A FACTOR STRUCTURE STUDY ON SELECTED ANTHROPOMETRIC VARIABLES OF UNIVERSITY LEVEL MEN KHO-KHO PLAYERS IN SANGLI

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Abstract:

This study was identified the prominent anthropometric factor among University level men kho-kho players in the Sangli district. A total of 30 kho-kho players were selected for the study and the age of the subject range from 18 to 20 years. The subject was selected from the Sangli district. Descriptive analysis was done on all the selected anthropometric variables namely; weight, height, sitting height, arm length, leg length. In this study, the principal component method was selected for the primary solution of factor analysis. Since there was very less study on anthropometric variables done on kho-kho players. The scholar has started this study to explore the importance of anthropometric variables among Kho-kho Players. The length factor (factor 1) comprises of height, arm length were highly loaded items, the index factor (factor 2) which comprises the ponderal index was heavily loaded item, another loaded factor of girth factor (factor 3) which comprised of thigh girth and calf girth were heavily loaded items among male Kho-kho players. The present study that the length factor(factor 1) comparison of height, arm length were heavily loaded items, the index factor (factor 2) which comprises the ponderal index was heavily loaded items, another loaded factor of the great factor (factor 3) which comprised of thigh girth and calf girth were heavily loaded items among male Kho-kho Players.

Keywords: Anthropometry, ponderal Index and crural index.

Introduction:

The field of Sports is currently undergoing remarkable scientific changes. Research has revamped the whole concept of sports. Highly technological involved in innovation true contributions from various disciplines like medicine, engineering, human biology, psychology, etc., have made the sports field more authentic, glamorous, and appealing. Different methods are tried to spot out potential talents and train them in near-ideal environments. Kho-kho is a dynamic team game played by both sexes requiring a high level of skills, excellent conditioning, and coordinated team effort. Kho-kho demands that all the players should be adopted to all the situations either attacking or defending. Kho-kho is the game which called for a strenuous, continuous thrilling action and therefore attracts the youth all stimulating and satisfying to any child anthropometric technique(skinfold fat, circumference, and diameter measurement) are popular for predicting body composition because they are not much expensive, require little space and can be performed easily (Behenke and William, 1974 and Pollock and Wilmore, 1990). Anthropometry is often used in physical education, sports science, physical activity, and biomedical sciences. Anthropometric measurement can be divided into height weight and length, width, circumferences or girths, depths, and skinfold. All measurements of the individual are external dimensions of the body. Anthropometric measurements, body composition, body size, and proportions are playing an important role in the physical performance and fitness of the sportsman. Height and weight both are indicators of overall body size and have been used for the grouping of children and youth in various kinds of activity according to their age and sex. Anthropometry is the systematized measurement that expresses the dimensions of the human body. The research on anthropometry measurement may be useful in selecting

the suitable game or sports for any individual. The idea behind the choice of a game or event by an individual of his interest is to give out the best possible abilities

Methodology:

Selection of subject

To achieve the above aim of the study University level men Kho-kho players of Sangli were selected. A total of 30 subjects was selected for the study and the age of the subject ranged from 18 to 20 years. The subject was selected from the Sangli district.

Selection of variables and tests

Nine Anthropometric variables such as Height, Weight, Sitting height, Leg length, Arm length, Thigh girth, Calf girth, Ponderal index, and Crural index.

Analysis of data and results of the study

Descriptive analysis was done on all the selected anthropometric variables namely; weight, height, sitting height, arm length, leg length, calf girth, thigh girth, ponderal index, crural index factor analysis describing the procedure to identify those linear arrangements of variables (called factors), which have large variances, supervising the linear combination, which has small variances. In this study, the principal component method was selected for the primary solution of factor analysis. Scores on selected nine anthropometric university-level men kho-kho players of the Sangli district were subjected to correlation analysis in the form of correlation matrices. These correlation matrices were used in the principal component analysis. The unloaded factors obtained were then rotated by the varimax method to find the final solution. Rotation of the factors is important to avoid the overlapping of variables in different factors. Each of these factors obtained from the selected groups namely anthropometric, Items with loading greater than or equal to ± 0.60 of varimax solution were selected for discussing these factors.

Descriptive analysis

Descriptive analyses of anthropometric variables are present in the following tables.

	Weight	Height	Sitting Height	Arm Length	Leg Length	Calf Girth	Thigh Girth	Ponderal Index	Crural Index
N	30	30	30	30	30	30	30	30	30
Mean	1568	4821	2423	2178	2842	1423	1031	325.2	46.10
Median	43.56	133.90	67.29	60.50	78.93	35.35	28.63	9.03	1.28
Mode	50	162	82	74	96	49	36	9.17	1.30
Std. Dev.	50	162	81	73	97	46	36	9.37	1.33
Kurtosis	3.47	5.21	3.17	3.50	5.27	4.25	3.70	0.55	0.15
Skweness	-0.79	-1.01	-0.32	-0.77	4.81	4.27	0.78	-0.79	17.11
Co-Eff. Variance	0.03	0.05	-0.30	-0.42	-1.42	-1.03	0.37	0.21	-3.85
Minimum	10.58	21.13	8.25	9.86	21.98	14.49	11.1	0.37	0.03
Maximum	38	126	62	55	63	27	23	7.95	0.46
Range	49	142	73	65	86	47	38	9.99	1.50
25th Percentile	12	16	11	10	23	20	14	2.03	1.04
50th Percentile	42	130.62	66	58	77	38	27	8.6187	1.30
75th Percentile	43	134	68	61	79	39.16	29	9.17	1.30

Factor analysis

Factor analysis of anthropometric, ware done in the process of factor analysis, the correlation matrix of the related anthropometric variables were obtained and is presented in a table.

Table 2 Correlation matrix of anthropometric variables

	Weight	Height	Sitting Height	Arm Length	Leg Length	Calf Girth	Thigh Girth	Ponderal Index	Crural Index
Weight	1.00								
Height	0.33	1.00							
Sitting Height	0.28	0.33	1.00						
Arm Length	0.22	0.47	0.25	1.00					
Leg Length	-0.03	0.38	0.14	0.2	1.00				
Thigh Girth	-0.15	-0.47	-0.11	-0.28	0.18	1.00			
Calf Girth	0.32	0.18	-0.03	0.23	-0.29	-0.41	1.00		
Ponderal Index	0.74	-0.06	0.15	0.00	-0.25	0.05	0.26	1.00	
Crural Index	-0.16	-0.01	-0.21	-0.21	-0.06	0.04	-0.17	-0.18	1.00

With the help of principal component analysis, all the above variables are distributed into various factors. With the help of Kaiser's criteria suggested by Guttmann, only those factors having latent rules greater than one were retained in each group and are presented in the table.

Table 3: Principal component analysis of anthropometric variables (un-rotated factor loadings)

	Factor-1	Factor-2	Factor-3
Eigen value	2.369	1.621	1.193
Total Variance. Exp.	26.320	18.015	13.262
Cum. Variance. Exp.	26.320	44.335	57.598
Weight	0.7	0.321	0.265
Height	0.58	0.484	0.125
Sitting Height	0.440	0.213	0.329
Arm Length	0.535	0.36	0.079
Leg Length	0.045	0.620	0.37
Calf Girth	0.48	0.302	0.401
Thigh Girth	0.439	0.085	0.585
Ponderal Index	0.438	0.592	0.341
Crural Index	0.303	0.044	0.245

The unloaded factors obtained were then rotated by the varimax method to find the final solution. Rotation of the factors is important to avoid the overlapping of variables in different factors. And is presented in a table.

Table 4: Principal component analysis of anthropometric variables (varimax solution)

	Factor-1	Factor-1	Factor-1
Eigen value	2.369	1.621	1.193
Total Variance. Exp.	26.320	18.015	13.262
Cum. Variance. Exp.	26.320	44.335	57.598
Weight	0.163	0.744	0.195
Height	0.72	0.051	0.245
Sitting Height	0.464	0.347	0.11
Arm Length	0.596	0.103	0.235
Leg Length	0.561	0.099	0.450
Calf Girth	0.003	0.25	0.650
Thigh Girth	0.27	0.087	0.676
Ponderal Index	0.180	0.786	0.089
Crural Index	0.164	0.33	0.01

Each of these factor obtained from anthropometric variables were involved and given names. Items with loading greater than or equal to = 0.6 t of the varimax solution were selected for discussing each factor is obtained from among the anthropometric variables and are presented in the table below.

Table 5: Factor one of the anthropometric variables after rotated factor loadings (varimax solutions)

Item No.	Name of the variables	Factor loading
1	Height	0.72
2	Arm length	0.596
2	Leg length	0.561

Factor 1 of anthropometric variables of university-level men Kho-kho players wear characterized by three variables from the selected nine variables namely height, arm length, leg length. Since, length factors such as height, leg length, and arm length were heavily loaded items, the factor can be called as length factor. This factor accounted for 26.31% of the total common factor accounted by all three factors.

Table 6: Factor two of anthropometric variables after rotated factor loadings (varimax solution)

Item No.	Name of the variables	Factor loadings
1	Weight	0.744
2	Ponderal Index	0.786

Table 6 shows that chapter 2 of anthropometric variables of university-level men Kho-kho players were characterized by two variables from the selected nine variables namely, weight and ponderal index. Since the index factors such as a ponderal index factor were the heavily loaded item; this factor can be called an index factor. This factor accounted for 18.01% of the total common factor accounted for all three factors.

Discussing of findings

Within the limitation of the study, the following findings were drawn from this present study applicable to male Kho-kho players. The length factor (factor 1) comprises of height, arm length were heavily loaded items. The index factor (factor 2) which comprises the ponderal index was a heavily loaded item. Another loaded factor of girth factor (factor 3) which comprised of thigh girth and calf girth were heavily loaded items among men Kho-kho players. To achieve the above purpose of the study University level men kho-kho players in Sangli were selected. Total 30 subjects for the study and the age of the subject ranged from 18 to 20 years. The subject was selected from the Sangli district. Descriptive analysis was done on all the selected anthropometric variables namely; weight, height, sitting height, arm length, leg length, calf girth, thigh girth, ponderal index, and crural index. In this study, the principal component method was selected for the primary solution of factor analysis. Since there was very less study on anthropometric variables done on Kho-kho players. The scholar has undertaken this study to explore the importance of anthropometric variables are among Kho-kho players.

Conclusion

Within the limits of this study, the following conclusions were drawn from the present study applicable to male kho-kho players. The length factor (factor 1) comprises of height, arm length were heavily loaded items, the index factor (factor 2) which comprises the ponderal index was heavily loaded item, another loaded factor of girth factor (factor 3) which comprised of thigh girth and calf girth were heavily loaded items among male Kho-kho players.

Recommendations

The investigator makes the following recommendations for the research scholars, teachers, physical teachers, coaches, and kho-kho players. Since there was very less study on anthropometric done on kho-kho players. So, a similar study may be conducted using university-level women kho-kho players. The same study may be extended to large sample size. A similar study may be conducted using female kho-kho players of another state. It is also recommended that coaches and trainers design the training plans for actual performance.

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