CODEN [USA]: IAJPBB ISSN : 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES
SJIF Impact Factor: 7.187

Avalable online at: http://www.iajps.com *Research Article*

AWARENESS AND KNOWLEDGE ABOUT BRONCHIAL ASTHMA AMONG MALE PRIMARY SCHOOL TEACHERS IN TAIF, KSA

Abdullah Khalafallah O Alnemari[1], Rasheed Ali Alghamdi[2], Abdulrahman Khalafallah Alnemari[3], Abdulaziz Khalafallah Alnumari[4], Abdulwahab Khalafallah Alnemari[5]

[1]Family Medicine Resident R4 MBBS, MOH, Taif, Saudi Arabia.
[2] Consultant Family Medicine, MBBS, SBFM, ABFM, MOH, Taif, Saudi Arabia.
[3] Bachelor of Medicine and Bachelor of Surgery, Taif, Saudi Arabia.
[4] Medical intern, Taif university, Saudi Arabia.
[5] Pharmacy student, Taif university, Saudi Arabia.

Article Received: February 2021 **Accepted:** February 2021 **Published:** March 2021

Abstract:

Background: *Bronchial asthma, as the most common childhood chronic condition of several etiological factors, has a wide range of incidence with no evidenced prevalence among Taif City populations. However, despite its wide distribution, the general knowledge about the condition is still unassessed.* ***Methodology:*** *A cross-sectional study conducted among primary school teachers in different boy schools in Taif City has been introduced an Arabic version of the Newcastle Asthma Knowledge Questionnaire [31] as a self-administered questionnaire to assess teachers` knowledge regarding asthma. Data were collected and analyzed using the SPSS version 26.* ***Results:*** *The study included 414 teachers. Of all, 96.9% had poor knowledge about bronchial asthma. Poor knowledge is significantly associated mainly with age, marital status, number of offspring, and having a previous history of similar condition, while having false information and myths regarding the condition is associated with the older age, Saudi nationality, and more years of experience. Teachers were able to identify the trigger of an attack of asthma were about 85.7%, only 5.6% have knowledge about the condition management, with 36% preferring inhaled to tablet drugs. In addition, it was agreed that prevention is important in cases of recurrent attacks (82.9%).* ***Conclusion:*** *Our study has reported poor knowledge about the condition, with falsely believed ideas about medications used or children's habits or activity to counteract the onset of asthma, increasing with age. Better knowledge was found in married teachers of middle age and had a family history of asthma.*

Corresponding author:
Abdullah Khalafallah O Alnemari,
Family Medicine Resident R4 MBBS, MOH, Taif, Saudi Arabia.

QR code

Please cite this article in press Abdullah Khalafallah O Alnemari et al., ***Awareness And Knowledge About Bronchial Asthma Among Male Primary School Teachers In Taif, KSA.,****Indo Am. J. P. Sci, 2021; 08(03).*

BACKGROUND:

According to the World Health Organization WHO, bronchial asthma is the most frequent chronic medical condition among children all over the world [1]. Its prevalence rate was estimated as 9.3% among children in the United States of America (USA).[2] Globally, the prevalence of asthma symptoms ranges from 5% to 35% among children, with a lower rate in developing compared to developed countries [3].

Bronchial asthma is characterized by recurrent attacks of shortness of breath associated with wheezing due to bronchospasm that leads to impairment in quality of life and often gets worse during the night and during physical activity [4].

In the Kingdom of Saudi Arabia (KSA), the overall prevalence of bronchial asthma symptoms in the previous 12 months of a big study carried out in Al-Madinah was 10.2% among primary school children, whereas those who ever-had symptoms of asthma, the prevalence was 23.6% [5].

There is a great probability that school children experience life-threatening asthma exacerbations at school as they spend about 30% of their day at school [6].

At present, bronchial asthma is not curable; however, symptoms can be managed by avoiding exposure to environmental allergens and irritants that can trigger an attack, suitable medical treatment, and self-management education [7]. Complications of bronchial asthma could occur as a result of poor knowledge about the disease and its triggers and management, poor use of inhaler technique, incompliance with therapy, and negative attitude toward the illness and the therapy [8]. The proper management of bronchial asthma among schoolchildren requires attention to the knowledge and behavior of teachers of asthmatic children [9].

Unfortunately, the majority of schools in developing countries, including Saudi Arabia, do not have a full-time physician or even nurse; therefore, it is essential for the school teachers to be aware of early asthma signs, its exciting factors, the time at which they should ask for extra medical help, and be able to make a decision regarding physical activity [10].

It has been reported in the USA that, on average, a child with active asthma missed [2,6] school days per year [11]. Also, inadequately controlled bronchial asthma negatively impacts the schoolchildren's quality of life through interfering with his/her daily activities and reducing the child's school attendance and productivity [12]. Children with asthma who are prohibited from participation in physical activities often feel isolated and rejected [13]. Finally, asthma is the third most frequent reason for hospitalization among children causing great direct and indirect health care burden [14].

The National Heart, Lung, and Blood Institute (NHLBI) asthma management guidelines [15] recommended classroom teachers to be aware of asthma policies and procedures, awareness of asthma triggers, aware of their role in the management of asthma among students, collaborate with the student and their family in dealing with missed schoolwork; encourage the student with asthma to participate in physical activity, help in minimizing allergens and irritants that can initiate an asthma attack in the classroom; and educate other students to be more tolerant with their colleagues with asthma.

The majority of studies that investigated knowledge of schoolteachers regarding bronchial asthma and its management in developed countries showed limited knowledge [16-18] similar to that or even worse was reported from developing countries [19-23].

Many studies have been identified through reviewing of literature [16-29]. Some of these studies were carried out in Saudi Arabia. However, no study has been cited from Taif city.

Rationale

- A considerable proportion of primary school children in Saudi Arabia are affected by bronchial asthma [10].
- Bronchial asthma is a leading cause of school absenteeism.
- Adequate asthma knowledge among schoolteachers is essential for the safety of their students who are suffering asthma exacerbation during school time.
- Literature review showing that studies assessing asthma knowledge among primary school teachers in Saudi Arabia is rare, with no study carried out in Taif.

Aim of the study

This study aimed to assess the awareness and knowledge about bronchial asthma among male primary school teachers in Taif city.

Specific objectives

1. To evaluate the knowledge about asthma among male primary school teachers in Taif city, 2019

2. To identify demographic and other personal characteristics associated with better asthma

knowledge among male primary school teachers in Taif city, 2019.

SUBJECTS AND METHODS:

Study design

A cross-sectional study

Study area/settings

This study was carried out at governmental primary schools for boys in Taif city, which is located in Western Saudi Arabia. It has an estimated population of 1,281,613 according to 2011 census.[30] In Taif city; there are 133 primary schools for boys (23 in the South region, 37in the East region, 31 in the Western region, and 42 in Al-Hawiya).

Study population

All male teachers working at governmental primary schools for boys in Taif city at the scholastic yeas 1439-1440 constituted the target population for the study (n= 4600); distributed as follows

-Eastern region (1469)

-Western region (1269)

-Southern region (1375)

-Al Hawiya (487)

Administrative teachers (not dealing with students) were excluded from the study.

Sample size

The number of male teachers working at governmental primary schools in Taif (1439-1440 H) is 4600. Assuming that 54.6% of them have poor knowledge regarding asthma according to a recent study carried out in Riyadh [22], keeping 5% as an error, and assuming a confidence level of 95%, the sample size was calculated using Epi-info staticalc software, version 7 and the minimum sample size was 352, rounded off to 385, accounting for 10% drop out.

Sampling technique

Multistage sampling technique was adopted:

In the first stage: Two of the geographical, educational regions of Taif city were chosen by a simple random technique.

In the second stage: Five schools were randomly selected from each one of the selected educational regions. Thus, a total of ten schools was recruited.

In the third stage: All teachers working in the selected schools were invited to participate in the study by completing the study questionnaire.

Data collection tool

The validated Arabic-version [22] of the Newcastle Asthma Knowledge Questionnaire [31] was used as a self-administered questionnaire to assess teachers` knowledge regarding asthma. The questionnaire includes two main sections;

(1) demographic characteristics included age, nationality, marital status, number of children, and working years.

(2) asthma knowledge. The questionnaire includes 31 item, with 25 true/false items and 6 open ended questions. It is categorized into general assessment of the asthma knowledge (questions1, 2, 3, 25, 26, 28, and 29), acute attack: recognition, triggers, and management (questions 6, 7, 8, 11, 15, 18, 19, 20, 21, 22, and 23), maintenance treatment (questions 10, 12, 14, 19, 27, and 31), and false myths (questions 4, 5, 9, 13, 16, 17, 24, and 30) [32].

Correctly answered questions would be assigned a score of "one," while wrongly answered questions will be assigned a score of "zero." The open-ended questions of the questionnaire will be rated by the researcher according to the published standard answers for these questions. The overall score will range between 0 and 31, with a higher score indicating greater knowledge. As for subscales, the total score constituted a sum of the score of each question, divided by the number of questions in the subscale, and multiplied by 100, presented as percentages.

Data collection technique

A self-administered questionnaire was utilized. The researchers visited the chosen schools and explained the purpose of the study to headmasters of the involved schools, and ask their cooperation. Data was collected from teachers during their free times after explaining the study purpose to them and recollected on the same day. The researchers were available to explain any inquiry in the questionnaire. More than one visit to each school was sometimes needed to complete the sample.

Data entry and analysis

All collected data were coded before its entry to a personal computer. Data entry and analysis were done by using the Statistical Package of the Social Sciences (SPSS) statistical program version 26. Kruskal-Wallis H test and Mann-Whitney U test were used for score analyses. A P-value of less than 0.05 was considered as a level of significance throughout the study.

Pilot Study

A pilot study was conducted on 30 teachers. The

questionnaire and methodology were tested, and necessary modifications were made accordingly.

Ethical consideration

Written permission from the Joint Program of Family Medicine in the Taif Region to start the study after approval by the local ethics committee was obtained before conducting the study. Written permission from the authorities in the Ministry of Education in Taif city was obtained. Written consents were collected at the beginning of the study from all participants. All information was kept confidential and was not used or accessed except for the purpose of the scientific research.

RESULTS:

Demographic data shows that most of the teachers are middle-aged, and the majority are of 11 years of experience or even more, as shown in Table 1. 69.1% of them are married with at least three children. Most of the teachers are shown to have neither previous attacks of asthma nor a family history.

Regarding general knowledge related to asthma, almost half of the respondents are able to identify asthmatic attacks fairly. They have shown good knowledge about possible and most common triggers as passive smoking (85.7%), knowing that the asthma patients have sensitive airways (76.6%), the problem magnifies at night (74.6%), while less had good knowledge about case diagnosis (16.7%) and possible activities for asthmatic children to enroll into (27.3%) as shown in table 2.

As shown in table 3, 16.9% of the teachers know the possible triggers of attacks, with less than half knowing that the cause of wheezes during the attacks be muscle tightening (40.6%) and swelling of the lining of the air passage in the lung (25.6%). However, regarding the management of attacks, only 28% of the responders have a previous background on medications to use when one of the asthmatic children comes to an acute attack. Of all, 11.1% knew that medications for asthma do not cause heart problems, and 20% knew that a short-term course of steroids does not produce side effects. Only 10.1% knew that the attack started too quickly that treatment initiation was not possible is not the cause of death after an acute asthma attack.

Regarding knowledge on maintenance treatment information, shown in Table 4, only 5.6% of the participants could mention at least two of the daily used preventive treatment. Of all, 24.9% knew that antibiotics are not used for asthma, 21.3% knew that allergy injections are not used for asthma, and short course steroids do not cause significant side effects (20%). On the other hand, 64.7% of participants know that with appropriate treatment, most children with asthma should lead a normal life with no restrictions on activity. It was also widely agreed upon (82.9%) that prevention is necessary for children with recurrent attacks.

Table 5 shows that the majority of participants have rejected the false belief supposing asthma to be infectious (87.7%) or accused of children growth retardation (65%), as well as the false certain association between asthma in one of the offspring to the possibility of asthma affection in the rest (78.7%). While 33.3% know that treatment addiction due to dependent usage is not possible, and 22.9% know that children with asthma can use dairy products.

The majority (96.9%) had poor Knowledge (NAKQ score < 21), as presented in figure 1.

Age was significantly associated with NAKQ score ($P = 0.001$), general knowledge subscale ($P = 0.047$), and acute attack subscale ($P = 0.000$). Non-Saudis demonstrated higher scores than Saudis in all subscales ($P < 0.05$). Mean NAKQ score±SD was 17.9±8.3 among Non-Saudis and 11.3±4.5 among Saudis ($P = 0.005$). Marital status was significantly associated with NAKQ score ($P = 0.000$), general knowledge subscale ($P = 0.002$), and acute attack subscale ($P = 0.000$). Similarly, the number of offspring, years of experience, personal and family history of asthma were significantly associated with the NAKQ score, general knowledge subscale, and acute attack subscale ($P < 0.05$). Teachers with 1-5 years of experience had a higher NAKQ score (12.77±4.65) than other groups ($P = 0.001$). Years of experience were also significantly associated with the false myths subscale score, where teachers with 1-5 years of experience had a higher false myths subscale score (46.8±21.93) than other groups. Positive personal and family history were associated with higher scores NAKQ and in all subscales. Teachers with a family history of asthma had a NAKQ score of 12.47±4.29 versus 10.82±4.88 for negative family history ($P = 0.000$).

Table 1: Socio-demographic data of the plotted sample (n=414).

Parameter		No.	Percentage
Age (years)	• **18 -**	63	15.2%
	• **25 -**	101	24.4%
	• **35 -**	165	39.9%
	• **45 -**	67	16.2%
	• **55 – 64**	18	4.3%
Nationality	• **Saudi**	405	97.8%
	• **Non-Saudi**	9	2.2%
Marital status	• **Married**	286	69.1%
	• **Single**	109	26.3%
	• **Divorced or widowed**	19	4.6%
Number of offspring	• **No offspring**	113	27.3%
	• **One or two**	132	31.9%
	• **Three or more**	169	40.8%
Number of offspring, Mean±SD (min-max)		3±1 (0-9)	
Years of experience	• **1 -**	125	30.2%
	• **6 -**	83	20.0%
	• **11 or more**	206	49.8%
Years of experience, Mean±SD (min-max)		11±8 (1-36)	
Diagnosed with bronchial asthma	• **No**	360	87.0%
	• **Yes**	54	13.0%
Family history of bronchial asthma	• **No**	262	63.3%
	• **Yes**	152	36.7%

Table 2: General Asthma-related Knowledge (n=414).

	Item	Correct answer	Correct answer (n (%)
Q1	What are the main symptoms of asthma?	Coughing, wheezing, shortness of breathing	208 (50.2%)
Q2	More than 1 in 10 children will have asthma at some time during their childhood.	True	144 (34.8%)
Q3	Children with asthma have abnormally sensitive air passages in their lungs.	True	317 (76.6%)
Q25	Swimming is the only suitable exercise for asthmatics.	False	113 (27.3%)
Q26	Parental smoking may make the child's asthma worse.	True	355 (85.7%)
Q28	The best way to measure the severity of a child's asthma is for the doctor to listen to his chest	False	69 (16.7%)
Q29	Asthma is usually more of a Problem at night than during the day.	True	309 (74.6%)

Table 3: Questions about triggers and possible management of attacks (n=414).

	Item	Correct answer	Correct answer (n (%)
Q6	Write down all the things you know that cause asthma (sometimes called trigger factors)	All three: allergens, colds, and exercise	70 (16.9%)
Q7	During an attack of asthma, the wheeze may be due to muscles tightening in the wall of the air passages in the lungs.	True	168 (40.6%)
Q8	During an attack of asthma, the wheeze may be due to swelling in the lining of the air passage in the lungs.	True	106 (25.6%)
Q11	What are three asthma treatments (medicines), which are useful during an attack of asthma?	Two of short-acting beta2-adrenergic preparation, ipratropium bromide, oral corticosteroids, and oxygen.	116 (28%)
Q15	If a person dies from an asthma attack, this usually means that the final attack must have begun so quickly that there was no time to start any treatment.	False	42 (10.1%)
Q18	Inhaled medications for asthma (e.g., Ventolin puffers) have fewer side effects than tablets.	True	142 (34.3%)
Q19	Short courses of oral steroids (such as prednisolone) usually cause significant side effects.	False	83 (20%)
Q20	Some asthma treatments (such as Ventolin) damage the heart.	False	46 (11.1%)
Q21	A 5-year-old boy has an attack of asthma and takes two puffs of Ventolin from a puffer (metered-dose inhaler). After 5 Min he is no better. Give some reasons why this might have happened.	Two from the medication has expired, inhaler is an empty, poor technique, insufficient dosage	23 (5.6%)
Q22	During an attack of asthma which you are managing at home, your child requires the nebulizer (mask) every two h. he/she is gaining benefit but is breathless after two h. provided that he/she doesn't get any worse, it is fine to continue with two h treatment.	False	101 (24.4%)
Q23	Write down ways of helping to prevent attacks of asthma during exercise.	Two out of warm-up exercises, short action beta-2 agonists or chromones prior to exercising, managing asthma. More carefully, breathing through the nose in, warm and humid environment.	86 (20.8%)

Table 4: Knowledge plotting about necessary medications for maintenance (n=414).

	Item	Correct answer	Correct answer (n (%)
Q10	Write down two asthma treatments (medicine), which are taken every day on a regular basis to prevent attacks of asthma from occurring.	Two inhaled corticosteroids, chromones, montelukast, long-acting beta-2- adrenergic agonist combinations	23 (5.6%)
Q12	Antibiotics are an important part of treatment for most children with asthma.	False	103 (24.9%)
Q14	Allergy injections cure asthma passages in their lungs.	False	88 (21.3%)
Q19	A short course of oral steroids (such as prednisolone) usually causes significant side effects.	False	83 (20%)
Q27	With appropriate treatment, most children with asthma should lead a normal life with no restrictions on activity.	True	268 (64.7%)
Q31	Children with frequent asthma should have preventive drugs.	True	343 (82.9%)

Table 5: False Myths-related questions (n=414).

	Item	Correct answer	Correct answer (n (%)
Q4	If one child in a family has asthma, then all his/her brothers and sisters are almost certain to have asthma as well.	False	326 (78.7%)
Q5	Most children with asthma have an increase in mucus when they drink cow's milk.	False	56 (13.5%)
Q9	Asthma damages the heart.	False	43 (10.4%)
Q13	Most children with asthma should not eat dairy products.	False	95 (22.9%)
Q16	People with asthma usually have 'nervous problems.'	False	117 (28.3%)
Q17	Asthma is infectious (i.e., you can catch it from another person).	False	363 (87.7%)
Q24	Children with asthma become addicted to their asthma drugs.	False	138 (33.3%)
Q30	Most children with asthma will have stunted growth.	False	269 (65%)

Figure (1): Proportion of good knowledge (NAKQ score ≥21) (n=414)

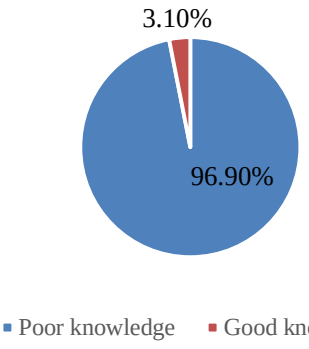

Table 6: NAKQ score and score subscales in association with socio-demographic characteristics (n=414).

Parameter		NAKQ Score	General Knowledge	Acute attack	Maintenance treatment	False myths
Age (years)	**18 -**	13.65±4.52	59.64±22.88	31.17±17.56	40.21±19.77	49.8±23.28
	25 -	11.47±5.19	51.2±21.31	21.33±19.22	38.28±20.35	42.2±21.13
	35 -	10.82±4.13	51±18.95	18.68±16.41	35.96±19.47	40.3±19.83
	45 -	11.21±4.99	50.96±20.24	20.49±20.23	34.83±18.52	44.03±23.37
	55 - 64	9.78±5.04	49.21±17.82	20.2±19.11	25.93±20.79	32.64±17.22
	P-value*	**0.001**	**0.047**	**0.000**	0.091	**0.023**
Nationality	**Saudi**	11.28±4.54	51.96±20.15	20.97±17.75	36.17±19.5	41.94±20.88
	Non-Saudi	17.89±8.28	66.67±30.3	49.49±28.06	53.7±24.69	66.67±32.48
	P-value	**0.005**	**0.022**	**0.002**	**0.023**	**0.008**
Marital status	**Married**	11.07±4.47	51.25±18.76	19.68±17.43	36.19±19.51	41.74±20.92
	Single	12.65±4.52	57.14±22.17	27.11±17.76	38.07±18.44	45.07±21.58
	Divorced or widowed	9.74±7.83	39.85±28	18.66±29.45	33.33±29.4	38.82±27.61
	P-value*	**0.000**	**0.002**	**0.000**	0.354	0.179
Number of offspring	**No offspring**	12.72±4.51	57.27±21.89	27.03±17.87	38.64±18.4	45.46±21.85
	One or two	10.69±5.06	47.94±20.67	18.18±18.29	36.87±20.9	41.1±23.04
	Three or more	11.14±4.46	52.32±18.63	20.6±18.28	34.91±19.69	41.57±19.74
	P-value*	**0.000**	**0.002**	**0.000**	0.190	0.246
Years of experience	**1 -**	12.77±4.65	58.06±21.06	25.82±19.02	39.33±18.98	46.8±21.93
	6 -	10.76±4.93	49.74±21.9	20.92±16.3	34.94±20.26	38.1±21.64
	11 or more	10.88±4.56	49.79±18.86	19.29±18.58	35.52±19.94	41.63±20.69
	P-value*	**0.001**	**0.001**	**0.004**	0.114	**0.019**
Diagnosed with bronchial asthma	**No**	11.25±4.86	51.55±20.65	20.93±18.87	36.02±20.07	42.05±21.47
	Yes	12.59±3.64	57.14±18.82	25.93±14.92	40.12±17.29	45.37±21.21
	P-value	**0.030**	**0.033**	**0.013**	0.155	0.135
Family history of bronchial asthma	**No**	10.82±4.88	49.02±20.86	19.95±18.6	35.31±20.09	41.13±21.27
	Yes	12.47±4.29	57.89±18.59	24.4±17.92	38.71±19.05	44.82±21.6
	P-value	**0.000**	**0.000**	**0.005**	0.128	0.129

*Kruskal-Wallis H test was used.
** Mann-Whitney U test was used.

DISCUSSION:

Bronchial asthma is the most common chronic respiratory condition among school children [1]. Because the condition is common, the NHLBI recommends schoolteachers to have good knowledge about asthma and to be aware of its triggers and the management guidelines [15].

Our results show a poor knowledge level of asthma among male teachers in Taif city with a NAKQ score of < 21 constituting 96.9% of all participants, as well as in subscales related to maintenance treatment lines and community-related false myths. The study of **Alshaikh *et al.*** carried out in Riyadh, KSA using the NAKQ and reported poor knowledge among 54.6% [22]. Another study conducted in Turkey reported satisfactory knowledge levels [23].

Our study has stated that better results regarding general knowledge about asthma were highest among married with at least three children's offspring and having a family history of the same condition. Another study conducted in Saudi Arabia has shown similar results as in multivariate logistic regression analysis; better asthma knowledge was significantly associated with being having children and having a

family history of asthma [22]. A study conducted in Bahrain [19], in contrast, has shown a higher knowledge level among single female teachers.
We have demonstrated a significantly high knowledge about triggers and presentation, found among those having children, who have a family history of similar condition, and with more years of experience. The study of **Alshaikh *et al.*** reported similar findings, with 54.6% of all participants had insufficient knowledge of these concerns [22]. In contrast, the study of **Ones *et al.*** conducted in Istanbul, Turkey, has reported that although teachers had a good and satisfactory range of knowledge, they are still deficient in information about either asthma triggers or proper management [23]. Another study had a contrary association, admitting that age, work experience, and educational level of the participants has an insignificant association with awareness about the condition presentation, but the history of dealing with asthmatic patients has the highest and most important association [24].

A higher association was found significant between the level of education, increasing number of witnessed cases within the classroom, and the level of condition identification and management, by several studies [25, 26, 28, 29].

Our study found no association between knowledge about treatment lines and any of the socio-demographic data. Also, another study conducted in South Africa [27] has shown areas of deficient knowledge of asthma attack management, with less than 50% of the participants have responded correctly. Our study has reported that adoption of knowledge that is falsely distributed with no clinical or well-based evidence is higher with age, more common among Saudis and teachers with more experience, with no more significant associations.

CONCLUSION AND RECOMMENDATIONS:

Our study has concluded that poor awareness and knowledge about bronchial asthma among the male teachers of Taif City- Saudi Arabia, is associated mainly with age, marital status, number of offspring, and having a previous history of similar condition, while having false information and myths regarding the condition is associated with the older age, Saudi nationality, and more years of experience.

It is recommended to assist workshops raising the knowledge about bronchial asthma, and their incidence among the school children and prevalence of the disease around the investigated area, to provide more valuable data and increase help the teachers' interaction with the acute attacks as fast as possible.

REFERENCES:

1. World Health Organization. Asthma. Fact sheet N°307. Updated November 2013. (Last accessed June 1st 2015). http://www.who.int/mediacentre/ factsheets/ fs307/en/
2. Bloom B, Jones LI, Freeman G. Summary health statistics for U.S. children: National Health Interview Survey, 2012. Vital Health Stat 2013; 10(258): 1-81.
3. Masoli M, Fabian D, Holt S, Beasley R. The global burden of asthma: executive summary of the GINA Dissemination Committee report. Allergy 2004; 59(5): 469-478.
4. Anwar H, Jaffer NH, Al-Sadri E. Asthma Knowledge among asthmatic school students. Oman medical journal 2008;23(2):90.
5. Nahhas M, Bhopal R, Anandan C, Elton R, Sheikh A. Prevalence of Allergic Disorders among Primary School-Aged Children in Madinah, Saudi Arabia: Two-Stage Cross-Sectional Survey. PLoS ONE, 2012;7(5): e36848.
6. Olympia RP, Wan E, Avner JR. The preparedness of schools to respond to emergencies in children: a national survey of school nurses. Pediatrics 2005;116(6): e738-e745.
7. Kestenbaum LA, Ebberson J, Zorc JJ, Hodinka RL. Shah SS. Defining cerebrospinal fluid white blood cell count reference values in neonates and young infants. Pediatrics. 2010;125(2):257-264.
8. Sin MK, Kang DH, Weaver M. Relationships of asthma knowledge, self-management, and social support in African American adolescents with asthma. Int J NurStud. 2005;42(3):307-313.
9. Aqeel T, Akbar N, Dhingra S, Noman-Ul-Haq. Assessment of Knowledge and awareness regarding asthma among school teachers in urban area of Quetta, Pakistan. Journal of Pharmacy Practice and Community Medicine. 2015 Oct-Dec;1(1): 18-23
10. Jaramillo Y, Reznik M. Do United States' teachers know and adhere to the national guidelines on asthma management in the classroom? A systematic review. The Scientific World Journal 2015; 2015: 624828.
11. Akinbami, Jean O, Moorman JE, Xiang Liu. Asthma prevalence, health care use, and mortality: United States, 2005-2009. US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics, 2011.
12. Schmier JK, Manjunath R, Halpern MT, Jones ML, Thompson K, Diette GB. The impact of inadequately controlled asthma in urban children on quality of life and productivity. Ann Allergy Asthma Immunol 2007; 98(3): 245-251.

13. Abdel Gawwad ES, El-Herishi S. Asthma education for school staff in Riyadh city: effectiveness of pamphlets as an educational tool. J Egypt Public Health Assoc 2007; 82(1-2): 147-171.

14.American Lung Association, Asthma and Children Fact Sheet. http://www.lung.org/lung-disease/asthma/resources/facts-and-figures/asthma-children-fact-sheet.html#9 (Last accessed June 1st 2015).

15. US Department of Health and Human Services, National Health Institutes of Health, National Heart, Lung and Blood Institute. Managing Asthma: A Guide for Schools, 2014. URL: http://www.nhlbi.nih.gov/files/docs/ resources/lung/ NACI_ ManagingAsthma-508%20FINAL.pdf (Last accessed June 1st 2015).

16. Unikel LH, Evans D, Bornstein L, Surrence K, Mellins RB. Asthma knowledge and asthma management behavior in urban elementary school teachers. J Asthma, 2010; 47(2): 185-191.

17. Rodriguez Fernandez-Oliva CR, Torres Alvarez de Arcaya ML, Aguirre-Jaime A. Knowledge and attitudes of teachers on children with asthma. An Pediatr (Barc) 2010; 72(6): 413-419.

18. Lucas T, Anderson MA, Hill PD. What level of knowledge do elementary school teachers possess concerning the care of children with asthma? A pilot study. J Pediatr Nurs 2012; 27(5): 523-527.

19. Alnasir F. Bahraini school teachers knowledge of asthma. Middle East J Med Fam 2004; 2(2): 422-443.

20. Govender D, Gray A. Knowledge of primary school teachers about asthma: a cross-sectional survey in the Umdoni sub-district, KwaZulu-Natal. S Afr Fam Pract 2012; 54(4): 347-351.

21. Bahari MB, Nur NM, Rahman AF. A knowledge of asthma in school children: a survey among primary school teachers. Singapore Med J 2003; 44(3): 131-135.

22-Alshaikh AA, Alanazi KK, Alanazi MD, Al-Momen RK. Knowledge about asthma among primary school teachers in Riyadh city, Saudi Arabia. Int J Med Res Prof. 2017 Sept; 3(5):177-84.

23. Ones U, Akcay A, Tamay Z, Guler N, Dogru M. Asthma knowledge level of primary schoolteachers in Istanbul, Turkey. Asian Pac J Allergy Immunol. 2006 Mar;24(1):9-15.

24. Mohammadzadeh I, Noori H, Mazloomzadeh S, Khodabandehlou M, Ahmadiafshar A. Asthma awareness among primary school teachers in Zanjan in 2014. Caspian J Pediatr Sep 2017; 3(2): 229-33

25. Pitstick C. Asthma knowledge among primary and secondary school teachers in rural northern Costa Rica. Cuadernos de Investigación UNED 2015; 7(1): 25-32.

26. Lucas T, Anderson MA, Hill PD. What level of knowledge do elementary school teachers possess concerning the care of children with asthma? A pilot study. J Pediatr Nurs. 2012 Oct;27(5):523-7.

27. Govender D, Gray A. Knowledge of primary school teachers about asthma: a cross-sectional survey in the Umdoni sub-district, KwaZulu-Natal. S Afr Fam Pract 2012; 54(4): 347-351.

28. Bruzzese JM, Unikel LH, Evans D, Bornstein L, Surrence K, Mellins RB. Asthma knowledge and asthma management behavior in urban elementary school teachers. J Asthma. 2010 Mar;47(2):185-91.

29. Rodríguez Fernández-Oliva CR, Torres Alvarez de Arcaya ML, Aguirre-Jaime A. Knowledge and attitudes of teachers on children with asthma. An Pediatr (Barc). 2010 Jun;72(6):413-9.

30. Kingdom of Saudi Arabia. Taif Governorate. Available at: http://www. taifcity.gov.sa

31. Fitzclarence CA, Henry RL. Validation of an asthma knowledge questionnaire. J Paediatr Child Health. 1990; 26(4): 200-204.

32. Leonardo Cabello M, Oceja-Setien E, García Higuera L, Cabero MJ, Pérez Belmonte E, Gómez-Acebo I. Assessment of parental asthma knowledge with the Newcastle Asthma Knowledge Questionnaire. Rev Pediatr Aten Primaria, 2013. 15: p. 117-126.