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ORIGINAL ARTICLE

Medicine Science International Medical Journal

Medicine Science 2021;10(2)532-8

Analysis of paternal smoke exposure and childhood obesity

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Received 30 December 2020;Accepted 18 January 2021
Available online 25.04.2021 with doi: 10.5455/medscience.2020.12.265

Abstract

Studies reported that parental smoking exposure may be a risk factor for childhood obesity. Present study analyzed that relationship between paternal smoking exposure and children's body mass index. We aim to evaluate that possible obesogenic effects of paternal smoke exposure. This is a cross sectional analysis of a survey from April to December 2020. A survey was performed to fathers aim to learn nourishment and smoking status and children to learn nourishment and lifestyle. Participants were classified according to body mass index results. The study group was formed of 272 individual (136 fathers, Mage=41.03±8.40 years and 136 children, Mage=4.19±1.25 years). In present research, 10.3% of children were overweight, and 2.9% obese. Also, 52.9% of children had smoking exposure and 10.3% were overweight whereas 2.9% of children were obese. Our results put forward that the relation between paternal smoking and children's body mass index was nonsignificant ($p>0.05$). This is the seminal study in Turkey analysis that obesogenic effect of paternal smoke exposure, In the future, more studies need to evaluate the relation of paternal smoking exposure and child obesity.

Keywords: Epigenetic, father, obesity, obesogens, smoke

Introduction

Past fifty years, the childhood obesity rate raised from 4% to over 18% in the worldwide. Obesity in childhood period may develop noncommunicable diseases as diabetes and cardiovascular diseases at a younger age. Because of that reason need a particular carefulness when fighting the childhood obesity epidemic [1]. Very newly topic in scientific area investigate that obesogenic effect of parental smoking. More recent researches reported that obesogenic effect of maternal or paternal smoking on childhood obesity. Childs who had a smoke exposure they had a rised risk of overweight or obese in adolescence. Epidemiological data indicates a favorable correlation among smoking exposure and obese or overweight in new generation [2-5]. The aetiology of obesity is incredibly complex. In the last fifteen years, the idea put forward that some chemicals may cause an obesity [6]. Cigarette smoke is a source of various chemical substances. Some of those are chromium, cadmium, particulate matter (PM), and polycyclic aromatic hydrocarbon (PAH). Experimental results support that chromium and cadmium have an anti-obesogenic effect. Also, experimental analysis indicates that PAH and PM have an obesogenic effect [7-17].

A favorable correlation among smoking exposure and overweight or obesity in childhood period was confirmed in a number of studies [13,14]. There were a considerable number of study in the worldwide however, in Turkey, there is no study examined possible changes in body mass index (BMI) of children's who exposure to paternal smoke.

Material and Methods

The collection of the surveys was an approved by the Süleyman Demirel University School of Medicine Ethical Committee of Clinical Research in İsparta (document number 2020/48). Research was planned as a cross sectional study of a questionnaire. An internet surveys was applied in Turkey.

Study was realized totally 272 person with 136 father and 136 child. Present study included fathers who were given consent,

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being in the 18 and old age. Also, children ≤18 ages included study who were parents given consent. The 31 question survey was performed to fathers which saved information on nutrition and lifestyle parameters, including smoking status. In addition, a 25 question survey was performed to children. Fathers and children both of them sex, age, nutrition habits, height, weight datas were recorded. BMI is calculated for both group considering to WHO criteria and participants were categorised as obese, overweight, normal, or underweight [1].

Statistical analysis

In the present study datas were analyzed using the Statistical Package for the Social Sciences (SPSS) version 21. Percentage and frequency examinations were used for investigating participants' demographic characteristics and Mean±Sd scores from the calculation instruments. A t-test of the two-state variables was used in the analysis of the variables providing the parametric assumptions. A chi-square (x^2) test is used to investigate categorical datas. According to test results P≤0.05 value was accepted statistically significant. An ANOVA test was used to analyze variables with more than two states. The differences in Anova were examined by Tukey method, one of the PostHoc methods. For the analyzes made, it was accepted as α=0.05.

Results

This study was performed from April to December 2020 with 272 participants. Finally, 136 father (Mage=41.03±8.40) ≥18, and 136 children (Mage=4.19±1.25) who were ≤18 in Turkey were included. BMI from fathers and children are shown in Table 1. Paternal BMI was found 80.97±16.94 (Mean±Sd). According to results 61.8% (n=84) of children were male and 38.2% (n=52) of children were female. In present study, 44.9% of children were underweight, 41.9% normal, 10.3% overweight, and 2.9% obese. Also, 65.5% of father were overweight or obese. Overall, 52.9% of children had smoking exposure. 10.3% of them were overweight whereas 2.9% were obese. Children mean weight were 44.18±20.64 and children height were 144,40±26.76. Father mean weight and height values were 80.97±16.94 and 168.94±34.16 respectively. Characteristics of BMI from children in <1 ages group 4.9% were underweight. There are no normal, overweight and obese individual in this group. In 1-4 ages group 13.1% were underweight, 1.8% normal, 25.0% obese. In 5-8 ages group 26.2% were underweight, 14.0% normal, 7.1% overweight. In 9-12 ages 32.8% were underweight, 17.5% normal, 35.7% overweight, 25.0% obese. In 13-16 ages 14.8% underweight, 50.9% normal, 42.9% overweight. In >17 ages group 8.2% were underweight, 15.8 normal, 14.3% overweight and 50.0% obese. Information of income and education from fathers was calculated (Table 2).

Table 1. Body mass index characteristics of study groups

Groups	N	Underweight	Normal	Overweight	Obesity
Father	136	6 4.4 %	41 30.1%	56 41.2%	33 24.3%
Child	136	61 44.9%	57 41.9%	14 10.3%	4 2.9%

Table 2. Baseline characteristics of fathers

	No. of subjects	Percent	p Value
Paternal income			
No income	7	5.1%	
Low	21	15.4%	0.013[a]
Medium	47	34.5%	
High	61	44.9%	
Paternal education			
Primary school	36	26.5%	
Secondary school	19	14.0%	
High school	37	27.2%	0.107[b]
Graduate	33	24.3%	
Postgraduate	11	8.1%	

In Euro: low, ≤€ 196,00; medium, € 196,00–392,00; high, ≥€ 392,00.
a:T test; b:Anova test

Our results indicate that the correlation among paternal income and smoking are statistically significant (P=0.013). The correlation among paternal education and smoking are also statistically significant (t=0.004). According to ANOVA test results the correlation between paternal education and the child's BMI, are statistically nonsignificant (α=0.05). In the present study, the nutritional habits and daily activities (consuming junk food, watching TV, physical activity etc.) of children were also recorded. Table 3 was shown family's views on children. In addition, the parents were asked whether or not they thought their child was overweight or obese. We assessed if there was an association (X^2=0.000) between thinking the child was overweight/obese and child BMI. Between relationship of exercise regularly and the child's BMI was statistically nonsignificant (X^2=0.059). Although there is no relationship between regular exercise and the child's BMI, this is a very close value. The children will lower their BMI level if the families encourage their children to exercise properly. Several fathers (14.7%) thought that their child was overweight or obese. Considering t-test results exposed smoke/hookah at home and child's BMI was statistically non-significant (P>0.05). Present study, also recorded datas which are fathers passive smoke exposure in workplace. According to independent t test father's passive smoke exposure and and child's BMI was statistically non-significant (P>0.05). In addition, considering ANOVA test results smoking intensity (pack/day) of father's and the child's BMI was statistically non-significant (P>0.05).

Table 3. Parental views on children

Questions	No. of subjects	Percent (%)
Is your child exposed smoke/hookah at home?		
No	88	64.7%
Yes	48	35.3%
Is your child overweight/obese?		
No	116	85.3%
Yes	20	14.7%
Has your child a regular/balanced diet?		
No	52	38.2%
Yes	84	61.8%
Is your child gaining weight despite your regular diet?		
No	104	76.5%
Yes	32	23.5%
Is your child consume junk food?		
No	31	22.8%
Yes	105	77.2%
Has your child a regular sleep?		
No	28	21.6%
Yes	108	79.4%
Is your child exercise regularly?		
No	114	83.8%
Yes	22	16.2%

Table 4. Characteristics of children

	No. of subjects	Percent	p value
Dietary habit			
Vegetables	39	28.7%	
Carbohydrate intake	37	28.7%	0.555[c]
Protein intake	60	44.1%	
Number of meals			
1	7	5.1%	
2	24	17.6%	0.592[c]
3	88	64.7%	
>4	17	12.5%	
Fast food			
Never	41	30.1%	
1 or 2 days per week	64	47.1%	0.062[d]
3 or 4 days per week	19	14.0%	
Everyday	12	8.8%	
Sports or exercise (days/week)			
Never	60	44.1%	
1-2 h	44	32.4%	0.609[d]
3-4 h	19	14.0%	
>5 h	13	9.5%	
Watching television (hours/day)			
Never	30	22.1%	
1-2	48	35.3%	0.032[d]
3-4	41	30.1%	
>5	15	12.5%	
The way of going to school			
On foot	53	39.0%	
Autobus	50	36.8%	0.584[c]
Automobile	30	21.2%	

c: Anova test, d: Chi squared test

Table 5. BMI results of study groups

	Underweight Father	Normal Father	Overweight Father	Obese Father
Underweight Child	3 4.9%	23 37.7%	26 42.6%	9 14.8%
Normal Child	3 5.3%	13 22.8%	25 43.9%	16 28.1%
Overweight Child	0 0.0%	4 28.6%	3 21.4%	7 50.0%
Obese Child	0 0.0%	1 25.0%	2 50.0	1 25.0%

Table 6. Paternal smoking status and Child's BMI results

Paternal smoking	Child BMI			
	Underweight	Normal	Overweight	Obesity
Never	20 32.8%	12 21.1%	2 14.3%	1 25.0%
Quit smoking	6 9.8%	16 28.1%	4 28.6%	1 25.0%
6-12 month	0 0.0%	1 1.8%	0 0.0%	0 0.0%
1-5 years	0 0.0%	1 1.8%	1 7.1%	0 0.0%
5-10 years	7 11.5%	7 12.3%	1 7.1%	0 0.0%
10-15 years	7 11.5%	1 1.8%	0 0.0%	0 0.0%
15-20 years	3 4.9%	6 10.5%	1 7.1%	0 0.0%
>20 years	18 29.5%	13 22.8%	5 35.7%	2 50.0%

Table 4 was shown life styles features in children. The correlation between watching television and BMI of children was statistically significant (X^2=0.032). The correlation among engaging in sports or exercise and child BMI was statistically nonsignificant (X^2=0.609). When we evaluate dietary characteristics of children fast food concumption and child BMI was statistically nonsignificant (X^2=0.065). Also, consuming junk food and child BMI was statistically nonsignificant (X^2=0.977).

Considering ANOVA test results child's age and child's BMI was statistically significant that was an another important result of present study (P=0,000). The correlation between physical activity and paternal smoking was statistically significant (P=0.000). Table 5 was shown BMI results of study groups. The relation among father's BMI and child's BMI was statistically non-significant (X^2=0.314). Table 6 was shown characteristics of children have a paternal smoking exposure. According to the results, smoking habits and BMI of children was statistically non-significant (P>0.05). Child's BMI results analyzed multiple comparisons Post Hoc test. Our results indicate correlation (mean difference=1.010) between underweight and normal was statistically significant (P=0.000). Also, correlation (mean difference=1.004) between underweight and overweight was statistically significant (P=0.003). The relation among paternal passive smoke exposure and child's BMI was statistically non-significant (X^2=0.281).

We analyzed the correlation between paternal smoking and children's BMI. The most important result of our study is that there were no statistical differences found between paternal smoking and children's BMI (X^2=0.488).

Discussions

Environmental factors impacting paternal lifestyle may have harmful consequences on child health, as paternal smoking. In last decade, there have been a numerous scientific research examining the potential correlation among parental smoking exposure and obesity [14,18-23]. However, number of studies about paternal smoking exposure and childhood obesity are insufficient. Infants who had smoking exposure during early life time period had low birth weight, but during adolescence they had a raised risk of obesity [18].

Epidemiological study results support a favorable relation between smoking exposure and raised risk of obese or overweight offspring [19,24]. Analysis indicate a relation among smoking exposure and childhood overweight. Also, early influence of smoking exposure especially at age 2 or 3 years is a high-risk [24,25]. Interestingly, smoking was not related with weight, height, or head circumference of the subjects [26,27]. Results reported that tobacco smoking may be an important risk factor for obesity. In human (n=83)

and animal (n=18) researches about smoking exposure found a favorable relation among obesity at any age and exposure [5]. A remarkable number of investigations show that smoking and obesity are related with harmful effects and, especially smoking exposure has a correlation with childhood obesity [28,29].

Parental exposure to smoke causes metabolic abnormalities as weight gain, blood lipids, and glucose metabolism [30]. According to the study in Indonesia children of smoking fathers, smoking mothers, and both parents smoking were associated with overweight. Also, the association reported that between passive smoking and obesity among adolescents aged 12–15 years [31].

The prevalence of overweight and obese offspring were greater for those whose had smoking exposure than those whose had never smoking exposure. Researches, indicate that smoking exposure not only give rise to childhood obesity but also cause to adolescent obesity [32-34].

Present research, we put forward the firstly detailed study regarding the influence of paternal smoking on BMI compared with healthy non-smoking fathers in Turkey. Children whose fathers smoked statistically non-significant for obesity compared with children whose fathers did not smoke. Our findings suggest that paternal smoking exposure in childhood period is not a risk for being overweight/obesity.

Conclusion and Recommendations

Recent epidemiological data supports a prominent correlation among paternal smoking and an increased risk of obese or overweight children. The prevalence of childhood obesity has raised in the worldwide. In the future, for better comprehension of paternal impacts on child risk of obesity, new studies should investigate in different ages groups in child which aim to learn the correlation between paternal smoking and childhood overweight or obesity. Lastly, smoking cessation interventions may result in pediatric health benefits.

Conflict of interests

The authors declare that they have no competing interests.

Financial Disclosure

All authors declare no financial support.

Ethical approval

Permission was obtained from Süleyman Demirel University Medical Faculty Clinical Research Ethics Committee (2020/48) for the study.

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