PATIENT KNOWLEDGE ON SELF-MANAGEMENT AND LEVEL OF ASTHMA CONTROL IN SULAIMANI

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ABSTRACT

Background

Asthma is a common clinical condition, its inflammatory disorder of air passage in which many cell and elements play a role, its non-communicable, non-curable, reversible obstructive airway disease. Most of the patients with asthma are not well controlled according to guidelines. The best way for management bronchial asthma is to control the disease, once asthma is controlled, it allows patients to do everything just like a normal healthy person, this might be achieved by good knowledge about the disease, because asthma may affects any one regardless of age, education level, and location.

Objectives

The goal of the study is to identify how asthma knowledge differs among groups of people and find out the relationship between the patient's knowledge and their level of asthma control in Sulaimani.

Patients and Methods

A cross-sectional study with randomized sample was collected from one hundred asthmatic patients in Sulaimani, using questionnaires filled in via a direct interview which consisted of three parts: 1- sociodemographic, 2- asthma knowledge, and 3- asthma control test. The relationship between asthma knowledge and demographic factors and asthma control levels was determined. The collected data were reviewed and analyzed using the Statistical Package for Social Sciences (SPSS version 22). P-value was obtained for the continuous variable using chi square, and considered significant if it was less than 0.05.

Results

The asthma knowledge was adequate, only 0.9% of these patients had a good knowledge, 58% had adequate knowledge, and 33% had poor knowledge. Most participants (62%) had poor asthma control, 35% had partial control, and only 3% had complete control. The higher the patient's level of control, the better the asthma knowledge scores, Conversely, patients with better knowledge of asthma had better asthma control based on the Asthma Control Test score (p= 0.001). Also, a higher education level was associated with more asthma control level (p=0.001).

Conclusion

In these patients, the level of asthma control was low and significantly correlated with the level of asthma knowledge. There is a clear need to improve knowledge in order to improve asthma control in Sulaimani.

Keywords: *Asthma Control, Asthma Knowledge, Sulaimani.*

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INTRODUCTION

Asthma is a clinical condition, its inflammatory disorder of air passage in which many cell and elements play a role, results from many interactions among inflammatory cells, their mediators, smooth muscles, airway epithelium, and nervous system, Its non-communicable, non-curable, reversible obstructive air way disease [1, 2].

The etiology of bronchial asthma is not completely understood, it's multifactorial, and the strongest risk factors are combination of genetic predisposition and environmental exposure to inhaled substances and particles [3, 4].

The air we breathe is containing many particles, lung airways more sensitive to these particles they see as foreign such as tobacco smoke, dust, chemicals, colds or flu and pollen also called asthma triggers. Immune system over react to these things (triggers) by releasing different cells and chemicals that cause the following airways change [5, 6]:

- Inflamed inner lining of the airway.
- Surrounding muscles of the airways get bigger and tighten.
- Airways glands produce lots of thick mucus.

All of these changes make narrowing air passages and harder to breathe; finally make asthma symptoms (cough, wheeze, chest tightness, and feel short of breathe). If the inflammation associated with asthma is not treated well, each time the airways exposed to asthma triggers, the inflammation increase, and the symptoms may get worse [5].

More than 339 million people affected by bronchial asthma in the world [7] and about 250,000 deaths annually [8] (383,000 deaths in 2015 [9]. In the United States affects more than 15 million persons, responsible for 500,000 hospital admission, 1.5 million emergency department visits, and 100 million days of restricted activity [10].

Worldwide, asthma economic costs are more than those for acquired immunodeficiency syndrome (AIDS) and tuberculosis combined. Medical expenses, as well as productivity and lost work, cost is associated to asthma severity, increasing with more severe disease [11].

Asthma is one of the most common chronic diseases, which has several symptoms and many triggers, Symptoms result from ongoing inflammation (swelling) of the air way in which becomes more sensitive and narrower than normal. Although this inflammation is one of the helpful defense mechanism of the body (lungs), it can be harmful if it occurs at the wrong time or stays for long time, after it's no longer needed. That's what happens when persons have asthma [5, 12].

The best way of management of bronchial asthma is to control the disease, once asthma is controlled, it allows patients to have an active like, like any ordinary healthy person. To achieve such a life, patients need to know more and more about asthma, what are the triggers and how avoid from them, use medications at proper time and maintain control for a longer period of time. This might be achieved by good knowledge about the disease, because asthma affects anyone regardless age, education level, and country [13].

Adherence to the treatment is the mainstay of the bronchial asthma management, in addition to that asthma is a disease that can be change over time(become worse),means that even when a person has achieved good asthma control level, the disease exacerbation still occur [14]. Therefore, each asthmatic patient needs to know how to manage the disease. If we speak about Sulaimani city most of the patients use only rescue medications that quickly halt asthma symptoms, they don't use controller or preventable medications.

Nowadays, there are many advances in asthma diagnosis and management, the prevalence of asthma control is still low worldwide, including Sulaimani. Many factors exist for this low level controlled asthma, for example, healthcare system factors (unaffordability for some patients, unavailability of medications especially controllers…), doctor factors (wrong diagnosis, insufficient time to inform patient about the disease and its management…), patient factors (age, education level, occupation, treatment adherence…), the persons low level of knowledge about asthma particularly on self-management, is a corner stone contributing to the low level of control[15].

The aim of this study was to identify how asthma's knowledge differs among groups of people (age, gender, occupation …), and find out the relationship between patients knowledge and their level of asthma control in Sulaimani. All of these with advise for controlling asthma symptoms, decreasing hospital admission, fewer exacerbation, high quality of life, and reducing mortality.

PATIENTS AND METHODS

In this cross sectional study, 100 asthmatic patients (55 females, 45 males) were selected randomly from July 2018 to February 2019, in Shahid Hemin, Shar teaching hospital and outpatient clinics in Sulaimani.

Patients with known case of asthma on regular treatment, diagnosed more than a year with asthma according to the Global Initiative for Asthma (GINA 2018), age from 16-70 years, were included in the study.

Exclusion criteria: major medical morbidity, cognitive impairment and unable to communicate verbally, less than one year diagnosed with asthma, refused to participate in the study, and age below 16 years and above 70 years.

Protocol of this study was approved by institutional review of Kurdistan board of Medical Specialties (KBMS), for participating in this research all patients provided verbal informed consent, with agreement.

Collection of the data were from direct interview using a questionnaire which had these sections; sociodemographics, asthma knowledge, and asthma control test, with full history and clinical examination.

Sociodemograghics include full name, age (16–70 years), gender (male and female), occupation (retired, house wife, teacher, student, worker, and military), address (urban and rural), level of education (illiterate, primary school, secondary and preparatory school, collage graduated or above), duration of the disease (should be more than one year).

Asthma knowledge created based on examples in the previous literature [15–17], included twenty questions, about asthma definition, symptoms, triggers, types and route of medications, how to avoid triggers, how and when to use medications, and the prognosis. Nineteen questions had (true) and (false) options, the remained one was open question, (I don't know) option was added to answer and enumerated as incorrect, score (1) for correct answer, score (0) for incorrect answer. Less than %50 correct answers (total score < 10 points) indicated poor knowledge, %50 - %75 correct answers (total score 10–15 points) indicated adequate knowledge, above % 75 correct answers (total score > 15 points) indicated good knowledge. The open question is about that, which type of medication is the best for asthma control (inhaler or injection or tablet or syrup).

Asthma control test is the most common tool currently in use to assess asthma control status[18]. All patients included can do it. It is self-administrated that completed in one session, based on symptoms and functioning with 4 weeks recall, five items (questions) were asked about daily activity restriction, attacks of shortness of breath, sleep disturbance due to asthma symptoms, using rescue inhaler or nebulizer medication, and patient rating his or her asthma control during that period[19]. Each item scored ranging from 1= all the time to 5=not at all, the total score range from 5 to 25, patient with full score indicate good control, score 20–24 for partial control, and below 19 poor control of asthma.

Statistical analysis

Data were collected and coded. The collected data were reviewed and analyzed using the Statistical Package for Social sciences (SPSS version 22). Descriptive statistics such as frequency and percentage were calculated. Measures of central tendency and dispersion around the mean were used to describe continuous variables. P value was obtained for the continuous variable using chi square, and considered significant if it was less than 0.05.

RESULTS

Analyzing the collected data through descriptive statistics revealed that 34 patients belonged to the age group 20-39, 31 to 40-59, 29 to > 59, and 6 to < 19. Regarding the participants' gender, it was observed that 55 patients (55%) were females and 45% were males. It was also seen that more than half of the participants (51%) were employees, 40% were housewives, and 9% were retired. In terms of their education, most of them (42%) were illiterate. Most of the patients (75%) resided in rural areas and 25% in urban regions (See Table 1).

Regarding the patients' opinion about the treatment, 32% of them used proper treatment, and 18% had no any idea about treatment and medication. Regarding their knowledge about asthma, most of the patients (58%) had adequate knowledge, 33% had poor knowledge, and 9% had good knowledge. In terms of Asthma control, it was not controlled in most cases (62%), 35% had partial control over it, and 3% had complete control over it (See Table 1).

Data analysis demonstrated that there was a significant relationship between asthma control level (controlled, partially controlled, and not controlled) and the level of asthma knowledge (p=0.001). In addition, a significant

relationship was observed between patients' asthma knowledge and their age (p=0.0008) (See Table 2).

Regarding the relationship between the patients' knowledge and their gender, the results revealed no significant association between these two variables (p=0.1). In addition, there was no significant relationship between the patients' family history of asthma and their asthma knowledge (p=0.8). The results revealed that there was a relationship between the patients' asthma knowledge and the place of their residence, and this relationship was found to be significant at p=0.05 (See Table 3).

In addition, the results indicated that there was no significant relationship between the patients' asthma knowledge and their occupation (p=0.08). In addition, no significant relationship was found between their asthma knowledge and their disease duration (p=0.1) (See Table 4).

According to the results, the patients' asthma knowledge and their education level were significantly correlated (p=0.001) (See Table 5).

Moreover, the results demonstrated that there was a slightly significant relationship between the patients' asthma knowledge and their opinion about the best treatment (p=0.03) (See Table 6).

The results of the present study indicated that there was a highly significant association between the patients' age and the state of their asthma control (p=0.002). The relation between their education level and the state of asthma control was also highly significant at p=0.001. The results also showed that there were slightly significant relation between the patients' occupation and the best treatment and asthma control state (p=0.04 for both). However, as the results indicated, the patients' asthma control state had no significant relationship with their gender (p=0.3), asthma duration (p=0.146), place of residence (p=0.7), and family history (p=0.9) (See Table 7).

Table 1. The frequency of the patients' demographics.

Variables		Frequency (N)	Percentage (%)
Age ,(year)	Adolescence <19	6	6.0
	Young 20-39	34	34.0
	Adult 40- 59	31	31.0
	Old > 59	29	29.0
	Total	100	100.0
Gender	Male	45	45.0
	Female	55	55.0
	Total	100	100.0
Occupation	Retired	9	9.0
	House wife	40	40.0
	Employee	51	51.0
	Total	100	100.0
Education	Illiterate	42	42.0
	Primary School	23	23.0
	Secondary and Preparatory School	16	16.0
	Collage graduated or above	19	19.0
	Total	100	100.0
Address	Rural	75	75.0
	Urban	25	25.0
	Total	100	100.0
Family history	Positive	27	27.0
	Negative	73	73.0
	Total	100	100.0
Asthma Duration (year)	1 - 10	53	53.0
	11 - 20	33	33.0
	>20	14	14.0
	Total	100	100.0
Best treatment	Inhaler	32	32.0
	There is no difference	22	22.0
	Syrup	9	9.0
	Injection	18	18.0
	Tablet	1	1.0
	Don't know	18	18.0
	Total	100	100.0
Asthma Knowledge	Good	9	9.0
	Adequate	58	58.0
	Poor	33	33.0
	Total	100	100.0
Asthma control	Controlled	3	3.0
	Partially controlled	35	35.0
	Not controlled	62	62.0
	Total	100	100.0

Table 2. Association between the patients' asthma knowledge, asthma control, and age.

		Asthma control			Total	P-value
		Controlled	Partial controlled	No controlled		
Asthma Knowledge	Good	3(33.3)	4(44.4)	2(22.2)	9(100.0)	0.001*
	Adequate	0(0.0)	28(48.3)	30(51.7)	58(100.0)	
	Poor	0(0.0)	3(9.1)	30(90.9)	33(100.0)	
Total		3(3.0)	35(35.0)	62(62.0)	100(100.0)	

		Age				Total	P-value
		Adolescence <19	Young 20-39	Adult 40-59	> 59		
Asthma Knowledge	Good	0 (0.0)	8 (88.9)	1 (11.1)	0 (0.0)	9(100.0)	0.008*
	Adequate	2 (3.4)	19 (32.8)	20 (34.5)	17(29.3)	58(100.0)	
	Poor	4 (12.1)	7 (21.2)	10 (30.3)	12(36.4)	33(100.0)	
Total		26(26.0)	6 (6.0)	34 (34.0)	31(31.0)	29 (29.0)	

*** Fisher's exact test**

Table 3. Relationship between the patients asthma knowledge, gender, place of residence, and family history.

Asthma Knowledge	Gender		Total	P-value
	Male	Female		
Good	3 (33.3)	6 (66.7)	9 (100.0)	0.1*
Adequate	23 (39.7)	35 (60.3)	58 (100.0)	
Poor	19 (57.6)	14 (42.4)	33 (100.0)	
Total	45 (45.0)	55 (55.0)	100 (100.0)	
	Address			
	Rural	**Urban**		
Good	8 (88.9)	1 (11.1)	9 (100.0)	0.05*
Adequate	47 (81.0)	11 (19.0)	58 (100.0)	
Poor	20 (60.6)	13 (39.4)	33 (100.0)	
Total	75 (75.0)	25 (25.0)	100 (100.0)	
	Family history			
	Positive	**Negative**		
Good	2 (22.2)	7 (77.8)	9 (100.0)	0.8*
Adequate	17 (29.3)	41 (70.7)	58 (100.0)	
Poor	8 (24.2)	25 (75.8)	33 (100.0)	
Total	27 (27.0)	73 (73.0)	100 (100.0)	

*** Fisher's exact test**

Table 4. The relationship between the patients' asthma knowledge, occupation, and disease duration.

		Occupation			Total	P-value
		Retired	House wife	Employed		
Asthma Knowledge	Good	1 (11.1)	0 (0.0)	8 (88.9)	9 (100.0)	0.08*
	Adequate	5 (8.6)	28 (48.3)	25 (43.1)	58 (100.0)	
	Poor	3 (9.1)	12 (36.4)	18 (54.5)	33 (100.0)	
Total		9 (9.0)	40 (40.0)	51 (51.0)	100 (100.0)	
		Duration year			**Total**	
		1 - 10 years	**11 - 20 years**	**>20**		
Asthma Knowledge	Good	8 (88.9)	1 (11.1)	0 (0.0)	9 (100.0)	0.1*
	Adequate	26 (44.8)	22 (37.9)	10 (17.2)	58 (100.0)	
	Poor	19 (57.6)	10 (30.3)	4 (12.1)	33 (100.0)	
Total		53 (53.0)	33 (33.0)	14 (14.0)	100 (100.0)	

*** Fisher's exact test**

Table 5. The relationship between the patients' asthma knowledge and their education level.

Asthma Knowledge	Education				Total	P-value
	Illiterate	Primary School	Secondary and Preparatory School	College graduated or above		
Good	0 (0.0)	1 (11.1)	0 (0.0)	8 (88.9)	9 (100.0)	0.001*
Adequate	25 (43.1)	12 (20.7)	11 (19.0)	10 (17.2)	58 (100.0)	
Poor	17 (51.5)	10 (30.3)	5 (15.2)	1 (3.0)	33 (100.0)	
Total	42 (42.0)	23 (23.0)	16 (16.0)	19 (19.0)	100 (100.0)	

*** Fisher's exact test**

Table 6. The relationship between the patients' asthma knowledge and the best treatment.

Asthma Knowledge	Best treatment						Total	P-value
	Inhaler	There is no difference	Syrup	Injection	Tablet	Don't know		
Good	5 (55.6)	2 (22.2)	0 (0.0)	0 (0.0)	0 (0.0)	2 (22.2)	9 (100.0)	0.03*
Adequate	23 (39.7)	14 (24.1)	3 (5.2)	9 (15.5)	0 (0.0)	9 (15.5)	58 (100.0)	
Poor	4 (12.1)	6 (18.2)	6 (18.2)	9 (27.3)	1 (3.0)	7 (21.2)	33 (100.0)	
Total	32 (32.0)	22 (22.0)	9 (9.0)	18 (18.0)	1 (1.0)	18 (18.0)	100 (100.0)	

*** Fisher's exact test**

Table 7. The relationship between the asthma control state and other studied variables.

		Asthma control				
		Controlled N%	Partial controlled N%	No controlled N%	Total N%	P-value
Age	Adolescence <19	0(0.0)	3(50.0)	3(50.0)	6(100.0)	
	Young 20-39	3 (8.8)	19(55.9)	12(35.3)	34(100.0)	
	Adult 40-59	0(0.0)	8(25.8)	23(74.2)	31(100.0)	0.002*
	> 59	0(0.0)	5 (17.2)	24 (82.8)	29(100.0)	
Total		3 (3.0)	35(35.0)	62(62.0)	100(100.0)	
Gender	Male	0(0.0)	15(33.3)	30(66.7)	45(100.0)	
	Female	3(5.5)	20(36.40	32(58.2)	55(100.0)	0.3*
Total		3(3.0)	35(35.0)	62(62.0)	100(100.0)	
Asthma Duration	1 - 10 years	3(5.7)	23(43.4)	27(50.9)	53(100.0)	
	11 - 20 years	0(0.0)	8(24.2)	25(75.8)	33(100.0)	0.146*
	>20	0(0.0)	4(28.6)	10(71.4)	14(100.0)	
Total		3(3.0)	35(35.0)	62(62.0)	100(100.0)	
Address	Rural	3(4.0)	27(36.0)	45(60.0)	75(100.0)	
	Urban	0(0.0)	8(32.0)	17(68.0)	25(100.0)	0.7*
Total		3(3.0)	35(35.0)	62(62.0)	100(100.0)	
Education	Illiterate	0(0.0)	7(16.7)	35(83.3)	42(100.0)	
	Primary School	0(0.0)	7(30.4)	16(69.6)	23(100.0)	
	Secondary and Preparatory School	0(0.0)	9(56.3)	7(43.8)	16(100.0)	0.001*
	College graduated or above	3(15.8)	12(63.2)	4(21.1)	19(100.0)	
Total		3(3.0)	35(35.0)	62(62.0)	100(100.0)	
Occupation	Retired	0(0.0)	1(11.1)	8(88.9)	9(100.0)	
	House wife	0(0.0)	11(27.5)	29(72.5)	40(100.0)	0.04*
	Employed	3(5.9)	23(45.1)	25(49.0)	51(100.0)	
Total		3(3.0)	35(35.0)	62(62.0)	100(100.0)	
Family history	Positive	1 (3.7)	10 (37.0)	16 (59.3)	27 (100.0)	
	Negative	2 (2.7)	25 (34.2)	46 (63.0)	73 (100.0)	0.9*
Total		3 (3.0)	35 (35.0)	62 (62.0)	100 (100.0)	
Best treatment	Inhaler	2 (6.3)	18 (56.3)	12 (37.5)	32 (100.0)	
	There is no difference	0 (0.0)	6 (27.3)	16 (72.7)	22 (100.0)	
	Syrup	0 (0.0)	2 (22.2)	7 (77.8)	9 (100.0)	
	Injection	0 (0.0)	3 (16.7)	15 (83.3)	18 (100.0)	0.04*
	Tablet	0 (0.0)	0 (0.0)	1 (100.0)	1 (100.0)	
	Don't know	1 (5.6)	6 (33.3)	11 (61.1)	18 (100.0)	
Total		3 (3.0)	35 (35.0)	62 (62.0)	100 (100.0)	

*** Fisher's exact test**

DISCUSSION

The results of the present study revealed that except for the age group < 19 (adolescence), all other age groups (young, adult, and old) were suffering from asthma almost equally, such that the age group < 19 accounted for only 6% of the participants, while the young group (20-39 years) accounted for 34% of the participants, adults (40-59 years) 31% of the participants, and the old group (> 59 years) 29% of them. Similar results were reported in Brazil (São Paulo, Rio de Janeiro, Curitiba, and Salvador), which observed that asthma was less prevalent in the age group < 18 (10.75%) than the other two groups (18-40 and ≥41 yeas) with prevalence rate of 89.25% [20].

It was also observed that asthma afflicted females more than males (55%). Similar results were reported in the Brazil (São Paulo, Rio de Janeiro, Curitiba, and Salvador) that observed asthma was more among women (68%), and was more symptomatic [21]. However, in the same country but another study reported that asthma was more prevalent among the participating women than the men [20]. This difference between the studies can be related to difference in the sampling methods used in these studies.

As demonstrated in the present study, asthma affectes different occupation groups regardless of their job types. However, unlike the present study, the result of the study carried out in India stated asthma was more prevalent in plant and machine operators and assemblers [22]. This difference can be attributed to the fact that the participants in the present study work in almost safe working environments.

The results depicted that most of the patients were illiterate. Similar results were reported by the study carried out in Iran (Khorramabad) which reported that over 35.8% of the patients with asthma were unable to read or write [23]. Most of the patients in the present study (75%) were from rural regions. Similar findings have been reported in previously conducted studies for example in Eastern Turkey [24, 25]. However, in China (Beijing) reported that asthma was more prevalent among urban residents than rural ones [26].

The results indicated that most of the patients with asthma (73%) did not have a family history. In this regard, different studies have reported different results. For example, some studies in USA (New York City) and in the Netherlands pointed out that family history is an effective factor in development of asthma [27, 28], while in line with this study, some studies reported no relationship between asthma occurrence and family history [29, 30].

The results of the present study indicated that 32% of the patients introduced inhalers as the best treatment for asthma, followed by injection (18%), syrup (9%), and tablets (1%). Similar study was reported in India, referred to inhalers as the most effective and widely used treatment for asthma [31]. Regarding the patients' knowledge about asthma, the results of the present study revealed that 58% of the patients had adequate knowledge. This finding is in good agreement with the results of previous studies [15, 32]. It was also observed that most of the patients (62%) did not have control over their disease and only 3% had complete control over their asthma. Similar findings were reported in United Kingdom, which reported that patients with asthma had limited control over asthma [33].

The results of the present study showed that there was a significant relationship between asthma knowledge and asthma control (p=0.001). Therefore, asthma control level can be enhanced among asthma patients by enhancing their knowledge about their disease. As opposed to this result, in a study in Turkey, indicated that equipping the elderly with knowledge on asthma self-management could lead to an increase in asthma control level, which stated equipping asthma patients with related knowledge can have effect on asthma control if the patients are provided with long-term education not just by the physician over short periods of time [34].

As shown by the results of the present study, there was a significant association between the patients' age and their asthma knowledge (p=0.008). The relationship between these two variables has not been focused on in any previous studies; therefore, it cannot be compared to any results. The results revealed that there was a significant relationship between the patients' asthma knowledge and their education (p=001). This finding is in line with those of the study carried out in Saudi Arabia(Riyadh), stated that education and asthma knowledge are significantly correlated among the pregnant women [35].

As concluded in the present study, there was a significant relationship between the patients' asthma knowledge and their opinion regarding the best treatment (p=0.03). Therefore, different levels of asthma knowledge can determine the type of treatment employed by the

patients, which in turn affects their opinion about the best treatments. No similar results were found in the literature; therefore, no comparison can be made.

Also, the results indicated that there was a significant relationship between the patients' asthma knowledge and their place of residence (p=0.05). This finding cannot be compared to any other ones in previous studies, because no studies have focused on this association. The results of the present study indicated that there were no significant relationships between the patients' asthma knowledge level and their gender (p=0.1), family history (p=0.8), occupation (p=0.08), and disease duration (p=0.1). Similarly, in Brazil a study found that there was no significant relationship between asthma knowledge and the patients' gender[21]. in Iran (Tehran) another study also reported that the patients' gender and their asthma knowledge were not significantly correlated [(36)]. Moreover, one study in Saudi Arabia was found no significant association between asthma knowledge and family history of asthma [(37)]. Unlike this study, the previous mentioned study in Iran (Tehran) concluded that the asthma patients' knowledge and disease durations are significantly correlated. However, it indicated that there was no significant relationship between the patients' occupation and their asthma knowledge [(36)], which is in line with the present study.

With regard to asthma control, the results of the present study indicated that there was a significant association between the patients' age and asthma control (p=0.002). Previously conducted studies in Rhode Island and Italy did not show a significant relationship between these two variables [(38, 39)]; however, lack of this relationship has not been supported by appropriate predictive models.

However, there was a significant association between the patients' education and the level of asthma control (p=0.001). This finding is in good agreement with those of the study carried out in Vietnam (Ho Chi Minh City) which stated that patients with higher levels of education have a better control over their asthma [(15)]. The relationship between the best treatment and asthma control was also found to be significant (p=0.04). This finding cannot be compared to any previous ones, because no previous study has focused on it.

The results of the present study showed that there was a significant relationship between the patients' occupation and asthma control (p=0.04). This finding is in good agreement with the results of previously conducted studies for example in a study in NewEngland [(40, 41)].

However, the results of the present study revealed no significant relationship between asthma control and the patients' gender (p=0.3), disease duration (p=0.146), place of living (p=0.7), and family history (p=0.9). In line with the present study, studies in Turkey and Poland found no significant relationship between asthma control and the patients' gender [(42, 43)].

The main value of this study is to orient physicians to check the knowledge of the patients about asthma during their management, particularly those with low level of education and older patients, empower them with self-management skills (e.g. activity, taking medication, education ..), and finally maintain regular interaction with patients and their families and actively involve them in their care.

In conclusion the results of the present study indicated that asthma knowledge can have a significant effect on asthma control. It was also observed that the patients' age and asthma knowledge were significantly correlated. Moreover, there was a significant association between the patients' place of living and asthma knowledge. Also, the patients' education had a significant effect on their asthma knowledge. In addition, the patients' asthma knowledge had a significant effect on the type of treatment they utilized (adherence to treatment and use corrected drug). With regard to the factors affecting asthma control, the results indicated that it is significantly influenced by the patients' age, education, and occupation.

REFERENCES

1. GINA Reports - Global Initiative for Asthma - GINA [Internet]. [cited 2019 Jun 16]. Available from: https://ginasthma.org/gina-reports/

2. WHO | Asthma. WHO [Internet]. 2013 [cited 2019 May 7]; Available from: https://www.who.int/respiratory/asthma/en/

3. Ukena D, Fishman L, Niebling W. Bronchial Asthma : Diagnosis and Long-Term Treatment in Adults. 2008;105(21).

4. Blumenthal MN. The role of genetics in the development of asthma and atopy [Internet]. Vol. 5, Current Opinion in Allergy and Clinical Immunology. 2005 [cited 2019 May 7]. p. 141–5.

5. Maddox L, Schwartz DA. The pathophysiology of asthma. Annu Rev Med [Internet]. 2002 [cited 2019 May 7];53:477–98. Available from: http://www.ncbi.nlm.nih.gov/pubmed/11818486

6. KleinJan A. Airway inflammation in asthma. Curr Opin Pulm Med [Internet]. 2016 Jan [cited 2019 Jun 18];22(1):46–52.

7. Global Asthma Network The Global Asthma Report 2018 [Internet]. 2018 [cited 2019 May 7]. Available from: www.globalasthmanetwork.org

8. D'Amato G, Vitale C, Molino A, Stanziola A, Sanduzzi A, et al. Asthma-related deaths. Multidiscip Respir Med [Internet]. 2016 [cited 2019 May 7];11.

9. WORLD ASTHMA DAY 2019 | MetroHealth HMO [Internet]. [cited 2019 Jun 18]. Available from: http://www.metrohealthhmo.com/what-to-know-about-asthma/

10. C.L. E. Managing asthma in the emergency department: Cost-effective strategies [Internet]. Vol. 13, Drug Benefit Trends. 2001 [cited 2019 May 7]. p. 35.

11. Nunes C, Pereira AM, Morais-Almeida M. Asthma costs and social impact. Asthma Res Pract [Internet]. 2017 [cited 2019 Jun 18];3:1.

12. Murdoch JR, Lloyd CM. Chronic inflammation and asthma. Mutat Res [Internet]. 2010 Aug 7 [cited 2019 May 7];690(1–2):24–39.

13. Price D, Fletcher M, van der Molen T. Asthma control and management in 8,000 European patients: the REcognise Asthma and LInk to Symptoms and Experience (REALISE) survey. NPJ Prim care Respir Med [Internet]. 2014 Jun 12 [cited 2019 Jun 18];24:14009.

14. Reed CE. The natural history of asthma in adults: the problem of irreversibility. J Allergy Clin Immunol [Internet]. 1999 Apr [cited 2019 Jun 18];103(4):539–47.

15. Nhu Nguyen V, Huynh Thi Hoai T, Chavannes NH. Knowledge on self-management and levels of asthma control among adult patients in Ho Chi Minh City, Vietnam. Int J Gen Med [Internet]. 2018 Feb 26 [cited 2019 May 7];Volume 11:81–9.

16. Mancuso CA, Sayles W, Allegrante JP. Knowledge, attitude, and self-efficacy in asthma self-management and quality of life. J Asthma [Internet]. 2010 Oct [cited 2019 May 8];47(8):883–8. Available from: http://www.ncbi.nlm.nih.gov/pubmed/20831465

17. Grant EN, Turner-Roan K, Daugherty SR, Li T, Eckenfels E, et al. Development of a Survey of Asthma Knowledge, Attitudes, and Perceptions. Chest [Internet]. 1999 Oct 1 [cited 2019 May 9];116:178S-183S. Available from:

18. Alzahrani YA, Becker EA. Asthma Control Assessment Tools. Respir Care [Internet]. 2016 Jan 1 [cited 2019 May 9];61(1):106–16.

19. Schatz M, Sorkness CA, Li JT, Marcus P, Murray JJ, et al. Asthma Control Test: Reliability, validity, and responsiveness in patients not previously followed by asthma specialists. J Allergy Clin Immunol [Internet]. 2006 Mar [cited 2019 Jun 18];117(3):549–56.

20. Alith MB, Gazzotti MR, Montealegre F, Fish J, Nascimento OA, et al. Negative impact of asthma on patients in different age groups. J Bras Pneumol [Internet]. 2015 Feb [cited 2019 May 9];41(1):16–22.

21. Zillmer LR, Gazzotti MR, Nascimento OA, Montealegre F, Fish J, et al. Gender differences in the perception of asthma and respiratory symptoms in a population sample of asthma patients in four Brazilian cities. J Bras Pneumol [Internet]. 2014 Dec [cited 2019 May 9];40(6):591–8.

22. Agrawal S, Pearce N, Millett C, Subramanian S V, Ebrahim S. Occupations with an increased prevalence of self-reported asthma in Indian adults. J Asthma [Internet]. 2014 Oct [cited 2019 May 9];51(8):814–24.

23. Amiri A, Asadi S, Almasi V, Ghobadi A. The Prevalence of Asthma in an Adult Population in Khorramabad, Iran. West Indian Med J [Internet]. 2014 Sep [cited 2019 May 9];63(5):443–6.

24. Tug T, Acik Y. Prevalence of asthma, asthma-like and allergic symptoms in the urban and rural adult population in Eastern Turkey. Asian Pacific J allergy Immunol [Internet]. 2002 Dec [cited 2019 May 9];20(4):209–15.

25. Malik HU-R, Kumar K, Frieri M. Minimal difference in the prevalence of asthma in the urban and rural environment. Clin Med Insights Pediatr [Internet]. 2012 [cited 2019 May 9];6:33–9.

26. Zhu W-J, Ma H-X, Cui H-Y, Lu X, Shao M-J, et al. Prevalence and Treatment of Children's Asthma in Rural Areas Compared with Urban Areas in Beijing. Chin Med J (Engl) [Internet]. 2015 Sep [cited 2019 May 9];128(17):2273–7.

27. Perzanowski MS, Canfield SM, Chew GL, Mellins RB, Hoepner LA, et al. Birth order, atopy, and symptoms of allergy and asthma among inner-city children attending Head Start in New York City. Clin Exp Allergy [Internet]. 2008 Jun [cited 2019 May 9];38(6):968–76.

28. Bernsen RMD, de Jongste JC, van der Wouden JC. Birth order and sibship size as independent risk factors for asthma, allergy, and eczema. Pediatr Allergy Immunol [Internet]. 2003 Dec [cited 2019 May 9];14(6):464–9.

29. Dik N, Tate RB, Manfreda J, Anthonisen NR. Risk of Physician-Diagnosed Asthma in the First 6 Years of Life. Chest [Internet]. 2004 Oct [cited 2019 May 9];126(4):1147–53.

30. Kuiper S, Muris JWM, Dompeling E, van Schayck CP, Schonberger HJAM, et al. Association between first-degree familial predisposition of asthma and atopy (total IgE) in newborns. Clin <html_ent glyph="@amp;" ascii="&"/> Exp Allergy [Internet]. 2006 May [cited 2019 May 9];36(5):594–601.

31. Rai SP, Patil AP, Vardhan V, Marwah V, Pethe M, et al. Best Treatment Guidelines For Bronchial Asthma. Med journal, Armed Forces India [Internet]. 2007 Jul [cited 2019 Jun 18];63(3):264–8.

32. Parvin IA, Ahmad SA, Islam MN. Knowledge about inhaler use among the chronic asthma patients in selected hospitals. Bangladesh Med Res Counc Bull [Internet]. 2011 Aug [cited 2019 May 9];37(2):47–50.

33. Bruton A, Lee A, Yardley L, Raftery J, Arden-Close E, et al. Physiotherapy breathing retraining for asthma: a randomised controlled trial. Lancet Respir Med [Internet]. 2018 Jan [cited 2019 May 9];6(1):19–28.

34. Ozturk AB, Ozyigit Pur L, Kostek O, Keskin H. Association between asthma self-management knowledge and asthma control in the elderly. Ann Allergy, Asthma Immunol [Internet]. 2015 Jun [cited 2019 May 9];114(6):480–4.

35. Al Ghobain MO, AlNemer M, Khan M. Assessment of knowledge and education relating to asthma during pregnancy among women of childbearing age. Asthma Res Pract [Internet]. 2018 [cited 2019 May 9];4:2.

36. Sharifi L, Pourpak Z, Heidarnazhad H, Bokaie S, Moin M. Asthma knowledge, attitude, and self-efficacy in Iranian asthmatic patients. Arch Iran Med [Internet]. 2011 Sep [cited 2019 May 9];14(5):315–20.

37. AlOtaibi 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 Manag Healthc Policy [Internet]. 2018 [cited 2019 May 9];11:67–75.

38. Chiron R, Vachier I, Khanbabaee G, Molinari N, Varrin M, et al. Impact of Rhinitis on Asthma Control in Children: Association With FeNO. J Asthma [Internet]. 2010 Aug 14 [cited 2019 May 9];47(6):604–8.

39. Braido F, Baiardini I, Balestracci S, Fassio O, Ravera S, et al. The relationship between asthma control and quality-of-life impairment due to chronic cough: a real-life study. Ann Allergy, Asthma Immunol [Internet]. 2008 Oct [cited 2019 Jun 18];101(4):370–4.

40. Nguyen K, Zahran H, Iqbal S, Peng J, Boulay E. Factors Associated with Asthma Control among Adults in Five New England States, 2006–2007. J Asthma [Internet]. 2011 Aug 13 [cited 2019 May 9];48(6):581–8.

41. Stanford RH, Gilsenan AW, Ziemiecki R, Zhou X, Lincourt WR, et al. Predictors of Uncontrolled Asthma in Adult and Pediatric Patients: Analysis of the Asthma Control Characteristics and Prevalence Survey Studies (ACCESS). J Asthma [Internet]. 2010 Apr 8 [cited 2019 May 9];47(3):257–62.

42. Dursun AB, Kurt OK, Bayiz H, Ozkan E, Cakaloglu A, et al. Does gender affect asthma control in adult asthmatics? Chron Respir Dis [Internet]. 2014 May 21 [cited 2019 May 9];11(2):83–7.

43. Trzcińska H, Przybylski G, Kozłowski B, Derdowski S. Analysis of the relation between level of asthma control and depression and anxiety. Med Sci Monit [Internet]. 2012 Mar [cited 2019 May 9];18(3):CR190-4.