The Relationship of Selected Anthropometric and Biomechanical Variable with the Performance of Volleyball Player

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INTRODUCTION:
A sport is as old as the human society and it has achieved a universal following in the modern times. It now enjoys popularity, which out strips any others form of social activity. It has become an integral part of the educational process; millions of fans follow different sport. Many participate in sports actives for fun or for health, fitness and well being. Sports have become a man movement and social phenomena of great magnitude. Biomechanics is an applied form of mechanics and consequently the methods used to investigate, it must be derived from those of mechanics but as boarding science in other scientific discipline such as anatomy, physiology and technie of sports.

The role of biomechanics in attaining high performance can not be overlooked, since it is the only science which helps to identify the faults in performing technique very precisely. There are basically two methods by which motor skill can be analysed. They are qualitative and quantitative. High speed movie film for exactness has been used extensively to examine in great details of the movements which occur too fast for the human eye to detect. In many of the elite sport training and research institution around the world, force applied during high caliber sporting event, while the analysis test have done much to improve understanding of movement and the performance of elite athletes, the analysis task faced by the coach are predominantly qualitative in nature.

Measurement of body since includes descriptive information such as height, weight and surface areas, while measure of body proportion describe the relationship between height, weight and among lengths, widths and circumference of various body segments. It has been found that top athletes in some sports tend to have those proportions that biomechanically aid the particular performance. However, the Volleyball as such as being played in limited countries irrespective of its vast popularity. As a result of which it could not be flourished to the maximum potency, though the advancement in techniques and in nature of the game has been tremendous apart from all these developments no steps have been taken to make it more scientific by constructing the test and validating them preparing the norms. Any part of educational discipline without some form of evaluation procedure is like a ship in the sea without a chart or compass. Volleyball is the most popular and the richest in the history of all ball games. There is no exact record available which shows when and by whom the game was started in England. It is as old as 13th century.

PURPOSE:
The purpose of the study was to analyze the relationship of selected anthropometric and biomechanical variables with the performance of players of Volleyball.

Hypothesis:
It was hypothesized that there may not be significant relationship of selected anthropometric and biomechanical variables to the performance of players for Volleyball.

Delimitation:
The study was delimited to 5 male Volleyball of 18 to 23 years of age of inter-University level.

The biomechanical variables, selected in the study were angles of wrist, elbow, shoulder, knee and ankle joint, and the height of centre of gravity of the body at moment release.

METHODS AND MATERIALS
Participants:
Five male Volleyball players who had participated in the west Zone interuniversity

Tournament held at Rajkot in January 2012 were selected as subjects for this study. Since the player had been trained for a considerable period of time, they were considered skilled and their technique was treated as stabilized.

All the subjects were explained the purpose of the study and were requested to put in their best during each attempt.

Criterion Measures:
The performance of Volleyball each selected subjects was taken as the criterion measure for the purpose of present study. The performance was recorded on the basis of twenty point scale. 5 point awarded in run up, 5 point awarded in placement of foot, 10 point awarded in Execution, 10 point awarded in Trajectory and 20 point awarded in line, length and spin.

The performance of the subjects on off spin bowling was collected on the basis of three judge's evaluation. The averages of three judges were considered as the final point obtained by each bowler. Further, to make the calculation easier it was reduced out of 10 point.

Tools and Apparatus:
To obtain reliable measurements, standard and calibrated equipments like, camera, steadiometer, weighing machine, steel tape etc were used in order to establish the reliability of the tester for anthropometric measurements, which were taken on two consecutive days, test retest method was used. The coefficient of correlation was calculated. The results had shown high degree of reliability. The camera used for biomechanical purpose was a standard Nikon EM (with motor drive).

Collection of Data and Analysis of Film:
Sequential photographic technique was employed for the biomechanical analysis of bowling. The camera used for this purpose was a standard Nikon EM (with motor drive).

For obtaining individual photographic sequence, the subjects were photographed in controlled conditions. The distance of the camera from the subject was 11.05 meters, and was fixed on the tripod at 1.07 meters height. A hurdle was filmed prior to filming of subjects for reference of height and distance.

The camera was operated by an expert professional photographer on the basis of the sequential photographs obtained the investigator developed the stick figures from which various biomechanical variables were taken. The stick figures were developed by using joint point method in which the b was located using segmentation method.

The Anthropometric variables were represented by the Anthropometric Measurements such as Height, Sitting Height, Leg Length, Arm Length and Weight. Body projections at the joints facing the camera were considered. The C.G. of each subject.

Statistical technique:
The relationship of selected anthropometric and biomechanical variables with the performance of Volleyball playing ability was calculated by using Pearson's product moment correlation. For testing the hypothesis the level of significance was set at 0.05.

RESULTS:
TABLE - I
Relationship of Selected Anthropometric Variables with the Performance of Players of Volleyball

No.	Variables	Coefficient of Correlation
1	HEIGHT(CMS)	0.93*
2	SITTING HEIGHT (CMS)	0.20
3	ARM LENGTH (CMS	0.35
4	LEG LENGTH	0.88*
5	BODY WEIGHT(KG)	0.04
6	HEIGHT OF RELEASE(CMS)	0.90*

*Significant 0.05(3) =0.878

As shown in table-I that the obtained values of coefficient of correlation is case of height (r =.93), leg length (r =.88) and height of release (r =.90) were found significant at 0.05 level of significance. Since these values were higher than the tabulated value of .878 for 3 degree of freedom at the selected level of significance.

TABLE - II
Relationship of Selected Biomechanical Variables with the Performance of Player Volleyball

No.	Variables	Coefficient Of Correlation	Mean
1	wrist	0.62	157.4
2	Ankle joint Left Leg .74	0.74	109
3	knee joint Left Leg	0.53	165
4	Elbow joint	0.11	175.4
5	shoulder joint	0.02	162
6	Ankle Joint Right Leg	0.02	102.4
7	Knee Joint Right Leg	0.07	132.4
8	Height of Centre of Gravity (mts)	0.80	0.92

Table –II indicates that none of the Biomechanical variable namely angles of Left Ankle joint (front leg), Right Ankle joint (rear leg), Elbow joint (bowling arm), Shoulder joint (bowling arm), Left knee joint (front leg), Right Knee Joint (rear leg) and Height of centre of gravity at moment release have significant relationship with the performance of the subjects in off spin bowling. Even though the value of coefficient of correlations in case of wrist joint (bowling arm) and Height of Centre of Gravity has exhibited quite high but were not found significant at the selected level of 0.05.

DISCUSSION
The obtained value of coefficient of correlation of selected anthropometric variables at the moment release Only the height and leg length have significant relationship with the performance of subjects in off spin bowling. In case of biomechanical variables none of the biomechanical variable has exhibited significant relationship with the performance of players in off spin bowling. It may be because of small size of the sample. It is a known fact that greater radius of rotation creates greater momentum but angle at elbow joint bowling arm did not exhibit significant relationship which may be due to other reasons. As a whole the variables which have shown high relationship with the performance must have contributed towards the performance of subject in off spin bowling.

CONCLUSIONS
Based on the analysis and within the limitations of the present study the following conclusions can be drawn. In anthropometric variables height and leg length has shown positive effect on performance of players off spin bowling in cricket. Height of release has shown positive effect on performance of off spin bowling. None of selected biomechanical variable has shown the significant relationship with the performance of cricketers in spin bowling.

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