ABSTRACT

The present study was conducted to estimate the dynamometric strength measurements, selected anthropometric characteristics and performance tests in the collegiate athletes of Delhi, to observe the gender differences of these traits among them, and to search any association of dynamometric strength measurements and anthropometric characteristics with the performance tests in them.

A total of 522 collegiate athletes from both sexes, aged 18-25 years were selected purposively from various colleges of Delhi during 2010-2013. An equal number of controls (n= 501, 364 males and 137 females) were also taken from the same place for comparison. Athletes from a total of six sports events were considered as sample, viz. sprinters (n=180), hurdlers (n= 113), middle distance runners (n= 113), long distance runners (n= 47), long jumpers (n= 40) and javelin throwers (n= 29).

As many as seven dynamometric strength measurements, viz. trunk strength, shoulder strength, elbow strength, wrist strength, hip strength, knee strength and ankle strength were measured by the Isokinetic Strength Dynamometer (CSMI Humac Norm Pvt. Ltd, Model 770) following standard techniques. A total of 18 anthropometric characteristics, namely, height, body weight, BMI, percent body fat and percent lean body mass, humerus and femur biepiconylar diameters, upper arm, chest, hip, wrist and ankle circumferences, shoulder width, biceps, triceps, subscapular, suprailliac and calf skinfolds, and two performance tests, viz. sit and reach test and multistage test were measured following standard techniques.

In the present study, collegiate athletes (both male and female) showed statistically significant (p<0.001) higher mean values for all the seven strength measurements than their control counterparts. Male athletes had significantly (p<0.001) higher mean values in all the strength variables, (except hip flexion right and left) than their female counterparts. Male sprinters had the highest mean values of trunk extension and flexion, while the lowest mean values for these traits were found in male long distance runners. Female hurdlers had the highest mean values of trunk extension and flexion, while the female sprinters showed the lowest mean value of trunk extension strength and the female long jumpers in trunk flexion.
Male javelin throwers showed the highest mean value for shoulder extension strength, whereas the lowest value of this trait was reported in hurdlers in dominant shoulder. On the other hand, shoulder flexion strength was reported to be the highest in male hurdlers and the lowest in male long distance runners. In female athletes, the highest mean value of shoulder extension strength was reported in javelin throwers and the lowest in the hurdlers in dominant, while shoulder flexion strength was the highest in hurdlers and lowest in sprinters.

Male javelin throwers showed the highest mean value of elbow extension in dominant arm, while the lowest mean value was reported in long distance runners. Elbow flexion was reported to be the highest in hurdlers in both the arms and the lowest in javelin throwers. Female athletes demonstrated the highest mean values of elbow flexion strength in hurdlers and extension strength in javelin throwers, while the lowest mean values for elbow extension were found in long jumpers and for elbow flexion in long distance runners.

The javelin throwers showed the highest mean values in wrist extension strength in both males and females and the lowest mean values in male and female long distance runners. Wrist flexion strength was reported to be the highest in male javelin throwers and in females in hurdlers, whereas the lowest mean values were reported in male and female long distance runners.

Male long jumpers showed the highest mean value of hip extension strength in dominant lower extremity, while the lowest mean value for hip extension strength were reported in long distance runners. In females, the highest hip extension strength was reported in hurdlers and the lowest in long distance runners. Male javelin throwers and sprinters showed the highest mean values for hip flexion strength, while in females, the highest mean value was noted in hurdlers. The lowest mean values for hip flexion strength were reported both in male and female long distance runners.

Male hurdlers showed the highest knee extension strength and the lowest in dominant extremity was reported in sprinters. In case of knee flexion, the highest mean value was reported in male sprinters whereas the lowest was found in long distance runners. Female hurdlers showed the highest mean value of knee flexion as well as extension strength and the lowest was reported in long distance runners.
Male sprinters showed the highest mean values in ankle extension strength, while ankle flexion strength was the highest in sprinters hurdlers in dominant extremity, whereas the lowest value was recorded in long distance runners (both flexion and extension). Female hurdlers showed the highest mean values of ankle extension and flexion strength and the lowest mean values were noted in long distance runners.

Male athletes were taller and heavier than their female counterparts. So far BMI was concerned; collegiate athletes had lower mean values than controls. Both male and female athletes showed lower mean values of humerus biepiconylar diameter than their control counterparts. Male athletes showed higher mean values for the trait as compared to female athletes. In case of femur biepiconylar diameter, male athletes showed higher mean values than control males while female athletes showed lower mean values than control females. Male athletes showed (p<0.001) higher mean values for the trait as compared to female athletes. In circumferential measurements, male athletes showed higher mean values in upper arm, chest, hip and ankle circumferences and lower mean value in wrist circumference than control males, while female athletes showed lower mean values in upper arm, chest and hip circumferences and higher mean values in wrist and ankle circumferences than control females. Male athletes showed (p<0.001) higher mean values in all the five circumferential measurements studied as compared to female athletes. In case of all five skinfold measurements, male and female athletes showed lesser mean values than their control counterparts. It was also reported that female athletes have lesser mean values in triceps, subscapular, suprailliac and calf skinfolds and higher mean value in biceps skinfold than their male counterparts. In case of percent body fat, male and female athletes showed lesser mean values than controls. Female athletes showed higher mean values for the trait as compared to male athletes. Both male and female athletes showed higher mean values in percent lean body mass than their control counterparts. Male athletes showed higher mean values for the trait as compared to female athletes.

In case of performance tests, results of the present study showed that both male and female athletes had significantly (p<0.001) higher mean values in sit and reach test and multistage test than their control counterparts. Male athletes showed significantly (p<0.001) higher mean values both in sit and reach test and multistage test than female athletes.
In athletes, significant positive correlations (p<0.001) of trunk extension and flexion strength were found with sit and reach test, multistage test and with all anthropometric variables studied, except BMI and suprailiac skinfold. Significantly positive correlations (p<0.001) of shoulder extension and flexion strength were found with sit and reach test, multistage test and with all anthropometric variables studied, except BMI, triceps and subscapular skinfolds and significantly negative correlations (p<0.001) with biceps skinfold. Significantly positive correlations (p<0.001) elbow extension and flexion strength were found with sit and reach test, multistage test and with all anthropometric variables studied, except BMI, and significantly negative correlations (p<0.001) with percent body fat. Significantly positive correlations (p<0.01 – 0.001) of wrist extension strength (right dominant) were observed with multistage test and most of the anthropometric variables except height, body weight, BMI, chest circumference and shoulder width, and of wrist flexion strength (right dominant) with sit and reach test and most of the anthropometric variables except BMI and humerus and femur biepiconylar diameters, while statistically significant negative correlations (p<0.01 – 0.001) was noted in percent body fat. Significantly positive correlations (p<0.001) of hip extension and flexion strength were found with humerus and femur biepiconylar diameters, wrist and ankle circumferences, shoulder width, and significantly negative correlations (p<0.002 – 0.001) with biceps and calf skinfolds. Significantly positive correlations (p<0.001) of knee extension and flexion strength were found with multistage test and most of the anthropometric variables, and significantly negative correlations (p<0.001) with percent body fat and biceps skinfold. Significantly positive correlations (p<0.03 – 0.001) of ankle extension and flexion strength were observed with sit and reach test, multistage test and most of the anthropometric variables, and significant negative correlations (p<0.001) with percent body fat and biceps skinfold.