

The Impact of Cultural Factors, The Level of Health Education Received by the Caregivers, and Stigma on Asthma Treatment among Children in Southern Jordan

Fatima Mahmoud Al-Tarawneh¹, Wesam khalid Al-Amarat^{ID*1},
Diala Abdul Kareem AlTwalbeh¹

¹Department of Medical Support, Al-Balqa Applied University, Al-Karak University College, Al-Karak, Jordan

For asthma treatment in children, caregivers need good knowledge and attitudes regarding the disease and its treatment. This study aimed to determine the impact of cultural factors, the level of health education provided to patients and their families, as well as the impact of stigmatization on the treatment awareness of children with asthma in southern Jordan. A validated questionnaire was used to collect data from a sample of ninety-seven caregivers selected from three hospitals in southern Jordan. Open ended questions were answered after demonstrating the inhaler technique in and evaluated according to the instructions of the National Asthma Education and Prevention Program (NAEPP, 2013). The result revealed moderate knowledge of asthma with a mean score of (22.36/32), as well as moderate knowledge of asthma treatment (24.26/40). A high mean was found for the impact of cultural and environmental factors (22.93/28), whereas low impact was found for stigma with a mean value of (4.73/12). Therefore, to improve future asthma management, additional efforts are required to educate caregivers and improve their asthma awareness and rectify any falsehoods regarding asthma medications by health care providers.

Keywords: Asthma. Stigma. Medication adherence. Health education. Culture.

INTRODUCTION

Asthma is outlined as a chronic disease characterized by airway inflammation that results in bronchoconstriction (Gandhi *et al.*, 2013). It may be outlined as hyper-responsiveness of the airways to allergens (Zaraket *et al.*, 2011). It is one of the foremost common globally six diseases that cause children's morbidity (Oubeidat *et al.*, 2010; Salvador Jr *et al.*, 2012). It is estimated that more than 339 million people worldwide suffered from bronchial asthma in 2016 (Vos *et al.*, 2016). It *et al.* The prevalence of the disease among Jordanian children was estimated as 12.3% (Al-sheyab *et al.*, 2012), being widespread among 6-7 years old children in Amman (the capital of Jordan) with a prevalence of 10% (Abu Ekteish, Otoom, Shehabi, 2009).

Another study found that about 16.6% of children under the age of 12 years in the southern governorate, Ma'an, suffer from bronchial asthma (Al Hroob *et al.*, 2016).

The role of the family in managing their asthmatic child is clearly outlined within the bronchial asthma management guidelines. Numerous literature indicated that the severity of bronchial asthma can be controlled with good and appropriate family management (Al-Anazi *et al.*, 2015). Bronchial asthma treatment is influenced by many factors, like family attitudes, their knowledge of bronchial asthma, educational attainment, income, drug availability, and access to health care providers. Also, cultural factors such as the use of certain herbs, a fear of drug side effects, and a concern of dependence on inhalers, in addition to the environmental factors such smoking and carrying animals were found to affect asthma treatment (Zhao *et al.*, 2013; Martinez, 2007). Additionally, the use of certain medications like NSAIDs and ACE inhibitors may worsen bronchial asthma (Douglas, Elward, 2010).

*Correspondence: W. k. Al-amarat. Department of Medical Support. Al-Balqa Applied University. Al-Karak University College, Al-Karak, Jordan. Phone: +962772683694. E-mail: wsam.amarat@bau.edu.jo. ORCID: <https://orcid.org/0000-0002-2899-2107>

In China, a study revealed that the most common reason for non-adherence to bronchial asthma medications is that parents fear the effects of medications on children's growth or intelligence (Zhao *et al.*, 2013).

Various studies have been conducted to evaluate the levels of caregivers' knowledge regarding bronchial asthma disease and medication among different populations. A study conducted in Pakistan revealed several misconceptions regarding the causes of bronchial asthma, with 37% of participants were believing that bronchial asthma is transmitted by infection (Hazir *et al.*, 2002). In Lebanon, they like the name chest allergy rather than bronchial asthma, it was shown that 48% of parents are worried about the addiction effect of bronchial asthma inhalers (Zaraket *et al.*, 2011). In addition, a moderate level of knowledge regarding asthma disease and poor knowledge regarding asthma medication were estimated among caregivers in Saudi Arabia (ALotaibi, ALAteeq, 2018). A numerous of asthmatic children mothers (21%) in Khartoum do not accept to use the inhalation treatment, while 69% do not use it mild or moderate symptoms, and 53% do not use preventer's inhalers, and 50% use the inhaler incorrectly (Noureddin *et al.*, 2019). In India, it was shown that only 21% of asthmatic patients use inhalers which was attributed to the cultural factors and lack of appropriate health education (Gajanan, Padbidri, Chandhury, 2016). In Jordan, a study conducted in the national capital, Amman, showed moderate level of caregivers' knowledge about asthma disease and low level of knowledge about asthma treatment. (Alshahwan *et al.*, 2018).

It is well known that the adherence of asthmatic patients to long-term inhalation therapy has created a significant contribution to regulate asthma and reduce morbidity, while failure to comply leads to poorer clinical outcomes and higher healthcare costs (Boutopoulou *et al.*, 2018). However, there are plentiful researches showing the low awareness among patients and caregivers regarding bronchial asthma medication. A study carried out in India announced that 80% of caregivers of asthmatic children weren't aware of corticosteroids, and 86% of them didn't recognize its mechanism to manage bronchial asthma (Bhagavayheeswaran *et al.*, 2016). Solely 55% of children with moderate/severe

chronic bronchial asthma were reported to use control medications daily (Klok *et al.*, 2015).

Southern area of Jordan is distinguished by specific culture of rural and Bedouin communities, and environmental factors such as pollution due to many factories and desert weather. In addition, the relatively low income, lack of health care facilities, and inadequate activation of clinical pharmacy or nursing in health education in this area may have negative impact on the patient knowledge about bronchial asthma disease and its treatment. Despite the high prevalence of bronchial asthma among children in south of Jordan (Al Hroob *et al.*, 2016), there is a gap in the literatures in terms of assessing the level of knowledge about asthma disease and awareness of its treatments and the factors affecting this matter among population of this area. Accordingly, this study aimed to explore the level of knowledge and attitude of parents (caregivers) about bronchial asthma, and the extent of health education that they have received, in addition to assess the effects of stigma, and cultural and environmental factors on the bronchial asthma treatment of children in southern part of Jordan. This will guide the health care providers and decision-makers in designing educational programs and redefining policies for their care to improve asthma management.

MATERIAL AND METHODS

Study setting

This study was conducted within the emergency department in three hospitals located within the southern part of Jordan, Karak Governmental Hospital, Al-Safi Governmental Hospital and, Ma'an Governmental Hospital, during the period from September 2019 to December 2019.

Study subjects

The subjects of the study were the caregivers (parents) of children with asthma aged between one and thirteen years as it's difficult to diagnose asthma before the age of one a year and the thirteen years old is the final childhood period accepted in pediatrics wards and

pediatrics clinics in Jordan. The caregivers (parents) were targeted as they look after the children and usually the co-patient for their sick child.

Data collection method

The data was collected by a structured interview conducted using a questionnaire which was developed by the researchers based on the study objects under the guidance of a review of similar literature. The questionnaire was written in Arabic language to confirm the good understanding of the participants as Arabic is the official and spoken language in Jordan. The questionnaire consisted of three sections: The first section dealt with the demographic characteristics of the study sample. The second section was divided into five categories. The first category evaluated asthma-related knowledge and consisted of eight questions with a score of 1-4 points (Never, sometimes, often, and always), in which never scored 1 point, sometimes 2 points, often 3 points, and always 4 points, and the total score was out of 32 where the lowest score obtained by the responder was 8. Hence, the results of this category were ordered into three levels: low (score 8-16), moderate (Score >16-24), and good (Score >24-32). The second category measured the level of awareness to asthma treatment and consisted of 10 questions asking about medication proper use and adherence. The answer of each question was rated by a score of (1-4) (Never, sometimes, often, and always). The overall score was 40 where the lowest score obtained by the responder was 10. The results of this category were also categorized as low (score 10-20), medium (score > 20-30) and good (score > 30-40). The third category investigated the cultural and environmental factors affecting on asthma treatment, and consisted of seven questions, each with a score of (1 to 4) (Never, some time, often and always). The overall score was 28 where the lowest score obtained by the responders was 7. The answers of this category were characterized as: low impact (score 7-14), moderate impact (score > 14-21), and high impact (score > 21- 28). The fourth category measured the extent of health education received by the members of the study sample, consisted of 9 questions, with a score of (1 to 4) (Never, some time, often, and

always) for each question. The overall score is 36 where the lowest score obtained by the responders was 9. Thus, the answers were classified as: low (score 9-18), moderate (score > 18-27), and good (score > 27-36). The fifth category evaluated the effect of stigma on the asthma treatment and consisted of three questions, each with a score of (1-4) (Never, some time, often, and always). The overall score for the answers was 12 and the minimum obtained score was 3. The results were categorized as low impact (score 3-6), moderate impact (score > 6-9), and high impact (score > 9-12).

The third section consisted of interview answers for open-ended questions that were recorded in the survey, including sources of information about asthma, herbs, or mixtures used to treat asthma, source of health information which the participants had obtained, and antibiotics use to treat an asthma attack. Finally, participants were asked to demonstrate how actually they use the MDI. The investigator observed the participant technique according to the NAEPP instructions checklist as stated below in the methodology section.

To determine the reliability and validity of the questionnaire, three experts had revised this questionnaire and modified some items. It was also applied to a pilot sample of 30 participants, where the pilot sample was not included in the final analysis. To calculate the reliability of the questionnaire, Cronbach's Alpha method was applied to the pilot sample, and the reliability coefficients of the questionnaire dimension varied as follows: The first dimension (asthma-related Knowledge) (0.96), the second dimension (asthma treatment awareness.) (0.98), the third dimension (cultural and environmental factors related to asthma) (0.94), the fourth dimension (The extent of health education received by the caregivers) (0.97) and the fifth dimension (the stigma associated with the asthma aspect among the study sample) (0.87) all of which are statistically acceptable. Parents/caregivers of children with asthma were contacted while sitting in the waiting area of the emergency department after receiving full care for their children. The questionnaires were distributed and collected by the investigators, after clarifying the purpose of the study, and if they accept participation, verbal consent was obtained from each participant. It took about 20 minutes to complete the questionnaire.

Data analysis

The data was encrypted and entered using the Statistical Package for Social Sciences version 20 (SPSS). The descriptive statistics were expressed as the mean and standard deviation (SD). Multiple regressions were used to explain the effects of asthma-related knowledge, cultural and environmental factors, the level of health education received by the sample, and the stigma on asthma treatment awareness. The open-ended questions data were recorded in the survey and analyzed manually, the percentage of study samples was reported. The final part was done by observing how the participants used (MDI) while evaluating each step separately to determine if the participants performed it in the right way. The percentage of correct usage for each step was calculated separately and shown in the interview results section.

Ethical consideration

Permission to conduct this research has previously been granted by the Institutional Review Board at Al-Balqa Applied University. The approval for this study was obtained from the Director of Karak Governmental Hospital, Director of Al-Safi Governmental Hospital and Director of Ma'an Governmental Hospital. Also, the participant's verbal consent before responding to the investigator and answering the questionnaire. Also, participants were reassured that participation is voluntary and they can withdraw at any time, as the principle of the Declaration of Helsinki was followed and all data was preserved and used for research purposes only.

RESULT AND DISCUSSION:

One hundred and twelve (112) participants were asked to participate in this study where only one caregiver was included for each child. Ninety-seven (97) participants agreed to complete questionnaires, with a response rate of 86.61%. Table I summarizes the demographic information of the participated caregivers and their children. The participants were distributed in the hospitals as 37 (38.14%) from Ma'an Government Hospital, 32 (33%) from Al-Karak Government Hospital,

and 28 (28.87%) from the government hospital Al-Safi. In the sample, 95 (97.9%) of caregivers were one of the parents and 2 (2.1%) were not. Concerning the educational level of the sample, the participants were divided into different levels. The mean age of the children was (6.8) years and ranged from two to thirteen years where 61% of them were older than 5 years and 56.7% were males. This is in consistent with other studies that have shown that males in childhood are more prone to asthma than females. (Abu-Ekteish, Otoom, Shehabi, 2009). Most of the children in the study sample (92.8%) have no other chronic diseases, while 74.2% suffer from other allergic diseases, particularly allergic rhinitis and conjunctivitis. This also agrees with a previously performed study (Al-Zayadneh *et al.*, 2019). A number of 32 (33%) participants have first-degree relatives who suffer from bronchial asthma, as many studies suggest the role of genetics in asthma (Thomsen, 2015). Furthermore, the data showed that 64 (66%) of the participants had received asthma-related (health education) from healthcare professionals such as physicians, pharmacists, and nurses.

TABLE I - Descriptive analysis of demographic data of caregivers and their children with asthma. (N = 97)

Variables	Number - Percentage (%)	Mean
Hospital		
Al- Karak Governmental Hospital	32 (33%)	
Ma'an Governmental Hospital	37 (38.18%)	
Al-Safi Governmental Hospital	28 (28.88%)	
Gender		
Male	55 (56.7%)	
Female	42 (43.3%)	
Level of education		
Illiterate	8 (8.2%)	
Primary school	6 (6.2%)	
High school	11 (11.34%)	
Diploma	11 (11.34%)	

TABLE I - Descriptive analysis of demographic data of caregivers and their children with asthma. (N = 97)

Variables	Number - Percentage (%)	Mean
Bachelor	54 (55.67%)	
Master and higher education	7 (7.22%)	
Previous knowledge of asthma (health education) that received from health professionals.		
Yes	64 (66%)	
No	33(34%)	
Relationship to the child		
Father/Mother	95 (97.9%)	
Other	2 (2.1%)	
child age years		6.8 years
Have a relatives with asthma		
Yes	32 (33%)	
No	65 (67%)	
Have other chronic disease		
Yes	7 (7.3%)	
No	90 (92.8%)	
Have other allergic disease		
Yes	72 (74.2%)	
No	25 (25.8%)	

The results shown in Table II demonstrate the moderate level of asthma related knowledge among the participants with overall mean of (22.36). The highest average (3.26), was for the statement (I am familiar with asthma attack symptoms like wheezing.), while the lowest average (1.91) was for the finding (I carried out an allergy test for my child, so I am familiar with allergens that can cause my child to have an asthma attack .) This may be due to poor health education and not covering this test by the health insurance in addition to unavailability of it in these governorates (Karak, ma'an). Thus, the patients need to go to Amman to perform this test which is costly for the caregivers. Therefore, it is highly recommended to provide this test freely in the public hospital especially for the patients. The participants also found the disease as serious and dangerous, which is good point since many studies have illustrated that the more severe and serious the disease, the more adherence to medications will be (George, Bender, 2019). In addition, they had moderate knowledge of aggravating factors such as influenza viruses attacking, and moderate knowledge of asthma as an inflammatory disease.

TABLE II - Descriptive statistics asthma related knowledge among the study members. (N = 97)

NO. items	Items	N	Mean	Std. Deviation	Level
1	I am familiar with allergens that can cause my child to have an asthma attack. So I carried out an allergy test on my child.	97	1.91	1.23	Low
2	The most exacerbating factor of an asthma attack is viruses (such as influenza).	97	2.62	1.22	Moderate
3	The main cause of asthma is an inflammatory disease.	97	2.78	1.07	Moderate
4	I believe that asthma is dangerous	97	3.11	1.13	Good
5	I can control an asthma attack when it occurs.	97	2.73	1.13	Moderate

TABLE II - Descriptive statistics asthma related knowledge among the study members. (N = 97)

NO. items	Items	N	Mean	Std. Deviation	Level
6	I find an asthma attack is frightening	97	2.98	0.95	Moderate
7	I am familiar with asthma attack symptoms like wheezing.	97	3.26	0.86	Good
8	If asthma attack ended there is no need to go to emergency department	97	2.96	0.85	Moderate
	Asthma related knowledge.	97	22.36	3.04	Moderate

Table III shows that there was low moderate levels of awareness regarding asthma treatment (knowledge, practice, and adherence to asthma treatment) with total mean of (24.26). The highest mean (3.01) was for the statement (I do not give NSAIDs as an anti-fever agent to my child with asthma.), which is not good because NSAIDs may exacerbate asthma (Douglas, Elward, 2010), while the lowest mean (1.58) was for (I had physical therapies to my asthmatic child (chest massage)) statement. This may be attributed to the poor health education that the sample was received. The mean of administration of the influenza vaccine was also somewhat moderate (2.19) and this may be due to moderate knowledge of the participants regarding the factors exacerbating asthma, one of which is a viral infection such as influenza, in addition to that government insurance does not cover the influenza vaccine. This finding is in consistent with a study conducted in 2016 on vaccination against influenza in Jordan where low vaccination rate (20% of adults) was reported. It was concluded that the concern about the safety and efficacy

of the vaccine was the main obstacle to influenza vaccination in adults and children, while the inclusion of the vaccine in national vaccination programs was an important factor in determining vaccine acceptance (Abu-Rish *et al.*, 2016). On the other hand, the previous reports found that flu vaccines can prevent 59%-78% of asthma attacks that lead to emergency visits and/or hospitalizations (Vasileiou *et al.*, 2017). Therefore, more attention should be paid to provide influenza vaccines to children with asthma and advice the caregivers by physicians to accept the vaccination. The results shows other worrying aspects including the flushing a child's mouth after using inhalers, which can increase the side effects such as oral thrush. In addition, the mean of (2.37) was for non-use of preventive inhalation in the absence of asthma symptoms, which can worsen and increase the rate of asthma attacks. This raise the need to focus on the patient's adherence to preventive inhalers by well-health education. Also, the mean of using inhalers before exercise is slightly moderate (2.19) and this may be due to poor knowledge of asthma exacerbation factors.

TABLE III - Descriptive statistics regarding knowledge, practice and adherence to asthma treatment among the study sample. (N = 97)

No. items	Items	N	Mean	Std. Deviation	Level
1	I had physical therapy to my asthmatic child (chest massage).	97	1.58	1.02	Low
2	Every year my child got the flu vaccine before the season.	97	2.19	1.25	Moderate
3	It's easy (without difficulty) to give my child his/her medication.	97	2.52	1.12	Moderate

TABLE III - Descriptive statistics regarding knowledge, practice and adherence to asthma treatment among the study sample. (N = 97)

No. items	Items	N	Mean	Std. Deviation	Level
4	It's easy (without difficulty) determining which inhaler my child needs.	97	2.74	1.29	Moderate
5	I made a commitment to give my child a preventative inhaler even without symptoms.	97	2.37	1.17	Moderate
6	My child washes his mouth after using the inhaler.	97	1.94	.92	Low
7	After the child's asthma attack over, I keep giving him/her the inhaler and medication.	97	2.70	1.13	Moderate
8	Give a bronchodilator inhalation to an asthmatic child before exercising.	97	2.19	1.25	Moderate
9	I do not give NSAIDs as an anti-fever agent to my child with asthma.	97	3.01	1.12	Good
10	I have committed to give my child his/her medication on time.	97	2.98	1.22	moderate
	Awareness to asthma treatment.	97	24.26	4.85	Low moderate

As shown in Table IV a high negative impact was found for cultural and environmental factors on asthma treatment with overall mean (22.93). The highest mean (3.45) was found for (I think an inhaler can cause my child to become dependent), while the lowest mean (3.09) was for the statement (I use an asthma treatment from social media). All of the above statements have a high impact, so there is a need to encourage health education by all health workers to overcome this negative influence of the cultural and environmental factors on asthma treatment. In agreement of these findings, several studies have indicated the significant influence of cultural and environmental factors on asthma treatment (Zhao *et al.*, 2013, Zaraket *et al.*, 2011). The cultural factor reduces adherence to treatment, especially fear of side effects such as an effect on growth, and fear of dependence on inhalers which is very common among the participants of the present study. Also, there was a common notion that no benefit from inhalers with average of (3.40), which may reduce adherence to treatment. Another aspect is the use of an herbal remedy which also reduces adherence to the prescribed asthma treatment. Also, the

participants extensively depend on the social media as a source of information that might not be based on the scientific method, exhibiting significant impact on asthma treatment with a mean of (3.09). All of these practices should be discouraged by appropriate and qualified health education. Furthermore, a high impact was found for environmental factors such as the presence of a smoker with a mean of (3.30), and the presence of pets in the house (3.09). This may also be due to poor knowledge regarding of some factors exacerbating the asthma, or due to an economic factor, as some members of the study sample depend on the livestock as source of income. The result of Table V showed a low level of health education that the study sample received. The overall mean was (16.16), and this might affect the treatment of asthma in a negative way. The highest average (2.12) was for the statement (when my child was diagnosed with asthma, the doctor explained to me about the disease and its treatment), while the lowest mean (1.22) was for (I made a commitment to visit the children's clinic periodically even if my child is fine). All the data incorporated in Table V show low or low moderate means, and this may

be due to the low number of staff comparative to the patient's number, in addition to no proper activation of clinical pharmacy or health educator. Another issue is that the demonstration method was not used by health providers to educate the patient recurrently. Also, there is continuous change in the doctors who are present in the clinics due to the constant movement of doctors across the various Ministry of Health hospitals. Several studies have indicated the significant impact of health education on the treatment of asthma. In Jordan, in 2018, a study found that the majority of hospitalized asthma patients with poor inhalation and poor asthma control lack the knowledge regarding asthma, and had not received appropriate health education (Basheti et al, 2018). Therefore, more efforts must be made by all health workers in order to educate asthma patients which will lead to good results of asthma treatment. It is recommended to increase the health

staff number to deal with the large number of patients, and to conduct an educational program for healthcare workers in order to increase their ability to educate the patient. A protocol needs to be created by the Ministry of Health to educate asthma patients that will be signed by both the health care provider and the patients or their primary caregivers. Furthermore, repeating the education for the patient when visiting the clinics and pharmacy, in addition to activating a special clinic that deals with health education purposes may efficiently improve asthma related knowledge. The results of Table VI show a low level of stigma among the study sample, with an overall mean of (4.73), which is good for treating asthma. The highest mean (1.74) was for the statement (I don't like my child using inhalers outside of our home). All of the statements show low mean, and this is a good point for asthma treatment.

TABLE IV - Descriptive statistics on cultural and environmental factors related to the asthma among the study sample. (N = 97)

No. items	Items	N	Mean	Std. Deviation	Level
1	I am worried about the side effects of the treatment (inhalation).	97	3.41	1.08	High
2	I believe that there is no benefit in the treatment (inhaler).	97	3.40	.98	High
3	I use an asthma remedy from social media.	97	3.09	1.03	High
4	There is a smoker in our home.	97	3.31	1.05	High
5	I think inhaler could cause my child to become dependent.	97	3.45	.82	High
6	There are pets in our house.	97	3.12	.84	High
7	I use herbal remedy for asthma.	97	3.13	.86	High
	Cultural and environmental factors related to the asthma.	97	22.93	2.48	High impact

TABLE V - Descriptive statistics of the extent of health education received by the members of the study sample.(N = 97)

No. items	Items	N	Mean	Std. Deviation	Level
1	A health care worker advised me to use the spacer if my child cannot use the inhaler properly.	97	1.91	1.23	Low
2	When my child was diagnosed with asthma, the doctor explained to me about the disease and its treatment.	97	2.12	1.02	Moderate

TABLE V - Descriptive statistics of the extent of health education received by the members of the study sample.(N = 97)

No. items	Items	N	Mean	Std. Deviation	Level
3	The doctor has confirmed that my child is using the inhaler properly using by demonstrative manner.	97	2.09	.87	Moderate
4	The pharmacist often explains to me about the proper use of an asthma treatment.	97	1.55	.90	Low
5	The pharmacist has confirmed that my child is using the inhaler properly using by demonstrative manner.	97	2.01	.89	Moderate
6	When my child was diagnosed with asthma, the pharmacist explains to me about the disease and its treatment.	97	2.03	.74	Moderate
7	Often when I go to the clinic, the doctor explained to me asthma and its treatment for my child.	97	1.74	.88	Low
8	I have made a commitment to visit the children's clinic periodically even if my child is fine.	97	1.22	.48	Low
9	On every visit to the children's clinic I find the same doctor.	97	1.49	.83	Low
	The extent of health education received by the members of the study sample.	97	16.16	2.69	Low

TABLE VI - Descriptive statistics about the presence of stigma among the study sample.(N = 97)

No. Items	Items	N	Mean	Std. Deviation	Level
1	I don't like the other person knowing that my child has asthma	97	1.44	0.61	Low
2	I don't like relatives knowing that my child has asthma	97	1.54	0.66	Low
3	I don't like my child using inhalers outside of our home.	97	1.74	0.88	Low
	The stigma associated with the asthma aspect among the study sample.	97	4.73	1.24	Low

Interview Results (part three):

This part was designed to evaluate the practice of caregivers or older children on the technique (use of the inhaler). The number of study participants who completed this part of the study was 91 participants. Six participants refused to complete this part of the study and only answered the questionnaire. In this part, caregivers or older children received an (MDI) and were asked to explain how to use it, and this was evaluated

by the researchers according to the (NAEPP) instruction checklist as follows. ([quotes 2013 Feb 28]. Available from (www.nhlbi.nih.gov/health/public/lung/asthma/asthma_tipsheets.pdf))

1. Remove the cap from the inhaler (89/97.8%).
2. Shake the MDI before use/connect the separator (spacer) to the inhaler (if used) (42/46.15%).
3. Keep the inhaler upright (56/61.54%).

4. Exhale to the residual volume away from the mouthpiece (32/35.16%).
5. Place the nozzle between the teeth (without biting) and the lips (81/89.01%).
6. Start breathing through the mouth at the same time, press firmly on the canister (40/44%).
7. Inhale strongly and deeply (39/42.86%).
8. Confinement for 5 seconds (46/50.55%).
9. Exhale out of the mouth of the mouth (53/58.24%).

According to these results, the most common mistake among participants was step 4 (exhale to residual volume away from the mouthpiece (32/35.16%). While the highest correct step was Step 1 (removal of the inhaler cap (89/97.8%). There was also a lack of coordination between initiation of breathing and drug release from the inhaler, as well as inhaling deeply and forcefully. Only 27.47% of the participants performed all the above steps correctly. Many kinds of literature have indicated that patient training on appropriate inhalation techniques is critical and must be routinely performed. In patients training on inhalation devices, health providers must do the following:

- 1) Know how each device works and how to improve delivery to the lungs. 2) Be able to effectively show the patient how the device works. 3) Teaching the patient how to use the device using the correct technique. And 4) regularly review the patient's progress and provide additional training if necessary (De Simoni *et al.*, 2017), Hence, it is necessary to educate patients in a demonstrative manner and should be repeated upon a patient visit to the clinic. In fact, this protocol was weak according to the findings of this study related to the health education that the sample obtained.

During the interview, we asked open-ended questions, these questions and their answers were as follows:

Herbal remedies that participants use to treat asthma, the responses were: Anethum (12/13.18%), chamomile (20/21.98%), thyme (15/16.48%), honey (26/28.57%), lemon (17/18.86%), black seeds (19/20.88%), carnation (19/20.88%) turmeric (6/6.59%), guava leaves (19/20.88%), ginger (8/8.79%), anise (13/14.29%). Most

participants who use herbal remedies were found to use more than one. The total number of participants who use herbal remedies was (83/91.21%), which is high and attributed to the strong influence of the cultural factor. The use of herbal remedies may reduce adherence to the prescribed medications, especially corticosteroid inhalers, leading to worsening asthma (Roy *et al.*, 2009). The health care provider should explain to the patient that these herbal remedies are not an alternative to asthma treatment, and they should use the prescribed medication.

When the participants were asked about their source of information about asthma and its treatment, they responded as follows:

Pediatrician (58/63.73%), general practitioner (44/48.35%), pharmacist (38/41.76%), nurse (15/16.48%), written material (10/10.99%), media (31/34.07%) and others (17/18.68). More than one responses were allowed for this question. The participants were confident that the information about the drug was correct whether it came from doctors or pharmacists.

The biggest source of information was the pediatrician and the general practitioner, as they are more in contact with the patient. While, the lowest for written materials as there is a lack of written Arabic materials on asthma. Therefore, it is recommended to make a short publication such as an Arabic language brochure about asthma and its treatment. Also, the appropriate use of inhaler technique as part of a well-organized health education program for asthma patients.

When the participants were asked for their information on the etiology of asthma, their replies were: I do not know (22/24.18%), allergens (49/53.85%), and infections (20/21.98%).

Therefore, more attention is needed in the Asthma Educational Program.

When asked if participants use antibiotics to treat an asthma attack, (76/83.52%) admitted that they used to take antibiotics to treat asthma attacks; and, if the antibiotics were prescribed to their child by the doctor due to child need, (31/40.79%) answered yes, while the others have received it either from the community pharmacy without a prescription, which is illegal, or by forcing the doctor to write antibiotics for their children. The guidelines do not recommend prescribing antibiotics after an asthma

attack. However, studies show that more than half of people with asthma attacks are given antibiotics anyway, which can increase resistance to antibiotics (Denholm, van der, Hay, 2020). The healthcare team should do more to teach the caregivers that antibiotics should not be given randomly. Also, the community pharmacy should not dispense antibiotics without a prescription.

Multiple regressions were performed to determine how knowledge about asthma, cultural and environmental factors, the level of health education received by the participant, and stigma affected on the treatment adherence.

Before performing multiple regressions, the assumptions of the regression model were examined. The linear relationship between the independent variables and the dependent one (Awareness to asthma treatment) was examined. The relation between the first variable (asthma-related knowledge) and (Awareness of asthma treatment) was (0.936). While the correlation between the third variable (Cultural and environmental factors related to asthma.) And (Awareness to asthma treatment) was (0.954), also the correlation between the fourth variable

(The extent of health education received by the members of the study sample) and (Awareness of asthma treatment) was (0.858), and the correlation between the fifth variable (The stigma associated with the asthma aspect) and (Awareness of asthma treatment) was (0.81). All of which is higher than the correlation (0.30), indicating a linear relationship between the independent variables and the dependent variable. The tolerance coefficient was tested and the first variable (asthma-related knowledge) is (0.825). The third variable (Cultural and environmental factors related to asthma) is (0.957), while the fourth variable achieved (The extent of health education received by the members of the study sample) is (0.806), and the fifth variable (The stigma associated with the asthma aspect) is (0.844), all of which is higher than (0.10), which indicates the absence of a high relationship between the independent and dependent variables. This finding supports the use of multiple regressions.

It is clear from Table No VII that the validity of the model to test the hypothesis based on the high calculated value of F, which (63,406).

TABLE VII PART A - Result of multiple regression analysis (impact of knowledge about asthma, cultural and environmental factors and level of health education that a participant received and stigma effect on treatment awareness).

Source	Sum square	Df	Mean square	F	sigma
Regression	905.832	1	905.832	63.406	.000 ^b
Residual	1357.199	95	14.286		
Total	2263.031	96			

TABLE VII PART B - Result of multiple regression analysis factors (knowledge of asthma, cultural and environmental factors, and level of health education a participant received and stigma) that affected treatment adherence

Knowledge about asthma disease	B	Standard error	Beta	T	Sig
Constant	4.709	2.486		1.894	0.061
Knowledge about asthma disease	1.008	0.127	.633	7.963	0.000

(R: 0.63) and coefficient of determination (R²:0.40)

Regression analysis shows that the disease concept among the studied sample is the only factor influencing adherence to treatment. Since partial correlation which

means that 40% of treatment awareness is due to disease knowledge.

The statistical data in Table VII part B based on the value of T calculated at the level of significance ($\alpha \leq 0.05$), indicate that the concept of disease among members of the study sample was statistically significant and contributed to the interpretation of the impact force on their adherence to treatment, which increases the value of beta coefficients (0.633).

A high interpretive force (0.4) was shown by the regression analysis for the impact of individual's knowledge regarding asthma on their commitment to drug adherence and asthma treatment awareness. This perhaps is due to the fact that their knowledge of asthma as a dangerous disease and the attack occurs is frightening helps to increase their commitment to the treatment. On the other hand, it was clear from the results of multiple regressions analyses that cultural and environmental factors did not contribute to an increase in treatment adherence. This may be due to the existence of cultural factors that affect the commitment to treating this disease in a negative way such as the idea that the inhalation causes the dependence on inhalers and having to worry about the side effects which has a significant impact as shown in this study. Some of the participants find the asthma medications to be more harmful than beneficial, especially preventive inhaler (ICS). So, treatment of asthma would not only depend on a given medication, but also on including the social and environmental factors. In a 2007 British study on the impact of race on asthma treatment, cultural factors reduced commitment to inhalation due to fear of addiction. The study found a great influence of rationing among white ethnicity from southern Asia. (Smeeton *et al.*, 2007) another study in Saudi Arabia in 2016 found the majority of participants (60.3%) were worried about the inhaled steroids' side effects, and 32% of them were concerned about the development of dependency. (Abu-Shaheen, Nofal, Heena, 2016) In addition, this study showed the low level of asthma related health education received by the sample negatively affect the treatment adherence. This may be due to the small number of medical staff and the lack of stability in hospital staff (frequent transfer between hospitals) in addition to the failure of proper activation of the clinical pharmacy in hospitals due to the small number of clinical pharmacists. It is advised to find

private clinics administered by specialized doctors and a clinical pharmacist to be reviewed by the asthma patient in order to obtain medical education about the disease and the use of medicines. Our results are consistent with other studies reporting that limited health education leads to increased fear of side effects of asthma control drugs and reduced adherence to medication, so educational interventions for asthma patients will improve adherence among asthma patients. In this context, several studies confirm the role of health education in adherence to medication. (Jordan *et al.*, 2019; Soones *et al.*, 2017)

LIMITATIONS OF THE STUDY

The results of this study have to be taken into account in the context of some limitations, this is a cross-sectional study conducted in three locations in the same geographical area, which may limit the generalization of the results to all places in the country, and the inclusion of small sample size may decrease representation. Therefore, a similar study is recommended among a larger population all across the country.

IMPLICATIONS OF THE STUDY

The results of this study are useful and crucial in providing insight into the knowledge of Jordanian caregivers of children who suffer from asthma about asthma and its treatment. Also, the study highlights factors that affect treatment adherence in the southern part of the country. In addition, the results of this study may be useful in the field of health care, health care administrators, and policymakers in order to design educational programs for caregivers of children with asthma to manage asthma. After identifying areas of knowledge deficit, especially in relation to the use of asthma medications, demonstrative education pattern can be implemented to train the caregivers how to use the inhaler. This study also provided some basic data related to the Jordanian caregiver's general knowledge about asthma in the region with a limited number of studies that may encourage researchers to conduct more research studies in this regard to confirm these results and to follow the effects of these factors on asthma treatment

from health as well as economic prospective . In addition, this study used different tools to measure its objects in a realistic manner.

CONCLUSION

This study revealed a moderate level of knowledge about asthma among caregivers of children with asthma, low moderate knowledge about asthma medication and adherence, and a low level of health education received by the sample. High effect of cultural factors, such as fear of a side effect of drugs or thought that the inhaler would cause a child's dependence, on asthma treatment was found. In addition, herbal medicines is commonly used instead of the prescribed medications. Also, this study revealed a small number of participants who know how to use the MDI technique correctly, in addition to presence misconceptions about asthma medication. Thus, in order to improve future asthma control, more effort is required to educate caregivers and improve their asthma awareness, medication use, and adherence. In addition, this study recommended creating a protocol for treating asthmatics and how to educate them about the disease and its treatment, especially teaching inhaler technique demonstratively, which will increase treatment adherence. It is also recommended to make further studies that highlight the problems of asthma treatment and how to solve them.

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REFERENCES

- Abu-Ekteish F, Otoom S, Shehabi I. Prevalence of asthma in Jordan: comparison between Bedouins and urban schoolchildren using the International Study of Asthma and Allergies in Childhood phase III protocol. *Allergy Asthma Proc.* 2009;30(2):181-185. doi: 10.2500/aap.2009.30.3208
- Abu-Rish EY, Elayeh ER, Mousa LA, Butanji YK, Albsoul-Younes AM. Knowledge, awareness and practices towards seasonal influenza and its vaccine: implications for future vaccination campaigns in Jordan. *Fam Pract.* 2016;33(6):690-697. doi: 10.1093/fampra/cmw086. Epub 2016 Aug 27. doi: 10.1093/fampra/cmw086 .
- Abu-Shaheen AK, Nofal A, Heena H. Parental perceptions and practices toward childhood asthma. *Biomed Res Int.* 2016; 6364194doi: 10.1155/2016/6364194
- Al-Anazi A, Al Moamary M, Ismaeli T, Alanazi AN, Olayan L, Alanazi AM, et al. Asthma in the pediatric population: Level of perception among the parents and guardians. *Int J Med Public Health.* 2015;5(1):14–18. doi:10.4103/2230-8598.151240
- Al Hroob AM, Nawafleh H, Altaif KI, Elfaqir S. Population Prevalence of Asthma in Ma'an Governorate, Jordan. *Health Sci J.* 2016;10(2):1-4.
- ALOtaiibi E, ALAteeq M. Knowledge and practice of parents and guardians about childhood asthma at King Abdulaziz Medical City for National Guard, Riyadh, Saudi Arabia. *Risk Manage Healthcare Policy.* 2018;11: 67-75. doi: 10.2147/RMHP.S143829
- Alshahwan S, Obeidat H, Alnajjar M, Alduhni A. Jordanian Caregivers General Knowledge about Asthma among Children. *J Med J.* 2108;52(3):147-157.
- Al-sheyab N, Gallagher R, Crisp J, Shah S. Peer-led education for adolescents with asthma in Jordan: a cluster-randomized controlled trial. . 2012;129(1):e106-e112. doi: 10.1542/peds.2011-0346.
- Al-Zayadneh EM, Alnawaiseh NA, Altarawneh AH, Aldmour IH, Albataineh EM, Al-Shagahin H, et al. Sensitization to inhaled allergens in asthmatic children in southern Jordan: a cross-sectional study. *Multidiscip Respir Med.* 2019;14(1):1-8.doi:10.1016/j.rmed.2015.07.016
- Basheti IA, Obeidat N, Reddel H. Inhaler technique education and asthma control among patients hospitalized for asthma in Jordan. *Saudi Pharm J.* 2018;26(8):1127-1136. doi:10.1016/j.jsps.2018.06.002
- Bhagavayheeswaran K, Kasav YB, Singh AK, Mohan S, Joshi A. Asthma-related knowledge, attitudes, parectices (KAP) of parents of children with bronchial asthma: A hospital-based study. *Ann Trop Med Public Health.* 2016;9:23-30. doi: 10.4103/1755-6783.168704
- Boutopoulou B, Koumpagioti D, Matziou V, Priftis KN, Douros K. Interventions on adherence to treatment in children with severe asthma: a systematic review. *Front Pediatr.* 2018;6:232.
- De Simoni A, Horne R, Fleming L, Bush A, Griffiths C. What do adolescents with asthma really think about adherence to inhalers? Insights from a qualitative analysis of a UK online forum. *BMJ Open.* 2017;7(6):e015245. doi:10.1136/bmjopen-2016-015245. doi: 10.1136/bmjopen-2016-015245
- Denholm R, van der Werf ET, Hay AD. Use of antibiotics and asthma medication for acute lower respiratory tract

- infections in people with and without asthma: retrospective cohort study. *Respir Res.* 2020;21(1):4. doi:10.1186/s12931-019-1233-5
- Douglas JG, Elward KS. *Asthma*. London: Manson Pub. 2010. pp. 27–29.
- Gajanan G, Padbidri V, Chandhury A. Assessment of Knowledge and Attitude of parents Towards the Allergy and Bronchial Asthma in Their Children. *Int J Med Public Health.* 2016;6(3):121-125. doi:10.5530/ijmedph.2016.3.5
- Gandhi PK, Kenzik KM, Thompson LA, DeWalt DA, Revicki DA, Shenkman EA, et al. Exploring factors influencing asthma control and asthma-specific health-related quality of life among children. *Respir Res.* 2013;14(2):1-10. doi: 10.1186/1465-9921-14-26
- George M, Bender B. New insights to improve treatment adherence in asthma and COPD. *Patient Prefer Adherence.* 2019; 13: 1325–1334. doi: 10.2147/PPA.S209532 .
- Hazir T, Das C, Piracha F, Waheed B, Azam M. Carers' Perception of childhood asthma and its management in a selected Pakistani community. *Arch Dis Child.* 2002;87(4):287–290. doi: 10.1136/adc.87.4.287
- Jordan DM, Bush JS, Ownby DR, Waller JL, Tingen MS. The impact of traditional literacy and education on health literacy in adolescents with asthma. *J Asthma.* 2019;56(8):882-890. doi:10.1080/02770903.2018.1494191
- Klok T, Kaptein AA, Duiverman EJ, Brand PL. Long-term adherence to inhaled corticosteroids in children with asthma: observational study. *Respir Med.* 2015;109(9):1114–9. 10.1016/j.rmed.2015.07.016. DOI: 10.1016/j.rmed.2015.07.016
- Martinez FD. CD14, endotoxin, and asthma risk: actions and interactions. *Proc Am Thorac Soc.* 2007;4(3):221–225. doi: 10.1513/pats.200702-035AW.
- National Asthma Education and Prevention Program website. How to use a metered-dose inhaler. www.nhlbi.nih.gov/health/public/lung/asthma/asthma_tipsheets.pdf. Updated March 2013. Accessed February 28, 2018.
- Noureddin AA, Shaaban KM, Mohamed SOO, Abdulla A, Mahmoud AA, Salman MST. The knowledge attitude and practice (KAP) of mothers of asthmatic children toward asthma in Khartoum asthma clinics. *Sci Rep.* 2019;9:12120. doi: 10.1038/s41598-019-48622-2.
- Oubeidat H, Shudifat R, Malkawi OY, Alduhni A, Gyshan HA. Family dynamics in parenting asthmatic child. *J Med J.* 2010;44(2):216-222.
- Pearson WS, Goates SA, Harrykissoon SD, Miller SA. State-based Medicaid costs for pediatric asthma emergency department visits. *Prev Chronic Dis.* 2014; 11: E108. doi: 10.5888/pcd11.140139.
- Roy A, Lurslrhacha L, Halam EA, Xiu-Min Li, Levental H, Wisnivesky JP. Use of herbal remedies and adherence to inhaled corticosteroids among inner-city asthmatic patients. *Ann Allergy Asthma Immunol.* 2010;104(2):132-8. Doi:10.1016/j.anai.2009.11.024.
- Salvador Jr EZ, Leon NA, Bautista MS, Ayuyao FG. Validation of a questionnaire on asthma knowledge, attitudes and practices among parents of children with asthma for the asthma pediatric education program of the Philippine Heart Center. *Phil Heart Center J* 2012;16:39-49.
- Smeeton NC, Rona RJ, Gregory J, Patrick White, Morgan M. Parental attitudes towards the management of asthma in ethnic minorities. *Arch Dis Child.* 2007;92(12):1082–1087. doi: 10.1136/adc.2006.112037.1082-1087.
- Soones TN, Lin JL, Wolf MS, O'Connor R, Martynenko M, Wisnivesky JP, et al. Pathways linking health literacy, health beliefs, and cognition to medication adherence in older adults with asthma. *J Allergy Clin Immunol.* 2017;139(3):804–809. doi:10.1016/j.jaci.2016.05.043.
- Thomsen SF. Genetics of asthma: an introduction for the clinician. *Eur Clin Respir J.* 2015;2:10.3402/ecrj.v2.24643. doi: 10.3402/ecrj.v2.24643.
- Vasileiou E, Sheikh A, Butler Ch, El Ferkh K, von Wissmann B, Jim McMenamin J, et al. Effectiveness of Influenza Vaccines in Asthma: A Systematic Review and Meta-Analysis. *Clin Infect Dis.* 2017; 65(8):1388–1395. doi: 10.1093/cid/cix524.
- Vos T, Abajobir AA, Abate KH, Abbafati C, Abbas KM, Abd-Allah F, et al. (Colabs.) Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet.* 2017;390(10100):1211-1259.
- Zaraket R, Al-Tannir M A, Abdulhak A B, Shatila A, Lababidi H. Parental perceptions and beliefs about childhood asthma: a cross-sectional study. *Croat Med J.* 2011;52(5):637-643. doi: 10.3325/cmj.2011.52.637.
- Zhao J, Shen K, Xiang L, Zhang G, Xie M, Bai J, et al. The knowledge, attitudes and practices of parents of children with asthma in 29 cities of China: a multi-center study. *BMC Pediatric.* 2013;13(1):20. doi: 10.1186/1471-2431-13-20.

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