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An investigation into the effect of cigarette smoking on the severity and control of asthma in adults in Sulaimani City

Una investigación sobre el efecto del tabaquismo en la gravedad y el control del asma en adultos en la ciudad de Sulaimani

Kosar Mohamed Ali[1]*, Aso Faridun Amin[2], Avan Kawees Muhammed[3]
[1]College of Medicine University of Sulaimani,Sulaimani, Kurdistan Region-Iraq.
[2]College of Medicine University of Sulaimani, Sulaimani, Kurdistan Region-Iraq.
[3]Sulimani Health directorate, Sulaimani, Kurdistan Region-Iraq.
*Corresponding Author: Kosar Mohamed Ali, College of Medicine University of Sulaimani, Sulaimani, Kurdistan Region-Iraq.
Corresponding Author EMAIL:kosar.ali@univsul.edu.iq

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Abstract: **Background and objective:** As a chronic lung disease, asthma can result in inflammation and narrowing of the airways, leading to recurrent episodes of coughing, wheezing, breath shortness, and chest tightness. Development of asthma can be affected by genetic and environmental factors of which smoking is a well-known risk factor. The present study was aimed at figuring out the association between cigarette smoking and asthma severity and control in asthmatic patients.

Patients and methods: Within a prospective cohort study conducted in Sulaimani City of Iraqi Kurdistan, 130 patients with asthma were examined. Data collected was performed through a researcher-designed questionnaire that was developed based on GINA 2018 International Guidelines for Asthma. The collected data were analyzed through descriptive and inferential statistics using Statistical Package for the Social Sciences version 25.

Results: The patients' mean age was 51.5±18.1 years. Most of the patients (66.9%) were females, and 50.8% were housewives. Also, 69.2% resided urban areas, and 53.1% were illiterate. Asthma control was significantly affected by the patients' age, education level, and smoking status, but not by occupation or place of residence. Moreover, asthma severity had a significant correlation with the patients' age and education level, but it was not significantly affected by their smoking status.

Conclusion: Asthma is more common among women. Patients with lower education level and higher age and those who smoke have a lower level of asthma control. Asthma severity is higher among the illiterate and older adults.

Keywords: cigarette smoking, asthma, asthma severity, asthma control, the Kurdistan region of Iraq

Resumen: Antecedentes y objetivo: como una enfermedad pulmonar crónica, el asma puede provocar inflamación y estrechamiento de las vías respiratorias, lo que lleva a episodios recurrentes de tos, sibilancias, dificultad para respirar y opresión en el pecho. El desarrollo del asma puede verse afectado por factores genéticos y ambientales de los cuales fumar es un factor de riesgo bien conocido. El presente estudio tuvo como objetivo descubrir la asociación entre el tabaquismo y la gravedad y el control del asma en pacientes asmáticos.

Pacientes y métodos: dentro de un estudio de cohorte prospectivo realizado en la ciudad de Sulaimani, Kurdistán iraquí, se examinaron 130 pacientes con asma. Los datos recopilados se realizaron a través de un cuestionario diseñado por un investigador que se desarrolló en base a las Directrices internacionales de GINA 2018 para el asma. Los datos recopilados se analizaron mediante estadísticas descriptivas e inferenciales utilizando el paquete estadístico para la versión 25 de Ciencias Sociales.

Resultados: la edad media de los pacientes fue de 51,5 ± 18,1 años. La mayoría de los pacientes (66,9%) eran mujeres y el 50,8% eran amas de casa. Además, el 69,2% residía en zonas urbanas y el 53,1% eran analfabetas. El control del asma se vio significativamente afectado por la edad, el nivel educativo y el tabaquismo de los pacientes, pero no por la ocupación o el lugar de residencia. Además, la gravedad del asma tuvo una correlación significativa con la edad y el nivel de educación de los pacientes, pero no se vio significativamente afectada por su tabaquismo.

Conclusión: el asma es más común entre las mujeres. Los pacientes con menor nivel educativo y mayor edad y aquellos que fuman tienen un menor nivel de control del asma. La gravedad del asma es mayor entre los analfabetos y los adultos mayores.

Palabras clave: tabaquismo, asma, gravedad del asma, control del asma, la región de Kurdistán en Iraq

As a prevalent chronic inflammatory disease of the pulmonary airways, asthma has been reported to be associated with bronchospasm, lower or upper airway blockage, reversible obstruction of airflow, and variable recurring symptoms[1,2]. Asthma is accompanied by various symptoms including shortness of breath, chest tightness, cough, and wheeze[3] which can worsen at night or with exercise[4]. It has been reported that environmental and genetic factors and medications like beta-blockers and aspirin can trigger asthma[5-7].

Asthma can lead to several complications and consequences including obstructive sleep apnea, rhinosinusitis (RS), gastroesophageal reflux disease[8] and psychological disorders[9]; therefore, it leads to a remarkable decrease in quality of life particularly in those with severe asthma[10]. Asthma can be classified based on its severity as intermittent, mild persistent, moderate persistent, or severe persistent[11] or its source which can be either extrinsic (atopic) or intrinsic (non-atopic)[12].

Global statistics has indicated that asthma affected 358 million people all over the world in 2015 and was reported to cause 397,100 deaths in the same year[13,14]. It has been estimated that 100 million more individuals will develop asthma by 2025[15]. Although it has been reported that asthma prevalence in Iraq is not definite yet[16], its prevalence rate in Baghdad was reported to be 22.3% in 2005[17]. According to the statistics published by World Health Organization in 2006, the prevalence rate of asthma in both Iraq and the Kurdistan Region was 8.3 per 1,000 persons[18].

It has been stated that asthma cannot be permanently cured; however, its symptoms can be improved[19]. Managing asthma symptoms requires a particular plan based on the specific triggers and allergens[20]. Controlling asthma symptoms can also be accomplished by taking some specific medications including short-acting β-agonists (SABAs) and anticholinergics[21].

Although the prevalence rate of asthma is not significantly different from that of the general population[22], research has shown that there is a relationship between active smoking and poor control of asthma in adults but not in teenagers[23]. Moreover, it has been pointed out that active smokes experience more severe consequences and complications of asthma[24]. However, the relationship between smoking and asthma has been claimed to be ambiguous, and the relevant studies have revealed contradictory results[25]. It is also noteworthy to mention that asthmatic smokers respond poorly to medications than nonsmokers[26]. Furthermore, it is more difficult to control asthma symptoms in smokers than nonsmokers[27].

Bearing in mind what was mentioned above, the present study was carried out in order to figure out the effects of cigarette smoking on the severity and control of asthma in adults living ins Sulaimani, the Kurdistan Region of Iraq.

1. Study design and patients: The present prospective cohort study was carried out in 3 hospitals (Shahid Dr. Hemen Hospital, Shar Teaching Hospital, and Emergency Hospital) located in Sulaimani City, the Kurdistan Region of Iraq. It was conducted from September 1, 2018 to March 31, 2019. The study sample consisted of 130 patients who had already been diagnosed with asthma. They were selected by a non-probability purposive sampling method. For this purpose some inclusion and exclusion criteria were taken into account. The inclusion criteria were the age of over 16 years, the patients' verbal consent, and stability, and the exclusion criteria were presence of chronic obstructive pulmonary disease (COPD), chronic bronchitis, and emphysema and undiagnosed cases.

2. Data collection: Based on the international guidelines for patients with asthma a researcher-designed questionnaire was designed in order to collect the required data on three parameters including demographic data, severity of asthma, and level of asthma control. The questionnaires were completed through face-to-face interview with the patients. The patients' demographic data included their age, sex, occupation, education level, smoking habits, and asthma duration. The level of asthma control was measured through 6 items based on the global for asthma management and prevention guideline (GINA, 2018)[28]. Asthma severity was assessed via 6 items according to the global for asthma management and prevention guideline (GINA, 2018)[28].

3. Statistical analysis: The collected data were analyzed through proportion percentage, arithmetic means, and standard deviation. Pearson R correlation was employed to calculate the direction of the correlation between the variables. Also, Chi-square test was used to figure out the significance of the relationship between the independent and dependent variables. Data analysis was conducted through Statistical Package for the Social Sciences version 25. A p-value of ≤ 0.05 was considered as statistically significant, and < 0.001 as highly significant.

4. Ethical considerations: To take the ethical considerations into account, ethical approval was retrieved from the authorities of the hospitals. Moreover, verbal informed consent was obtained from the participants of the study. Also, confidentiality of the collected data was ensured.

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Results

The present study was participated by 130 asthmatic patients selected from 3 hospitals in Sulaimani, the Kurdistan Region of Iraq. It was seen that they aged from 16 to 98 years with a mean age of 51.5 (±18.1) years. Regarding their gender, most of the participants (66.9%) were females, and 33.1% were males. In terms of their occupation, over half of them (50.8%) were housewives and 41% were employed. It was seen that 69.2% resided urban areas, and the rest lived in the countryside. Regarding their education level, it was observed that over half of them (53.1%) were illiterate (See Table 1).

Table 1. Demographic characteristics of the study sample

	Frequency (N)	Percentage (%)
Age group (year) Mean: 51.5 ± 18.1, min: 16 years, max: 98 years		
16-30	25	19.2
31-60	58	44.6
61-90	47	36.2
Gender		
Female	87	66.9
Male	43	33.1
Occupation		
Housewife	66	50.8
Unemployed	10	7.7
Employed	54	41.5
Residency		
Rural	40	30.8
Urban	90	69.2
Education level		
Illiterate	69	53.1
Primary school	26	20.0
Secondary school	16	12.3
Collage	19	14.6

As revealed by the collected data, the mean number of cigarette packs consumed by the patients was 10.1 (±4.7) packs per year. And regarding the duration of asthma, it was seen that the patients had been suffering from 12.3 (±10.7) years on average with a range of 0.08-60 years (See Table 2).

Table 2. Number of cigarette packs consumed by the patients

Variables	Mean ± SD	Range
Pack/Year	10.1 ± 4.7	1 to 18
Duration of asthma (year)	12.3 ± 10.7	0.08 to 60

In terms of the patients asthma control and status and their smoking control, the results revealed that most patients (44.6%) did not control their asthma, 39.2% controlled it partially, and 16.2% did not control it. Asthma severity was found to be severe persistent in 35 patients (26.9%) and moderate persistent in 66 cases (50.8%). Also, most of them (42.3%) had never smoked, 15.4% were current smokers and 22.3% were ex-smokers (See Table 3).

Table 3. The patients' asthma control, severity, and smoking status

	Frequency (N)	Percentage (%)
Level of asthma control		
Controlled	21	16.2
Partially controlled	51	39.2
Uncontrolled	58	44.6
Severity of asthma		
Mild intermittent	16	12.3
Mild persistent	13	10
Moderate persistent	66	50.8
Severe persistent	35	26.9
Smoking status		
Current smoker	20	15.4
Ex-smoker	29	22.3
Never smoked	55	42.3
Passive smoker	20	15.4
Social smoker	6	4.6

Regarding the relationship between the level of asthma control and the patients' demographic characteristics, level of asthma control had significant relationships with age groups and education level (p<0.001). The level of asthma control declined with an increase in the patients' age and a decrease in their education level. The relationship between smoking status and level of asthma control was also significant at a p-value of 0.05. However, no significant relationships were noticed between asthma control level and the patients' occupation and place of residence (See Table 4).

The results demonstrated that asthma severity had a significant relationship with the patients' age and education level (p<0.001), such that asthma severity increased with the patients' age and decreased with their education level (See Table 5).

The results also revealed that, severity of asthma did not have a significant relationship with the patients' smoking status (p>0.05) (See Table 6).

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Table 4. The relationship between asthma control level and demographic characteristics

		Level of asthma control			Total	P-value
		Controlled	Partially controlled	Uncontrolled		
Age groups (year)						
16-30	F	12	7	6	25	
	%	9.2	5.4	4.6	19.2	
31-60	F	7	31	20	58	
	%	5.4	23.8	15.4	44.6	< 0.001 (0.435)
61-90	F	2	13	32	47	
	%	1.5	10.0	24.6	36.2	
Total	F	21	51	58	130	
	%	16.2	39.2	44.6	100.0	
Education level						
Illiterate	F	3	26	40	69	
	%	2.3	20.0	30.8	53.1	
Primary school	F	2	14	10	26	
	%	1.5	10.8	7.7	20.0	
Secondary school	F	6	5	5	16	<0.001 (0.023)
	%	4.6	3.8	3.8	12.3	
Collage	F	10	6	3	19	
	%	7.7	4.6	2.3	14.6	
Total	F	21	51	58	130	
	%	16.2	39.2	44.6	100.0	
Smoking status						
Current smoker	F	1	9	10	20	
	%	0.8	6.9	7.7	15.4	
Ex-smoker	F	0	15	14	29	
	%	0.0	11.5	10.8	22.3	
Never smoked	F	12	22	21	55	
	%	9.2	16.9	16.2	42.3	0.05 (0.157)
Passive smoker	F	6	4	10	20	
	%	4.6	3.1	7.7	15.4	
Social smoker	F	2	1	3	6	
	%	1.5	0.8	2.3	4.6	
Total	F	21	51	58	130	
	%	16.2	39.2	44.6	100.0	
Occupation						
Housewife	F	5	29	32	66	
	%	3.8	22.3	24.6	50.8	
Unemployed	F	1	4	5	10	
	%	0.8	3.1	3.8	7.7	0.05 (-0.195)
Employed	F	15	18	21	54	
	%	11.5	13.8	16.2	41.5	
Total	F	21	51	58	130	
	%	16.2	39.2	44.6	100.0	
Residency						
Rural	F	4	11	25	40	
	%	3.1	8.5	19.2	30.8	
Urban	F	17	40	33	90	0.023 (-0.221)
	%	13.1	30.8	25.4	69.2	
Total	F	21	51	58	130	
	%	16.2	39.2	44.6	100.0	

Table 5. Relationship between asthma severity and the patients' age and education level

		Severity of asthma				Total	P-value
		Mild intermittent	Mild persistent	Moderate persistent	Severe persistent		
Age groups (year)							
16-30	F	8	6	10	1	25	
	%	6.2	4.6	7.7	0.8	19.2	
31-60	F	6	6	32	14	58	
	%	4.6	4.6	24.6	10.8	44.6	<0.001 (0.433)
61-90	F	2	1	24	20	47	
		1.5	0.8	18.5	15.4	36.2	
Total	F	16	13	66	35	130	
	%	12.3	10.0	50.8	26.9	100.0	
Education Level							
Illiterate	F	3	2	39	25	69	
	%	2.3	1.5	30.0	19.2	53.1	
Primary school	F	3	2	14	7	26	
	%	2.3	1.5	10.8	5.4	20.0	
Secondary school	F	3	4	7	2	16	< 0.001 (0.038)
	%	2.3	3.1	5.4	1.5	12.3	
Collage	F	7	5	6	1	19	
	%	5.4	3.8	4.6	0.8	14.6	
Total	F	16	13	66	35	130	
	%	12.3	10.0	50.8	26.9	100.0	

Smoking status		Severity of asthma				Total	P-value
		Mild intermittent	Mild persistent	Moderate persistent	Severe persistent		
Current smoker	F	0	2	11	7	20	0.218 (-0.245)
	%	0.0	1.5	8.5	5.4	15.4	
Ex-smoker	F	0	3	19	7	29	
	%	0.0	2.3	14.6	5.4	22.3	
Never smoked	F	9	5	27	14	55	
	%	6.9	3.8	20.8	10.8	42.3	
Passive smoker	F	5	2	7	6	20	
	%	3.8	1.5	5.4	4.6	15.4	
Social smoker	F	2	1	2	1	6	
	%	1.5	0.8	1.5	0.8	4.6	
Total	F	16	13	66	35	130	
	%	12.3	10.0	50.8	26.9	100.0	

Table 6. Relationship between asthma and patients' smoking status

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Discussion

According to the results of the present study, the patients' mean age was 51.5 years, and most of them were females. This finding is in line with the results of a study carried out in Asthma and Allergy Center in Sulaimani City by Al-Banna and Hassan (2009) who reported that 61.3% of the patients were females and 38.7% males[29]. Similarly, another study conducted in Baghdad revealed that more women (55%) had asthma[30]. Higher prevalence of asthma among females has been contributed to hormonal and immunological factors and their different response to occupational and environmental exposures[31,32]. Medina-Ramón et al. (2003) contributed higher prevalence of asthma among women to their higher exposure to chemical cleaning products[33].

Most of the asthmatic patients in the present study were from urban areas. This finding is in agreement with those of the studies carried out by El-Shazly et al. (2006) and Douwes et al. (2007) who pointed out that asthma is more prevalent among urban residents because of westernized lifestyles and exposure to more vehicle emissions[34-36]. It was also seen that asthma was more prevalent among illiterate patients. This finding is in line with the study carried out by Sari and Osman (2007) who stated that higher levels of education lead to better adherence to chronic disease management drugs among patients with asthma and COPD[37]. Moreover, the results showed that 42.3% of the patients did not smoke, and only 15.4% were smokers. This finding is in line with those of the study carried out by Cerveri et al. (2012) who mentioned that smoking is less frequent among asthmatic patients[38].

A majority of patients (44.6%) were found to fail to control their asthma. Similar findings were reported by Ahmad (2016) who observed 67% of the patients failed to control their disease[30]. As revealed by the results of the current study, the level of asthma control was significantly correlated with the patients' age, education level, and smoking status (p<0.05), such that a rise in the patients' age and a drop in their education level led to a lower level of asthma control. This finding is in good agreement with the results reported by Cerveri et al. (2012) who observed higher levels of asthma control in patients with higher education and lower age and those who had quit smoking[39]. However, asthma control level was not correlated with the patients' occupation and place of residence. As opposed to the present study, Al-Banna and Hassan (2009) and Ahmad (2016) reported a significant association between asthma control and employment[29,30]. This difference can be contributed to difference percentages of workless patients and those working in different jobs.

The results demonstrated that asthma severity rose with the patients' age. Similarly, a significant association between asthma severity and patients' age and education level was reported by Bavbek et al. (2000) who concluded that asthma severity is affected by prolonged asthma duration and older ages[40]. As indicated in Table 5 above, there was a significant inverse relationship between asthma severity and educational level, such that asthma severity rose as the patients' educational level dropped. This finding is in line with the results of the study conducted by Yan et al. (2016) who referred to low education level as a remarkable risk factor for higher severity of asthma[41]. As revealed by the results of the present study, asthma severity did not have a significant correlation with the patients' smoking status. It was seen that moderate and severe asthma was more prevalent in patients who had never smoked. This finding is not in agreement with the results of the study carried out by Nagase et al. (2019) who reported asthma is more severe in smokers than non-smokers[42]. This difference can be attributed to the fact that it is probable that the patients in the present study chose not to reveal their smoking due to being ashamed of their family members because of the certain culture of the region.

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Asthma is more prevalent among females and the illiterate. The level of asthma control is negatively affected by increased age, low level of education, and smoking, such that asthma control is more likely to fail in patients of older ages, with low education level, and who smoke. However, the patients' occupation and place of residence do not affect asthma control. Asthmatic patients' education level and age have a significant effect on the severity of asthma, such that asthma is more severe in illiterate and old patients. However, asthma severity was not significantly influenced by the patients' smoking status.

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