

Comparison of Physical Fitness among Smoker and Non-Smoker Men

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Abstract

Background: It is well documented that cigarette smoking has negative impacts on body health, as well as social health, economy, culture, etc. Nowadays, there is a large body of evidence that smoking is the cause of numerous life-threatening diseases like cardiovascular and pulmonary diseases along with different kinds of cancer. The aim of this study was to compare the physical fitness of smokers and non smokers.

Methods: This cross-sectional study was conducted on 64 non-sportsmen (34 non-smokers and 30 smokers) aging 19–27 years. Both groups were matched for age, weight, height and body mass index (BMI). The smokers used cigarettes at least 5 cigarettes a day for 2 years. None of them had a musculoskeletal disease. We used a questionnaire and physical fitness tests for data gathering. The tests were used to measure muscle strength, endurance, speed, agility and flexibility in both groups.

Findings: The muscle strength was significantly different in smokers and non-smokers ($P = 0.012$). Moreover, smokers had less agility ($P = 0.004$) and speed ($P = 0.008$) than non-smokers. However, although smokers were weaker than non-smokers, the differences in muscle endurance ($P = 0.066$) and flexibility ($P = 0.095$) were not the statistically significant.

Conclusion: According to these results, the smokers were less powerful than nonsmokers. In addition, physical activity skills in young smokers were decreased. Therefore, smoking will cause a gradual loss of physical strength and active personal and social power.

Keywords: Tobacco, Physical fitness, Muscle.

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Introduction

The health hazards of tobacco use are well-documented. Despite this knowledge and the warnings given in the media and press, the number of smokers is escalating day by day. The population of smokers is estimated to be about one billion and one hundred million people worldwide; two-thirds of which live in developing countries. According to Iran's Ministry of Health, there are over one million smokers in the country. They consume 50 billion cigarettes every year. Increasing cigarette consumption, particularly among young people, has become a major problem in our society. Moreover, it is predicted that in the next 20 years, 7 out of every 10 people who die of smoking-related diseases would be from the low- or middle-income countries around the world.¹

It is generally considered that the use of tobacco affects the cardiovascular system, the lung, mouth, teeth, etc. It would finally lead to diseases such as cancer as well as increased mortality.² But the impact of smoking on the muscles and skeletal system, as another aspect of the smoking, is less considered. A review of the prevalence of musculoskeletal and muscular pain among the smokers showed that the muscles of the body are also threatened by smoking due to the mechanism of muscle contraction activities.³⁻⁷ The slow effect of smoking on skeletal muscle system results in lack of attention to the problem. Most families have a negligible view on the recreational use of tobacco by young people. According to the above mentioned subjects, this study is going to investigate the disadvantages of smoking among young people's motion activities in the community. It also reviews the muscular function in different groups of people, those who have a younger body and less duration of smoking. Finally, the research intends to study the physical activity skills in young smokers comparing to non-smokers.

Methods

This study was conducted on 64 male students aging 19 to 27 years in Shiraz University of Medical Sciences (34 non-smokers and 30 smokers), Iran. The subjects were selected by simple sampling and were matched for age, height, weight, and obesity index. The smokers had a history of consuming at least 5 cigarettes a day for at least 2 years. All samples were free of

diseases affecting the nervous and muscular systems and did not practice any sports. Data collection was done through a questionnaire and physical standardized tests in order to measure strength, endurance, speed, agility and flexibility of muscles. The questionnaire contained information regarding age, height, weight, duration of cigarette smoking and the number of cigarettes used per day. The physical examinations were conducted as follows:

A) Curl-up and sit-up tests to assess abdominal muscle strength: In this examination the person lay on his back so that the distance from the heel to hip is about 30 cm. The knees were bent at 90 degrees while the feet were on the ground and the hands were placed constantly behind the ears. The subject's legs were held by the examiner while the subject did the curl-up and sit-up tests bringing the elbows to the knees for one minute. The correct actions were recorded.^{8,9}

B) Pull-up test to measure the strength of the shoulder belt muscles: The case took the bar with both hands and ready for flying while opening the hands up to the shoulder width with his body completely flat and motionless. The legs were not in contact with the ground. He had to try to bring the chin to the bar by using his hands and then return to the first state. The numbers of repeated movements were considered as points.^{8,9}

C) Jumping to assess the strength of lower limb muscles: The case had to stand behind the start line with his legs separated to the shoulder width. His legs were slightly bent at the knee joints and the hands performed a motion of sweeping. Then he did a long jump and after landing, the closest point of the body to the jumping start line was measured. The case could jump up to three times and the best jump was recorded.^{8,9}

D) Forty five- meter running for measuring the speed: In this test, the time the case spent for running a distance of 45 meters was considered recorded.^{8,9}

E) Running 9 meters for four times to measure agility: The subject stood behind the start line with two pieces of wood being placed in 9 meters away from him. Then he began running

with a sign, picked up one piece of wood, returned to the start line, put the piece of wood behind the line, ran again, took the second piece, and passed the start line quickly. The time of the whole process was recorded.^{8,9}

F) Using a flexible ruler to measure the flexibility: The subject sat on the ground with straight legs. He performed the motion of tests for 2 times and moved his hands toward the toes as much as possible and kept himself in this position for a few seconds. The relevant point in the third time was recorded by the flexible ruler.^{8,9}

Statistical analysis: Analysis of means was performed using SPSS₁₆, Wilcoxon and Mann-Whitney statistical tests were used for data analysis ($\alpha < 0.05$).

Results

The mean age of smokers (21.44 ± 1.47 years) was not significantly different from non-smokers (22.36 ± 1.54 years). The smokers had the habit of smoking for 2 to 6 years (3.45 ± 1.15 years) and consumed 5 to 20 cigarettes per day (mean: 11.6 ± 2.34). The mean weight was 66.11 ± 4.13 kg in non-smokers and 66.13 ± 4.19 kg in smokers ($P > 0.05$). The mean height of smokers and non-smokers were 175.93 ± 2.37 and 175.76 ± 2.38 cm, respectively ($P > 0.05$).

The average numbers of times that non-smokers and smokers could go over the bar were statistically different (6.17 ± 3.04 vs. 3.76 ± 2.95 times, $P = 0.012$). Likewise, a significant difference was seen in jumping results the smokers (206.56 ± 4.99 cm) and non-smokers (216.70 ± 4.19 cm) achieved ($P = 0.004$). However, no significant difference was observed in abdominal muscle endurance in the two groups of smokers and non-smokers (35.73 ± 4.67 vs. 39.38 ± 5.16 times of correct actions, $P = 0.066$).

The average times smokers and non-smokers ran the distance of 45 meters were significantly different (6.74 ± 0.54 vs. 6.37 ± 0.53 seconds, $P = 0.008$). In addition, the results of the agility test were also different among smokers and non-smokers (10.04 ± 0.58 vs. 9.62 ± 0.59 seconds, $P = 0.006$). The flexibility of smokers and nonsmokers were not significantly different (28.43 ± 3.58 vs. 31.88 ± 2.24 cm, $P = 0.095$).

Discussion

Muscle strength measurement in the shoulder belt and the lower limb showed a significant difference between smokers and non-smokers, i.e. the smokers were less powerful than the non-smokers. The results of the present study were similar to the some other researches; Orlander et al. studied the vastus lateralis muscle in smokers and non-smokers and reported that the isometric and dynamic strength of smokers were lower than non-smokers.¹⁰ Al-Obaidi et al. also investigated the isometric strength of lumbar extensor muscles in smokers and non-smokers with or without back pain and suggested that healthy non-smokers with back pain had more muscle strength than the their counterparts in the smokers group.¹¹ In a study on physical fitness parameters, Fukuba et al. came to the conclusion that cigarette smoking reduced the aerobic and non-aerobic power.¹²

Fukuba et al.¹² and Gorecka and Czernicka-Cierpisz¹³ reported that the perseverance of smokers was lower than the non-smokers.¹³ However, in the present study, although the muscle endurance in the smokers was lower than the non-smokers, the difference was not statistically significant which may be due to the lower age and duration of smoking in the study population. Therefore, another study on older smokers with longer time of cigarette smoking is suggested.

In the study of muscle flexibility among the smokers and non-smokers, it was observed that the smokers had more muscular flexibility than the non-smokers but the difference was not statistically significant. On the contrary, Kumar et al. studied reported the flexibility of smoker athletes to be more than non-smoker ones.¹⁴ The inconsistency of the results may be due to the fact that we studied healthy individuals who were not engaged in sports while Kumar et al. studied the flexibility in two groups of athletes.

Similar to Orlander et al.,¹⁰ Fukuba et al.,¹² and Gorecka and Czernicka-Cierpisz,¹³ in the present study, the agility and speed of smokers were significantly less than non-smokers. However, Weisman et al. studied military women and came to this conclusion that mild and light smoking had no effects on aerobic and non-aerobic capacity, as well as upper and lower limbs speed and agility.¹⁵ It seems that the smoking rate, duration of smoking and

individuals' physical activities can affect the contractions of the muscle systems (aerobic and non-aerobic) in different ways. Therefore, further research in this field is necessary to investigate the effects of smoking on different systems of muscle contractions and the use of devices such as electromyography (EMG) to more accurately determine the results.

Based on the results obtained from this study, it can be concluded that body muscles are among the organs that could be threatened by smoking. The damage will cause the gradual loss of physical strength and reduction of active personal

and social power which in turn result in wasting useful hours of daily work and damaging the economy of the society.

Conflict of interest: The Authors have no conflict of interest.

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مقایسه آمادگی جسمانی - حرکتی مردان سیگاری و غیر سیگاری

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چکیده

مقدمه: بی‌شک استعمال سیگار یکی از معضلات مهم جامعه امروزی است که پیامدهای شوم غیر بهداشتی اقتصادی-اجتماعی و فرهنگی را با خود به همراه دارد. اکنون این حقیقت بر مجامع علمی ثابت شده است که سیگار عامل بسیاری از امراض خطرناک قلبی-عروقی، ریوی، سرطان‌ها و ... می‌باشد. هدف این تحقیق، مقایسه آمادگی جسمانی و حرکتی مردان سیگاری و غیر سیگاری بود.

روش‌ها: این تحقیق بر روی ۶۴ مرد جوان ۱۹-۲۷ ساله (۳۴ فرد غیر سیگاری و ۳۰ فرد سیگاری) انجام شد. نمونه‌ها به روش نمونه‌گیری ساده انتخاب شدند و از نظر سن، قد، وزن و شاخص فربهی همخوانی داشتند. افراد سیگاری حداقل به مدت ۲ سال و روزانه ۵ نخ سیگار مصرف می‌کردند. کلیه نمونه‌ها فاقد بیماری مؤثر بر سیستم عصبی-عضلانی بودند و به ورزش اشتغال نداشتند. روش جمع‌آوری اطلاعات از طریق پرسش‌نامه و انجام آزمون‌های اندازه‌گیری قدرت، استقامت، سرعت، چابکی و انعطاف پذیری عضلانی بود.

یافته‌ها: در مقایسه قدرت عضلانی افراد سیگاری و غیر سیگاری اختلاف معنی‌داری مشاهده شد ($P = 0/012$). همچنین افراد سیگاری نسبت به افراد غیر سیگاری دارای چابکی کمتری بودند ($P = 0/004$) و سرعت کمتری داشتند ($P = 0/008$)، ولی در آزمون‌های استقامت عضلانی ($P = 0/066$) و انعطاف پذیری ($P = 0/095$) با وجود این که افراد سیگاری دارای آمادگی پایین‌تری بودند، از نظر آماری اختلاف معنی‌داری به دست نیامد.

نتیجه‌گیری: یکی از ارگان‌های مورد تهدید از جانب سیگار عضلات می‌باشد. سیگار به مرور زمان موجب تحلیل رفتن قوای جسمانی- حرکتی فرد و در نتیجه کاهش فعالیت او می‌گردد.

واژگان کلیدی: تنباکو، آمادگی جسمانی- حرکتی، ماهیچه.

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