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Determination of fitness level in male and female college aged students

Morteza JOURKESH¹, Iraj SADRI¹, Ali OJAGI¹ and Amineh Sharanavard

¹ Department of Physical Education and Sports Science, Islamic Azad University, Shabestar branch, IRAN

ABSTRACT

The importance of physical fitness to health for all individuals has been well documented. Physical fitness is a required element for all the activities in our society. Health related physical fitness of an individual is mainly dependent on lifestyle related factors such as daily physical activity levels. It was believed that the low physical fitness level of an individual is associated with higher mortality rate. Physical fitness is also considered as the degree of ability to execute a physical task under various ambient conditions. The purpose of this study is to experiment, measure and evaluate the level of physical fitness among college students of Islamic Azad University (IAU), shabestar branch based on gender. There were 450 students who has been involved in this physical fitness test study which were 250 male *students(mean* ± *SD*; *Age:* 22.5 ± 8.25 yrs, *Height:* 174.23 ± 5.2 cm, *Weight:* 68.45 ± 9.29 kg) and the other 200 are female students(mean \pm SD; Age: 22.75 \pm 6.2 yrs, Height: 159.75 \pm 5.2 cm, Weight: 56.71 ± 8.84 kg). There were 6 activities in this test which were 12 minute run, sit-up, vertical jump for explosive strength, 10 meter agility shuttle, flexibility and push up. All these tests were evaluated the level of fitness from aspect agility, speed, endurance of cardiovascular, power of leg and flexibility. Physical fitness performance was better in male students, except for sit and reach test, in which female students performed better.

Keywords: Physical fitness, university students, motor skills.

INTRODUCTION

Physical fitness can be thought of as an integrated measure of most, if not all, the body functions(skeletomuscular, cardiorespiratory, hematocirculatory, psychoneurological and endocrine –metabolic) involved in the performance of daily physical activity and/or physical exercise. Regular physical activity is an important component of a healthy lifestyle and helps to keep the body fit. Physical activity is any bodily movement produced by skeletal muscle that results in energy expenditure. Physical fitness is required not only by athletes for better performance, but also by non-athletes for maintenance of a healthy body and healthy mind. Fitness is generally considered to have five components: aerobic capacity, muscle strength,

muscular endurance, flexibility, and body composition [16].Hence, when physical fitness is tested, the functional status of all these systems is actually being checked. This is the reason why physical fitness is nowadays considered one of the most important health markers, as well as a predictor of morbidity and mortality for cardiovascular disease (CVD) and for all causes [1,4,5] In the recent decade, a decline in physical activity among college students has been observed [12,13]. Physical fitness according to the President's Council on Fitness, is a broad quality involving medical and dental supervision and care immunization and other protection against disease, proper nutrition, adequate rest, relaxation, good health practices, sanitation and other aspects of healthful living. It further states that exercise is an essential element to achieving and maintaining physical fitness. Physical fitness is the basis of all the activities of our society. If we fail to encourage physical development and prowess, we will undermine our capacity for thought and for work. Thus physical fitness of our citizens is a vital prerequisite to a country's realization of its full potential as a nation and to the opportunity of each individual citizen to make full and fruitful use of his/her capabilities [2,6]. Recent studies indicate that almost half of the U.S. college student population does not participate in moderate or vigorous physical activity [14]. Peter et al.(2010) examined Trends in Body Fat, Body Mass Index and Physical Fitness Among Male and Female College Students. The researchers found that there was a small and declining minority of male and female college students who are physically in shape. A high physical fitness level in childhood and adolescence is associated with more favorable health-related outcomes, concerning present and future risk for obesity, cardiovascular disease, skeletal health and mental health, 1 2 which highlights the need to include physical fitness testing in health and/or educational monitoring systems[3,7,8]. Vigorous physical activity (aerobic fitness) is closely associated with increases in maximum oxygen consumption (VO2ma, mL kg-' min-').Previous research examining aerobic fitness levels in African Americans has led to conflicting results. For example, while one study found no differences in the gender-specific aerobic fitness levels of African-American men and women[9] another study found that African-American women had significantly lower levels of aerobic fitness compared with white and Mexican-American women. No such difference existed for African-American men[10].However, another study found that aerobic fitness levels were lower in both African-American men and women compared with white men[11]. The present study emphasizes on the physical fitness of the Male and female college students. There is need for the students to measure and analyze their physical fitness for their own benefit and improvement. For better productivity the students should be healthy and have good physical fitness. The present study is taken with the objective to analyse the physical fitness of the IAU, shabestar branch students.

MATERIALS AND METHODS

Population and Samplings

The population consisted of male and female students from different states, during the fall semester (October–December,2008) involvement in general physical fitness of the epartment of Physical Education and Sports Science in IAU,shabestar branch. The total population was 450 students comprising of 250 male and 200 female were chosen and identified. The exclusion criteria were histories of healthy and orthopedic problems, such as episodes of hamstrings injuries, fractures, surgery or pain in the spine or hamstring muscles over the past six months. Since Physical fitness testing was part of mandatory curricula for all physical activity classes, informed consent forms were not collected. The protocol was approved by the Ethics and Research Committee of the IAU,shabestar branch.

Assessment of Physical Fitness Tests

Flexibility

Flexibility was assessed using the MicroFit FAS-2 flexometer to measure lower back and hamstring flexibility. The participants sat on the floor, with their shoes off, their legs straight, and feet against the flexometer foot stop. Before the test the technician asked the participant: "Do you have a back injury or is there any other reason you should not try to touch your toes?" If the participant's answer was positive, the flexibility test was skipped. When participant reached forward and touched the flexometer for 3 seconds, a measurement was recorded in centimeters.

Vertical Jump Test

The participants stands side on to a wall and reaches up with the hand closest to the wall. Keeping the feet flat on the ground, the point of the fingertips was marked or recorded. This was called the standing reach height. The athlete then stands away from the wall, and leaps vertically as high as possible using both arms and legs to assist in projecting the body upwards. The jumping technique can or cannot use a countermovement. Attempt to touch the wall at the highest point of the jump. The difference in distance between the standing reach height and the jump height is the score. The best of three attempts was recorded.

Agility Test

Agility was assessed using 10 meter agility shuttle test. Mark two lines 10 meters apart using marking tape or cones. The two blocks was placed on the line opposite the line they was going to start at. On the signal "ready", the participant places their front foot behind the starting line. On the signal, "go!" the participant sprints to the opposite line, picks up a block of wood, runs back and places it on or beyond the starting line. Then turing without a rest, they run back to retrieve the second block and carry it back across the finish line. Two trials are performed.

12minute Run (cooper Test)

Cardiovascular fitness was assessed using 12 minute run test. Place markers at set intervals around the track to aid in measuring the completed distance. Participants were ruined for 12 minutes, and the total distance covered is recorded. Walking was allowed, though the participants must be encouraged to push themselves as hard as they can[17].

Sit-up Test

The abdominal muscular strength and endurance of the abdominals and hip-flexors was assessed using sit-up test. To assure the starting position, the patisipants lies on his/her back with knees flexed, feet on floor with the hands on the opposite shoulders. The feet was held by partners to keep them in touch with the testing surface. The student, by tightening his/her abdominal muscles, curls to the sitting position. Arm contact with the chest must be maintained. The chin should remain tucked on the chest. The sit-ups were completed when the elbows touch the thighs. To complete the sit-up the participants returns to the down position until the midback makes contact with the testing surface. When the timer gives the signal "ready go", the sit-up performance were started and the performance was stopped on the command "stop". The number of correctly executed sit-ups performed in 60 seconds was the score[18].

Push Up Test

Measuring upper body strength and endurance, participants lower the body to a 90-degree elbow angle and push up. Set to a specified pace.Participants were complete as many

repetitions as possible. Students begin performing push-ups according to the cadence. The correct push-up were performed to a pace of one complete push-up every three seconds 1.5 seconds down and 1.5 seconds up, with no hesitation[19].

Statistical analysis

The Statistical Package for the Social Sciences (SPSS; version 18.0) was used for the data analysis. Independent t tests were used to assess overall differences between men and women in relation to age, height, weight. The Pearson Correlation was used to test the hypothesis to determine the relation between age and gender. P values less than or equal to 0.05 on two-sided tests were considered statistically significant.

RESULTS

Table 1 describes the physical parameters of the study population. Out of the 450 IAU, Shabestar Branch students who participated in this study, 250 were males and 200 were females. Mean % body fat for males was 12.2% and 23.4% for the females, respectively. The mean VO2max for males was 37.4 mL/kg/min and 32.1 mL/kg/min for females, respectively. The mean BMI was 25.6 kg/m² for males and 25.2 kg/m² for females, respectively. Age was 22.5yrs for male and 22.75 yrs for females, respectively. The mean Height was 174.23 cm for male and 159.75 cm for females, respectively. The mean Weight was 68.45 kg for male and 56.71 kg for females, respectively.

Independent t tests revealed that male students were significantly taller (P=.0001), heavier (P=.0001), and had higher VO2max levels (P=.0001) than female students. In addition, large effect sizes also were observed for these variables. Approximately 39% of female students and 305% of male students were classified as overweight or obese according to the National Center for Health Statistics percentile cutpoints for BMI [20].

Table 2 and 3 shows the mean score and standard deviation male and female students in all the six items of the physical fitness. The mean sit up was 38.55 for males and 31.25 for females, respectively. The mean vertical jump was 54.25 for males and 45.32 for females, respectively. The mean sit and reach was 15.15 for males and 32.74 for females, respectively. The mean sub up was 41 for males and 25 for females, respectively. The mean cooper was 1845 for males and 1545 for females, respectively. The mean agility was 10.38 for males and 11.61 for females, respectively.Overall, physical fitness performance was better in male students, except for sit and reach test, in which female students performed better.

Physical characteristics	Males	Females	
Age (years)	22.5 ± 8.25	22.75 ± 6.20	
Height (cm.)	174.23 ± 5.20	159.75±5.20*	
Weight (Kg.)	68.45 ± 9.29	56.71±8.84 *	
% Body Fat	12.2 ± 4.5	$23.1 \pm 5.20*$	
BMI (kg/m^2)	25.6 ± 5.72	25.2 ± 6.31	
VO2max (mL/kg/min)	37.4 ± 13.2	$32.1 \pm 15.3*$	

Table 1 : Physical characteristics of the subjects. Values are mean (\Box SD).

*Significantly different from male at $P \leq .05$.

Test	N	Mean	SD	Maximum	Minimum
Sit Up(no.)	250	38.55	7.92	50	17
Vertical Jump(cm.)	250	54.25	6.58	60	35
Push Up(no)	250	41	8.42	62	19
Sit and Reach(cm.)	250	15.15	6.38	25	5
Cooper(min.)	250	1845	6.32	2300	1510
Agility(sec.)	250	10.38	7.25	11.67	9.62

Table3.Pysical fitness test results for male students

Table2.Pysical	l fitness te	st results f	for femal	e students
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Test	N	Mean	SD	Maximum	Minimum
Sit Up(no.)	200	31.25	1074	45	15
Vertical Jump(cm.)	200	45.32	11.12	50	25
Push Up(no)	200	25	8.53	30	8
Sit and Reach(cm.)	200	32.74	11.25	41	15
Cooper(min.)	200	1545	10.41	2000	1210
Agility(sec.)	200	11.61	8.36	14.5	10.2

DISCUSSION

The recently published literature indicates that physical fitness is an important health marker already in youth, [7,8,3] highlighting the need of meaningful and accurate physical fitness assessment in young people. Correct interpretation of physical fitness assessment requires comparing the score obtained in a particular person with normative values for the general population with the same sex and age[3]. The results of present study showed that physical fitness performance was better in male students, except for sit and reach test, in which female students performed better. Our results are consistent with and extend the findings of Ortega

et all.(2011)reported better performance for female students in sit and reach test. In support, Jensen & Fisher(1979)found that the girls' flexibility is slightly superior when compared to the boys. However, in another study accomplished by Araújo et all.(2002) with 123 adolescents, being 58 girls, with ages between 13 and 18 years, were not found significant differences in the flexibility among the genders in the test of sit down and reach. The study accomplished by Okano et al (2001)corroborates the results presented previously. They didn't verify significant differences between the genders and ethnics in the test of "seat-and-reaching" with 103 pre-pubescent children between 8 and 11 years. It can be said that the fact that female students has presented superior values to the males values might have happened in function of viscoelastic properties of muscles have short duration[23,24].

In this study, we measured performance on fitness tests, and the output can be influenced by several factors, such as a potential "learning" effect (positive systematic bias) when the test would have been performed a second time. The results of present study suggest that neither learning nor fatigue (negative systematic bias) effects occurred when physical fitness is assessed, on a test-retest basis, in male and female students. The tests can, therefore, be considered reliable in this population. Regarding validity, we have just systematically reviewed the literature on that issue[25,3] and concluded that the shuttle run test is a valid test to assess agility, that the push up test is a valid test to assess lower-body muscular strength. A large number of other field-based fitness tests present limited evidence, mainly due to a limited number of studies available (one for each test).

Leger and Gadoury(1989) pointed out that lack of motivation might result in test ceasing, before participants have reached their physiological limit. As a result, it was proved that time factor might induce other factors that would affect the validity of the sit-up test.Docherty (1996) defined that muscular endurance is the ability of a muscle, or muscle group, to generate force repeatedly or for an extended period of time. Based on the definition, sit-up with no time limit was a standard to measure abdominal muscular endurance because extended period of time was given. Based on the above conclusion, for the consideration of time control, time limitation seems to be a better system in realistic life. For school curriculum, the physical test will be always carried out in P.E. lessons. It is rushed to test all students in an uncontrolled time. On the other hand, for the other physical tests such as security forces physical tests, large amount of candidates will be invited to perform physical tests. From the view of administration and management, it is better to give time limitation when the validity of the timed sit-up test was proved by previous researches. While an abdominal muscular endurance test was performed, muscles other than abdominal wall might help as synergetic functioning. Carlos et al. (1991) stated that the rectus femoris participated to a great degree when sit-up was performing. In their study, they suggested that the sit-ups performed with extended knees and supported feet required more activity of the rectus femoris than the sit-ups performed with extended knees and unsupported feet. On the other hand, Chong,Lee, Will, Ashley and Nicole (2006) added that lower paraspinal, latissimus dorsi and upper trapezius showed action potential while a full sit-up was performing.

The results of this study suggest that female students have lower levels of aerobic fitness compared with male students. Our findings are in agreement with other study that have examined aerobic fitness levels in African-American adults[30]. According to observations of the Amsterdam Growth and Heath Longitudinal Study, physical activity levels affect aerobic power during puberty and later in life [31]. Thus, we assumed that physical activity levels of our study participants were similar as earlier in their life, and, consequently, their aerobic capacity resulted from long term engagement in a given physical activity pattern. Aerobic capacity of male students was significantly higher compared to that of female participants, This has been confirmed by correlations between considered variables in female and male participants disregarding their physical activity levels. In addition, future research examining aerobic fitness levels should assess what percentage of male and female students played university sports and whether participation in such activities influenced aerobic fitness levels.

There are a few limitations to the study that need to be considered. First, The motivation of the subjects in performing the physical fitness tests, were uncontrollable. It might affect the results of the study. Secondly, The performance of the subjects might affected because of their physical lifestyle and the physical activity level.Furthermore,The performance of the subjects might affected due to their different physical characteristics. Study findings are applicable only to the subjects included in this study. Strength, speed, endurance (cardiovascular capacity) and other desirable physical qualities can only be developed through vigorous activity, but complete fitness is achieved through a sensible balance of all these provisions adapted to age, maturity and capability of the individual. The research has provided early information to help the students understand their performance level or their physical fitness. It will encourage them to be involved in sports. The information can be applied as criteria in selecting or choosing athletes It is also a source to assist Sport Science lecturers and coaches to be proactive and change their perspective in order to improve the athlete's performance. According to the results of this study, it is suggested that the Physical fitness is carried out in Semester 1and each student is needed to at least take up a course on games or athletic for each semester so that their physical fitness is maintained. Therefore, it is suggested that the

population taken as samples are varied among the society, taking the aspects of demography, age, gender, level of fitness and the involvement in sports.

CONCLUSION

The results of this study suggest that female students have lower levels of fitness fitness compared with male students. In addition, physical fitness performance was better in male students, except for sit and reach test, in which female students performed better. Future research needs to examine methods for increasing physical fitness levels among this population group and identify cut-points related to health outcomes for all fitness components.

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