

Knowledge and Practice of Asthmatic Children's Parents About Daily Air Quality

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Background: Knowledge and practice about air pollution are essential subjects in special groups such as cardio-pulmonary patients. For children with air pollution-related diseases, knowledge and attitude of parents play a determining role in this respect. Since providing a coherent curriculum needs evidence-based information, this survey was conducted to assess the knowledge and practice of asthmatic children's parents about daily air quality since asthmatic children are among the most vulnerable at-risk groups when it comes to air pollution.

Materials and Methods: All parents of asthmatic children referred to the Pediatric Clinic of Masih Daneshvari Hospital during one year period (250 people) completed knowledge and practice questionnaire on air pollution. Knowledge questions consisted of familiarity with pollution standard index (PSI), ways to find out about it, respiratory effects of air pollution and etc. Practice questions consisted of reducing outdoor presence and activity of children and actions taken to reduce air pollution in polluted days.

Results: In general, 3.2% of parents were familiar with PSI, 12.5% were aware of ways to find out about daily air quality, 65.2% were aware of air pollution respiratory effects, 65.6% were aware of air pollution effects on asthmatic children and 4.4% were aware of ineffectiveness of surgical masks in prevention of air pollution health effects. The obtained practice score ranged from 4 to 16, and the participants' mean score was equal to 11.79.

Conclusion: This study revealed that parents of asthmatic children were aware of air pollution hazards for their children and wanted to prevent them but they did not know how. Therefore, asthmatic children in Tehran are still exposed to risks of air pollution.

Key words: Knowledge, Practice, Air pollution, Asthmatic children, Parents

INTRODUCTION

Air pollution is among the biggest environmental dilemmas worldwide threatening the lives of living creatures (1). In Iran, similar to many other countries, air pollution is among the biggest bio-environmental issues especially in metropolitans like Tehran. Studies have shown that Tehran's air pollution dilemma is very serious compared to global standards (2). The share of loss due to outdoor air pollution compared to indoor in Tehran is 83%

versus 17% (3). It should be noted that the main cause of air pollution in Tehran is its heavy traffic (4).

According to reports by the World Health Organization (WHO) in 2009, the estimated annual mortality rate related to outdoor air pollution was 9,100 individuals with a DALY equal to 1. This rate for indoor air pollution was 300 individuals with a DALY=0.1 (5).

It has been found that air pollutants such as small particles, nitrogen dioxide, sulfur dioxide and especially

black carbon particles and ozone can lead to asthma attacks or their exacerbation. Direct correlation of air pollution and asthma has been demonstrated in several studies and this correlation has been found to be stronger than the relationship of food allergens with asthma. The prevalence of asthma due to air pollution in girls is higher than in boys. Furthermore, living within 100 m distance from highways (and probably pollution sources) is among the asthma risk factors. This risk increases as the mentioned distance decreases. Pollution due to power plants in the United States causes 550,000 asthmatic attacks per year (6- 8).

According to a report by the Ministry of Health of Iran in 2003 based on national and international (WHO) surveys, the prevalence of asthma was 14.7092 in 0-4 year old boys, 32.5616 in 5-14 year old boys, 8.4005 in 0-4 year old girls and 19.4479 in 5-14 year old girls out of every 1000 individuals (9).

The correlation between air pollution and asthma in Tehran as one of the most polluted cities worldwide was demonstrated in a study by Masjedi et al. They showed that hospital admissions due to asthma had a significant correlation with nitrogen dioxide and sulfur dioxide concentrations in the air (10).

In general, bio-environmental pollution has turned into a crisis and is worsening day by day. Humans are the main cause of pollution and thus, pollution control actions are now focused on social science (11).

Fardi in his study mentioned that public education and enhancing people's knowledge is a potential factor for decreasing air pollution in Tehran (12). Awareness about bioenvironmental dilemmas is defined as a combination of knowledge, attitude and value in interaction with environment (13). Knowledge about air pollution is especially important in specific groups such as cardiopulmonary patients. Wen et al, in their study on asthmatic adults regarding changing or reducing their outdoor activity at times of air pollution alerts demonstrated that knowledge about the media and health specialists' recommendations may be associated with

change of outdoor activity (14). For children with air pollution-related diseases, knowledge and attitude of parents play a determining role. A study in the United States showed that most parents of asthmatic children were aware of air pollution advisories and complied with them. Knowledge of the parents of asthmatic children in this respect was greater than that of parents of non-asthmatic children (15).

No previous comprehensive study has evaluated the knowledge and practice of parents of asthmatic children regarding daily air quality in Iran. On the other hand, compiling a comprehensive educational program needs evidence-based data. Thus, the purpose of this study was to evaluate the knowledge and practice of parents of asthmatic children in Tehran about daily air quality since asthmatic children are among the most vulnerable at-risk groups when it comes to air pollution and it is necessary to enhance the knowledge of their parents in this respect.

MATERIALS AND METHODS

This cross-sectional study was conducted in the Pediatric Pulmonary Clinic at National Research Institute of Tuberculosis and Lung Disease, Masih Daneshvari Hospital during 2012-2013. The understudy population comprised of all parents of asthmatic children presenting to the mentioned clinic during this time period.

All parents (father, mother or both) of asthmatic children presenting to the Pediatric Pulmonary Clinic at Masih Daneshvari Hospital during 2012-2013 who were willing to cooperate and participate in this study were enrolled. Knowledge and practice questionnaire about air pollution was administered among them whenever the parents were present in the clinic. The questionnaires were filled out by the parents in presence of a trained technician. The technician emphasized the importance of accurately filling out the questionnaire. If the parents were not able to personally fill out the questionnaire, the technician did it for them. After completion of questionnaire, an educational pamphlet specifically designed for this purpose was given to them. The inclusion criterion was parents of children

with confirmed diagnosis of asthma by a pediatric physician. The exclusion criteria were not willing to participate in the study and residing outside the city of Tehran.

A pilot questionnaire was first prepared according to the questionnaires used in similar previous studies, Tehran's air pollution status and language and culture of Iranians. The questionnaire was given to several experts in the field to assess its validity and reliability. The pilot study was conducted one month ahead of the main project and the Cronbach's alpha was found to be 86%.

The questionnaire started with some information regarding the importance of the project and asked for demographic characteristics of children and their parents. Knowledge questions included knowledge about the PSI, ways to find out about daily air pollution status, the effect of air pollution on respiratory diseases, effect of surgical masks on prevention of adverse health effects of air pollution and the most important source of Tehran's air pollution. The practice questions included reducing the outdoor presence and activity of children, measures taken to reduce air pollution such as curbing the use of vehicles in polluted days as recommended by the authorities or out of their own sense of obligation to do so. Parents' response to each question was evaluated. Furthermore, to assess the correlation of knowledge and practice with study variables, the knowledge and practice scores of parents were calculated and categorized.

To follow ethical guidelines, parents willingly filled out the questionnaires and provided written informed consent. All personal information remained confidential. After completion of 250 questionnaires, data were analyzed using SPSS version 15 software. In order to use chi-square test for the assessment of correlation between variables, the knowledge and practice scores of parents were categorized into poor, moderate, and good categories.

RESULTS

A total of 250 parents of asthmatic children received questionnaires; of which, 247 filled out the questionnaires almost completely and entered the study. The participants

were 160 mothers and 87 fathers. The mean age of asthmatic children was 7.5 years. The mean age of parents was 36.5 years. There were 35.2% asthmatic girls and 63.2% asthmatic boys. In terms of level of education of parents, 0.4% of parents were illiterate, 26% had high-school education, 52.4% had high school diploma and 18.8% had higher educational levels. The mean monthly income of families was 7,280,000 Rials.

As described earlier, the main part of questionnaire had 2 sections: 6 questions about knowledge and 4 questions about practice of parents regarding air pollution and its effects on asthma. Parents' responses to the first 5 questions regarding knowledge (with answers of yes, no and I'm not sure) are summarized in Table 1. In the first 4 questions, "yes" was the correct answer while for the last question (bolded in the Table), the correct answer was "no". According to Table 1, 3.2%, 12.5%, 65.2%, 65.6% and 4.4% of parents were aware of the PSI index, how to find out about daily air quality, effects of air pollution on respiratory diseases, effects of air pollution on asthmatic children and ineffectiveness of surgical masks for prevention of air pollution health effects, respectively.

In response to the last question in the knowledge section regarding the most important source of Tehran's air pollution, 87%, 5.2% and 0.8% believed the main source to be cars and motorcycles, factories and industries and household pollutants, respectively; 8% of parents did not answer to this question.

Parents' responses to performance questions are summarized in Table 2. At days with media alerts regarding high air pollution, 48.9% of parents usually decreased their child's outdoor activity and 49.7% of parents curbed use of vehicles. Also, at days when parents felt the air was highly polluted, 41.2% usually decreased their child's outdoor activity and 44.5% of parents curbed use of vehicles.

To determine the practice score of parents who had personal car, the following scoring system was used:

Never: score 1, Sometimes: score 2, Often: score 3, Always: score 4. The obtained practice score ranged from 4

to 16. The mean score gained by participants was 11.79 (SD=2.36).

The correlation of overall knowledge and practice score of parents of asthmatic children about outdoor air pollution with level of education and income was assessed. Level of knowledge of parents was not significantly correlated with their level of education but, in group with the lowest knowledge, 20% had high school diploma or higher level of education; in group with moderate level of knowledge, 72.3% and in group with the highest level of knowledge 73.7% had high school diploma or higher educational levels.

Level of knowledge was not associated with the family's level of income either. But, it should be noted that 100% of subjects with the lowest level of knowledge belonged to the low-income group (monthly income less than 7, 500,000 Rials).

The practice of parents of asthmatic children about outdoor air pollution had a statistically significant association with their level of education (Table 3). As observed in Table 3, none of the parents with educational level higher than high school diploma had poor practice. No significant association was detected between the practice of parents and level of income.

Table 1. Parents' responses to knowledge questions regarding air pollution

Questions	Yes	No	I am not sure	Total
	No. (%)	No. (%)	No. (%)	No. (%)
Knowledge about the concept of PSI	8 (3.2)	239(96.7)	-	247 (100)
Knowledge about how to find out about daily air quality	31 (12.5)	216 (87.4)	-	247 (100)
Effect of air pollution on respiratory diseases such as asthma	161(65.2)	0(0)	86 (34.8)	247 (100)
Effect of air pollution on their asthmatic child's condition	162 (65.6)	1 (0.4)	84 (34)	247 (100)
Effect of surgical masks on preventing air pollution health effects	82 (33.2)	11(4.4)	153(61.9)	246 (99.5)

*It should be noted that considering the question designs, the "I am not sure" response option did not apply to the first 2 questions.

Table 2. Parents' responses to practice questions regarding air pollution

	Always	Usually	Sometimes	Never	Total
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Reducing the child's outdoor activity at days with media alerts regarding air pollution	73 (29.5)	121(48.9)	44 (17.8)	4 (1.6)	242 (97.9)
Reducing the child's outdoor activity at days when parents feel the air pollution rate is high	72 (29.1)	102 (41.5)	63 (25.5)	6(2.4)	243 (92.3)
Not using personal car at days with media alerts regarding air pollution	19 (7.6)	123 (49.7)	39 (15.7)	6(2.4)	187 (75.7)
Not using personal car at days when parents feel the air pollution rate is high	18 (7.2)	110 (44.5)	53 (21.4)	6 (2.42)	187 (75.7)

*It should be noted that of 247 participants, only 187 had personal car and all of them answered to the last two questions.

Table 3. Parents' performance about outdoor air pollution based on their level of education

Performance	Level of education of parents			Total
	Below high school diploma	High school diploma	Higher than high school diploma	
Poor	40%	60%	0%	100%
Moderate	29.7%	51.7%	18.6%	100%
Good	12.7%	49.2%	38.1%	100%

*It should be noted that illiterate parents were not included in the analysis due to their small number

DISCUSSION

In general, the obtained results revealed that parents of asthmatic children did not have acceptable level of knowledge about air pollution but in terms of performance, they were willing to act properly.

The most important question in the knowledge section was the concept of PSI and of 250 parents, only 8 (3.2%) were familiar with this concept. This indicates that in our community, even parents of asthmatic children who are at risk and most susceptible to air pollution are not familiar with the most important index of daily air pollution. In a study by Rabiee et al, in Isfahan before conduction of an educational maneuver in the city, of 408 individuals only 24 (5.9%) were familiar with the concept of PSI (16); which is comparable with our obtained result. However, specific groups such as the asthmatic children's parents were expected to have higher level of knowledge in this respect. Of all parents, only 31 (12.5%) were aware of ways to find out about daily air quality and mentioned Internet, TV and billboards in the city. This issue indicates that even if people and at risk groups are aware of the PSI and want to plan their daily activities based on daily air quality, they do not know how to find out about it. Unfortunately, there are no user-friendly, easy-to-learn techniques to find out about air quality in Tehran and access to the website of the air quality control in Iran and city billboards has its own limitations. Dorevitch et al, in their study in Chicago showed that 62% of people knew how to find out about daily air quality (17).

About 65% of participants were aware of the effects of air pollution on respiratory diseases and particularly asthma in children; which is an acceptable rate. But, the question is whether there is sufficient awareness about daily air quality in Tehran in order for the parents to decrease their asthmatic child's outdoor activity. In Utah and Lake City in the United States, 93% of asthmatic children's parents were aware of the effects of air pollution on their child's condition (15).

Only 11 subjects selected the answer "no"; which was the correct answer to the question whether the surgical

masks could prevent the harmful health effects of air pollution. Even old studies have confirmed the ineffectiveness of surgical masks for this purpose (18, 19). This misinterpretation may cause a high-risk group such as asthmatic patients to stay longer in polluted environment because of wearing surgical masks. Thus, it is especially important to enhance the public knowledge in this respect. In general, very low level of knowledge gained by parents about factors discussed in the questionnaire such as the PSI that play important role in people's practice, indicates the poor public awareness in this regard.

The mean practice score of parents was 11.79 (range 4 to 16); which was overall acceptable and shows the parents' intention to reduce their child's outdoor activity and not using personal cars in polluted days. Furthermore, 87% of participants knew that cars and motorcycles are the most important sources of air pollution in Tehran. Knowledge in this respect may change their performance towards reducing air pollution. However, the problem is, they are not aware of the PSI or ways to find out about daily air pollution rate. Additionally, the public transportation system in Tehran is weak and it is not always possible not to use personal car. In the United States, 79% of asthmatic children's parents tried to decrease pollution and 64% restricted their child's outdoor activity in polluted days (15).

This study showed that asthmatic children's parents are aware of the risks of air pollution for their children's condition and try to prevent these risks but they do not know how to do it because they are not familiar with the PSI and do not know how to find out about daily air quality. Furthermore, in many cases, they cannot reduce their child's outdoor activity or have to use personal car. As a result, asthmatic children are at constant risk of air-pollution health hazards in Tehran.

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