

Musculoskeletal Fitness among College Students of Adesh University- An Observational Study

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Abstract

Aim: To study musculoskeletal fitness among college students of adesh university. **Method:** The present study was conducted at college level students of adesh university, Bathinda (Punjab). A sample of 200 college students both female and male was selected through random sampling. **Results:** It is found that subjects have more flexibility in spine and hip joint muscles as compared to shoulder girdle and upper arm muscles. Subjects have fair upper body strength and poor abdominal strength and endurance. **Conclusion:** The result of this study revealed that student has significant difference in the musculoskeletal fitness levels among the age group of 16-27 years. It is concluded that 62% students have shoulder girdle and upper arm muscles flexibility, 82% have spine and hip joint muscles flexibility, 42% students have below average upper body strength and 85% have below average abdominal strength and endurance.

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Introduction

“Physical fitness is a primary creed of health.” According to WHO (1946), health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (Mayorga et al. 2012). Physical fitness is defined as our capability to carry out day- to- day activities without excessive exhaustion. Commonly it is carried out through proper nourishment and vigorous physical exercise (Rajalaxmi et al. 2017). Individual are physically fit when both the ordinary and the unusual demands of the day-to-day life can be met by them carefully and successfully without being excessive exhausted and still energy have been left by them for recreation and frolic activities (Hoeger and Hoeger 2009). For physical fitness number of measurable component is doing contribution. The most commonly cited element fall into two groups: one is related to health and other is related to skills (Caspersen et al.1995). Component of fitness that related to health comes under the health-related fitness (Huotari et al. 2009). Health related fitness’s components are cardiovascular endurance, muscular strength and endurance, muscular flexibility, and body composition (Hoeger and Hoeger 2009). In motor skills, fitness is vital in action such as basketball, racquetball, golf, hiking, soccer, and water skiing (Hoeger and Hoeger 2009). The skill-related fitness refer to “current ability to perform activities requiring the involvement of agility, balance, coordination, power, reaction time, and speed (Kotwica and Majcher 2012). Important component

of a vigorous life style is regular physical activity. Only athletes is not require physical fitness for good performance, but it is also required by non-athletes for maintenance of healthy body and safe life (Jourkesh et al. 2011). The most prevalent modifiable risk factor and indicator of both morbidity and mortality are sedentary lifestyle and low physical fitness (Pawaria et al.2017).One important aspect of physical health or physical fitness is the musculoskeletal system (Kell et al. 2011). Musculoskeletal fitness is a multidimensional construct (Pate et al.2012). To enable the performance of chore against one's own body weight or an external resistance done by comprising the integrated function of muscle strength, endurance, muscle flexibility, and muscle power (Pate et al.2012).

Term '*strength*' referred to the maximal force is generated by a muscle or muscle group at a specific velocity (Kraemer et al.1988). During a particular joint movement force or torque have been generated by a muscle (Naclerio et al.2009).

Endurance - It is the ability to maintain forces frequently or to generate forces over a period of time. To determine the functional capacity examination of muscle endurance is important (O'Sullivan et al.2014).

Muscle flexibility- The ability to move a joint through its accessible range of motion (ROM), without producing excessive myotendinous stress. Improved ability to complete ADL, increased functional independence, and increased mobility is being associated by high levels of flexibility (Carregaro et al. 2007).

Musculoskeletal fitness is being associated by many health benefits such as decreased incidence of coronary risk factors, increased bone mineral density (reduced risk of osteoporosis), increased flexibility, improved glucose tolerance, and greater success in completion of activities of daily living (ADL). Health status is enhanced by improving the musculoskeletal fitness. Thus, overall quality of life can be increased by maintaining of musculoskeletal fitness (Kell et al.2001). The second most common reason for physician visits is being compromised by musculoskeletal conditions. In the industrialized world there is negative impact on health- related quality of life (Mayer et al. 2009). In the health industry the musculoskeletal injuries have been identified as a key area of concern by the National Occupational Health and Safety Commission of Australia, in 1994 (West and Gardner 2001).

In the adolescent population Musculoskeletal symptoms and injuries are prevalent and it have a significant impact on their future musculoskeletal health. After headaches musculoskeletal pain have been identified the second most reported physical system by one study and up to 7% of adolescents suffered from this type of system often or on a daily basis (Legault et al.2015).

For upper limb and lower limb separate tests were used for flexibility. Upper limb flexibility was measured by shoulder stretched test and for limb toe touch test was used. To measure upper body strength push up test used (Multani et al.2013). Abdominal strength and endurance was measured by sit up test (Kotwica and Majcher P. 2012). The aim of our study is to evaluate the musculoskeletal fitness among college students of Adesh University, Bathinda. The objectives of present study were to observe the (1) flexibility of upper arm and shoulder girdle muscles (2) flexibility of spine and hip joint muscles (3) strength of abdominal muscles and hip flexors muscles (4) endurance of upper body in college students.

Material and Method

This study was observational study design. The study was carried out in campus of Adesh University, Bathinda. After getting the approval from Institutional Research Committee and Ethical Committee of Adesh University, a sample of 200 college students both female and male were selected through random sampling. Subjects were selected according to inclusion and exclusion criteria.

Inclusion criteria:

- Age group 17-26 years
- Both male and female subjects
- BMI- 18.5-24.5 kg/m²

Exclusion criteria- Subjects with the history of

- Musculoskeletal,
- Cardio respiratory,
- Endocrinal (DM,Hypothyroidism/Hyperthyroidism etc.),
- Hematological (Anemia etc.)
- Systemic findings (injuries/conditions)

Written informed consents were taken from all the subjects. Subjects were asked to perform:

- Shoulder stretch tests for upper arm and shoulder girdle muscles flexibility
- Toe touch test for spine and hip joint flexibility
- Bent-knee Push up test for upper body strength and endurance
- Sit- up test for abdominal muscles and hip flexors muscles strength and endurance.

The data was statistically analyzed by applying mean and mean percentage .

Results

Total no. of subject was 200 and among them 100 is male and 100 are female and the mean age of total no. of subject is 21.225 years. The statistical analysis of base line value is shown in table 1. Mean age of male is 21.17 years and female is 21.28 years.

Table 1. Mean and standard deviation of Age total subject

Total no. of subject	Mean age of subject (in years)	Standard deviation
200	21.225	1.8524

The present study showed that total no. of subject is 200 and out of them 122 subject have shoulder girdle and upper arm muscles flexibility. Statistical value shown in table 2. From table 2 results shown that 61% subjects have shoulder girdle and upper arm muscles flexibility and 39% shows less flexibility.

Table 2. Percentage value of Shoulder Stretch Test for shoulder girdle and upper arm muscles flexibility

Shoulder Stretch Test	Findings in %
Yes	61%
No	39%

The flexibility of spine and hip joint muscle is about 82% out of 100%. Total 200 students performed the toe- touch test and 164 were able to touch their foot. The result achieved by the students is shown in table 3. From table 3 result shown that the flexibility of spine and hip joint muscles is 82% and 18% of subjects have less flexibility of spine and hip joint muscles.

While analyzing the upper body strength and endurance with the help of modified push- ups test 42% of students have below average strength and endurance of upper body. The statistical value shown in table 4. From table 4 result shown that Bent Knee Push- Ups Test in subjects have 14% Excellent, 13% Good, 32% Average, 34% Fair and 8% poor upper body strength and endurance. 42% of subjects have below average strength and endurance of upper body.

The result of Sit- Ups test for abdominal muscle strength and endurance is shown in table 5. Result of Sit- Ups Test in subjects shown 4% Excellent, 2% Good, 4% Above Average, 5% Average, 16% Below Average and 69% Poor abdominal strength and endurance. From table 5 result shown that Sit- Ups Test in subjects have 4% Excellent, 2% Good, 4% Above Average, 5% Average, 16% Below Average and 69% Poor abdominal strength and endurance. Overall 85% subjects have below average strength and endurance of abdominal muscles.

Table 3. Percentage value of Toe- Touch test for flexibility of spine and hip joint muscles

Toe- touch Test	Findings in %
Yes	164
No	36

Table 4. Percentage value of Bent Knee Push-Ups Test for upper body strength and endurance

Bent Knee Push- Ups Test	Data in %
Excellent	14
Good	13
Average	32
Fair	34
Poor	8

Table 5. Percentage value of Sit-ups Test for upper body strength and endurance

Sit- Ups Test	Findings in %
Excellent	4
Good	2
Above average	4
Average	5
Below average	16
Poor	69

Discussion

The present study was performed among college students with the aim to evaluate the musculoskeletal fitness among college students of Adesh University, Bathinda. This study explored that students who were examined they have low level of muscular strength and endurance and good flexibility of spine and hip joint muscles. In the study, total 200 subjects were taken from College

of Adesh University, Bathinda with certain selection criteria, with mean age of 21.225 years \pm SD 1.852. While testing flexibility for spine and hip joint muscles, toe touch test and shoulder stretch test shows two diverse pictures. According to the results, 82% subjects have good flexibility for spine and hip joint muscles whereas, 61% of subjects are found with good shoulder girdle and upper arm flexibility. Bent knee push- ups test is used to evaluate upper limb strength which presented a skewed picture. Subjects have 4% Excellent, 2% Good, 4% Above Average, 5% Average, 16% Below Average and 69% Poor abdominal strength and endurance. Sit- ups test is used to measure abdominal strength and endurance and we found 4% Excellent, 2% Good, 4% Above Average, 5% Average, 16% Below Average and 69% Poor abdominal strength and endurance. The result of the current study favors the findings of physical fitness among physiotherapy students for Punjab and Haryana which was conducted by Multani et.al. (2013). They concluded that physical fitness level of physiotherapy students is not satisfactory as compared to the physical demand of the profession. Interestingly, the flexibility results showed good flexibility in toe touch test but poor flexibility in performing flexibility testing of shoulder joint(Multani et.al. 2013). Another study was conducted on Health- related physical fitness in Brazilian school children for the Brazil sport program by Palegrini et. al. (2011) and showed that regarding abdominal strength/ muscular endurance, three out of four students did not meet the recommended criteria to health. Prevalence of inadequate muscular strength was observed both in the male and female genders. This situation is of great concern, since inadequate levels of abdominal strength/ endurance may cause postural and articular problems as well as musculoskeletal injuries Palegrini et. al. (2011). In present study results supported a study done on school children to evaluate their minimum muscular fitness levels by Gharote (2000) which showed that the failure percentage was 20.8% and flexibility failures 11.6 % which is much low. They suggested inclusion of Yogasanas in the physical activities programme in the schools for the improvement of the status of the failures. Further work along this line is in progress (Gharote 2000). A study of evaluation of fitness level in male and Females College aged students conducted by Jourkesh et. al. (2011) also stated that physical fitness performance was better in male students, except for flexibility test, in which female students performed better. Pawaria et al.(2017) found that the girl's flexibility is slightly superior when compared to the boys. A previous study which was conducted to find out the relationship between physical self- concept and health- related physical fitness in Spanish school children by Mayorga et. al (2012) which concluded that boys showed higher objective values of strength, endurance, and general fitness (Mayorga et. al 2012). Both the above studies worked in the areas of gender comparison which could be a insight for the present study to be targeted. Higher level of muscular strength and endurance is being associated by musculoskeletal fitness which definitely gave benefit both basic and instrumental ADL and translate into favorable circumstances for independent living. The low level of shoulder flexibility and muscular strength/ endurance may become a risk factor for the musculoskeletal disorder. One of the major causes of this reduced flexibility may be faulty posture. There is a need to explore the major factors affecting shoulder flexibility. Greater flexibility, one among various factors may effectively reduce the incidences of muscle injuries as a result of increased absorption of energy decreasing the load on working muscles. Finding of the present study conclude that the college students presented inadequate levels of musculoskeletal fitness. Therefore, it is suggested that mechanisms which improve the musculoskeletal fitness in students should be implemented, especially with public policies in neighborhood, parks and condominium which enable physical activities and sports practices. The study has provided the awareness to the subjects towards the performance level of their fitness. It will encourage them to be involved in various fitness activities like sports. It is suggested that the musculoskeletal fitness should be signified at the level of

colleges and schools where students need to take up at least a course on games or athletics so that their optimal fitness can be improved and maintained.

References

- Carregaro RL, Silva LCCB& Gil Coury HJC. 2007. Comparison between two clinical tests for the evaluation of posterior thigh muscles flexibility. *Rev.bras.fisioter.* 11(2):125-130.
- Caspersen CJ, Powell KE, Christenson GM.1995. Physical Activity, Exercise, and Physical fitness: Definitions and Distinctions for Health- Related Research. *Public Health Reports.*1995;100(2):128.
- Gharote MM. Minimum muscular fitness in school children. *Indian J Physio Pharmacol.*2000;44(4):479-484.
- Hoeger WWK, and Hoeger SA. 2009. *Fitness and Wellness*, Wadsworth.
- Huotari P, Saakslanti A, Watt A.2009. Associations between the self- estimated and actual physical fitness scores of Finnish grade 6 students. *Physical Education and Sport.*7(1):27-36.
- Jourkesh M, Sadri I, Ojagi A, Sharanvard A.2011. Determination of fitness level in male and female college aged students. *Scholars Research Library.*3(2): 326-333.
- Kell RT, Bell Gordon, Quinney A.2001.Musculoskeletal fitness, Health outcomes and quality of life. *Sport Med.*31(12):863-873.
- Kotwica MA, and Majcher P. 2012.Physical fitness level of 1st year medicine and physiotherapy students of Lublin Medical University. *Pol. j. sport tourism.*19:107-112.
- Kraemer WJ, Deschenes MR, Fleck SJ.1988.Physiological Adaptations to Resistance Exercise Implications for Athletic Conditioning. *Sports Medicine.*6:246-256.
- Legault EP, Descarreaux M, Cantin V. 2015.Musculoskeletal symptoms in an adolescent athlete population: a comparative study. *BMC Musculoskeletal Disorder.*16:1-9.
- Mayer RS, Baima J, Bloch R, Braza D, Newcomer K, Sherman A, et.al.2009.Musculoskeletal education for medical students. *Am J Phys Med Rehabil.*88:791-797.
- Mayorga D, Viciano J, Cocca A.2012. Relationship between physical self- concept and health- related physical fitness in Spanish schoolchildren. *Procedia- Social and Behavioral Science.* 69:659-668.
- Multani NK, Bhawana, Singh A. 2013.Level of physical fitness among physiotherapy students a study of Punjab and Haryana. *World applied science journal.* 21(8):1136-1140.
- Naclerio FJ, Jimenez A, Alvar A, Peterson MD.2009. Assessing strength and power in resistance training. *J. Hum. Sport Exerc.*4(2):100-113.
- O'Sullivan SB, Schmitz TJ, Fulk GD. 2014. *Physical rehabilitation*. F.A.Davis Company.
- Pate R, Oria M, Pillabury L.2012.Fitness measure and health outcomes in youth. *National academy of sciences.*153-191.
- Pawaria S, kalra S, Pal S. 2017. Study on Cardio-Respiratory Fitness of Physiotherapy students: A Cross – sectional study. *J Phy Fit Treatment & Sports.*1(2):1-3
- Pelegriani A, Silva DAS, Petroski EL, Glaner MF.2011. Health- related physical fitness in Brazilian schoolchildren: Data from the Brazil sport program. *Rev Bras Med Esporte.*17(2):92-96.
- Rajalaxmi V, Vijayalakshmi B, Shalini V, Motcharakkini L, tharani G. 2017.To Analyze the Physical Fitness of Female Physiotherapy Students and its Correlation with Depression and Anxiety. *Int J Cur Res Rev.* 9(20):19-23.
- West DJ and Gardner D.2001. Occupational injuries of physiotherapists in North and central Queensland. *Australian Journal of Physiotherapy.*47:179-186.

Conflict of Interest: None declared