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INVESTIGATION OF SELECTED ANTHROPOMETRIC AND PHYSICAL VARIABLES PREDICTORS OF FAST SERVE IN TENNIS

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Abstracts The purpose of the study was to investigation of selected anthropometric and physical variables predicator of fast serve in tennis. Thirty (30) male tennis players were chosen as subjects for the purpose of present study. The selection of subjects was based on participation in national level tournaments. Height, weight, leg length, arm length, chest girth, shoulder width, upper arm girth and fore arm girth were the anthropometric variables; grip strength, arm & shoulder strength, back strength and leg strength were the selected physical variables The speed of fast serve performance in tennis was estimated by a Speed Radar Gun. To investigate anthropometric and physical variables predicator of fast serve performance in tennis, multiple regressions was applied by using Step-Wise Method. Two Models and regression equation for prediction of fast serve was also developed. Among both the models the second model in which arm & shoulder strength and upper arm girth observed was 69.7% which was the highest among all other discussed models. Hence, this model is most suitable and adaptable for serve in tennis.

Index terms: Speed Radar Gun, Anthropometric variables, physical variables and Tennis Serve

I. Introduction

The tennis serve is the stroke that places the ball in play and is frequently alluded to as the main stroke in the sport of tennis. It has become a rule weapon of assault and is utilized to put the adversary on edge by constraining a get back from the frail side or by moving the beneficiary out of position. A decent solid serve can here and there be the premise of dominating a match of tennis. . A player will hit the ball with a racquet so it will fall into the askew inverse help box without being halted by the net. Ordinarily players start a serve by throwing the ball into the air and hitting it (normally close to the most elevated purpose of the throw). The ball can just touch the net on a return and will be viewed as great in the event that it falls on the contrary side. On the off chance that the ball contacts the net on the serve at the same time, at that point continues to the appropriate help box, it is known as a let; this is definitely not a legitimate serve in the significant visits (however see underneath) in spite of the fact that it is additionally not a shortcoming. Players ordinarily serve overhead, anyway serving underhand is permitted. The serve is the lone shot a player can take as much time as necessary to set up as opposed to responding to an adversary's shot. Be that as it may, starting at 2012, there is a 25-second cutoff to be permitted between focuses. The serve is quite possibly the most troublesome shots for a beginner, however once dominated it very well may be a significant preferred position. Progressed players can hit the serve from various perspectives and frequently use it as a hostile weapon to acquire a bit of leeway in the point or to win it through and through. Along these lines, players above amateur level are relied upon to win the greater part of their administration games, and the capacity to break a rival's serve assumes a critical part in a match.

II. Materials and Methods

Thirty (30) male tennis players were chosen as subjects for the purpose of this study. Random sampling was employed for reaching valid conclusions of this study. The selection of subjects was based on participation in national level tournaments of tennis. The subjects belonged to various state and union territories. The height, weight, leg length, arm length, chest girth, shoulder width, upper arm girth and fore arm girth were the anthropometric variables; grip strength, arm & shoulder strength, back strength and leg strength were the selected physical variables. The data on all the anthropometric measurements were collected by using standard procedure as available in literature and the scores for selected physical variables were obtained by using the standard tests namely grip strength measured by grip dynamometer, medicine ball put for arm & shoulder strength, dynamometer for back strength and leg strength,. The performance of fast tennis serve ball was measured by a Speed Radar Gun. The speed radar gun was used to measure the speed of serve ball. All players were free to serve whatever they want like flat as well as slice serves. To investigate anthropometric and physical variables of fast serve in tennis, multiple regressions were applied by using Step-Wise Method. Models and regression equation for prediction of fast tennis serve was developed.

III. Analysis, Discussion and Findings

Multiple Regression analysis for prediction of fast Serve in Tennis was computed by using Step-Wise Method. Models and regression equation for prediction of fast tennis serve was developed.

Table - 1
Model Summary along with the Value of R And R^2
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.803[a]	.644	.632	8.75	.644	50.74	1	28	.000
2	.835[b]	.697	.674	8.24	.052	4.64	1	27	.040

a. Predictors: (Constant), Arm & Shoulder strength

b. Predictors: (Constant), Arm & Shoulder strength, Upper Arm Girth

Table-1 reveals the multiple regression value for anthropometric and physical variables of fast tennis serve. In model 1, only arm & shoulder strength was observed that explained 64.4 % variability (R square= 0.644) and this model was also significant as F value (50.94) was found to be significant ($p<.05$). Further in model 2, Arm & shoulder strength and upper arm girth observed as it explained 69.7 % variability (R Square=0.697) and this model was also significant as the F value (30.988) was found to be significant ($p<.05$). On the basis of these findings it is recommended that this model is the most suitable and adaptable for fast serve in tennis.

Table – 2
Anova Table Showing *F*-Values for all the Models
ANOVA[a]

Model		Sum of Squares	D f	Mean Square	F	Sig.
1	Regression	3889.04	1	3889.04	50.739	.000[b]
	Residual	2146.16	28	76.65		
	Total	6035.20	29			
2	Regression	4203.54	2	2101.77	30.982	.000[c]
	Residual	1831.65	27	67.84		
	Total	6035.20	29			

a. Dependent Variable: Serve

b. Predictors: (Constant), Arm & Shoulder strength

c. Predictors: (Constant), Arm & Shoulder strength, Upper Arm Girth

In table-2, F-value for both models has been shown. Since F-value for the second model is highly significant, it may be concluded that the model selected is highly efficient.

Table – 3

Regression Coefficients of Selected Variables in Different Models Along With Their T-Value Partial Correlation Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	26.027	13.373		1.946	.062			
	Arm & Shoulder strength	4.303	.604	.803	7.123	.000	.803	.803	.803
2	(Constant)	13.390	13.883		.964	.343			
	Arm & Shoulder strength	3.209	.762	.599	4.209	.000	.803	.629	.446
	Upper Arm Girth	1.181	.548	.306	2.153	.040	.705	.383	.228

a. Dependent Variable: Serve

The regression coefficients in both the models have been shown in table-3. In the second model t-value for two regression coefficients are significant as their significance values (*P*-values) are less than 0.05. Thus, it may be concluded that the variables; arm & shoulder strength upper arm girth and significantly explains the variations in the tennis serve performance. Regression equation using regression coefficients (B) of the second model are shown in table-2, the regression equation can be developed as follows:

Tennis serve Performance = 13.390 + 3.209 × (Arm & shoulder strength) + 1.181 × (Upper Arm Girth)

From the above regression equations we concluded that the second equation is quite reliable as the value of R^2 is 0.697 is greater than other models. In other words the two variables selected in regression equation which explains that 69.7% of variability in the fast tennis serves is quite good. Since F-value for this regression equation is highly significant, this model is reliable. At the same time all the regression coefficients in this model are highly significant and therefore it may be interpreted that the two variables selected in the model viz.: arm &shoulder strength and upper arm girth are valid in estimating the fast serve performance in tennis. To investigate anthropometric and physical variables of fast tennis serve, multiple regressions was applied by using Step-Wise Method. Models and regression equation for prediction of fast tennis serve was also developed.

Discussion and Conclusion

The research scholar developed two regression models for predicting fast serve in tennis. In the first model arm & shoulder strength was only contributing where as in the second model arm & shoulder strength combined upper arm girth with were helpful in predicting tennis services. The second model contributes all most 69.7% to the performance of fast serve in tennis. As it is well known greater arms & shoulder strength with upper arm girth underlie the performance of tennis services. Arm & shoulder Strength and girth of upper arm are the key factors in the execution of fast services in tennis. Arm & Shoulder Strength has an effect on service speed in a positive ways. It is believed high speed of service throw, workout to improve Arm & Shoulder will positively contribute the performance. The good quality of proportionate of upper arm girth, perhaps a greater physiological cross sectional of muscles contain more muscles fibers that's directly related to more sarcomere count and contractibility in muscles contractile property which lead to more cross bridge formation inside the muscles and generate greater amount of force in fast serve performance in tennis .

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