Original Article

Health-related physical fitness in high school adolescents

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ABSTRACT

Background and Aim: Nowadays, sedentary lifestyle has been introduced as a major challenge to human health. Thus, exercise and physical activity, followed by physical fitness, have been emphasized as low cost methods. The aim of this study was to evaluate physical activity and physical fitness among adolescents. Method: This study was of descriptive-analytic type that evaluated the physical fitness of 550 high school students in Rasht city in the year 1395. The samples were selected by random and two-stage cluster sampling methods. Data gathering tool was Inventario individual and four health related fitness tests. Data analysis was done using descriptive statistics and logistic regression test with Backward LR method in SPSS-22 software. Results: Overall, the results revealed a moderate level of physical fitness among students. Girls had a higher mean score in terms of flexibility, BMI (body mass index) and cardiovascular fitness compared to boys. The type of school was the only variable able to predict students' physical fitness ($\beta = 0.333$) and ($p = 0.023$). Conclusion: Since most of the students had poor physical fitness, it is recommended to pay more attention to their sports and health program in schools.

Keywords: Physical Fitness, Student, Adolescent, Health.

Introduction

Among the factors influencing health, exercise, mobility and resulted physical fitness have been emphasized by everyone as a desirable approach [1]. Today, physical fitness factors are divided into two sections: health related fitness and mobility related fitness. Health-related physical fitness focuses on maintaining healthy living, including strength, muscular endurance, cardiovascular endurance, flexibility and body composition [2]. Based on this, one of the most scientifically valid methods for assessing the health is the assessment of body composition and physical fitness which is considered as a health factor and indicator of a healthy lifestyle to develop the national development standards for children and adolescents [3]. Relationship of low-mobility lifestyle and disorders such as cardiovascular disease, low coping ability with stress, depression, low productivity, and absence from the work environment has been indicated [1, 4]. Various diseases are often rooted in younger ages, as recent studies also indicated the relationship between the low level of physical fitness in adolescence and type 2 diabetes, cardiovascular disease and mortality in adults [5, 6]. At present, low mobility lifestyle is a major challenge to human health [7] and 9.1 million deaths per year occur worldwide due to lack of mobility [8]. Studies show low mobility of 40 percent of Iranians, especially between the ages of 15 and 24 [9]. Studies have shown the increasing trend of obesity and overweight during adolescence, especially in students, while adolescence is considered to be one of the most critical periods in human evolutionary life. Habits formed in this period determine the healthy lifestyle in adult ages, so changing lifestyle in this period is the most effective way of preventing diseases with a positive effect on metabolism, blood pressure, cardiovascular and nervous systems, and individuals with a high level of physical fitness are less exposed to diseases [5, 10, 11].

Access this article online	
Website: www.japer.in	**E-ISSN:** 2249-3379

How to cite this article: Samaneh Hosseini, Asieh Sedighi, Mitra Sedghi Sabet, Ehsan Kazem Nejad, Atefeh Ghanbari, Mino mitra Chehrzad. Health-related physical fitness in high school adolescents. J Adv Pharm Edu Res 2019;9(S2):156-160.
Source of Support: Nil, Conflict of Interest: None declared.

The onset of physical activity in adolescence by making healthy behaviors a habit will have more health benefits for the entire life period [12]. Physiological factors such as age, gender and genetic affect physical fitness [13]. This issue has been extensively investigated in European and North American societies, but in Iran its importance is not well understood [5]. Therefore, the importance of this issue on the one hand and limited information in city of Rasht on the other hand led the present study to the assess physical fitness in adolescents in Rasht to provide the necessary information for researchers to clarify the current situation and do necessary planning.

Method

This research was a descriptive-analytic study and research community consisted of all students of Rasht city. According to the size of the population, 550 students were selected randomly and clustered. The sample size according to Ramezan et al. [14] was estimated 550 with 95% level of confidence and the limit value less than 10%, using the formula below.

$$N0 = \left(\frac{\left(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta} \right)^2}{\left(\frac{1}{2} ln \frac{(1+r)}{(1-r)} \right)^2} + 3 \right)$$

The research environment in this study was all schools in Rasht city. The selection of schools was random and each selected school was assumed as a cluster. According to the number of classes in the selected schools, selection of the class was done also based on a two-stage clustered method among the individuals having the including criteria (high school level, lack of disorder or physical problem with regard to the health record at the school and the interest for participation), after coordination with the education department and obtaining permission to collect information. Referring to schools was preferably conducted in the students' leisure time, based on a schedule. Data collection was done by using personal information questionnaire (age, gender, number of family members, mother and father education level, mother and father's occupation, education level and type of school) and four health related fitness tests, including:

1. Harvard Three-Minute Step Test for Cardiovascular Function. (In this test there is a step with a height of 30 to 50 cm and is designed in accordance with the height of the students, and the student begins to go up and down 30 times per minute. Heart rate was recorded 1 to 1.5 minutes after the end of the test at the time of rest and the test score was calculated by entering the heart rate in the Harvard Short Term Step Formula.
2. Percentile of body mass index, which implies the body composition was measured by measuring height, weight, and age. To measure the weight of students, a digital scale was used and to measure the height of the students, the subject was asked to take off the shoes and stick the leg heels to the wall, while the trunk and head were straight and had a minimum cloth (uniform of the school) and stand next to the wall looking forward. Students' height was measured and recorded by measuring tape which one end was tangent to the bottom of the wall and the other end was tangent to the student's head and in the stretched position, with a precise of 1 cm. The body mass index was calculated by entering the height and weight numbers in BMI formula and the body mass index percentile was calculated by converting BMI to standard Z score.

- One-minute sits-up test for measuring muscle strength (the hands are placed crosswise on the chest and the number of the sits-ups that the student does in one minute is calculated).

Sit and reach flexibility test for measuring flexibility (the student sits on the mattress on the floor and sticks the palms to the flexible box and without bending the knees, moves the hands through 3 to 4 moves on the flexible box and the most stretch will be accounted).

After obtaining the scores of these tests, in order to calculate the overall scores of physical fitness tests, each of the scores measured by the formula was converted to a standard Z score (Z score is also known as standard deviation and shows how much a person has distance from the middle point of reference, and the percentiles actually reflect the same Z score) and to determine the overall fitness status, three levels of activity are defined as low, medium and high. Finally, the results were obtained according to SPSS software, descriptive statistics (mean and frequency, standard deviation, table) and backward LR regression test.

Results

The results showed that majority of the studied units were consisted of female students (56.5%) and the rest were male (43.5%). Data analysis showed that male and female students had middle physical fitness, so that 95.3% of students were in a middle level of physical fitness (only 3.1% of them showed high levels (Table 1). The findings showed that in the field of cardiovascular function, 87.5% of the students had poor cardiovascular fitness and only 12.5% of them showed average cardiovascular function, and none of the students were in the range of good cardiovascular function.

Table 1. frequency distribution of case studies according to overall physical fitness.

Overall physical fitness	Number(Percentage)
Low level activity Z < -1	9 (1.6)
Moderate level activity -1 < Z <+1	524 (95.3)
High level activity Z <+1	17 (3.1)
Total	550 (100)

About the body mass index of students, 16.2% of them had weight deficiency, 56.7% were in the normal range, 18% were

overweight and 9.1% of them were in obesity range based on BMI.

In the field of physical fitness endurance, 28.2% of the students were in the excellent range, 21.6% and 21.3% were in the range of very good and good, 15.3% were in the poor range and 13.6% were in the range of need for improve, respectively.

In terms of flexibility of students, the results showed that both females and males were good in this characteristic, so that only 1.6% of females and 1.8% of males showed weak flexibility. 21.6% of females and 13.3% of males were in the medium range, 28% of females and 18.9% of males were in good range, 4% of females and 9.1% of males were in excellent range and 0.5% of females and 0.4% of males were in a very excellent of flexibility.

In examining the physical fitness status by the gender as shown in (Table 2), the only field that males had higher mean scores than girls was muscular endurance. In the other fields, the mean scores were almost identical and there was a slight difference between boys and girls, which, according to this, girls had a higher mean scores in terms of flexibility, body mass index and cardiovascular fitness than boys.

Table 2. physical fitness status of students by gender and field

physical fitness	Gender	Number	Average (Standard deviation)
Flexibility	Female	311	3.45(1.39)
	Male	239	3.22(1.36)
Body mass index	Female	311	2.22(0.80)
	Male	239	2.16(0.82)
Cardiovascular fitness	Female	311	1.16(0.36)
	Male	239	1.07(0.27)
Endurance	Female	311	2.64(0.69)
	Male	239	2.83(0.83)

As shown in (Table 3), in predicting ability of physical fitness based on social-individual variables, only the type of school in terms of public or private could predict students' physical fitness ($P = 0.023$) and ($\beta = 0.323$). So that students in public schools had less chance of physical activity and students were more active in private schools.

Table 3. predicting ability of physical fitness students based on social-individual variables

Variable	Beta	P value	df	Standard deviation	Regression coefficient	At least	Maximum
State or Private school	0.323	0.023	1	0.496	-1.13	0.122	0.853
Fixed Number	0.063	0.000	1	0.344	-2.75	Trust distance 95% Relative Chance	

Discussion

The results showed that physical fitness of students was in the middle range and a small percentage of them had high level of activity. Comparing boys and girls, boys achieved better sores than girls only in muscle endurance. In justifying this, Wilford [1] and colleagues reported that high fat mass contributes to increased heart rate and blood pressure during exercise and reduced cardiac respiratory and muscular endurance. Since boys had more muscle mass and fewer fat mass than girls, it could be concluded higher muscular endurance in boys is justifiable [13]. In the study conducted by Ekblum et al on 1737 male and female students, it was shown that differences in sits-up (muscular endurance) among boys and girls were only in the age range of 13 to 16, and boys in this range had better performance than girls [14]. On the other hand, because cardiovascular endurance construct the basis of human health and other components of physical fitness are affected by this component, the design of aerobic exercises, in accordance with students' fitness status at exercise sessions, can improve this component and lead to the effect on other components of physical fitness and their general improvement [8].

The findings of this study were in the range of medium to good in terms of flexibility. So that girls had higher flexibility than boys. In this regard, studies conducted by Tofighi et al. on the effect of physical fitness factors of students aged 17-19 years showed that boys had better performance in cardiovascular fitness, muscular endurance and agility than girls, and the girls had a better flexibility performance. ($P < 0.005$). Also, a study by Ramezani et al. among students, showed that the average score of flexibility in boys was lower than that of girls [15]. In addition, studies on Brazilian children and adolescents showed that flexibility among girls varies with age [16]. The difference in flexibility between children, adolescents and adults varies according to age and gender and is influenced by factors such as genetic, culture and pathology [17]. This explaines changes in the flexibility levels in girls and boys. According to the results of this research and investigating the body mass index, 9.1% of students were obese, 18% of whom were overweight and 16.2% of them were underweight. This increased rate of obesity has also been reported globally, so that at present time, 1.2 billion people in the world are overweight and it is expected to reach 1.3 billion people in the world by 2020 [18]. These high percentages in underweight people on the one hand and obesity and overweight on the other requires the attention to exercise and physical activity, and subsequent physical fitness.

According to the results, none of the students were in the range of good cardiovascular fitness. In justifying these findings, it could be said that these results indicated a lack of mobility due to the lack of educational planning and spending the leisure time, inactively by students. On the other hand, the increasing advances in technology have reduced physical activity. Therefore, the important factor of health, mobility and physical activity, is severely limited, and students are far from cardiovascular fitness, and activity is restricted into small apartment buildings, which also has its own problems. Under such conditions, students who are not members of any sport clubs and whose parents do not pay attention to their exercise and mobility, practically are deprived from physical activity at this critical time of physical growth.

Additionally, in predicting physical fitness on the basis of individual-social variables, only the type of the school based on being public or private had the capability to predict physical fitness. So that students in the private schools were more physically active. This result may be attributed to spending more time on students in private schools and paying more attention to them, and also, it could be attributed to a better financial situation of the parents of these students who, by spending more on their children's sport activities, make them physically fit.

Therefore, it is suggested that, in order to strengthen students' physical fitness, detailed and comprehensive plans should be provided by the Ministry of Education, the Ministry of Sport and affiliated organizations to promote the knowledge, attitudes of adolescents and students, as well as sports and leisure programs in the leisure time of the students, who consist a large proportion of adolescents, to push these future generation into sport and physical activity, reduce illness and increase the health of the community, and increase their productivity and ability to work in adult age.

One of the most important limitations of this study was unrecognizable physical and mental disorder of the subjects at the time of completing the questionnaire, which was not identifiable by the researcher and may have affected the way subjects responded.

Conclusion:

In the present study, the results showed that the level of physical fitness in students was not enough, so in this regard, educating students about the importance and the way of performing sport activities in improving physical fitness and personal health is very effective.

Acknowledgments:

This article is extracted from the master's thesis approved by Guilan University of Medical Sciences with the code of ethics 95032518. In this way, the researchers appreciate the Vice-Chancellor of Research and Technology of Guilan University of Medical Sciences, Research Center of Social Factors Affecting Health, as well as the officials of the Ministry of Education in Rasht for coordinating with the schools and all the students who participated in this study.

References

1. ElahiT, AshtianiA, Biegdeli E. The Relationship between Physical Fitness and Mental Health -in a Military Medicin. 2012; 14(3):192-199. (Full text in Persian).
2. Huang, Y; Malina, R.2002." Physical Activity and Health-Related Physical Fitness in Taiwanese Adolescents". Journal of Physiological Anthropology and Applied Human Science, 21, 1:11-19.
3. Hosseini A, Safari M, Hamedinia M. Drnvjvananpsr health-related physical fitness Sabzevaree. Journal of Sabzevar University of Medical Sciences. 2010; 18(1):55-66. (Full text in Persian)
4. Anokye, N.w; Truman, P; Green, C; Pavey, T.G; Tylor, R.S.2012. "Physical Activity and Health Related quality of life". BMC public health, 12,624:2-8.
5. Ernst, M; Pine, D.S; Hardin, M.2006." Triadic model of the neurobiology of motivated behavior in adolescence". NIH Public Access, 36, 3:299-312.
6. Pate, R.R; Wang, C; Dowda, M; Farrell, S.W; O'Neill, J.R.2006." Cardiorespiratory fitness levels among us youth 12 to 19 years of age: Findings from the 1999-2002 national health and nutrition examination survey". Archives of Pediatrics & Adolescent Medicine, 160,10:1005-10125.
7. Hojabrnia, Z; Hasrani, S.S; Hozhabrnia, A.2015. "Examining the Relationship Between Physical Fitness, Emotional Intelligence and Health Related Quality of Life Female University Student in India". magnt research report, 3,6:1-15.
8. Kashef M, NazarianMadovani A. Evaluation and providing physical fitness norms of shahidrejaee Teacher Training university students. journal of Physical Education. 2013; 2(1):29-38. (Full text in Persian).
9. Kyrolainen H, Hakkinen K, Kautiainen H, s. Santtila M, Pihlainen K, HakkinenA. Physical fitness, BMI and Sickness absence in male military. Personal occupational medicine.2008; 58:251-256.
10. Naghibi F, Golamkani N, Esmaili H, Moharrari F. The relationship between lifestyle and health-related quality of life in adolescent girls in the city of Mashhad in the 91- 92 school year. Journal of Obstetrics and Gynecology and Infertility. 2013; 16(61):9-19. (Full text in Persian).
11. Jonathan, D; Wilson, K.M.2002." Delivering quality care: adolescents' discussion of health risks with their providers". Journal of Adolescent Health, 30, 3:190-195.
12. Khanian H, Hosseini M, Ataashzadeh F, Chaibakhsh S. Sports understanding of adolescent girls in Tehran 1391 - 92 Based on stages of change model year. Journal of Nursing and Midwifery Journal martyr Beheshti. 2013; 24(85): 11-20.
13. Tophighi A, Tartibian B, Toloeiazar j. The effect of gender on body composition and physical fitness factors of 17 to 19-year-old students using the FFMI-FMI regression model. Urmia Medical Journal.2012 23(4): 381-387. (Full text in Persian).
14. Orjan E, Kristjan O, Bjorn E. Physical performanceand body mass index in Swedish children and adolescents. Scandinavian Journal of Nutrition.2005; 49(4):172-179.
15. Ramezan A, Nazarian A. Relationship between students Emotional Intelligence, Fitness and Life Quality. Journal of Applied Research of sport management. 2013; 2(2):85-98. (Full text in Persian)
16. Kyröläinen H, Häkkinen K, Kautiainen H, Santtila M, Pihlainen K, Häkkinen A. Physical fitness, BMI and Sickness absence in male military Personal. Occup Med

(Lond). 2008 Jun; 58(4):251-6. doi: 10.1093/occmed/kqn010. Epub 2008 Feb 22.

17. Bize R, Johnson JA, Plotnikoff RC. Physical activity level and health-related quality of life in the general adult population: a systematic review. Prev Med. 2007 Dec; 45(6):401-15. Epub 2007 Jul 21.
18. Moradi M, Shariat F, Mirzaian K. The effect of education on the prevention of obesity and weight management knowledge areas referred to health centers in Tehran. Journal of health promotion, health education.2013; 1(1):33-40. (Full text in Persian).