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ORIGINAL ARTICLE

INVESTIGATION OF THE FACTORS PREDOMINENT TO BADMINTON PLAYING ABILITY

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Abstract:

The purpose of the present study was to analyze the anthropometric, bio-motor and skill performance factors associated with playing ability of college Badminton players. The data were collected from 100 male Badminton players from various colleges affiliated to Bharathidhasan University, Trichirapalli, Tamilnadu, India. The subjects who participated in inter collegiate level Men Badminton Tournament during the academic year 2008-2009 were randomly selected as subjects. The age of the selected subjects ranged from 18 to 25 years. The present study consists of one criterion variable, namely playing ability of Badminton players, and sixteen determinant variables. Collected data was subjected to statistical analysis by using Pearson product moment correlation to determine the relationship between dependent variable and independent variable. The computation of multiple regressions was also used. In multiple regressions, a criterion variable was predicted from a set of predictors. Forward selection method of multiple regressions was used in this study to find out the predictor variable that has the highest correlation with the criterion variables and it is entered into the equation first. The rest of the variables are entered into the equation depending on the contribution of each predictor. It was concluded that the regression equation for the prediction of Badminton playing ability includes flexibility, speed, arm length, serving and overhear clear shot.

KEYWORDS:

Anthropometric, bio-motor, skill performance and playing ability

INTRODUCTION

Badminton is a game that is increasing in popularity. It is an extremely demanding sport. At an elite level, players are often required to perform at their limits of speed, agility, flexibility, endurance and strength. On top of all of this, players must maintain a high state of concentration in order to meet the tactical/mental demands of dealing with their opponents. The varied potential stresses of competitive play are considerable. It is therefore essential that everyone involved with the modern game ought to be familiar with the fitness requirements of the game and how 'Badminton fitness' can be enhanced.

Badminton is a game where the technique requires running ability, both for offensive and for defensive strategies; serving or smashing respectively. Height has thus potential placement as a preferable pre-requisite for the performance-excellence in many sport or game. Anthropometrical measurements have revealed correlation between body structure and physical characteristics, and sports capabilities. This knowledge of mathematical correlation permits sports physicians to evaluate and to predict performance potentialities on the basis of physical characteristics and the specific requirements of the game for sport-the prediction prognostics (Sundarrajan, 1979).

High performance in sports is the outcome of magnitude and the quality of motor movements. These motor movements require physical fitness, technique, tactics and physiological development of athletes. Although the ratio differs from game to game but certain amount of all these qualities are the

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necessary prerequisite for any motor movement (Singh & Singh, 2002). It is a highly complex sport and this presents great challenges for players and coaches of all levels. Competitive matches may last at least 45 minutes. So, badminton is a combination of speed (anaerobic fitness) in rallies and endurance (aerobic fitness) to allow sustained efforts and to promote recovery between rallies. Great strength, power, agility and flexibility are also required. All of these fitness components should form part of a player's fitness training. Additionally, the development of tactical and technical elements is, of course, also vital. With all of these types of training, an understanding of the principles of fitness training from a general point of view is essential.

Studies have pointed out the importance of physical characteristics for different sports such as volleyball (Carvalho et al., 2005; Duncan et al., 2006; Malousarisa et al., 2008), rugby (Gabbett, 2002), and basketball (Neto e Cesar, 2005). However, few studies in the literature have investigated physical and physiological characteristics of badminton (Faude et al., 2007; Chint et al., 1995; Cabello & González-Badillo, 2003). The changing nature of game demands better skill and increased physical abilities. It is a known fact that players should be better in morphological measures, body composition, motor fitness components and physiological traits. But there is no previous study in India to determine the factors, which dominate in Badminton players and also to determine the factors, which contribute for successful outcome in the game. The present study is a sincere attempt on the above so-far uninvestigated area. This section attempts to investigate the importance of anthropometric measurements, selected biomotor and skill variables to playing ability of college level badminton players.

METHODOLOGY

The purpose of the present study was to analyze the anthropometric, bio-motor and skill performance factors associated with playing ability of college Badminton players. The data were collected from 100 male Badminton players from various colleges affiliated to Bharathidhasan University, Trichirapalli, Tamilnadu, India. The subjects who participated in inter collegiate level Men Badminton Tournament during the academic year 2008-2009 were randomly selected as subjects. The age of the selected subjects ranged from 18 to 25 years.The present study consists of one criterion variable, namely playing ability of Badminton players, and sixteen determinent variableswhich are presented in table-I

Table: I- Selection of Variables and Tests

S. No	Criterion Variables	Test items
1	Height	Stadiometer
2	Weight	Weighing Machine
3	Arm length	Lufkin Anthropometric tape
4	Leg Length	Lufkin Anthropometric tape
5	Arm Circumference	Lufkin Anthropometric tape
6	Thigh Circumference	Lufkin Anthropometric tape
7	Calf Circumference	Lufkin Anthropometric tape
8	Muscular Endurance	Sit-ups
9	Shoulder Strength	Push-ups
10	Grip Strength	Grip Dynamometer
11	Speed	50 m run
12	Explosive power	Vertical Jump
13	Flexibility	Sit and reach
14	Agility	Shuttle Run
15	Serving	French Short Service Test
16	Over Head Clear Shot	GSC Badminton Clear Test
17	Playing Ability	Judges rating

STATISTICAL TECHNIQUE

To determine the relationship between criterion variable and determinant variables Pearson product moment correlation was used. The computation of multiple regressions was also used. In multiple regressions, a criterion variable was predicted from a set of predictors. Forward selection method of multiple regressions was used in this study to find out the predictor variable that has the highest correlation with the criterion variables and it is entered into the equation first. The rest variables are entered into the equation depending on the contribution of each predictor. In all the cases 0.05 level of significance was fixed to test the hypothesis.

RESULT

The data on selected anthropometric measurements, bio-motor abilities and skill performance variables were statistically analyzed by using Pearson product moment correlation and the results were presented in table-II.

Table-II: Pearson Product Moment Correlation Matrix between Criterion and Determinant Variables of Badminton Players

Variables	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17
X1	1.000	.141	-.232	-.168	.063	-.058	-.035	.115	-.103	-.018	-.004	-.221	.062	.321	-.121	-.145	.017
X2	.141*	1.000	.206	.619	.695	.021	.112	-.162	-.052	.021	-.037	-.092	-.052	.258	.013	.007	.135
X3	-.232*	.206	1.000	.335	.318	.059	-.105	.195	.020	.066	-.013	-.144	-.011	-.191	.124	.100	.048
X4	-.168	.619	.335	1.000	.531	.044	.046	-.123	.018	.173	.036	-.064	.015	-.007	.180	.157	.116
X5	.063	.695	.318	.531	1.000	.118	.035	-.126	-.019	.125	-.083	-.246	-.070	.092	.014	.011	.139
X6	-.058	.021	.059	.044	.118	1.000	-.036	-.031	-.048	-.014	.150	.048	.157	-.070	.045	.204	-.118
X7	-.035	.112	-.105	.046	.035	-.036	1.000	-.173	.034	.145	-.132	.045	-.124	.031	-.061	.007	-.006
X8	.115	-.162	.195	-.123	-.126	-.031	-.173	1.000	.044	-.022	-.029	-.135	.098	-.193	.113	.066	-.262
X9	-.103	-.052	.020	.018	-.019	-.048	.034	.044	1.000	.035	.056	.076	-.045	-.071	.125	-.067	-.129
X10	-.018	.021	.066	.173	.125	-.014	.145	-.022	.035	1.000	-.134	-.246	-.131	-.204	-.179	.156	.086
X11	-.004	-.037	-.013	.036	-.083	.150	-.132	-.029	.056	-.134	1.000	.119	-.148	-.022	.011	.005	.000
X12	-.221*	-.092	-.144	-.064	-.246	.048	.045	-.135	.076	-.246	.119	1.000	.157	.200	-.172	.047	-.272
X13	.062	-.052	-.011	.015	-.070	.157	-.124	.098	-.045	-.131	-.148	.157	1.000	.091	.048	-.012	-.230
X14	.321*	.258	-.191	-.007	.092	-.070	.031	-.193	-.071	-.204	-.022	.200	.091	1.000	-.274	-.093	-.030
X15	-.121	.013	.124	.180	.014	.045	-.061	.113	.125	-.179	.011	-.172	.048	-.274	1.000	.045	.024
X16	-.145*	.007	.100	.157	.011	.204	.007	.066	-.067	.156	.005	.047	-.012	-.093	.045	1.000	.120
X17	.147*	.135	.048	.116	.139	-.118	-.006	-.262	-.129	.086	.000	-.272	-.230	-.030	.024	.120	1.000

X1-Playing Ability, X2- Height, X3- weight, X4-Arm Length, X5-Leg Length, X6-Arm Circumference, X7-Thigh Circumference,
X8-Calf Circumference, X9-Muscular Endurance, X10-Shoulder Strength, X11-Grip Strength, X12-Speed, X13-Explosive Power, X14-Flexibility, X15-Serving, X16-Serving & X17-Overhead Clear Shot.

*The required table 'r' value is 0.138 at 0.05 level of confidence. It is evident from table-II that there was significant relationship between playing ability and height, weight, speed, flexibility, serving and overhead clear shot of Badminton players in each variable separately. Multiple regression equation was computed since, the multiple correlation is sufficiently high to warrant prediction from it. Then, the correlation identifies the independent variables to be included and their order in the regression equation. Multiple correlation was computed by forward selection method on data obtained from the college Badminton players and the results are presented in table-III.

Table-III: Multiple Correlation Co-efficient for the Predictors of Playing Ability of College Badminton Players

S. No	**Variables** (Forward Selection)	R	R Square	Adjusted 'R' Square	'R' Square Change
1	Flexibility	0.321	0.103	0.094	0.103
2	Flexibility& Speed	0.433	0.188	0.171	0.085
3	Flexibility, Speed & Arm length	0.481	0.231	0.207	0.043
4	Flexibility, Speed, Arm length & Serving	0.516	0.266	0.235	0.035
5	Flexibility, Speed, Arm length, Serving & Overhear clear shot	0.58	0.33	0.30	0.07

From the table-III, it was found that the multiple correlation coefficient for predictors such as flexibility, speed, arm length, serving and overhear clear shot is 0.58 which produce highest multiple correlation with Badminton playing ability. R square values showed that the percentage of contribution of predictors to the playing ability (dependent variable) in the following order. About 10% of the variation in the playing ability was explained by the regression model with one predictor flexibility. About 19% of the variation in the playing ability was explained by the regression model with two predictors, flexibility and speed. An additional 9% of the variance in the playing ability is contributed by speed. About 23% of the variation in the playing ability was explained by the regression model with three predictors, flexibility, speed and arm length. An additional 4% of the variance in the playing ability is contributed by arm length. About 27% of the variation in the playing ability was explained by the regression model with four predictors, flexibility, speed, arm length and serving. An additional 4% of the variance in the playing ability is contributed by serving. About 33% of the variation in the playing ability was explained by the regression model with four predictors, flexibility, speed, arm length, serving and overhear clear shot. An additional 6% of the variance in the playing ability is contributed by overhear clear shot. Multiple regression equation was computed and the results were presented in table-IV.

Table-VI: Regression Coefficients for the Predicted Variables with Playing Ability of College Badminton Players

Variables	Unstandardized Coefficients		Standardized Coefficients
	B	Std. Error	Beta
(Constant)	7.091	.156	
Flexibility	.018	.005	.321
(Constant)	9.209	.682	
Flexibility	.021	.005	.380
Speed	-.302	.095	-.297
(Constant)	10.093	.768	
Flexibility	.019	.005	.344
Speed	-.326	.093	-.321
Arm length	-.010	.004	-.213
(Constant)	8.848	.955	
Flexibility	.021	.005	.373
Speed	-.309	.092	-.304
Arm length	-.011	.004	-.243
Serving	.036	.017	.194
(Constant)	27.23	1.01	
Flexibility	0.35	.008	0.395
Speed	-.405	.051	-.292
Arm length	-.17	.063	-.252
Serving	0.16	.029	.238
Overhear clear shot	.053	.030	.211

From the table-IV, the following regression equations are derived for college Badminton players with dependent variables.

Regression Equation in obtained scores form = XC

$XC = (0.35)\,A + (-0.405)\,B + (-0.17)\,C + 0.16\,D + 0.053\,E + 27.23$

Where, Xc = Playing Ability, A = Flexibility, B= Speed,
C = Arm length, D= Serving and E = Overhear clear shot

Regression Equation in standard scores form = ZC

$ZC = 0.395\,Z_1 + (-0.292)\,Z_2 + (-0.252)\,Z_3 + 0.238\,Z_4 + 0.211\,Z_5$

Where, Zc = Playing Ability, Z_1 = Flexibility, Z_2 =Speed,
Z_3 = Arm length Z_4 = Serving and Z_4 = Overhear clear shot

The regression equation for the prediction of Badminton playing ability includes flexibility, speed, arm length, serving and overhear clear shot. As the multiple correlation on playing ability with the combined effect of these independent variables is highly significant, it is apparent that the obtained regression equation has a high predictive validity.

DISCUSSION

Badminton once was regarded as a slow recreational game, but it has grown into a fast and powerful sports and one of the Olympic events for 1992. With matches lasting up to an hour, this demanding event requires a player to possess a variety of attributes including deceptive skillful techniques, flexibility, agility and both aerobic and anaerobic power (Lo & Stark, 1991). The performance of Badminton has been regularly influenced to a great extent by physical ability, anthropometric variables and skill variables. In the modern Badminton game, power, serving, speed, strength and rudiments of game have been over emphasized to gain control in offense and defense at any level of competition. This puts a great deal of demand in terms of potential physical efforts on the part of each player on the playing field. In Badminton dynamic physical adaptation patterns are of immense importance. The real achievement needs supreme proficiency level in all ingredients (skills) of the game. The mastery over handling the opponents, skill, fitness, against opponent and rhythmical display of all possible elements of the game are determining factors to win the game in one's own favour.

CONCLUSION

The analysis of data for college Badminton players reveals that Badminton playing ability can be predicted from selected anthropometric measurements, bio-motor abilities and skill performance variables. The regression equation for the prediction of Badminton playing ability of college Badminton players includes flexibility, speed, arm length, serving and overhear clear shot. As the multiple correlation on playing ability with the combined effect of these independent variables is highly significant, it is apparent that the obtained regression equation has a high predictive validity. Thus, this equation may be successfully utilized in selecting intercollegiate level Badminton players. Obviously these variables need to be given special attention while preparing players for intercollegiate level competitions. Training schedules at this level should include separate training units for each of these variables.

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