

ABOUT ASSESSMENT THE LEVEL OF KNOWLEDGE OF PARENTS ASTHMA IN THEIR CHILDREN AT MAKKAH CITY IN SAUDI ARABIA 2019

Faisal Ali Maroof¹, Nozhah Ahmad Sulimani², Maha Marzoq Almawalad³, Azzah Abdallah Ashi⁴, Qassem Mohammad Alammari⁴, Manahal Ahmad Alharbi⁴, Amani Ahmad Alsharif⁴, Khalid Mohammad Alyami⁵, Shroog omar albshri⁴, Bashayer Ahmed alharbi⁴, Azmi Abbas Hashem Albarakati⁶

¹General Dentistry, MOH MAKKAH, Saudi Arabia.

²Nursing technician, MOH MAKKAH, Saudi Arabia.

³Dental technician, MOH MAKKAH, Saudi Arabia.

⁴Nursing technician, MOH MAKKAH

⁵Epidemiology technician, MOH MAKKAH, Saudi Arabia.

⁶Health management specialist, MOH Makkah, Saudi Arabia.

Abstract:

Background

Children with asthma face multiple challenges that encompass learning how to cope with. Bronchial asthma is a public health problem in all countries irrespective of their level of development, being generally under-diagnosed and undertreated, and most asthma-related death commonly occurs in low-income and lower-middle income countries. Family management of asthmatic children is affected by several factors, primarily the parent's knowledge and attitude toward asthma. In 2004, the highest prevalence of asthma was reported by physicians in Saudi Arabia (25%). Bronchial asthma is a serious disease since it is very common disease in Saudi Arabia, and it doesn't only affect the individual physiologically, however it also affects the individual's quality of life, leading to missing days from school or work, emergency hospital visits, hospitalization, and caregivers and parents' time and effort. Consecutively, it affects the whole community, asthma, the most common chronic illness in children is responsible for more school absenteeism than any other single chronic childhood condition. **Aim of the study:** To assessment the level of Knowledge of parents about asthma in their children at Makah **Method:** A cross-sectional study was conducted attending the primary health care centers in Makkah, Saudi Arabia. An asthma Knowledge of parents about childhood asthma was used to measure the knowledge. During the October to November, 2019, participants were (200).

Results: Knowledge of the participant toward asthma study results show the majority of participant had average information Myths and beliefs regarding asthma were (65.0%) while Range (9-18) Mean± SD (12.144±4.15), regarding the General knowledge about asthma show the majority of participant had average information were (51.0%) while Range (4-15) Mean± SD (11.58±3.15), also Knowledge about associated aspects of asthma the majority of participant had average information were (78.0%) while Range (5-10) Mean± SD (7.108±2.011).

Conclusion: The asthma knowledge in the Saudi Arabian population is insufficient, and efforts should be carried out to spread asthma knowledge to the people among the parents and guardians of asthmatic children. asthma management should include patients, parents, and public awareness regarding the disease, its symptoms, medications, and highlight the misconceptions about asthma medications at both hospital level and community, for better control of asthma, more effort is needed to educate caregivers and to enhance them.

Keywords: Assessment, Knowledge, parents, asthma, children, childhood, Makah

1. Introduction:

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 asthma among children can greatly be controlled by proper management of the disease by the family. [1,2] 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. [2,3]

In 2006, it was estimated that 14% of the world's children experienced symptoms of asthma. [3,4] Locally, in Saudi Arabia, according to studies conducted over the past three decades, the prevalence of asthma in children ranges from 8% to 25%. [4,5] 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. This issue results in inadequate or low assessment made by teachers of their social, psychological, and educational needs. [6] The prevalence of asthma cannot be measured in terms of lung function abnormalities since most asthmatic children have normal lung function. [7,8] There is no agreed definition of asthma that is suitable for use in epidemiological surveys. However,

if people are simply asked whether they (or their children) have ever had asthma, the answers are remarkably specific, as screening test for the disease. [9]

Asthma is reported to be one of the most common chronic diseases in childhood, impairing not only the quality of life of the patients but also their families and incurring high costs to the health care system and society [10]. In the Middle East, asthma prevalence ranging from 5% to 23% has previously been reported to be lower than in developed countries [11,12]. This variation in rates suggests that environmental factors and variations in the presence of aeroallergens may affect its development. Genetic factors and temperature have a very close inverse correlation with the seasonal distribution of asthmatic attacks while humidity has a direct correlation. There are insufficient data to fully explain the variations in prevalence within and between populations [13]. Bronchiolitis usually happens in the winter and early spring. It most often affects children younger than 2 years old (The Saudi initiative of bronchiolitis diagnosis, management, and prevention (SIBRO) aimed to facilitate pediatricians and general practitioners to manage such conditions. The roles of supportive therapy; oxygen; bronchodilators; anti-inflammatory, antibacterial, and antiviral agents; and make recommendations to influence clinician behavior on the basis of the evidence. The prevention methods are reviewed, as is the potential role of complementary and alternative medicine (CAM).[14]

Bronchiolitis is an acute inflammatory illness of the small bronchioles, which is usually caused by a viral infection. The most common agent is a respiratory syncytial virus (RSV). This condition may manifest at any age, but symptoms are usually severe only in young infants [13]. The prevalence of bronchiolitis in the KSA ranges between 25%-88%. RSV belongs to the pneumoviridae family (a single-stranded RNA) with two subtypes, A and B. Bronchiolitis is a well-recognized condition; it affects around 1%–3% of all healthy children and more than 10% in high-risk groups. Bronchiolitis represents a large public health burden throughout the world where 2%–10% of cases require hospitalization. About 5% of RSV bronchiolitis cases require Intensive Care Unit (ICU) admission. [15]

1.2 Literature Review

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]. Fadzil et al reported in Previous studies that were conducted on parents with asthmatic children have also shown low asthma knowledge results, such as the mean score of the parents was 15.5, which was 50% of the total score.[15] There was a higher score in another study, with a mean of 18.3 for parents with asthmatic children who were admitted to New Castle Mater Hospital and John Hunter Hospital.[16] In addition, in another study, parents scored 19.9 in the Royal Children Hospital, Australia.[17] Comparably, one of the highest percentages on the asthma knowledge test was an average of 72% by parents.[18]

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. [14,19] 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. [1,20]

1.3. Rationale:

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. This mean may be a gap between knowledge of bronchial asthma among childhood and also there is a high percentage of children with uncontrolled asthma and is a high knowledge deficit among the children with asthma, all these factors increase the risk of respiratory disorders, middle ear disease, dental caries, and the risk of developing lung cancer in adulthood in Saudi Arabia.

1.3 Aim of the study:

To assess the level of Knowledge of parents about asthma in their children at Makah 2019

1.4 Objectives:

Assessment the level of Knowledge of parents about asthma in their children at Makah. 2019

1.5 Study design:

This study is descriptive type of cross-sectional study was conducted among 800 childhood asthma applying a convenience sampling technique .

1.6 Study Area

This study was conducted at Makkah Mokarramah. During the April to June, 2019 which is one of the major cities in Saudi Arabia with an estimated population of approximately 2 million. There are 38 primary health care (PHC) centers at Makkah Mokarramah ,Saudi Arabia. Primary health care is a cornerstone in the national health transformation as a part of the Vision 2030 in Saudi Arabia.¹³ Primary health care centers provide preventive, curative, and rehabilitative health services including treatment of common illnesses, immunization, maternal and child health, screening, and oral health. In each PHC center, a dedicated clinic run by a general practitioner and other healthcare professionals is assigned for follow up of children diagnosed with asthma. The clinic provides clinical care as well as educational services for patients. Asthma clinics in PHC centers follow the Saudi guidelines for asthma including management and education for patients. Children with asthma are diagnosed in the hospital by specialist physicians and then referred to the PHC centers for follow up. The number of registered physician-diagnosed children with asthma in the PHC centers in the Makkah Mokarramah region is approximately 2000. The primary data were collected from caregivers of children with asthma coming for a follow-up visit in the asthma clinic in PHC centers in at Makkah Mokarramah, Saudi Arabia.

1.7 Study Population

The inclusion criteria of the study were: i) children diagnosed with asthma; ii) children aged one to 12 years old; iii) visiting PHC centers with their caregivers for follow up; and iv) caregivers can speak Arabic. Children with other chronic diseases or their caregiver was not a first-degree relative were excluded from this study. The sample size for the study was calculated to be (200) participants based on an assumed frequency of outcome variable of 50% with an accepted margin of error of plus-or-minus 5 and a confidence level of (95%). 4 PHC centers were randomly selected to be included in the study these centers were selected from the list of PHC centers in Makkah Mokarramah, Saudi Arabia using simple random sampling technique. Within these centers, caregivers of children with asthma attending a follow-up visit in the asthma clinic were recruited sequentially.

1.8 Sample size

It was calculated based on 18.3% of parents who correctly answered more than 60% of the questions in Using 95% confidence interval and a 5% margin of error, the sample size was estimated to be 200 . The sample size was calculated by using open Epi epidemiologic calculator. A nonrandom, convenience sampling technique was used to obtain the sample

2. Data collection tool

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, self-education about the disease. The individuals' demography consisted of age, sex, marital status, number of children if any, education, place of residence, job, if the person suffers from asthma, and whether they have children who suffer from bronchial asthma or know someone who suffers from asthma. Followed by 30 questions about asthma awareness covering various aspects, and then a section about self-education about asthma and the sources of the information they know about asthma.

This survey was performed using a Structured Asthma Knowledge Questionnaire in their native language (Arabic) that was answered through interviews with 200 randomly selected participant Arabians The data was collected, translated, entered to a database and analyzed.

2.1 Data entry and analysis:

The Statistical Package for Social Sciences (SPSS) software version 24.0 has been used for data entry and analysis. Descriptive statistics (e.g., number, percentage) and analytic statistics using Chi-Square tests (χ^2) to test for the association and the difference between two categorical variables were applied. A p-value ≤ 0.05 will be considered statistically significant.

2.2 Pilot study

A pilot study has been conducted in the same sector due to the similarity to the target group using the same questionnaire to test the methodology of the study. As a feedback, the questionnaire has been clear and no defect has been detected in the methodology

2.3 Ethical considerations

Permission from the Makkah joint program of Saudi pediatric residency program will be obtained. Permission from the Directorate of health and education, verbal consents from all participants in the questionnaire were obtained. All information was kept confidential, and results will be submitted to the department as feedback .

2.4 Budget: Self-funded

3. RESULTS

Table 1 Distribution of demographic data (age, gender, Marital status, Number of children, Level of education) of the Participants in our study (n=200)

Age (years)		
<25		
25-35		
35-45		
>45		
Relationship to child		
Mother		
Father		
Guardians or relatives		
Number of children		
1		
2		
3 or more	0	
Level of education		
Illiterate		
Primary		
Preparatory		
Secondary		
University		
Occupation		
Work	2	
Not work		
Family income		
<5000		
5000-10000		
10000-15000		
>15000		
Age of child		
<5		
>5	2	
Gender of child		
Male		
Female	4	

History		
Family history of asthma		
No		
Yes	4	
Does child have other chronic diseases or disabilities?		
No	2	
Yes		
More than the one child in the family with a chronic illness or disabilities?		
No		
Yes	8	
Visits more than one hospital?		
No	4	
Yes		
Did you get instructions either in our hospital or in another hospital?		
No	0	
Yes		

In our study showed that the only (39.00%) of the participated were (35-45) years while (25-35) years were (22.0%), regarding the Relationship to child the majority of the participated Relationship with mother were (48.0%), while Approximately more than half of mothers of the participant number of children 3 or more (55.0%). The majority of the participated the level of education were preparatory (37.00%). and the majority of Occupation were work (76.0%), regarding does anyone of your family suffer from asthma the majority of the participated were (67.0%) yes suffering while Does child have other chronic diseases or disabilities were (81.0%). While More than the one child in the family with a chronic illness or disabilities majority of the participated yes were (79.0%). Visits more than one hospital the majority of the participated not visit were (67.0%), regarding Did you get instructions either in our hospital or in another hospital the majority of the participated no were (95.0%)

Table 2 Distribution of Asthma knowledge questionnaire

	Strongly agree		Agree		Disagree		Strongly disagree		Percentage of agreement	Chi-square	p-value
Myths and beliefs regarding asthma											
Inhalers use can lead to dependence addiction									0.25	0.520	0.001
Inhalers can have an effect on the heart or damage it									0.5	0.360	0.000
It is not good for children to use the inhaler for too long									0.25	0.320	0.000
After a child's asthma attack, once the coughing is over, the use of the inhaler and medications should be stopped										0.000	0.000
Children with asthma should use asthma medications only when they have symptoms (coughing, congestion, or wheezing)									0.5	0.880	0.000
It is better to use inhalers directly, without a holding chamber, so the medication can go more directly to the lungs									0.5	0.360	0.000
When a child has an asthma attack, it is best to go to the emergency room even if symptoms are mild									0.25	0.280	0.004
General knowledge about asthma											
The main cause of asthma is airway inflammation									0.75	0.120	0.000
Asthma attacks can be prevented if medications are taken even when there are no symptoms between attacks										0.600	0.000
Upper respiratory infections are the main causes or triggers of asthma attacks									0.25	0.520	0.000
If an asthmatic child gets the flu, you should apply the inhaler even if there is no coughing or wheezing									0.25	0.640	0.000
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									0.25	0.560	0.000
Some medications for asthma do not work unless they are administered every day									0.75	0.600	0.000
Knowledge about associated aspects of asthma											
Parents/guardians should ask a doctor to tell the school that an asthmatic child should not exercise or participate in physical education classes									0.25	0.920	0.000
Children who have asthma should not participate in sports that make them breathe too much									0.75	0.800	0.000
It is best not to smoke or let anyone else smoke near a child who has asthma	10								0.5	8.160	0.000
When the parents/guardians of a child with asthma smoke outside the house,									0.75	0.400	0.000

won't affect the child										
------------------------	--	--	--	--	--	--	--	--	--	--

Tables 2 present the knowledge analysis show all the asthma knowledge questions show that is a significant correlation between Knowledge were p-value =0.001 also some participants missed answering the first question in the first part of knowledge; therefore, the exact number of responses was mentioned (Table 2). Consequently, total calculation (n) and analysis for that section.

Table (3) Distribution of the asthma Knowledge questions

	Knowledge			Score	
	Weak	Average	High	Range	Mean±SD
Myths and beliefs regarding asthma		60		9-18	12.144±4.15
General knowledge about asthma		51		4-15	11.58±3.15
Knowledge about associated aspects of asthma		78		5-10	7.108±2.011
Total		64		4-75	11.152±7.910

Table 3 Regarding Knowledge of the participant toward asthma study results show the majority of participant had average information Myths and beliefs regarding asthma were(65.0%) while Range (9-18) Mean±SD(12.144±4.15), regarding the General knowledge about asthma show the majority of participant had average information were(51.0%) while Range (4-15) Mean±SD(11.58±3.15), also Knowledge about associated aspects of asthma the majority of participant had average information were(78.0%) while Range (5-10) Mean±SD (7.108±2.011).

Figure (1) Distribution of the asthma Knowledge questions

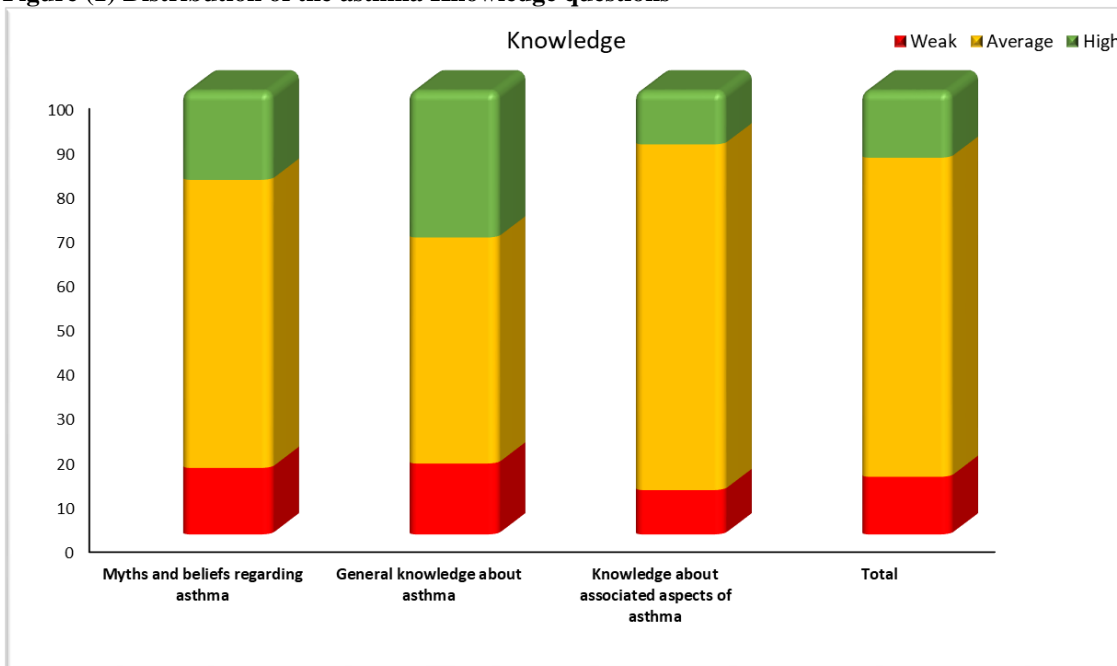


Table 4 Distribution of the associated of Knowledge about asthma and socio-demographic factors in Makkah AlMukarramah

		Knowledge		F or T	NOVA or T-test	
		Mean	SD		F test value	T test value
Age (years)	≤5	48.486	398	0.829	0.479	
	6-35	48.477	834			
	36-45	48.731	176			
	≥45	48.605	644			
Relationship to child	Other	48.135	482	1.514	0.223	
	Mother	48.466	425			
	Guardians or relatives	48.188	643			
	Others	48.135	482			
Level of education	Literate	48.433	542	1.379	0.243	
	Primary	48.149	900			
	Preparatory	48.531	553			
	Secondary	48.750	050			
	University	48.850	375			
Occupation	Work	48.125	906	0.124	0.901	
	Not work	48.292	639			
Family income	≤1000	48.840	996	0.884	0.450	
	1000-10000	48.882	603			
	10000-15000	48.646	780			
	≥15000	48.059	064			
More than the one child in the family with a chronic illness or disabilities?	Yes	48.024	348	0.127	0.899	
	No	48.203	017			
Visits more than one hospital?	Yes	48.978	869	0.467	0.641	
	No	48.545	502			
Did you get instructions either in your hospital or in another hospital?	Yes	48.932	947	0.794	0.074	
	No	48.600	454			

Table (4) summarizes the relationships between demographics and background characteristics of the knowledge of the participants. Also show that is no significant relation between Knowledge about asthma and demographic data regarding age (increase in 35-45 years) where $F=0.829$ and $P\text{-value} < 0.479$ by mean+ SD (48.731±8.176). The knowledge was found to be higher among mothers compared with other groups where $F=1.514$ ($p=0.223$). Higher knowledge score was observed among Secondary education group, where $F=1.379$ but this was not statistically significant were ($p=0.243$). Regarding more than the one child in the family with a chronic illness or disabilities in our study the majority of our participants were noticed in yes more than no with no significant relation by mean+ SD (48.203±8.017) were $T=-0.127$ and $P\text{-value}=0.899$. also regarding Visits more than one hospital in our study the majority of our participants were noticed in yes more than no with no significant relation were $T=-0.467$ and $P\text{-value}=0.641$. Regarding did you get instructions either in our hospital or in another hospital in our study the majority of our participants were noticed in yes more than no with no significant relation were $T=-0.794$ and $P\text{-value}=0.074$

4. Discussion

The purpose of this study was to explore the level of knowledge and practice of parents in the management of asthma in their children. The majority of participants in the current study were mothers with age of 25-35 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. [13,21] 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. [22] 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. [23,24]

In one local study, patients with asthma reported the incidence of asthma in their fathers (17.5%), mothers (14.9%), and siblings (60.5%).¹⁸ 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. [25,26] 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. [9,27]

In another local study, Al-Binali et al explored the mothers' knowledge of asthma using a different scoring tool. [13,28] 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 did not know the mechanisms of asthma. [13,29] Internationally, the findings are similar. For example, the majority of parents in India have poor knowledge of asthma. [19,30]. In another local study, Al-Binali et al explored the mothers' knowledge of asthma using a different scoring tool. [13,31] 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 did not know the mechanisms of asthma. [13,32] Internationally, the findings are similar. For example, the majority of parents in India have poor knowledge of asthma. [19,33]

In the current study, participants were had average knowledgeable about the associated aspects of asthma, majority of participant had average information Myths and beliefs regarding asthma were (65.0%), regarding the General knowledge about asthma show the majority of participant had average information were (51.0%) while, also Knowledge about associated aspects of asthma the majority of participant had average information were (78.0%)

5. Conclusion:

There is a high percentage of children with uncontrolled asthma and is a high knowledge deficit among the parents and caregivers of children to the asthma. An educational program targeting the general population and the caregivers should be implemented to correct any false beliefs regarding asthma and asthma medications. the previse study's demonstrated that bronchial asthma knowledge in the Saudi Arabian population is insufficient, and efforts should be carried out to spread bronchial asthma management.

6. References

1. Al-Anazi, A., Al Moamary, M., Ismaeli, T., Alanazi, A. N., Olayan, L., Alanazi, A. M., ... & Qureshi, S. (2015). Asthma in the pediatric population: Level of perception among the parents and guardians. *International Journal of Medicine and Public Health*, 5(1). National Heart, Lung, and Blood Institute. (2002). Global initiative for asthma: global strategy for asthma management and prevention. *Bethesda, MD: National Institutes of Health*.
2. Hazir, T., Das, C., Piracha, F., Waheed, B., & Azam, M. (2002). Carers' perception of childhood asthma and its management in a selected Pakistani community. *Archives of disease in childhood*, 87(4), 287-290.
3. Wa Somwe, S., Jumbe-Marsden, E., Mateyo, K., Senkwe, M. N., Sotomayor-Ruiz, M., Musuku, J., ... & Fishman, M. C. (2015). Improving paediatric asthma care in Zambia. *Bulletin of the World Health Organization*, 93, 732-736.
4. Kutzora, S., Weber, A., Heinze, S., Hendrowarsito, L., Nennstiel-Ratzel, U., von Mutius, E., ... & GME Study Group. (2018). Asthmatic/wheezing phenotypes in preschool children: Influential factors, health care and urban-rural differences. *International journal of hygiene and environmental health*, 221(2), 293-299.
5. Al Ghobain, M. O., Algazlan, S. S., & Oreibi, T. M. (2018). Asthma prevalence among adults in Saudi Arabia. *Saudi medical journal*, 39(2), 179.
6. Al-Harbi, S., Al-Harbi, A. S., Al-Khorayyef, A., Al-Qwaiee, M., Al-Shamarani, A., Al-Aslani, W., ... & Yousef, A. (2016). Awareness regarding childhood asthma in Saudi Arabia. *Annals of thoracic medicine*, 11(1), 60.

7. Masoli, M., Fabian, D., Holt, S., Beasley, R., & Global Initiative for Asthma (GINA) Program. (2004). The global burden of asthma: executive summary of the GINA Dissemination Committee report. *Allergy*, 59(5), 469-478.
8. Sobki, S. H., & Zakzouk, S. M. (2004). Point prevalence of allergic rhinitis among Saudi children. *Rhinology*, 42, 137-140.
9. BinSaeed, A. A., Torchyan, A. A., Alsadhan, A. A., Almidani, G. M., Alsubaie, A. A., Aldakhail, A. A., ... & Alsaadi, M. M. (2014). Determinants of asthma control among children in Saudi Arabia. *Journal Of Asthma*, 51(4), 435-439.
10. Al Frayh, A. R., Shakoor, Z., ElRab, M. G., & Hasnain, S. M. (2001). Increased prevalence of asthma in Saudi Arabia. *Annals of Allergy, Asthma & Immunology*, 86(3), 292-296.
11. Peterson-Sweeney, K., McMullen, A., Yoos, H. L., & Kitzman, H. (2003). Parental perceptions of their child's asthma: management and medication use. *Journal of Pediatric Health Care*, 17(3), 118-125.
12. Zaraket, R., Al-Tannir, M. A., Bin Abdulhak, A. A., Shatila, A., & Lababidi, H. (2011). Parental perceptions and beliefs about childhood asthma: a cross-sectional study. *Croatian medical journal*, 52(5), 637-643.
13. Al Binali, A. M., Mahfouz, A. A., Al Fifi, S., Naser, S. M., & Al Gelban, K. S. (2010). Asthma knowledge and behaviours among mothers of asthmatic children in Aseer, south-west Saudi Arabia. *EMHJ-Eastern Mediterranean Health Journal*, 16 (11), 1153-1158, 2010.
14. BinSaeed, A. A. (2014). Caregiver knowledge and its relationship to asthma control among children in Saudi Arabia. *Journal of Asthma*, 51(8), 870-875.
15. Fadzil, A., & Norzila, M. Z. (2002). Parental asthma knowledge. *The Medical Journal of Malaysia*, 57(4), 474-481.
16. Liu, A. H., Zeiger, R., Sorkness, C., Mahr, T., Ostrom, N., Burgess, S., ... & Manjunath, R. (2007). Development and cross-sectional validation of the Childhood Asthma Control Test. *Journal of Allergy and Clinical Immunology*, 119(4), 817-825.
17. Pattemore, P. K., Asher, M. I., Harrison, A. C., Mitchell, E. A., Rea, H. H., & Stewart, A. W. (1990). The interrelationship among bronchial hyperresponsiveness, the diagnosis of asthma, and asthma symptoms. *Am Rev Respir Dis*, 142(3), 549-554.
18. Norzila, M. Z., Hasanah, I., Deng, C. T., & Azizi, B. H. (2000). Asthma education: how much does it improve knowledge of childhood asthma amongst medical students and paramedics?. *The Medical journal of Malaysia*, 55(3), 324-330.
19. Shivbalan, S., Balasubramanian, S., & Anandnathan, K. (2005). What do parents of asthmatic children know about asthma?: An Indian perspective. *The Indian journal of chest diseases & allied sciences*, 47(2), 81-87.
20. El-Hefny AM, Nassar SI, El-Heneidy FM, Said M, ElBeleidy AS, El-Marsafy E, Moustafa NA, El-Falaky M, Haddad Z. Epidemiology of childhood asthma in Cairo. *Med J Cairo University*. 1994; 62(2):505–518.
21. Georgy, V., Fahim, H. I., El Gaafary, M., & Walters, S. (2006). Prevalence and socioeconomic associations of asthma and allergic rhinitis in northern Africa. *European Respiratory Journal*, 28(4), 756-762.
22. Georgy, V., Fahim, H. I., El Gaafary, M., & Walters, S. (2006). Prevalence and socioeconomic associations of asthma and allergic rhinitis in northern Africa. *European Respiratory Journal*, 28(4), 756-762.
23. Zedan, M., Settin, A., Farag, M., Ezz-Elregal, M., Osman, E., & Fouda, A. (2009). Prevalence of bronchial asthma among Egyptian school children. *Egypt J Bronchol*, 3(2), 124-130.
24. Sears, M. R., Burrows, B., Flannery, E. M., Herbison, G. P., & Holdaway, M. D. (1993). Atopy in childhood. I. Gender and allergen related risks for development of hay fever and asthma. *Clinical & Experimental Allergy*, 23(11), 941-948.
25. El-Mashad, G. M., Mahmoud, A. A., & Hafez, A. A. A. (2016). The prevalence of bronchial asthma among primary school children in Menoufiya Governorate (El-Bagour Center). *Menoufia Medical Journal*, 29(1), 89.
26. Abdallah, A. M., Sanusy, K. A., Said, W. S., Mahran, D. G., & Mohamed-Hussein, A. A. (2012). Epidemiology of bronchial asthma among preparatory school children in Assiut district. *Egyptian Journal of Pediatric Allergy and Immunology (The)*, 10(2).
27. Halim, W. B., Khalil, K. A., Sobhy, S. A., & Hasb-Allah, S. A. (2013). Prevalence of bronchial asthma among secondary schools students at Abu Khalifa village-Ismailia Governorate. *The Medical Journal of Cairo University*, 81(2).
28. El-Saify, M. Y., Shaheen, M. A., Sabbour, S. M., & Basal, A. A. (2008). Epidemiological Pattern and Management of Pediatric Asthma Review of Ain Shams Pediatric Hospital Chest Clinic Data Cairo, Egypt 1995-2004. *Egyptian Journal of Pediatric Allergy and Immunology (The)*, 6(2).
29. Stempel, D. A., Mauskopf, J., McLaughlin, T., Yazdani, C., & Stanford, R. H. (2001). Comparison of asthma costs in patients starting fluticasone propionate compared to patients starting montelukast. *Respiratory medicine*, 95(3), 227-234.
30. Al Dhduh, M. A., Sabri, N. A., & Fouda, E. M. (2015). Prevalence and severity of allergic diseases among Egyptian pediatric in different Egyptian areas. *Int J Pharm Sci Res*, 2, 107.
31. Gergen, P. J., Fowler, J. A., Maurer, K. R., Davis, W. W., & Overpeck, M. D. (1998). The burden of environmental tobacco smoke exposure on the respiratory health of children 2 months through 5 years of age in the United States: Third National Health and Nutrition Examination Survey, 1988 to 1994. *Pediatrics*, 101(2), e8-e8.

32. Bassiony, M. M. (2009). Smoking in Saudi Arabia. *Saudi Med J*, 30(7), 876-81.
33. Al-Harbi, S., Al-Harbi, A. S., Al-Khorayyef, A., Al-Qwaiee, M., Al-Shamarani, A., Al-Aslani, W., ... & Yousef, A. (2016). Awareness regarding childhood asthma in Saudi Arabia. *Annals of thoracic medicine*, 11(1), 60.