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EFFECTS OF SMOKING ON LUNG FUNCTIONS AND RESPIRATORY MUSCLE STRENGTH AT YOUNG AGE

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Abstract:

Introduction and objectives: *Despite being aware of its harmful and hazardous effects, many young adults begin experimenting with cigarettes at a very early age and then adopt it as a regular habit. The basic objective of our study is to analyze the effects of smoking on lung functions and respiratory muscle strength at young age.* ***Methodology of the study:*** *This cross-sectional study was conducted at Nishtar Hospital, Multan during July 2019 to February 2020. Youth male subjects aged 12 to 18 years participated in this cross-sectional study. Socio-demographic values and medical history of the selected patients were recorded clearly. Prior to participation in this study, each subject signed an informed consent form to comply with the ethical guidelines.* ***Results:*** *Most subjects started cigarette smoking between the ages of 15 to 18 years. The most common duration of cigarette smoking was 1–3 years. Three major parameters, chest expansion, lung function using spirometry, and respiratory muscle strength, were compared and these all are high in smokers.* ***Conclusion:*** *It is concluded that most of the people started smoking in young age due to environmental and social factors. It is also observed that chest expansion is greater in smokers as compared to non-smokers and smokers suffer ore from respiratory diseases as compared to non-smokers.*

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INTRODUCTION:

In the present era, cigarette smoking is a major but preventable cause of death. Despite being aware of its harmful and hazardous effects, many young adults begin experimenting with cigarettes at a very early age and then adopt it as a regular habit[1]. Cigarette smoking is an important worldwide health problem, and it has been reported that 1.7 million Thai youths currently smoke. This problem is compounded by the fact that the rate of cigarette smoking in young people continues to steadily increase. Cigarette smoking carries major health risks with the most cause-specific mortalities being those of respiratory and cardiovascular diseases. Therefore, smoking habits may affect the respiratory function of youths[2].

Earlier reports have indicated that in young adults, relatively small amounts of cigarette smoke can cause deficit in lung functions[3]. Smoking 15 cigarettes per day in males has been associated with 4% decline in forced mid expiratory flow as compared to those who never smoked. Since inhaling cigarette smoke has been shown to produce acute changes in the lung including alterations in resistance to airflow, cough, and irritation of the airway, the early stage of smoking might affect the respiratory function of youths[4]. However, there have been few studies which have investigated the effect of smoking on pulmonary function in adolescents. In previous studies, cigarette smoking was found to have an effect on the lung function of the adolescent boys and girls[13, 14]. Those studies found that FEV_1/FVC decreased in adolescent smokers of both sexes. Only the pulmonary function test with a spirometer was measured in those studies[5]. Therefore, to clarify the effect of smoking on the respiratory function of smoking and non-smoking youths, we measured and compared their chest expansion, the lung function test using a spirometer, and respiratory muscle strength to learn more about the dangers of cigarette smoking[6].

Objectives of the study

The basic objective of our study is to analyze the effects of smoking on lung function, and respiratory muscle strength at young age.

METHODOLOGY OF THE STUDY:

This cross-sectional study was conducted at Nishtar Hospital, Multan during July 2019 to February 2020. Youth male subjects aged 12 to 18 years participated in this cross-sectional study. Socio-demographic values and medical history of the selected patients were recorded clearly. Prior to participation in this study, each subject signed an informed consent form to comply with the ethical guidelines. The information on smoking habits was obtained through interviews. Subjects who currently smoked cigarettes were classified as smokers and those without a history of smoking cigarettes were classified as non-smokers.

Respiratory function test

The respiratory function test consisted of the measurement of chest expansion, the lung function test using spirometry, and respiratory muscle strength. For chest expansion measurements of circumference and diameter, subjects were instructed to fully inhale and exhale in the standing position.

Statistical analysis

The data of respiratory function were compared between the smoker and non-smoker groups using the independent t-test for normally distributed data or the Mann-Whitney U test for other distributions. Differences were considered statistically significant at $p<0.05$.

RESULTS:

Most subjects started cigarette smoking between the ages of 15 to 18 years. The most common duration of cigarette smoking was 1–3 years and the maximal number of cigarettes smoked per day was less than or equal to 10 cigarette per day. Three major parameters, chest expansion, lung function using spirometry, and respiratory muscle strength, were compared. The chest expansion of the non-smoker group was significantly greater than that of the smoker group. There were significant differences in the chest circumference at the axilla level.

Table 01: Respiratory function analysis of smokers and non-smokers

	Non-smokers (Mean±SD)	Smokers (Mean±SD)
Chest expansion		
Chest circumference		
• Axilla (cm)*	5.71±1.62	4.68±2.03
• Xiphoid process (cm)	5.32±1.68	5.18±2.22
• 10th Costal cartilage (cm)	4.66±1.19	4.24±2.03
Chest diameter		
• AP (cm)*	3.56±0.61	3.06±0.69
• ML (cm)*	3.51±0.44	3.18±0.85
Spirometry		
• FEV_1 (litre)	2.96±0.62	2.68±0.62
• FVC (litre)*	3.07±0.68	2.68±0.62
Respiratory muscle strength		
• MIP (cmH_2O)	77.71±25.78	66.85±22.52
• MEP (cmH_2O)*	76.35±21.61	62.53±15.85

DISCUSSION:

Comparing this study's observations with some of the others which have found that whereas older symptomatic adult smokers with histories of large numbers of pack years may have lower FVC levels than non-smokers, young adult smokers have FVC levels equivalent to or higher than age equivalent non-smokers[7]. It is possible that at the time they started smoking and then with the subsequent growth maturation years, particularly in the very early twenties, they had developed somewhat larger lungs and thus experienced no discomfort on smoking which led to their smoking on regular basis[8]. In this study also, greater FVC values and the development of greater height in the smokers fortifies the above observation made by these studies. This study also reports that the young adults with subsequent growth maturation developed greater inspiratory and expiratory muscle strength, however with the growth in age this study showed no significant difference when compared with the respiratory pressures[9].

In this study, all parameters of chest expansion of the non-smoking youths were greater than those of the smoking youths. Decreased chest circumference at the axillary level was associated with reductions in the AP and ML diameters. This is because chest expansion at the axillary level represents the upper chest breathing pattern, which utilizes a combination of upward and forward chest movements or the pump-handle movement, as well as upward and outward chest movements or the bucket handle movement[10].

CONCLUSION:

It is concluded that most of the people started smoking in young age due to environmental and social factors. It is also observed that chest expansion is greater in smokers as compared to non-smokers and smokers suffer ore from respiratory diseases as compared to non-smokers.

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