ORIGINAL ARTICLE

Passive Smoking and Respiratory Symptoms among Children in Tertiary Care Hospital of Sindh

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Abstract

Background: Passive exposure to environmental tobacco smoke in the home and other places, and active smoking throughout later childhood all have an impact on the respiratory health of children. Parental smoking has been associated with respiratory symptoms and deteriorated lung function in children.

Objective: This study aims to determine the prevalence of respiratory symptoms among children and their association with passive smoking and respiratory symptoms among children aged up to 12 years in selected tertiary care hospitals in Sindh.

Methods: This study was a cross-sectional study, conducted in two tertiary care hospitals from where 217 children aged up to 12 years were selected who attended the pediatric OPD for a routine checkup. Children suffering from malignancies and other health issues such as chest infection and congenital pulmonary airway malformation were excluded.

Results: A total of 217 children with a mean age of 6.4 years (±5.0) years participated in this study. Approximately 73.6 % of children between 0-6 years and 85% between 7-12 years had cough respectively. The results show a significant association between the smoking status of parents and respiratory health among children (0.049), according to the analysis symptoms like coughing, shortness of breath while running/walking, and getting tired p-values 0.038, 0.035, and 0.003 easily show statistically significant association whereas phlegm production shows non-significant (p-value 0.380) association with passive smoking exposure among children up to 12 years of age, experienced in last 30 days for more than 2 times/week.

Conclusion: Children's health experts should discuss the negative effects of smoking and the necessity of reducing exposure to secondhand smoke; parents should be informed about these issues and advised not to smoke in front of children.

Keywords: *Respiratory effects, children, passive smoking, tobacco, Pakistan.*

INTRODUCTION

Smoking is a serious public health issue everywhere in the world, but notably in poorer nations [1]. Inhaling tobacco smoke from others is referred to as passive smoking. Passive smoking is widespread, and this environmentally friendly tobacco smoke contains several strong respiratory irritants. Children who are exposed to passive smoking have a higher chance of developing respiratory conditions such as asthma, bronchitis, and pneumonia. A common, significant, and avoidable risk factor for respiratory issues is passive smoking, especially in children [2]. The prevalence of passive smoking exposes people to numerous strong respiratory irritants. Parental smoking has been associated with respiratory symptoms and deteriorated lung function in children. Numerous studies have shown that adult involuntary tobacco consumption causes a considerable decrease in pulmonary function. Additionally, elevated serum concentrations of total IgE have been associated with passive smoking [3]. The respiratory health of the community will be greatly improved by reducing passive smoking. Few studies suggested that current maternal smoking is more closely connected to the prevalence of respiratory problems in schoolchildren than past maternal smoking [3]. Smoking has been shown to enhance allergy symptoms because it increases bronchial reactivity in smokers and causes a significant immunological imbalance in those who are exposed [4]. In children smoking exposure is very dangerous as it can cause many respiratory illnesses or allergic reactions. More than 4,000 compounds that could be harmful to humans are present in tobacco smoke. Adolescent smoking initiation is influenced by a variety of factors, including neurobiological and genetic factors, psychosocial factors, and the smoking practices of peers and family members [5].

Although the links between passive Environmental Tobacco Smoke exposure in childhood and adult lung cancer are less definite, there is diagnostic evidence of mutagenesis linked to passive ETS exposure in childhood [6]. Some studies suggested that passive smoking increases the risk and severity of asthma and respiratory symptoms in adulthood [7]. According to reports, around the world, 40% of youngsters are exposed to secondhand smoke (SHS). According to estimates, regularly 2 million children are exposed to SHS at home. Therefore, passive smoking represents a serious threat to the health of millions of children [8].

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Received: July 27, 2023; Revised: February 02, 2024; Accepted: February 26, 2024
DOI: https://doi.org/10.37184/lnjpc.2707-3521.6.34

  ISSN: 2708-9134 (Online) Liaquat National Journal of Primary Care 2024; 6(2): 136-140

A survey of 60 studies revealed that young children exposed to passive smoking at home have a 20% to 50% higher risk of having lower respiratory tract infections [9]. The onset of childhood asthma and wheezing is facilitated by passive smoking during and after pregnancy. Particularly, wheezing in children under the age of four is linked to smoking during pregnancy [10]. Smoking during pregnancy has an effect at all stages, but it appears that stopping before the third trimester will limit some of the effects. Indoor factors that are most frequently associated with respiratory morbidity are mold growth and ETS, but their roles in the development of allergic asthma remain unknown. There is still ambiguous and contentious evidence associated with the risk of asthma to the fumes from gas cooking, dust mites pet allergies, and other factors [11]. Moreover, some studies suggested that Parental smoking does not affect the prevalence of allergic asthma in school-age children (5–16 years). However, both asthmatic and non-asthmatic children suffer from respiratory symptoms that are influenced by parental smoking. Children who are exposed to ETS experience 20–40% more wheezing, coughing, phlegm, and shortness of breath [12]. Smoking cessation programs offered to parents of children hospitalized for respiratory illnesses and pregnant women attending prenatal clinics seem to high success rate. This study aims to evaluate the association between passive smoking exposures and respiratory health in children. Giving individuals the knowledge that they need to protect themselves from community passive smoking will have a significant positive impact on their respiratory health.

Children's exposure to environmental tobacco smoke is a widespread issue, with wide global reviews suggesting that currently, 39-71% of children are subjected to passive smoking [13]. There is no evidence that parents of symptomatic children are more likely to underreport their smoking than other parents, according to a European study that compared the deliberate nicotine concentrations in-home air to reported parental smoking. The study estimated a misclassification rate of about 6% [14]. The aspects of passive smoking differ from those of successfully breath in standard smoke because it consists of 85% side stream smoke from smoking tobacco and 15% standard smoke. There is evidence that tobacco exposure in occupational settings causes' lung cancer in non-smoker adults, which is likely to contribute to contrasts in the strength of the relationship between active and passive smoking with adverse well-being results in epidemiological studies [15].

MATERIALS AND METHODS

This study was a cross-sectional study conducted in two public tertiary care hospitals in Hyderabad and Jamshoro from October 2022 to January 2023. Children aged up to 12 years who attended the pediatric OPD at the selected hospitals for routine checkups were selected. The subjects were selected using a consecutive sampling technique. sampling, according to the inclusion and exclusion criteria. All those children who came along with their parents to attend the pediatric OPD aged up to 12 years were included in this study while children suffering from malignancies and other health issues such as chest infection and congenital pulmonary airway malformation were excluded. Parents who were unwilling to participate were also excluded from our study.

The sample size was calculated by using Open Epi sample size calculation by keeping the percentage of the prevalence of respiratory symptoms among children" as 21.4% with a confidence interval of 95%, margin of error of 6%, and significance level of 0.05, minimum sample size 180 was obtained. After adjusting for the 20% non-response a sample size of approximately 217 was obtained to achieve the study objective.

Data collection was carried out using a self-administered structured questionnaire. The questionnaire had three sections in the first section (I) demographic data about the child and parents, section II contained questions regarding passive smoking and the smoking status of other family members, and their habits of smoking and section III had information regarding respiratory symptoms of the children experienced in the last 30 days. Information regarding socio-demographic information such as the child's age, child's gender parental education, and income was collected. Information regarding parents' smoking status along with other family members' smoking habits for passive smoking among children was also asked. Mothers were specifically questioned about alternative smoking practices, encompassing the use of substances such as huqa or birri. The study gathered detailed information on respiratory symptoms, which are indicative of potential health implications associated with smoking. These symptoms included morning cough (predominant in the morning upon waking, potentially linked to conditions like bronchitis or asthma), daytime cough (occurring throughout the day, excluding the morning, suggestive of airway irritation or inflammation), wheezing (characterized by a high-pitched whistling sound during breathing, often associated with narrowed airways as seen in asthma or bronchitis), phlegm production (the secretion of mucus or phlegm from the respiratory tract, with increased production possibly indicating respiratory infections or chronic conditions), shortness of breath (a sensation of breathlessness or difficulty breathing, commonly associated with various respiratory conditions), getting tired easily (fatigue or exhaustion occurring more quickly than usual during physical activities, potentially linked to compromised respiratory function), and pain in the chest (discomfort or pain in the chest area, with various potential causes, including respiratory issues such as inflammation, infection, or muscle strain).

The information regarding respiratory symptoms such as morning cough, daytime cough, wheezing, phlegm

production, shortness of breath, getting tired easily, and pain in the chest were also recorded.

The Statistical Package for Social Sciences (SPSS version 22.0) was used for analysis. Pearson's chi-square test and T-test were used for continuous and categorical variables respectively.

The Ethics Review Board of the selected hospitals and SZABIST University permitted to conduct this study. Informed consent was taken from the participants.

RESULTS

A total number of 217 children with a mean age of 6.4 years (±5.0) years participated in the research. Results show that 111 out of 217, 51.2% of children were of age between 0-6 years, while 48.8% of 7-12 years are included in this research study. Out of them 97 (44.7%) are male and 120 participants (55%) are females. Almost 62% (n=135) of participants belong to rural areas and only 37.8 % (n=82) belong to urban areas. Table **1**.

Table 1: Socio-Demographic Characteristics of Children Up To 12 Years, N=217.

Variables	Frequency (n = 217)	Percentage (%)
Age		
0-6 years	111	51.2
7-12 years	106	48.8
Gender		
Male	97	44.7
Female	120	55.3
Parental Education Level		
Primary	71	32.7
Secondary	52	24
University degree	31	14.3
Uneducated	63	29
Number of Siblings		
One	45	20
Two	37	17
Three	36	16
More than Four	99	46
Residential Status		
Urban	82	37.8
Rural	135	62.2

Table 2: Smoking habits of parents and exposure to passive smoking among their children age up to 12 years N=217.

Variables	Children with Respiratory Symptoms n(%)	Children without Respiratory Symptoms n(%)	OR (95 % CI)	P value
Smoking Status of Parents			1.73 (1.00-2.99)	0.049
Yes	48(47.1)	54(52.9)		
No	39(33.9)	76(66.1)		
Active smokers in the household			1.58 (0.91-2.77)	0.103
Yes	39(47)	86(53)		
No	48(35.8)	44(64.2)		
Passive Smoking			0.90 (0.519-1.56)	0.711
Yes	50(39.1)	78(60.9)		
No	37(41.6)	52(58.4)		

CI: Confidence interval, **OR:** Odds ratio

Table **2** shows the smoking habits of parents, measured as only 47.1% % (n=48) said 'Yes' that they are active smokers (smoking includes cigarettes and birri) and the remaining 33.9% (n=39) denied smoking.

Table **3** shows the symptoms of respiratory health, each symptom is explained here separately and according to the analysis of symptoms like coughing, and shortness of breath. and getting tired easily show a statistically significant association whereas wheezing chest pain and phlegm production show a non-significant association with passive smoking exposure among children up to 12 years of age, experienced in the last 30 days for more than 2 times/week.

Table 3: Signs and Symptoms of respiratory health associated with passive smoking exposure among children up to 12 years of age, experienced in the last 30 days.

Respiratory Symptoms	n (%) No/Never	n (%) Yes	p-value
Coughing			0.038
Age 0-6 years	29 (26.9)	81(73.1)	
Age 7-12 years	17 (15.0)	90(85.0)	
Wheezing and Chest Pain			0.086
Age 0-6 years	14 (12.7)	96(87.3)	
Age 7-12 years	23(21.5)	84(78.5)	
Phlegm Production			0.380
Age 0-6 years	82(73.6)	29(26.4)	
Age 7-12 years	72(68.2)	34(31.8)	
Shortness of Breath when Running/Exercise/Walking			0.035
Age 0-6 years	10(8.2)	101(91.8)	
Age7-12 years	18(17.8)	88(82.2)	
Getting Tired Easily			0.003
Age 0-6 years	88(79.1)	24(20.9)	
Age 7-12 years	63(59.9)	42(40.1)	

The row and column total for this table does not add to the sample size due to multiple responses.

DISCUSSION

In this study, we showed that in children aged up to 12 years residing in Hyderabad and Jamshoro, passive smoking was associated with an increase in respiratory symptoms. Parental smokers were advised on the risks of child exposure to tobacco smoke or ETS for children and to report an association between passive smoking of mother/father and other family members and respiratory symptoms among children aged up to 12 years to be associated with morning cough, daytime cough, shortness of breath while walking and running. In this study, it was found that children's exposure to cigarette smoke at home was much higher in families that identified themselves as being in a difficult financial situation and in households where the father had a poor level of education. According to reports, smoking continues to be more prevalent among the poor and less educated, precisely the families who are least able to bear the financial burden. Another study found the proportion of the percentage of children aged 7 to 12 who were in a home where a current smoker was present was approximately 50% [4]. This likely reflects

how much time children spend at home at different ages and how likely it is that adolescents are exposed to other sources of exposure, such as peer group smokers. Numerous studies have found a strong association between exposing children to cigarette smoke at home and a range of lower respiratory symptoms, such as wheezing, cough, and phlegm [12] as well as more absences from school due to respiratory illnesses and visits to the doctor for wheezing infections [13, 14]. A study reported that smoking is thought to contribute to approximately 60,000 premature deaths annually. 31% of deaths are attributed to SHS children. Similarly [15, 16], a Scottish study found an association between salivary cotinine levels among children aged between the 2nd and 12th year old and the number of smokers in the household as well as how frequently they smoke. The authors discovered a positive association between children's respiratory issues and passive smoking [17].

Exposure to tobacco smoke during childhood is strongly associated with respiratory health issues. However, the correlation between habitual snoring and the impact of tobacco smoke on the upper airway diminishes as children progress through their school years. [18, 19].

The WHO evaluated that nearly half of the world's pediatric population, or 700 million youngsters/children, are thought to be significantly exposed to secondhand smoke [20, 21]. The incidence of pediatric lower tract infections increases with exposure to passive smoke, according to a comprehensive review and meta-analysis of 60 studies (OR both smoking parents 1.54-95% CI 1.40-1.69-vs OR single smoking parent 1.22-95% CI 1.10-1.35) [10]. A study was conducted in the United States) CT in which children between 6 months to 18 years residing in 161 different CT cities, passive smoking exposure was linked to more severe asthma (adjusted relative risk ratios, or aRRRs, for mild and moderate persistent asthma, respectively, were 1.07 (1.00, 1.15) and 1.11 (1.02, 1.22)) [21, 22]. Additionally, passive smoking has a significant negative effect on lung health, including decreased lung function, increased coughing and sputum production, and discomfort in the chest [23]. The health of children who are exposed to passive smoking is negatively impacted for their lifelong, and the health care system is significantly burdened as a result. Children spend most of their time at home and indoors, the home is a significant source of exposure. Unlike adults, who may decide to be in a Smoke-free environment, children have little control or choice over their exposure to passive smoking. Therefore, it is still unclear whether ETS exposure in children who are older than infants can cause asthma to develop from scratch or if it merely serves as a trigger for the symptoms of asthma that have already developed. Analysis from the Global Burden of Disease Study 2017 estimated that 63,822 pediatric (<10 years of age) deaths worldwide were ascribable to SHS exposure that year (GBD 2017 Risk Factor Collaborators, 2018) [24, 25].

In the current study, 62% of children belong to rural areas and that is why it has low awareness regarding the effect of passive smoking exposure on respiratory health. We investigated those children who were exposed to tobacco smoke having more respiratory issues. It shows a statistically significant association between the age of the children and respiratory symptoms in which symptoms last for 2 times/week like coughing in the morning or during day time show a significant association p-value 0.038 n=91(85%) with age 7-12 years. Although phlegm production shows no association n=81(73%) p-value 0.380, shortness of breath while walking and running shows a significant association 82% and p value 0.035 with age group 7-12-year-old children and in the last-child getting tired easily is also one of the symptoms of respiratory illness n=64 (59%) experiences with age group 0-6-year-old children also show positive association p-value 0.003 [26].

A significant correlation was found between tobacco exposure and respiratory symptoms, one of the finest studies in my area of research to date as per my knowledge of the impact of passive smoking on respiratory health, has examined subjective effect markers, such as symptoms, and reported asthma. These factors make the investigation strong. The main limitation is that it is a cross-sectional study and we lack information about the duration of tobacco exposure. With a small sample size a prospective longitudinal study should also be conducted so that the results will be more generalized so that we comment on the duration of exposure.

CONCLUSION

In this study, it was discovered that parents of children with asthma/respiratory issues smoked more frequently. The negative impacts of tobacco smoke exposure on children must be made known to parents. Improved respiratory health is predicted to result from lessening community-wide and specifically public areas/workplace exposure to cigarette smoke.

Public health implication: Children are more prone to passive smoking exposure because they breathe more quickly than adults and therefore breathe in more pollutants per pound of body weight. Additionally, because they frequently use their hands to mouth, children consume higher levels of cigarette smoke pollutants. The home is a significant source of exposure because children spend more time in the home than outdoors, so it is very important to guide the smokers' parents need to be informed that their kids might get sick from breathing in tobacco smoke. Moreover, this study will reveal that the policy of banning smoking in public areas will influence attitudes and social norms against passive smoking exposure.

ETHICAL APPROVAL

Ethical approval was obtained from the Institutional Review Committee of Liaquat University Hospital (LUH), Hyderabad/Jamshoro (REF letter No.: LUH/

Estt/69915/20). All procedures performed in studies involving human participants were following the ethical standards of the institutional and/ or national research committee and with the Helsinki Declaration.

CONSENT FOR PUBLICATION

Written informed consent was taken from the participants.

AVAILABILITY OF DATA

The data set may be acquired from the corresponding author upon a reasonable request.

FUNDING

Declared none.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGEMENTS

Declared none.

AUTHORS' CONTRIBUTION

All the authors contributed equally to the publication of this article.

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