Evaluation of Selected Motor Fitness Components Associated with Sprinting Performance

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Abstract

The study was designed to evaluate the motor fitness components associated with sprinting performance. To achieve the purpose, 20 male sprinters who participated in the Bharathidasan University Inter Colligate Athletic meet were selected as subjects. The 100mts running performance was taken as criterion variable. The following motor fitness variables namely leg strength, explosive power, speed endurance, muscular endurance and flexibility were selected as independent variables. The data collected from the subjects were analysed with simple correlation and multiple correlation to find out the relationship and combined association respectively. The results of the study revealed that all the independent variables are highly correlated with sprinting performance and they are considered as the best determinants for predicting sprinting performance.

Keywords: Sprinting, Leg strength, Explosive power, Speed endurance, Muscular endurance, Flexibility

Introduction

Sports participation and appreciation have become integral part of life. Competitive sports make tremendous demands on the physical conditioning, vitality, endurance and mental powers of the participants. Only the finest can play to the best of their abilities. Each sport has its own patter, muscle load, tempo and duration. Today, the people of every country are more concerned with physical fitness than ever before as it has become the vital part of winning sports competition.

All sports activities depend on the natural and fundamental skills of walking, running, climbing, jumping, throwing, pulling and pushing. Any achievement in sports is largely based on the finer aspect of combination of the above fundamental skills. The athlete is the product of nature and nurture. Changes takes place in the athletes internal and external environments in relation to the possible maximum advantage provided by his particular genetic pattern. Each athlete is unique. This uniqueness may be obvious in appearance, body dimensions, resting heart rate and emotions.

Sporting achievement in each case demonstrates an athlete's ability in the selected sport and the evaluation of this by some acknowledged criteria of the sport. Sports performances depend largely on inherited characteristics of muscle fibre distribution and neuro-muscular co-ordination. The three qualities strength, speed and endurance are the basic qualities for sprinting. Sprinting is a high powered running. It depends more on genetic factor than training methods. Among all physical fitness components, speed is the hardest to develop. Speed, strength, endurance, flexibility and co-ordination are the different factors that influences sprint. According to Dick (1980), speed as well as strength is the most important factors for sprinting ability.

Sprinting involves the athlete in an attempt to run at peak speed for the complete duration of the race (Paish, 1976). According to Conger (1939), strength of legs, arms and shoulder and speed of muscle contractions are important factors in attaining championship performance. Vitale (1973) opined that speed can be improved by strengthening the muscle involved in a particular movement for which speed is desired like other elements. Strength and endurance will also contribute to the athlete to improve the speed.

Statement of the Problem

The purpose of the present investigation was to determine the association of leg strength, explosive power, speed endurance, muscular endurance and hip flexibility on sprinting performance of inter collegiate male sprinters.

Methodology

To achieve the purpose of the study, 20 male sprinters who participated in the Bharathidasan University inter collegiate Athletic meet during the year 2006-07 were selected at random as subjects. Sprinting performance (100mts run performance) was selected as criterion variable. The following variables such as leg strength, explosive power, speed endurance, muscular endurance and hip flexibility were selected as independent variables. Both the criterion and independent variables were assessed by using the standardized tests as detailed below and presented in Table –I. Simple correlation was employed to find out the relationship of each of the independent variables with the criterion variable. Secondly multiple correlation was used to evaluate the combined association of all the independent variables with the sprinting performance.

Table – I

Selection of Tests

Variables	Test items
Sprinting performance	100 mts run
Leg strength	Leg dynamometer test
Explosive power	Standing broad jump
Speed endurance	150 mts run
Muscular endurance	Bent knee sit-ups
Hip flexibility	Sit and reach test

Discussion on Findings

The data collected from 20 male sprinters who participated in the Bharathidasan University inter collegiate Athletic meet were statistically analysed by applying simple correlation and multiple correlation as recommended by Clarke and Clarke and presented below.

Table – II
Simple Correlation between Sprinting Performance and Selected Motor Components

Correlation co-efficient (r)	Percentage of relationship
$r_{12} = 0.65^*$	42.25%
$r_{13} = 0.89^*$	79.27%
$r_{14} = 0.86^*$	73.96%
$r_{15} = 0.78^*$	60.84%
$r_{16} = 0.72^*$	51.84%

* Significant at 0.05 level of confidence. Table value required for significant at .05 level is 0.43with df 19.

Table – III
Multiple Correlation between Sprinting Performance and Selected Motor Components

Co-efficient of multiple correlation ($R_{1.23456}$)	Percentage of combined relationship
0.938	87.98%

From the analysis of the data, it was found that there was a high positive relationship between sprinting performance and selected motor components such as leg strength, explosive power, speed endurance, muscular endurance and hip flexibility. Among the motor components selected for this study, explosive power is highly correlated with sprinting performance followed by speed endurance, muscular strength, hip flexibility and leg strength respectively. The three qualities strength, power and endurance are the basic qualities for sprinting. Explosive power is a combination of speed and strength. The athletes with better strength would have better power which leads to better speed. Gibson (1979) states that in sprinting propelling the body into rapid motion from a stationary position and reaching maximum speed requires considerable power which is essential for good sprinting. In sprints, strength endurance plays an important role in the last phase to maintain the maximum speed till the end point (Singh, 1991). This might be the reason that sprinting performance had high significant association with explosive power, speed endurance, muscular endurance and leg strength.

Flexibility is a basic pre-requisite for a good quantities and qualitative execution of sports movements. Generally greater flexibility leads to better performance level and the less chance of occurrence of injury. Individual with good flexibility have a greater movement and less stiffness of the muscle which enhance the performance level. Sprinting performance depends much on stride length and stride frequency. Normally flexibility in responsible for better stride length and stride frequency of the sprinters. So that sprinters undergo stretching exercises to increase these two characteristics. Therefore, there was a high significant association existed between sprinting performance and hip flexibility.

It is also revealed from the result of the study that the combined association of motor fitness components with sprinting performance is 0.938 (87.98%). It indicates that all the selected motor fitness components put together play an important role for improving sprinting performance. Further it reveals that speed alone is not sufficient for better sprinting performance. When it was combined with other important motor qualities like leg strength, explosive power, speed endurance, muscular endurance and hip flexibility, it helps to improve sprinting performance. Hence, it was concluded that the selected motor fitness variables namely explosive power, speed endurance, strength endurance, hip flexibility and leg strength are the better determinants, which influences on sprinting performance.

Conclusions

With in the limitations of the study, the following conclusions were drawn from the results obtained.

1. The motor fitness variables selected for this study were significantly associated with sprinting performance.
2. Among the independent variables selected for this study, explosive power was highly related with sprinting performance followed by speed endurance, muscular endurance, hip flexibility and leg strength respectively.
3. The selected motor fitness variables such as leg strength, explosive power, speed endurance, muscular endurance and hip flexibility were considered as most important factors and better determinants for predicting sprinting performance.

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