Effect of inhaler medication adherence on quality of life among asthmatic patients in Erbil City

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Abstract

Background and objective: Asthma is the most common health problem that impaired a patient's quality of life (QoL). Metered dose inhaler is a key route for improving asthma control and quality of life, the objective of this study was to assess asthma inhaler medication adherence and its effect on the quality of life of asthmatic patients.

Methods: A cross-sectional study was employed at Rizgary and Hawler Teaching Hospital in Erbil City, in the Kurdistan Region of Iraq from March 2021 to November 2022. A non-probability/purposive sampling technique was used to choose 300 asthmatic patients. Data was collected through a questionnaire consist of demographical data, asthma quality of life, metered dose inhaler checklist, and an asthma control test. Chi-square, Mann Whitney u test and binary logistic regression were used to find out the result of the study and P value <0.05 was significant.

Results: Out of 300 patients with asthma, 58% were females, the mean age (±SD) was 46.7±9.04 years, 43% used the metered dose inhaler improperly, 61% was uncontrolled asthma and67%reported poor quality of life. The following variables were associated with a poor quality of life: age ≤40 (P = 0.023, OR = 1.95), insufficient family income (P = 0.020, OR= 1.92), duration of disease ≤ 10 years (P = 0008, OR= 2.30), and improper used meter dose inhaler (P = 0001, OR = 3.32) respectively.

Conclusion: Appropriate using the inhaler technique is associated with better quality of life in asthmatic patients. Healthcare providers teaching patients with asthma should have the basic skills and knowledge to use metered dose inhalers correctly to reduce readmission and mortality rate.

Keywords: Quality of life; Inhaler medication adherence; Asthma control.

Introduction

Asthma is a long-term respiratory disease that affects the airways of the lungs. It is identified by symptoms, such as shortness of breath, chest tightness, wheezing, and cough, 262 million people in 2019 have asthma and 455 000 deaths.[1] Asthma is more common in female adults than males. Asthma is more likely in people who have other hypersensitive conditions, such as rhinitis, and eczema, exposure to a different of environmental irritants and allergens that increase the risk of asthma, including, house dust, mites, and exposure to fumes, dust, chemicals, air pollution in indoor, and outdoor.[2,3] Adherence to asthma medication is an ongoing issue in the healthcare system. WHO defines adherence as "the extent to which a person's behavior corresponds with agreed recommendations from health care providers. The problem arising during asthma management include non-adherence to medicines and improper use of inhaler technique.[4,5]

The most important consequence of non-adherence to asthma medications is uncontrolled asthma, leading to poor symptom control, higher rates of readmission, and impaired quality of life.[6]

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Non-adherence to medication leads to a significant increase in healthcare utilization, including visits to the emergency department, hospitalizations, and exacerbation because of uncontrolled asthma.[7] Quality of life (QoL) is an important endpoint as it reflects the effect of the disease from the patient's perception. Inappropriate asthma management can strongly affect the QoL, including physical, emotional, social, and occupational.[8] QoL measurement has become a frequently significant factor in assessing patient well-being as well as treatment effectiveness. Such measurement has gained popularity as a clinical outcome, reaching beyond the measurement of physical health or functional status.[9] There is no previous study done on the association between inhaler medication devices and the quality of life of asthmatic patients. Therefore, the objective of this study was to assessment of asthma inhaler medication adherence and its effect on the quality of life.

Methods

The cross-sectional study was done to assess the effect of inhaler medication on the quality of life in asthmatic patients at Rizgary and Hawler Teaching Hospitals in Erbil City in the Kurdistan Region of Iraq, from March 2021 to November 2022. Due to the lack of exact data on asthmatic prevalence, and the lack of a specialized center for respiratory disease in the city would be rather difficult to define exactly the patient population in the governorate accordingly to the more representative sample the researcher used on-probability/ a purposive sampling method was used to select (n=300) asthmatic patients.

The study population consisted of asthmatic patients who are willing to participate in the study, both male and female patients, age more than 18 years old, patients diagnosed with asthma, and patients on any inhaler device for at least one month while exclusion criteria were, newly diagnosed case of asthma, uncooperative patients, severe asthmatic patients require intensive care unit, chronic obstructive pulmonary disease, and someone unable to complete the questionnaire was excluded.

The questionnaire was directed through face-to-face interviews by researchers to maintain good data collection. The first part of the questionnaire included patients' demographical characteristics (age, gender, level of education, family income, cigarette smoking, number of exacerbations, duration diagnosis of disease, and family history). The asthma quality of life questionnaire (AQLQ) consists of four domain (symptoms 12 questions, activities limitations 11 questions, emotional function 5 questions, and environmental stimuli 4 questions) and an overall score (32 questions).

The answer to each question was scored on a 7-point Likert scale, with 1 representing maximal impairment and 7 representing no impairment. Higher scores on the AQLQ indicate better quality of life. The total score was computed by totaling all the answers and dividing it by the total number of questions, The domain scores were calculated as the mean of the domain's particular items and the general QoL score was calculated as the mean of the domain scores.[10] The mean score for each domain of AQLQ has estimated a low mean score (≤3.5) considered as poor QoL and a high mean score (>3.5) score was good QoL. The total domain AQLQ mean scores were calculated for the two cohorts the total mean score was dichotomized as poor QoL (≤112) and good QoL (>112). Also, for metered dose inhaler the data was collected through used checklist which consisting of 8 items rated from (0-1) scoresforthe estimation of the corrected and uncorrected response or total scores of metered dose inhalers considered as improperly (≤4) score while for properly used inhaler (>4) score.[11] The final part was controlled asthma questions were determined by Asthma Control Test (ACT). It is a quick, simple, (5-item) questionnaire

used to measure asthma symptoms, using medications, and the effect of asthma on daily activity living at work or home. Each questioner lasting to a 5-point rating scale extending from (1 to 25) score was determined by totaling the response scores to the five questions; the higher the score indicated the better the asthma control.[12] The researcher was fully aware of the ethical circumstances in carrying out the study.

Ethical Consideration
Ethical approval was obtained from the ethical committee in the College of Nursing/ Hawler Medical University, Patients were informed and consented to participation in the study.

Statistical analysis
Data analysis by a statistical package for social sciences (SPSS version 26). Descriptive statistics were used for patients' data, with frequencies and percentages for categorical variables and Chi-square to find out the association between quality of life and variables of the study, Mann Whitney u test was used to compare the quality of life domains with proper and improper of using metered dose inhaler, controlled and uncontrolled asthma. Binary logistic regression models were used to find and predict factors affecting the quality of life of asthmatic patients, P <0.05 was considered statistically significant.

Results

A total of 300 asthmatic patients were included in the study, 58% were females and the mean age was 46.7±9.04, 40% were illiterate, 51% reported insufficient family income, 61% were ex-smoker, 64% informed less than 4-time exacerbations per year and 60% were having asthma for more than 10 years, in relation to metered dose inhaler 43% used improperly. While, 57% were used properly, about asthma control test 61% were uncontrolled although 39% were controlled, 67% reported poor quality of life whereas 33% was good quality of life. Moreover, it has

been found that there was a significant association between poor quality of life and patients age group less than 40 years (P = 0.006), female gender (P = 0.001), insufficient monthly income (P = 0.037), less than 4 times of exacerbations in a year (P = 0.001), duration of disease equal and less than 10 years (P = 0.001) and improperly used metered dose inhaler (P = 0.001) (Table 1).

Table 2 show the mean score for AQLQ domains was a low mean score (≤3.5) considered as poor QoL and a mean score more than (3.5) scores as good QoL. Also, the results show that the quality-of-life domain was lower in symptom control (2.30±0.98) and the patient had more activity limitation (2.49±0.97) while, in other domains patients had more emotional status (3.49±1.69) and better able to environmental control (3.56±1.84).

Table 1 Association between asthma quality of life and variables of the study

Variables		Quality of life		Total	P
		Poor N (%)	Good N (%)	N (%)	value
Age (years)	≤40	88 (76.5)	27 (23.5)	115 (38.3)	<0.006
	>40	113 (61)	72 (38.9)	185 (61.7)	
Gender	Male	69 (54.8)	57 (45.2)	126 (42)	<0.001
	Female	132 (75.9)	42 (24.1)	174 (58)	
Level of education	Illiterate	72 (60.0)	48 (40)	120 (40)	0.124
	Read & write	72 (72.7)	27 (27.3)	99 (33)	
	Primary school	27 (60.0)	18 (40)	45 (15)	
	High school	30 (83.3)	6 (16.7)	36 (12)	
Family income	Insufficient	111 (72.5)	42 (27.5)	153 (51)	0.037
	Sufficient	90 (61.2)	57 (38.8)	147 (49)	
Cigarette smoking	Non-smoker	69 (59)	48 (41)	117 (39)	0.182
	Ex-smoker	132 (72.1)	51 (27.9)	183 (61)	
Exacerbations /year	≤ 4 time	144 (75)	48 (25.0)	192 (64)	<0.001
	> 4 time	57 (52.8)	51 (47.2)	108 (36)	
Duration of disease	≤10 year	96 (80)	24 (20)	120 (40)	<0.001
	>10 year	105 (58.3)	75 (41.7)	180 (60)	
Metered dose inhaler	Improper	108 (83.7)	21 (16.3)	129 (43)	<0.001
	Proper	93 (54.4)	78 (45.6%)	171 (57)	

Table 2 Mean scores of asthmatic quality of life questionnaires

Quality of life domains	Mean ± SD/ scale	Mean ± SD/ total
Symptom	2.30±0.98	27.7±11.81
Activity	2.49±0.97	29.84±11.59
Emotion	3.49±1.69	17.48±8.46
Environment	3.56±1.84	14.26±7.36
Total QoL	2.79±1.01	89.28±32.41

Table 3 illustrates the mean and standard deviation of patients who used an appropriate metered dose inhaler associated with better quality of life compared to those used inappropriately used metered dose inhaler, in domains including symptom 24.67 (±8.36) to 29.98 (±13.43), activity 25.91 (±9.90) to 32.81(±11.91), emotion 15.58 (±8.70) to 18.91 (±8.00) environment 12.42 (±6.72) to 15.65(±7.54) and also, in total quality of life 78.58 (±26.81) to 97.35 (±33.96) respectively.

Table 4 shows the mean and standard deviation of quality of life mean score was significantly higher in the controlled asthma compared to uncontrolled asthma, patients with asthma had better symptoms control 25.5 (±12.83) to 27.98 (±10.06), lower activity limitation 28.19 (±10.0) to 30.90 (±12.41), better emotion status 15.43 (±6.96) to 18.79 (±9.07) to better environment control 13.10 (±6.01) to 15.00 (8.04) and higher improve quality of life 84.70 (±27.29) to 92.21 (±35.05) consequently.

Table 3 Comparison of quality of life with metered dose inhaler

Quality of life domains	Proper used Inhaler				Improper used Inhaler				P-value
	Mean	SD	Median	Mean rank	Mean	SD	Median	Mean rank	
Symptom	29.98	13.43	25	160.11	24.67	8.36	24	137.77	0.027
Activity	32.81	11.91	28	175.21	25.91	9.90	23	117.74	<0.001
Emotion	18.91	8.00	18	168.03	15.58	8.70	12	127.27	<0.001
Environment	15.65	7.54	15	166.39	12.42	6.72	11	129.43	<0.001
Total QoL	97.35	33.96	78	173.50	78.58	26.81	70	120.01	<0.001

Mann-Whitney U test was used to calculate *P*-value

Table 4 Comparison of quality of life with asthma control test

Quality of life domains	Controlled Asthma				uncontrolled Asthma				P-value
	mean	SD	Median	Mean rank	mean	SD	Median	Mean rank	
Symptom	27.98	10.06	25.00	163.58	25.5	12.83	23.00	142.14	0.029
Activity	30.90	12.41	26.00	157.14	28.19	10.00	25.00	140.12	0.047
Emotion	18.79	9.07	16.00	162.16	15.43	6.96	13.00	132.26	<0.001
Environment	15.00	8.04	14.00	156.98	13.10	6.01	12.00	140.36	0.020
Total QoL	92.21	35.05	74.00	151.51	84.70	27.29	72.00	148.92	0.038

Mann-Whitney U test was used to calculate *P*-value

A logistic regression model was constructed to assess the association between selected patients' data as predictor variables and poor quality of life (AQLQ) as shown in Table 5, variables chosen in the model were based on the bivariate analysis. age, gender, economical status, hospital readmission, and duration of disease, were put into the model. Model fit was measured by the likelihood ratio statistic ($\chi 2$= 33.26, P <0.001) and the Hosmer and Leme show test ($\chi 2$= 12.47, P >0.131), the variability observed in the target variable is explained by the regression mode was R^2 = 23.8%. The following variables were associated with a poor quality of life: age ≤ 40 (β =0.69, OR= 1.95), insufficient family income (β 0.65, OR= 1.92), duration of disease $\leq$ 10 years (β =-0.83, OR= 2.30) and improper used meter dose inhaler (β 1.20, OR= 3.32) respectively.

Discussion

Asthma is a major chronic disease that leads to restricted daily living activity and utilized of significant healthcare resources. Inhaler medication adherence has been found to be an important indicator to control asthma and improve the quality of life in asthmatic patients. The present study result shows that quality of life in both domains of symptom and activity were lower scores than emotion and environment.

The findings are quite comparable with an analysis study done in Malaysia on 40 asthmatic patients which found that most of the asthmatic patients had a severe degree of defect in the symptoms domain, emotional function, and environmental domain while in the activity domain, most of the patients had a mild defect.[13]

In a study conducted by,[14] it was shown that the global mean QoL score of asthma patients was 3.66 ± 1.41 whereas in the present study was 2.79±1.01. In the current study, patients using an appropriate metered dose inhaler were associated with better quality of life compared to those inappropriately used inhaler in all domains including symptoms activity, emotion, and environment, the result of the present study is parallel to the study which set out to determine the patients whose used the improper of inhaler device was the lower quality of life scores in all the domains in compared with

Table 5 Determinants associated with poor asthmatic quality of life

Variables		*P* value	OR	95% CI	
				Lower	Upper
Age /year	≤40	0.023	1.95	1.09	3.47
	>40		Ref.		
Gender	Female	0.341	1.33	0.73	2.40
	Male		Ref.		
Family income	Insufficient	0.020	1.92	1.10	3.35
	Sufficient		Ref.		
Exacerbations/ year	≤4 times	0.164	1.50	0.84	2.66
	> 4 times		Ref.		
Duration/year	≤10	0.008	2.30	1.24	4.27
	> 10		Ref.		
Metered dose inhaler	Improper	0.001	3.32	1.73	6.37
	Proper		Ref.		

those having proper technique (*P* <0.001).[15]

Older people have greater disease asthma attacks mostly due to poor adherence to medication, higher physical activity limitation, and end-stage disease that leads to the development of irreversible asthma.[16] Also, the current study found that factors related to worse quality of life were the age of less than 40 years, insufficient economic status, and duration of disease less than 10 years, which was supported by a study showing that, lower educational level, insufficient monthly income, poorer asthma control, and more hospital admissions were important factors of a poor QoL in the asthmatic patient.[17] Moreover, the findings come along with another study shows the general quality of life score was higher in patients from the high-income group than those with lower income.[18] The association between asthma control and quality of life has been evident in the study, this appears to be closely linked to the study showing that the QoL score was higher in patients with controlled asthma compared to patients with uncontrolled disease.[19]

This study may have some limitations. Firstly, being a cross-sectional study causality relationship cannot be found and the potential inaccuracies in the responses of the patient, are inherent in any questionnaire, participants were recruited at different times over a period of one year so their QOL at different.

Conclusion

The study identified high-level to good adherence to meter dose inhalers was 57%, 33% of asthmatic patients had a good quality of life, and 39% of their disease was controlled. The researchers concluded that patients who use an appropriately metered dose inhaler are associated with better asthma control and better quality of life. Further studies with longer duration of follow-up are required to educate asthmatic patients about using metered dose inhalers

Competing interests

The authors declare that they have no competing interests.

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