PREDICTION OF COMPETITION PERFORMANCE OF SPRINTERS ON THE BASIS OF BODY COMPOSITION, EMOTIONAL INTELLIGENCE AND PHYSIOLOGICAL CHARACTERISTICS

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Abstract:

Athletes differ from each other in their characteristics according to their events. This study aimed to identify performance predictors in 100m sprinters of All India inter-university taking into consideration their body composition, emotional intelligence and psychological characteristics. Twenty-three sprinters participated in this study. The measurements of body composition characteristics were done with the help of Body Composition Monitor having Scale HBF-361. In order to evaluate emotional intelligence, the scale developed by Hyde, Pethe, and Dhar was used. Dry spirometer was used to measure vital capacity, Harvard step test was used to measure the Vo2 max, Manual methods was applied to measure the basal pulse rate and standardized digital sphygmomanometer was used to measure blood pressure. Multiple linear regression analysis was applied to identify the best model for performance prediction. Results indicated that the regression model explains the significant variance in competition performance of 100m sprinters and can be used for the predictions. Body composition, emotional intelligence and physiological characteristics accounted for 77% of the variance in performance for 100m sprinters. The most significant predictors of 100 m sprint performance in female sprinters were vital capacity and body mass index.

Key Words: Body composition, Emotional intelligence, Physiological characteristics, Competition performance and sprinters.

Introduction:

In the recent years, it has been found that issue which influence optimal performance in athletics events has received considerable attention in the scientific literature. Variables which have been associated with running performance include body composition, physical characteristics and

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maximal aerobic power (Apostolidis, N. et al. 2003., Bar., O. 1987; Ben et al., 2007**)**. An elite athlete is a rare combination of talent with adequate anthropometric and psychological characteristics, in a favorable genetic framework. Anthropometric traits are known in the literature as determinants of athletic performance (Burke, E.J. 1980**)**. Greater fat-free mass (FFM) and reduced adiposity, less ectomorph and more strength improved race performance in 100 m sprinters according to a previous study (Caterisano, A. et al. 1997). Successful sprinters tend to be homogeneous in height and body mass, as highlighted by coefficients of variation of 2% and 9%, respectively (Bosco, C. et al. 2004).

Athletic performance is also affected by emotional intelligence. Chakarvarti and Lal (2016) found that high performance male sprinters are more intelligent that low performers, as high achievers continually manage and deal with their feelings under various states of competition. Frazee Zamanian et al (2011) claimed that world class competitors are more intelligent emotionally than normal people. Physiological exercise testing is important to track and field athletes to help identify potential talent but also to provide the players, trainers and coaching staff with some profiles of the players and a measure for evaluating training programs (Fox, E. et al. 1988). Testing physiological requirements in athletics has become more specific over the past decade with further advances in both sports' science, technology and general understanding of the physiological requirements for testing athletics. However, despite this progress in testing procedures and knowledge, there still appears limited research regarding the analysis and critical appraisal of tests used specifically for track and field athletes.

Methodology

In the present investigation for the collection of data, the investigator used purposive random sampling procedure. The total sample of present study consist of 23 female sprinters, who had participated in All India Inter-university championship, w. e. f. 25-12-2015 to 31-12-2015 held at Punjabi University, Patiala. Subject's age ranged between 18 and 25 years. The measurements of body composition characteristics were done with the help of Body Composition Monitor having Scale HBF-361. The scale of emotional intelligence developed by Hyde, Pethe, and Dhar (2002) was used to measure emotional intelligence. Dry spirometer was used to measure vital capacity, Harvard step test was used to measure the Vo2 max, Manual methods was applied to measure the basal pulse rate and standardized digital sphygmomanometer was used to measure blood pressure. Multiple linear regression analysis was applied to identify the best model for performance prediction.

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Result and Discussion

Table-I: Model summary of body composition, emotional intelligence and physiological characteristics to competition performance 100m sprinters

R	R Square	Adjusted R Square	Std error of estimation
.877	.770	.54	.32

The table-I shows that the coefficient of correlation (i.e. R) between the variables has a value of .877 (87.7%) whereas the coefficient of determination is .770 (77.0%). It shows that 77% variation in the competition performance of 100m sprinters has been explained by the body composition characteristics, emotional intelligence and physiological characteristics taken together.

Table-II: Analysis of variance of body composition, emotional intelligence and physiological characteristics on competition performance of 100m sprinters

Source of variation	Sum of square	Degree of freedom	Mean square	F	Sig
Between	4.01	11	.36	3.35	.028
Within	1.20	11	.11		
Total	5.21	22			

From the table-II it has been observed that the p-value is 0.028 which is less than 0.05 and the F-test is significant. Hence the model explains the significant variation in competition performance of 100m sprinters due to body composition characteristics, emotional intelligence and physiological characteristics. Overall, the model is significant.

Table-III: Regression coefficients associated with competition performance of the 100m sprinters

	Unstandardized Coefficient	t value	P value	Remarks
Constant	20.70	4.14	**.001**	Significant
Body Fat %	.081	1.21	.250	Not Significant
BMI	-.344	3.54	**.004**	Significant
Skeletal Muscle Mass	.045	.39	.697	Not Significant

Basal Metabolic Rate	.001	.79	.443	Not Significant
Visceral Fat	.137	1.07	.307	Not Significant
Emotional Intelligence	-.004	.23	.822	Not Significant
Vital Capacity	-.558	1.76	**.005**	Not Significant
Vo2 Max	-.051	1.09	.298	Not Significant
Pulse Rate	.004	.241	.813	Not Significant
Systolic Blood Pressure	-.023	.85	.412	Not Significant
Diastolic Blood Pressure	.022	1.24	.237	Not Significant

From the table-III it is clear that, body fat percentage is positively related to competition performance of 100m sprinters as evident from the value of its coefficient (.081) i.e. If body fat percentage increases by one unit, competition performance of 100m sprinters will increase by .081 units, while keeping others predictors constant. But it is also evident from the table that the association of body composition for competition performance is insignificant (p-value = 1.21).

The body mass index is negatively related to competition performance of 100m sprinters as evident from the value of its coefficient (-.344) i.e. If body mass index increases by one unit, competition performance of 100m sprinters will decrease by .344 units, while keeping others predictors constant. But it is also evident from the table that the association of body mass index for competition performance is significant (p-value = .004).

The variable, skeletal muscle mass is positively related to competition performance of 100m sprinters as evident from the value of its coefficient (.045) i.e. If skeletal muscle mass increases by one unit, competition performance of 100m sprinters will increase by .045 units, while keeping others predictors constant. But it is also evident from the table that the association of body composition for competition performance is insignificant (p-value = .697).

The variable, basal metabolic rate is positively related to competition performance of 100m sprinters as evident from the value of its coefficient (.001) i.e. If basal metabolic rate increases by one unit, competition performance of 100m sprinters will increase by .001 units, while keeping others predictors constant. But it is also evident from the table that the association of body composition for competition performance is insignificant (p-value = .443).

The variable, visceral fat is also positively related to competition performance of 100m sprinters as evident from the value of its coefficient (.137) i.e. If visceral fat increases by one unit,

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competition performance of 100m sprinters will increase by .137 units, while keeping others predictors constant. But it is also evident from the table that the association of body composition for competition performance is insignificant (p-value = .307).

The emotional intelligence is negatively related to competition performance of 100m sprinters as evident from the value of its coefficient (-.004) i.e. If emotional intelligence increases by one unit, competition performance of 100m sprinters will decrease by .004 units, while keeping others predictors constant. But it is also evident from the table that the association of body mass index for competition performance is significant (p-value = .822).

The variable, vital capacity is negatively related to competition performance of 100m sprinters as evident from the value of its coefficient (-.558) i.e. If vital capacity increases by one unit, competition performance of 100m sprinters will decrease by .558 units, while keeping others predictors constant. But it is also evident from the table that the association of body mass index for competition performance is insignificant (p-value = .105).

The variable, Vo2 Max is negatively related to competition performance of 100m sprinters as evident from the value of its coefficient (-.051) i.e. If Vo2 Max increases by one unit, competition performance of 100m sprinters will decrease by .051 units, while keeping others predictors constant. But it is also evident from the table that the association of body mass index for competition performance is insignificant (p-value = .298).

The variable, pulse rate is positively related to competition performance of 100m sprinters as evident from the value of its coefficient (.004) i.e. If pulse rate increases by one unit, competition performance of 100m sprinters will increase by .004 units, while keeping others predictors constant. But it is also evident from the table that the association of body composition for competition performance is insignificant (p-value = .813).

The variable, systolic blood pressure is negatively related to competition performance of 100m sprinters as evident from the value of its coefficient (-.023) i.e. If systolic blood pressure increases by one unit, competition performance of 100m sprinters will decrease by .023 units, while keeping others predictors constant. But it is also evident from the table that the association of body mass index for competition performance is insignificant (p-value = .412).

The variable, diastolic blood pressure is positively related to competition performance of 100m sprinters as evident from the value of its coefficient (.022) i.e. If diastolic blood pressure increases by one unit, competition performance of 100m sprinters will increase by .022 units, while keeping others predictors constant. But it is also evident from the table that the association of body composition for competition performance is insignificant (p-value = .237).

Discussion

The value of R^2= .770 from table-I indicated that 77% variation in the competition performance of 100m sprinters has been explained by the body composition characteristics (body fat percentage, body mass index, skeletal muscle mass, basal metabolic rate and visceral fat), emotional intelligence and physiological characteristics (vital capacity, vo2 max, Pulse rate, systolic blood pressure and diastolic blood pressure). Further, it has been also found from the table-II that the regression model explains the significant variance in competition performance of 100m sprinters and can be used for the predictions. The multiple regression analysis from table-III, develop equation for the prediction of competition performance in 100m sprinters on the basis of body composition characteristics, emotional intelligence and physiological characteristics. Out of five body composition characteristics, emotional intelligence and five physiological characteristics, only vital capacity and body mass index significantly predicts the competition performance. The Results of the present study are not in line with the study reported by Meckel, Y. et a; (1995). They found significant and positive correlations were existing between running time and fat %, and insignificant correlations were found between running time and peak VO2 reaction. Meta-analysis examining the relationship between emotional intelligence (EI) and sports performance in competitive sports and found that EI is a possible predictor in sports performance (Kopp and Jekauc, 2018). Takashi, Abe et al. (2019) reported similar results with the present investigation that differences in muscle mass may not play a large role in determining successful performance in elite female sprinters.

Conclusions:

It has been found that the regression model explains the significant variance in competition performance of 100m sprinters and can be used for the predictions. Hence it can be concluded that in case of female 100m sprinters, the most contributing variable of competition performance is vital capacity which is followed by body mass index.

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