

Endurance Capacity In College Sport Girls-A Comparative Study

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Abstract: Background: A comparative study of endurance capacity between sports and normal college girls and to show the importance of sports in physical fitness among college students. Method: The present study was carried out in 120 college girls, Ambajogai. The cases (60 girls) were involved in sports like football, hockey, volleyball etc. and the controls (60girls) were not involved in sports. The parameters compared between cases and controls are -1) breath holding test, 2) 40 mmHg endurance test 3) maximum voluntary contraction by handgrip dynamometer 4) VO_2 max by using Harward step test and Astrand Ryhming nomogram. Result: All above parameters were significantly increased in sports girls than controls by applying 'Z' test. Conclusion: Endurance capacity is statistically increased in sport girls than normal. Hence, we suggest here that students should get involve in sports and it should be made a compulsory subject in colleges. So that students develop mental and physical health to overcome stress in education.

Key words: Astrand Ryhming nomogram, Endurance test, Handgrip dynamometer, VO_2 max

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Introduction: German Philosophy states that 'Build more playgrounds, not hospitals'¹. In western countries, the department of sports create awareness about how early participation in sports and physical education can help to inculcate healthy lifestyles. We need to know that all the wealth and knowledge in the world would be of no use if tomorrow you are on your death-bed due to poor health. So through sports, all youths are encouraged to acquire knowledge, develop positive attitude and abilities to maintain health and well being throughout their life.

In this modern era, more popularity of television, movies, computers and video games leads to sedentary lifestyle among youths. Stressful academics and physical inactivity increases depression, suicidal tendencies, heart diseases, diabetes mellitus, obesity and cancer in college students.

Introducing youth to sports is very important. Sport is essential not only for physical and mental fitness, but it helps in education for introducing values such as dedication, discipline and responsibility. Providing opportunity for our students to experience sports during their school days is an investment in our future society. The main objective of sports is to develop physical, psychological health and a spirit of tolerance. Today, millions of girls are engaged in some sort of sports or physical fitness endeavour. Many studies

were carried out in males and urban population, but few in rural and females. However, the purpose of this study was designed to highlight the importance of sports in college girls for physical fitness.

Materials and Method: The present observational study was carried out in 120 college girls of age group between 18 to 22 yrs at Dept of Physiology, SRTR Govt. Medical College, Ambajogai.

The study was approved by institutional ethical committee SRTRGMC, Ambajogai. Cases and controls were selected as per the following criteria. Cases: 60 college girls, involved in sports like football, hockey, basketball and volleyball since 2 to 3 yrs, played games 1 to 2 hrs per day for 4 to 5 days in a week.

Controls: 60 girls from same colleges, not involved in sports and any other physical activity. The study was carried out during proliferative phase of menstrual cycle of girls.

Physical examination of all the subjects before the start of procedure was done by taking consent. Girls suffering from pulmonary, heart diseases and other illness were excluded. All the procedures were followed in accordance with the ethical standards of the committee on human experimentation of the institution in which the experiments were done.

Procedure: (1) Breath Holding test: Sit quiet for 5 min. Take a full, but not too deep breath. Hold it with mouth and nostrils closed. Note time in seconds. (2) Flack's mercury manometer (40mmHg endurance) test: Ask the subject to take deep inspiration. Ask her to close her nostrils and blow into the mercury manometer to raise the mercury-pressure to a level of 40 mmHg. The cheek should not be blown. Maintain the level of 40 mmHg and note the time in sec. Watch for the pulse. It should not increase until the breaking point. (3) Maximum voluntary contraction²: Ask the subject to hold the handgrip dynamometer with the help of right hand, with the upper arm dependent and forearm held horizontally on the side arm of chair. MVC was measured in kg by brief contraction of handgrip of less than 3 sec. duration. Three successive readings were taken with rest of 1 min between each test. The best reading was taken. (4) Maximal oxygen consumption (Vo_{2max})³: It was calculated by using step test technique and Astrands Ryhming nomogram. The subject was asked to step up and down 33 cm high bench 22 times per min for 5 min. The rate was adjusted with the help of metronome. The pulse rate for one min. immediately after exercise was noted. This was matched with weight of the subject using nomogram to obtain Vo_{2max} .

Result:

Table 1: Comparison of breath holding test in between sport and control girls

Parameter - Breath Holding test (sec)	Mean ± S.D.	'z' value	'p' value
Cases (n=60)	59.19 ± 13.49	6.04	P<0.05
Controls(n=60)	38.04 ± 8.04		

There is statistically significant increase in breath holding time in sport girls than normal college girls by applying Z test.

Table 2: Comparison of 40 mmHg endurance test in between sport and control girls

Parameter- 40 mmHg endurance test (sec)	Mean± S.D.	'z' value	'p' value
Cases (n=60)	49.42 ± 11.10	6.12	P<0.05
Controls (n=60)	32.33± 5.73		

There is statistically significant increase in 40 mmHg endurance test in sport girls than normal college girls by applying Z test.

Table 3: Comparison of Maximum voluntary contraction test in between sport and control girls

Parameter MVC(kg)	Mean ± S.D.	'z' value	'p' Value
Cases (n=60)	43.57± 6.63	2.53	P<0.05
Controls (n=60)	34.23± 5.47		

There is statistically significant increase in Maximum Voluntary Contraction in sport girls than normal college girls by applying Z test.

Table 4: Comparison of Vo_{2max} in between sport and control girls

Parameter Vo_{2max} (lit/min)	Mean ± S.D.	'z' value	'p' Value
Cases (n=60)	3.04± 0.40	3.25	P<0.05
Controls (n=60)	2.50± 0.35		

There is statistically significant increase in Vo_{2max} (lit/min) in sport girls than normal college girls by applying Z test.

Discussion: The group of exercises involved in sports like football, Hockey, Basketball and volleyball are flexibility, aerobic and anaerobic exercises. Flexibility exercises such as stretching improve range of motion of muscles and joints. Aerobic trainings such as running focus on increasing cardiovascular endurance. Anaerobic exercises such as sprinting increase short term

muscle strength³. A type of circuit training in these sports which build both strength and endurance⁴. Breath holding time and 40 mmHg endurance training are related to respiratory efficiency and used as a rough index of cardiopulmonary reserve. These tests have definite and direct relation with vital capacity. Dryer, Wittich and Peabody noted that physical training increases vital capacity by 30%⁵. In sports, much of the improvement in pulmonary function is attributable to strengthened respiratory musculature. These become more efficient reducing the oxygen costs for breathing. These muscles improve respiratory efficiency and minimize respiratory work at given exercise intensity⁶. So, breath holding time and 40mmHg endurance test are significantly more in sport girls than controls (Table 1&2).

Maximum voluntary contraction is determined by strength of muscle which relates to muscle cross sectional area³. Costill and Coyle demonstrated an increase in muscle fiber area that has undergone physical training⁷. Growth of muscle primarily resulted from an enlargement of muscle fibers and increase in number assumed due to fiber splitting⁸. During sport exercise muscles undergo hypertrophy due to increase in no. of myofibrils, mitochondria, ATP, phosphocreatine, stored glycogen and fat⁹. One of the primary benefit from exercise is the ability to increase muscle recruitment. This is an example of increased "mind-muscle" connection that becomes possible through regular training of sports. Hence, Maximum voluntary contraction is significantly higher in sport girls as compared to controls (Table 3). Sports scientists use VO_{2max} as the best measure of aerobic power. VO_{2max} is a maximal rate of oxygen consumption in ml/kg/min. VO_{2max} of marathoner is about 45% more than untrained person. During sports, girls underwent aerobic exercise, performed at moderate levels of intensity for extended periods of time. It strengthens heart and respiratory muscle efficiency, increases RBC count for transport of oxygen and O_2 diffusing capacity at lung⁹. Hence, VO_{2max} of sport girls is higher than controls (Table 4).

Conclusion: Endurance capacity is more in sport girls than normal girls. Now a days, physical

inactivity is seen among students due to sedentary lifestyle which may lead to many mental and health problems. Hence, we suggest that students should get involved in sports and it should be made a compulsory subject in colleges. Enter the world of sports and games, a world beyond the pages of books.

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Source Of Financial Support- Nil

Conflict Of Interest- None
