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COMPARISON OF RESPIRATORY PARAMETERS OF CHILDREN WITH SMOKING AND NON-SMOKING PARENTS

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Abstract:
The aim of this study was to determine the effect of passive smoking on children by comparing some of the respiratory parameters of the children of smoker and non-smoker parents. A total of 200 students, aged 12-14 years, were participated in the study, including 100 students who were exposed to smoke and 100 students who were not exposed to smoke. The age, body weight and respiratory functions of the students were measured. Respiratory parameters were assessed as forced vital capacity (FVC), maximal voluntary ventilation (MVV), vital capacity (VC) data. The independent t test was used in the analysis of the obtained data. Significant differences were found among the groups in all of the age, height and respiration parameters of males and females ($p<0.05$). When the significant difference in VC values examined, there was no difference in FVC and MVV values between groups of respiratory parameters of passive smokers and non-smokers ($p>0.05$), significant differences were found in VC values ($p <0.05$). As a result, we found that VC which is the respiratory functions in children who were exposed to cigarette smoke was affected negatively in our study. Changing parent's smoking behavior will contribute to increased quality of life of children who exposed to cigarette smoke.

Keywords: respiratory function, child, smoking

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1. Introduction

Smoking poses a serious risk to the health of the user, and the health of others who share the same environment with him (1). It is estimated that approximately one billion people in the 21st century will lose their lives due to illnesses caused by smoking if the smoking pattern continues as it is (2). The fact that the smoke is responsible for the harms reveals that the non-smokers are also at risk. It is known that children, elderly and sick individuals, who are the most vulnerable part of society, will suffer more harm than smoking. Smoke is emerged the result of the leaves of the tobacco plant not completely burning. The substances contained in the smoke are present in the gas and particulate phase. The type of tobacco, the combustion temperature, the length of the smoke, the nature of the paper, the filter and the additives matter added to tobacco are the main reasons affecting the smoke gas and particulate (3). Environmental tobacco smoke (ETS) is known as smoke emitted from a burning smoke or other tobacco product, or exhaled by a smoker (4). Among passive smokers, children are groups with the highest risk to the society with their different physiological and developmental characteristics according to adults. In addition to these features, the fact that children cannot protect themselves from smoke is also known as a situation that increases the influence (5,6). It is observed that the exposure of environmental tobacco smoke among children in the world is between 40-75% (7,8). In our country this rate is determined as 53-70% (8,9). In Western countries, the World Health Organization (WHO) estimates that about 700 million children are exposed to smoke in the 1980s and 1990s, although smoking among adults was declined (3).

In this study, we examined the effect of this exposure on the parameters of respiratory function in our country (10), where close to 75% of children are regularly exposed to passive smoking; unlike other studies, it is aimed to be evaluated by physiological measurements.

2. Materials and Methods

In this study which made by taking the necessary permissions, between a total of 394 male and female students, in the 304 volunteered students, 34 students were left work with their own wishes, while 10 students were eliminated because they were smoking. The remaining 260 volunteer students were measured and the measurements of 200 students who were close to each other in terms of age, height, body weight were evaluated.

Students participating in the study; after the demographic information (date of birth in terms of day, month and year, age, height, weight, gender), were taken and information about the measurements was presented to the students. For students breathing parameters; forced vital capacity (FVC), vital capacity (VC), and maximal voluntary breathing (MVV) measurements was carried. It has been noted that the selection of individuals is close to each other in terms of age, height, and body weight.

2.1 Data Collection

The measurement of respiratory parameters was performed with a M.E.C. Pocket-Spiro USB 100 Spirometer.

2.2 FVC Measurement

A simple explanation of the measurements was made and the measurement was shown. It is stated that the subjects need a maximal effort and that the results may be meaningless otherwise. Movement was repeated during the measurement of subjects and subjects were motivated by voice pronounces. At the time of measurement, after three times normal inspiration and expiration the subject first completed the measurement by performing maximal inspiration and then expeditiously as fast as possible, (11,12).

2.3 VC Measurement

The information about the subjects was recorded on the spirometer and then the subject was placed in a sitting position. Movement was repeated during the measurement of subjects and subjects were motivated by voice pronounces. When commanded, the subject first completed normal inspiration and expiration three times, then filling the lungs completely with air by slowly completed maximal inspiration, and then measurement was completed by slowly exposing the entire air in the lungs as much as possible (11,12).

2.4 MVV measurement

The information about the subjects was recorded on the spirometer and then the subject was placed in a sitting position. Movement was repeated during the measurement of subjects and subjects were motivated by voice pronounces. When the subject felt ready, the subject was able to perform a rapid and deep inspiration and expiration with a maximum of 12 seconds with the time device.

2.5 Statistical Analysis

SPSS 16.0 program was used for statistical analysis. Dependent t-test was used to compare the pre- and post-tests of the groups, and independent t-test was used to compare the two groups. Statistical results were assessed at 95% confidence interval and $p < 0.05$ significance level.

3. Results

Those exposed to smoking were 12.88 ± 0.67 years, those who were not exposed to smoking were 12.97 ± 0.70 years; those who were exposed to smoke in body weight 46.98 ± 9.89 kg, those who were not exposed to smoke 48.82 ± 10.18 kg; the length of the smoke exposed was 159.18 ± 7,617 cm and the length of the smoke was 159.81 ± 7.48 cm. Age, height, body weight were not significantly different between the groups ($p > 0.05$).

Table 1: Descriptive characteristics of subjects according to smoke exposure status

Variable	Group	N	Mean	Std. D
Age (year)	Smoker	100	12.88	0.67
	Non- Smoker	100	12.97	0.70
Weight (kg)	Smoker	100	46.98	9.89
	Non- Smoker	100	48.82	10.18
Height (cm)	Smoker	100	159.18	7.17
	Non- Smoker	100	159.81	7.48

In table 2, the mean age was 13.02 ± 0.67 years for males and 12.83 ± 0.70 years for females; the body weight was 48.58 ± 11.17 kg for men and 47.22 ± 8.81 kg for women; the height was 161.53 ± 7.60 cm for males and 157.46 ± 6.44 cm for females. Age, height, body weight were significantly different between the groups ($p < 0.05$).

Table 2: Descriptive characteristics of subjects according to gender status

Variable	Group	N	Mean	Std. D
Age (year)	Male	100	13.02	0.67
	Female	100	12.83	0.70
Weight (kg)	Male	100	48.58	11.17
	Female	100	47.22	8.81
Height (cm)	Male	100	161.53	7.60
	Female	100	157.46	6.44

Respiratory parameters of men and women are presented in table 3. The mean VC lt was 2.64 ± 0.54 for males and 2.46 ± 0.42 for females; FVC lt men are 2.84 ± 0.45 lt and

women are 2.54 ± 0.43 lt; MVV pale / min men 82.12 ± 13.60 pale / min, women 74.24 ± 13.52 pale / min. Significant differences were found between the groups in all of the respiratory parameters (p <0.05).

Table 3: Comparison of measured respiratory parameters of men and women

Variable	Group	N	Mean	Std. D	t	p
VC (lt)	Male	100	2.64	0.54	2.607	**0.010***
	Female	100	2.46	0.42		
FVC (lt)	Male	100	2.84	0.45	4.732	**0.001***
	Female	100	2.54	0.43		
MV (pale/dk)	Male	100	82.12	13.60	4.113	**0.001***
	Female	100	74.24	13.52		

The body composition parameters of the subjects exposed to smoke and not exposed to smoke are presented in table 4. BMI was 18.46 ± 3.27 kg / m2 in exposed to smoke and 19.04 ± 3.45 kg / m2 in not exposed to smoke; Waist Hip Ratio 0.80 ± 0.06 in exposed to smoke, 0.81 ± 0.07 in not exposed to smoke; BFP was 14.51 ± 3.87% for those exposed to smoke, and 14.84 ± 3.42% for those not exposed to smoke. There were no significant differences between the groups in the BMI, WHR, and BFP parameters (p> 0.05).

Table 4: Comparison of body composition parameters of smoking and non-smoking individuals in their families

Variable	Group	N	Mean	Std. D	t	p
BMI (kg/m^2)	Smoker	100	18.46	3.27	-1.223	0.223
	Non- Smoker	100	19.04	3.45		
Waist Hip Ratio	Smoker	100	0.80	0.06	-0.390	0.697
	Non- Smoker	100	0.81	0.07		
BFP (%)	Smoker	100	14.51	3.87	-0.573	0.567
	Non- Smoker	100	14.84	4.14		

The respiratory parameters of the smokers and non-smokers in the family are presented in table 5. VC lt was 2.45 ± 0.42 liters for those exposed to smoke , 2.464 ± 0.54 liters for those non-exposed smoke; FVC was 2.64 ± 0.40 lt for those exposed to smoke, 2.75 ± 0.52 lt for those not exposed to smoke; MVV was 76.67 ± 12.13 pale/min for those exposed to smoke and 79.69 ± 15.73 pale/min for those not exposed to smoke. There was no significant difference in MVV and FVC values between groups in respiratory parameters (p>0.05), but there was a significant difference in VC values (p <0.05).

Table 5: Comparison of respiratory parameters of smoking and non-smokers in their families

Variable	Group	N	Mean	Std. D	t	p
VC (lt)	Smoker	100	2.45	0.42	-2.806	**0.006***
	Non- Smoker	100	2.64	0.54		
FVC (lt)	Smoker	100	2.64	0.40	-1.649	0.101
	Non- Smoker	100	2.75	0.52		
MVV (soluk/dk)	Smoker	100	76.67	12.13	-1.519	0.130
	Non- Smoker	100	79.69	15.73		

4. Discussion

Smoking in addition to being the most common habit in the world, it is reported that the adverse effects (13,14) of substances found in smoke on human health are especially large in children, and this problem is recognized as an important public health problem in all age groups (15,16); because exposure to smoke has been shown to cause nicotine accumulation in non- smokers close to smokers (17).

In children who were exposed to smoke in the home, some respiratory parameters were compared to determine the effect of passive cigarette smoking on children and female students with a mean age of 13.02 ± 0.67 years and male students with a mean age of 12.83 ± 0.70 years were included in the study (Table 2).

In this study, FVC measurements in passive smokers were 2.64 ± 0.40 lt. and 2.75 ± 0.52 lt in the passive non-smoker group (Table 5).

In a study investigating the effect of smoking, fruit consumption and physical activity on blood oxidant and antioxidant levels and respiratory functions, the FVC values of the passive smoking group were reported as 4.8 ± 1.16 l and in the nonsmoking group as 4.6 ± 1.1 l (18). While Urritia et al. found no significant difference between FEV1 and FEV1 / FVC values of 1,500 people (20-44 years) which in non-smokers, passive smokers, quitters, 1-9 smokers per day and 10-20 smokers per day, there was a significant difference in FEV1 and FEV1 / FVC between non-smokers and smokers more than 20 cigarettes a day (19). Similarly, in 175 healthy volunteers aged 20 to 50 years, there was no significant difference in FVC, FEV1, FEV1 / FVC between smokers and non-smokers but it was reported that FEV1 / FVC and FEF25-75 of the quitters were significantly lower than the values of both groups (20). Bohadana et al. reported that there was no difference in FEV1 and FEF25-75 between smokers and non-smokers in healthy young adults, and that there was a significant difference in borderline FEV1 / FVC value ($p = 0.049$) (21). Demirci found that the pre and post-training FVC levels of the athletes were lower than the non-smokers and that this decrease was statistically significant ($p < 0.01$) (22). Doherty and Dimitriov (24) were

found a significant decrease in FVC of smokers compared to non-smokers, were found a positive correlation between physical activity, fitness and lung capacity (23-24).

It is reported that the smoke to be an important public health problem in all children during their developmental period (15,16). A decrease in FVC values was reported in children aged 9-13 years who were exposed to smoke by their parents (25). Especially in some studies on children; FEV 1, FEV 1 / FVC and FEF 25-75% value of the children in the age group of 6-10 years who were exposed to smoking were found to be distorted (26) and Similarly, it is reported that in the children between 8 and 15 years of age exposed to smoke the FEV and FVC values were lower (27).

In our study, the reason why there was no significant difference in the FVC findings of the subjects may be the duration and effect of passive smoking exposure on subjects participating in the study were not definitively determined and the number of subjects included in the study was limited.

VC measurements; passive smokers were 2.45 ± 0.42 lt. and 2.64 ± 0.54 lt in the non-passive smoker group (Table 5).

Doğanay found that the VC value of the passive smoking group was 4,3 ± 0,99 and that of the non-smoking group was 4,2 ± 1,10 lt in studying the effects of smoking, fruit consumption and physical activity on blood oxidant and antioxidant levels and respiratory functions (18). In a study by Raven and Hogan reported that the average VC in 18 professional footballs was 5.29 liters and it is a normal value in society (28), the decrease in VC values before and after training of the smoking athletes was significantly higher than others ($p < 0.001$) (22), the VC values of the non-smoking group were found to be higher than those of the non-sports group and the smoking group, the exercise was positive and the smoking was the negative effect (29). Similarly, it is reported that both passive (30) and active smoking have been reduce the VC values (31).

In our study, it can be said that the decrease in VC values of children exposed to smoke to be similar to the literature findings. Another measure of respiratory parameter, MVV measurement, in the passive smoker group have been identified as 76.67 ± 12.13 pale/min in the group without passive smoking, 79.69 ± 15.73 pale / min (Table 5).

In a study by Raven and Hogan, the MVV values of 18 professional soccer players were significantly higher (28). In a study which on respiratory function tests in passive smoking children studies by Uysal et al., have not been found significant differences between the passive smoking group and the non-passive smoking group, assessed separately for men and women (32).

Gupta et al. found that children who were exposed to passive smoking during childhood had a greater risk of developing lung cancer than children who were not exposed to smoke (33), and they reported that there was great evidence that children exposed to smoke had significant adverse effects on respiratory health (34,35,36).

In our study, the reason why there was no significant difference in the MVV findings of the subjects may be the duration and effect of passive smoking exposure on subjects participating in the study were not definitively determined and the number of subjects included in the study was limited. Passive smoking has been found to have a negative impact on children's VC parameters in our study. But the reason why there was no significant difference in the MVV and FVC respiratory parameters may be the duration and effect of passive smoking exposure on subjects participating in the study were not definitively determined and the number of subjects included in the study was limited. In addition, it is considered appropriate to conduct longitudinal studies to determine what kind of effect passive smoking causes in children in the following years.

In conclusion, we found that the vital capacity (VC) of the children who were exposed to smoke was affected negatively. This result will contribute to increasing the quality of life of children who are exposed to smoke by changing parental smoking behavior positively. Smoking near the children is a major health problem for children. Although the risk of passive smokers has been slightly reduced by the law prohibiting smoking in public places, smokers at home still constitute a health threat for the health of their children. Also, efforts should be made to raise awareness of families in order to combat smokers that adversely affect the health of young people, especially children, in our country and all over the world, and to prevent passive smoking.

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