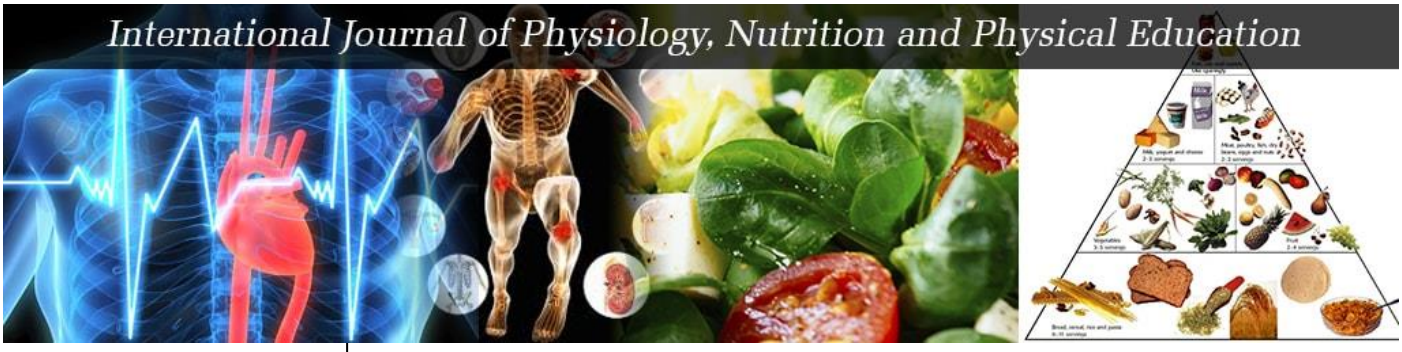

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A study on bio-motor variables of cricket players to develop talent identification model for cricket in Nepal

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Abstract
Background: Identification of talent is most important to enhance the sports performance and bio-motor variables plays vital role to identify. Very few studies have been conducted on talent identification in cricket. The main aim of the study is to identify bio-motor variables of cricket players for developing talent identification model.
Methods: The study is a descriptive study. The convenient sampling method is used to select the subjects. Standard tools and test have been used to collect data of total 200 male cricket players of age (14-17 years).
Results: Results of the study showed that bio-motor variables are very important to develop talent identification model for cricket.
Conclusion: On the basis of result, it is found that six bio-motor variables should be taken instead of taking too much variables while identifying talent in cricket.

Keywords: bio-motor variable, factor analysis, talent identification, eigen value, variance

Introduction

Identification of most talented individual of various fields has been taking place from its existence and sport was not exception to this. But, the approach and methods towards talent identification have been modernized throughout the years' especially due to ever increasing professionalism, competitiveness to win in various national and international level competitions, to economically use scarce but valuable resources, and broad scale commercialization of sports. Sports authority of the countries, sports organizations, physical educationists and coaches are always in search for identifying most talented and suggesting most objective and scientific criteria to address the issue in early childhood in different sports. Present study endeavors to focus on developing objective, scientific and parsimonious talent identification criteria based on bio-motor variables in cricket.

Sport talent identification is the process of recognizing current participants with the potential to become elite players. It entails predicting performance over time by measuring physical, physiological, psychological and social attributes as well as technical abilities, either in isolation or in combination (Williams & Reilly, 2000) [13]. It is well generalized and published in various journals recently, that the sports events are mostly dependent on the Physique of an individual (Rico-Sanz, 1998) [10]. Studies have shown that there is significant relationship between many of the physical fitness variables with the cricket performance. So, for identifying the talent for cricket it is important to emphasis on bio-motor variables, along with this regular assessment can also help to prepare the training program for the athlete (Gursoy, *et al*. 2012), on the basis of physical abilities an individual can be identified or rejected as being talented (Dudink, 1994; Helsen *et al*. 2000) [5, 6].

Previous studies had suggested that physical fitness components played an important role in determining the performance of an individual, without desired level of physical components for the concerned game we cannot expect the higher performance in the competition at higher level. These studies on physical components indicated that importance of physical components is not negligible (Burr, *et al*., 2008) [3].

In this study, the researcher intended to find out the required bio-motor variables for cricketers to develop talent identification model.

Rationale of the Study

Sport talent identification is the process of recognizing current participants with the potential to become elite players. Bio-motor variables are broadly used to identify the talent for a particular sport. So, it is very important to find out bio-motor variables required for cricketers. Hence, in the study, the researcher tries to find out bio-motor variables to develop talent identification model for cricket.

Methods

The study is a descriptive study. The sample consists of 200 junior cricket players from ten different cricket academies (10 from each) of Nepal. The convenient sampling method was used to select the subjects. Standard tools and test were used to collect the data for selected 9 bio-motor variables.

Reliability and Validity: Reliability of the tests and Testers competency was evaluated together by test- retest method and result was obtained by Product Moment Correlation (Gogia 2002; Dubey 2006) [15].

Before starting data collection, the researcher introduced himself and explained the purpose of the study to the players. Then researcher demonstrated the 14 test items of the research. Subjects were instructed to follow the activities for each test and the score was noted on the score card.

Statistical Analysis

Factor analysis was applied on the data obtained on junior cricket players to find out the factors and the variables with highest factor loading to develop a model. Factor analysis is used to measure latent/unobservable construct or constructs by focusing on large number of observable instances.

Results

Table 1: KMO and Bartlett's Test of sphericity on bio-motor components

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.694
Bartlett's Test of Sphericity	Approx. Chi-Square	635.508
	Df	36
	Sig.	.000

Above table 1 reported KMO value, along with Bartlett's test. The KMO value (.694) was found more than .05, which concluded that the sample size taken for the present study & for applying factor analysis was sufficient. If the value of KMO test found less than .05 than the null hypothesis might be rejected and the inference could be drawn that number of samples were not sufficient. Further Bartlett's test of sphericity revealed significance value (p value) .000 was significant at .05 level of significance, which concluded that the correlation matrix was different to identity matrix which ascertained the reliability of the model.

Table 2: Total Variance Explained by the bio-motor Factors

Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	3.081	34.234	34.234	3.081	34.234	34.234	2.992	33.244	33.244
2	1.192	13.247	47.482	1.192	13.247	47.482	1.205	13.390	46.634
3	1.118	12.427	59.909	1.118	12.427	59.909	1.195	13.275	59.909
4	.937	10.416	70.325						
5	.789	8.763	79.088						
6	.702	7.796	86.884						
7	.611	6.794	93.678						
8	.511	5.680	99.357						
9	.058	.643	100.000						
Extraction Method: Principal Component Analysis.									

The table 2 showed eigenvalues for each motor fitness variable, the extracted factors and the explained variance by these factors. As one can see in the table the eigenvalue for three factors was more than 1, hence three factors were retained as their eigenvalue was more than 1. It can also be seen that after rotation the first factor explained 33.244%, second factor 13.390% and third factor explained 13.275% of the entire variance. Thus the three factors jointly explained 59.909% of the total variance.

Table 3: Component Matrix: Unrotated Factor Solution

	Component		
	1	**2**	**3**
Hand Grip Strength	-.470	.073	.461
Standing Broad Jump	-.297	.425	.590
Push Ups	-.259	.635	.006
Fore Arm Plank	.297	.666	-.059
Right Leg wall sit test	.880	.098	.118
Left Leg wall sit test	.932	.068	.117
Speed	-.711	.065	-.281
Flexibility	.183	-.350	.645
Agility	.660	.133	-.181
Extraction Method: Principal Component Analysis.			

Table 3 showed initial un-rotated factor solution for bio-motor variables, nine variables were divided into three extracted factors according to most important variable with similar response in factor one and simultaneously in factor two and three. The factor loadings for each of the variable on three extracted factors were shown in the table. Since it resulted from unrotated factor solution, as a result some of the variables showed their contribution exceeding one factor, the problem was sorted out using varimax rotation to get the final corrected rotated solution.

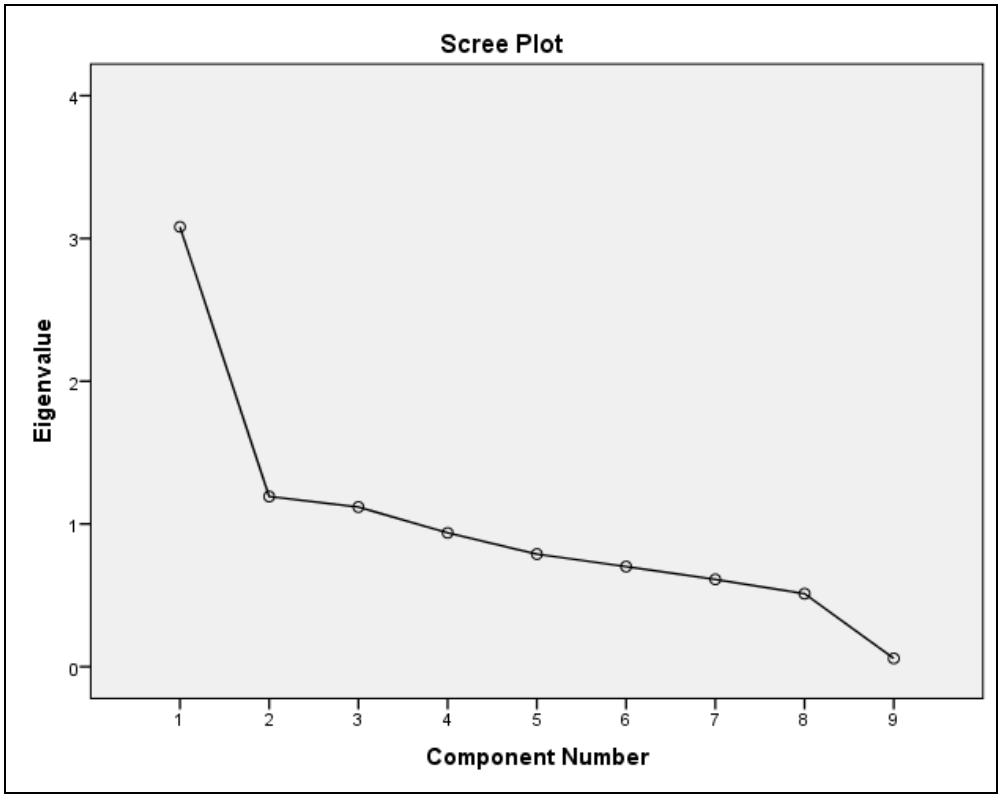

Fig 1: Scree Plot for bio motor components

Figure 1 showed eigenvalues for all motor fitness variables taken in the study plotted on y-axis against the factors on x-axis. Plot showed the clear picture regarding number of variables to be retained, three factors were retained before elbow bent having eigenvalue more than 1. Note: the curve starts flatten after factor three and too subsequent factors were having eigenvalue below one, thus were removed from the final analysis.

Table 4: Rotated Component Matrix: Varimax Rotated Solution

	Component		
	1	2	3
Hand Grip Strength	-.365	.553	-.003
Standing Broad Jump	-.137	.711	.303
Push Ups	-.189	.186	.632
Fore Arm Plank	.344	.016	.646
Right Leg wall sit test	.892	-.049	.021
Left Leg wall sit test	.939	-.067	-.011
Speed	-.741	-.109	.164
Flexibility	.267	.509	-.491
Agility	.623	-.283	.132
Extraction Method ; Principal Component Analysis			

Table 4 provided final corrected solution after applying varimax rotation, which enable the variable to show its significance in one factor only. The variables were to be identified in three different factors on the basis of this final rotated solution obtained, in the present problem investigator has identified the variables with loadings equals to or more than .6. Owing to this criterion variables were grouped in each of the three factors as shown in (Table's 1-4).

Identification of variables into four different extracted factors

Table 5: Factor 1: Leg strength and quickness Factor

S. No.	Items	Loadings
1	Right Leg wall sit test	.892
2	Left Leg wall sit test	.939
3	Speed	-.741

The factor 1 in the table 5 contained variables, right leg wall sit test, left leg wall sit test and speed that measure leg strength and quickness hence could be named as "Leg strength and quickness factor". The variables loaded on factor one were having significantly higher factor loading thus extract sufficient variance in explaining the factor.

Table 6: Factor 2: Explosive strength Factor

S. No.	Items	Loadings
1	Standing Broad Jump	.711

The factor 2 in table 6 contained variable, standing broad jump that measures Explosive strength, hence could be termed as "Explosive strength factor". As the threshold limit to select the variable into second factor had been set at ≥.7 keeping interpretability of the factor in mind, thus extracted variables explained the factor well.

Table 7: Factor 3: Core strength Factor

S. No.	Items	Loadings
1	Push Ups	.632
2	Fore Arm Plank	.646

The factor 3 in table 7 contained variables, push up and fore arm plank that measure core strength hence could be termed as "Core strength Factor". As the threshold limit to select the variable into second factor had been set at ≥.6 keeping interpretability of the factor in mind, thus extracted variables explained the factor well.

Table 8: Talent identification criteria based on bio-motor factor

S. No.	Items	Loadings
1	Right Leg wall sit test	.892
2	Left Leg wall sit test	.939
3	Speed	-.741
4	Standing Broad Jump	.711
5	Push Ups	.632
6	Fore Arm Plank	.646

The Table 8 suggested criteria to identify talent in youth male cricket using bio motor abilities. Investigator had thoroughly studied and statistically analyzed nine varied bio motor abilities ranging from speed to strength thus suggested that three factors Left leg strength endurance, Right leg strength endurance and speed clubbed into one, standing broad jump in two and fore arm plank and push up in factor three were most important and sufficient in explaining group characteristics based on bio motor abilities. The model so developed comprehensively included speed, strength and endurance abilities, which explains 62.169%.

Discussion

Present research endeavor was focused to develop an objective and most parsimonious bio-motor variables based talent identification criteria in cricket. Investigator had thoroughly studied and statistically analyzed, nine different bio-motor variables and found six variables were most important in explaining group characteristics based on bio-motor, instead of studying too many number of variables. The model so developed comprehensively included all different bio-motor measurements i.e. from lower body strength to speed, explosive strength and core body strength endurances; these extracted variables explained 62.169% of the total variance in defining talent based on bio-motor variables.

Different nine bio-motor variables were subjected to the factor analysis and revealed that four factors were having eigenvalue more than one, evident from figure 1. So, quickness, leg strength endurance, explosive strength and core strength endurance, based on correlation among the variables, explain ability of the factor and the loadings of the variable on the factor, after obtaining rotated component matrix solution by applying varimax rotational technique. Three variables Right leg wall sit test .892, Left leg wall sit test .939 and Speed were having a loading of ≥.741 clubbed in "Leg strength and quickness Factor" (Table 5), Standing broad jump 7.11 in explaining the factor explosive strength, hence was clubbed into "Explosive strength factor" (Table 6). Push up was selected into factor three "Core strength", as having a factor loading of ≥.6 (Table 7) in explaining factor satisfactorily. Hence instead of studying too many variables, these five variables may be focused for talent identification in cricket based exclusively on bio-motor variables.

The result of the present study was in line with the study of Asteya (2015) [14] a talent identification model to identify talent in squash and revealed bio-motor variables back strength and flexibility were important to identify squash talent. In the same way (Bril 1980; Volkov & Filin 1983; Koley, Ayra-Petyan 1991; Bishop *et al*., 2016; Koley *et al*., 2012) [1, 12, 8] found that bio-motor variables are important to identify talent. The present study also supports those studies. The developed model will help to identify talent in cricket.

Conclusion

Sport talent identification is the process of recognizing current participants with the potential to become elite players. Anthropometry is broadly used to classify an individual and to identify the talent for a particular sport. So, it is very important to find out bio-motor variables required for cricketers. From result of this study, it was found that bio-motor variables are very important to identify talent in cricket and six variables included in the model (right and left leg wall sit test, standing broad jump, 30 m run (speed), fore arm plank, and push up) explain 62.169% of the total variance in defining talent based on bio-motor variables.

Limitations of the Study

The present study consist 200 subjects which is small sample size for generalizing the results. Hence, future study could be on a large sample size. In the present study, convenient sampling method was used which will limit the generalization.

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