

The Relationship between Pneumonia with Parental Smoking in Children under 10 Years Old: A Case- Control Study

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Abstract

Background

Recognition of risk factors for childhood pneumonia as the main cause of mortality and morbidity is essential. We aimed to determine the relationship of pneumonia with parental smoking in hospitalized children under 10 years old in Qom city, Iran.

Materials and Methods

This case-control study was performed among 240 children under 10 years old in Ayatollah Golpayegani hospital in Qom city, Iran. Patients were recruited by convenience sampling; 120 patients with pneumonia as the case group, and 120 patients without pneumonia as the control group were enrolled. Parents were asked about duration of exposure to cigarette smoking, the number of cigarettes smoked per day by parents, the frequency of the smokers in family of children, parental education, age of exposure to cigarette smoking, location of smoking, frequency of hospitalization, and duration of hospitalization. The parental smoking was assessed and compared across two groups. The data were analyzed using SPSS software (version 13.0).

Results

The mean age in case group was 29.1 ± 30.3 months and in control group was 32.9 ± 31.1 months. In this study it was seen that lower age of smoking exposure was related to pneumonia. In fact significant difference was found between the groups for age of exposure to cigarette smoking ($p=0.001$), and location of smoking ($p=0.048$), but the other variables such as duration of hospitalization (day), hemoglobin level, frequency of the smokers in family of children and parental education had no association ($P > 0.05$).

Conclusion

Based on the results of this study and comparing with similar studies conducted in this field, it can be concluded that pneumonia is related to parental smoking especially in younger ages.

Key Words: Children, Iran, Parent, Pneumonia, Smoking.

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1- INTRODUCTION

Smoking is one of the common health problems. Smoking and exposure to secondhand smoke harm the human body. Exposure to secondhand smoke is a risk factor for lung cancer or cardiovascular disease (1). Because of the materials of cigarettes, its smoke can cause oxidative stress and undesirable changes in the body systems. Cigarette smoke causes cardiovascular disorders and chronic diseases (2). So many disorders can be associated with smoking and it can cause metabolic abnormalities. The relationship between smoking and disease is different in different races (3). Pneumonia is a lower respiratory tract infection. Pneumonia is one of the most important causes of childhood death and the common cause of hospitalization in childhood. Understanding the type and cause of pneumonia helps to treat and prevent it. Human nose, protect respiratory tract from germs, dust and other agents and is covered with hair. When the nasal mucosa is not able to protect us from harmful agents, infectious agents enter the lungs and lead to disease. Pneumonia is one of the ten most common cause of death among all age groups in the United States and the sixth cause of death in the elderly and the most common cause of death from infection (4, 5).

According to data released by the World Health Organization (WHO), about 56 Million people died due to pneumonia (5) of which 6.10 million were children and 99% of them were in low- and middle-income countries. In low-income countries, pneumonia is the most important cause of death in childhood and the most common cause of hospitalization. Basic and epidemiological studies in relation to etiologic factors and prognosis in such societies are small and inadequate. One of the major difficulties in this area are the effects of parental smoking on children's health (6). Considering the above

mentioned facts, this study aimed to assess the relationship between parental smoking and pneumonia in children under 10 years referred to Ayatollah Golpayegani hospital and outpatients in Qom, Iran.

2- MATERIALS AND METHODS

2-1. Study design and methods

This case-control study was done among 240 under 10 year- old children in Ayatollah Golpayegani hospital in Qom-Iran in (Jul- Dec 2016), including those with and without pneumonia as the case and control group. The case group consisted of a group of 120 children under 10 years of age with pneumonia who were hospitalized in the pediatric ward of Ayatollah Golpayegani hospital. Pneumonia was defined as having symptoms of pneumonia, such as fever, cough, grunting, dyspnea, moderate to severe respiratory distress, and toxic appearance. Confirmation of pneumonia diagnosis was carried out by an expert pediatrician (5, 6). The control group consisted of 120 outpatient children with simple common cold symptoms, under 10 years of age who were referred to emergency medicine department of Ayatollah Golpayegani hospital, without pneumonia or chronic respiratory disease according to the information provided by the parents. Two hundred and forty subject were recruited by convenience sampling. The number of samples in each group, with the first type error of 0.05 and second type of error of 20%, were considered to be 120 in each group. Parents of children were asked about smoking history.

2-2. Measuring tools

A questionnaire inquired about the following information: age, gender, weight, height, and hemoglobin (was evaluated by a blood test) were recorded. Also, parents were asked about the variables including: the duration of exposure to cigarette smoking (year), the

number of cigarettes smoked per day by parents, the frequency of the smokers in family of children, the parental education, the age of exposure to cigarette smoking (months), the location of smoking, the frequency of hospitalization (day), and the duration of hospitalization.

2-3. Ethical consideration

The purpose of the study was explained to the parents and informed consent was taken from the parents before the children enrolling. All patients' information remained confidential and ethical issues related to human studies (according to the Helsinki Statement) were considered.

2-4. Exclusion criteria

Exclusion criteria for this study were other severe diseases or major metabolic dysfunctions. None of the cases had a history of prematurity.

2-5. Data Analyses

The data were analyzed using SPSS software (version 13.0) for Windows. Mean and standard deviation (SD) for quantitative variables and frequency for qualitative variables were calculated. Chi-square test and t-test were used to examine the relationships between variables. The statistical significance level was considered to be 0.05.

3- RESULTS

A total of 240 patients were enrolled in this study. The mean age in case group was 29.1±30.3 months and in control

group was 32.9±31.1 months. In study group 67 (55.8%) were male and in the control group 62 (51.7%) were females. Gender distribution was similar in the two groups (P> 0.05). The mean of the weight in the case group was 3164.7±743.1 grams and in the control group was 2877.8±192.2 grams and the mean height in case group was 56.6±10.5 cm and in control group was 50±9 cm. The frequency distribution of age and anthropometric measures were similar in the two groups (P> 0.05). The frequency of clinical symptoms in case group was as follows: fever 27 (22.5%), cough, 26 (21.7%), dyspnea 5 (4.2%), wheezing in 13 cases (10.8%), and 49 more than one sign (40.8%). Results showed that 65 (54.6%) patients in the case group and 38 (32.2%) patients in the control group had the history of hospitalization (P = 0.0001) (**Table.1**).

In case group 94 (87.3%) subject were urban and 26 (21.7%) patients were rural people and in the control group, 84 (70%) were urban and 36 (30%) patients were rural people, respectively (P> 0.05). According to the findings of this study, no significant difference was observed between the two groups in terms of exposure to tobacco smoke, the number of cigarettes smoked and the hemoglobin between two groups (P> 0.05) (**Table.1**). Based on the results of this study, there was a significant difference between the two groups in terms of age of exposure to cigarette smoking (p=0.031), and location of smoking (Inside home and Outside home) (P=0.048) (**Table.1**).

Table-1: The comparison of variables under study in the case and control group

Variables	Sub-group	Control Number (%)	Case Number (%)	P-value
Duration of exposure to cigarette smoking (year)	Under 1 year of age	10 (13.5%)	8 (11.4%)	> 0.05
	1-5 years	25 (33.8%)	15 (21.4%)	
	> 5 years	39 (52.7%)	47 (67.1%)	
Number of cigarettes smoked per day by parents	1-10	37 (50%)	42 (60.9%)	> 0.05
	10-20	29 (39.2%)	20 (29%)	
	<20	8 (10.8%)	7 (1.1%)	

Frequency of the smokers in family of children	Mother	2 (2.7%)	2 (2.9%)	> 0.05
	Father	45 (60.8%)	47 (67.1%)	
	Both	14 (18.1%)	5 (5.1%)	
	Close relatives	13 (17.6%)	16 (22.9%)	
Parental education	Diploma or less	86 (71.7%)	84 (70%)	> 0.05
	Bachelor	29 (24.2%)	32 (26.7%)	
	Master of science or higher	5 (4.2%)	4 (3.3%)	
Age of exposure to cigarette smoking (months)	Infancy	46 (62.2%)	54 (79.4%)	0.031
	1-24	13 (17.6%)	2 (2.9%)	
	48-60	12 (16.2%)	10 (14.7%)	
	60 months of age and more	3 (4.1%)	2 (2.9%)	
Location of smoking	Inside home	50 (67.6%)	36 (51.4%)	0.048
	Outside home	24 (32.4%)	34 (48.6%)	
Frequency of hospitalization	1	25 (65.8%)	38 (58.5%)	0.0001
	2	9 (23.7%)	19 (29.3%)	
	3 and more	4 (10.5%)	8 (12.3%)	
Duration of hospitalization (day)	1-3	25 (65.8%)	35 (53%)	> 0.05
	3-5	7 (18.4%)	17 (25.8%)	
	5-7	1 (2.6%)	5 (7.6%)	
	<7	5 (13.2%)	9 (13.6%)	
Hemoglobin (g/dL)	Less than 10	13 (10.8%)	19 (15.8%)	> 0.05
	10-12	84 (70%)	79 (65.8%)	
	12<	23 (19.2%)	22 (18.3%)	

4- DISCUSSION

Pneumonia is one of the most important causes of childhood death and the common cause of hospitalization and is one of the most important causes of mortality in adult, but basic and epidemiological studies in relation to etiologic factors and prognosis in such small communities are inadequate (6). One of the major difficulties in this area are the effects of parental smoking on children's health. Accordingly, in this study the relationship between cigarette smoking parents dealt with pneumonia in children under 10 years. This case-control study showed that early exposure to smoking was significantly lower in the case group ($P= 0.031$). There was no significant relationship between exposure to tobacco smoke, the number of cigarettes smoked and the hemoglobin between two groups ($P> 0.05$). In review study that conducted in America in 2012, 204 articles were analyzed. Finally, it was announced that smoking by parents, especially fathers in the home, increases the risk of chronic

rhinosinusitis up to 50% (7). Also, the increased rate of pneumonia was observed in our study. An experimental study was conducted by Goldstein-Daruech et al. in the United States, their observations supported the hypothesis that smoking makes the sinonasal microbial biofilms in non-smokers who are exposed to cigarette smoke, and increases the risk of chronic rhinosinusitis which is consistent with the findings of our research about pneumonia (8). In a cohort study conducted in Norway by Håberg et al. 22,390 children were enrolled. They concluded that chronic respiratory diseases are significantly associated with paternal smoking (9); our results confirm these findings. A cross-sectional study conducted in the UK (2006) by Pattenden et al., 53,879 children were evaluated. Exposure to smoking in this study was in 3 types: maternal smoking during pregnancy, parental smoking in the first two years and the use of cigarettes by parents for now. The effects of such exposure to tobacco smoke were wheezing and asthma, sleep

problems, bronchitis, cough, sensitivity to inhaled allergens and hay fever (10). Finally, it was announced that parental smoking increases the risk of chronic respiratory diseases in children that is similar to the results of our research. Cook et al. in a review article announced that cigarette smoke increases the incidence of chronic respiratory diseases, otitis and asthma in children (11). The results of this study also confirms the results of Cook et al. study. In the cohort study that Lanari et al. were conducted in Italy from November 2009 to December 2012, infants with gestational age greater than 33 weeks, were studied and 2,210 infants were followed during their first year of life, 120 (5.4%) patients were hospitalized due to bronchiolitis. Expose to passive smoking in pregnant women or smoking more than 15 cigarettes a day by pregnant women, increased the risk of bronchiolitis (12). These results confirm the harmful effects of smoking on children and increase the risk of bronchiolitis leading to hospitalization in the first year of life.

In a study conducted in Poland by Bielska et al., the relationship between smoking and its impact on the frequency of acute respiratory tract infections were investigated. Data were collected by questionnaire. 302 children aged 3 years randomly from among 1,200 preschool children in 51 centers in the city, had been selected. Children based on parental smoking habits, were divided into 3 groups: 28% of children lived in families that smoking was banned at home, 26% of children lived in families that smoking was done in a private room and 45% of children lived in families that were smoking in all home environments (13). This study showed an increase in respiratory infections in children whose parents smoke in the home environment. In the meta-analysis study that was conducted in 2010 by Jones et al., in the UK, they concluded that smoking parents,

dramatically increases the risk of respiratory tract infections. This risk was higher when parents were both smokers (14). Other studies indicate exposure to tobacco smoke, increases the risk of lower respiratory infections during infancy (14, 15) that the relationship between secondhand smoke exposure and the incidence of pneumonia, is similar to the results of our research. We suggest more studies with larger sample sizes are necessary. Also, other risk factors for pneumonia should be studied.

4-1. Limitations of the study

There are several types of cigarettes and drugs. In this study, we were not able to investigate the effects of using different types of cigarettes on children pneumonia separately. Also, in our study we did not investigate the effect of drugs on childhood pneumonia. The impact of the use of drugs by parents on children's pneumonia should be considered.

5- CONCLUSION

Based on the results of this study, there was a significant difference between the two groups, in terms of age of exposure to cigarette smoking, and location of smoking (Inside home and outside the home). Finally, based on the results of this study and comparing them with similar studies conducted in this field, it can be concluded that probably pneumonia is related to parental smoking especially in younger ages; so parents can reduce the rate of pneumonia by reducing their children's exposure to cigarette smoke.

6- CONFLICT OF INTEREST: None.

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