PREDICTION OF BASKETBALL PLAYING ABILITY FROM SELECTED PHYSICAL FITNESS PHYSIOLOGICAL ANTHROPOMETRIC AND PSYCHOLOGICAL VARIABLES OF WOMEN BASKETBALL PLAYERS

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ABSTRACT

The aim of the investigation was to predict the basketball playing ability from selected physical fitness, physiological, anthropometric and psychological variables of basketball players. To achieve this purpose of the study, various basketball teams participated in the South Zone Inter University Basketball Tournament for women and those teams, which entered into the pre-quarter finals stage were contacted and selected. From that one hundred and forty four university female basketball players from twelve universities (n = 12), were selected. The age of the subjects was ranged between 18 and 25 years. The Pearson Product Moment correlation was used to find out the relationship between the selected physical fitness, physiological, anthropometrical variables and psychological variables with basketball playing ability. Further, multiple regression equation was computed only because the multiple correlations were sufficiently high to warrant prediction from it. Then, the correlation identified the independent variables to be included and their order in the regression equation. Multiple correlations were computed by enter selection method. The regression equation for the prediction of basketball playing ability of female basketball players includes flexibility, muscular strength, muscular endurance, resting pulse rate, breath holding time, height, leg length, stress and anxiety.

Key Words: *Prediction, Physical fitness, Physiological, Anthropometric and Psychological Variables, Basketball playing ability & Basketball players*

INTRODUCTION

The present study has taken into consideration a court game that is basketball. Court games are unique in the sense that they are played in a relatively small area and involve the handling of a ball or similar object and often an implement. It requires a high degree of running, maneuverability and total body agility in order to gain good court position and compete with one's opponent on both offensive and defensive maneuvers. Fast starting, stopping, dodging, darting and acceleration are the fundamental requirements to a good court play. Since court games often involve conditions bouts of play at a vigorous rate, a high level of anaerobic endurance and also good jumping ability is of great importance.

Basketball is a game of skill. But it's also a game of athletic ability and movement.

To be a good player, not only they have to know the game and have good basketball skills, but they also have to be extremely agile. Improving ability to move quickly around the court and they will be a better player. The game is all about movement: whether it's driving by a player on offense, sliding to defend a dribbler, or going after a loose ball...increasing quickness and agility gives an edge over the competition. Basketball is a game of movement. But it's also a game of stops-and-starts. As an offensive player they sprint to the offensive end of the floor, hustle 10 or 12 feet across the court to set a screen, roll to the basket, make a quick move to get open to catch a pass, pass and screen away, cut to the basket for a potential offensive rebound. It's all about footwork, movement, mobility.

Basketball is an athletic game involving its participants in a range of demanding motor skills. These skills vary in kind from, being able to run quickly with precision and good timing on a small, sometimes congested, court area, to, the fine hand eye coordination skills of catching and dribbling, or, shooting, or, passing what appears to be quite a large basketball. It also assumes that the players understand and incorporate a set of rules and are prepared to not only play by them, but to co-operate with others (including their teammates) in order to achieve the aims associated with the game.

Basketball players move with great speed over a limited space. In this sport, players cover about 4500–5000 m during a 40-min game with a variety of multidirectional movements such as running, dribbling, and shuffling at variable velocities and jumping (Crisafulli et al., 2002). Basketball, above all else, is a game about decision making, which implies that its players need to be able to apply their skills in the quickly changing and very variable environment that is the essence of the activity.

Basketball is a fast, skilful team game consisting of running, jumping, throwing and catching. It is the most important team game for women and has unrivalled international popularity among females. Since, the researcher is a basketball player, she feels that there is a need for an analytical study in order to discriminate the dominant factors associated with the basketball playing ability of inter-University level participants. Moreover, limited number of researches had been done among basketball players, and also there is a lack of descriptive data on the playing ability of Inter-University basketball players. This has motivated the investigator to take up the study to compare selected physical fitness, physiological,

anthropometric and psychological variables on basketball playing ability among women basketball players of different university.

METHODOLOGY

Subjects

The purpose of the study was to analyze the selected physical, physiological, anthropometrical and psychological variables and basketball playing ability of inter-university female basketball players. To achieve this purpose of the study, one hundred and forty four university female basketball players from twelve universities, such as, Madras University, Chennai, Jain University, Bangalore, Hindustan University, Chennai, SRM University, Chennai, Anna University, Chennai, Calicut University, Calicut, MG University, Kottayam, Kerala University, Kerala, VELS University, Chennai, Bangalore City University, Bangalore, Gitam University, Gitam and Vel Tech University, Chennai, were selected as subjects. The age of the subjects was ranged between 18 and 25 years.

Variables

The selected physical fitness (flexibility, shoulder muscular endurance and muscular strength), physiological (resting pulse rate and breath holding time), anthropometrical variables (standing height, and leg length) and psychological variables (stress and anxiety) and basketball playing ability of various university female basketball players were chosen as subjects.

Experimental Design and Statistical Technique

The Pearson Product Moment correlation was used to find out the relationship between the selected physical fitness, physiological, anthropometrical variables and psychological variables with basketball playing ability of various university female basketball players. Further, multiple regression equation was computed only because the multiple correlations were sufficiently high to warrant prediction from it. Then, the correlation identified the independent variables to be included and their order in the regression equation. Multiple correlations were computed by enter selection method on data obtained for the female basketball players in basketball playing ability.

RESULTS

The result derived by Pearson Product Moment correlation are in table-I.

Table – I: Correlation between Selected Criterion Variables of Female University Basketball Players

	Flexibility	Muscular Strength	Muscular Endurance	RHR	BHT	Height	Leg Length	Stress	Anxiety	Playing Ability
Flexibility	1.00	0.427*	0.448*	-0.488*	0.595*	0.196*	0.189*	0.603*	-463*	0.585*
Muscular Strength	-	1.00	0.256*	-0.317*	0.505*	0.247*	0.298*	0.528*	-0.293*	0.597*
Muscular Endurance	-	-	1.00	-0.302*	0.399*	0.087	0.128	0.303*	-0.180*	0.402*
Resting Pulse Rate	-	-	-	1.00	-0.402*	0.003	0.026	0.048*	0.200*	-0.443*
BHT	-	-	-	-	1.00	0.297*	0.278*	0.786*	-0.545*	0.658*
Height	-	-	-	-		1.00	0.953*	0.369*	-0.408*	0.293*
Leg Length	-	-	-	-		-	1.00	0.329*	-0.394*	0.309*
Stress	-	-	-	-		-	-	1.00	0.646*	-0.709
Anxiety									1.00	-0.478
Playing Ability										1.00

** Significant at 0.05 level of confidence.*

It is evident from the Table - I that there is significant relationship between basketball playing ability and flexibility, muscular strength, muscular endurance, height, leg length, resting pulse rate, breath holding time, stress and anxiety of female university basketball players in each variable separately.

Table – II: Multiple Correlation Co-Efficient tor the Predictors of Basketball Playing Ability of Female Basketball Players

S. No	**Variables** (Enter Selection)	R	R Square	Adjusted R Square	R Square Change
1.	Flexibility	0.565	0.320	0.315	0.320
2.	Flexibility, Muscular strength and Muscular endurance	0.707	0.499	0.489	0.180
3.	Flexibility, Muscular strength, Muscular endurance and Resting pulse rate	0.722	0.521	0.507	0.022
4.	Flexibility, Muscular strength, Muscular endurance, Resting pulse rate and BHT	0.760	0.578	0.563	0.057
5.	Flexibility, Muscular strength, Muscular endurance, RHR, BHT and Height	0.766	0.586	0.568	0.008
6.	Flexibility, Muscular strength, Muscular endurance, Resting pulse rate, Breath holding time, Height and Leg length	0.767	0.588	0.567	0.002
7.	Flexibility, Muscular strength, Muscular endurance, Resting pulse rate, BHT, Height, Leg length and Stress	0.792	0.627	0.605	0.039
8.	Flexibility, Muscular strength, Muscular endurance, Resting pulse rate, BHT, Height, Leg length, Stress and Anxiety	0.792	0.628	0.603	0.001

From the Table - II, it is found out that the multiple correlations co-efficient for predictors, such as flexibility, muscular strength, muscular endurance, resting pulse rate, breath holding time, height, leg length, stress and anxiety is 0.792 which produces highest multiple correlations with basketball playing ability of female university basketball players. 'R' square values show that the percentage of contribution of predictors to the basketball playing ability (dependent variable) is in the following order.

1. About 63% of the variation in basketball playing ability was explained by the regression model with nine predictors, such as, flexibility, muscular strength, muscular endurance, resting pulse rate, breath holding time, height, leg length, stress and anxiety.

2. About 63% of the variation in the basketball playing ability was explained by the regression model, with eight predictors, such as, flexibility, muscular strength, muscular endurance, resting pulse rate, BHT, height, leg length and stress.

3. About 59% of the variation in the basketball playing ability was explained by the regression model with seven predictors, such as, flexibility, muscular strength, muscular endurance, resting pulse rate, BHT, height and leg length.

4. About 59% of the variation in the basketball playing ability was explained by the regression model with six predictors, such as, flexibility, muscular strength, muscular endurance, resting pulse rate, breath holding time and height.

5. About 58% of the variation in the basketball playing ability was explained by the regression model with five predictors, such as, flexibility, muscular strength, muscular endurance, resting pulse rate and breath holding time.

6. About 52% of the variation in the basketball playing ability was explained by the regression model with four predictors, such as, flexibility, muscular strength, muscular endurance and resting pulse rate.

7. About 50% of the variation in the basketball playing ability was explained by the regression model with three predictors, such as, flexibility, muscular strength and muscular endurance. An additional 32% of the variance in the basketball playing ability is contributed by flexibility. Multiple regression equation was computed and the results were presented in Table III.

Table – III: Regression Co-Efficient For the Predicted Variables with Basketball Playing Ability of Female University Basketball Players

S. No	Variables	B	Std. Error	Beta Weights
1.	(Constant)	1.502	0.584	
	Flexibility	0.355	0.043	0.565
2.	(Constant)	-0.416	0.575	
	Flexibility	0.192	0.045	0.306
	Muscular strength	0.104	0.016	0.421
	Muscular endurance	0.052	0.02	0.177
3.	(Constant)	5.79	2.539	
	Flexibility	1.63	0.046	0.260
	Muscular strength	0.097	0.016	0.394
	Muscular endurance	0.045	0.019	0.155
	Resting pulse rate	- 0.066	0.026	- 0.165
4.	(Constant)	3.209	2.464	
	Flexibility	0.088	0.046	0.140
	Muscular strength	0.75	0.016	0.305
	Muscular endurance	0.034	0.019	0.114
	Resting pulse rate	- 0.049	0.025	- 0.124
	Breath holding time	0.101	0.023	0.325
5.	(Constant)	1.809	2.596	
	Flexibility	0.085	0.046	0.135
	Muscular strength	0.072	- 0.016	0.290
	Muscular endurance	0.034	0.018	0.117
	Resting pulse rate	- 0.056	0.025	- 0.141
	Breath holding time	0.093	0.024	0.299
	Height	0.013	0.008	0.096
6.	(Constant)	2.414	2.731	
	Flexibility	0.086	0.046	0.137
	Muscular strength	0.068	0.017	0.277
	Muscular endurance	0.032	0.019	0.109
	Resting pulse rate	- 0.059	0.025	- 0.147
	Breath holding time	0.095	0.024	0.305
	Height	- 0.005	0.028	0.035
	Leg length	3.387	4.676	0.139
7.	(Constant)	7.876	2.983	
	Flexibility	0.048	0.045	0.076
	Muscular strength	0.056	0.016	0.228
	Muscular endurance	0.039	0.018	0.133
	Resting Pulse Rate	- 0.040	0.025	- 0.100
	Breath Holding time	0.033	0.028	0.108
	Height	- 0.024	0.026	- 0.175
	Leg length	5.611	4.503	0.230
	Stress	- 0.119	0.032	0.362

Table – III (Continued)

REGRESSION CO-EFFICIENT FOR THE PREDICTED VARIABLES WITH BASKETBALL PLAYING ABILITY OF FEMALE UNIVERSITY BASKETBALL PLAYERS

S. No	Variables	B	Std. Error	Beta Weights
8.	(Constant)	8.204	3.055	
	Flexibility	0.044	0.046	0.070
	Muscular strength	0.058	0.017	0.234
	Muscular endurance	0.040	0.018	0.135
	Resting Pulse Rate	- 0.041	0.025	- 0.103
	Breath Holding time	0.032	0.028	0.104
	Height	- 0.024	0.026	- 0.171
	Leg length	5.329	4.546	0.219
	Stress	- 0.113	0.034	- 0.341
	Anxiety	- 0.013	0.024	- 0.039

From Table - III, the following regression equations were derived for university basketball players with dependent variables.

1. Regression Equation in obtained scores form = X_C

$$X_C=(0.044)X_1+(0.058)X_2+(0.040)X_3+(-0.041)X_4+(0.032)X_5+(-0.024)X_6+(5.329)X_7+(-0.113)X_8+(-0.013)X_9+8.204$$

Where, X_c = Basketball playing ability, X_1 = Flexibility, X_2 = Muscular strength, X_3= Muscular endurance,X_4= Resting pulse rate,X_5= Breath holding time X_6 = Height, X_7= Leg length, X_8= Stress and X_9 = Anxiety.

2. Regression Equation in standard scores form = Z_C

$$Z_C=(0.070)Z_1+(0.234)Z_2+(0.135)Z_3+(-0.103)Z_4+(0.104)Z_5+(-0.171)Z_6+(0.219)Z_7+(-0.341)Z_8+(-0.039)Z_9$$

Where, Z_c = Basketball playing ability, Z_1 = Flexibility, Z_2 = Muscular strength, Z_3= Muscular endurance,Z_4= Resting pulse rate,Z_5= Breath holding time Z_6 = Height, Z_7=Leg length, Z_8= Stress and Z_9 = Anxiety.

The regression equation for the prediction of basketball playing ability of female basketball players includes flexibility, muscular strength, muscular endurance, resting

pulse rate, breath holding time, height, leg length, stress and anxiety were predictive. As the multiple correlations on basketball playing ability with the combined effect of these independent variables are highly significant, it is apparent that the obtained regression equation has a high predictive validity. Thus, this equation may be successfully utilized in selecting university female basketball players.

DISCUSSION

The development of a regression equation incorporating physical fitness**,** physiological**,** anthropometric**,** and psychological variables to predict basketball playing ability in female athletes reflects a multidimensional approach to performance analysis. Basketball is a complex sport requiring a synthesis of biomechanical, physiological, and mental skills, and using a multivariate model allows for a more accurate estimation of an athlete's potential performance.

Physical fitness attributes such as speed**,** agility**,** muscular strength**,** and explosive power have been shown to directly impact basketball performance. Female basketball players with higher levels of agility and lower-body power tend to outperform others in sprinting, rebounding, and defensive skills (Drinkwater, Pyne, & McKenna, 2008). The inclusion of these variables in a regression model helps capture the athleticism required for effective gameplay.

Key physiological indicators such as VO_2max**,** anaerobic capacity**,** and heart rate recovery are crucial for performance in a high-intensity intermittent sport like basketball. High aerobic capacity improves recovery during and between games, while anaerobic capacity enables high bursts of performance like sprints and jumps (Ben Abdelkrim, El Fazaa, & El Ati, 2007). Hence, physiological metrics serve as critical predictors in evaluating endurance and cardiovascular efficiency.

Anthropometric factors such as height**,** wingspan**,** body mass index (BMI)**,** and body fat percentage are strong predictors of success in basketball, particularly in rebounding, shooting, and blocking (Hoare, 2000). Taller players with greater reach and optimal lean body mass tend to have a positional advantage, particularly in post play and defense. Including such measurements in a regression model enhances predictive accuracy.

Psychological traits like self-confidence**,** mental toughness**,** motivation**,** and focus significantly influence game performance. Players with strong psychological profiles often

exhibit better decision-making under pressure and show greater consistency in performance (Vealey, 2007). By integrating psychological scales into the model, the regression equation better reflects the holistic nature of competitive play.

Combining these domains into a single predictive model enables coaches, trainers, and sport scientists to evaluate players more comprehensively. Such regression models can be used in talent identification, training program personalization, and performance forecasting. As basketball performance results from an interaction of diverse factors, this integrative approach aligns well with modern principles of sports performance science (Reilly, Williams, Nevill, & Franks, 2000).

CONCLUSIONS

The regression equation for the prediction of basketball playing ability of female basketball players includes flexibility, muscular strength, muscular endurance, resting pulse rate, breath holding time, height, leg length, stress and anxiety. As the multiple correlations on basketball playing ability with the combined effect of these independent variables are highly significant, it is apparent that the obtained regression equation has a high predictive validity. Thus, this equation may be successfully utilized in selecting university female basketball players.

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