

AssesmentOf Anthropometry And PhysicalFitness Index Among Indian WrestlersBy Harvard Step Test.

Savita Hiremath¹, Parwati Patil², ShivaprasadS Goudar³

¹Assistant Professor, Dept. of Physiology, USMKLE IMP, Belgaum, Karnataka, INDIA

²Professor and HOD, Department of Physiology, JNMC, Belgaum, Karnataka, INDIA

³Professor, Department of Physiology, JNMC, Belgaum, Karnataka, INDIA

Corresponding Author: Savita Hiremath¹

Abstract:Background: Wrestling is a sport for everyone, athletes of all sizes and ability are drawn to wrestling for the simple reason that it is fun. It is a sport that tests the strength, stamina, and skill of two opponents. Wrestling is a physical chess match featuring moves and counter moves, endurance, strength, intelligence, and quickness. In spite of all these complexities, a key area that plays an important role in Wrestling is a wrestler's physical fitness.

Objective: To assess the physical fitness index in Indian wrestler's by Harvard step test and also to compare fitness with age and sex matched sedentary controls.

Method: 35 wrestler's divided into two groups depending on duration of training and age and sex matched 35 controls were the participants in this study. Height, weight and BMI were calculated. Physical fitness index was calculated using Harvard step test. Students unpaired 't' test, where significance of the p value was < 0.05 was used to compare two groups

Results: (Group B) Senior players showed a significantly higher physical fitness index than the juniors. The wrestler's group showed higher physical fitness index than the controls.

conclusion: Duration and frequency of training period certainly have positive influence on physical fitness levels and can be used to discriminate properly higher and lower cadre wrestlers

Key Words: Physical Fitness Index, Harvard step test, Wrestler

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I. Introduction

Wrestling is a sport for everyone, athletes of all sizes and ability are drawn to wrestling for the simple reason that it is fun. It is a sport that tests the strength, stamina, and skill of two opponents. Wrestling is a physical chess match featuring moves and counter moves, endurance, strength, intelligence, and quickness. In wrestling the opponent are of the same weight so size is not an element in any wrestlers success. For a beginner wrestlers, its crucial to learn the basics with correct form and technique as these basis are used at all level of competitive wrestling.^{1,2}

Physical fitness is a multidimensional concept that has been defined as a set of attributes that people possess or achieve that relates to the ability to perform physical activity. Physical fitness is defined as ability to carry out daily tasks with vigor and alertness without undue fatigue with ample energy to enjoy leisure time pursuits to meet unusual situations and unforeseen emergencies.^{3,4} It is comprised of skill related, health related and physiologic components. The American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD) recommended this test to study health related Physical Fitness Program in youth.⁵ The fusions of all these prerequisites cannot be attained at a specific age or by a specific wrestler. Wrestling is a sport that tests the strength, stamina, and skill of two opponents, hence wrestlers need to develop and cultivate on different aspects of the game and bodily parameters to become a desirable and an excellent wrestler.⁶ This study was evaluate the influence of duration of training on physical fitness index and performance of Indian wrestlers.

II. Material And Methods

The present cross sectional study was conducted in the Department of Physiology in a Jawaharlal Nehru Medical College, Belgaum between July 2013 to July 2014.

Subjects & selection method: Using universal sampling 35 wrestlers who regularly practiced at District stadium Belgaum for a minimum period of 4 years and who were in the age group of 18-25yrs were included and 35 controls age (18 – 25 yrs) and sex matched participants from KLE University were selected by randomization. Further based on number of years of training 35 wrestlers were divided into two groups, Group A (> 4 years)

and Group B ≤ 4 years of training). Descriptive data of the participant's age, medical history, training schedule regarding number of years of wrestling practice, and dietary history were obtained by questioning the participants. Nature of the study was explained and written informed consent was obtained from them. The study was approved by the Ethical and Research Committee of the institution.

Inclusion criteria:

1. All the wrestlers trained & practicing regularly for a minimum period of $3 \geq$ years and who were in the age group of 18-25yrs.
2. Age (18–25yrs) and sex matched participants coming from same region who have not undergone any sort of sports training or carrying out regular exercise were selected randomly in comparative group.

Exclusion criteria:

1. Subjects with respiratory, neuromuscular, cardiac, endocrine disorders among wrestlers and comparative group.
2. Students from comparative group who were doing regular physical exercise, meditation or undergoing any sports training.

Procedure

The participants were assed for the baseline parameters of height, weight and BMI. The height was as measured by Commercial stadiometer to the nearest 0.5 cm. The participant was made to stand erect with bare foot on the floor board of the stadiometer with his or her back to the vertical backboard of the stadiometer. Weight was recorded by Digital scale with an accuracy of ± 100 gm, participant was asked to come in light clothes and bare foot.

BMI is calculated by dividing body weight in kilograms by height in meters squared also called Quetelet Index. PHYSICAL FITNESS INDEX (PFI) was calculated on Harvard step test which required stepor platform 20 inches high, stopwatch, metronome gives beat every 2 seconds at a rate of 30 per minute.

The subject steps up and down on the platform at a rate of 30 steps per minute (every two seconds) for 5 minutes or until exhaustion. Exhaustion is defined as when the athlete cannot maintain the stepping rate for 15 seconds. The athlete immediately sits down on completion of the test, and the total number of heart beats is counted between 1 to 1.5 minutes after finishing. Total test time in seconds was noted down.^{3,7}

Scoring: the Fitness Index score is determined by the following equation

$$\text{Physical Fitness Index (PFI)} = \frac{100 \times \text{test duration in seconds}}{5.5 \times \text{pulse count between 1 and 1.5 minutes}}$$

Statistical analysis

Statistical analysis involved quantitative variables summarized through mean and standard deviation. Difference between mean of the two groups was tested using Students unpaired "t" test, where significance of the p value was < 0.05 .

III. Result

Group A consisted of 24 wrestlers (18 males and 6 females) and Group B had 11 wrestlers (10 males and 1 females). Mean age of group A was 19.3 yrs and that of group B was 18.6 yrs. In the present study mean age of the wrestlers was 19.1 years where as of the controls it was 19.7 years. Mean height and weight of both the groups were almost similar with the mean height in the wrestler group being higher than control group but the difference being statistically insignificant. Mean of BMI was significantly higher in control group ($p < 0.05$). (Table 1)

Harvard step test findings among wrestler groups show mean Heart rate between 1 – 1.5 min was less in group A than group B. The difference was found to be statistically significant ($p < 0.05$). Physical fitness index (PFI) was found to be more in wrestler group A than group B and the difference was statistically significant ($p < 0.05$). (Table 1)

In comparison with controls the Physical fitness index (PFI) was found to be more in wrestlers group and the difference was statistically significant ($p < 0.05$). Mean Heart rate between 1 – 1.5 min was less in wrestler group than control group. The difference was found to be statistically significant ($p < 0.05$).

Table 1 :Shows Base line parameters and Results of Harvard step test among Wrestlers (mean± SD) (n=35)

Variables	Group A(≥ 4yrs) n=24	Group B(< 4 yrs) n=11	p -value
Height(cms)	154 ±6.54	165 ± 4.92	0.669
Weight(kg)	55 ± 7.53	53.36 ± 5.55	0.132
BMI	21.2 ± 2.09	19.8 ± 1.3	0.065
Harvard Step Test			
Test time (sec)	300± 0	300 ± 0	<0.001*
Heart beat between 1 to 1.5 mins	59.7 ± 3.41	64.7 ± 5.46	<0.001*
PFI score	91.6 ± 5.08	84.8 ± 7.18	<0.001*

(*) p value significance = < 0.05

Table 2: Baseline parameters & results of Harvard step test of judo and control groups (mean± SD)(n=70)

Variables	Wrestlers	controls	p -value
Height(cms)	164.34±6.02	167.31±6.96	0.060
Weight(kg)	56.06±7.13	60.97±8.56	0.011*
BMI	20.8±2.07	21.9±3.30	0.056
Harvard Step Test			
Test time (sec)	300±0	165.7±51.69	< 0.001*
Heart beat between 1 to 1.5 mins	61.3±4.71	69.3±7.66	< 0.001*
PFI score	89.5±6.55	43±10.25	< 0.001*

(*) p value significance = < 0.05

IV. Discussion

Physical fitness has three main aspects. These are static fitness (absence of disease), dynamic fitness (ability to perform strenuous work) and motor skills fitness. Of these three, the dynamic fitness is very important in athletes which can be measured by Harvard step test.⁸ One is said to be “physically fit” if they have the ability to carry out daily tasks with vigor and alertness, without undue fatigue, and with ample energy to enjoy leisure time pursuits and to meet unforeseen emergencies.⁴ Wrestling is a sport that tests the strength, stamina, and skill of two opponents. A study proved that elite & amateur wrestlers had similar height, BMI & body fat ratio, but there were significant differences between the sport experiences of elite wrestlers and amateurs.⁹ Despite there being no difference between the groups in anthropometrical characteristics, it is important to note that the BMI percentage were almost same in both groups with little difference but, when compared to the untrained, sedentary controls there was a huge difference indicating that wrestlers were lean. This supports the assumption that wrestlers try to maximize lean body mass and minimize fat mass. These results corroborates with the results done in other studies. It could be a reflection of physiological adaptations to long-term wrestling training.^{1,10,11,12}

In our study Physical fitness index calculated by Harvard step test showed a higher index for group A wrestlers than B group. Total time on the steps was high for group A than group B. The pulse counts between 1-1.5 mins after the test was low in group A than group B, Thus the PEI in group A was more than that in group B. All these finding of this test were significant suggesting faster recovery in (group A) due to aerobic training. The increased ATP/PCr stores and elevated myokinase and creatine concentration, results in an ability to supply more energy through the phosphagen and aerobic systems, thus decreasing the reliance on anaerobic glycolysis. With reduced anaerobic glycolysis during exercise, less energy is required during the recovery period to rid the muscle of H⁺ and lactate, potentially hastening the recovery process.¹³ However it has been demonstrated that there are no major physiological differences between wrestlers of both freestyle and Greco-Roman styles.¹⁴

Harvard step test introduced by Brouha et al is widely regarded as a useful test of fitness for strenuous exercise in young men and with appropriate modification in young women¹⁵. Longer duration of practice might be contributing to the high PFI in group A. Fitness index is directly proportional to the duration of exercise and inversely proportional to post exercise pulse counts. Harvard step-test is considered to be a useful test of the cardiovascular fitness of athletes.^{16,17}

Harvard step was performed on both the groups to calculate their physical fitness index. The results state that the wrestlers have faster recovery than the controls and better aerobic capacity.¹⁸ The higher PFI score in wrestler group proves that definitely the wrestlers are more physically fit than the controls and it can be attributed to their duration and frequency of training. A proper choice of tests should provide diagnostic insights into the morphological, motor and functional components of athletic fitness.¹⁹ Understanding the demands of the sport of wrestling is of huge value to the strength & conditioning coach and sport scientist. Excellence in sport achievements are rare and require much effort and commitment. Many athletes struggle to break through various kinds of human limits, but only a few manage to be successful, which depend on advanced sports training techniques and strategies. The application of this knowledge must incorporate all dimensions of physiology, biomechanics and sport medicine with the combined intuition and coaching ability of .And this can be achieved by an elaborate training programmes given by the elite coach

V. Conclusion

From the study it can be concluded that wrestlers were substantially higher in the physical fitness than the normative levels for similarly aged untrained individuals. Wrestlers with long duration of training, similar anthropometry & being subjected to same training showed higher physical performance than the wrestlers with shorter duration of training, indicating training has better effects on physical performance of wrestlers

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