



## A Study of Predictive Anthropometric Variables of Spiking in Volleyball Players of South Gujarat Region

### ABSTRACTS

*The objective of this research study is to predict the most contributory factor which affects the spiking performance of south Gujarat players. twenty male spikers in volleyball from south Gujarat region were selected as subjects, these twenty spikers were sorted from nearly thirty spikers by the panel of three experts who have judge them during competition and practice sessions. These twenty male spikers were a mainly district player who represents state as well as university. The Anthropometric variables data selected for the study were tested at 0.05 level of significance. The coefficient of correlation was applied to find out contributory an anthropometric variable which affects spiking in volleyball. Multiple correlations were applied for the variables which are positively correlated to spiking performance. Multiple regression equation was developed in order to predict the most contributory factor towards spiking in volleyball for anthropometric variables. In all cases 0.05 level of significance was fixed to test the hypothesis of this study.*

*It has been observed that the contributory anthropometric variables which affect spiking performance were back strength, arm-shoulder strength, leg strength, speed, agility and spine flexibility.*

**Key Words:** Prediction, Spiking and Contributory Variables.

### INTRODUCTION

Men have consistently strived to run faster, jump higher and exhibit greater strength, endurance and skill. We are unsurprisingly competitive and ambitious for excellence in performance. As a result of practical experience, old methods of conditioning, though captivating and rich in tradition, have been superfluous and replaced by new and advanced methods based on insight and understanding with the help of sophisticated equipment.

High sports performance is not merely the product of physical, psychological and physiological prerequisites crazed by an individual sportsman. High performances are achieved after a elongated period of training supported directly or indirectly by the society.

In the hectic scenario of modern life, sports activities have got much more relevance in the context of men and women getting physical exercise and thereby keeping oneself fit and inhabiting their leisure hours in a useful manner. However, competitive sports need more training and repeated practice to enable the player or athlete to perform well.

### LITERATURE REVIEWED

Cox (1974) studied the relationship between team performance in volleyball and a skill component of serving and service reception, setting, spiking, spike defense and free ball passing. Charting procedure was adopted for collecting the data, sample games were selected from the 1922-1973 North west volleyball tournament schedules. The statistical charting system used for evaluating the skill components was an adaptation of one proposed by James Coleman in the international volleyball review. Reliability of charting system was established prior to the season first tournament. Multivariate analysis of variance discriminate

analysis and multiple correlation technique were used to analysis the data. The result of the study indicates that after considering together all the said volleyball skills as measured by adopted charting procedure are significantly related to team performance when viewed in terms of losing and winning and in terms of total points scored by the team charted.

Agility is an imperative factor in the prediction of performance in volleyball, Joseph (1983) resolute the relationship of power, agility, shoulder flexibility, arm length and leg length to volleyball playing capability. Thirty male volleyball players were selected as subjects from LNIPE Gwalior, Sargent Jump measures the power, 40 meters' shuttle run had been made to measure agility, and shoulder flexibility by graded stick and steel tape was used to measure arm length and leg length, the playing and skill as based on the average subjective judgment of three experts. Product moment correlation was used to statistically examine the data and it was clinched that, playing ability of men volleyball players mainly depended on power which is most dependable single variable. Arm length and leg length are also unswerving variables in prediction of playing capacity of male volleyball players. In prediction of playing ability of male volleyball players the inconsequential relationship has been shown by the variables like agility and shoulder flexibility.

Miguel Silva et al. (2016) had completed excellent study on Match analysis in volleyball: A systematic review. Where his article aims to review available literature on match analysis on adult male volleyball. Specific key words "performance analysis", "match analysis", "game analysis", "notational analysis", "tactical analysis", "technical analysis", "outcome" and "skills" were used to search relevant databases. The research was conducted according to PRISMA (Preferred Reporting Items for Systematic reviews and Meta analyses) guidelines. Of 3407 studies initially identified, only 34 were fully reviewed, and their outcome measures extracted and analyzed. Studies that fit all inclusion criteria were organized into two levels of analysis, according to their research design (comparative or predictive) and depending on the type of variables analyzed (skills and their relationship with success, play position and match phase). Results show that from a methodological point of view, comparative studies were currently complemented with some predictive studies. This predictive approach emerged with the aim to identify the relationship between variables, considering their possible interactions and consequently its effect on team performance, contributing to a better understanding of Volleyball game performance through match analysis. Taking into account the limitations of the reviewed studies, future research should provide comprehensive operational definitions for the studied variables, using more recent samples, and consider integrating the player positions and match phase contexts into the analysis of Volleyball.

## **PROBLEM OF THE STUDY**

The problem of the study is to predict the selected Anthropometric variables of spiking in volleyball (male) players of South Gujarat Region.

## **OBJECTIVE**

1. To find out contributory Anthropometric variables effects on spiking performance.
2. To find out the most contributory factor in Anthropometric variables which affects spiking performance in volleyball players of south Gujarat region.

## **SELECTION OF SUBJECTS**

20 male players were players who represented district and state level tournaments from south Gujarat region.

## MEASUREMENT STANDARDS

Standard equipment's were used for specific variables which have been taken for the study.

## STATISTICAL PROCESS

The data which was collected by various procedures were standardized and taken for further statistical procedure where multiple correlations was applied and multiple regression equation was done to predict the most contributory factor in volleyball spiking.

## METHODS& PROCEDURE

The researchers used the descriptive approach with the style of linking correlations as it is appropriate to the nature of the proposed problem and to achieve study goals.

### 1. Co-efficient of Correlation between Spiking Performances to Anthropometric Variables

Coefficient of Correlation 'R'	
Variables correlated	Coefficient of correlation 'r'
Arm length and spiking performance	.528*
Upper arm girth and spiking performance	.255
Fore leg length and spiking performance	.543*
Thigh girth and spiking performance	.497*
Calf girth and spiking performance	.154
Shoulder width and spiking performance	.046
Chest girth and spiking performance	.239
Wrist circumference and spiking performance	.185
Leg length and spiking performance	.559*
Weight and spiking performance	.318
Height and spiking performance	.636*
Hand length and spiking performance	.456*
Fore arm girth and spiking performance	.296
Upper arm length and spiking performance	.386

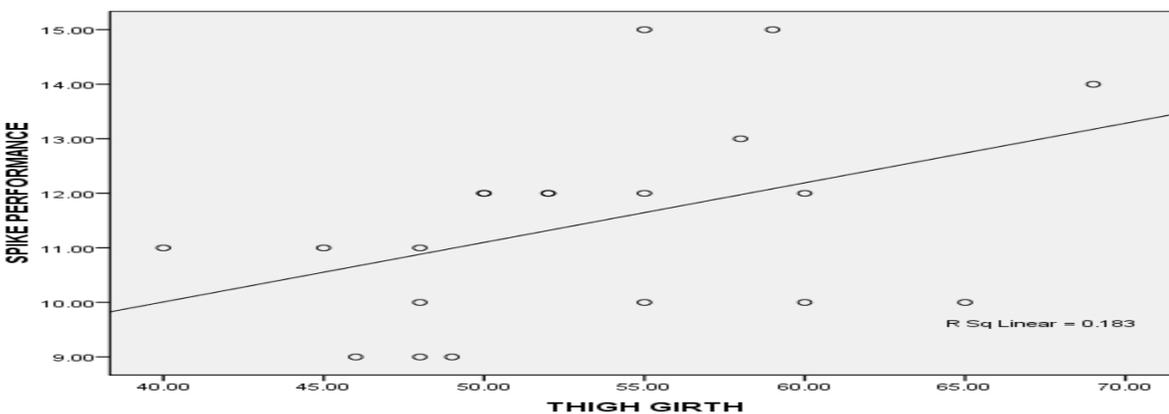
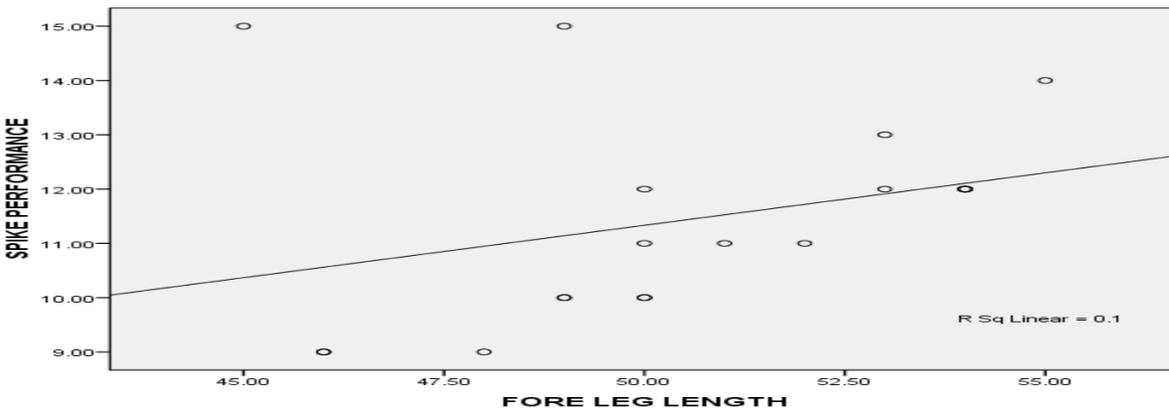
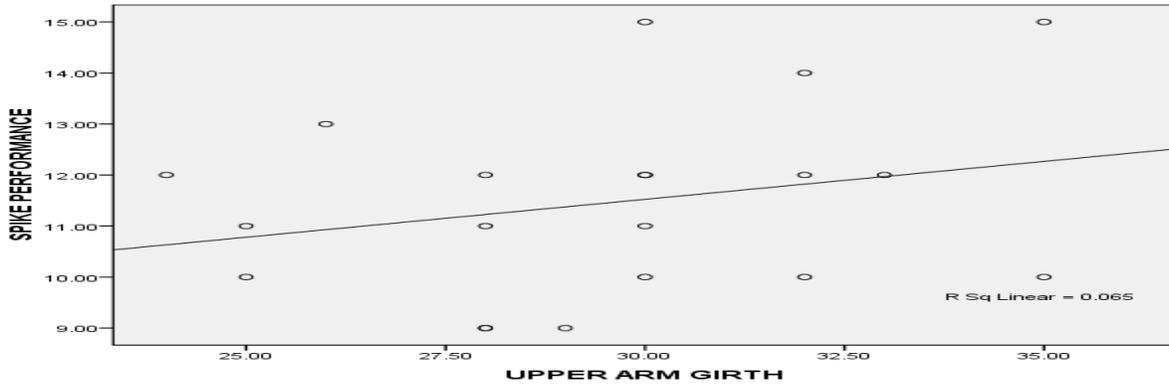
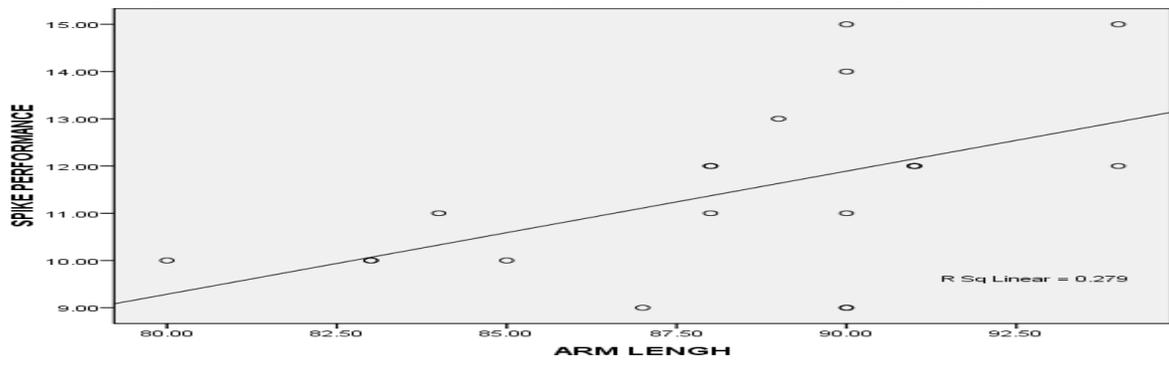
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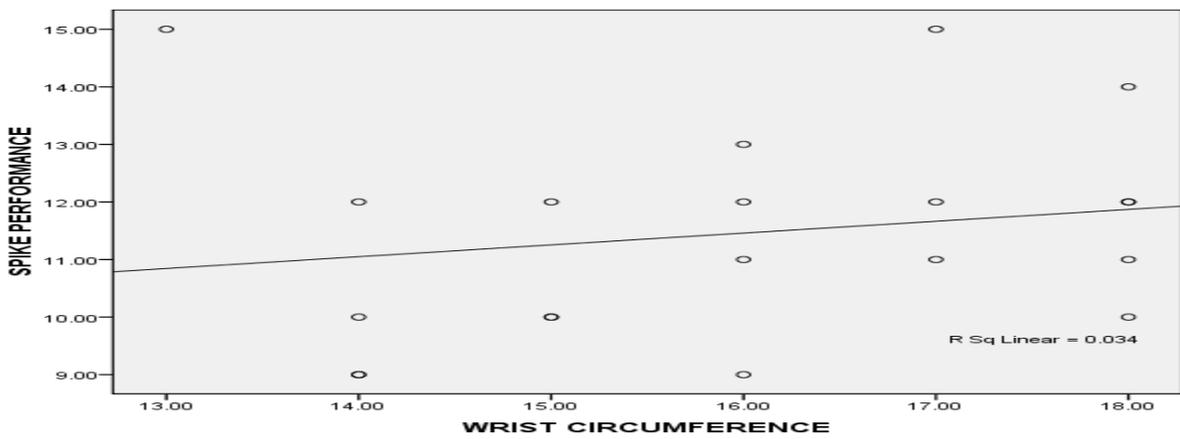
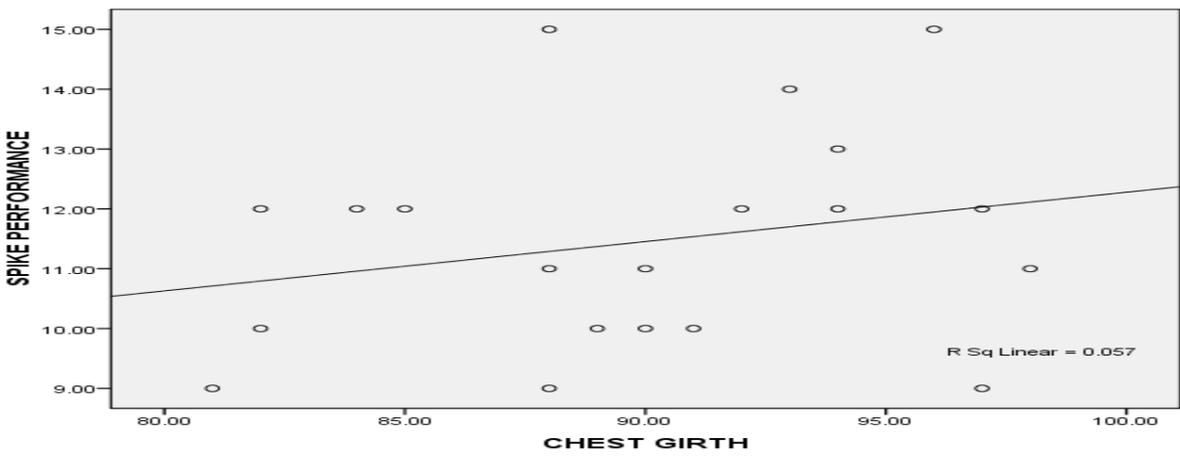
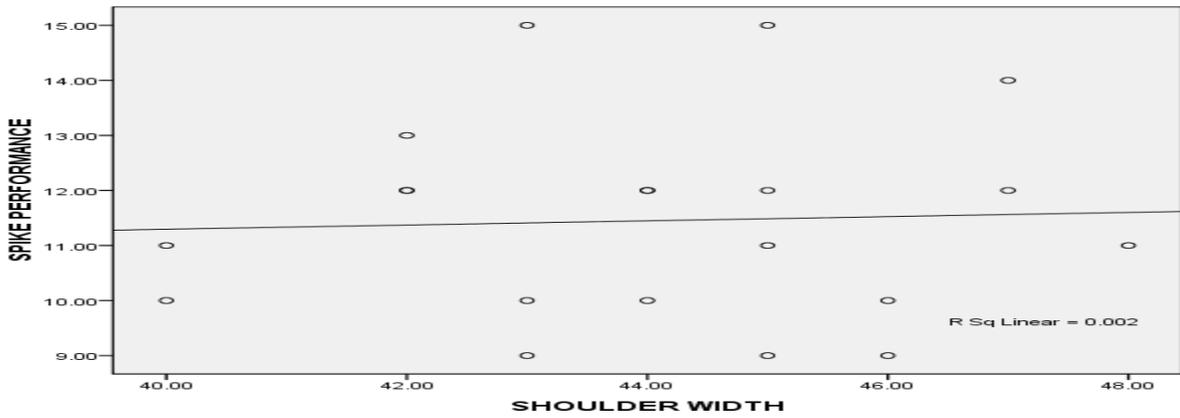
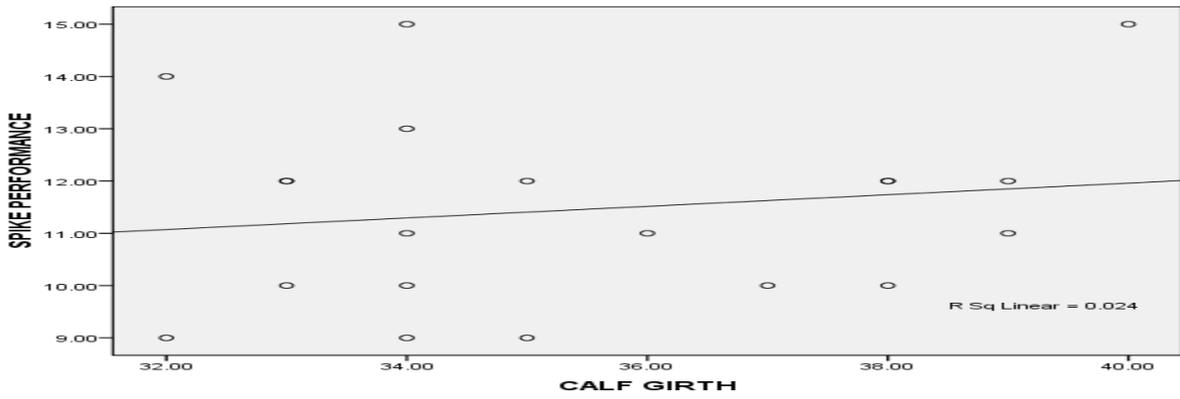
\*significant at .05 level.

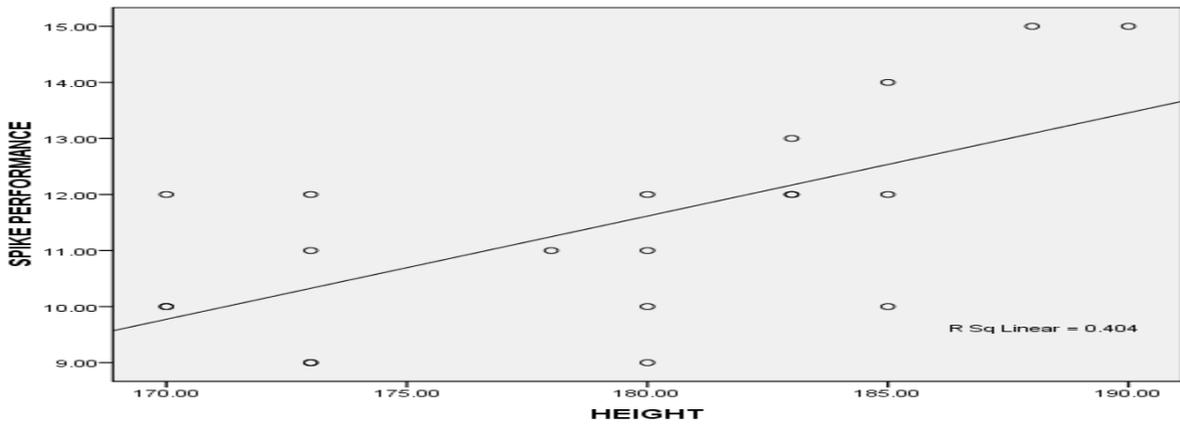
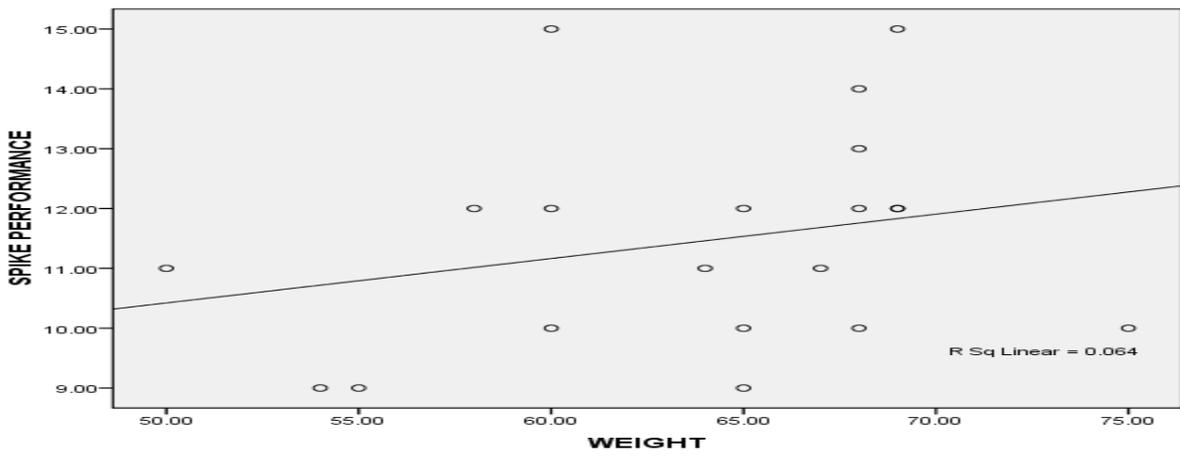
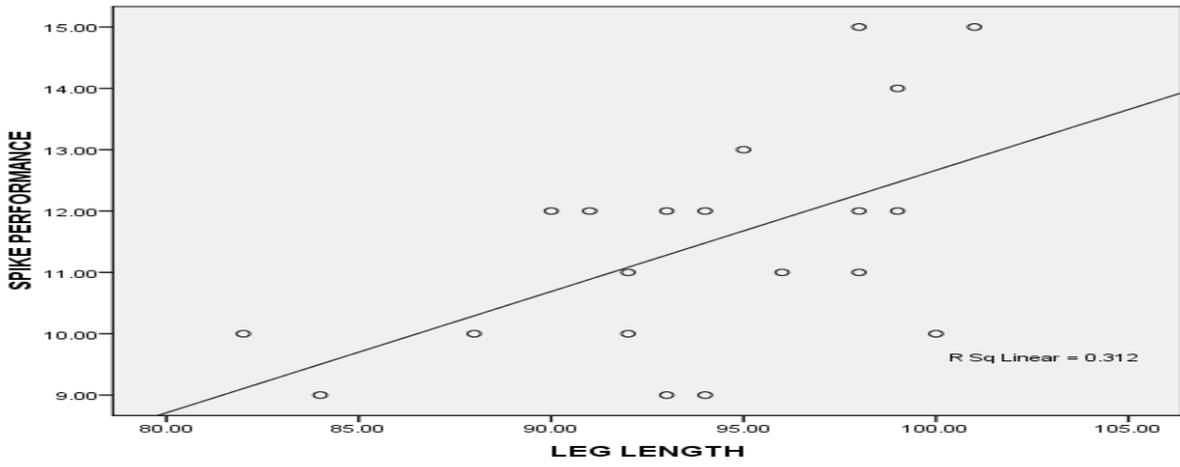
$r_{.05(20)} = 0.423$  (as per the significance table according to N)

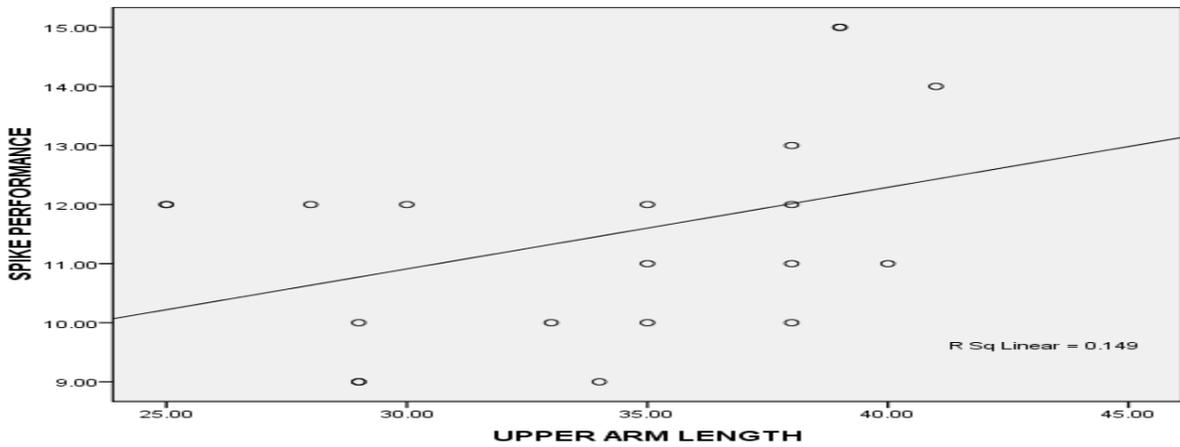
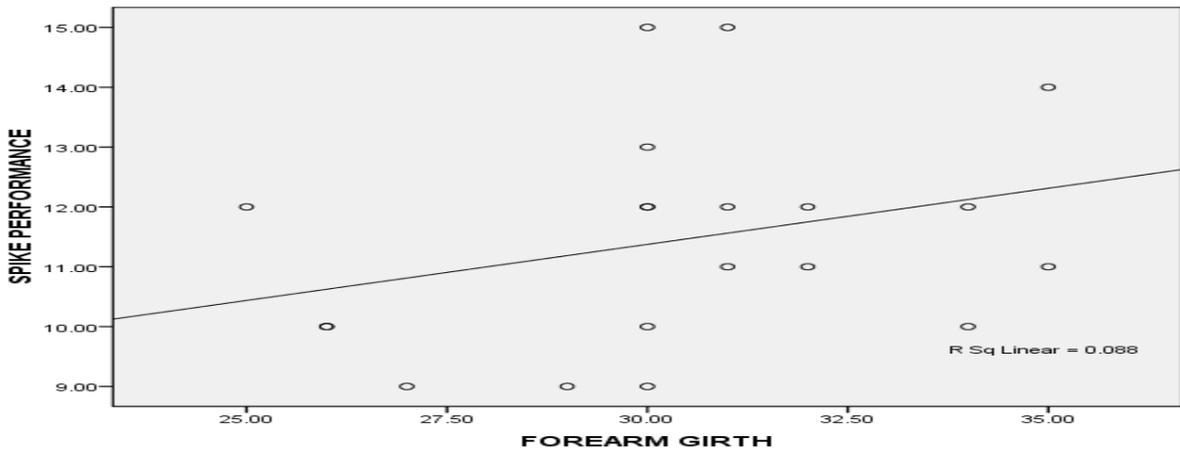
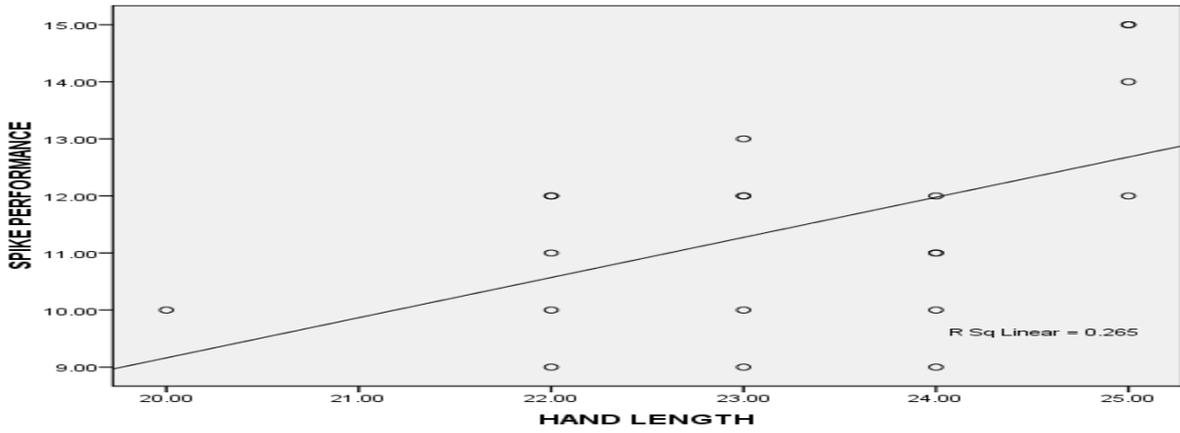
The above table indicates that the spiking performance is significantly related to Arm Length, Foreleg Length, and Thigh girth, Leg Length, Height and Hand Length. All these variables were significant and contribute towards spiking performance as their values were above (0.423) which is greater and significant at 0.05 level of significance.

### Scatter Plots Showing the Correlations of Anthropometric Variables to Spiking Performance









## COMBINE CONTRIBUTION OF ANTHROPOMETRIC VARIABLES TO SPIKING PERFORMANCE

### 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	.864 <sup>a</sup>	.746	.629	1.10889	.746	6.366	6	13	.003

a. Predictors: (Constant), HAND LENGTH, FORE LEG LENGTH, ARM LENGTH, THIGH GIRTH, HEIGHT, LEG LENGTH

The value of the multi co-relation coefficients between independent variables and dependent variable is 0.864. The value of  $R^2$  (0.746) shows that 63% variance in spiking performance comes due to these factors. In another words, it can be said that 37% variance in overall spiking quality comes due to other factors.

ANOVA <sup>b</sup>						
	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.965	6	7.827	6.366	.003 <sup>a</sup>
	Residual	15.985	13	1.230		
	Total	62.950	19			
a. Predictors: (Constant), HAND LENGTH, FORE LEG LENGTH, ARM LENGTH, THIGH GIRTH, HEIGHT, LEG LENGTH						
b. Dependent Variable: SPIKE PERFORMANCE						

Anova F- value is 6.366 which is significant ( $p \leq 0.05$ ) means this model is good fit for regression. More over null hypothesis is rejected which implies that independent variables collectively affect overall spiking features. To know the level of effect of these independent variables, results of t-test has been taken into consideration.

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-39.101	9.399		-4.160	.001
	ARM LENGTH	.173	.084	.351	2.051	.061
	FORE LEG LENGTH	.103	.106	.169	.979	.345
	THIGH GIRTH	.098	.045	.382	2.158	.050
	LEG LENGTH	.066	.081	.188	.821	.427
	HEIGHT	.088	.058	.303	1.514	.154
	HAND LENGTH	.124	.283	.091	.438	.669
a. Dependent Variable: SPIKE PERFORMANCE						

The above table shows the positively correlated significant variables when combined in multiple correlations only Thigh girth appears to be significant at 0.05 level of confidence. All other variables were above 0.05 level of significant.

### (E) REGRESSION MODEL

The regression equation developed for prediction of spiking performance on the basis of anthropometric, physical and physiological variables have mentioned as follows.

$$\text{Spiking performance} = -39.10 - .091 \times X_1 + .169 \times X_2 + .188 \times X_3 + .303 \times X_4 + .351 \times X_5 + .382 \times X_6$$

Where,  $y$ = the dependent variable of spiking performance,  $\alpha$  is the y intercept which means the value of  $y$  when all the  $x$  values are zero,  $X_1$ = Hand Length,  $X_2$ =Fore leg length,  $X_3$ =Leg Length,  $X_4$ = Height,  $X_5$ =Arm Length,  $X_6$ =Thigh Girth.

## FINDINGS

From the above regression equation, the findings revealed that Thigh Girth, Arm Length, Height, Leg Length, Fore Leg Length, Hand Length plays significant role towards spiking performance in volleyball. Where the Beta value of Thigh Girth was highest at (0.382), followed by Arm Length with Beta value of (0.351), Height with Beta value of (0.303), Leg Length with Beta value of (0.188) Fore Leg Length with Beta value of (0.169) Hand Length with beta value (0.091). All these six independent variables contribute to spiking performance at very similar level.

Thigh Girth contributes significantly highest to spiking performance because a player can generate greater force during spiking. Also, a player can have an effective approach run and jump which is required for spiking. Player with greater Thigh Girth generates strength and can perform multiple spiking without decreasing power and jump.

Height, leg length, hand length, fore leg length and arm length are eventually correlated and connected to each other directly. Height contributes significantly towards spiking performance because a player may be able to generate greater force due to longer limbs. Usually it is seen that all players at national and international level are of adequate height as the game of volleyball has become highly advanced and competitive. The players with greater height can achieve higher reach against the high blocks of the opponent. Further it has been pointed out that the height of the spikier is directly proportional to the point of contact with ball during spiking as it may help spikers to finish the ball more effectively.

## REFERENCES

- I. Cox, Richard Hardee (1974). The Relationship between Selected Volleyball Skill Components and Team Performance of Men's North East Double Volleyball Team. Dissertation Abstracts International, 34:5685.
- II. Joseph V.K, (1983) "Relationship of Power, Agility, Flexibility and Measurements of Selected Body Segments to Volleyball Playing Ability", Unpublished Master's Thesis, Jiwaji University.
- III. M. Silva et al.: A systematic review in Volleyball, Monten. J. Sports Sci. Med. 5 (2016) 1: 35–46.

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