

# Investigation of the Effects of Smoking Addiction and Physical Activity on Some Respiratory Functions in Young Adult Males

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## Abstract

The aim of the study is to investigate the effect of smoking addiction and physical activity on some respiratory functions in young adult males. 120 male students who have no health problem with an age average of 21,00 (years) , height average of 174,2 (cm) and weight average of 69,62 (kg) have voluntarily participated in the study. The students participating in the study have been categorized according to their condition of doing exercise and addiction to smoking. Spirometer (Pony Fx, Italy) was used to determine pulmonary functions of students. In the statistical analysis of the obtained data SPSS program has been used. The normality distribution of the data has been identified with Shapiro-Wilk test. In the analysis of the data which have no normal distribution, Kruskal Wallis test and in the sub groups Mann- Whitney U test has been used. It has been determined that FVC, FEV1, FEF25-75% (L/s), PEF (L/s), VC and MVV values of the student groups who doing regular exercise are significantly higher than the student groups who do not ( $p<0,05$ ). No statistically significant difference has been found in FEV1/FVC(%) value among the groups ( $p>0,05$ ). It has been found that smoking addiction is effective on PEF value in a significant level ( $p<0,05$ ).

**Keywords:** respiratory functions, exercise, smoking addiction

## 1. Introduction

Sportive activities, because of their physical and physiological advantages, are one of the important social activities that people prefer for a suitable physical structure and to protect general health (Kürkçü & Gökhan, 2011). Regular exercises directly affect physical and physiological development. Exercise and physical activity which are highly important for the development of a healthy physical structure contribute to the development of many systems in the body and the functioning of those systems in a healthy way. Respiratory system is one of the systems that exercise and physical activity directly affect (Alpay et al., 2007).

In many previous studies, it has been identified that long term and regular exercises develop respiratory functions (Doherty & Dimitriou, 2007; Vaithyanadane et al., 2012). Likewise, in the literature, it is possible to encounter many studies determining that respiratory functions spoil because of smoking habits (Mehta et al., 2016). However, it has still been a debate how those both factors together effect respiratory functions.

Determining the effect of cigarette dependence on respiratory functions, which causes many fatal diseases, is very important for sports performance (Trinder et al., 2000). The aim of the study is to investigate the effect of exercise and smoking addiction factors to evaluate separately in addition to the effect of both factors together on some respiratory functions of young adult males.

## 2. Method

### 2.1 Research Group

A total of 120 male students studying in Muş Alpaslan University who have no health problem and with an age average of 21,00 (years), height average of 174,2 (cm) and weight average of 69,62 (kg) have voluntarily participated to our study. Those students have been categorized to their condition of doing sports and smoking habits. The student groups who are addictive to smoking have been created by the students smoking through at least 4 years, who are not addicted to any drugs except cigarette and do not drink alcohol. The student groups who do exercises have been selected by the students who have done sports in different sport branches for at least 3 years and still do sports regularly at least 1 hour everyday of 5 days in a week.

## 2.2 Spirometric Measurements

The functional condition of respiratory tract can be identified classically with measuring lung volume and capacities (Atan et al., 2013). The respiratory function tests of the participant students in the study have been made with Pony Fx spirometer. Before the test has been conducted the students have been informed about that they should not smoke cigarette at least 1 hour before the test, should not drink alcohol at least 4 hour before, should avoid heavy exercise, should not wear tight clothes, should not eat heavy dishes 2 hours before and should not take bronchodilator pills. The total measurements have been performed when the individual is in the sitting position having closed nose with a band grip by making a few aspirations in breath volume connected to spirometer with a mouthpiece after it is ensured that he gets used to this kind of breathing. Each measurement has been repeated 3 times and the best value has been recorded.

## 2.3 Analysis of Data

In statistical analysis of the obtained data SPSS program has been used. The normality distribution of the data has been determined with Shapiro-wilk test. Kruskal Wallis test has been used in the analysis of the data which do not have normality distribution and in the sub groups Mann-Whitney U test has been used.

## 3. Results

Table 1. BMI values of young adult males

Parameters	Groups	N	Avr.	S.D	R. Avr.	Chi-Square	P	Direction of difference
<b>BMI (kg/m<sup>2</sup>)</b>	1 Ones who doing sports	42	22,73	2,54	65,45	3,604	0,308	p>0,05
	2 Ones who doing sports & Smoker	27	21,75	1,72	50,70			
	3 Ones who don't do sports	26	22,75	2,35	66,67			
	4 Ones who don't do sports & Smoker	27	22,84	3,80	61,17			

The respiratory functions show an alteration according to gender, age, height, weight and body sizes (Tartibain and Birami, 2010). When examining Table 1, there is not a significant difference statistically between the values of the groups' body max index that is to say it has been seen that there is a homogeneous distribution among the groups.

Table 2. Tests of Normality

Parameters	Shapiro-Wilk		
	Statistic	df	Sig.
<b>BMI (kg/m<sup>2</sup>)</b>	,960	122	,001
<b>FVC(L)</b>	,992	122	,036
<b>FEV1(L)</b>	,984	122	,015
<b>FEV1/FVC (%)</b>	,972	122	,013
<b>PEF (L/s)</b>	,966	122	,004
<b>FEF25-75% (L/s)</b>	,770	122	,000
<b>VC (L)</b>	,958	122	,001
<b>MVV (L/min)</b>	,970	122	,009

When examining Table 2, it is seen that parameters of respiratory function do not show normal distribution.

Table 3. Some respiratory functional values and analysis of young males

Parameters	Groups	N	Avr.	S.D.	Ranking average	Chi-Square	P	Direction of Difference
FVC(L)	1 Ones who doing sports	42	5,30	0,54	72,12	14,698	0,002	1-3, 1-4, 2-3, 2,4
	2 Ones who doing sports & Smoker	27	5,35	0,69	72,22			
	3 Ones who don't do sports	26	4,80	0,57	45,08			
	4 Ones who don't do sports & Smoker	27	4,86	0,78	50,07			
	Total	122	5,11	0,67				
FEV1(L)	1 Ones who doing sports	42	4,58	0,56	75,27	17,373	0,001	1-3, 1-4, 2,4,
	2 Ones who doing sports & Smoker	27	4,50	0,57	69,59			
	3 Ones who don't do sports	26	4,11	0,54	46,60			
	4 Ones who don't do sports & Smoker	27	4,07	0,69	46,33			
	Total	122	4,35	0,63				
FEV1/FVC% (%)	1 Ones who doing sports	42	86,39	5,72	70,00	4,165	0,244	p>0,05
	2 Ones who doing sports & Smoker	27	84,44	6,43	58,15			
	3 Ones who don't do sports	26	85,49	6,11	59,69			
	4 Ones who don't do sports & Smoker	27	83,84	6,68	53,37			
	Total	122	85,20	6,19				
PEF (L/s)	1 Ones who doing sports	42	8,82	1,13	83,88	34,817	0,000	1-2, 1-3, 1-4, 2-4, 3-4
	2 Ones who doing sports & Smoker	27	7,97	1,72	62,94			
	3 Ones who don't do sports	26	7,53	1,20	52,27			
	4 Ones who don't do sports & Smoker	27	6,38	1,84	34,13			
	Total	122	7,82	1,71				
FEF25-75% (L/s)	1 Ones who doing sports	42	5,22	1,16	74,95	13,200	0,004	1-3, 1-4, 2-4
	2 Ones who doing sports & Smoker	27	4,89	0,94	63,11			
	3 Ones who don't do sports	26	5,02	2,57	56,04			
	4 Ones who don't do sports & Smoker	27	4,32	1,02	44,22			
	Total	122	4,91	1,53				
VC (L)	1 Ones who doing sports	42	5,06	0,52	73,86	13,959	0,003	1-3, 1-4, 2-3
	2 Ones who doing sports & Smoker	27	5,00	0,66	68,13			
	3 Ones who don't do sports	26	4,45	0,76	44,73			
	4 Ones who don't do sports & Smoker	27	4,71	0,99	51,80			
	Total	122	4,84	0,76				
MVV (L/min)	1 Ones who doing sports	42	143,57	20,71	82,69	23,938	0,000	1-2, 1-3, 1-4
	2 Ones who doing sports & Smoker	27	126,68	26,49	55,72			
	3 Ones who don't do sports	26	120,31	17,95	48,02			
	4 Ones who don't do sports & Smoker	27	114,26	32,16	47,30			
	Total	122	128,39	26,91				

When examining Table 3, it has been determined that FVC, FEV1, FEF25-75% (L/s), VC and MVV values of the groups who do sports are significantly higher than the groups who do not ( $p < 0,05$ ). No significant difference in FEV1/FVC (%) values has been found among the groups ( $p > 0,05$ ). It has been also determined that PEF (L/s) value of the group doing sports is statistically higher than other groups in a significant level ( $p < 0,05$ ), PEF (L/s) value of the group doing sports and smoking addictive is statistically higher than sedentary group in a significant level ( $p < 0,05$ ) and PEF (L/s) value of the sedentary group is statistically higher than sedentary group with smoking addiction in a significant level ( $p < 0,05$ ).

#### 4. Discussion and Conclusion

FVC and FEV1 values decrease when there is contraction or obstruction in airways. FEV1 value is more related to big airways. According to our research results, it has been identified that FVC and FEV1 values of the student groups doing sports is significantly higher than the student groups who do not do sports ( $p < 0,05$ ). Also, it has been determined that there is no statistically significant difference in FVC and FEV1 values between the student groups doing sports with smoking addiction and the student group who do not smoke but do sports ( $p > 0,05$ ).

It has been established in many studies that long term and regular exercises develop respiratory muscles and increase respiratory function capacity (Robinson et al., 1982; Johnson et al., 1996; Gökdemir et al., 2007; Sable et al., 2012; Ahmadi et al., 2013). In the study aimed at identifying the respiratory function capacity of the swimmers and sedentary groups, it has been determined that FVC and FEV1 values of the swimmers are higher than the sedentary groups (Vaithyanadane et al., 2012). In another study conducted on athletes and swimmers it has been determined that FVC and FEV1 values of the athletes and swimmers are statistically higher than the sedentary groups in a significant level (Doherty & Dimitriou, 2007). According to our study findings we can state that regular exercise in young adult males develop tough vital capacity and increase the functioning of big airways. Findings of many studies in literature have determined that regular exercise develops respiratory functions and supported our study results.

In some studies, it has been determined that smoking directly effects lung functions negatively, smoking addiction causes big and medium airways tighten, this tightening is directly proportional with smoking duration (Tecimer et al., 1995; Boskabaday et al., 2011). In another study, it has been determined that there is a significant relationship between decrease in respiratory functions and smoking duration (Burrows et al., 1977). In a study conducted on sedentary groups in India, it has been identified that respiratory functions of smoking addictive's spoil relatively 17.3 times more compared to the ones who do not smoke (Rubeena et al., 2009). Unlike those studies mentioned above, in our study findings no statistically significant difference in FVC and FEV1 values according to the smoking addiction factor between the groups. We consider that this situation is because the positive effect of sport comes into prominence rather than the negative effect of cigarette.

FEV1/FVC% (%) value is an important parameter used in identifying restrictive lung diseases like respiratory insufficiencies and the occlusion in airways found in lungs (Demir, 2017). In our study findings, it has not been found that there is statistically significant difference in FEV1/FVC% (%) value according to smoking addiction and exercise variables among the groups ( $p > 0,05$ ).

PEF (L/s) value shows big airway functions. According to our study findings, it has been stated that there is statistically significant difference in PEF (L/s) value according to both exercise and smoking addiction variables among the groups. Özkurt et al. (2000) have determined in their study that PEF value of the individuals who smoke is statistically lower in a significant level than the ones who do not. According to those results, it can be said that physical activity heals big airway functions in lungs and on the other hand smoking cigarette damages prominently to big airway functions.

FEF25-75% (L/s) value informs about medium and small scale obstruction in bronchus. In a study researching the effect of low density and long term exercise performed by sportsmen and sedentary groups who smoke cigarettes and hookah on respiratory functions, it has been stated that exercise has increased FEF25-75% (L/s) value in both sportsmen who smoke cigarettes and sedentary groups (Kouba, et al., 2015). In our study results, the reason why FEF25-75% (L/s) value of both groups who do sports is statistically higher in a significant level than all other has shown the positive effect of sport.

MVV value decreases in the conditions when respiratory resistance increases in individuals, respiratory muscles are affected, lung and thorax compliances increase and decrease, respiratory control mechanisms break down (Günay et al., 2005). Mazic et al. (2015) have stated in their study that MVV and VC values of sportsmen in different branches compared to sedentary groups are higher in a significant level. In a study conducted on healthy adults, it has been determined that exercise has changed VC and MVV values (George et al., 2014). According to results obtained in our study, it has been stated that VC and MVV values of the groups who do sports are higher compared to other groups. This situation shows that the positive effect of sport is at the forefront.

According to results of our study, it has been identified that the groups who do sports have higher air volume in big and small airway in lungs compared to sedentary groups. In this population, when considering the effect of sport performed with smoking on respiratory functions it can be said that the positive effect of exercise on respiratory muscles is determinant rather than the negative effect of cigarette. Accordingly it can be said that exercise and sport do not prevent the damage of cigarette to lungs but they make this damage invisible with their positive effect on respiratory functions.

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