

Parental Knowledge, Attitudes, and Practices Regarding the Use of Prescribed Inhalers in Asthmatic Children Attending Ambulatory Healthcare Services Clinics

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Abstract

Background: Bronchial asthma affects 10%–15% of children worldwide. Parental attitudes constitute a major factor in helping to achieve successful asthma control in children. We aimed to assess parental knowledge, attitudes, and practices (KAPs) regarding the use of prescribed inhalers for children with asthma in Abu Dhabi, United Arab Emirates. **Subjects and Methods:** This was a cross-sectional survey-based study conducted at the Ambulatory Healthcare Services (AHS) clinics across Abu Dhabi. Questionnaires that assessed parental KAPs regarding inhalers used in asthma were distributed to 365 parents of children (≤ 10 years of age) who had a diagnosis of asthma and had been followed up at an Abu Dhabi AHS clinic in the past 12 months. **Results:** Only 9.3% of the participants correctly answered $\geq 75\%$ of the questions assessing knowledge, whereas 49.0% gave positive responses to $\geq 80\%$ of the questions related to attitudes and 56.2% correctly performed $\geq 53\%$ of the practices. Higher levels of knowledge and practices were demonstrated among nonnationals and those with a higher level of education, and more positive attitudes were found among older parents. Knowledge and attitudes positively correlated with the level of practice. **Conclusions:** Although a minority of the participants had a good level of knowledge, they tended to demonstrate positive attitudes and good practices with regard to the use of an inhaler. Overall, a much more concerted effort is required by healthcare providers in Abu Dhabi to assess parental understanding about their child's inhaler as well as educate parents about their practical use.

Keywords: Abu Dhabi, Ambulatory Healthcare Services, asthma, attitudes, knowledge, parents, practices

INTRODUCTION

Bronchial asthma is the most common chronic disease in children,^[1] affecting 10%–15% of children worldwide.^[2] In the US, 5.6 million school-aged children and youth between 5 and 17 years old were reported to have asthma.^[3] In Saudi Arabia, a study conducted between 2007 and 2009 revealed an 11.4% prevalence rate among children aged 6–14 years.^[4] There are no updated data on the prevalence of asthma among children in the UAE, but two studies in 1994 and 2000 showed that the prevalence among students aged 6–13 years in the UAE was 13.6% and 13%, respectively.^[4,5]

Asthma has a considerable impact on the quality of life and poses a high-economic burden on healthcare systems. Thus, appropriate patient management is important. The goal of asthma treatment is to control the symptoms and reduce the risk of future exacerbations.^[6] Although there

is no definitive cure, appropriate treatment, monitoring, and patient and family education can contribute to disease control.^[7] However, asthma management and control in children are challenging because of the immaturity of the respiratory and immune systems, natural history of the disease, and difficulties in establishing the diagnosis and administering medications.^[7,8] Parental knowledge, attitudes, and practices (KAPs) regarding the use of inhalers are important.

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In a multi-center study conducted in 29 cities in China to examine the KAPs of parents of children diagnosed with asthma, the researchers found the parents' KAPs to be poor.^[9] Furthermore, a gap was identified between recommended and actual practices. The researchers concluded that improving knowledge and attitudes may contribute to parents using better practices. In this regard, according to the Global Initiative for Asthma (GINA), parental awareness about asthma is important for disease management, and training parents to improve KAPs about asthma should be included in routine clinical care.^[7]

Accordingly, this study assessed the KAPs of parents of children with asthma in Abu Dhabi, UAE, with regard to the use of prescribed inhalers.

SUBJECTS AND METHODS

Design and ethics

This was a cross-sectional survey-based study conducted at the Ambulatory Healthcare Services (AHS) clinics in Abu Dhabi. The study proposal received approval from the Sheikh Khalifa Medical City Institutional Review Board/Research Ethics Committee. The study was granted authorization from the Health Authority Abu Dhabi-Research Authorization and was also approved by the AHS' Research Committee.

Participants

Parents of asthmatic children <10 years of age who had used inhalers in the past 12 months and were following up at AHS clinics in Abu Dhabi were included in the study. Parents whose first language was neither Arabic nor English were excluded from the study. Clinics that were >60 km from the middle of Abu Dhabi (off island) were also excluded (Al Samha clinic). Based on a sample size calculator and using a margin of error of 5% and 95% confidence intervals, 365 participants were needed for the study.

Abu Dhabi city was divided into two regions, namely Abu Dhabi Island and middle region. Stratified random sampling was used to select the clinics that participated in the study. Two clinics were randomly selected from Abu Dhabi Island and four clinics from the middle region. The sample size of each clinic was calculated based on the proportional numbers of patients attending each clinic. All patients were consecutively included until the required number in each clinic was attained. A middle region clinic refused participation; hence, another clinic was randomly selected. The clinics involved in the study initially and after re-selection are shown in Figure 1. A total of 365 questionnaires were collected over 10 months.

Questionnaire

We developed a questionnaire to assess parental KAPs regarding the use of inhalers [Appendix 1]. In the development of the questionnaire, we reviewed the Asthma Knowledge Questionnaire (AKQ) developed by Rodriguez and Sossa.^[10] We also reviewed the translated and validated Arabic version of the AKQ.^[11] Finally, the questionnaire of "knowledge,

attitude, and behavior of asthmatic patients regarding asthma in primary care setting in Abu Dhabi, United Arab Emirates" published in 2015 was reviewed.^[12]

The questionnaire was developed in both English and Arabic and modified after a pilot study. It has four sections: sociodemographic data, KAP. The knowledge section consists of 16 items, and each correct answer is given a score of 1. A score of 0–5 was considered poor, 6–11 was considered fair, and 12–16 was considered good. The attitudes section consists of five items, and a score of 0–1 was considered negative, 2–3 was considered neutral, and 4–5 was considered positive. The practice section consists of 15 items, and a score of 0–7 was considered bad, while 8–15 was considered good.

Procedure

Parents were informed about the purpose of the study and that participation was not obligatory, they could withdraw at any time, and responses were confidential. After providing written informed consent, they completed the questionnaire through a face-to-face interview with healthcare professionals (i.e., nurses, pharmacists, and physicians) working in the clinics. The inhaler technique was demonstrated by participants by face-to-face demonstration.

Statistical analysis

Data were compiled and summarized using Microsoft Excel and analyzed using Statistical Package for the Social Sciences, SPSS version 18, SPSS Inc., Chicago, IL, USA. The relationships between the total and sub-categorical scores among each other and with the sociodemographic variables were examined using the Chi-squared or Pearson's correlation analysis. A value of $P < 0.05$ was considered statistically significant.

RESULTS

Sociodemographic characteristics

As shown in Table 1, of the 325 participants, most were mothers, married, and 31–40 years old. Emirati parents represented 40.6% of the sample. For levels of education, 44.4% had completed high school and 47.9% had a university education or more the percentage of employed participants were 58.4%.

Knowledge

The average score was 6.2 ± 3.6 . Specifically, 9.3% ($n = 34$) had good knowledge, 38.1% ($n = 139$) had fair knowledge, and 52.6% ($n = 192$) had poor knowledge.

The majority of parents were not aware of the common side effects associated with reliever inhalers. Only 28.2% of parents were aware that a reliever inhaler can cause a fast heartbeat, and only 12.8% of parents were not aware that reliever inhalers can cause a shaky feeling. By contrast, more than half of the parents thought that diarrhea and joint pain were side effects of using reliever inhalers (61.4% and 64.4%, respectively).

Only 37.5% of the parents were aware that the reliever inhaler should be used in acute asthma attacks. Most (69.9%) thought that a preventer inhaler can be used in acute attacks, and 19.9% thought that a combination inhaler could be used in acute asthma attacks. With regard to long-term management of asthma, 74.5% were aware that a reliever inhaler can be used. However, only 27.7% were aware that a preventer inhaler can be used in the long-term management of asthma.

The percentage of parents who correctly knew that wheeze, chest tightness, and cough are indications for using a reliever inhaler were 66.3%, 67.7%, and 53.2%, respectively. However, 48.5% and 51.8% of parents wrongly thought that symptoms of sore throat and a blocked nose, respectively, are indications for using reliever inhalers.

Only 30.1% of the parents knew the recommended frequency of visits for controlled asthma cases. The percentage of parents who stated that inhaler techniques were checked by healthcare providers was 65.2% and 63.0% reported that they received an explanation about the types of inhalers. Most parents (67.7%) were confident about the use of inhalers. Almost half (50.4%) were aware of an asthma action plan, and 42.5% knew the correct storage method for inhalers. Regarding information sources on the use of inhalers, the predominant source of information was from healthcare professionals (65.5%), followed by the Internet, family members, brochures, newspapers, and TV/radio [Appendix 1].

Table 1: Sociodemographic characteristics

Characteristics	n (%)
Relation to child	
Father	103 (28.2)
Mother	262 (71.8)
Marital status (n=364)	
Married	330 (90.7)
Divorced/widow	34 (9.3)
Age	
<21	19 (5.2)
21-30	113 (31.0)
31-40	170 (46.6)
>41	63 (17.2)
Nationality	
Emirati	148 (40.6)
Arab non-Emirati	130 (35.6)
Non-Arab non-Emirati	87 (23.8)
Educational level	
Primary school and less	28 (7.7)
High school	162 (44.4)
University and above	175 (47.9)
Employment status	
Unemployed	121 (33.1)
Student	31 (8.5)
Employed	213 (58.4)

Table 2 provides the results on the effect of the sociodemographic characteristics on the level of knowledge. The percentage of parents who had good knowledge was the highest in parents of non-Emirati nonArab background (16.1%). The percentage of parents who had a poor level of knowledge was the highest among Emirati parents (58.8%). Knowledge level was not significantly associated with relation to child, marital status, or the age of the parents.

Attitudes

The average score was 3.9 ± 2.5 . The percentage of parents who had a positive attitude toward the use of inhalers was 49%, whereas 16.2% and 34.8% of the parents exhibited neutral and negative attitudes, respectively. Almost one-quarter of the parents (21.4%) believed that inhalers could lead to hypertension. Similarly, 24.7% believed that inhalers might have harmful lung effects. Regarding the effectiveness of nebulizers, inhalers, and spacers, 52.1% believed that inhalers are less effective than nebulizers, whereas 36.2% believed that inhalers are more effective than spacers. The percentage of parents who believed that inhalers could lead to addiction was 54.8%.

Table 3 provides the results on the effect of sociodemographic characteristics on attitudes. With regard to age, 11.1% of the parents who were >40 years of age had positive attitudes toward the use of inhalers, whereas 2.7% of parents who were 21–30 years old had positive attitudes ($P = 0.014$). The percentage who were students or employed and had a negative attitude was 93.5% and 72.3%, respectively ($P = 0.021$). Attitudes were not significantly associated with relation to child, marital status, nationality, or education level.

Practice

The average score was 9.3 ± 5.0 . The percentage of parents whose scores reflected good practices in the use of inhalers was 56.2%, whereas 43.8% had scores that reflected bad practices. Parents who applied the correct steps of the inhaler technique were identified as follows: 55.9% for check the expiration date, 58.9% for shake the inhaler, 59.7% for breathe in and out slowly, 83.6% for hold breath for 10 s, and 55.1% for replace the cap at the end.

Table 4 provides the results on the effect of sociodemographic characteristics on practices. There was a significant relationship between nationality and practices: 53.4% of Emirati participants scored in the good practices range, while 50.8% of Arab non-Emirati and 69% of non-Arab non-Emirati participants scored in the good practices range ($P = 0.020$). The relationship between education level and practices was also significant: 63.4% of those who had a university level of education or above scored in the good practices range, while 52.5% of parents with a high school education and 32.1% with a primary school education or less scored in the good practices range ($P = 0.004$). When correlating employment status and practices, 61.5% of employed parents, 47.9% of unemployed parents, and 51.6% of parents who were students scored in the good practices

range ($P = 0.048$). Practice level was not significantly related to marital status, age of the parents, or relation to child.

Table 2: Effect of sociodemographic characteristics on level of knowledge

Characteristics	Poor, n (%)	Fair, n (%)	Good, n (%)	P
Relation to child				
Father	53 (51.5)	40 (38.8)	10 (7.9)	0.960
Mother	139 (53.0)	99 (37.8)	24 (9.2)	
Marital status				
Married	169 (51)	128 (39.0)	33 (10.0)	0.218
Divorced\widow	22 (64.7)	11 (32.4)	1 (2.9)	
Age				
<21	10 (52.6)	5 (26.3)	4 (21.1)	0.303
21-30	63 (55.8)	41 (36.2)	9 (8.0)	
31-40	92 (54.1)	65 (38.2)	13 (7.7)	
>41	27 (42.9)	28 (44.4)	8 (12.7)	
Nationality				
Emirati	87 (58.8)	52 (35.1)	9 (6.1)	0.002
Arab non-Emirati	75 (57.7)	44 (33.8)	11 (8.5)	
Non-Arab non-Emirati	30 (34.5)	43 (49.4)	14 (16.1)	
Educational level				
Primary school and less	21 (75.0)	6 (21.4)	1 (3.6)	0.000
High school	103 (63.5)	55 (34.0)	4 (2.5)	
University and above	68 (38.8)	78 (44.6)	29 (16.6)	
Employment status				
Student	19 (61.3)	12 (38.7)	0	0.005
Unemployed	74 (61.2)	42 (34.7)	5 (4.1)	
Employed	99 (46.5)	85 (39.9)	29 (13.6)	

Finally, 72.8% of the parents who were aware of an asthma action plan stated that they feel confident about the use of inhalers ($P = 0.022$).

Relationship between parental knowledge, attitudes, and practices

There was a significant relationship between knowledge and attitudes toward the use of inhalers: 14.6% of the parents who had good knowledge had positive attitudes, whereas only 3.1% of those who had poor knowledge had positive attitudes ($P = 0.000$). In addition, 88.2% of the parents who had good knowledge reported good practices, whereas only 27.6% of those who had poor knowledge reported good practices ($P = 0.000$). There was also a significant relationship between attitudes and practices, whereas 88.2% of the parents who had positive attitudes reported good practices in the use of inhalers ($P = 0.000$).

DISCUSSION

The GINA^[7] and the asthma guidelines for the prevention and treatment emphasize the importance of education and the optimal use of inhaler devices. In this study, of parents in the UAE who had children with asthma that were 10 years old or younger, overall inhaler-related KAPs were insufficient.

Almost half the sample had poor scores for the level of knowledge. Similar results were found in a study conducted in China, where results from an asthma-related KAPs survey showed that more than half the parents had a low level of

Table 3: Effect of sociodemographic characteristics on attitudes

Characteristic	Positive, n (%)	Neutral, n (%)	Negative, n (%)	P
Relation to child				
Father	3 (3.0)	19 (18.4)	81 (78.6)	0.611
Mother	14 (5.3)	47 (18.0)	201 (76.7)	
Marital status				
Married	17 (5.2)	61 (18.5)	252 (76.4)	0.315
Divorced\widow	0	5 (14.7)	29 (85.3)	
Age				
<21	1 (5.3)	5 (26.2)	13 (68.4)	0.014
21-30	3 (2.7)	15 (13.3)	95 (84.0)	
31-40	6 (3.5)	40 (23.5)	124 (73.0)	
>41	7 (11.1)	6 (9.5)	50 (79.4)	
Nationality				
Emirati	6 (4.1)	24 (16.2)	118 (79.7)	0.491
Arab non-Emirati	6 (4.6)	21 (16.2)	103 (79.2)	
Non-Arab non-Emirati	5 (5.8)	21 (24.1)	61 (70.1)	
Educational level				
Primary school and less	1 (3.6)	3 (10.7)	24 (85.7)	0.064
High school	4 (2.5)	24 (14.8)	134 (82.7)	
University and above	12 (6.9)	39 (22.3)	124 (70.8)	
Employment status				
Student	2 (6.5)	0	29 (93.5)	0.021
Unemployed	4 (3.3)	18 (14.9)	99 (81.8)	
Employed	11 (5.2)	48 (22.5)	154 (72.3)	

Table 4: Effect of sociodemographic characteristics on practices

Characteristics	Good, n (%)	Bad, n (%)	P
Relation to child			
Father	58 (56.3)	45 (43.7)	0.972
Mother	147 (56.1)	115 (43.9)	
Marital status			
Married	191 (57.9)	139 (42.1)	0.062
Divorced\widow	14 (41.2)	20 (58.8)	
Age			
<21	13 (68.4)	6 (31.6)	0.206
21-30	69 (61.1)	44 (38.9)	
31-40	86 (50.6)	84 (49.4)	
>41	37 (58.7)	26 (41.3)	
Nationality			
Emirati	79 (53.4)	69 (46.6)	0.020
Arab nonlocal	66 (50.8)	64 (49.2)	
Non-Arab nonlocal	60 (69.0)	27 (31.0)	
Educational level			
Primary school and less	9 (32.1)	19 (67.9)	0.004
High school	85 (52.5)	77 (47.5)	
University and above	111 (63.4)	64 (36.6)	
Employment status			
Student	16 (51.6)	15 (48.4)	0.048
Unemployed	58 (47.9)	63 (52.1)	
Employed	131 (61.5)	82 (38.5)	

knowledge.^[9] More specifically, more than two-thirds of the participants in the present study were not able to recognize the most common side effects of reliever inhalers, and more than half did not know about the correct use of inhalers. This can possibly be explained by the finding that more than half of the parents reported that they did not receive an explanation about inhaler types. These findings are similar to another study conducted in Cairo, where more than one-third of the mothers were found to have incomplete knowledge about asthma medications.^[13]

Almost half the participants had incorrect knowledge regarding indications for reliever inhaler use. In addition, the majority of parents were unaware that a preventive inhaler could be used on a long-term basis. Parents understood asthma as an acute disease in the form of attacks, and hence they focused more on using reliever inhalers rather than preventing the acute attacks. Moreover, more than half the parents were not aware of the correct frequency for follow-up if the asthma is controlled. The main source of parents' information regarding asthma inhalers were healthcare professionals, which is consistent with another study conducted to assess patients' knowledge of asthma in a primary care setting in Abu Dhabi.^[12] Thus, clinicians should continue to play an important role in educating parents about inhaler use.

In this study, approximately half of the participants (49%) had positive attitudes and about one-third (35%) had negative attitudes toward the use of inhalers. These findings are similar

to those of two studies conducted in China in 2009^[9] and 2014,^[12] whereas a significant proportion of parents were found to have a negative perception about inhaler use given the side effects they believed it could cause. In this analysis, almost half the parents thought that inhaler use could lead to addiction. However, attitudes toward the use of inhalers were associated with age of the parents, whereby elderly parents (>40) had more positive attitudes than younger parents (21–30-year-old). It may be that elderly parents are more experienced in childcare.

With regard to inhaler practices, about half the participants were able to correctly identify the steps in inhaler use technique. This could be explained by the finding that around two-thirds of the parents had received an explanation about the correct use of inhalers. However, it should be noted that the parental level of education was associated with inhaler practices. In addition, we found that more than two-thirds of the participants who were given asthma action plans stated that they are confident about the use of inhalers. This finding is consistent with a US study showing that parents who were given a written asthma action plan for acute attacks were more confident in managing their child's asthma exacerbation.^[14] These findings emphasize the importance of encouraging healthcare professionals to provide parents with a clear asthma action plan, both verbal and written.

There are some limitations to this study. Parents might not have been shown asthma action plans and hence their lack of awareness of its purpose. Also, before the information reported by a parent might not be accurate since they might not have been the primary caregiver.

CONCLUSIONS

Only a minority of the parents in the present study had a good level of knowledge regarding the use of inhalers, and approximately half had positive attitudes and reported good practices. Moreover, a good level of knowledge and positive attitudes were related to good practices. Greater effort is required by healthcare providers to educate parents and assess their understanding. Every parent of a child with asthma should have a discussed asthma action plan. Inhaler technique should be checked at every asthma-related visit, as this facilitates the correct use of inhalers and is associated with improvement in controlling asthma symptoms. As such, better knowledge fosters better attitudes and practices.

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Authors' contributions

All authors conceived the study jointly, LAA-A, SAA-J and LMA-Y conducted the study and analyzed the data. EAD supervised the statistical analysis. AS and EAD revised the

manuscript for intellectual content. All authors approved the final version.

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Conflicts of interest

Non of the authors declared any conflicts of interest.

Compliance with ethical principles

The study was approved by the Institutional Review Board of Sheikh Khalifa Medical City (EC-31.12.2015[RS-409]) and all participants gave written informed consent.

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APPENDIX 1. STUDY QUESTIONNAIRE

In 1-6, Please circle the single appropriate number

1. What's your relation to the child?

- a. Mother
- b. Father

2. What is your marital status?

- a. Married
- b. Divorced\Widow

3. What is your age?

- a. < 21
- b. 21-30
- c. 31-40
- d. > 41

4. What is your nationality?

- 1. Emirati
- 2. Arab non Emirati
- 3. Non-Arab

5. What is your educational level?

- a. Primary school and less
- b. High school
- c. University and above

6. What is your current employment status?

- a. Student
- b. Unemployed
- c. Employed

***In the remaining questions, please choose a single answer unless otherwise stated
In 7-9; please choose YES or NO or I DO NOT KNOW (Grid is provided)***

7. Has your Inhaler technique been checked by a healthcare professional in last year?

8. Have you ever been given an explanation by a health care professional about the type(s) of inhalers for asthma prescribed for your child?

9. After seeing the healthcare professional about your child's inhalers, did you feel confident about administering an inhaler to your child?

10. How many of your children, aged 10 or less, are prescribed inhalers for asthma?

- a. One
- b. Two
- c. Three or more

11. Regarding the information about inhalers that are used in asthma, which of the following sources applies to you? (You can choose more than one answer)

- a. Health care professionals
- b. Family members/friends
- c. Brochures/posters/ printed materials
- d. Internet
- e. Newspapers/magazines.
- f. TV/radio

12. Are you aware of an “asthma action plan”?

- a. Yes
- b. No

13. Which of the following is the commonest side effect of reliever inhalers? (You can choose more than one answer)

- a. Fast heartbeat
- b. Diarrhe
- c. Joint pain
- d. Feeling shaky
- e. Don't know

14. How often should your child attend his doctor for a review of his asthma inhaler medications if the asthma is controlled?

- a. Every month
- b. Every 3 -12 months
- c. Every 2 years
- d. Never

15. Which of the following types of inhalers improve acute symptoms of asthma? (Grid provided for Yes, No, or I do not know)

- a. Reliever
- b. Preventer
- c. Combination

16. Which of the following types of inhalers improve long-term asthma control? (Grid provided for Yes, No, or I do not know)

- a. Reliever
- b. Preventer
- c. Combination

17. A reliever inhaler should be administered for which of the following symptoms? (Grid provided for Yes, No or I do not know)

- 1. Sore throat
- 2. Wheeze
- 3. Blocked nose
- 4. Chest tightness
- 5. Cough

18. In your opinion, inhalers: (Grid provided for Agree, Unsure or Disagree)

- a. They can lead to dependence/addiction
- b. They are more effective if used along with a spacer
- c. They can have harmful long-term effect on the lungs
- d. They can cause hypertension
- e. They are less effective than nebulizers

19. How do you store your inhalers (Choose True or False for each statement).

- a. It should be kept in a refrigerator.
- b. Room temperature is ideal for storage.
- c. Near window / sun exposure.

20. Regarding the correct administration of an inhaler:

Parent able to explain or confirm or demonstrate the following steps (Mark as Yes or No)

- a. Check label and expiry date
- b. Hold upright and shake well before use
- c. Breathe out gently
- d. Put mouthpiece between teeth without biting and close lips to form good seal
- e. Start to breathe in slowly through mouth and press down firmly on canister and continue to breathe in slowly and deeply
- f. Hold breath for about 10 seconds then remove inhaler from mouth
- g. Breathe out gently away from inhaler
- h. Replace cap

21. Regarding the correct use of spacer/aerochamber: (Answer only if patient is using aerochamber)

Parent able to explain or confirm or demonstrate the following steps (Mark as Yes or No)

- a. Remove cap
- b. Shake inhaler and insert in back of aerochamber
- c. Place mouthpiece in mouth (or mask over mouth and nose)
- d. Encourage person to breathe in and out slowly and gently.
- e. Once breathing pattern is well established, depress canister with free hand and leave canister in same position as person continues to breathe in and out slowly (tidal breathing) five more times.
- f. Remove the aerochamber from person's mouth.