



Assessment of mother's awareness regarding indoor asthma triggers

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Highlights

- A high percentage of mothers have knowledge about indoor pollutants.
- Spraying pesticides is one of the most prevalent asthma triggers among participants.
- Ventilation is used commonly by mothers as a control measure to reduce indoor pollutants.
- Most mothers are ready to be educated about asthma triggers.

ARTICLE INFO

Article history:

Received 26 February 2019
Revised 24 September 2019
Accepted 26 September 2019
Available online 02 October 2019

Keywords:

Asthma triggers, allergic asthma, and indoor pollutants.

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ABSTRACT

An indoor air pollutant is a very real and dangerous thing because is far more than outdoor air. A pollutant is any harmful contaminant in the air; therefore, indoor air pollution is when pollutant from substance contaminate the air indoors, such as gas, particles, rectifiers, disinfectants, tobacco smoke, spices, perfumes, and fungi that are inside the house. The objective of this study is to assess mothers' knowledge about indoor asthma triggers and their impacts on children's health. The researcher prepared a questionnaire for mothers and distributed it to children in schools for interviews. The study used children and their mothers, asthma triggers and mothers' knowledge. The cross-sectional study started in January to June 2017 descriptive design was used: population of the study included all students at Othman Ben Afan elementary school in Benghazi city. 42% of mothers do not use incense every day. Most of the mothers who answered the questionnaire read precautions posted on the label of detergent before using and 25% of mothers whose children with allergic asthma. Most of the mothers use ventilation as a control measure. The results showed a high percentage of mothers have knowledge about indoor pollutants. Besides, moderate percentages of mothers have been spraying pesticides indoors.

1. Introduction

Asthma affects about 10% to 15% of children worldwide, and affects an estimated 300 million individuals worldwide with an expected increase to 400 million worldwide by 2025. Childhood asthma prevalence ranged from 2.1% in developing to 32.2% in developed countries (Kiley and Morosco, 2007)

We all face a variety of risks to our health in our daily activities (IOM, 2000). Driving in cars, flying in airplanes, engaging in recreational activities, and being exposed to environmental pollutants all pose varying degrees of risk. Some risks are simply unavoidable. Some we choose to accept because to do otherwise would restrict our ability to lead our lives the way we want. Some are risks we might decide to avoid if we had the opportunity to make informed choices. Indoor air pollution and exposure to hazardous substances in the home are risks we can do action in this regard (Kiley and Morosco, 2007; IOM, 2000; Breyssee *et al.*, 2010; Mahmoudi, 2007; Noonan *et al.*, 2010)

In the last several years, a growing body of scientific evidence has indicated that the air within homes and other buildings can be more seriously polluted than the outdoor air in even the largest and most industrialized cities. Other researches indicate that people spend approximately 90% of their time indoors. Thus, for many people, the risks to health from exposure to indoor air pollution may be greater than risks from outdoor pollution. In addition, people exposed to indoor air pollutants for the longest periods are often those most susceptible to their effects. Such groups include the young, the elderly, and the chronically ill, especially those suffering from respiratory or cardiovascular disease (Kiley and Morosco,

2007; IOM, 2000; Breyssee *et al.*, 2010; Mahmoudi, 2007; Noonan *et al.*, 2010).

Asthma is a disease of the respiratory system characterized by the occurrence of intermittent attacks, reversible airflow obstruction, severe shortness of occasional incidents of cough and wheezing which accompanied with hypersensitivity resulting from exposure to environmental pollutants during the early years of childhood (Peat *et al.*, 2001). Symptoms are changing from person to person, ranging from mild to severe, and happen in both asthma caused by allergies and that occurs as a result of non-sensitive and can include; cough, wheezing, difficulties during breathing, constriction in the chest, and excess in the mucus secretion (Kiley and Morosco, 2007; IOM, 2000; Breyssee *et al.*, 2010; Mahmoudi, 2007; Noonan *et al.*, 2010).

Any person can have asthma regardless of race, culture age, or even gender. However, family history can increase the likelihood of developing asthma. People who suffer from allergies more vulnerable to asthma are children. Asthma usually occurs when children at the age of five, and adults in the third decade, and can also be infected by older people, with about 10% of asthma cases are diagnosed after the age of 65 (Kiley and Morosco, 2007; IOM, 2000; Breyssee *et al.*, 2010; Mahmoudi, 2007; Noonan *et al.*, 2010).

There are two basic types of asthma: extrinsic asthma (allergy) and endogenous asthma (not because of sensitivity). In many cases, a person can develop both types together, which is a mixture of external and internal origin. External origin asthma is more prevalent among children and adolescents and usually disappears with age and with avoiding allergens factors (Kiley and Morosco, 2007; IOM, 2000; Breyssee *et al.*, 2010; Mahmoudi, 2007; Noonan *et al.*, 2010).

2. Literature review

Several surveys about the occurrence of asthma among children have been made in many countries, based on, data from epidemiological cross-sectional and longitudinal studies revealed a wide range in the prevalence and incidence of asthmatic children (Beasley et al., 2003; King et al., 2004). A standardized questionnaires were used by the International Study of Asthma and Allergies in Childhood (ISAAC) to measure the prevalence and symptoms of asthma among children aged from 6-7 years, and 13-14 years from 156 centers in 56 countries; the survey has covered more than 750,000 children, the results showed that the prevalence of wheezing in the previous 12 months ranged between 1.6 to 36.7% (Weiland et al., 2004).

A study was conducted at high school students in the city of Riyadh in the Saudi Arabia Kingdom. The study sample is stratified which consists of 500 students. The results showed that the total secondary students who had asthma in the city of Riyadh during the academic study year 1419/1920 are 1840 students are suffering from a rate of 4.9% of the total students 38,544. There was an excess in the proportion of chronic diseases, which include asthma. There is a clear difference in incidence between neighborhoods in the city of Riyadh in the neighborhood compared with suburban areas in the city. Besides, the study showed the times of morning and evening during the day are the most significant periods; respondents experienced asthma and irritation as a result of the high concentration of nitrogen oxides, sulfur, and ozone gas as which are made by the interaction of hydrogen carbonates and oxides of nitrogen in the presence of light. 40.4% of the respondents had smokers among the members of their families and this makes them more susceptible to have asthma. In addition, the study showed that indoor environmental factors such as dust and odor are the most trigger for asthma. Therefore, it is acceptable to suggest that the fluctuations in asthma prevalence are greatly related to environmental factors. Since the majority of people spend most of their times indoors, the quality of indoor air is significantly more important than that of outdoor air. Many studies showed that nitrogen oxides emitting from gas cookers have been associated with respiratory symptoms. Besides, some studies showed evidence that asthma is associated with formaldehyde and other volatile organic compounds in environments of schools and homes. Such compounds are emitting from items such as furniture which are irritating to the respiratory system and cause allergy (Kiley and Morosco, 2007; IOM, 2000; Breysee et al., 2010; Mahmoudi, 2007; Noonan et al., 2010).

Asthma is a disease which is caused by many factors including allergic and environmental ones; when interact they will worsen allergic inflammation in the lower respiratory tracts (Al-Jahdali et al. 2007). All people may develop asthma from all ages but most studies had made suggested those children made the majority who develop asthma. Therefore, children are most commonly affected by asthma. Fortunately, about 50% of children are affected by asthma; the symptoms will decrease in adulthood (Expert panel report 2.1997).

3. The objective of the study

The objective of the study was to assess the mothers' knowledge and awareness regarding indoor asthma triggers and their impacts on children's health.

4. Public health importance

Unfortunately, asthma is a common respiratory disease. Although, the mortality of asthma is low. Yet, the disease is tending to alarm anxiety of concern, especially among children. Since it is the major cause of hospital admission. The peak incidence of asthma is during the first five years of life. However, it can start at any age.

In many cases, it is difficult to distinguish asthma from other respiratory infections and other chronic respiratory diseases. Therefore, most surveys use the same methods to investigate asthma and artificial techniques in their surveys. The International Study of Asthma and Allergies among children (ISAAC, 1998) was conducted in 155 centers within 56 countries and the prevalence

of wheeze in the last 12 months in 13-14-year-olds was 29-32% in the United Kingdom. The European Community Respiratory Health Survey (ECRHS) was made in 48 centers within 22 countries, mostly in Western Europe. It showed a similar pattern to that found by ISAAC. The prevalence of specific IgE, a marker of atopic sensitivity, which is known to be associated with asthma, was much higher in the UK than in Iceland, Greece, Norway, Italy, and parts of Spain. Wherever a survey has been repeated after an interval of 10 years or more, in the same area using the same methods, the prevalence of asthma has been found higher. Most of these surveys have used questionnaires inquiring about symptoms (particularly wheeze) rather than asthma alone, so this excess is not merely attributable to a change in a diagnostic fashion (Weiland et al., 2004).

5. Methods

Epidemiological Design of the Study: A cross-sectional study started in January to June 2017 descriptive design was used.

5.1 Data collection method

The researcher prepared a questionnaire for mothers and distributed it to children in schools for interviews. The study used children and their mothers, asthma triggers and mothers' knowledge.

5.2 Questionnaire

The questionnaire consists of 18 questions and the type of questionnaire was a close-ended questionnaire. The first part of the questionnaire included five questions about demographic information. The second part was including questions about the indoor asthma triggers, which measure mother knowledge. The third part was including the questions about the practices of the mothers.

5.3 Preparation

The study included all students in Othman Ben Afan elementary school located in Benghazi city. The questionnaire was prepared by students based on Asthma triggers and respiratory symptoms. The number of questionnaires which had been distributed is 216.

The school was selected based on its location. The sample included all students from the first to sixth grade. The school was selected is Othman Ben Afan that located in Alkeesh area in Benghazi. In addition, most of the refugee families (displaced families). The difficulty was in choosing the school because most of the target schools were in conflict places. The data was input using the excel program to calculate the percentage as the parameter of interest.

6. Results

Table 1 the highest percentage (58.5%) of the mothers was in the age group 30-45 years and 35.3% of them was an undergraduate. Considering the work, more than half (67.1%) of the mothers were not working, 51.7% of mothers had more than five children and 60.4% of participants were living in an apartment. Most of the families included in the study have children with 96. %. Almost 46.5% of them from the age group 1-4 years. The results showed that children who live in an apartment is moderately high 60.4% comparing with who live in houses.

Table 2 presents measures of the knowledge of mothers about allergic asthma: the results showed that 95.2% of mothers had old and never made maintenance of buildings. 55.5% of mothers have knowledge about indoor pollutants. Around 31% of the mothers said there was indoor smoking. About 42% of the mothers did not use incense every day. The percentage of mothers who read the label of using materials before they apply them was 87.9% and a low percentage (25.1%) of them had knowledge about allergic asthma for children.

Table 3 presents the results according to the practices, which may increase the risk of asthma. A high percentage (66.7%) of the participants is spraying the pesticides indoor. A high percentage (94.2%) of mothers had knowledge about the importance of ventilation. A high percentage (96.1%) of mothers is ready to be educated.

Table 1

The full descriptive statistics for the sample.

Variable	Frequency	Percentage
Age		
Less than 30	10	4.8
30 – 45	121	58.8
Greater than 45	72	34.8
Missing	4	1.9
Total	207	100
Education	Frequency	Percentage
Postgraduate	1	0.5
undergraduate	73	35.3
secondary	60	29
Elementary or less	59	28.5
Not educated	10	4.9
Missing	4	1.8
Total	207	100
Work	Frequency	Percentage
Not working	139	67.1
Working	67	32.4
Missing	1	0.5
Total	207	100
Number of kids	Frequency	Percentage
1-2	14	6.8
3-4	79	38.2
5 or more	107	51.7
Missing	7	3.38
Total	207	100
Type of house	Frequency	Percentage
Apartment	125	60.4
house	78	37.7
missing	4	1.9
Total	207	100

Table 2

Descriptive statistics for questions that measure the knowledge

Variable	Frequency	Percentage
Maintenance		
Recent maintenance	88	42.5
Does not need (New)	54	26.1
Since two year	55	26.6
Old and never maintained	197	95.2
Missing	10	4.8
Total	207	100
Knowledge about indoor pollutants	Frequency	Percentage
Yes	115	55.5
No	91	44
Missing	1	0.5
Total	207	100
Indoor smoking	Frequency	Percentage
yes	64	31
No	142	68.5
Missing	1	0.5
Total	207	100
Outdoor smoking	Frequency	Percentage
yes	206	99.5
no	1	0.5
Total	207	100
No of times using incense	Frequency	Percentage
Once a day	82	39.6
Many times per day	30	14.5
Not every day	87	42
Never Use it	8	3.9
Total	207	100
Read label of using materials	Frequency	Percentage
Yes	182	87.9
No	21	10.1
Missing	4	1.9
Total	207	100
A child with allergic asthma	Frequency	Percentage
yes	52	25.1
No	154	74.4
Missing	1	0.5
Total	207	100

Table 3

Descriptive statistics for questions that measure the practices

Variable	Frequency	Percentage
Spraying pesticides indoor		
yes	138	66.7
no	68	32.7
Missing	1	.5
Total	207	100
Having wool toys	Frequency	Percentage
Yes	127	62.6
No	76	37.4
Total	207	100
Knowledge of the importance of ventilation	Frequency	Percentage
yes	195	94.2
No	10	4.8
Missing	2	1
Total	207	100
Effects of Humidity	Frequency	Percentage
yes	190	91.8
no	16	7.7
missing	1	.5
Total	207	100
Effects of paints	Frequency	Percentage
Yes	193	93.2
No	13	6.3
Missing	1	.5
Total	207	100
Ready to be educated	Frequency	Percentage
Yes	199	96.1
No	5	2.3
Missing	3	1.4
Total	207	100

7. Discussion

In the study, 216 questionnaires have been submitted to the students to take them to their mothers; 207 of the questionnaires have been returned. Thus, the response rate was very accepted 96%. In the table (1) demographic data for mothers show that more than half of the ages of mothers were between 30 and 45 years (58.5%). In addition, the majority of the educational levels of mothers were the undergraduate (35.3%). While those who are uneducated represent the lowest proportion in the sample with a percentage (4.9%). Most of the families included in the study have children with percent 96.6%. And 46.5% of them from the age group (1-4 years) and 25.1 % of their children have allergic asthma which should alarm our concern. There was evidence that exposure to air pollutants in the early years of life may increase the risk of asthma among children, in addition; many surveys have already made including cross-sectional and longitudinal investigations showed that asthma and wheezing are common among children (Beasley et al., 2003; King et al., 2004).

A moderate portion of the mothers was asked about indoor smoking, answered that family members smoke indoor (31%) in the presence of other family members: therefore the cigarette smoking represents one of the common asthma triggers in our study. The surgeon General's report issued in 2004 summarized; there was a causal relationship between smoking and wheezing among children (U.S. Department of Health and Human Services, 2004). On the other hand, several prospective types of research on the general community could not demonstrate excess in diagnosed asthma among children of smoking parents (Leeder et al., 1976; Grotmaker et al., 1982). However, many studies have been made recently, suggest that exposure in the early years of the life of children to tobacco smoke which is similar to vehicle exhaust is a mixture of air contaminants, is strongly related to the excess risk of developing asthma than is exposed in the later years of life of children (Rob et al., 2006).

About 42% of mothers do not use the incense every day. Most of the mothers replied that they read the instruction sons on the label of detergent before using (87.9%). This gives clues that mothers concern about precautions posted on detergents' containers. Concerning the knowledge of mothers about indoor air pollution, the results of our study showed that more than fifty-five percent of

mothers know what indoor air pollutants are. Another study made in Kuwait on 80 households demonstrated the relationship between indoor air quality and asthma symptoms (Al-Anzi and Salman, 2011).

Regarding the questions about the practicing, 66.7% of the mothers who involved in the study, they use pesticides for insects. There are enough knowledge and awareness among mothers concerning the importance of ventilation for the house. The ventilation can reduce indoor pollutants because outdoor air has fewer pollutants than indoor air; if the house is not located close to the industrial site or near high roadway (Fletch, 1996; Crane, 1998).

The very high percentage of the mothers know the effects of the humidity on their children. A report recently was issued by the World Health Organization states that numerous studies have been made; their results present that reducing the dampness can result in reducing the adverse health effects (WHO, 2009; Husman, 1999). Besides, many studies made on small samples of asthmatic people; the results showed that housing interventions including mold eradication with fungicides and ventilation lead to an improvement in the asthma symptoms (Burr, 2007; Kerscmar, 2006).

A very high percentage of the mothers are willing to be educated about asthma triggers; this will make support for intervention which will be effective to reduce the prevalence of asthma among children in the near future. A study made by Krieger et al showed that visits to homes by health workers in order to support mothers in reducing asthma triggers will cause decreases in the use of health care services and enhance the quality of life (Krieger et al., 2005). Besides, a study was made by Carter and associates showed that home visits also reduced acute visits to health services for asthma among children with allergy to dust (Carter et al., 2001).

A key strength of this study was this assessment of mothers' knowledge and awareness; it gives a unique opportunity to provide information about a topic, which is lacking in our country. The goal of parents who have children with asthma and allergies is to reduce the frequency and severity of asthma and allergy attacks for these children in order to not interfere with their normal activities. It is important to say that our study does not include all types of asthma triggers, but focus on the awareness of the mothers that make the basis for any control strategy and the preventive program could be implemented in the soon future. Control begins with learning which triggers factors affect your child since no two children are alike.

8. Conclusion

The results showed high percentages of mothers have knowledge about indoor pollutants and allergic asthma among children as well. Besides, moderate percentages of mothers have been spraying pesticides indoor and a high percentage of mothers had knowledge of the importance of ventilation as a control measure. There was respect proportion of children have allergic asthma. Need more studies in our country to know the proportions of allergic asthma among our children.

9. Recommendations

The current study recommended that:

- Education training program about asthma should be conducted at hospitals, to understand and know about indoor air pollutants and their roles in developing asthma.
- Similar studies should be conducted on a larger sample of mothers in different cities in Libya.
- Make surveys on a periodic basis for children to evaluate respiratory symptoms.
- Make effective environmental sanitary programs to reduce indoor pollutants.
- Avoiding using asthmatic triggers containing items.

10. Limitations

- Many schools in Benghazi are located in conflict areas.
- Many schools in Benghazi are located in conflict areas.
- No free database is available in the University of Benghazi through which we can get links to published papers.

References

- Al-Anzi, S., Fawaz, and Salman A. Ayed (2011) 'Correlation of asthma symptoms with the prevalence of indoor NO₂ concentration in Kuwait', *Journal of environmental protection*, 2, pp. 186-193
- Al-Jahdali, H. H., Al-Zahrani, A. I., Al-Otaibi, S. T., Hassan, I. S., Al-Moamary, M. S., Al-Duhaime (2007) 'Perception of the role of inhaled corticosteroid and factors affecting compliance among asthmatic adult patients', *Saudi medical journal*, 28(3), pp. 569-573
- Beasley, R., Ellwood, P., Asher, I. (2003) 'International patterns of the prevalence of pediatric asthma. The ISAAC program', *Pediatric Clin Am.*, 50, pp. 539-553.
- Breyssee, P. N., Diette G. B., Matsui, E. C., Buts, A. R. Hansel, N. N. McCrmack, M. C. (2010) 'Indoor air pollution and asthma in children proceedings', *American Thoracic Society.*, 7, pp. 102-106.
- Burr, M. L., Mathews I. P., Arthur, R. P., Watson,, H. L., Gregory, C. J., Dunstan, F. D. J., Palmer, S. R (2007) 'Effects on patients with asthma of eradicating visible indoor mold: a randomized controlled trial', *Thorax.*, 62(9), pp. 766-771
- Carter, M. C., Perzanowski, M. S., Raymond, A., Platts-Mills, T. A. E. (2001) 'Home intervention in the treatment of asthma among inner-city children', *J. Allergy Clin Immunol.*, 108(5), pp. 137-737.
- Crane, J., Ellis I, Siebers, R. (1998) 'A pilot study of the effect of mechanical ventilation and heat exchange on house dust mites and Der; 1 in New Zealand homes', *Allergy*, 53(8), pp. 755-762
- Expert panel report 2 (1997) Guidelines for diagnosis and management of asthma. *National Institutes of Health.*
- Fletcher, A. M., Pickering, C. A., Custovic, A., Sumpson, J., Kennaugh, J., Woodcock, A. (1996) 'Reduction in humidity as a method of controlling mites and mite allergens: the use of mechanical ventilation in British domestic dwelling', *Clin Exp Allergy.* 26(9), pp. 1051-1056
- Grantmaker, S. L., Walker, D. K., Jacobs, F. H., Ruch-Ross, H. (1982) 'Parental smoking and the risk of childhood asthma', *Am J Public Health*, 72, pp. 574-579.
- Husman, T. M. (1999) 'The health protection act, national guidelines for indoor air quality and development of the national indoor air programs in Finland', *Environ Health Perspect*, 107(3), pp. 515-517.
- Institute of Medicine "IOM" (2000) Clearing air: Asthma and indoor air exposures. *National academy press.* Washington DC.
- ISSAC (1998) Worldwide variations in the prevalence of asthma symptom: the International Study of Asthma and Allergic in Childhood, *Eur respire. J.*, 12, pp. 315-335
- Kerscmar, C. M., Dearborn, D. G., Schluchter, M. (2006) 'Reduction in asthma morbidity in children as a result of home remediation aimed at moisture sources. *Environ', Health Perspect*, 114(10), pp. 1574-1580.
- Kiley, J., Morosco, G. (2007) Guidelines for the Diagnosis and Management of Asthma. National Heart, Lung, and Blood Institute. Expert panel Report.3.
- King, M. E., Mannino, D. M., Holguin, F. (2004) 'Risk factors for asthma incidence', *Panminerva Med.*, 46, pp. 97-111.

- Krieger, J. W., Takaro, T. K., Song, L., Weaver, M. (2005) 'The Seattle-King County Healthy Homes Project: a randomized, controlled trial of a community health worker intervention to decrease exposure to indoor asthma triggers', *Am J Public Health*, 95(4), pp. 652-659
- Leeder, S. R., Crokhill, R. T., Irwing, L. M., Holland, W. W. (1976) 'Influence of family factors on asthma and wheezing during the first five years of life', *Br J Prev Soc Med.*, 30, pp. 213-218
- Mahmoudi, M. (2007) Allergy and Asthma: Practical Diagnosis and Management. *Electronic book*. First edition.
- Noonan, C., Brown, B., Bentley, B., Conway, K., Corcoran, M., Four-Star, k., Freide, P., Hemlock, B., Wagner, S., Wilson, T (2010) 'Variability in childhood asthma and body mass index across Northern Plains American Indian communities', *J. Asthma*, 47(5), pp. 495-500
- Peat, J. K., Toelle, B. G., Marks, G. B. (2001) 'Continuing the debate about measuring asthma in population studies', *Thorax.*, 56, pp. 406-411.
- Rob McConnell, Kiros Berhane, Ling Yao, Michael Jerrett, Fred Lurmann, Frank Gilliland, Nino Kunzli, Jim Gauderman, Ed Avol, Duncan Thomas, John Peters (2006) 'Traffic, susceptibility, and childhood asthma', *Environ Health Perspect*, 114(5), pp. 766-772
- U.S. Department of Health and Human Services (2004) The health consequences of smoking: a report of the surgeon general. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Office on Smoking and Health. Atlanta, GA.
- Weiland, S. K., Bjorksten, B., Brunekreef, B. (2004) 'Phase II of the international study of asthma and allergies in childhood (ISAAC II): rationale and methods', *Eur Respir J.*, 24, pp. 406-412.
- World Health Organization "WHO" (2009) WHO Guidelines for indoor air quality dampness and mold. WHO Regional Office for Europe Copenhagen. Denmark. Available at: <http://www.euro.who.int/document/E92645.pdf>