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Anthropometric Variables between High and Low Performer Sub-Junior Female Gymnasts: A Comparative Study

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Abstract:

The aim of the study was to compare selected anthropometric variables between high and low performer sub-junior gymnasts. To work on the above said objective, 45 sub-juniors female gymnasts were taken as the subjects. The data were drawn during Sub Junior State Championship, held at SKR College of Physical Education, Punjab, India. The anthropometric variables taken in this study were age, height, weight, sitting height, leg length, arm length, shoulder width, chest width, hip width, arm circumference, chest circumference, hip circumference, thigh circumference, and calf circumference. For obtaining data on the selected anthropometrical variables standard equipments and techniques were used. To compare high and low performers, the performance score of the selected gymnasts were arranged in descending order, after that it was divided into three quarterlies. Upper quarter was treated as the high performers and lower quarter was treated as low performers, remaining middle quarter was eliminated from the study, thus there were 30 subjects remained for the final analysis. Comparison of high and low performers was made by using t test. The results of the study indicated that significant difference existed between high and low performer female sub-junior gymnasts in the variables of performance, age, height, sitting height, leg length, arm length, shoulder width, chest width, hip width, hip circumference, thigh circumference, and calf

circumference; whereas no significant difference existed in the variables of weight, arm circumference, and chest circumference.

Key words: Anthropometry, sub-junior, high performance, low performance.

Introduction

The effectiveness of physical performances is related to various basic traits, found in the individuals including their maturation, body size and physique type. Many of these traits are related to heredity, such as body weight have hereditary implications, but may also be effected by environmental influences, the nature and amount of exercise, nutritional and health aspects (Claessens, Lefevre, Beunen, & Malina, 1999; Hussain, Ahmed, Mohammad, & Ali, 2013). The study of athletes has always been of interest to investigators in a variety of disciplines. Anthropologists, biologists, physiologists, sociologists and sports scientists have investigated the high level performers on various aspects. Sports in present era taking the help of science in order to enhance performance, maintain safety and ensure long time health of athletes (Hussain, et al., 2013). In this manner women's gymnastics in particular has been sought and continues to need scientific assistance, because children in gymnastics are involved relatively at a very young age to high level of performance and competition (Bradshaw, & Le, 2004; Ali, & Mohammad, 2012).

The poor performance of Indian athletes at the international competition has been of great concern, especially to the coaches, physical educationists and sport scientists. Efforts have been made to improve the standards of athletes since long however, little success has so far been achieved in this respect. There are numerous factors which are responsible for the performance of an athlete (Ali, & Mohammad, 2012). The physique and body composition, including the size, shape,

form are known to play a significant role in this regard. The performance of an athlete in any game or event is also dependent on his/her suppleness, skills, training, motivation and on various other factors of physiological and biochemical nature. Age, sex and physical growth have also been noticed to influence a person's capacity for physical activities (Wayne & Gary, 1972).

It is good to see that the facilities and researches in the field of physical education and sports have improved amply in recent past. The factor which perhaps does not given adequate attention is the surface physiology. It is also notable that the study in this area was never taken in order to spot out the gaps and subsequently bridge them. No study directly connected to the present study could be traced out in the literature available, however some works allied to the present study has been done previously. It is also important to hint an understanding of relevant and connected literature to get a full picture of what has been said with regard to the problem taken up for the study. Hence, the investigator in the form of present study is make modest effort in this direction to study and compare high and low performer sub-junior female gymnast on their anthropometrical variables.

Methods and Materials

Subjects

For the purpose of the study 45 sub-junior (under 14 years) female gymnasts were taken as the subjects. The subjects were the participant of the Sub-Junior State Gymnastics Championship, held at SKR College of Physical Education, Punjab, India on November 5-6, 2013. The age of the selected subjects were ranged from the 7 to 12 years. Prior to data acquisition it was assured that the subjects included in this study were having no injury or illness reported 6 months before on the date of data collection.

Tools

In order to measure the anthropometrical variables anthropometrical rod, steel measuring tape and portable weighing machine were used. All required instruments were available in the laboratory of S.K.R. College of Physical Education, Punjab, India.

Variables of the Study

- Age (measured in chronological order).
- Height (measured in centimeters)
- Weight (measured in kilogram)
- Sitting height (measured in centimeters)
- Leg length (measured in centimeters)
- Arm length (measured in centimeters)
- Shoulder width (measured in centimeters)
- Chest width (measured in centimeters)
- Hip width (measured in centimeters)
- Arm circumference (measured in centimeters)
- Chest circumference (measured in centimeters)
- Hip circumference (measured in centimeters)
- Thigh circumference (measured in centimeters)
- Calf circumference (measured in centimeters)

Data Collection

Data on the selected variables were collected during the sub-junior state gymnastics championship. Prior to data collection consent from the team managers/coaches and the subjects were obtained. After acquiring the consent, data were collected on the above mentioned variables.

Statistical Analysis

To compare high and low performers, the performance score of the female gymnasts (selected in this study) were arranged in descending order, and was divided into three quarterlies. Upper quarter (having highest points) was treated as the high

performers and lower quarter was treated as low performers, remaining middle quarter was eliminated from the study, thus there were a total of 30 subjects remained for the final analysis. To compare high and low performers the t test was used. Further the level of significance was set at 0.05 with 28 degree of freedom. All statistical functions were performed with the help of SPSS v-16 software.

Results

The results of the study are presented in the following tables.

Table 1: Descriptive statistics of the selected variables of high and low performance sub-junior female gymnasts

Variables	N	Mean		SD	
		High	Low	High	Low
Performance (points)	15	34.28	9.33	16.35	6.96
Age (years)	15	10.53	8.73	1.50	1.66
Height (cm)	15	139.27	125.07	10.47	11.01
Weight (kg)	15	28.93	24.20	6.95	7.09
Sitting Height (cm)	15	72.33	65.87	5.16	5.05
Leg Length (cm)	15	66.93	59.53	6.61	6.82
Arm Length (cm)	15	58.60	52.93	4.45	6.29
Shoulder Width (cm)	15	31.47	28.87	2.03	2.44
Chest Width (cm)	15	22.80	20.67	2.30	2.09
Hip Width (cm)	15	25.20	22.67	1.78	2.35
Arm Circumference (cm)	15	20.00	18.73	2.39	2.40
Chest Circumference (cm)	15	63.93	59.40	7.76	4.15
Hip Circumference (cm)	15	72.00	65.80	6.61	7.19
Thigh Circumference (cm)	15	38.07	34.27	4.35	4.46
Calf Circumference (cm)	15	26.60	24.60	2.09	2.97

Table 2: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Performance"

Group	N	Mean	SD	t value
High Performers	15	34.28	16.35	5.43*
Low Performers	15	9.33	6.96	

*Significant
Tab $t_{0.05(28)} = 2.04$

Table 2 showed that significant difference existed between high and low performer sub-junior female gymnasts in the variable of "performance". This is because, the calculated t (5.43) is found more than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom.

Table 3: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Age"

Group	N	Mean	SD	t value
High Performers	15	10.53	1.50	3.10*
Low Performers	15	8.73	1.66	

*Significant
Tab $t_{0.05(28)} = 2.04$

From the above cited Table 3 it is evidenced that significant difference existed between high and low performer sub-junior female gymnasts in the variable of "age". It is because, the calculated t (3.10) is found more than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom.

Table 4: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Height"

Group	N	Mean	SD	t value
High Performers	15	139.27	10.47	3.61*
Low Performers	15	125.07	11.01	

*Significant
Tab $t_{0.05(28)} = 2.04$

Examination of Table 4 documented that there is significant difference existed between high and low performer sub-junior female gymnasts in the variable of "height". It is because, the calculated t (3.61) is found more than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom.

Table 5: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Weight"

Group	N	Mean	SD	t value
High Performers	15	28.93	6.95	1.84
Low Performers	15	24.20	7.09	

*Significant

Tab $t_{0.05(28)} = 2.04$

Above cited Table 5 documented that no significant difference existed between high and low performer sub-junior female gymnasts in the variable of "weight". It is because, the calculated t (1.84) is found less than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom.

Table 6: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Sitting Height"

Group	N	Mean	SD	t value
High Performers	15	72.33	5.16	3.46*
Low Performers	15	65.87	5.05	

*Significant

Tab $t_{0.05(28)} = 2.04$

As vivid from the Table 6 that calculated t (3.46) is found more than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom, thus there is significant difference existed between high and low performer sub-junior female gymnasts in the variable of "sitting height".

Table 7: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Leg Length"

Group	N	Mean	SD	t value
High Performers	15	66.93	6.61	3.01*
Low Performers	15	59.53	6.82	

*Significant

Tab $t_{0.05(28)} = 2.04$

When we went through Table 7 it is found that there is significant difference existed between high and low performer

sub-junior female gymnasts in the variable of "leg length". It is because, the calculated t (3.01) is found more than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom.

Table 8: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Arm Length"

Group	N	Mean	SD	t value
High Performers	15	58.60	4.45	2.84*
Low Performers	15	52.93	6.29	

*Significant

Tab $t_{0.05(28)} = 2.04$

From the above cited Table 8 it is evidenced that there is significant difference existed between high and low performer sub-junior female gymnasts in the variable of "arm length". It is because, the calculated t (2.84) is found more than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom.

Table 9: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Shoulder Width"

Group	N	Mean	SD	t value
High Performers	15	31.47	2.03	3.16*
Low Performers	15	28.87	2.44	

*Significant

Tab $t_{0.05(28)} = 2.04$

Above cited Table 9 showed that there is significant difference existed between high and low performer sub-junior female gymnasts in the variable of "shoulder width". It is because, the calculated t (3.16) is found more than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom.

Table 10: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Chest Width"

Group	N	Mean	SD	t value
High Performers	15	22.80	2.30	2.65*
Low Performers	15	20.67	2.09	

*Significant

Tab $t_{0.05(28)} = 2.04$

From the above cited Table 10 it is evidenced that there is significant difference existed between high and low performer sub-junior female gymnasts in their variable of "chest width". It is because, the calculated t (2.65) is found more than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom.

Table 11: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Hip Width"

Group	N	Mean	SD	t value
High Performers	15	25.20	1.78	3.32*
Low Performers	15	22.67	2.35	

*Significant

Tab $t_{0.05(28)} = 2.04$

Examination of the above cited Table 11 documented that there is significant difference existed between high and low performer sub-junior female gymnasts in the variable of "hip width". It is because, the calculated t (3.32) is found more than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom.

Table 12: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Arm Circumference"

Group	N	Mean	SD	t value
High Performers	15	20.00	2.39	1.44
Low Performers	15	18.73	2.40	

*Significant

Tab $t_{0.05(28)} = 2.04$

Table 12 evidenced that no significant difference existed between high and low performer sub-junior female gymnasts in the variable of "arm circumference". It is because, the calculated t (1.44) is found less than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom.

Table 13: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Chest Circumference"

Group	N	Mean	SD	t value
High Performers	15	63.93	7.76	1.99
Low Performers	15	59.40	4.15	

Tab $t_{0.05(28)} = 2.04$

Above cited Table 13 documented that no significant difference existed between high and low performer sub-junior female gymnasts in the variable of "chest circumference". It is because, the calculated t (1.99) is found less than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom.

Table 14: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Hip Circumference"

Group	N	Mean	SD	t value
High Performers	15	72.00	6.61	2.45*
Low Performers	15	65.80	7.19	

*Significant

Tab $t_{0.05(28)} = 2.04$

An examination of the above cited Table 14 evidenced that there is significant difference existed between high and low performer sub-junior female gymnasts in the variable of "hip circumference". It is because, the calculated t (2.45) is found more than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom.

Table 15: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Thigh Circumference"

Group	N	Mean	SD	t value
High Performers	15	38.07	4.35	2.36*
Low Performers	15	34.27	4.46	

*Significant

Tab $t_{0.05(28)} = 2.04$

Above cited Table 15 evidenced that there is significant difference existed between high and low performer sub-junior

female gymnasts in the variable of "thigh circumference". It is because, the calculated t (2.36) is found more than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom.

Table 16: Mean, SD and t value between high and low performer sub-junior female gymnasts for the variable of "Calf Circumference"

Group	N	Mean	SD	t value
High Performers	15	26.60	2.09	2.13*
Low Performers	15	24.60	2.97	

*Significant

Tab $t_{0.05(28)} = 2.04$

From the above cited Table 16 it is evidenced that there is significant difference existed between high and low performer sub-junior female gymnasts in the variable of "calf circumference". It is because, the calculated t (2.13) is found more than tabulated t (2.04) at 0.05 level of significance with 28 degree of freedom.

Discussion

The results of the study indicated that significant difference existed between high and low performer sub-junior female gymnasts in the variables of performance, age, height, sitting height, leg length, arm length, shoulder width, chest width, hip width, hip circumference, thigh circumference, and calf circumference; whereas no significant difference existed between high and low performer female sub-junior gymnasts in the variables of weight, arm circumference, and chest circumference.

Pertaining to the results it was found that as subjects' grown-up (in respect to their age) their performance also increases, it might be due to the fact that gymnastic activities required practice and those who were aged have much more practise hours in comparison with their younger age counterparts, similar results are documented by Kaur (2014).

The same sort of results was found for height, as height of the gymnasts increased their performance also increases (Kaur, 2014). When weight is taken into account, it is documented that it does not have much influence on the performance of the sub-junior gymnasts (Ali & Mohammad, 2012).

The variables like sitting height, leg length and arm length also have a positive influence on the performance. As these variables increased (lengthwise) the performance of the gymnasts also enhanced in positive manner.

Gymnastics is a game of poses, in this study it is proved as shoulder width, chest width and hip width found significant when compared high and low performance gymnasts.

When circumference of the arm and chest is taken into account, it was found that no significant difference existed between high and low performer gymnasts, this indicate these variables don't have much influence on the performance. But this is not true for the hip circumference, thigh circumference and calf circumference because there were significant differences existed between high and low performer gymnasts in these variables.

Conclusions

On the basis of obtained results it can be concluded that, except weight, aim circumference and chest circumference all reaming variables have positive influence on the performance of female sub-junior level gymnasts.

REFERENCES

Ali, Z., & Mohammad, A. (2012). Anthropometric profile of children's of Himachal Pradesh, India. International

Journal of Physical Education, Health, & Sports Sciences, 1(1), 47-53.

Bradshaw, E.J. & Le, R.P. (2004). Anthropometric and biomechanical field measures of floor and vault ability in 8 to 14 year old talent-selected gymnasts. Sports Biomechanics, 3(2), 249-262.

Claessens, A.L. & Lefevre, J. (1998). Morphological and performance characteristics as drop-out indicators in female gymnasts. Journal of Sports Medicine and Physical Fitness, 38(4), 305-309.

Claessens, A.L., Lefevre, J., Beunen, G., & Malina, RM. (1999). The contribution of anthropometric characteristics to performance scores in elite female gymnasts. Journal of Sports Medicine and Physical Fitness, 39(4), 355-360.

Deutz, R.C., Benardot, D. Martin, D.E., & Cody, M.M. (2000). Relationship between energy deficits and body composition in elite female gymnasts and runners. *Medicine Science Sports and Exercise,* 32(3), 659-668.

Hussain, I., Ahmed, A., Mohammad, A. & Ali, Z. (2013). Anthropometric profile of school children belonging to different regions of Himachal Pradesh. European Academic Research, 1 (4), 396-401.

Kaur, D. (2014). Comparative study of anthropometric variables between high and low performer sub-junior female gymnasts. (Unpublished Master's thesis, SKR College of Physical Education) Department of Physical Education, Punjabi University, Patiala, India.

Wayne, E. S., & Gary, D. L. (1972). Physical characteristics of college age women gymnasts. Research Quarterly, American Association for Health, Physical Education and Recreation, 43(2), 226-234.