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Physiological variables as predictor of playing ability of sub junior hockey players

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Abstract

Background: The objective of the study was to prediction of hockey playing ability on the basis of Physiological variables.

Method: For the purpose of study twenty male National hockey players were selected. Hockey playing ability was selected as a dependent variable and Physiological was considered as Independent Variable. The Hockey playing ability was measured by composite score of three judges rating and Physiological variables were measured by physiological kit. To find out the significant relationship Pearson's Product Moment correlation and find out the joint contribution multiple correlations was used and find out prediction multiple regression equation was used. The level of significance was set at .05 levels.

Results: Hockey performance was found significantly correlated with Peak Flow Rate as well as Body Mass Index, at 0.05 level of significance and multiple correlation to Peak Flow Rate, Body Mass Index, Systolic Blood Pressure, Diastolic Blood Pressure and Resting Heart Rate are 0.817 and regression equation $Y = 19.391 + .046 (\text{Systolic Blood Pressure}) - .086 (\text{Diastolic Blood Pressure}) - .059 (\text{Resting Heart Rate}) + .004 (\text{Peak Flow}) - .467 (\text{Body Mass Index})$.

Keywords: Blood pressure, peak flow rate, resting heart rate, body mass index

Introduction

Field hockey is an intermittent endurance sport involving short sprinting as well as movement with and without ball (Manna *et al.*, 2009) ^[9]. Successful performance in field hockey is influenced by physiological and anthropometric characteristics such as body size and composition, functional parameters (physical capacity) (Scott, 1991; Singh *et al.*, 2010) ^[13] and fitness (strength, speed, anaerobic and aerobic capacity, agility) (Nikitushkin & Guba, 1998). In field hockey, players are to bend forward to the ground for the maximum groundwork and to cover a wider range all around during the game (Sodhi, 1991) ^[13]. Anthropometric characteristics and physiological variables were compared too, among the national hockey players of India, Pakistan and Sri Lanka (Singh *et al.*, 2010) ^[13].

Physiology is the science of functioning of all the organs and systems of an organism. For the physiological system of the body to be fit, they must function well enough to support to specific activity that the individual is performing more over different activity make different demands upon the organism with respect to circulatory, respiratory, metabolic and neurologic process which are specific to the activity.

Physiological variables may be defined as those variables which are directly linked with various physiological systems such as heart rate, blood pressure, vital capacity, fat percentage, respiratory rate and haemoglobin. Men's hockey develop separately from women's hockey. (B.V Vimalnath, 2012).

High level of performance in sports and games might be dependent upon the physiological make up and it was recognized that physiological proficiency was needed for the high level performance. How much athletic ability present in a particular person is attributable to genetics, and how much is determined by training and other adaptations made by the athlete.

Objective of the study

1. The objective of the study was to find out relationship between dependent variable (Hockey performance) and independent variables (physiological variables).

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- Another objective of the study was to find out joint contribution of independent variables (selected physiological variables) in predicting dependent variable (Hockey performance).
- To establish regression equation for predicting dependent variable (Hockey performance) on the basis of independent variables (physiological variables).

Methodology

Selection of subjects

For the purpose of study, twenty young hockey men players belonging to the age level of 14 to 16 years in national tournament selected as the subject for the study.

Criterion measures

Table 1: Criteria for measurement of physiological variables

S. No	Variable	Equipment /test	Unit
1	Blood Pressure	Stethoscope and sphygmomanometer	Mm/Hg
2	Peak Flow Rate	Peak Flow Meter	Litre/ Minutes
3	Body Mass Index	By Formula. (Weight/Hight ²)	Kg/M ²
4	Resting Heart Rate	Stop Watch	Heart Beats/Minute

Performance in hockey

Performance in Hockey was measured by judging their playing ability. Playing ability of all player were judged (out of 10 points) from a rating scale by a panel of experts and the average of three score was consider as playing ability.

Statistical analysis

- To find out correlation between dependent variable (Hockey Playing Ability) and independent variables (Physiological), Pearson's Product Moment method of correlation was used.
- To find out joint contribution of independent variables (Selected Physiological) in predicting dependent variable (Hockey Playing Ability), Multiple Correlation was used.
- For predicting dependent variable (Hockey Playing Ability) on the basis of independent variables (Physiological), multiple regression equation will be used.

Findings

The data was analyzed using product moment correlation to find out relationship of selected Physiological variables to hockey performance. The results pertaining to the relationship

are presented in Table no-1.

Table 2: Relationship of Physiological Variables to Hockey Playing Ability

Variables	Correlation coefficients
Systolic Blood Pressure	-.184
Diastolic Blood Pressure	-.205
Peak Flow Rate	-.565*
Body Mass Index	-.676*
Resting Heart Rate	-.363

Significant at .05 levels

r. (18) =0.443

Table -2 revealed that Hockey Performance was found significantly correlated with Peak Flow Rate and Body Mass Index as the correlation coefficient values (-.565, -.676) were found higher than the tabulated value at 0.05 level of significance. Hockey Performance was found not significantly with Systolic Blood Pressure, Diastolic Blood Pressure and Resting Heart Rate, as the correlation coefficient values were found lower than the tabulated value at 0.05 level of significance.

Table 3: Joint Contribution of Physiological Variables of Hockey Performance

Dependent Variables	Independent Variables	Coefficient of Multiple Correlation
Hockey Playing Ability	Systolic Blood Pressure	.817*
	Diastolic Blood Pressure	
	Peak Flow Rate	
	Body Mass Index	
	Resting Heart Rate	

Significant at .05 levels

R. (14) =0.513

Table-3 indicates significant relationship between criterion variable (Hockey Performance) and independent variables (Selected Physiological variable) as coefficient of multiple

correlations 0.817 is higher than the tabulated value at 0.05 level of significance.

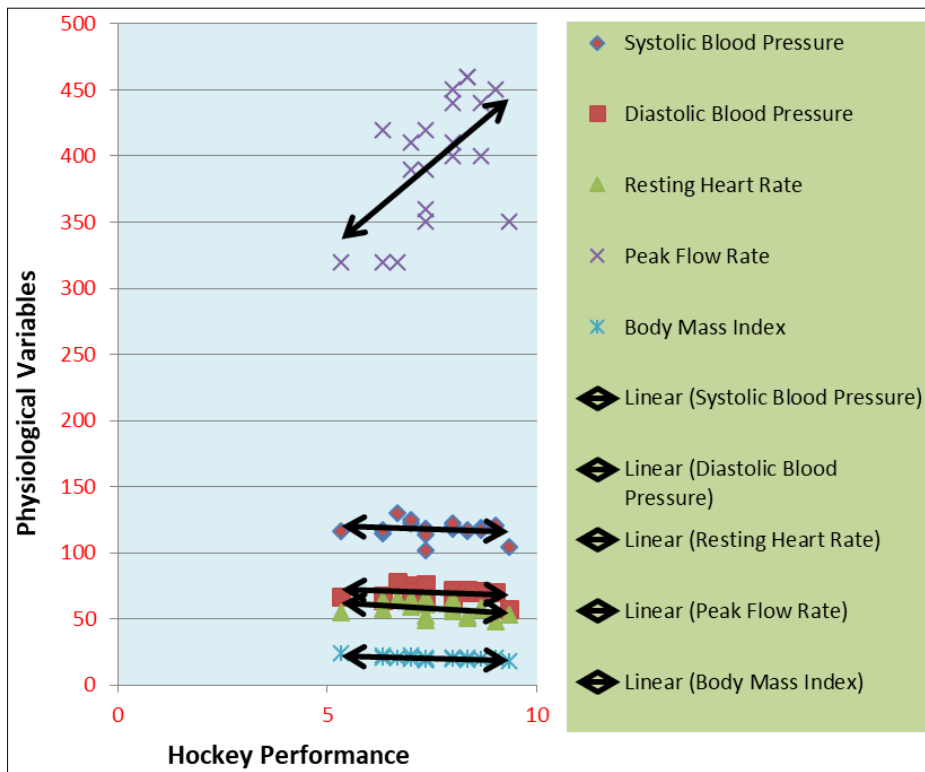


Fig 1: Combined Relationship between Dependent Variable (Hockey Performance) and Independent Variable (Selected Physiological Variable) of Sub- Junior Hockey Players

Table 4: Model Summary

R square	Adjusted R square	Standard Error
.663	.548	.675

The above shows that Adjusted R Square (.548) as predictor was included, which means that 54.8% of the variance in the performance of Hockey player was associated with changes in the Physiological variables.

Table 5: Analysis of Variance for the Regression

	Sum of Square	df	Mean Square	F	Significant
Regression	12.326	4	3.081	6.748*	.003
Residual	6.850	15	.457		
Total	19.176	19	3.548		

* Significant at .05 level

$F_{0.05}(4, 15) = 3.06$

Finding of table 4 revealed that developed regression model is significant for prediction of criterion variable and model can be used for further prediction, as value of 'F'(6.748) was found significant at 0.05 level of significance.

Multiple Regression Analysis

The multiple regression equation for predicting the hockey performance on the basis of relative contribution of five Physiological variables resulted in the following-

Equation

$$Y = 19.391 + .046 (\text{Systolic Blood Pressure}) - .086 (\text{Diastolic Blood Pressure}) - .059 (\text{Resting Heart Rate}) + .004 (\text{Peak Flow}) - .467 (\text{Body Mass Index})$$

Discussion

The Indian national game 'Hockey' is one of the popular games played in our country. It is a very fast game majorly played on artificial turf in present time which made the game

even faster. The game of hockey requires a very high level of physical, physiological and psychological fitness as well as some inborn potentialities.

The purpose of the study was to prediction of hockey playing ability on the basis of Physiological variables.

As far as Physiological variables are concerned, the result of the present study clearly indicate that Systolic Blood Pressure, Diastolic Blood Pressure and Resting Heart Rate were not found significant in relation to their performance of junior as well as sub-junior national level field hockey players. Since the hockey players selected for the purpose of the study were sub-junior players (14 to 16 years of age) we may say that the above discussed Physiological variable do not have any relation to their performance on the other hand a significant relationship was found in Peak Flow Rate as well as Body Mass Index. Results of the study conducted by Bendsure Vijaykumar Vimalnath (2012) conducted a study on a study on physiological variables on playing ability of national level men hockey players gave the similar conclusion that significant relationship of hockey playing ability with Peak Flow but the relationship between fat percentage and hockey playing ability were not found to be statistically significant.

In relation to multiple correlations, The Results of the study also shows that the significant multiple correlation coefficients were found between physiological variables and Hockey performance of Hockey players.

Conclusion

In hockey playing ability Peak Flow Rate as well as Body Mass Index was found significant with anthropometric variables. Multiple correlation coefficients are 0.817. peak flow rate found significant may be because of hockey players requires higher rate of expiratory output per minute therefore positive relationship were obtain. Body Mass Index was found negatively significant with the performance because hockey requires a fairly fit player for performance.

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