

Knowledge and practice of parents and guardians about childhood asthma at King Abdulaziz Medical City for National Guard, Riyadh, Saudi Arabia

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Background: Family management of asthmatic children is affected by several factors, primarily the parent's knowledge and attitude toward asthma.

Objective: The aim of this study was to explore the knowledge and practice of parents and guardians about asthma in their children.

Methods: Two hundred and thirty-one self-administered questionnaires were distributed to parents and guardians attending, with their children, general pediatric and pediatric pulmonology outpatient clinics at King Abdullah Specialist Children's Hospital, King Abdulaziz Medical City for National Guard, Riyadh, Saudi Arabia, during the period from August 2016 to March 2017.

Results: Most of the participants (79.6%) have moderate knowledge. The mean of total knowledge was found to be higher among mothers compared with other groups ($p=0.019$). Most participants (88.3%) reported providing asthma treatment regularly and 61.9% visited the clinic regularly. Almost half of the participants have misconceptions about asthma medications. During acute asthma attacks, more than half of the participants (54.5%) massaged their child's chest or back, and 52.4% provided the child homemade or herbal remedies.

Conclusion: This study revealed a moderate level of knowledge about asthma among the parents and guardians of asthmatic children, but poor knowledge about asthma medications. For better control of asthma, more effort is needed to educate caregivers and to enhance their awareness about asthma and highlight the misconceptions about asthma medications at both hospital level and community level.

Keywords: parenting, home management, chronic disease, emergence

Introduction

Asthma is one of the most common chronic diseases, with more than 300 million cases found worldwide.¹ The increase in asthma prevalence, morbidity, and mortality has intensified public health concerns.²

In 2006, it was estimated that ~14% of the world's children experienced symptoms of asthma.³ Locally, in Saudi Arabia, according to studies conducted over the past three decades, the prevalence of asthma in children ranges from 8% to 25%.⁴⁻⁷

Asthma is considered the third leading cause of hospitalization among children under the age of 15 and one of the leading causes of absenteeism from school.⁸ This issue results in inadequate or low assessment made by teachers of their social, psychological, and educational needs.⁹

All asthma management guidelines intensify the importance of the role of the family in managing childhood asthma. Reports in the literature indicate that the severity of

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asthma among children can greatly be controlled by proper management of the disease by the family.¹⁰ Moreover, family management of children with asthma is affected by several factors, such as parent's knowledge and attitude toward asthma, level of education, income, access to health care, and medications. An example was found in a study conducted in China where most parents of children with poor adherence to medication regimen were worried about the effect of medication on their children's growth and where 23.98% of parents were worried about the potential harm to their children's intelligence.² Similarly, in Pakistan, a study exploring the knowledge of asthma among parents of asthmatic children revealed many misconceptions regarding the triggers of asthma, and up to 37% of participants thought that asthma was contagious.¹¹

Another study conducted in Lebanon found that majority of parents did not recognize asthma by its name, but referred to it as chest allergy or recurrent dyspnea. Most of them were confused about the etiology of asthma, 66.5% thought that herbs were a useful treatment for asthma, and ~48% of parents were worried that inhaler therapy could cause an addiction.¹²

Locally, in Asir region, Saudi Arabia, a similar study conducted to assess the knowledge and awareness among mothers of asthmatic children revealed that mothers had deficiencies in their knowledge about asthma; most mothers did not know the mechanism of the disease and its potential complications.¹³

Another similar local study, carried out in 2013 in Riyadh, Central Saudi Arabia, to explore the caregiver's knowledge and its relationship to asthma control among children, found that the prevalence of uncontrolled asthma was three times higher in children of the participants who have misconceptions about the proper time to stop asthma medication. They believed that medication should be stopped once the coughing is over and after an acute asthma attack has resolved.¹⁴

Likewise, a study of the perception of parents and guardians toward asthma in their children, conducted in the emergency unit at King Saud Bin Abdulaziz University, Saudi Arabia, found that most of the participants were aware of asthma.¹⁰

The third local study done recently to explore the perceptions and practices of parents toward childhood asthma, in Riyadh, Saudi Arabia, found that majority of participants were concerned about the side effects of inhaled steroids, and 32% of them were concerned about dependency on asthma medications. This concern was significantly more marked among less educated parents.¹⁵

The aim of this study was to explore the knowledge and practices of parents and guardians about asthma in their children.^{10,13–15} Previous local studies investigating the same topic are different from our study either in setting (emergency room [ER] or inpatients compared with outpatient setting in our study), in population (mothers only compared with both mothers and fathers in our study), in sample size (our study in comparison has much more sample size), in the type of asthma cases (primary or secondary cases compared with secondary and tertiary cases in our study), or being old – as one of the studies was done 8 years ago.

Methods

Study setting

This study was conducted in general pediatric and pediatric pulmonology outpatient clinics at King Abdullah Specialist Children's Hospital (KASCH), King Abdulaziz Medical City for National Guard, Riyadh, Saudi Arabia, during the period from August 2016 to March 2017.

In KASCH outpatient clinics, there are 16 general pediatric and five pediatric pulmonology clinics operated weekly and run by consultants. Both settings receive patients referred from the ER, family practice, and pediatric subspecialties. The pediatric pulmonology clinic usually receives patients with unstable or hard-to-control asthma. Every clinical session examines from 10 to 15 children who are accompanied by either one or both parents or a close relative (guardian).

Study subjects

The study subjects were the parents and guardians of pediatric patients with asthma aged between 1 and 14 years. Diagnosis of asthma is difficult before the age of 1, and 14 years is the official upper limit for pediatric patients in the hospital.

Sample size

The sample size was calculated based on 18.3% of parents who correctly answered more than 60% of the questions in a similar study conducted by Zhao et al.² Using 95% confidence interval and a 5% margin of error, the sample size was estimated to be 230 and adjusted to 260 to compensate for incomplete forms. The sample size was calculated by using open Epi epidemiologic calculator. A nonrandom, convenience sampling technique was used to obtain the sample.

Data collection methods

Data were collected using a questionnaire developed by the investigator, based on the study objectives and after a literature review of similar studies.

The questionnaire is divided into three sections. The first section includes the demographic characteristics and background of the study population and their asthmatic children.

The second section assesses the knowledge of parents/guardians about asthma in their children. For this section, a validated questionnaire, namely Arabic asthma knowledge questionnaire, was used with the permission of the authors.^{16,17} The questionnaire comprised 17 questions, classified into three categories: the myths and beliefs regarding asthma, general knowledge of asthma, and knowledge of the associated aspects of asthma. All the questions were analyzed separately. Each category was scored individually and then subcategorized into three levels (ie, good, moderate, and poor knowledge). Mean scores were calculated for each category.

The first category, myths and beliefs regarding asthma, contained seven questions, each question with a score of 1–4. The possible total score of 28 was subcategorized as follows: poor (score 7–14), moderate (score >14–21), and good (score >21–28).

The second category, level of knowledge about the disease, contained six questions, each question with a score of 1–4. The possible total score of 24 was subcategorized as follows: poor (score 6–12), moderate (score >12–18), and good (score >18–24).

The third category, knowledge about associated aspects of asthma, contained four questions, each question with a score of 1–4. The possible total score of 16 was subcategorized as follows: poor (score 4–8), moderate (score >8–12), and good (score >12–16).

The total sum of all three categories was calculated to be 68, and this total was subcategorized into three levels: poor (score 17–34), moderate (score >35–51), and good knowledge (score >51–68).

The third section contains close-ended questions about the practice of parents and guardians in managing asthma in their children.

The questionnaire was reviewed by two research experts and pretested in a pilot study on a sample of 20 participants and then finalized. The results of the piloted questionnaires were not included in the analysis.

Patients/guardians were approached while sitting in the waiting area of the clinics, and the questionnaires were distributed and collected by an investigator, after explaining the purpose of the study and obtaining verbal consent from each participant. The principles of Helsinki Declaration were followed in this regard.

Data management and analysis plan

Data were coded and entered using the Statistical Package for Social Sciences Version 23 (IBM Corporation, Armonk, NY, USA). Descriptive statistics were expressed in the form of frequencies and percentages for categorical variables, while mean and standard deviation (SD) were used for description of continuous variables. Analytic statistics used the χ^2 test to assess differences between categorical variables. Means were compared by using independent Student's *t*-test (analysis of variance when applicable). Statistical significance was set at $p \leq 0.05$.

Ethical considerations

Approval of the study was obtained from King Abdullah International Medical Research Center, Ministry of National Guard, Riyadh, Saudi Arabia. Verbal consent was obtained from participants when the questionnaires were distributed, and the principles of the Declaration of Helsinki were followed. All data were kept confidential and used only for research purposes.

Results

Two hundred and thirty-one of 260 participants completed the questionnaires, with a response rate of 88.84%.

Table 1 summarizes the demographic and background characteristics of the study participants for both parents/guardians and their children. Among the study group, 165 (71.4%) were mothers, and 40 (17.3%) were fathers, with the rest being guardians and relatives. The mean age was 35 (± 8.5) years, ranging from 18 to 62 years. The mean age of the children was 6.5 (± 3.95) years, ranging from 1 to 14 years; 61% of them were ≥ 5 years old, 68.4% of them were male, and most of them (84%) did not have any other chronic disease.

Table 2 shows the sources of information about asthma for parents and guardians. The participants received most of their information from pediatricians, family physicians, written materials, and the Internet (87%, 44%, 41%, and 40%, respectively).

Tables 3 and 4 present the knowledge analysis. Some participants missed answering the first question in the first part of knowledge; therefore, the exact number of responses was mentioned (Table 3). Consequently, total calculation (*n*) and analysis for that section (Table 4) and bivariate analysis (Table 5) were done for 230 participants instead of 231. The mean score for the first category (myths and beliefs regarding asthma) was 18.10 (± 3.75) out of 28. Most of the participants (64.3%) had moderate knowledge, and 13.9% had poor knowledge in this category.

Table 1 Demographics and background characteristics of the participants

	Number	%
Demographic data (n=231)		
Age of parents/guardians		
≤35 years	129	55.8
>35 years	102	44.2
Educational level of parents/guardians		
Illiterate	34	14.7
School	112	48.5
College	85	36.8
Relationship to child		
Mother	165	71.4
Father	40	17.3
Guardians or relatives	26	11.3
Family income (SR; monthly)		
0–5000	67	29
>5000–10,000	111	48.1
>10,000	53	22.9
Age of child		
<5 years	90	39
≥5 years	141	61
Gender of child		
Male	158	68.4
Female	73	31.6
Background (n=231)		
Family history of asthma		
Yes	148	64.1
No	83	35.9
Does child have other chronic diseases or disabilities?		
Yes	37	16
No	194	84
More than the one child in the family with a chronic illness or disabilities?		
Yes	29	12.6
No	202	87.4
Visits more than one hospital?		
Yes	52	22.5
No	179	77.5
Did you get instructions either in our hospital or in another hospital?		
Yes	225	97.4
No	6	2.6

Table 2 Sources of information about asthma

	Yes		No	
	Number	%	Number	%
Pediatrician (n=231)	201	87	30	13
Family physician/general physician (n=230)	102	44.3	128	55.7
Health educator (n=231)	70	30.3	161	69.7
Nurses (n=231)	60	26	171	74
Written health materials (n=231)	95	41.1	136	58.9
Relatives/friends (n=231)	87	37.7	144	62.3
Internet/social media (n=231)	94	40.7	137	59.3
Television (n=231)	47	20.3	184	79.7

The mean score for the second category (general knowledge about asthma) was 17.79 (± 2.17) out of 24. Most of the participants (60.2%) had moderate knowledge, and 3% had poor knowledge in this category.

The mean score for the third category (knowledge about associated aspects of asthma) was 9.63 (± 1.88) out of 16. Most of the participants (78.4%) had moderate knowledge, and 8.7% had poor knowledge in this category.

The mean value for the total knowledge score was 45.53 (± 5.57) out of 61. Most of the participants (79.6%) had moderate knowledge, 18.7% had sufficient knowledge, and only 1.7% had poor knowledge.

Table 6 summarizes the practice of parents/guardians toward asthma in their children. More than half of the participants massaged their child's chest or back and provided the child homemade or herbal remedies during acute asthma attacks. Most participants (88.3%) gave the child his/her medication regularly, and 90% removed any aggravating factors for asthma from the house, while 38.1% of participants did not visit the clinic regularly.

Table 5 summarizes the relationships between demographics and background characteristics and the mean of total knowledge of the participants. The mean of total knowledge was found to be higher among mothers compared with other groups ($p=0.019$). Higher knowledge score was observed among higher education group, but this was not statistically significant.

Table 7 summarizes the relationships between total knowledge of participants and their practice in managing their child's asthma. Those participants who administer the asthma medication regularly, visit their doctors regularly, and do not give their children herbal treatments have a higher mean score of asthma knowledge compared with others.

No significant correlation was found between the participants' characteristics and asthma management practice except that families with a positive history of asthma visit the clinic regularly.

Discussion

The purpose of this study was to explore the level of knowledge and practice of parents and guardians in the management of asthma in their children.

The majority of participants in the current study were mothers with a mean age of 35 years. This is expected since asthma is more prevalent in young children of young mothers. Mothers would be expected to be the main carer and to attend the clinic. Another local study also found the mean age of mothers to be similar.¹³

Table 3 Asthma knowledge questionnaire

	Strongly agree	Agree	Disagree	Strongly disagree
	Number (%)	Number (%)	Number (%)	Number (%)
First category: myths and beliefs regarding asthma				
Inhalers use can lead to dependence or addiction (n=230)	31 (13.5)	70 (30.4)	58 (25.2)	71 (30.9)
Inhalers can have an effect on the heart or damage it (n=231)	21 (9.1)	93 (40.3)	65 (28.1)	52 (22.5)
It is not good for children to use the inhaler for too long (n=231)	44 (19)	112 (48.5)	41 (17.7)	34 (14.7)
After a child's asthma attack, once the coughing is over, the use of the inhaler and medications should be stopped (n=231)	42 (18.2)	109 (47.2)	47 (20.3)	33 (14.3)
Children with asthma should use asthma medications only when they have symptoms (coughing, congestion, or wheezing) (n=231)	26 (11.3)	48 (20.8)	104 (45)	53 (22.9)
It is better to use inhalers directly, without a holding chamber, so the medication can go more directly to the lungs (n=231)	21 (9.1)	38 (16.5)	75 (32.5)	97 (42)
When a child has an asthma attack, it is best to go to the emergency room even if symptoms are mild (n=231)	50 (21.6)	103 (44.6)	49 (21.2)	29 (12.6)
Second category: general knowledge about asthma (n=231)				
The main cause of asthma is airway inflammation	70 (30.3)	127 (55)	19 (8.2)	15 (6.5)
Asthma attacks can be prevented if medications are taken even when there are no symptoms between attacks	67 (29)	108 (46.8)	41 (17.7)	15 (6.5)
Flu infections are the main causes or triggers of asthma attacks	76 (32.9)	107 (46.3)	35 (15.2)	13 (5.6)
If an asthmatic child gets the flu, you should apply the inhaler even if there is no coughing or wheezing	21 (9.1)	79 (34.2)	88 (38.1)	43 (18.6)
Asthmatic children might have attacks that are severe enough to require hospitalization in an intensive care unit or they might even die from an attack	80 (34.6)	122 (42.8)	15 (6.5)	14 (6.1)
Some medications for asthma do not work unless they are administered every day	51 (22.1)	106 (45.9)	59 (25.5)	15 (6.5)
Third category: knowledge about associated aspects of asthma (n=231)				
Parents/guardians should ask a doctor to tell the school that an asthmatic child should not exercise or participate in physical education classes	76 (32.9)	106 (45.9)	35 (15.2)	14 (6.1)
Children who have asthma should not participate in sports that make them run too much	62 (26.8)	105 (45.5)	46 (19.9)	18 (7.8)
It is best not to smoke or let anyone else smoke near a child who has asthma	138 (59.7)	77 (33.3)	6 (2.6)	10 (4.3)
If the parents/guardians of a child with asthma smoke outside the house, it won't affect the child	79 (34.2)	82 (35.5)	33 (14.3)	37 (16)

Table 4 Score of asthma knowledge

Scores of categories						
	Well informed		Moderate knowledge		Poor knowledge	
	Number	%	Number	%	Number	%
First category: myths and beliefs regarding asthma (n=230)	>21–28		>14–21		7–14	
	50	21.7	148	64.3	32	13.9
Second category: general knowledge about asthma (n=231)	>18–24		>12–18		6–12	
	85	36.8	139	60.2	7	3.0
Third category: knowledge about associated aspects of asthma (n=231)	>12–16		>8–12		4–8	
	30	13.0	181	78.4	20	8.7
Total knowledge score (n=230)	>51–68		>35–51		17–34	
	43	18.7	183	79.6	4	1.7

Most children were boys aged ≥ 5 years. This is a similar finding to that of another local study that found most children with asthma (86%) to be between the ages of 8 and 12 years.⁶ A study conducted in the south of Saudi Arabia found that the ages of asthmatic children ranged from 3 to 11 years with a mean age of 6.3.¹³

Almost a quarter of children in this study had a follow-up for their asthma with another health facility. This is common locally, where many patients with chronic disease in Saudi Arabia receive care from more than one health facility for the same disease. This practice may result in a waste of resources and physicians, and the patients may

Table 5 Relationships between demographics and background characteristics of the participants and the mean of total knowledge of participant

		Number	Mean of total knowledge	Standard deviation	Test	p-value
Demographic data (n=230)						
Age of parents/guardians, years	≤35	129	45.59	5.11	t-test =0.191	0.849
	>35	101	45.45	6.137		
Educational level of parents/guardians	Illiterate	33	44.33	5.50	ANOVA =2.889	0.058
	School	112	45.05	5.21		
	College	85	46.63	5.92		
Relationship to child	Mother	165	46.17	5.68	ANOVA =4.046	0.019
	Father	40	44.12	4.85		
	Other	25	43.56	5.17		
Income (SR)	0–5000	67	44.31	5.95	ANOVA =2.66	0.072
	>5000–10,000	110	45.78	5.39		
	>10,000	53	46.56	5.26		
Age of children	<5 years	90	45.42	5.14	t-test =0.245	0.807
	≥5 years	140	45.60	5.84		
Gender of child	Male	158	45.61	5.60	t-test =0.318	0.750
	Female	72	45.36	5.54		
Background (n=230)						
Family history of asthma	No	83	45.02	5.36	t-test =1.045	0.297
	Yes	147	45.82	5.68		
Does the child have other chronic diseases or disabilities?	No	193	45.49	5.38	t-test =0.232	0.817
	Yes	37	45.72	6.54		
More than the one child in the family with a chronic illness or disabilities?	No	202	45.46	5.61	t-test =0.507	0.613
	Yes	28	46.03	5.29		
Visits more than one hospital?	No	179	45.44	5.71	t-test =0.447	0.655
	Yes	51	45.84	5.06		

Note: Student's t-test was used.

Abbreviation: ANOVA, analysis of variance.

Table 6 Practice of parents/guardians toward asthma in their children

Practice questions (n=231)	Yes		No	
	Number	%	Number	%
During acute asthma attacks				
Do you give the child his necessary medications?	223	96.5	8	3.5
Do you massage your child's chest or back?	126	54.5	105	45.5
Do you give the child homemade remedies or herbal remedies?	121	52.4	110	47.6
Prevention of asthma attacks				
Do you give the child his medication regularly?	204	88.3	27	11.7
Do you remove any aggravating factors for asthma from the house, eg, animals and cigarette smoke?	208	90.0	23	10.0
Do you visit the doctor responsible for child regularly?	143	61.9	88	38.1

find continuity of care and development of management plans confusing.

Some participants were interviewed during their visit to the pediatric pulmonology clinic, which receives pediatric patients with unstable or hard-to-control asthma, and therefore may make them different in their knowledge and practice for several reasons. One reason is that if the child has difficult or hard to control asthma parents will visit the health facilities more, will see the doctor and educator more and will be more knowledgeable about asthma. Another reason may be

that at the specialized clinic of asthma education is part of the care provided for each patient's visit by trained asthma educators. However, in the analysis, participants were not subcategorized according to clinical setting, and hence, we do not know whether there is any difference between the two groups in regard to knowledge or practice.

Family history of asthma is a cardinal feature of asthma, and the majority of participants in this study reported having a family history of the condition, in common with local and international trends. In one local study, patients with asthma

Table 7 Relationships between parent/guardian behavior toward their child's asthma and the mean of total knowledge of participants

Practice questions (n=230)		Number	Mean of total knowledge	Standard deviation	t-test	p-value
During acute asthma attacks						
Do you give the child his/her necessary medications?	No	8	43.7500	3.49489	0.922	0.358
	Yes	222	45.5991	5.62771		
Do you massage your child's chest or back?	No	105	45.5810	5.77591	0.115	0.909
	Yes	125	45.4960	5.41894		
Do you give the child homemade remedies or herbal remedies?	No	110	46.8636	5.62021	3.54	0.000
	Yes	120	44.3167	5.26281		
To prevent of asthma attacks						
Do you give the child his/her medication regularly?	No	27	42.4074	4.61819	0.16	0.002
	Yes	203	45.9507	5.56577		
Do you remove any aggravating factors for asthma from the house, eg, animals and cigarette smoke?	No	23	42.5652	6.15575	2.732	0.007
	Yes	207	45.8647	5.42030		
Do you visit the doctor responsible for child regularly?	No	87	43.5632	5.17530	4.346	0.000
	Yes	143	46.7343	5.47973		

Note: Student's t-test was used.

reported the incidence of asthma in their fathers (17.5%), mothers (14.9%), and siblings (60.5%).¹⁸

The majority of participants received their information about asthma from pediatricians, followed by family physicians, written materials, and the Internet. This finding correlates with the system of care of children with asthma in Saudi Arabia, where the majority of children with asthma have a follow-up in a general pediatric clinic or pediatric pulmonology clinic. The role of the family physician in caring for childhood asthma is growing, and a stricter referral system is being implemented, where patients need to be checked and managed first by family physicians and in the more difficult cases to be referred to specialists. The Internet is a growing source of health information in developing countries such as Saudi Arabia, and in this study, 40% of participants reported the Internet as a source of information about asthma. Considering the brevity of clinic visits and the lack of asthma educators in many health facilities in Saudi Arabia, the role of the Internet as a source of asthma education needs to be enhanced, and more professional and certified Arabic Web sites for health education should be made available for patients and their families.

The majority of participants in this study have a moderate knowledge score in the total knowledge and all knowledge subcategories (myths and beliefs, general knowledge, and knowledge of associated aspects). Similar findings were reported in another study conducted in Riyadh, Saudi Arabia, where mean knowledge score of caregivers was 53.4 (SD =6.5) and ranged from 40 to 75.¹⁴

In another local study, Al-Binali et al explored the mothers' knowledge of asthma using a different scoring tool.¹³ They found a good knowledge of the symptoms of asthma,

mainly wheeze, cough, and chest tightness. They also knew that the common cold, changes in the weather, and insecticides were aggravating factors for asthma, but were unaware of the potential dangers of smoke, food, and psychological stress. The majority of mothers in that study (84.4%) did not know the mechanisms of asthma.¹³ Internationally, the findings are similar. For example, the majority of parents in India have poor knowledge of asthma.¹⁹

In the current study, participants were most knowledgeable about the associated aspects of asthma, with 78.4% having a moderate level of knowledge, while the least area of knowledge was the myths and beliefs about asthma where 13.9% of participants had poor knowledge. In this subcategory of knowledge, parents and caregivers were presented with statements such as "asthma inhalers can lead to dependence or addiction," "inhalers may cause harm to heart and chest," and "not to use inhalers for long time." Almost half of them either strongly agreed or agreed with these misconceptions. Moreover, one third of participants believed that it was not good for children to use inhalers for too long and thought that the use of an inhaler and other medications should be stopped after an asthma attack. Similarly, in a local study of adult patients with asthma, 37.2% of patients felt that asthma medications are not safe if used for a long time, and 34.5% of patients believed that medications were associated with addiction.²⁰ In another recent study in schools in Riyadh, central Saudi Arabia, the majority of participants (60.3%) were concerned about the side effects of inhaled steroids, and 32% of them were concerned about the development of dependency.¹⁵

This is also consistent with the findings from international studies. For example, a multicenter study among children in

China found that 67.3% of parents were worried about the effects of corticosteroids on their children's growth. Another 40.56% of parents were concerned about drug dependency, and 23.98% of parents were worried about the potential harm it poses to their child's intelligence.² Another study, in the USA, revealed that 38.2% of caregivers expressed concerns about their child's use of daily asthma medication, and 48.9% were concerned about the side effects of asthma medication.²¹

It seems that, despite most of the participants in this study having a good knowledge of the background of asthma, common symptoms, and aggravating factors, still there is a knowledge gap regarding medications. An essential component of asthma management is adherence to the medication regimen.²² Hence, these findings are worrying since they may have a negative impact on the parent's approach to caring for their asthmatic child. Unfortunately, despite significant improvement in quality, safety, and effectiveness of inhalers,¹⁴ many studies reported that misconceptions and concerns lead to nonadherence to asthma inhalers and, consequently, to poor asthma control.^{22,23}

Although almost all participants in this study (97.4%) reported receiving instructions on how to use inhalers, more effort is needed in terms of health education about asthma management, concentrating more on the safety of asthma medication when used under clinical supervision.

Many studies explored the negative effect of environmental tobacco smoke exposure on asthma control in children.^{24,25} The majority of our participants (93%) were aware that it is best not to smoke or allow smoking near a child who has asthma. Two other studies reported similar findings, supporting our results.^{14,26}

The negative effect of third-hand smoking is becoming a widely explored issue. A study in an urban city of South Korea found increased prevalence of respiratory symptoms in children exposed to second- and third-hand smoke.²⁸ There was very little knowledge about this issue in our participants, where almost two thirds of participants agreed with the statement "If the parents/guardians of a child with asthma smoke outside the house, it won't affect the child." This finding was consistent with that of another study done in Riyadh, Saudi Arabia.¹⁴

The misconceptions of participants about asthma medication were reflected in their actual practice in managing asthma in their children, as almost half of the participants in the current study reported providing alternative therapy for asthma such as massage, home remedies, and herbal remedies. Such therapies were more widely used by participants with a lower knowledge score. Similarly, another local study

revealed that 23.7% of parents massaged their children, and 17% of parents provided herbal medications.¹⁵ This finding can be interpreted in the context of fear of prolonged use of asthma medication and as an attempt to find an alternative therapy with fewer adverse reactions.

Another important observation was that only 61% of the participants in this study reported visiting an asthma clinic regularly, and among these people, the knowledge score was found to be higher. Similarly, in another recent study conducted in Riyadh, Saudi Arabia, only 53.9% of parents regularly visited pediatric clinics.¹⁵ Another study in China reported that 73.8% of controlled asthmatic children consult their doctor regularly.²

The current study showed that participants who give their children asthma medications regularly, visit the doctor regularly, and do not give herbal medications have more knowledge compared with others. This is expected since knowledge would be expected to reflect positively on practice.

Patients' knowledge about chronic conditions such as asthma is a key factor for better management and control.²⁷ In a local study conducted in Riyadh, Saudi Arabia, it was found that the prevalence of uncontrolled asthma is three times higher among the children of caregivers who agree with the statement "It is not advisable for children to use an inhaler for too long."¹⁴ In another study conducted in the USA, 115 parents of children received education about asthma, and a follow-up survey 6 months later found significant improvement in their knowledge and behavior regarding asthma management at home, which is expected to result in better control of asthma in their children.²⁹

This study, we think, is adding more in terms of more sample size, including both mothers and fathers, to studies done locally about asthma with more exploration about parent and families' knowledge and practice of asthma in children, and participants were taken in a new clinical setting not done before.

This study revealed a moderate level of knowledge about asthma among the parents and guardians of asthmatic children, but poor knowledge about asthma medications. For better control of asthma, more effort is needed to educate caregivers and to enhance their awareness about asthma, at both hospital and community levels.

Regarding the limitations of this work, this study was carried out in general pediatric and pediatric pulmonology outpatient clinics, and the findings may not be generalizable to all communities; we used a self-administered questionnaire in this research, and recall bias cannot be excluded. In addition, information reported by fathers may not be

accurate since they are not usually the caregiver of asthma management at home.

Disclosure

The authors report no conflicts of interest in this work.

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