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PREDICTIONOFTHEFACTORSPREDOMINANTTOPLAYING ABILITY OF VOLLEYBALL PLAYERS

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Abstract

The purpose of this study was to determine the factors predominant to playing ability of volleyball players. To achieve this purpose, the investigator selected thirty male south zone inter-university level volleyball players as subjects. The age of the selected subjects was from eighteen to twenty three years. In this study one criterion (volleyball playingability)and thirteen determinant variables (anthropometricmeasurements, motor fitness components and game skill performances) are included. Pearson product moment correlation was utilized to verify the association between criterion (volleyball playing ability) and determinant variables. The relationship between criterion and determinant variables as well as inter-correlations among determinant variables was calculated by using Pearson product-moment correlation formula. The computation of multiple regressionswasalsoused.Multipleregressionsanalysiswasusedtofindoutthepredictor variable that has the highest correlation with the criterion variables and it is entered into theequationfirst.Therestofthevariablesareenteredintotheequationdependingonthe contribution of each predictor. To test the hypothesis 0.05 level of significance was fixed. Amongtheselecteddeterminantvariablesheight,weight,leglength,thighgirth,explosive power and speed of the volleyball players were highly correlated with volleyball playing ability. Theregression equationforthe volleyballplayingabilityincludesexplosive power, height, speed and volleying ability.

Keywords: *Anthropometric measurements, Motor fitness components, Skill performances and Volleyball players*

INTRODUCTION

Tobringsuccess,scientifictechniquesareutilizedtoenticeeveryounceofenergy, everyfractionofasecondandeverycentimeter,outofasportspersonwhoisconsiderbeing more or less a machine. Everywhere new efforts are on to set up research laboratories so that ways and means could be found not only to assess but also to accelerate human performanceinsports.Reallysportshavenotbecomeextremelycomplicatedphenomenon. A primarypurposeof most of the competitive sports is towin. Theprobabilityof winning is enhanced by an understanding of the inherent structure of the sport and a pragmatic interplay between chance and skill. In prediction studies the, outcomes are estimated in advance. Generally these predicted consequences are not possibility of guesses, although they are based upon various alreadyknown carefullyconceived beliefs or relationships or facts.Insportsandgames,theexpertsattempttopredictthesuccessofanindividualduring competition. Their prediction is based on body composition, Physical fitness factors, physiological factors and skills.

Volleyball is an Olympic sport played professionallyin manyEuropean countries. However,notwithstandingtheprofessionalization,whichisadvancinginthissport,alackof scientificinformationonitsperformancecanbenoticed.Thiscanbeduetomanyreasons, one of them is that most of the research which has been conducted in this field has been publishedinEasternEuropeancountriesandisnotreadilyaccessibletothesportscience

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community. Anotherreasoncanbeattributedto theconservativeapproach mostcoacheshave towardsphysicalconditioningforvolleyballplayers.Physicalconditioninginvolleyballis extremelyimportantfortopperformance,sothecorrectapproachtotrainingshouldbebased ontheknowledgeofthespecificrequirementsofthegameperformance.Mostofthestudies reviewed were cross-sectional, and only a few reported data on performance related physical parameters of volleyball players.

Volleyballisasportthatrequiresamultitudeofathleticabilities,suchasexplosive, agility, muscular endurance and strength in the lower body, muscular balance and high levels of neuromuscular co-ordination, body awareness and stamina, the ability to know where the body is, and being able to move it, good flexibility to avoid injury and correct balance between the quadriceps and hamstrings, as well as strength imbalances between the left and right leg. Thus, every volleyball player is interested to improve their game performance.

Volleyball performers must be athletic, they have to be quicker and need an excellentathleticism.Ifathletesaretoattainahighlevelofperformance,informationfrom the continuous assessment of competition must be made available to aid in the evaluation of how players are performing and progressing. The research scholar being himself a volleyball player noticed some issues related to the players fitness and skill performance. Taking this into consideration the research scholar has decided to conduct his research on thesameandfindthesolutionoftheproblem.Thisresearchwillbeusefulforbothplayers as well as coaches to improve game performance. By considering the above literature, an attempthasbeenmadetoinvestigatetheanthropometric,motorfitnessandvolleyballskill performance relationship with playing ability of inter-university level volleyball players.

METHODOLOGY

Selectionof Subjects

To determine the factors predominant to volleyball playing ability of volleyball players,thirtymalevolleyballplayersfromAcharyaNagarjunaUniversity,Guntur,Andhra Pradesh, Indiawerechosen. Randomgroupdesignwasused,asitismostappropriate. The ageofthesubjectswasfrom18to23years.Standardizedtestswereusedtocollectrelevant dataontheselecteddeterminantvariables(anthropometric,motorfitness&skillvariables) and the criterion (volleyball playing ability) variable was assessed by judges rating.

Statistical Techniques

In this study one criterion (volleyball playing ability) and thirteen determinant variables are included. Pearson product moment correlation was utilized to verify the association between criterion (volleyball playing ability) and determinant variables. The relationship between criterion and determinant variables as well as inter-correlations amongdeterminantvariableswascalculatedbyusingPearsonproduct-momentcorrelation formula.Thecomputationofmultipleregressionswasalsoused.Inmultipleregressions,a criterionvariablewaspredictedfromasetofpredictors.Multipleregressionsanalysiswas used 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. To test the hypothesis 0.05 level of significance was fixed.

Result

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The range, minimum, maximum, mean and standard deviation values on selected anthropometric, motor fitness, skill performance and playing ability of volleyball players are in table-I.

Table–I:Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
VPA	30	66.00	88.00	77.1667	5.63905
Ht	30	167.00	177.00	1.7140E2	2.90778
Wt	30	66.00	85.00	74.6667	4.42823
AL	30	60.00	83.00	65.1000	4.03733
LL	30	85.00	91.00	87.8667	1.67607
Biceps	30	25.00	32.00	28.7667	1.69550
Thigh	30	35.00	47.00	39.5667	3.56886
Power	30	39.00	57.00	50.2667	5.04417
Flex	30	8.00	12.00	9.7667	1.22287
Speed	30	7.00	8.10	7.4300	.27562
Sth	30	65.00	69.00	67.0333	.99943
Volley	30	23.00	29.00	26.4333	1.61210
Spike	30	28.00	35.00	31.9333	1.92861
Serve	30	38.00	41.00	39.4000	.96847

Todeterminetherelationshipbetweencriterionanddeterminantvariablesandalso to found out the interrelationship between the determinant variables Pearson product moment correlation was used and the obtained results are given in table-II.

Table–II:InterCorrelationMatrix

	VPA	Ht	Wt	AL	LL	Biceps	Thigh	Power	Flex	Speed	Sth	Volley	Spike	Serve
PA	1	.833**	-.357	.307	.524**	.314	.650**	.847**	.171	-.651**	.011	-.312	.080	-.120
Ht		1	-.265	.281	.209	.194	.330	.653**	.202	-.644**	.066	-.413*	.288	.051
Wt			1	-.176	-.006	.008	-.049	-.200	.233	.353	-.138	.233	.009	.249
AL				1	.114	-.117	.046	.315	.291	-.272	.016	-.097	-.159	-.152
LL					1	.559**	.855**	.706**	.119	-.290	.003	-.297	.029	-.221
Biceps						1	.689**	.443*	-.243	-.103	-.219	-.403*	.396*	.017
Thigh							1	.773**	.095	-.323	-.015	-.392*	.176	-.277
Power								1	.245	-.400*	-.016	-.477**	.101	-.114
Flex									1	-.040	-.078	-.192	-.080	.023
Speed										1	-.079	.133	-.054	.264
Sth											1	.183	-.249	-.121
Volley												1	-.534**	-.071
Spike													1	.089
Serve														1

**Therequiredtable'r'valueis0.34at0.05levelofconfidence*

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VPA	PlayingAbility	Biceps	BicepsGirth	Sth	MuscularStrength
Ht	Height	Thigh	ThighGirth	Voll	Volleyingability
Wt	Weight	power	Explosive Power	Spike	Spikingability
AL	Arm Length	Flex	Flexibility	Serve	Servingability
LL	Leg Length	Speed	Speed		

The correlation analysis proved that the selected determinant variables height (0.833), weight (0.357), leg length (0.524), thigh girth (0.650), explosive power (0.847), speed (0.651) were significantly correlated with the volleyball playing ability, because these correlation values are more than the necessary (0.34) value (0.05 level).

Analysisof VarianceResults

The analysis of variance for the influence of predictor variables on volleyball playing ability among volleyball players is given in table -III.

Table–III:Outputof Analysisof Variance

Model		SS	df	Mean Square	F	Sig.
1	Regression	661.549	1	661.549	71.075	.000[a]
	Residual	260.617	28	9.308		
	Total	922.167	29			
2	Regression	787.272	2	393.636	78.788	.000[b]
	Residual	134.895	27	4.996		
	Total	922.167	29			
3	Regression	812.196	3	270.732	64.008	.000[c]
	Residual	109.971	26	4.230		
	Total	922.167	29			
4	Regression	828.924	4	207.231	55.562	.000[d]
	Residual	93.243	25	3.730		
	Total	922.167	29			

The found ‘F’ values 71.075, 78.788, 64.008 and 55.562 are highly significant(0.05levels). It established that the all chosen determinant variables are collectively influenced the volleyball player’s playing ability.

Since the ANOVA ‘F’ values are very much significant, the computation of multiple regressions was performed. Multiple regression equation was calculated only becausethemultiplecorrelationswereadequatelyhightowarrantpredictionfromit.Then, the correlation identified the independent variables to be included and their order in the regression equation.

Multiplecorrelationswerecomputedbystep-wiseargumentmethodandtheresults are presented in table – IV.

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Table–IV:Step-WiseMultipleRegressionbetweenPlayingAbility and Determinant Variables of Volleyball Players

Model	R	R Square	AdjustedRSquare	Std.Errorof the Estimate
1	.847[a]	.717	.707	3.05086
2	.924[b]	.854	.843	2.23520
3	.938[c]	.881	.867	2.05661
4	.948[d]	.899	.883	1.93124

a. Predictors:(Constant),Power

b. Predictors:(Constant),Power,Ht

c. Predictors:(Constant),Power,Ht,Speed

d. Predictors:(Constant),Power,Ht,Speed,Volley

From Table – IV it was found that the multiple correlations co-efficient for predictors, such as explosive power, height, speed and volleying ability was 0.948 which produce highest multiple correlations with volleyball playing ability. 'R' square values show that the percentage of contribution of predictors to the volleyball playing ability (Dependent variables) is in the following order.

1. About 71.7% of the variation in the volleyball playing ability was explained by the regression model with one predictor such as explosive power.

2. About 85.4% of the variation in the volleyball playing ability was explained by theregressionmodelwithtwopredictorssuchasexplosivepowerandheight.Anadditional 13.70% of the variance in the volleyball playing ability was contributed by height.

3. About88.10%ofthevariationinthevolleyballplayingabilitywasexplainedby the regression model with three predictors such as explosive power, height and speed. An additional2.70%ofthevarianceinthevolleyballplayingabilitywascontributedbyspeed.

4. About 89.9% of the variation in the volleyball playing ability was explained by the regression model with four predictors such as explosive power, height, speed and volleyingability.Anadditional1.80%ofthevarianceinthevolleyballplayingabilitywas contributed by volleying ability.

Multiple regression equation was calculated and the obtained results are presented in table – V.

Table–V:RegressionAnalysisofPredictionEquationofVolleyballPlayers

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	29.570	5.673		5.212	.000
	Power	.947	.112	.847	8.431	.000
2	(Constant)	-114.606	29.040		-3.946	.001
	Power	.591	.109	.529	5.438	.000
	Ht	.946	.188	.488	5.016	.000
3	(Constant)	-34.732	42.387		-.819	.420
	Power	.599	.100	.536	5.990	.000
	Ht	.668	.208	.344	3.213	.003
	Speed	-4.398	1.812	-.215	-2.427	.022
4	(Constant)	-74.527	44.015		-1.693	.103

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	Power	.662	.098	.592	6.721	.000
	Ht	.766	.201	.395	3.820	.001
	Speed	-3.701	1.733	-.181	-2.136	.043
	Volley	.552	.261	.158	2.118	.044

From the Table – V, the following regression equations were derived for playing ability of volleyball players. Regression Equation in obtained scores form = PA

VolleyballPlayingAbility(VPA)=29.570+0.662(explosivepower)+0.766 (height) - 3.701(speed) + 0.552 (volleying ability)

Theregressionequationforthevolleyballplayingabilityincludesexplosivepower, height, speed and volleying ability. As the multiple correlations on volleyball playing abilitywith the combined effect of these independent variables are highlysignificant, it is apparent that the obtained regression equation has a high predictive validity.

Discussion

The performance of volleyball players is influenced by many factors such as physical, physiological and psychological variables, technique, tactics, physique, body size, body composition and application of biomechanical principles. It has been well established that special physical characteristics indicates whether the player would be suitable for the competition at the highest level in a specific sport (Slater et al., 2005). No doubt the performance of player influenced by many factors but still physical fitness components of a specific game is the primary factor among those entire factors (Lidor & Ziv, 2010).

Duringavolleyballmatchplayersareinvolvedinvariousperformancemovements such as; defensive and offensive jumps, blocks, spikes and sprints where power, strength, agility, and speed are required (Gabbett & Georgieff, 2006). Volleyball is a team sport which requires intermittent bouts of high intensity exercise, followed by periods of low intensity activity (i.e. walking or standing) (Marques et al., 2006). These high-intensity boutsincludebothhorizontalapproachmovements(spikejumps)andmovementswithout an approach i.e. jump setting, jousts, blocking (Sheppard et al., 2008). Nowadays, elite volleyballplayersarequicker,strongerandinbetterphysicalconditionthanbefore,which couldbearesultofyear-roundscientifictraininganddevelopingskillsthataddedstrength, power and fitness specific to their sport (Scates & Linn, 2003).

The ability of the neuromuscular system to produce power is critical to the performance in sports that require changes in direction, sprints, jumps and throws (i.e. functional abilities (Izquierdo et al., 2002; Ronnestad et al., 2008; Tricoli et al., 2005). Specifically, volleyball skills, such as serving, attacking, blocking, setting, digging and receivingtheservicerequirehighlevelsofthesefunctionalabilities(Izquierdoetal.,2002; Marques et al., 2008; Fathi et al., 2019). Despite the recognized importance of improving functional abilities to sports performance, their actual contribution to enhancing skill performance is still equivocal. In this regard, a few studies have been conducted focusing primarily on the effects of physical training on sport-specific skills (Fletcher & Hartwell, 2004) rather than sports performance in real match conditions.

Conclusion

Among the selected determinant variables height, weight, leg length, thigh girth, explosivepowerandspeedofthevolleyballplayerswerehighlycorrelatedwithvolleyball playingability.Thepredictorvariablesnamelyexplosivepower,height,speedand

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volleyingabilitycanbeusedtopredicttheplayingabilityvolleyballplayers. Theabilityof a player in a team game like volleyball depends largely in the various anthropometric, motor fitness and skill parameters of the players. Present day science is very much interestedinestimatingtheoptimum anthropometric,motorfitness and skillmake-upof a player. So the scanning and selection of a particular volleyball player may be achieved successfully to a great extent by measuring anthropometric, motor fitness and skill performances.

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