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ORIGINAL RESEARCH

Can Pharmacists' Counseling Improve the Use of Inhalers and Quality of Life? A Prospective "Pre" and "Post" Education Analysis in Mardan, Pakistan

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Introduction: Asthma is one of the common major non-communicable respiratory diseases, and is associated with a lower health-related quality of life (QOL). Poor inhalation is a significant contributing factor to poor control of asthma. Community pharmacist has a vital role to play in assisting patients and ultimately improving their asthma conditions through the use of inhalers.

Aim: This study aimed to assess the effectiveness of "pre" and "post" educational intervention by a community pharmacist within a community pharmacy on asthma patients' QOL, inhaler technique, and adherence to therapy during the endemic phase of COVID-19.

Methods: A "pre" and "post" interventional study was performed at a community pharmacy in the city of Mardan, Pakistan, in 2022 during the COVID-19 pandemic. Patients were divided into two groups, ie control and pharmacist-led education groups. After assigning patients to both groups, the baseline data were collected and followed for one month to compare the reduction in errors in the use of inhalers, QOL, and adherence to therapy. A paired sample *t*-test was performed, keeping a p-value <0.05 as statistical significance.

Results: A total of 60 patients were recruited, majority (58.3%) were females, and 28.3% were from the age group of 46–55 years old. A statistically significant difference was observed in the pre- and post-education QOL score among patients in the pharmacist-led education group, from a mean ± SD at pre-education of 40.23±10.03 to a mean±SD at post-education of 48.10±5.68. Similarly, a statistically significant difference was observed for the correct use of inhalers, ie MDIs and DPIs. Similarly, a statistically significant difference was observed in the adherence status between pre-education and post-education by pharmacists.

Conclusion: The findings of the study revealed a positive impact of community pharmacist-led education on QOL, inhaler technique, and adherence to therapy among patients with asthma.

Keywords: adherence, asthma, community pharmacist, pharmacist-led education, quality of life, Pakistan

Introduction

Chronic respiratory diseases such as asthma are the biggest threat to health worldwide, especially in developing countries.[1] The prevalence of asthma is increasing at a very alarming rate due to rapid urbanization, lifestyle modification, and industrialization.[2] Globally, there are approximately 334 million asthma cases, and its prevalence is increasing year by year.[3] Prevalence and mortality of asthma vary geographically with higher cases observed in developed countries; however high mortality is observed in developing countries too.[4] Asthma is among the most common major non-communicable respiratory diseases which are associated with poor health-related quality of life (QOL).[5,6]

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Among patients with asthma, poor inhalation is a significant contributing factor toward poor control of the disease because of inadequate dosing of the prescribed medication.[7] Asthma has a great impact on the population, socially as well as economically, and when asthma is poorly controlled it may lead to considerable economic impact with frequent hospital admissions, poor QOL, and ultimately death.[8] Adherence to therapy plays an important role in the overall health of the patient. 24% of exacerbations and almost 60% of hospitalizations resulting from asthma-related issues are due to poor adherence to therapy.[9] Adherence to controller medication for the management of asthma is critical. The literature revealed medication adherence toward the controller medication is constantly low,[10–14] and poor medication adherence is a major challenge for asthma resulting from complex therapeutic regimens.[15] Various reasons contribute to non-adherence to therapy, including poor knowledge of the proper and appropriate use of inhalers, forgetfulness, and misconceptions about asthma's long-term impacts on health.[13,16,17] Other than these, several other factors also play a contributing role in the non-adherence to therapy including complex regimens, side effects associated with therapy, high cost of medication, in some cases dislike of medication, and distant pharmacies.[13,18,19] It is extremely important to counsel patients through video instruction programs or lecturing on proper techniques for inhaler use to optimize their treatment.[20]

Pharmacists have a very important role in delivering both the initial training to asthma patients regarding the first-time use of an inhaler, and the subsequent regular follow-up retraining of patients.[21,22] Community pharmacists can play a significant, positive role in the health of patients who live in rural areas and are isolated because of limited access to primary health-care facilities.[23,24] More particularly, in some countries community pharmacists are specifically placed for the regular checking of inhaler techniques in case of new inhaler prescriptions or refills; pharmacist interventions significantly assist in improving the inhaler technique of asthma patients.[25–27] Pharmacist-led interventions among patients with asthma enable these patients to enhance their inhaler technique, thus contributing to improved medication adherence, asthma control and QOL.[28,29] Furthermore, the pharmacist's education and counseling role can lead to improved asthma control and, overall, enable asthma patients to have a fully active and productive life.[30] Poor asthma control results from delivery of sub-therapeutic doses due to improper inhalation techniques.[31]

Various studies in Pakistan documented that in patients with asthma an improper inhalation technique persisted, leading to poor compliance and uncontrolled asthma status.[6,32–35] Consultants and physicians are overburdened in Pakistan, so a community pharmacist's role is vital to assist patients and ultimately improve the asthma conditions of patients using inhalers. This study aimed to assess the effectiveness of a pharmacist-led education intervention by a community pharmacist on QOL, inhaler technique, and adherence to therapy among patients with asthma during the endemic phase of COVID-19.

Method

Study Design

This study had a pre–post study design, in order to assess the effectiveness of a pharmacist-led education intervention by a community pharmacist in a community pharmacy setting on QOL, inhaler technique, and adherence to therapy among patients with asthma. The study was performed in 2022 during the endemic phase of COVID-19, when a surge of respiratory-related diseases was observed. The counseling was performed by a registered pharmacist working in a community pharmacy in the city of Mardan, Pakistan.

Eligibility Criteria

Patients who were aged 18 years or above, of both genders (male and female), clinically diagnosed with asthma, and prescribed inhalers for managing their asthma were included in the study. Patients not willing to participate in this study were excluded.

Study Procedure

The study's purpose was explained, and patients' consent was obtained before enrolment in the study. After consent, the patients were screened for eligibility criteria. For those who met the inclusion criteria, all the parameter data were

recorded, ie age, gender, education status, marital status, socio-economic status, the severity of disease, and QOL. Patients were randomly assigned into one of two groups, ie control group and a pharmacist-led education group. After assigning patients, the baseline data were collected and one month's follow-up was performed to compare patients' reduction in inhaler use error, adherence to therapy and ultimately their QOL.

Ethics and Dissemination

The study was approved by the Ethical and Research Committee of Abdul Wali Khan University Mardan, Pakistan. All procedures performed in this study involved human participants following the ethical standards of the institutional and/or national research committee and the 1964 Helsinki Declaration. Informed written consent was obtained from all the patients who were willing to participate in this study. Furthermore, the patients were informed that they could leave the study at any time. For future reference, proper patient identity numbers were assigned to each patient. To avoid and minimize any bias in the study all the data were kept highly confidential.

Measurement Tools

Demographics data: A demographic data sheet was designed to collect data on patients related to age, gender, education status, weight, employment status, marital status, socioeconomic status, and severity of asthma disease.

Quality of life (QOL): To evaluate the aspects of QOL, a validated tool named Functional Assessment for Non-Life-Threatening Conditions (FANLTC) was used. The FANLTC assesses 4 domains, namely physical well-being, social/family well-being, emotional well-being, and functional well-being. Each item of these 4 domains of FANLTC is scored from 0 to 4, where 0 is considered as "not at all" while 4 is considered as "very much". The QOL score on the FANLTC tool ranges from 0 to 104, in which a lower score represents a poor QOL while a higher one represents a better QOL.[36]

Metered Dose Inhalers (MDIs) and Dry Powder Inhalers (DPIs): To assess the correct and appropriate use of either MDIs or DPIs among patients with asthma, a checklist was adopted from previous literature.[37] For MDIs the checklist was comprised of 8 questions, while for DPIs it was comprised of 11 questions. For each correct step, a score of 1 was awarded, while for an incorrect step a score of zero was given. To assess the correct use of inhalers among patients, the checklist used depended on whether patients were using an MDIs or DPI. The questionnaire was administered to patients in both the pharmacist-led education group and in the control group. After one month of pharmacist-led education and counseling, the checklist was administered to the same patients in both groups to assess any improvement in the correct use of inhalers.

Adherence to Inhaler Treatment

The adherence to the inhaler treatment was assessed on a ten-item questionnaire "Test of Adherence to Inhalers (TAI)".[38] The score for each item of the questionnaire ranged from 1 to 5, "where 1 was considered as the worst possible score while 5 as the greatest possible score", thus 10 points represent a minimum score whereas 50 points a maximum score. Three stages for adherence were established along this continuum: ≤45 graded as poor, 46–49 graded as intermediate, and 50 graded as good. The scores for adherence to inhaler treatment were assessed for the two groups of patients, both at the start of the study (pre-education for the non-control group) and after one month, at the endpoint of the study (post-education).

Education/Intervention Tool

Pharmacist-led education was performed by using a leaflet as a counseling aid as well as verbal counseling about the proper use of inhalers. The counseling material was designed according to the standard reference and approved after consultation with a practicing respiratory consultant and a registered pharmacist.

Sample Size and Data Analysis

The study was a pilot study designed to assess the effectiveness of pharmacist-led education by a community pharmacist on QOL, inhaler technique, and adherence to therapy among patients with asthma in Pakistan. Therefore, no formal sample size calculation was conducted. The study aimed to recruit at least 60 patients, with 30 patients in each group, ie the control group and the pharmacist-led education group. All the data collected through the questionnaires were entered and analyzed using

Software Package for Statistical Sciences (SPSS) version 21. For categorical variables, numbers and frequencies were used. Quantitative variables were represented as mean ± standard deviation and a paired sample *t*-test was used for comparisons between the pre- and post-data, with a p-value of <0.05 being considered statistically significant.

Results

Demographic Characteristics of Patients

A total of 60 patients with asthma were included in this study, with 30 patients in each group. The majority of the patients, n=35 (58.3%), were females, n=17 (28.3%) were from the age group of 46–55 years, and half of the patients, n=30 (50%), were uneducated. Regarding marital status, n=48 (88%) were married and n=25 (41.7%) were housewives/ stay-at-home moms. About the severity status of asthma, n=35 (58.3%) of the patients were categorized as having persistent-moderate asthma (See Table 1 for details).

Table 1 Demographic Characteristic of Included Patients

	Category	Total N (%)	Control Group N (%)	Pharmacist-Led Education Group N (%)
Gender	Male	25 (41.7)	12 (48)	13 (52)
	Female	35 (58.3)	18 (51.4)	17 (48.6)
Age	18–25 years	4 (6.7)	2 (50)	2 (50)
	26–35 years	9 (15)	6 (66.7)	3 (33.3)
	36–45 years	15 (25)	6 (40)	9 (60)
	46–55 years	17 (28.3)	9 (52.9)	8 (47.1)
	56 and above	15 (25)	7 (46.7)	8 (53.3)
Education status	Uneducated	30 (50)	14 (46.7)	16 (53.3)
	Primary	12 (20)	6 (50)	6 (50)
	Higher secondary	7 (11.7)	4 (57.1)	3 (42.9)
	Bachelors	9 (15)	5 (55.6)	4 (44.4)
	Postgraduate	2 (3.3)	1 (50)	1 (50)
Weight in kilograms (kg)	Less than 50 kg	5 (8.3)	0 (0)	5 (100)
	51–60 kg	31 (51.7)	19 (61.3)	12 (38.7)
	61–70 kg	16 (26.7)	7 (43.8)	9 (56.3)
	71–80 kg	8 (13.3)	4 (50)	4 (50)
Employment status	House wife/ stay at home	25 (41.7)	12 (48)	13 (52)
	Student	4 (6.7)	2 (50)	2 (50)
	Private job	21 (35)	7 (33.3)	14 (66.7)
	Gov. Job	8 (13.3)	8 (100)	0 (0)
	Business man	2 (3.3)	1 (50)	1 (50)

(*Continued*)

Table 1 (Continued).

	Category	Total N (%)	Control Group N (%)	Pharmacist-Led Education Group N (%)
Marital status	Single	2 (3.3)	0 (0)	2 (100)
	Married	48 (88)	24 (50)	24 (50)
	Widow/Divorced	10 (16.7)	6 (60)	4 (40)
Financial status	10,000–20,000 PKR	13 (21.7)	6 (46.2)	7 (53.8)
	20,000–30,000 PKR	27 (45)	14 (51.9)	13 (48.1)
	30,000–40,000 PKR	7 (11.7)	3 (42.9)	4 (57.1)
	40,000–50,000 PKR	10 (16.7)	6 (60)	4 (40)
	More than 50,000 PKR	3 (5)	1 (33.3)	2 (66.7)
Severity of asthma	Persistent-Mild	13 (21.7)	6 (46.2)	7 (53.8)
	Persistent-Moderate	35 (58.3)	16 (45.7)	19 (54.3)
	Persistent-Severe	12 (20)	8 (66.7)	4 (33.3)

Abbreviation: PKR, Pakistani Rupee.

Assessment of QOL of Patients with Asthma

The quality of life of patients with asthma was assessed by using a validated tool named FANLTC. In the pharmacist-led education group, the mean ± standard deviation at pre-education was 40.23 ± 10.03 and at post-education was 48.10 ± 5.68. A statistically significant difference was observed in the mean scores of the patients between pre- and post-education, with p=<0.001, while no statistically significant difference was observed between pre- and post-education for the control group of patients (See Table 2 for details).

Assessment of Inhalation Technique at Pre- and Post-Education

Among n=30 patients with asthma in the pharmacist-led education group, n=17 were using MDIs and n=13 were using DPIs. In this group, the patients were given counseling and education about the correct use of inhalers prescribed to them. A statistically significant difference was observed in the correct use of inhalers for both MDIs (from mean ± standard deviation of 4.65 ± 0.70 to 5.65 ± 1.54) and DPIs (from 6.00 ± 1.00 to 6.85 ± 10.7), with p=0.003 and p=0.002, respectively. In the control group, no statistically significant difference was observed (see Table 3 for details).

Adherence to Inhaler Treatment

The adherence to inhaler treatment was assessed by using the ten-item questionnaire "Test of Adherence to Inhalers" (TAI). The pharmacist-led education and counseling showed that a good number of patients shifted from poor adherence

Table 2 Pre and Post Comparison of Quality of Life Score in Both Groups

	Pre		Post		P-value
	Mean	SD	Mean	SD	
Control group	54.00	12.05	55.03	10.12	0.093
Pharmacist-led education group	40.23	10.03	48.10	5.68	<0.001*

Note: Pair *t*-test was used; *Shows statistically significant less than 0.05.
Abbreviation: SD, Standard deviation.

Table 3 Pre and Post Comparison for the Mean Score of MDI and DPI in Both Groups

Mean Score of MDI Before and After Pharmacist-Led Education						
	Control Group			**Pharmacist-Led Group**		
	Mean	**SD**	**p-value**	**Mean**	**SD**	**p-value**
Pre	4.78	0.83	0.169	4.65	0.70	0.003*
Post	5.00	0.71		5.65	1.54	
Mean Score of DPI Before and After Pharmacist-Led Education						
	Mean	**SD**	**p-value**	**Mean**	**SD**	**p-value**
Pre	5.43	1.03	0.162	6.00	1.00	0.002*
Post	5.52	0.98		6.85	1.07	

Note: Pair *t*-test was used; *Shows statistically significant less than 0.05.
Abbreviations: MDI, Metered Dose Inhaler; DPI, Dry Powder Inhaler; SD, Standard deviation.

Table 4 Pre and Post Comparison for Adherence to Inhaler Use in Both Groups

Adherence (Items 1–10 TAI)	**Control Group**					**Pharmacist-Led Education Group**				
	Pre		**Post**		**p-value**	**Pre**		**Post**		**p-value**
	n (%)	**Mean ± SD**	**n (%)**	**Mean ± SD**		**n (%)**	**Mean ± SD**	**n (%)**	**Mean ± SD**	
Poor adherence (≤45)	19 (63.3)	43.03 ± 4.73	18 (60.0)	43.2 ± 4.70	0.202	19 (63.3)	43.10 ± 4.94	11 (36.7)	44.73 ± 4.62	0.003*
Intermediate adherence (46–49)	10 (33.3)		11 (36.7)			9 (30.0)		15 (50.0)		
Good adherence (50)	1 (3.3)		1 (3.3)			2 (6.7)		4 (13.3)		

Note: Pair *t*-test was used; *Shows statistically significant less than 0.05.
Abbreviations: TAI, Test of Adherence to Inhalers; SD, Standard deviation.

to intermediate or good adherence, thus showing an improvement in the adherence status of patients toward their medication. Also, a statistically significant difference was observed in the adherence status between pre- and post-education by pharmacists, namely p=0.003, while no statistically significant difference was observed in patients of the control group (see Table 4 for details).

Discussion

Asthma is a common major non-communicable respiratory disease leading to compromised health-related quality of life. Among patients with asthma, inadequate use of prescribed inhaler medication contributes significantly to inadequate dosing of these medications, and ultimately leads to poor control of asthma.

To the best of our knowledge, the current study is the first of its kind to evaluate the impact of pharmacist-led education by a community pharmacist on QOL, inhaler technique, and adherence to therapy among patients with asthma in a community pharmacy in Pakistan. Despite the availability of various drug therapies for asthma, symptoms in the majority of patients are uncontrolled, and they present with poor QOL, mainly due to the incorrect use of inhalational techniques. A study conducted in Pakistan reported that the majority of patients with asthma have compromised QOL due to incorrect inhaler technique.[6] Studies have also shown that patients having improper inhaler techniques are more prone to frequent hospitalizations and have poorly controlled asthma.[39] Another study conducted in Pakistan reported poor health-related QOL among patients with asthma.[40] In the present study, we found significant improvement in patients' QOL in the pharmacist-led education group compared to the control group. Similar results are also reported by a study conducted in Nepal which found significant improvement in QOL of asthma patients as

a result of pharmacist-led intervention.[41] Other studies also reported that pharmacist-led intervention can improve patients' QOL.[28,42] However, one study reported no improvement in QOL of patients with asthma following pharmacist-led intervention.[43] The difference in results may be attributed to the nature of the education/intervention provided by the pharmacists.

Our study findings showed statistically significant improvement regarding the correct use of inhalers, in terms of mean scores for both MDIs and DPIs, which is in agreement with other studies which also reported significant improvement in patients' proper use of inhalers after following pharmacist instructions.[28,44–46]

Adherence to asthma medication is crucial for its optimum outcomes. Our findings also showed a statistically significant difference in the adherence status between pre- and post-education by the pharmacist. A decent number of patients shifted from poor adherence to intermediate adherence and good adherence, thus showing an improvement in the adherence status of patients toward medication. Similar results were reported by Yadav et al,[41] where pharmacist-led intervention resulted in patients' significantly improved adherence to therapy and proper inhalation technique. Another study by Mehuys et al reported similar results.[45] A recent study, conducted in 2022, concluded that an individualized educational intervention can improve adherence to therapy among patients with asthma.[47] Furthermore, a systematic review and meta-analysis conducted in 2020 compared the impact of the pharmacist-led intervention on adherence to therapy in asthma/COPD patients between the pharmacist-led intervention group and control group, and concluded that adherence to therapy is significantly increased in the pharmacist-led intervention group vs control group.[48]

Strengths and Limitations

Our study showed a positive impact of community pharmacist-led education on QOL, inhaler technique, and adherence to therapy among patients with asthma. Therefore, it demonstrated the value of a community pharmacist working with patients with asthma in a community pharmacy to improve inhalation techniques and adherence to therapy, reducing hospitalizations and frequent visits to the emergency department associated with improper inhaler use and poor adherence to therapy, and thus leading to an improved QOL. However, the results of this study should be confirmed through larger studies.

Conclusion

Our study demonstrated a positive impact of pharmacist-led education intervention on quality of life, inhaler techniques, and adherence to therapy in a community pharmacy among patients with asthma. Therefore, community pharmacists could play an important role in reducing frequent hospitalizations by improving quality of life, adherence to therapy, and inhalation techniques among patients with asthma.

Disclosure

The authors report no conflicts of interest in this work.

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