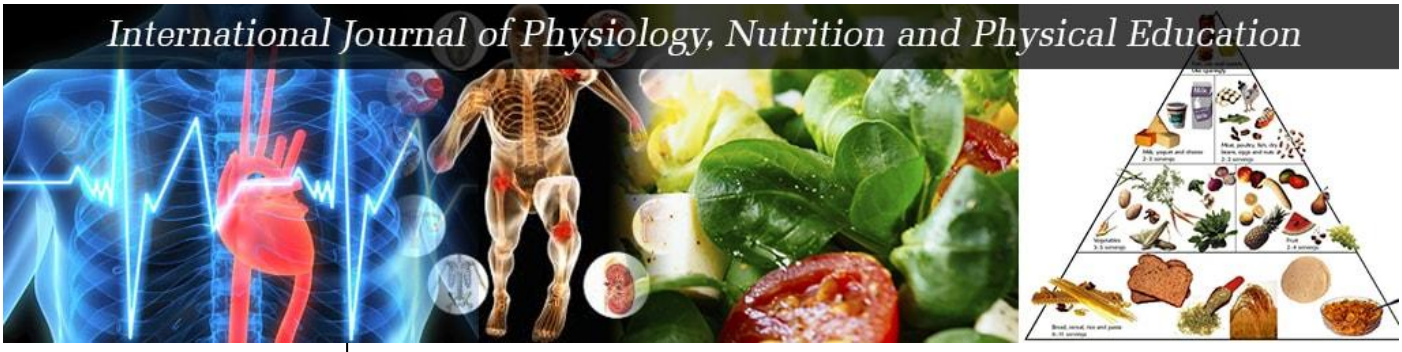

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An analysis of selected anthropometric characteristics and sprint start performance of elite male athletes

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Abstract
Introduction: The study was aimed to make an analysis of selected anthropometric characteristics and sprint start performance of elite male athletes.
Methods: Fifteen male elite athletes (sprinters) from the STC and COE schemes of Sports Authority of India, Thiruvananthapuram, were selected as the subjects for the study. Their age ranged from 16-29 years. 25 anthropometric measurements out of 39 measurements suggested by International Society of the Advancement of Kinanthropometry (ISAK) were selected as variables. Also video recording of sprint start of the athletes was selected as the test item.
Result: The performance of the athletes in the 10 metre increased with the increase in their body mass, sitting height, chest girth, biacromial breadth and A-P chest depth. Performance in the 10 metre sprint showed no significant relationship with the other selected anthropometric variables.
Conclusion: Block clearance of the sprint athletes is associated with many of their body features. Block clearance, velocity and sprint time are more dominant with the increased body mass, sitting height and chest girth of the elite male sprint athletes.

Keywords: Anthropometry: Anthropometry is the study of the measurement of the human body in terms of the dimensions of bone, muscle, and adipose (fat) tissue

Introduction
Specific anthropometric characteristics are needed to be successful in certain sporting events. Anthropometry is the science which deals with the measurement of the size, weight, and proportions of the human body. It is also important to note that there are some differences in body structure and composition of sports persons involved in individual and team sports. The tasks in some events, such as shot put or high jump, are quite specific and different from each other and so are the successful physiques. This process whereby the physical demands of a sport lead to selection of body types best suited to that sport is known as "morphological optimization".
Anthropometrical and physical parameters have been found to discriminate among successful athletes in different sports, the sprints referred to, short and high intensive events which require high anaerobic capacity. Indeed, the acquisition of speed is critical for the majority of sports. In the event of track athletics, 100 - meter sprinting race is probably the most impressive event in worldwide competitions. The prize for being the fastest person in the world could be claimed by the world-record holder because of the sheer speed of this race. People all over the countries strive to compete in the international events, such as the Olympic Games since 1896. However, we could seldom find a Chinese or even an Asian in the final of sprinting events, except the 110-Hurdles event in recent years. This may imply that the Chinese may have certain disadvantages in sprinting events.
In short sprint running events, starting performance has a critical impact on the final result of the race. A successful start is characterised by a high horizontal velocity of the sprinter's center of mass at the instant of block clearance. Further, this velocity should be reached in the shortest possible time. Therefore, short reaction time and short push - off time are mandatory for good starting performances.

Purpose, Methods and Procedure

The purpose of the study was to make an analysis of selected anthropometric characteristics and sprint start performance of elite athletes.

Fifteen male elite athletes (sprinters) from the STC and COE schemes of Sports Authority of India, Thiruvananthapuram, were selected as the subjects for the study. Their age ranged from 16-29 years.

25 anthropometric measurements out of 39 measurements suggested by International Society of the Advancement of Kinanthropometry (ISAK) were selected as variables. Also video recording of sprint start of the athletes was selected as the test item.

Body mass was recorded in kilograms. Stretch stature and sitting height was recorded in centimeters. Girth measurements such asArm girth relaxed, Arm girth flexed and tensed Forearm girth, Wrist girth, Chest girth, Thigh girth, Mid-thigh girth, Calf girth, Ankle girth, Length measurements such as Acromiale-radiale, Radiale-stylion, Midstylion-dactylion, Iliospinale height, Trochanterion height, Tibialelaterale height, Foot length, Breadth measurements such as Biacromial breadth, Biiliocristal breadth, Transverse chest breadth, Anterior posterior chest depth, Biepicondylarhumerus breadth and Biepicondylar femur breadth were recorded in centimetres.

The video recordings of the sprint start needed for the study were taken in a single session on 14th march 2014 from the LNCPE synthetic track. In order to cover the start trails Sony HDR-XR160 High-Definition Handycam Camcorder andSony HDR-CX190 High Definition Handycam 5.3 MP Camcorder cameras from Kerala Cricket Association and Sha Angle View Software which was developed by Dr. S.J Shabu and Silicon Coach Software were also used in study.

The data collected from 15 elite male sprinters was analysed using Descriptive statistics and Pearson product moment correlation. SPSS personal computer software was used for analysis of the data.

Result and discussion

The body mass, sitting height, chest girth, biacromial breadth and A-P chest depth correlated significantly but negatively with the 10 meter sprint time of the athletes. The negative correlation value indicated that the less time score in the 10 meter performance is better performance. This proves that the performance of the athletes in the 10 meter increased with the increase in their body mass, sitting height, chest girth, biacromial breadth and A-P chest depth. Performance in the 10 meter sprint showed no significant relationship with the other selected anthropometric variables.

Block clearance time of the athletes correlated significantly with body mass, stretch stature, sitting height, forearm girth, wrist girth, chest girth, ankle girth, acromialeradiale length, radialestylion, mid-styliondactylion, iliospinale height, trochanterion height, tibialelaterale height, biacromial breadth, foot length and femur breadth. Negative correlation value of the above variables with block clearance time proves that the performance (less timing) improved with the increase of the said sixteen values.

Remaining nine variables **(**arm girth relaxed, arm girth flexed and tensed, thigh girth, mid-thigh girth, calf girth, biiliocristal breadth, transverse chest breadth, A-P chest depth, humerus breadth) did not show any relationship with block clearance time.

The first stride distance showed no significant relationship with the selected anthropometric variables.

Front block angle significantly but negatively correlated with radiale-stylion. This proves that the front block angle showed higher values as the radiale-stylion length increased.

Rear block angle, front ankles' angle and rear ankles' angle did not show any relationship with the selected anthropometric variables.

Rear knee angle correlated significantly with biiliocristal breadth. The positive correlation values prove that as the biiliocristal breadth increased the rear knee angle also got increased.

Front knee angle correlated significantly with sitting height and femur breadth. The higher values of sitting height and femur breadth influenced to increase on front knee angle.

Hip angle at set position, arm angle and height of C.G at set position showed no significant correlation with the selected anthropometric variables.

Velocity of the athlete at the 10 meter sprint showed significant relationship with body mass, chest girth, thigh girth and A-P chest depth.

Increase in the velocity was observed with increase in the above said anthropometric measurements of the elite male sprint athletes.

The results of the study indicate that the block clearance time of the athlete is crucial with many bodily features of sprint athletes.

Body mass, sitting height and chest girth of the sprint athletes were determinant factors of better sprint time, block clearance and body velocity in the 10 meter sprint.

Based on the results of the study it is concluded that, block clearance of the sprint athletes is associated with many of their body features. Block clearance, velocity and sprint time are more dominant with the increased body mass, sitting height and chest girth of the elite male sprint athletes.

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