

## A Survey of the Physical Fitness Levels of Shiraz University of Medical Sciences Students from 1994 to 2011

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**Abstract:** *Despite the frequent advertisements and recommendations on doing physical activities, unfortunately the prevalence of doing physical activity among the youth has not improved much. Regarding the possibility of the changes in the level of physical fitness during the time (due to the changes in social behavior, food habits, paying attention to exercise and so on), the current study aimed to investigate the level of physical fitness of the university students over a period of 18 years, from 1994 to 2011. According to the results, the endurance of the abdominal muscles (measured through sit-up test) and the agility factor in the male and female students has statistically changed from 1994 to 2011 ( $p < 0.001$ ). The explosion power of the lower limb muscles (measured through jumping with both feet test) in males. Appropriate planning on improving the level of physical activities of the university students is recommended to be noticed by the authorities to have healthy experts and specialists in different fields of medicine. That's why it is emphasized that "a sound mind is in a sound body".*

**Keywords:** *exercise, physical fitness, youth, university students*

### Introduction:

According to the WHO report, 109 million deaths occur all over the world due to the lack of physical activity<sup>1</sup>. Based on the report of the American Heart Association, lack of physical activity is one of the top five causes of death in the world<sup>2</sup>. About 3.2 million deaths and 32.1 million DALYs (Disability Adjusted Life Years) annually can be attributed to insufficient physical activity<sup>3</sup>. Despite the frequent advertisements and recommendations on doing physical activities, unfortunately the prevalence of doing physical activity among the youth has not improved much; from 1999 to 2003 it was changed from 30.5% to 33.4%<sup>4</sup>. According to a study in America, 20% to 50% of adults do not exercise at all<sup>4</sup>. Based on the report of the American Centers for Disease Control and Prevention in 2003, the lack of physical activity is more prevalent among women, ethnic minorities, and low-income families<sup>5</sup>. Another study in United

Stated showed that the level of physical activity decreased from 2001 to 2009. In the study above, the level of physical activity in females was lower than that in males<sup>6</sup>. In a survey among twenty countries, the lack of physical activity varied from 7% to 41% in males to 6% to 49% in females. Lack of physical activity is one of the most important factors in developing chronic diseases and cancer.

Physical fitness is defined as having a high physical ability in a way that one is able to do daily activities without feeling tired. In the specialists' point of view, physical activity is defined as ability to accomplish daily activities without getting too much tired, to have enough energy to do recreational activities in leisure time and encountering with unexpected events in general, and doing exercise in an effective and successful way<sup>9</sup>.

Physical activities include all behaviors that lead to consumption of energy<sup>10</sup>. They are divided into mechanical activities (such as isometric, isotonic, static and dynamic) and metabolic activities (aerobic and non-aerobic)<sup>11</sup>. Muscular power, flexibility and physical endurance are the physiological features of the body in relation to physical fitness and health<sup>12</sup>. An investigation on the university students in 2000 showed that about one-third to two-thirds of the students are physically inactive<sup>13</sup>. Also, the physical activity level is reducing among the university students in the United States<sup>14</sup>. A survey on the level of physical activity of the Iranian university students in 2000 also demonstrated their poor performance in the endurance of shoulder girdle muscles (horizontal bar test) and the speed and agility tests (zig zag run)<sup>15</sup>.

The related studies conducted in Iran were mostly cross-sectional, investigating only a few participants. Regarding the possibility of the changes in the level of physical fitness during the time (due to the changes in social behavior, food habits, paying attention to exercise and so on), the current study aimed to investigate the level of physical fitness of the university students over a period of 18 years, from 1994 to 2011.

### **Method:**

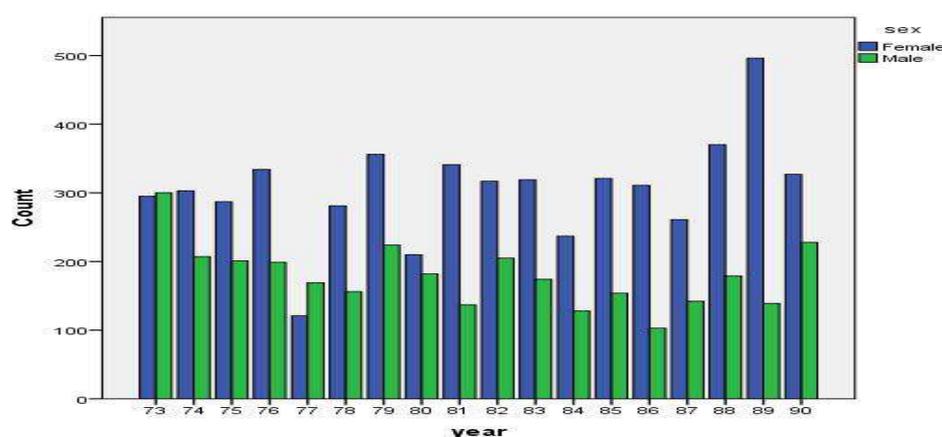
In this longitudinal study, the performance of all the students of Shiraz University of Medical Sciences was investigated in some aspects of physical fitness over 18 years, from 1994 to 2011. The abdominal muscles endurance in male and female students was measured by sit-up test. In this test, the number of successful sit-ups within one minute was recorded for each student. The amounts of speed and agility of the students were measured through 4\*15-meter run and the required durations for completing this task were recorded for different participants. Non-aerobic power in female students was investigated by using zig zag test (the number of correct zig zag jumps by each student in one minute). Also, the explosion power of the lower limb muscles in male students was estimated through jumping with both feet.

All the students who had selected the physical exercise course I (physical fitness) in each year were investigated in this study and ones who were not able to do physical exercises due to medical problems were excluded from the study.

The normal distribution of the continuous quantitative variables was checked by Kolmogorov-Smirnov Statistical Test. If the data were normally distributed, they were shown in means and standard deviations and for comparing the means, parametric tests such as t-test and ANOVA were used. If the data were not normally distributed, they were shown in median and interquartile range (IQR) and non-parametric tests such as Mann-Whitney u-test and Kruskal-Wallis test were used for comparing different groups. A p value of less than 0.05 was considered as statistically significant.

### Findings:

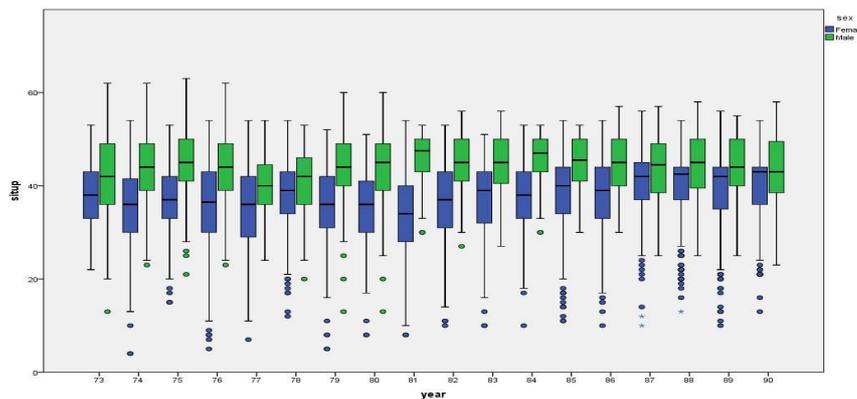
Over a period of 18 years from 1994 to 2011, a total of 8714 students from Shiraz University of Medical Sciences were studied, while 5487 (63%) of them were female and 3227 (37%) were male students. Frequency of the female and male students under the study is shown in Chart 1.



**Chart 1. The number of the students under the study during 1994 to 2011 according to gender**

The distributions of the variables such as sit-up, 4\*15-meter run, zig zag test and jumping with both feet were not normal. The endurance of the abdominal muscles (measured through sit-up test) in the students has statistically changed from 1994 to 2011 ( $p < 0.001$ ). The total median of the sit-ups in one minute was 41 (35 and 45) in the students. The lowest sit-up median was 37 (31 and 44) in 2002 and highest one was 43 in 2006, 2009, 2010 and 2011. It seems that the endurance of the abdominal muscles is improved during the last three years of the study in a way

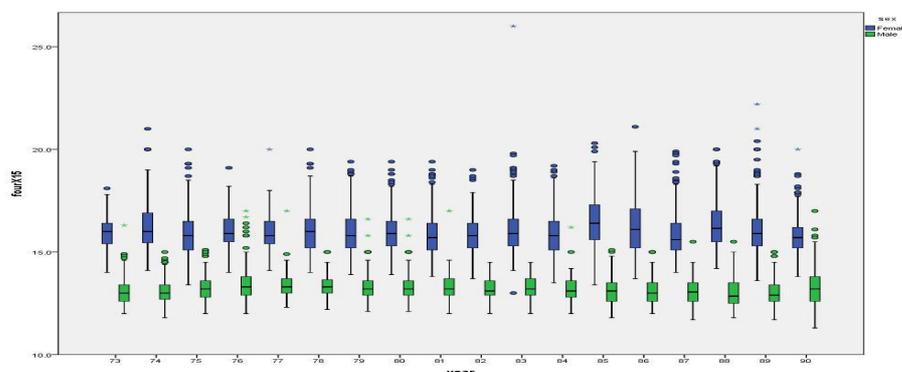
that in the male students, the differences were statistically significant during the study period. The total median of the male students was totally 44 (39 and 50) sit-ups per minute. The lowest sit-ups median was 40 (36 and 45) in 1998 and the highest median was 47.5 (43 and 50) in 2002. The obtained values are distributed around the median without any specific order (Chart 2).



**Chart 2. The plot box of the sit-ups during 1994 to 2011 according to gender**

The endurance of the abdominal muscles in female students was also statistically different during the years of the study ( $p < 0.001$ ). The total median of the sit-ups in the females was 39 (33 and 43). It means that the median of the sit-ups in females was equivalent to its 25<sup>th</sup> percentile in males. The endurance of the abdominal muscles in the female students was significantly lower than that in males ( $p < 0.001$ ). The lowest median of the sit-ups in females was 34 (36 and 44) in 2002 and the highest one was 43 (36 and 44) in 2011. It seems that the endurance of the abdominal muscles in female students was improving in the last seven years of the study (Chart 2).

The agility factor (4\*15-meter run) was statistically different considering all the students during the years of the study. The total median was 15.2 seconds (13.4 and 16.2). The lowest median was 14 (13.3 and 15.6) in 1998 and the highest median was 15.7 (13.6 and 16.9) in 2006. It seems that the obtained values were changing around the median without any specific order (Chart 3).

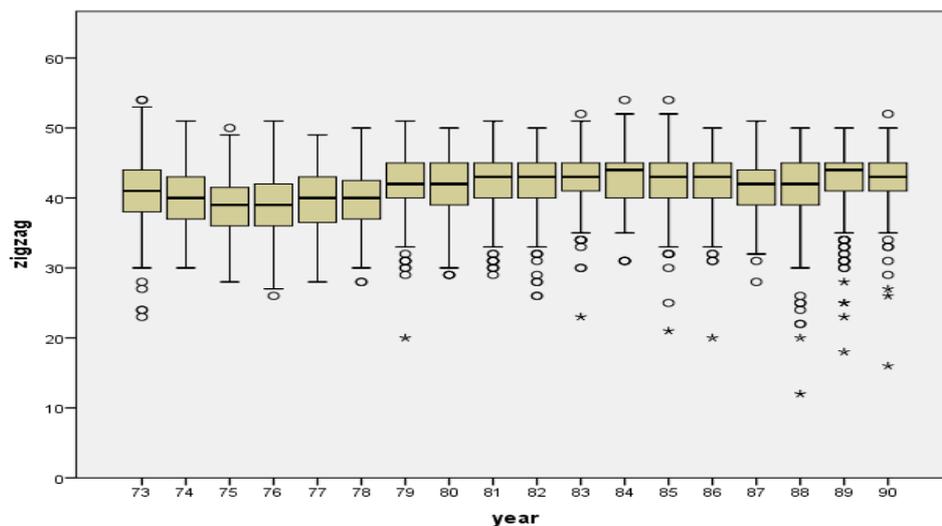


**Chart 3. The plot box of the measured times in 4\*15-meter run during 1994 to 2011 according to gender**

The agility factor (4\*15-meter run) in male students was also statistically different during the years of the study ( $p < 0.001$ ). The total median in the male students was 13.1 seconds (12.7 and 13.6). The lowest median in male students was 12.9 (12.5 and 13.5) in 2009 and the highest median was 13.3 in 1997 to 1999 (Chart 3). The obtained values were again changing around the median without any specific order.

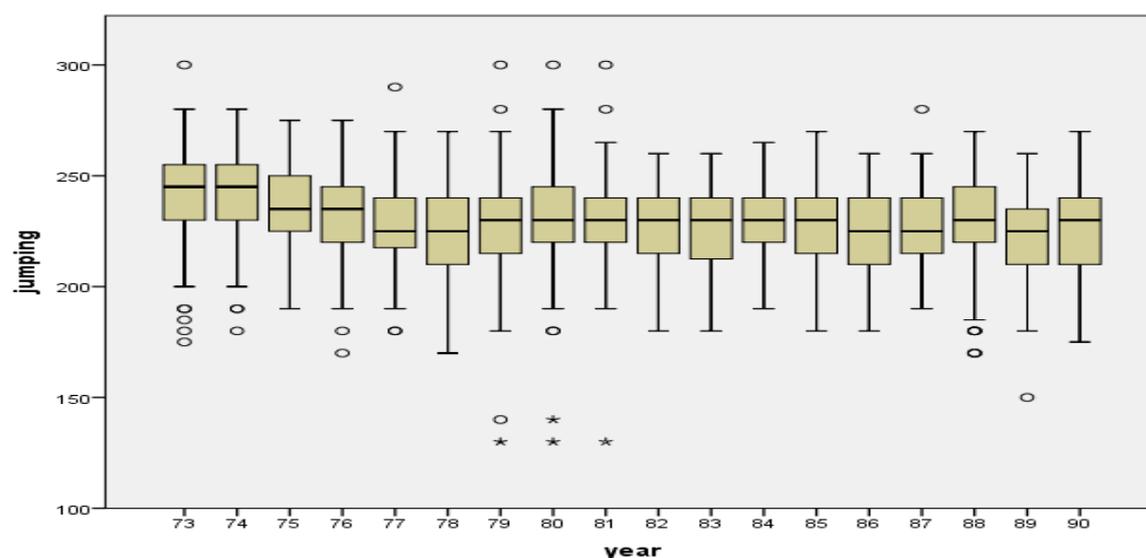
The agility factor (4\*15-meter run) in female students was also statistically different during the years of the study. The total median in female students was 15.9 seconds (15.3 and 16.6). The lowest median was 15.6 seconds (15.1 and 16.4) in 2008 and the highest one was 16.4 seconds (15.6 and 17.3). The obtained times in female group was statistically higher than that in male group.

The amount of muscular power (based on zig zag test) in female students was statistically different during the years of the study ( $p < 0.001$ ) (Chart 4). The total median was 42 zig zags (39 and 45) per minute. The lowest median was 39 zig zags per minute in 1996 and 1997 and the highest median was 44 zig zags per minute in 2005 and 2010. The obtained values were changing around the median without any specific order.



**Chart 4. The box plot of the zig zags per minute in female students during 1994 to 2011**

The explosion power of the lower limb muscles (measured through jumping with both feet test) in male students was also statistically different during the years of the study ( $p < 0.001$ ) (Chart 5). The total median of the jumps was 230 cm (220 and 245). The lowest median was 230 cm in 1998 and 1999 and the highest one was 245 cm in 1994 and 1995. After that time, the trend of the lengths of the jump was ascending but the median never exceeded 230 cm.



**Chart 5. The box plot of the length of jumps with both feet (cm) in male students during 1994 to 2011**

### Discussion:

From 1994 to 2011, the endurance of the abdominal muscles in male and female students of Shiraz University of Medical Sciences varied from about 45 sit-ups per minute for the male to 40 sit-ups per minute for the female students. It seems that the endurance of the muscles was improved in the last three years of the study for the male and in the last seven years of the study for the female students.

The number of the sit-ups in the female group was lower than that in males; this is similar to a study in Sweden<sup>16</sup>. The number of the sit-ups in three quarters of the males was higher than that in half of the females<sup>17</sup>. It shows the higher endurance of the abdominal muscles of the male students in doing physical exercises that is most probably because of the higher muscle mass in the males' body, which is influenced by the effect of the male hormones such as androgen on the shape and the strength of the muscles.

The amount of agility in male and female students was slightly changed during 1994 to 2011<sup>18</sup>. The median of the 4\*15-meter run varied between 12.9 to 13.3 seconds in the male students, while it was between 15.6 to 16.4 seconds in females. About three-seconds difference between males and females was because of the higher muscle mass in males. However, despite the recent changes in lifestyles and diets, the relative consistency of the obtained values in each group suggests that agility is most probably an inherent characteristic in human beings and it is

related to the physical characteristics of individuals. This should be followed and confirmed in future research.

Measuring the non-aerobic power in female students through zig zag test also shows the same result. The median of the zig zags was between 39 to 44 zig zags per minute during the years of the study.

The explosive power of the lower limb in the male students was decreased by the time passed. The median of the jump length was 245 cm in 1994 and 1995. This amount decreased to the lowest in 1998 and 1999 (230 cm). After that time, the general trend was ascending but it never exceeded 230 cm.

Due to the sociological changes in lifestyles and easier lives in recent decades, the amount of physical activity decreased. It seems that the university students have less active lives than before. The most probable reasons of this lack of physical activity are increase in the amount of the courses and focus of instructors on the theoretical lessons instead of doing some activities that include physical activities. Spending lots of hours in libraries and conference halls provokes this lack of activity. Considering the fact that most of the participants of this study were freshmen, it is obvious that by increasing the amount of lessons in future, the students will suffer more from the lack of physical activity. It highlights the importance of finding some solutions for this problem as soon as possible.

The positive point of this study is that it was longitudinal and it investigated more than 8700 university students. However, the limitation of the study is that some important variables such as the heights and weights of the students were not measured.

Medical and paramedical jobs are considered the hardest professions in the world. These groups are trained to promote the health of the society and they should be healthy and powerful. Therefore, it is emphasized that they should improve their knowledge and their physical health should also be taken into account. Appropriate planning on improving the level of physical activities of the university students should be noticed by the authorities to have healthy experts and specialists in different fields of medicine. That's why it is emphasized that "a sound mind is in a sound body".

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