ISSN: 2349 - 4891

International
Journal of Recent Research and Applied Studies

Prediction of Volleyball Playing Ability from Selected Physical and Physiological Variables of State Level Volleyball Players

S. Benkins Dinesh[1], Dr. S. Glady Kirubakar[2]

[1]*Ph.D., Research Scholar, Department of Physical Education, Tamilnadu Physical Education and Sports University, Chennai, Tamilnadu, India.*
[2]*Assistant Professor, YMCA College of Physical Education, Chennai, Tamilnadu, India.*

Received 8th September 2014, Accepted 15th October 2014

Abstract

The purpose of the study was to predict of volleyball playing ability from selected physical and physiological variables of state level volleyball players. To achieve the purpose of the study, the investigator selected 100 state level volleyball players who participated in state level coaching camps conducted by Tamil Nadu Volleyball Association and Clubs. The subjects were in the age group between 18 to 25 years. All the subjects had participated in the state level Volleyball tournaments. Only volunteer, healthy and physically fit subjects were selected for this study. All the subjects completed the Health History Questionnaire, Physical Activity Questionnaire and the Informal Consent Form and voluntarily expressed their willingness to participate in the study. A repeated measure research design was used with Volleyball playing ability as the criterion variable and selected physical and physiological variables as the predictor variables. Agility was measured through shuttle run test. Muscular Endurance was measured through sit ups test. Explosive Power was measured through standing broad jump test. Shoulder Strength was measured through pull ups test. Flexibility was measured through sit and reach test. Resting Heart rate was measured for by a period of one minute and recorded in beats per minute. It was measured by Digital Heart Rate & Blood Pressure measuring machine, made in Japan. Vital Capacity was measured using Wet Spiromter. Breath Holding Time was Breath Holding Time was measured using nose clip and stop watch. Anaerobic Power was measured using Margaria Kalamen Power Test. Mean Arterial Blood Pressure was determined based on Systolic and Diastolic Blood Pressure. The volleyball playing ability was determined by subjective rating by three experts and was used as the criterion variable. The backward selection in multiple regression method was used to determine the prediction equation. The volleyball playing ability could be best predicted from physical fitness variables, such as, agility, muscular endurance, shoulder strength and flexibility. The volleyball playing ability could be predicted from physiological variable, such as, vital capacity, breath holding time and anaerobic power.

Keywords: Volleyball, Physical, Physiological, Prediction, Playing Ability.

Introduction

Sport plays a very prominent role in the modern society. It is important to individuals, a group, a nation and indeed the world. Throughout the world, sport has a popular appeal among people of all ages and both sexes. Volleyball has developed into a highly competitive sport which requires a high level of physical, physiological and psychological fitness. The game at a high level of competition, requires quicker sudden movements and fast reaction. Volleyball matches have no time limit and matches can last for several hours, if the teams are evenly matched. Successful play in volleyball is not the outcome of power alone but it is the product of the combined display of power and tactical abilities. Modern game of volleyball is characterized by accuracy, concentration and cleverness **(Vidyasagar Sharma, H.A. Khan & Butchiramaiah, C. 1986).** Volleyball has changed beyond recognition in the past three decades from an unorganized sport into a highly competitive, requiring a high level of physical fitness, mental alertness and mastery over techniques. Volleyball has a great need for volitional qualities, with equal technical and tactical mastery the team whose players show the greatest desire for victory will win **(Dewaram, W.I. 1982).**

Physical fitness is soundness of body, a condition in which its functions are duly and efficiently discharged. Physical fitness encourages and benefits body mobility, strength etceteras. Fitness is the state which characterizes the degree to which a person is bound to function efficiently. To lead a happy and successful life, people have developed physical fitness because it is necessary for the proper functioning of the body and the system. Exercise physiology is the scientific study of physiological changes in athletes body with the effects of exercise, whether long term or short term. Different environmental changes, namely, altitude,

Correspondence
S.Benkins Dinesh,
E-mail: benkinsdinesh@gmail.com, Ph: +9190038 25592

climate, temperature, humidity, nutritional status etc have some close associations with the optimal performance of an athlete **(Rouben, 1971).**

Methodology

The purpose of the study was to predict of volleyball playing ability from selected physical and physiological variables of state level volleyball players. To achieve the purpose of the study, the investigator selected 100 state level volleyball players who participated in state level coaching camps conducted by Tamil Nadu Volleyball Association and Clubs. The subjects were in the age group between 18 to 25 years. All the subjects had participated in the state level Volleyball tournaments. Only volunteer, healthy and physically fit subjects were selected for this study. All the subjects completed the Health History Questionnaire, Physical Activity Questionnaire and the Informal Consent Form and voluntarily expressed their willingness to participate in the study. A repeated measure research design was used with Volleyball playing ability as the criterion variable and selected physical and physiological variables as the predictor variables. Agility was measured through shuttle run test. Muscular Endurance was measured through sit ups test. Explosive Power was measured through standing broad jump test. Shoulder Strength was measured through pull ups test. Flexibility was measured through sit and reach test. Resting Heart rate was measured for by a period of one minute and recorded in beats per minute. It was measured by Digital Heart Rate & Blood Pressure measuring machine, made in Japan. Vital Capacity was measured using Wet Spiromter. Breath Holding Time was Breath Holding Time was measured using nose clip and stop watch. Anaerobic Power was measured using Margaria Kalamen Power Test. Mean Arterial Blood Pressure was determined based on Systolic and Diastolic Blood Pressure. The volleyball playing ability was determined by subjective rating by three experts and was used as the criterion variable. The backward selection in multiple regression method was used to determine the prediction equation.

Results

Table I. Descriptive statistics on selected physical variables of the subjects

S.No	Variables	N	Mean (M)	Standard Deviation (SD)
1	Agility	100	12.092	0.7139
2	Muscular Strength	100	16.92	2.799
3	Explosive Power	100	1.2842	0.1135
4	Shoulder Strength	100	13.74	3.454
5	Flexibility	100	14.55	2.552

Table I shows the mean values, standard deviation and the range for selected physical fitness of the subjects. The mean value of agility of the subjects was 12.092 with standard deviation of ± 0.7139, the muscular strength was 16.92 with standard deviation of ± 2.799, explosive power was 1.2842 with standard deviation of ± 0.1135, shoulder strength was 13.74 with standard deviation of ± 3.454 and flexibility was 14.55 with standard deviation of ± 2.552.

Table II. Descriptive statistics on selected physiological variables of the subjects

S.No	Variables	N	Mean (M)	Standard Deviation (SD)
1	Resting Heart Rate	100	72.65	6.109
2	Vital Capacity	100	2460.00	266.788
3	Breath Holding Time	100	41.85	6.263
4	Mean Arterial Blood Pressure	100	77.36	4.53
5	Anaerobic Power	100	76.97	6.414

Table II shows the physiological variables of the subjects. The mean values of the resting heart rate of the subjects was 72.65 with standard deviation of ± 6.109, the vital capacity was 2460 with standard deviation of ± 266.788, breath holding time was 41.85 and standard deviation of ± 6.263 mean arterial blood pressure was 77.71 with standard deviation of ± 4.53, the anaerobic power was 76.97 with standard deviation of ± 6.41.

Table III. Correlation coefficient between volleyball playing ability and selected physical variables of the subjects

S.No	Variables	N	Mean (M)	Obtained 'r' value
1	Agility	100	12.092	-0.172*
2	Muscular Strength	100	16.92	0.770*
3	Explosive Power	100	1.2842	0.443*
4	Shoulder Strength	100	13.74	0.709*
5	Flexibility	100	14.55	0.662

* Significant at 0.05 level.

The results proved that the selected physical fitness variables agility, muscular endurance, explosive power, shoulder strength and flexibility were significantly correlated with the volleyball playing ability as the obtained 'r' values -0.172, 0.77, 0.443, 0.709 and 0.662 respectively were greater than the required table 'r' value of 0.165 at 0.05 level be significant .

Table IV. Correlation coefficient between volleyball playing ability and selected physiological variables of the subjects

S.No	Volleyball Playing Ability Vs Variables	N	Mean (M)	Obtained 'r' value
1	Resting Heart Rate	100	72.65	-0.411*
2	Vital Capacity	100	2460.00	0.128
3	Breath Holding Time	100	41.85	0.475*
4	Mean Arterial Blood Pressure	100	77.36	0.188*
5	Anaerobic Power	100	76.97	0.660*

* Significant at 0.05 level

The results proved that selected physiological variables resting heart rate, mean arterial blood pressure, breath holding time and anaerobic power were significantly correlated with volleyball playing ability as the obtained 'r' values -0.411, -0.188, 0.475 and 0.660 respectively were greater than the required table 'r' value to be significant at 0.05 level. And there was no significant relationship between volleyball playing ability and vital capacity.

Table V. The variables selected for prediction with beta and ' t ' values for volleyball playing ability

Variables	Beta in	t	Sig	Partial Correlation	Collinearity Statistics
					Tolerance
Agility	-0.098	-2.453	0.016	-0.253	0.81
Muscular Endurance	0.161	2.531	0.013	0.26	0.322
Shoulder Strength	0.225	4.654	0.000	0.444	0.558
Flexibility	0.124	2.338	0.022	0.242	0.462
Vital capacity	0.075	1.975	0.051	0.206	0.914
Breath Holding time	0.085	2.049	0.043	0.213	0.754
Anaerobic Power	0.186	3.529	0.001	0.352	0.471

Table V shows that the partial correlation between volleyball playing ability and selected predictor variables agility, muscular endurance, shoulder strength, flexibility, vital capacity, breath holding time and anaerobic power were -0.253, 0.26, 0.444, 0.242, 0.206, 0.213 and 0.352 respectively which were significant at 0.01 level.

Table VI. Multiple correlation, r square, r square change and significance of the selected predictor variables by backward selectors

S.N	Variables Predicted	R	R square	F change	ANOVA 'F'	Significance of 'F' change
1 2 3 4 5 6 7	Agility Muscular endurance Shoulder strength, Flexibility Vital capacity, Breath holding time Anaerobic power	0.941	.885	1.553	61.787	0.000

In Table VI the selected predictor variables by backward regression method, namely, agility, muscular endurance, shoulder strength, flexibility, vital capacity, breath holding time and anaerobic power. The multiple correlation R 0.941 with R square value of 0.885, F change of 1.553 and ANOVA 'F' of 61.787 with the significant F change of 0.000 are presented in the above table.

Table VII. Beta unstandardised co-efficients, constant value and significants of each backward selected variables

Selected Variables	Unstandardized Beta Coefficients	Constant	Sig
Constant		-62.413	
Agility	-2.016		0.016
Muscular Endurance	0.842		0.013
Shoulder Strength	0.952		0.000
Flexibility	0.712		0.022
Vital capacity	0.0041		0.051
Breath Holding time	0.199		0.043
Anaerobic Power	0.423		0.001

In Table VII the beta unstandardized co-efficients, constant value and significance of each backward selected variable are shown. The constant value of -62.413 are presented. Based on the results presented, the following multiple regression formula was determined by the backward selection method from model 10 (Table X) and the null hypothesis were rejected at 0.10 level of significance with agility, muscular endurance, shoulder strength, flexibility, vital capacity, breath holding time and anaerobic power.

$$\textbf{Playing Ability} = Y^1 = -2.016\,X_1 + 0.842\,X_2 + 0.952\,X_3 + 0.712\,X_4 + 0.0041\,X_5 + 0.199\,X_6 + 0.423\,X_7 - 62.413$$

Where Y^1 = the predicted score, X_1= Agility, X_2 = Muscular endurance, X_3= Shoulder Strength, X_4 = Flexibility, X_5 = Vital Capacity, X_6= Breath Holding Time, X_7= Anaerobic Power, a =-62.413 (constant).

The above equation where the variables with significant ratio exceeding the df of 1,90 and 0.10 level were removed as can be seen from Table XII. The investigator set the significant level for retaining the variable in equation as df of 1.90 at 0.10 and all the variables that exceeded this level were removed.

Conclusion

Based on the limitation and delimitation of the present research study, it was concluded that:

1. The volleyball playing ability could be best predicted from physical fitness variables, such as,

agility, muscular endurance, shoulder strength and flexibility.
2. The volleyball playing ability could be predicted from physiological variable, such as, vital capacity, breath holding time and anaerobic power.

References

1. Dewaram, W.I. (1982), Article in the Japan Vs India Volleyball Test Match Souvenir (Madras: Madras Arts Printers, 1982), pp. 21-23.
2. Hakkinen, K. (1993). Changes in physical fitness profile in female volleyball players during the competitive season. *J Sports Med Phys Fitness.* 33(3):223-32.
3. Mathur, D., Toriola, A., & Igbokwe, N. (1985). Somatotypes of nigerian athletes of several sports. *British Journal of Sport Medicine,* 19(4): 219-220.
4. Papadopoulou, S.D., Papadopoulou, S.K., Gallos, G.K., Likesas, G., Paraskevas, G. & Fachantidou, A. (2002). Anthropometric differences of top Greek and foreign volleyball players. *International Journal of Volleyball Research*, 5, 26-29.
5. Rouben B. Frost (1971), Physiology cal Concepts applied to Physical Education and Coaching, New York: Addison Wesley Publishing company, p. 70
6. Sakurai, M., & Miyashita, M. (1983). Developmental aspects of over arm throwing related to age and sex. Hum. Movem. Sci. 2: 67-76.
7. Skoufas, D., Kotzamanidis, C., Hatzikotoylas, K., Bebetsos, G., & patikas, D. (2003). The Relationship between the anthropometric variables and the throwing performance in Handball. *J Hum Mov Sci*, 45: 469-84.
8. Vidyasagar Sharma, H.A. Khan and C. Butchiramaiah (1986). An Article in SNIPES Journal Vol. 9 (Patiala: NIS Oct), p. 40.