Research Paper

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Prediction of Volleyball Players fore Arm Pass Skill Ability in Relation to Their Anthropometric Profile and Strength Measures

Physical Education

KEYWORDS : Anthropometric profile, Fore arm pass, strength measures and volleyball players.

Dr. Kuldeep Singh — Assistant Professor in Physical Education, V.V.(P.G.) College, Shamli Uttar Pradesh.

Dr. Sukhbir Singh — Associate Professor in Physical Education, University College, Kurukshetra, Kurukshetra University, Kurukshetra.

ABSTRACT

Volleyball is game of skill and strategies. Wherein, Fore Arm Pass is inevitable skill for volleyball players. Hence, the purpose of this study was to correlate anthropometric profiles and strength measures with fore arm pass skill ability and further to develop the regression equation for the prediction of volleyball players fore arm pass skill ability. The research was conducted on Inter-University level 55 male volleyball players of age range 18-25 years. Twenty eight anthropometric profiles and two strength measures as independent variables and fore arm pass skill tests as dependent variable were evaluated of each subject. 6 lbs medicine bell put and sergeant jump to measure strength measure and Helman Volleyball Test bettery (1971-73) to measure fore arm pass skill ability were used. SPSS (11.5) computer software was used to analyze the data and it determined that the body weight and linear measurements, i.e., standing height, trunk length, arm length, upper arm length, leg length and hand length; body girths i.e., shoulder, upper arm and chest girth; body diameters i.e., shoulder and hip diameter; body composition variables. i.e., lean body mass and strength measures components i.e., arm strength and leg strength have positive and significant correlations with fore arm pass skill ability of volleyball players. The size of multiple correlation is sufficiently large and hence regression equation developed is useful for the prediction of fore arm pass skill ability of volleyball players.

Introduction:

Volleyball is one of the most amazing sports, includes fast movements, jumping's, landings and sudden shifts which need high power and strength for optimized performance. Physical structures of volleyball players are mainly assessed through measuring anthropometric parameters such as standing height, Body mass index and some other physical factors related to performance skills like jumping ability, agility, strength and endurance. Numerous studies have investigated anthropometric parameters of volleyball players. In volleyball, technical and tactical skills, anthropometric characteristics and individual physical performance capacities are most important factors that contribute to the success of a team in competitions (Hakkinen, 1993). The research by Japan Volleyball Association demonstrated the significant correlation between the vertical jumping index and the competitive ability of the volleyball players. It was found that the jumping ability had a positive correlation with the number of spiking, and the total success rates of spiking, blocking and serving in a game (Tian, 2006). Height has been reported to be a discriminating factor between successful and non-successful teams in a collegiate tournament (Morrow et al., 1979)

Volleyball game may be characterized as an integrated playing action of six main skills, serve, serve-reception, set, spike, block and dig. Volleyball is game of skill and strategies. One skill is the ability to place the ball in the desired direction, with the right height, direction and speed. Apart from the techno-tactical performance in game, age, height, body composition and experience are external criteria, which indicate the performance capabilities of a team and its future. Hence, in the present research the authors endeavor to explore the possible ingredients of anthropometric profiles and strength measures which are essential for execution of fore arm pass skill in volleyball game. Since the game of volleyball involves frequently fore arm pass skill in the playing situations, hence fore arm pass skill is inevitable ingredient for volleyball players.

Methodology:

Fifty five male volleyball players who participated in the All India (North-East) Zone Inter-University tournament between the age group of 18 to 25 years, constituted the subjects of the study. The data of the subjects were collected by using the anthropometric rod; vernier calipers, steel tape and skin fold calipers, according to the instructions given by Weiner and Lourie, (1969). All subjects' measurements were taken on the right side of the body. Body composition variables i.e., body density, fat percentage; fat weight and lean body mass were collected by using Durnin and Rehaman's Equation (1967) and Siri's Equation (1961) respectively. The variables for strength measures i.e., arm strength and leg strength were measured by 6 lbs Medicine ball Put and Sergeant jump respectively. The dependent variable i.e., fore arm pass skill ability of volleyball players was measured by Helman Volleyball Test bettery (1971-73). The data were analyzed by applying Pearson Product Moment method for correlation and Warry Do Equation for prediction of fore arm pass skill ability of volleyball players with the help of SPSS (11.5) computer software.

Results and discussion:

Table-1: Mean, Standard Deviation and Correlations of selected anthropometric profile to fore arm pass skill ability of volleyball players. (N=55)

Sr.No.	Variables correlated with fore arm pass skill.	Mean	Std. Deviation	Co-efficient of correlation 'r'
1	Fore Arm Pass skill ability	33.89	2.48	.624 **
	Body Weight	72.00	5.96	
2	Standing Height	185.06	5.59	.531**
3	Trunk Length	59.32	3.10	.457**
4	Arm Length	83.39	6.67	.279*
5	Upper Arm Length	34.75	2.06	.393**
6	Fore Arm Length	30.09	1.62	.265
7	Leg Length	19.89	0.99	.602**
8	Hand Length	46.37	7.38	.283*
9	Hand Breath	54.29	2.79	-.151
10	Elbow Diameter	6.98	0.40	.160
11	Shoulder Diameter	39.79	3.59	.408**
12	Hip Diameter	33.09	2.47	.456**
13	Knee Diameter	9.25	0.74	.218
14	Ankle Diameter	7.17	0.46	.245
15	Shoulder Girth	115.59	3.91	.553**
16	Upper Arm Girth	27.44	1.58	.351**
17	Chest Girth	91.45	10.06	.306*
18	Thigh Girth	55.55	7.48	.265

**Significant at .01 level of significance = .340 &
*Significant at .05 level of significance = .262 (N= 55, df= 53)

Table-1 shows, that the correlations of body weight and linear measurements, i.e., height, trunk length, upper arm length and leg length; body diameters i.e., shoulder and hip diameters; body girths i.e., shoulder and upper arm girths are positive and significant at .01 level of confidence, whereas arm length, hand length and chest girth have positive and significant correlation at .05 level of confidence with fore arm pass skill ability of volleyball players. It implies that body weight, standing height, trunk length, upper arm length, leg length and hand length form the good leverage system in the body; and at the executions of skills this system helps to develop the force and maximum support. The shoulder and hip diameters also helps in the body for the execution of this skill. The current evidence is very well supported by the studies of Gopinathan(2009) on Handball players., Hooda, B.S.(2008) on Indian Junior Male Basketball Players and Singh, K., & Chauhan (2010) on Basketball players.

Table-2: Mean, Standard Deviation and Correlations of skin-fold and body composition measurements to fore arm pass skill ability of volleyball players. (N=55)

Sr. No.	Variables correlated with fore arm pass skill.	Mean	Std. Deviation	Co-efficient of Correlation 'r'
19	Fore Arm Pass skill ability	33.89	2.48	-.180
	Biceps Skin-fold	39.17	13.72	
20	Triceps Skin-fold	55.53	15.62	.054
21	Sub-scapular Skin-fold	93.62	35.98	.136
22	Superailliac Skin-fold	64.73	23.26	.078
23	Thigh Skin-fold	87.33	31.38	.101
24	Calf Skin-fold	80.75	24.62	.192
25	Body Density	1.06	0.01	-.029
26	Fat Percentage	14.99	3.87	.050
27	Fat Weight	10.79	3.22	.249
28	Lean Body Mass	61.21	5.27	.567**

It is clearly indicated from table-2 that the correlation of lean body mass is positive and significant at .01 level of confidence, whereas only biceps skin fold and body density have negative and insignificant correlations with fore arm pass skill efficiency. It suggests that the optimum development of these skin folds and body composition variables suit to develop the fore arm pass skill ability of volleyball players. This occurs due to regular participation in the physical activity programme that consumes excess calories of energy. Hence avoid accumulation of excess fat and make the body fit for efficient functioning. Similar findings were reported by Chauhan, M.S.(1988) on college women Shot putters, Hooda, B.S.(2008) on Basketball Players and De Garay.(1974) on Olympic Athletes.

Table-3: Mean, Standard Deviation and Correlations of strength measures components to fore arm pass skill ability of volleyball players. (N=55)

Sr. No.	Variables correlated with fore arm pass skill.	Mean	Std. Deviation	Co-efficient of Correlation 'r'
29	Fore Arm Pass skill ability	33.89	2.48	.372**
	Explosive arm strength (6lbs Medicine ball put)	12.49	0.87	
30	Explosive leg strength (Sergeant Jump)	57.73	6.67	.476**

It is evident from results shown in Table-3 that the correlations of arms and legs strength are positive and significant at .01 level of confidence with fore arm pass skill, it suggests that arm and leg strength directly contribute to improve the volleyball players fore arm pass skill ability. Similar findings were reported by Chauhan, M.S.(2004) on University Throwers, Tanner.(1964) on Olympic Athletes and Lamp(1954) on Junior High School boys and girls of volleyball.

Table-4: Multiple correlation and regression equation of selected anthropometric measurements and fore arm pass skill ability of volleyball players. (N=55, M=10)

Dependent Variable (Yc)	Selected Independent Variables (X's)	Regression Co-efficient (Bx)	Multiple Correlation (R)	Determinant of Multiple Correlation (R2)	Percentage of each Variables
Fore arm pass skill ability of volleyball players	1.ArmStrength(X29)	1.080	.808	.652	14.05
	2.Leg Strength(X30)	.034			4.35
	3.Height(X2)	.039			4.67
	4.Trunk Length(X3)	.100			5.71
	5.Leg Length (X7)	.081			9.36
	6.Shoulder Diameter(X11)	.066			3.89
	7.Shoulder Girth(X15)	.151			13.17
	8.Sub-scapularSkin-fold(X21)	.008			1.58
	9.Lean Body Mass(X28)	.070			8.43

**Significant at .01 level of significance =.543
*Significant at .05 level of significance =.486 (N=55, df=55-10=45)
Beta Coefficient (Bo)= .213, S.E. of Estimate = 1.605

Pcx = (Beta Weight) x (r) x (100), Where: Beta Weight = Bx . SD of X / SD of Yc and r = Coefficient of correlation between X and Yc.

Multiple correlation from table-4, (R= .652) of arm strength, leg strength, height, trunk length, leg length, shoulder diameter, shoulder girth, sub-scapular skin-fold and lean body mass taken together with fore arm pass skill ability of volleyball players are significant at .01 level of significance. It shows that the combined effect of these variables taken together contribute to improve the fore arm pass skill ability of volleyball players.

Table-4, further illustrates that the multiple regression analysis performed to develop equation for the prediction of fore arm pass skill efficiency of volleyball players on the basis of X_{29}, X_{30}, X_2, X_3, X_7, X_{11}, X_{15}, X_{21} and X_{28} strength measures and anthropometric profiles. Resulted multiple regression equation in scores from is:

$$Y_c=B_o+B_1.X_{29}+B_2.X_{30}+B_3.X_2+B_4.X_3+B_5.X_7+B_6.X_{11}+B_7.X_{15}+B_8.X_{21}+B_9.X_{28}$$

$$Y_c =.213+1.080.X_{29}+.034.X_{30}+.039.X_2+.100.X_3+.081.X_7+.066.X_{11}+.151.X_{15}+.008.X_{21}+.070.X_{28}$$

Where Y_c = Predicted fore arm pass skill efficiency of volleyball players.

X_{29}=Arm Strength, X_{30}=Leg strength, X_2=Height, X_3=Arm Length, X_7=TrunkLength, X_{11}=Shoulder Diameter, X_{15}= Shoulder Girth, X_{21}= Sub-scapular skin-fold and X_{28}= Lean body mass

It indicates that the fore arm pass skill ability can be predicted on the basis of these nine variables. The value of multiple coefficient of determinant (R^2= 0.652) suggests that the combination of these nine variables collectively accounts for 65.2 percent of variance of fore arm pass skill ability. The remaining variance of fore arm pass skill ability scores 34.80 percent is due to other factors. Hence, the developed regression equation could be put in to the prediction of fore arm pass skill ability of volleyball players.

R^2 =can be broken up as.
R^2 = 65.2=14.05+4.35+4.67+5.71+9.36+3.89+13.17+1.58+8.43.

It shows that arm strength, leg strength, height, trunk length, leg length, shoulder diameter, shoulder girth, sub-scapular skin fold and lean body mass contribute 14.05%, 4.35%, 4.67%, 5.71%, 9.36%, 3.89%, 13.17%, 1.58% and 8.43% individually towards the variance of fore arm pass skill ability of volleyball players scores respectively. The coefficient of multiple correlation is of sufficient size, so the equation developed can be put in to the prediction for the evaluation of fore arm pass skill ability of volleyball players.

The results of the present study are completely supported by other similar studies conducted by many scientists i.e., Singh, K. & Chauhan, M.S.(2010), Chauhan, M.S.(1988, 2004), De Garay(1974), Singh, K. & Mohan, L., & Sharma Y.P.(2009).

Conclusion:
A perusal of summary of results shows that the body weight and linear measurements, i.e., standing height, trunk length, arm length, upper arm length, leg length and hand length; body girths i.e., shoulder, upper arm and chest girth; body diameters i.e., shoulder and hip diameter; body composition variables. i.e., lean body mass and strength measures components i.e., arm strength and leg strength have positive and significant correlations with fore arm pass skill ability of volleyball players.

The multiple correlation (R=.808) of arm strength, leg strength, height, trunk length, leg length, shoulder diameter, shoulder girth, sub-scapular skin-fold and lean body mass taken together with fore arm pass skill ability of volleyball players is highly significant. The size of coefficient of multiple correlation is quite large and hence these variables are very important ingredients for predicting the performance of fore arm pass skill ability of volleyball players.

anthropometric variables i.e. arm strength, leg strength, height, trunk length, leg length, shoulder diameter, shoulder girth, sub-scapular skin fold and lean body mass with fore arm pass skill efficiency is highly significant.

The size of multiple correlation is sufficiently large and hence regression equation developed by nine strength measures and anthropometric variables can be put in to prediction equation of the fore arm pass skill efficiency of volleyball players.

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