
11	Agility	Between Groups	1.46	2	0.73	0.70
		Within Groups	90.48	87	1.040	

*p< 0.05 Table f, df (2, 87) at (0.05) = 3.10

In table - II the result of analysis of variance in weight (11.55); arm length (19.25); muscular strength (5.83) and explosive power (7.47) among the three age categories were greater than the table value of 3.10, indicating that it was significant (p< 0.05) for degrees of freedom (2, 87), at 0.05 level of confidence. Since the 'F' value was significant. The Tukey's HSD Post-hoc test was further computed to find out which pair of three age categories was better among other and the results are tabulated in table - 4.4.

In the table -II however they obtained f value for height (1.37); leg length (0.91); arm span (2.39); hand length (1.90); hand span (2.66); speed (2, 88) and agility (0.70) among the three age categories, were lesser than the table value of 3.10 which indicated no significant difference among three age categories at,0.05 level of confidence.

TABLE -3
TUKEY'S HSD POST HOC TEST OF SIGNIFICANCE FOR WEIGHT, ARM LENGTH, MUSCULAR STRENGTH AND EXPLOSIVE POWER DIFFERENCE AMONG THE MEAN OF MALE HANDBALL PLAYERS AT VARIOUS AGE CATEGORIES

Variables	Mean difference			C I
	16-18 Vs 19-21 age category	16-18 Vs 22-24 age category	19-21 Vs 22-24 age category	
Weight	5.47*	9.95*	4.48*	**4.11**
Arm Length	4.36*	5.04*	0.68	**1.75**
Muscular Strength	2.37	6.7*	4.33*	**3.95**
Explosive Power	2	7.4*	5.4*	**3.93**

Form the table III, it can be seen that the mean differences of weight between 16-18 age category and 19-21 age category; 16-18 age category and 22-24 age category and 19-21 age category and 22-24 age category (5.47 & 9.95 and 4.48); and for arm length,16-18 age category and 19-21 age category & 16-18 age category and 22-24 age category (4.36 & 5.04); and for muscular strength, 16-18 age category & 22-24 age category and 19-21 age category and 22-24 age category (6.7 & 4.33); and for explosive power, 16-18 age category and 22-24 age category and 19-21 age category and 22-24 age category (7.4 & 5.4), were significantly differ.

It reveals that there was a significant difference in the variable weight, arm length, muscular strength and explosive power as the mean difference value was greater than the confidence interval value 4.11, 1.75, 3.95 and 3.93. Where as the arm length mean difference between 19-21 age category and 22-24 age category (0.68), and for muscular strength,16-18 age category and 19-21 age category (2.37), and for the explosive power, 16-18 age category and 19-21 age category (2), do not show any significant difference as mean difference interval value 4.11, 1.75, 3.95 and 3.93.

The result indicating that 16-18 Vs 22-24 age category group pair has greater score than the other two groups on the selected variables weight, arm length, muscular strength and explosive power. The mean values of selected anthropometric and physical fitness variables among three groups are graphically presented in figures.

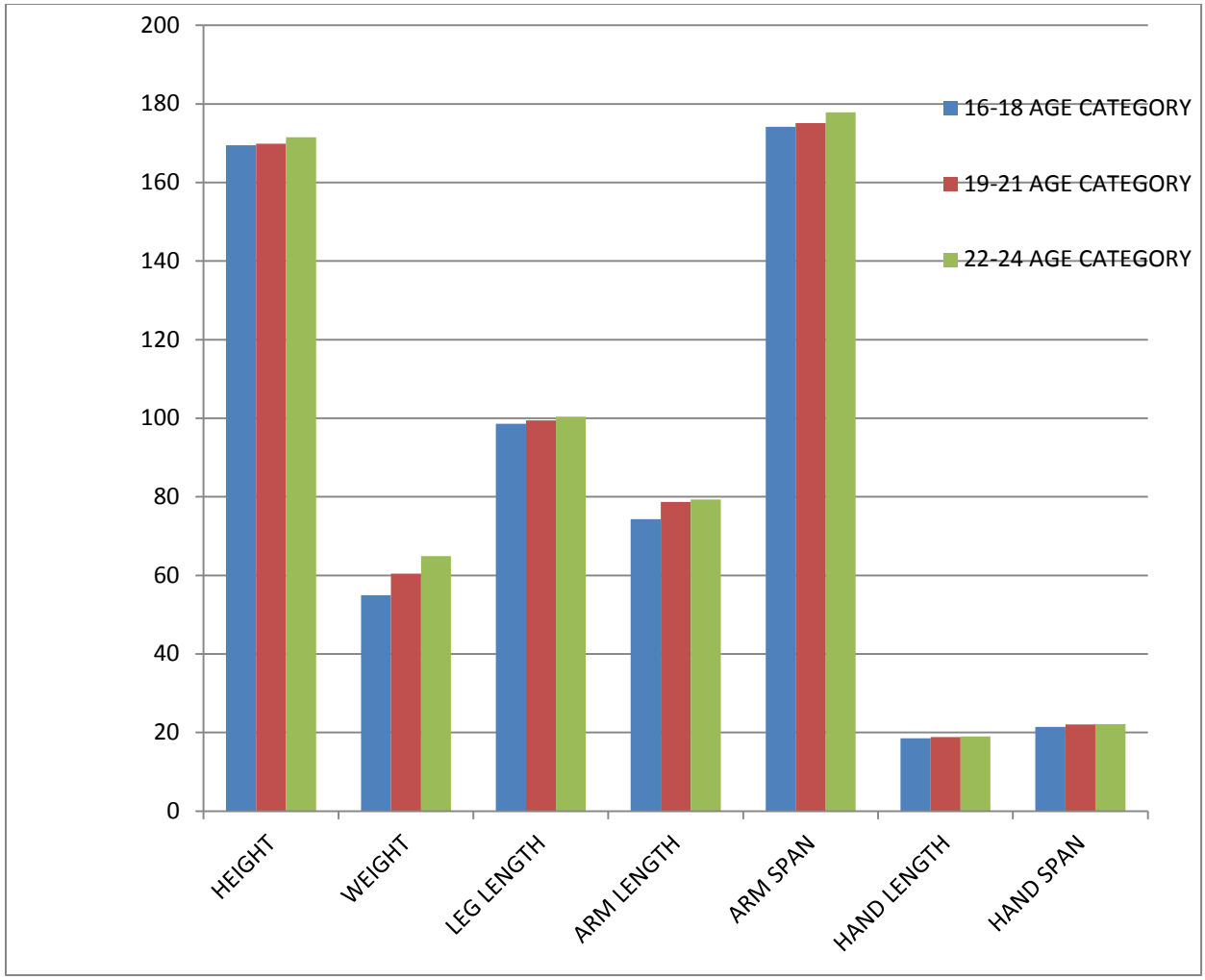

Figure- I

Bar diagram showing the mean values of selected anthropometric characteristics of male handball players at various age categories

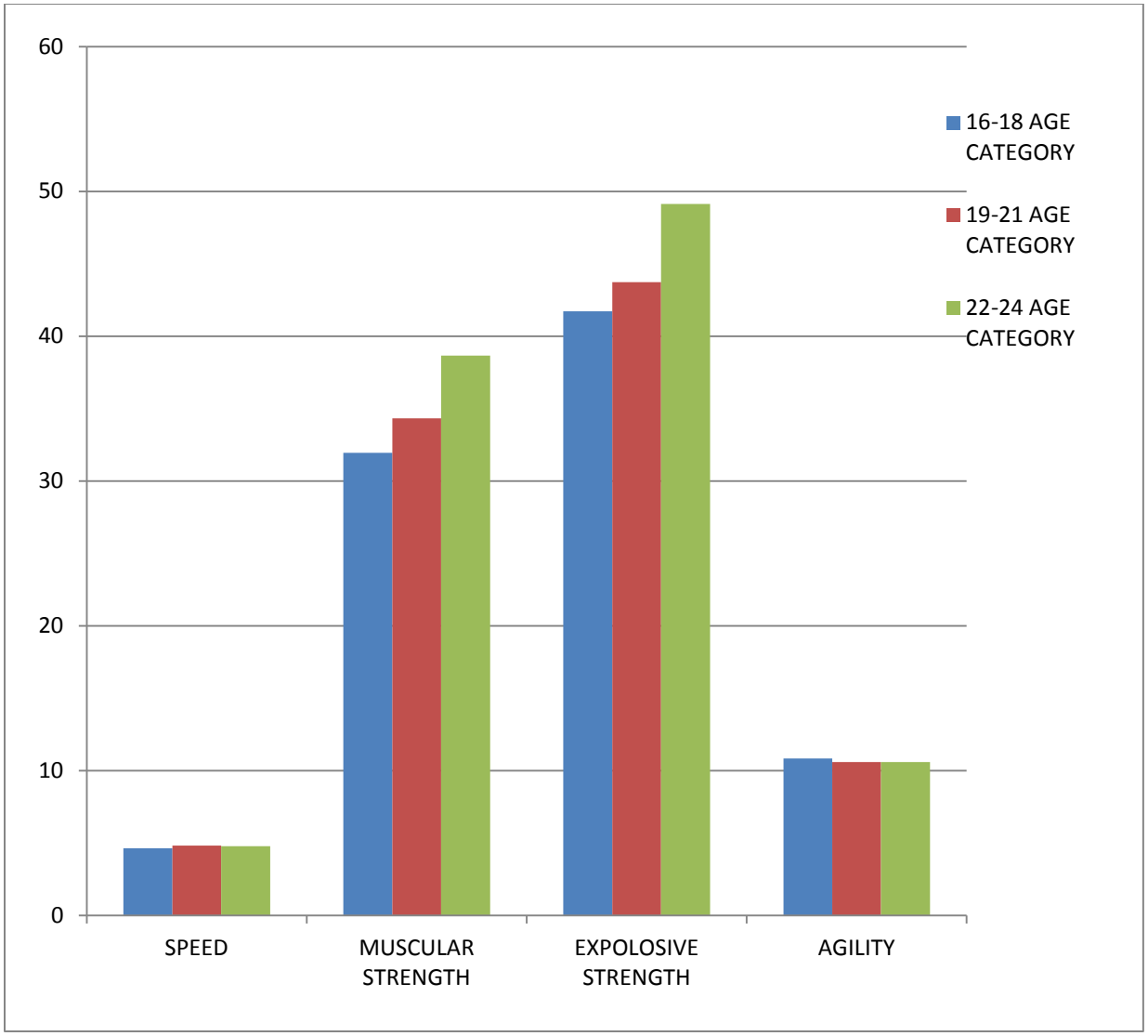

Figure- II
Bar diagram showing the mean values of selected physical fitness characteristics of male handball players at various age categories

DISCUSSION ON FINDINGS

Handball is one of the intermittent team based sports which requires a game specific characteristics in order to complete 60 min of competitive play and to achieve success. In this game movement patterns are characterized 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 number of studies. In this study, body weight, height and arm length in terms of anthropometric characteristics and muscular strength and explosive power in terms of physical fitness variables were seem to be the most important components among the different age categories. The result of the study revealed that there was significant difference exists among the three age categories of handball players with reference to the selected physical and anthropometric characteristics namely body weight, arm length, muscular strength and explosive power respectively in accordance with Visnapuu & Jurimae, 2009; Sporis, et al., 2010; and Chaouachi, et al., 2010. Playing at elite level variety of areas must be addressed. These includes the physiological demands imposed by the nature of the game, psychological domain, and particularly the size and shape to be required for playing the game handball. These findings suggest that physical and anthropometric characteristics should be included in any selection testing of handball players.

CONCLUSIONS

Within the limitations of present study, on the basis of the findings, the following conclusions were draw.

1. In the anthropometrical variables, weight and arm length showed a significant difference whereas no significant difference showed in the variables height, leg length, arm span, hand length and hand span among the subjects of 16-18 age category, 18-21 age category and 22-24 age categories of male Handball payers.
2. In the physical fitness components speed and agility does not show any significant difference where as there was significant difference in the muscular strength and explosive power among the subjects of 16-18 age category, 18-21 age category and 22-24 age categories of male Handball payers.
3. After analyzing the overall part the investigator come to a conclusion that 22-24 age group was better among the three groups on the height, weight, leg length, arm length, arm span, hand length, hand span, muscular strength and explosive power except speed & agility.

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