

Uncovering Factors Contributing to Poor Asthma Control among Asthmatic Patients in Erbil City - Kurdistan Region

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Abstract

Background: Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation and variable expiratory airflow limitation.

Objective: The objective of this study was to uncover factors contributing to poor asthma control in Erbil City, Iraq.

Methods: To assess asthma control in Erbil City a cross-sectional observational study was conducted on 200 patients with asthma from the 1st, of June to the 31st, of December 2023. Demographics, clinical characteristics, triggers, comorbidities, inhaler problems, causes of visit, and state of asthma control were evaluated using Global Initiative for Asthma 2023 as the assessment tool questionnaire. Asthma control was divided into three levels controlled, partly controlled, and uncontrolled.

Results: In this study, 200 patients with asthma (108 females and 92 males) were studied.

The mean age \pm SD of the patients was 35.61 ± 17.182 years and the female-to-male ratio was nearly 1:1. Asthma control was very poor as only 24 patients (12%) were controlled. Neither sex nor age group has a statistically significant association with asthma control. Factors significantly associated with asthma control included improper inhaler technique (45.5%), fear of addiction (29%) improper inhaler prescription (27.5%), cost (23%), device type (22.5%), infections (21%), indoor and outdoor exposure (18%), tobacco smoking (17%), allergic rhinitis (28.5%), gastroesophageal reflux disease (21.5%) and short-acting beta agonist alone therapy 104(52%). Other factors were non-significantly associated with asthma control such as emotional stress (9.5%), food allergy (8.5%), obesity (15%), atopic dermatitis (6%), obstructive sleep apnea (15%), and pregnancy (5.5%).

Conclusion: The current study concluded that factors associated with uncontrolled asthma were improper inhaler technique, fear of addiction, improper inhaler prescription, cost, device type, infections, indoor and outdoor exposure, tobacco smoking, allergic rhinitis, Gastro-esophageal Reflux Disease and short-acting beta agonist alone therapy.

Keywords: Asthma; Control; Comorbidities; Inhaler; Triggers.

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Introduction:

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms, such as wheezing, shortness of breath, chest tightness, and cough, that vary over time and in intensity, together with variable expiratory airflow limitation (1).

Asthma is one of the common chronic respiratory disorders affecting 1–29% of the population in different countries (2).

The asthma prevalence in the Middle East ranges from 4.4% to 7.6% while in Iraq according to some national studies is below 9% in adults (4,5), which is lower than in other parts of the world namely Europe and North America. Asthma as a disease regarded as a controllable disease and the aim of almost all guidelines including Global Initiative for Asthma (GINA) guidelines for asthma management is to offer a good and normal healthy life (1). Control of

Asthma is defined as the level of control in which the various features such as symptoms, and good quality of life with reducing the future adverse events have been removed or reduced by treatment (6).

In 2019, globally estimated that over 260 million people are living with poorly controlled asthma with a high frequency of disabilities and premature deaths especially in low- and middle-income countries (7). Asthma control evaluation according to a study (Characterization of Severe Asthma Worldwide) was done in several countries including the United Kingdom, United States, Italy, and South Korea, and a Web-based Database registry from Australia, Singapore, and New Zealand from 2014 to 2017. According to that study, 57.2% of patients had poorly controlled asthma (8). In Middle Eastern countries still, there is no dependable data on asthma control although there are some data from several studies like the ESMAA study in which only a small percentage of asthmatics were controlled for example in Jordan (14.8%), Iraq (17.5%), Kuwait

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(42.6%), and Qatar (41.1%) were controlled (9). In Turkey around 90% of adults with asthma were uncontrolled (10), in Saudi Arabia 68.1% of asthmatics were uncontrolled (11).

Asthma control is determined by the interaction between the patient's comorbidities, underlying disease processes, environment, genetic background, psychosocial factors, and the treatment that they are taking (1).

Uncontrolled asthma has negative impacts on the quality of life and increases the risk of exacerbations (12).

There are several tools for the evaluation of asthma control, one of the important tools is GINA defined criteria for assessment of asthma control. GINA assessment tool criteria measure symptom control in the past 4 weeks.

Asthma control levels are divided into three levels according to GINA criteria, first is well-controlled (all symptoms' criteria are absent), second is partly-controlled (one to two criteria are present), and uncontrolled (three to four criteria are present) (1).

Risk factors or causes of uncontrolled asthma are numerous including; Short-acting beta agonist (SABA) overdose (> one canister per month) (13), improper inhaler technique (up to 80% of community patients) (14), poor medication adherence (15), allergic rhinitis (16), Gastro-esophageal Reflux Disease (GERD) (17), obesity (18), confirmed food allergy (19), atopic dermatitis (20), obstructive sleep apnea (21), pregnancy (22), tobacco smoking (23), psychological problems (24), and indoor and outdoor exposure (25).

Among patients with uncontrolled asthma around 3.7% of them have severe asthma despite good inhaler technique and adherence (26).

There are insufficient dependable clinical data and large studies about the level of asthma control in Iraq, therefore; the current study aimed to uncover factors contributing to uncontrolled asthma in Erbil City, Iraq.

Materials and Methods:

Study design: This cross-sectional observational study was conducted to assess asthma control

In Erbil City. The study was conducted on 200 patients who were diagnosed previously with asthma in a private clinic and Rizgary Teaching Hospital from 1st, June to 31st, December 2023.

Patient data were collected through questionnaires filled by doctors during hospital or private clinic visits.

Demographic, clinical characteristics, triggers, comorbidities, inhaler problems, causes of visit, and the state of asthma control using the GINA 2023 assessment tool questionnaire.

Study population: The age group that was diagnosed with asthma was 12 to 81 years old. These patients were presented to a hospital or outpatient private clinic. Any patient with other

chronic respiratory disease other than asthma was excluded from the study.

Assessments: Asthma control levels were divided into three levels according to GINA criteria (controlled, partly controlled, and uncontrolled). The GINA criteria include (daytime symptoms > twice/week, any night waking, short-acting beta receptor agonist reliever for symptoms > twice/week, any activity limitation due to asthma), and risk factors for poor asthma outcomes (risk factors for exacerbation).

Inhalational Device Assessment Tool score (IDAT) was used for assessing inhaler technique which is composed of five scores from good inhaler technique (score 4-5) to poor inhaler technique (score 1-2).

Statistical Analysis

The statistical analysis was performed using Statistical Package for the Social Sciences version 23 (SPSS 23, IBM Company, and Chicago, USA). The Chi-squared test was used, but when the Chi-squared test was inappropriate then Fisher's exact test was used. $P \leq 0.05$ was considered statistically significant.

Results:

The mean age \pm SD of the patients was 35.61 ± 17.182 years (ranging from 15 to 81 years), and the female-to-male ratio was 1.17:1. Most of the patients were between ages 15 to 34 years old (51.5%) as shown in figure 1.

Demographic characteristics of study patients are shown in Table 1; Asthma control was very poor, and only 24 patients (12%) were controlled according to GINA guidelines.

Table 2 showed factors affecting asthma control in study patients; in the study, neither sex nor age group has a statistically significant (P -value > 0.05) association with asthma control.

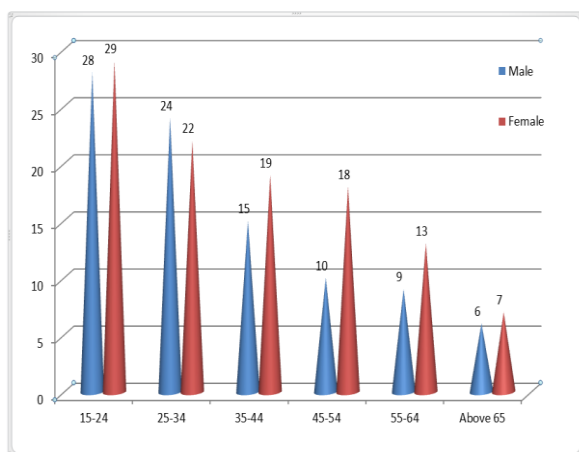
Among inhaler-related causes of uncontrolled asthma, there were statistically significant, inhaler related factors including improper inhaler technique (45.5%, P -value = 0.001) which is assessed by the Inhalational Device Assessment Tool (IDAT), fear of addiction (29%, P -value = 0.003) improper inhaler prescription (27.5%, P -value = 0.001), cost (23%, P -value = 0.005) and device type (22.5%, P -value = 0.015).

Triggers had an important effect on asthma control, some of them were statistically significant like infections (21%, P -value = 0.007), indoor and outdoor exposure (18%, p -value = 0.018), and tobacco smoke (17%, p -value = 0.039) while other triggers like emotional stress (9.5%, p -value = 0.223) and food allergy (8.5%, p -value = 0.278) were statistically not significant.

Some of the comorbidities were statistically significant (P -value < 0.05) associated with asthma control, like allergic rhinitis (28.5%, p -value = 0.016) and GERD (21.5%, p -value = 0.018) while other comorbidities have no statistically significant

association with asthma control like obesity(15% , p-value = 0.284), Atopic dermatitis (6% , p-value = 0.323), obstructive sleep apnea (15% , p-value = 0.089), psychological problem (7% , p-value = 0.277), and pregnancy (5.5% , p-value = 0.952).

Different factors affecting asthma control in the same patient, about 139 (69.5%) of patients with non-controlled asthma have at least two risk factors. Table 3 shows the effect of inhaler medication type on asthma control. According to our study, SABA alone therapy 104(52%, p-value =0.001) has a statistically significant negative impact on asthma control.



P VAUE = 0.791

FIGURE 1: SEX AND AGE-GROUP DISTRIBUTION AMONG STUDIED PATIENTS.

TABLE 1: DEMOGRAPHIC CHARACTERISTICS OF STUDY PATIENTS

Characteristic	Category	No. (%)
Sex	Male	92 (46)
	Female	108 (54)
Age Group/ year	15-24	57(28.5)
	25-34	46 (23)
	35-44	34 (17)
	45-54	28 (14)
	55-64	22 (11)
	Above 65	13 (6.5)
Asthma status	Well-controlled asthma	24 (12)
	Partly-controlled asthma	90 (45)
	Uncontrolled asthma	86 (43)
BMI*	Low	16 (8)
	Normal	72 (36)
	Over weight	68 (34)
	Obese	44 (22)
Smoking Status	Current smoker	34 (17)
	Ex-smoker	36 (17.5)
	Never smoked	130 (55)
Family history	Asthma	88 (44)
	Allergic rhinitis	92 (46)
	Eczema	30 (15)
Pregnancy	Pregnant	11 (5.5)

*BMI: body mass index

Table 2: Different factors affecting asthma Control in study patients.

Factor	Asthma Control			Total No. (%)	P-value
	Well-controlled asthma No. (%)	Partly-controlled asthma No. (%)	Uncontrolled asthma No. (%)		
Sex					
Male	14 (58.3)	43 (47.8)	35 (40.7)	92 (46)	
Female	10 (41.7)	47 (52.2)	51 (59.3)	108(54)	0.278
Inhaler related					
Technique	0 (0.0)	43 (47.8)	48 (55.8)	91(45.5)	0.001
Fear of addiction	0 (0.0)	27 (30)	31 (36)	58 (29)	0.003
Prescription	0 (0.0)	22 (24.4)	33 (38.4)	55 (27.5)	0.001
Coast	0 (0.0)	19 (21.1)	27 (31.4)	46 (23)	0.005
Device type	0 (0.0)	21 (23.3)	24(27.9)	45 (22.5)	0.015
Trigger					
Infection	0 (0.0)	17 (18.9)	25 (29.1)	42 (21)	0.007
Indoor and outdoor exposure	0 (0.0)	13 (14.4)	23 (26.7)	36 (18)	0.018
Tobacco smock	0 (0.0)	15 (16.7)	19 (22.1)	34 (17)	0.039
Emotional stress	0 (0.0)	9 (10)	10 (11.6)	19 (9.5)	0.223
Food allergy	0 (0.0)	9 (10)	8 (11.8)	17 (8.5)	0.278
Comorbidities					
Allergic rhinitis	1 (4.2)	27 (30)	29 (33.7)	57(28.5)	0.016
GERD	0 (0.0)	20 (22.2)	23 (26.7)	43(21.5)	0.018
Obesity	1 (4.2)	15 (16.7)	14(16.3)	30(15)	0.284
Atopic dermatitis	0 (0.0)	5 (5.6)	7 (8.1)	12(6)	0.323
OSA	0 (0.0)	15 (16.7)	15 (17.4)	30(15)	0.089
Psychological	0 (0.0)	6 (6.7)	8 (9.4)	14(7)	0.277
Pregnancy	1 (4.2)	5 (5.6)	5 (5.8)	11(5.5)	0.952
No. of factors*					
One risk factor	3 (12.5)	28(31.1)	1(1.2)	32 (16)	
≥ Two risk factor	0 (0.0)	62 (68.9)	63 (89.5)	139 (69.5)	0.001
No risk factor	21(87.5)	0 (0.0)	8 (9.4)	8 (9.3)	

OSA: obstructive sleep apnea, GERD: Gastro-esophageal reflux disease

Table 3: Effect of inhaler medication type on asthma control

Inhaler type	Asthma Control			Total No. (%)	P-value
	Well-controlled asthma No. (%)	Partly controlled asthma No. (%)	Uncontrolled asthma (%)		
SABA* alone	1 (4.2)	52 (57.8)	31 (59.3)	104(52)	
LABA**+ICS***	16 (66.7)	29 (32.2)	25 (29.1)	70 (35)	0.001
LABA+ICS+SABA	7 (29.2)	5 (5.6)	7 (8.1)	19 (9.5)	
LABA+ICS+LAMA****	0 (0.0)	4 (4.4)	7 (3.5)	7 (3.5)	

SABA*: short-acting agonist, LABA**: long-acting beta-agonist, ICS***: inhaled corticosteroid, LAMA****: long-acting antimuscarinic agent.

Discussion

This study was done on 200 patients with bronchial asthma, the mean age of the patients was 35.61 ± 17.182 years (ranging from 7 to 81 years), and the female-to-male ratio was; 1.17:1.

According to our study, although bronchial asthma is more common among females, through an unknown mechanism, it was statistically not significant. These results were similar to other studies regarding the increasing prevalence of asthma among females, but in those studies, the results were statistically significant (1,2,3).

In the current study, Asthma control was very poor in which only 24 patients (12%) were controlled by using GINA guidelines.

Globally one of the well-known important causes of uncontrolled asthma is related to inhaler causes. In our study the most common factors affecting asthma control were inhaler-related factors, inhaler-related factors including improper inhaler technique (45.5%, p -value = 0.001) which is assessed by the Inhalational Device Assessment Tool (IDAT), fear of addiction (29%) improper inhaler prescription (27.5%), cost (23%) and device type (22.5%), all these factors were statistically significant. Our results were similar to previous studies which were done on inhaler-related causes of uncontrolled asthma-like improper inhaler technique (18,4,5), fear of inhaler addiction (6), device type (7), and cost of the inhaler 80.

In our study, triggers like infections (21%), indoor and outdoor exposure (18%), and tobacco smoking (17%) while other triggers like emotional stress (9.5%) and food allergy (8.5%) were among the causes of uncontrolled asthma but statistically not significant, similar results with statistically significant triggers were found in other studies (23,27,25,9,10).

Comorbidities had a significant impact on asthma control. In our study, allergic rhinitis had a statistically significant impact on asthma control (28.5%); therefore, good control of concomitant allergic rhinitis may improve asthma control as seen in other studies (17). Gastro-esophageal reflux disease is another comorbidity that had a significant impact on asthma control (21.5%) according to another study that demonstrated a bidirectional relationship with asthma control (18), higher BMI scores independent of sex, age, and severity of asthma (19), study had a statistically significant association with asthma control while in our study, despite of the presence of an association between asthma control and obesity, but statically non-significant (15%)

Atopic dermatitis and asthma are commonly associated with each other, whether they are of the same disease spectrum or comorbidities, and their effect on disease is still not clear as seen in other studies (21). In our study, there was an association between atopic dermatitis and asthma control but statically non-significant (6%). Obstructive sleep apnea is significantly associated with asthma.

control, but in our study not significant (15%), regarding the association with pregnancy, (5.5%) were statistically non-significant, not like other studies (23).

Different factors including multiple triggers, and comorbidities affect asthma control in the same patient, about 139 (69.5%) of the patients with non-controlled asthma have at least two statistically significant risk factors, and similar results were obtained in other studies (11,12).

Inhaler medications type had a significant effect on asthma control, according to our study, inhaled short-acting beta agonist (SABA) alone therapy 104(52%) had a statistically significant negative impact on asthma control as seen in other studies (16, 14), while in inhaled corticosteroids (ICS) + inhaled long-acting beta-agonist (LABA), especially formoterol, had a statistically significant positive impact on asthma control as seen in other studies (xxvii).

Conclusion

In our study, the most important statistically significant factors affecting asthma control were improper inhaler technique, fear of addiction, improper inhaler prescription, cost, device type, infections, indoor and outdoor exposure, tobacco smoking, allergic rhinitis, gastroesophageal reflux, and SABA alone therapy). However, other factors, although they were associated with asthma control but statistically non-significant like obesity, obstructive sleep apnea, psychological and pregnancy. Interestingly 69.5% of patients with non-controlled asthma had at least two risk factors.

Authors' declarations:

We confirm that all the Figures and Tables in the manuscript are ours. Authors signed on ethical considerations to the local ethical committee in the College of Medicine; Hawler Medical College approved the project according to code number (2 on 30/10/2023).

Conflicts of Interest: None

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الكشف عن العوامل التي تساهم في ضعف السيطرة على مرض الربو بين مرضى الربو في مدينة أربيل إقليم كردستان

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الخلاصة:

الخلفية: الربو هو مرض متباين، وعادة ما يتميز بالتهاب مجرى الهواء المزمن والتقييد المتغير لتدفق هواء الزفير. **الهدف:** ان الهدف من هذه الدراسة هو الكشف عن العوامل التي تساهم في ضعف السيطرة على الربو في مدينة أربيل، العراق. **الطرق:** لتقييم السيطرة على الربو في مدينة أربيل، تم إجراء دراسة رصدية مقطعية على 200 مريض مصاب بالربو في الفترة من 1 حزيران إلى 31 كانون الأول 2023. تمت تقييم الخصائص الديموغرافية والسريية والمسببات والأمراض المصاحبة ومشاكل الاستنشاق وأسباب الزيارة وحالة السيطرة على الربو باستخدام المبادرة العالمية للربو 2023 باعتبارها أداة استبيان التقييم. تمت قسيم مستوى السيطرة على الربو لثلاثة مستويات مسيطر عليه كلياً، ومسيطر عليه جزئياً وغير مسيطر عليه.

النتائج: تم تنفيذ هذه الدراسة دراسة 200 مريض مصاب بالربو (108 إناث و 92 من الذكور). كان متوسط عمر المرضى \pm الانحراف المعياري 17.182 \pm 35.61 سنة، وكانت نسبة الإناث إلى الذكور 1:1 تقريباً. وكانت السيطرة على الربو سيئة جداً حيث تمت السيطرة عليه في 24 مريضاً فقط (12%). (ليس للجنس

ولا لفئة العمرية علاقة ذات دلالة إحصائية مع السيطرة على الربو. العوامل التي ترتبط بشكل كبير بالسيطرة على الربو تشمل تقنية الاستنشاق غير الصحيحة (45.5%)، الخوف من الإدمان (29%)، وصفة الاستنشاق غير الصحيحة (27.5%)، المعطف (23%)، نوع الجهاز (22.5%)، العدوى (21%)، الأماكن المغلقة. والتعرض في الهواء الطلق (18%)، والتدخين (17%)، والتهاب الأنف الأرجي (28.5%)، ومرض الارتجاع المعدي المريئي (21.5%)، والعلاج بمحفزات بيتا قصيرة المفعول كعلاج وحيد 104 (52%). (في حين أن العوامل الأخرى لم تكن مرتبطة بشكل كبير مع السيطرة على الربو مثل الإجهاد العاطفي (9.5%)، حساسية الطعام (8.5%)، السمنة (15%)، التهاب الجلد التأتبي (6%)، انقطاع التنفس الانسدادي أثناء النوم (15%)، والحمل (5.5%). % العوامل التي ترتبط بشكل كبير بالسيطرة على الربو تشمل تقنية الاستنشاق غير المناسبة (45.5%)، الخوف من الإدمان (29%)، وصفة الاستنشاق غير الصحيحة (27.5%)، المعطف (23%)، نوع الجهاز (22.5%)، العدوى (21%)، التعرض الداخلي والخارجي (18%)، تدخين التبغ (17%)، التهاب الأنف التحسسي (28.5%)، مرض الارتجاع المعدي المريئي (21.5%)، والعلاج بمحفزات بيتا قصيرة المفعول كعلاج وحيد 104 (52%). بينما المترتبط العوامل الأخرى بشكل كبير بالسيطرة على الربو مثل الإجهاد العاطفي (9.5%)، والحساسية الغذائية (8.5%)، والسمنة (15%)، والتهاب الجلد التأتبي (6%)، وانقطاع التنفس الانسدادي النومي (15%)، والحمل (5.5%). **الاستنتاج:** توصلت الدراسة الحالية إلى استنتاج مفاده أن العوامل المرتبطة بعدم السيطرة على الربو هي تقنية الاستنشاق غير الصحيحة، والخوف من الإدمان، ووصفات الاستنشاق غير الصحيحة، والساحل، ونوع الجهاز، والالتهابات، والتعرض الداخلي والخارجي، وتدخين التبغ، والتهاب الأنف التحسسي، ومرض الارتجاع المعدي المريئي، وقصر المفعول العلاجي محفزات بيتا قصيرة المفعول كعلاج وحيد. **مفتاح الكلمات:** الربو، السيطرة، الأمراض المصاحب، جهاز الاستنشاق، النوايض.