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RELATIONSHIP OF 100MT SPRINT PERFORMANCE OF SPRINTERS ON SELECTED MOTOR FITNESS COMPONENTS, ANTHROPOMETRIC MEASUREMENTS AND PHYSIOLOGICAL VARIABLES

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ABSTRACT

The purpose of the study was to see the relationship of selected motor fitness components, anthropometric measurements and physiological variables with 100mt sprint performance of sprinters. Twenty male athletes aged between 14-18 years were selected from sports authority of India (SAI) Lucknow. The Motor Fitness Components included Speed (50 yard run), Muscular strength (Pull-ups), Muscular endurance (Bent knee sit-ups), Muscular power (Standing broad jump), Circulatory respiratory endurance (600-yards run/walk test), Flexibility (Sit and Reach) and Agility (Shuttle run). Anthropometric Measurements included are Standing height, Weight, Leg length, Upper leg length, Lower leg length, Arm length, Upper arm length, Lower arm length, Hip width, Shoulder width, Chest width, Calf girth, Thigh girth, Chest girth, Upper arm girth and Lower arm girth Physiological Variables are Resting pulse rate, Positive breath holding time, Negative breadth holding time, Body composition, Systolic blood pressure, Diastolic blood pressure, Respiratory rate and Maximum expiratory pressure. The performance ability of sprinter in motor fitness components namely Speed (50 yard run), Muscular endurance (Bent knee sit-ups), Muscular power (Standing broad jump), Circulatory respiratory endurance (600-yards run/walk test), and Agility (Shuttle run) are significant related to 100mt sprint performance. Anthropometric measurements namely Standing height, Weight, Upper leg length, Hip width, Shoulder width, and Chest width are significant related to 100mt sprint performance. Physiological variables namely Positive breath holding times are significant related to 100m sprint performance. To find out the motor fitness components, anthropometric measurements and physiological variables to sprint performance correlations, Pearson product moment correlation, multiple correlations, and regression analysis statistical technique were employed.

KEYWORDS :*VMotor fitness components, Anthropometric measurements, Physiological variables and Sprinters.*

INTRODUCTION

The application of modern science and technology to sports is an effort to analyse and improve performance and is not a new idea. These efforts command little attention until a number of small innovates countries begin to organise program dedicated to the scientific development of Olympic athletes. The world of sports then became intrigued with the sports sciences area of biomechanics, physiology, sports sciences and sports psychology and the application of practical methods including carbohydrates loading, blood doping, slow analysis, attitude training, relaxation technique and numerous others. There was a sudden realization that sports sciences offered the key to athlete domination.

Sports and games are competitive in nature and meant for a particular age group. The talented and gifted youngsters only enjoy the participation. So the process of channelization of athletes into various sports and games should be according to their ability and interest. After various investigations made by the sports experts, this is an important phenomenon in the present competitive sports world. The ignorance of the person may build a great stumbling block in the progress of the sports in the country because it has been seen that a large population in India remains aloof from competitive sports.

METHODOLOGY:-

Twenty male athletes aged between 14-18 years were selected for this study. These subjects were selected from the Sports Authority of India (SAI) Lucknow. The following Motor Fitness Components included Speed (50 yard run), Muscular strength (Pull-ups), Muscular endurance (Bent knee sit-ups), Muscular power (Standing broad jump), Circulatory respiratory endurance (600-yards run/walk test), Flexibility (Sit and Reach) and Agility (Shuttle run). Anthropometric Measurements included are Standing height, Weight, Leg length, Upper leg length, Lower leg length, Arm length, Upper arm length, Lower arm length, Hip width, Shoulder width, Chest width, Calf girth, Thigh girth, Chest girth, Upper arm girth and Lower arm girth Physiological Variables are Resting pulse rate, Positive breath holding time, Negative breadth holding time, Body composition, Systolic blood pressure, Diastolic blood pressure, Respiratory rate and Maximum expiratory pressure. The necessary data was collected by administering various tests for the chosen variables. The time chosen for assessing the performance ability was administered in the Athletic ground of Sports Authority of India (SAI) and also the Motor fitness components, Anthropometric measurements and Physiological variables. Statistical analysis of data collected on Twenty male athletes i.e 100mt Sprinters. The data on 100m sprint performance (dependent variables) along with motor fitness components, anthropometric measurements and physiological variables (independent variables) were examined by Pearson's product moment correlation, Multiple correlation, Regression analysis statistical technique was employed.

FINDINGS:-

TABLE-1
RELATIONSHIP OF MOTOR FITNESS COMPONENTS WITH 100MT SPRINT PERFORMANCE OF SPRINTERS

Variables	Coefficient of correlation 'r'
Speed (50 yard run)	0.682*
Muscular strength (pull-ups)	- 0.389
Muscular endurance (Bent knee sit-ups)	- 0.661*
Muscular power (Standing broad jump)	- 0.684*
Circulatory respiratory endurance (600-yard run/walk)	0.723*
Flexibility (sit and reach)	0.043
Agility (shuttle run)	0.711*

From the Table-1 it is clear that five motor fitness components have significant relationship with 100mt sprint performance. They are 50 yard run (0.682); bent knee sit-ups (-0.661); standing broad jump (-0.684); 600-yard run/walk (0.723); and shuttle run (0.711). In respect to other motor fitness components (pull-ups and sit & reach) the relationship with 100mt sprint performance is not found to be statistically significant at 0.05 level as they are below tabulated value i.e 0.444.

TABLE-2
RELATIONSHIP OF ANTHROPOMETRIC MEASUREMENTS WITH
100MT SPRINT PERFORMANCE OF SPRINTERS

Variables	Coefficient of correlation 'r'
Standing height	0.527*
Weight	0.467*
Leg length	0.434
Upper leg length	0.454*
Lower leg length	0.395
Arm length	0.335
Upper arm length	0.267
Lower arm length	0.297
Hip width	0.639*
Shoulder width	0.595*
Chest width	0.723*
Calf girth	0.270
Thigh girth	0.116
Chest girth	0.275
Upper arm girth	-0.049
Lower arm girth	-0.018

Table-2 it is clear that six anthropometric measurements have significant relationship with 100mt sprint performance. They are standing height (0.527); weight (0.467); upper leg length (0.454); hip width (0.639); shoulder width (0.595); and chest width (0.723). In respect to other anthropometric measurements (leg length, lower leg length, arm length, upper arm length, lower arm length, calf girth, thigh girth, chest girth, upper arm girth and lower arm girth) the relationship with 100mt sprint performance is not found to be statistically significant at 0.05 level as they are below tabulated value i.e 0.444.

TABLE-3
RELATIONSHIP OF PHYSIOLOGICAL VARIABLES WITH
100MT SPRINT PERFORMANCE OF SPRINTERS

Variables	Coefficient of correlation 'r'
Resting pulse rate	0.165
Positive breath holding time	-0.501*
Negative breath holding time	-0.002
Body composition	-0.132
Systolic blood pressure	-0.116
Diastolic blood pressure	-0.234
Respiratory rate	-0.373
Maximum expiratory pressure	-0.285

Table-3 it is clear that one physiological variables have significant relationship with 100mt sprint performance. They are positive breath holding time (-0.501). In respect to other physiological variables (resting pulse rate, negative breath holding time, body composition, systolic blood pressure, diastolic blood pressure, respiratory rate and maximum expiratory pressure) the relationship with 100mt sprint performance is not found to be statistically significant at 0.05 level as they are below tabulated value i.e

0.444.

TABLE-4
COMBINED CONTRIBUTION OF MOTOR FITNESS COMPONENTS, ANTHROPOMETRIC MEASUREMENTS AND PHYSIOLOGICAL VARIABLES WITH 100MT SPRINT PERFORMANCE OF SPRINTERS

Criterion variables	Independent variables	Multiple correlation	Coefficient of multiple correlation
100mt sprint	50 yard run (1) Bent knee sit-ups(3) Standing broad jump (4) 600-yard run/walk (5) Shuttle run (7) Standing height (8) Weight (9) Upper leg length (11) Hip width (16) Shoulder width (17) Chest width (18) Positive breath holding time (25)	Rc.1345789(11)(16)(17)(18)(25)	0.960*

Table-4 has disclosed that the combined contribution of motor fitness components, Anthropometric measurements and physiological variables of 100mt sprint performance are 50 yard run (1); bent knee sit-ups (3); standing broad jump (4); 600 yard run/walk (5); shuttle run (7); standing height (8); weight (9); upper leg length (11); hip width (16); shoulder width (17); chest width (18); and positive breath holding time (25) is significant at 0.05 level of confidence as the computed value of (0.960*) (Rc. 1345789(11)(16)(17)(18)(25) for multiple correlation was more than the value of 0.444 required for the multiple correlation coefficient to be significant at 0.05 level of significant with 18 degree of freedom. From the obtained value of multiple correlation it can be deduced that all the above variables taken together contributes to 100mt sprint performance.

TABLE-5
LINEAR REGRESSION EQUATIONS OF MOTOR FITNESS COMPONENTS, ANTHROPOMETRIC MEASUREMENTS AND PHYSIOLOGICAL VARIABLES WITH 100MT SPRINT PERFORMANCE OF SPRINTERS

S.No	Linear regression equations
1.	Y = 4.80 + 1.10 (50 yard run)
2.	Y = 13.43 – 0.03 (bent knee sit-ups)
3.	Y = 16.69 – 1.92 (standing broad jump)
4.	Y = 13.43 – 0.03 (600 yard run/walk)
5.	Y = 9.16 + 0.23 (shuttle run)
6.	Y = 6.08 + 0.03 (standing height)
7.	Y = 9.12 + 0.03 (weight)
8.	Y = 7.04 + 0.09 (upper leg length)
9.	Y = 8.22 + 0.11 (hip width)
10.	Y = 4.17 + 0.20 (shoulder width)
11.	Y = 6.87 + 0.15 (chest width)
12.	Y = 13.27 + 0.03 (positive breadth holding time)

Where Y = Criterion variables i.e 100mt sprint performance

MULTIPLE LINEAR REGRESSION ANALYSIS:-

The multiple linear regression analysis in order to predict 100mts sprint performance were Y = 4.283 (constant) + 0.932 (50 yards run) – 0.006 (bent knee sit-ups) + 0.180 (standing broad jump) + 0.004 (600-yards run/walk) + 0.016 (shuttle run) + 0.052 (standing height) – 0.015 (weight) – 0.068 (upper leg length) – 0.019 (hip width) – 0.092 (shoulder width) + 0.131 (chest width) – 0.012 (positive breadth holding time).

DISCUSSION OF FINDINGS:-

A sprinter basically needs a very high amount of speed, which he develops by the genetic make-up (muscle type) and also the training efficiency. On biomechanically analyzing the running action we find that stride length and frequency are the basis for speed. The length of the stride depends upon the person's ability to lengthen his Ariel phase which is made possible by pulling the leg higher. This is made possible mainly by the contraction of quadriceps groups of muscles along with the abdominal muscles. Hundred meters is also affected by the explosive strength of the muscles, as it is also anaerobic event having its performance basis on the power generated by the contracting muscle. The muscles groups are exercised, heart and respiratory functions along with the muscles had undergone stress caused by physiological adaptive changes in the individual so that after sometime all the above stated parameters functioned more effectively and thus caused an increased in 600 yard run/walk. Shuttle run enables a person to execute quick body movements so that the faster movement of the legs can be properly synchronized with the movements of the arms. An athlete with good height can run fast by opening the stride length by spending considerably less energy. Weight will be helpful increasing the force applied to pull the body forward with fast speed from the block. Longer stride also depends upon the upper leg length of an individual. The hip, shoulder, chest, legs are equally important are reactive on the areas, which work alternatively with the legs. The arm action should also be in correspondence to the leg action as any difference in the power and range of leg and arm movements. The high intensity of exercise has very high level of energy requirement and so such demands for oxygen consumption but the poor supply of oxygen might be starving the working muscles for oxygen.

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