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Research Article

Controlling Bronchial Asthma through the Management of Laryngopharyngeal Reflux (LPR)

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Abstract

Background: Bronchial asthma is a common respiratory disorder usually accompanied by other symptoms such as laryngopharyngeal reflux and gastroesophageal reflux. The presence of reflux can lead to the worsening of asthma symptoms. Although there are some data on the control of gastroesophageal reflux to control asthma, it is still unclear if the management of laryngopharyngeal reflux could have the same impact.

Objective: This study evaluates the impact of laryngopharyngeal reflux management on the control of bronchial asthma.

Design and Setting: A cohort study was carried out in King Saud University Medical City, Riyadh, Saudi Arabia, over six months for patients presenting with uncontrolled asthma. Data were collected from patients' records, and asthma was evaluated through ACT score and HARQ-S score. The collected data included patients' demographics, comorbidities, asthma symptoms, and medications used. Data analysis was executed through SPSS program version 26.

Results: 145 patients were included. All the patients had a cough, while 59.3% had wheezing, and 55.2% had shortness of breath as signs of poor control of asthma. As for controllers, 42.1% of patients used beta-agonist inhalers four days/week, while all the included patients used inhaled corticosteroids daily. The mean ACT score in the first visit was 16.37 ± 2.74, which indicates a partial control for asthma symptoms, while the average score for the ACT at the end of follow up after eight weeks of treatment was 23.88 ± 2.73, which shows that asthma was significantly well controlled using proton pump inhibitor (p value < 0.001). As for the HARQ-S score, the mean score at the time of diagnosis was 34.51 ± 14.82, which indicates a poor control for asthma symptoms, while the average score was 7.52 ± 3.80 after treatment, which shows a significantly reasonable control for asthma (p value < 0.001). Age group significantly affected the asthma control through HARQ-S score (p value = 0.023), where patients aged between 51 to 60 showed the best asthma control after treatment.

Conclusion: The management of laryngopharyngeal reflux using proton pump inhibitors in patients with uncontrolled asthma can significantly improve their asthma control after eight weeks.

Keywords: *Laryngopharyngeal Reflux (LPR); Gastroesophageal Reflux Disease (GERD)*

Introduction

Laryngopharyngeal reflux (LPR) can be defined as the passage of gastric content moving to the laryngopharynx [1]. It is sometimes called extraesophageal reflux. There are some differences in clinical manifestations and pathophysiology between LPR and gastroesophageal reflux disease (GERD) [2]. LPR can be accompanied by some respiratory manifestations, such as bronchial asthma, which might affect disease control or worsen the symptom [3].

On the other hand, GERD can worsen bronchial asthma through different mechanisms [4]. Exposure of the esophagus to acids can lead to a vagal reflex, which stimulates a bronchial constriction as well as gastric content aspiration [5]. That is why up to 80% of patients with GERD can present with accompanying bronchial asthma [6]. On the other hand, some asthmatic patients may be asymptomatic for reflux.

The clinical manifestations of GERD and LPR are also different [7]. The most common symptoms for GERD are regurgitation as well as heartburn, yet patients with LPR do not usually have these symptoms [8]. The diagnosis of LPR can only be achieved through symptoms described by patients in addition to laryngoscopy [9].

Another method of diagnosis is the double probe pH monitoring; however, this method is not preferred [10]. This is because it requires dietary modification, and it could be inconvenient for most of the patients [11]. Also, the physical examination might not be accurate if used solely. Hence, the recommended diagnostic tool is symptoms scores combined with these techniques [12].

However, data are scarce on managing LPR on controlling patients with bronchial asthma, especially those with uncontrolled asthma, compared to data available on gastroesophageal reflux disease [13].

Aim of the Study

This study aims to evaluate the effect of managing LPR on asthma control in Saudi patients.

Materials and Methods

Study design

This is a single-center, cross-sectional observational study that was carried out in King Saud University Medical City, Riyadh, Saudi Arabia. All the included patients presented with uncontrolled bronchial asthma that was evaluated using the Asthma control test (ACT) and the Swedish Version of the Hull Airway Reflux Questionnaire. All patients who had bronchial asthma and presented to the pulmonary clinic were included, while smokers, patients with other chronic lung diseases, heart failure, or chronic kidney disease, as well as patients on ACEIs or ARBs, were excluded.

Data collection

Patients data were collected over six months. Patients were prescribed proton pump inhibitors (PPI), pantoprazole 20 mg twice daily, and followed up at two, four, six and eight weeks. Patients' data were collected, including their demographic data, comorbidities, asthma symptoms, and medications used.

Statistical analyses

Data were represented in terms of frequencies and valid percentages for categorical variables. One-way ANOVA analysis was used to compare means among different groups. A paired t-test was applied to compare scores at the time of diagnosis and at the end of follow up. All P values < 0.05 were considered statistically significant. IBM SPSS (Statistical Package for the Social Science; IBM Corp, Armonk, NY, USA) was used to perform all statistical calculations, version 26 for Microsoft Windows.

Results

One hundred and forty-five patients with uncontrolled bronchial asthma were included in this study. Demographic data, asthma symptoms, used medications, and scores used for diagnosis were all reported and analyzed, as shown below.

General characters of patients

Out of the 145 patients, 55.9% of the whole cohort were females. Age was subclassified into six groups, starting from less than 20 years old to more than 60 years old. The most prevalent age group was patients above 60 years old (33.1%), while only 3.4% were in the age group below 20 years old.

Body mass index was classified into three categories, where 59.1% had a BMI between 25 to 29.9 kg/m^2. Smokers and those with chronic respiratory disease were excluded from this study. All demographic characters are shown in detail in table 1.

		Count	Percent
Gender	Male	64	44.1
	Female	81	55.9
Age group	Less than 20	5	3.4
	21 to 30	14	9.7
	31 to 40	24	16.6
	41 to 50	19	13.1
	51 to 60	35	24.1
	More than 60	48	33.1
BMI categories	18.5 to 24.9 kg/m^2	41	14.1
	25 to 29.9 kg/m^2	172	59.1
	More than 30 kg/m^2	27	9.3
Smoking	Yes	0.00	0.00
	No	145	100.0
Chronic respiratory disease	Yes	0.00	0.00
	No	145	100.0

Table 1: *Shows the demographic data of patients.*

Bronchial asthma symptoms

Symptoms of bronchial asthma were evaluated and recorded. The common symptoms in the included cohort were coughing, wheezing, and shortness of breath. All the included patients had a cough, while 59.3% had wheezing and 55.2% had shortness of breath, as shown in table 2.

		Count	Percent
Cough	Yes	145	100
	No	0.00	0.00
Wheezing	Yes	86	59.3
	No	59	40.7
Shortness of breath	Yes	80	55.2
	No	65	44.8

Table 2: *Bronchial asthma symptoms in the included cohort.*

Use of medications

Patients were asked about the medications that they are taking. As for asthma controllers, 42.1% of the included patients used beta-agonist inhalers four days/week, while all the included patients used inhaled corticosteroids daily.

All patients were not on any proton pump inhibitors at the beginning of the study, and all patients who were on either ACEIs or ARBs were excluded, as shown in table 3.

		Count	Percent
Use of beta-agonist inhalers (number of days/week)	One	1	0.7
	Two	20	13.8
	Three	25	17.2
	Four	61	42.1
	Five	20	13.8
	Six	17	11.7
	Every day	1	0.7
Daily use of inhaled corticosteroids	Yes	145	100
	No	0.00	0.00
Use of ACEIs or ARBs	Yes	0.00	0.00
	No	145	100
Use of PPI in the first visit	Yes	0.00	0.00
	No	145	100

Table 3: *The use of medications in the included patients.*

Asthma control before and after LPR treatment

To evaluate the control of asthma symptoms, patients were evaluated using the HARQ-S score and ACT score. Starting with the ACT score, the mean score in the first visit was 16.37 ± 2.74, which indicates a partial control for asthma symptoms, while the average score for the ACT at the end of follow up after eight weeks of treatment was 23.88 ± 2.73, which shows that asthma is well controlled.

As for the HARQ-S score, the mean score at the time of diagnosis was 34.51 ± 14.82, which indicates a poor control for asthma symptoms, while the average score was 7.52 ± 3.80 after treatment, which shows a reasonable control for asthma. The mean score over the eight weeks is shown in figure 1.

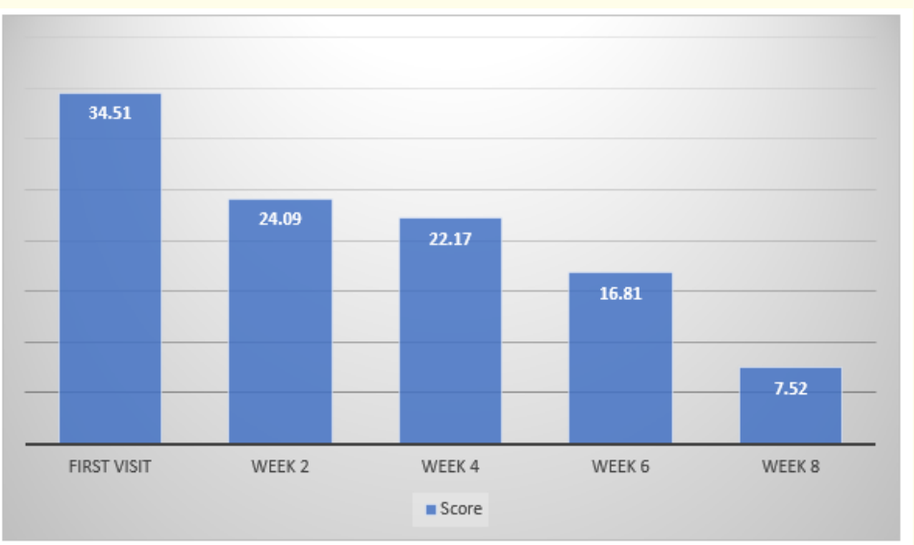

Figure 1: *Mean HARQ-S score over the eight weeks.*

Both scores were compared before and after treatment using paired t-test at a level of significance p value < 0.05. It has been demonstrated that there was a significant difference in the two scores before and after treatment, which indicates a significant control of asthma symptoms after eight weeks of treatment using a proton pump inhibitor, as shown in table 4.

	First Visit		Week 8		P-Value
	Mean	SD	Mean	SD	
ACT score	16.37	2.746	23.88	2.735	< 0.001*
HARQ-S	34.51	14.824	7.52	3.803	< 0.001*

Table 4: *HARQ-S and ACT scores at the time of diagnosis and at the end of follow up.*

Factors influencing asthma control

To identify any risk factors that might contribute to improving or worsening symptoms with treatment, HARQ-S and ACT scores at the end of follow up were compared over different demographic variables using a one-way ANOVA test at a level of significance p value < 0.05.

The comparison showed that only age group significantly affected the asthma control through HARQ-S score (p value = 0.023), where patients aging between 51 to 60 years old showed the best asthma control after treatment based on the HARQ-S score as shown in table 5.

Mean		Week 8 HARQ			Week 8 ACT		
		SD	P-value	Mean	SD	P-value	
Gender	Male	7.22	3.632	0.392	23.98	2.769	0.692
	Female	7.77	3.938		23.80	2.722	
Age group	Less than 20	9.00	3.606	0.023*	25.20	2.387	0.752
	21 to 30	7.50	3.590		23.21	2.860	
	31 to 40	9.25	3.904		23.58	2.358	
	41 to 50	7.63	3.905		23.79	2.699	
	51 to 60	5.83	3.249		24.17	2.935	
	More than 60	7.71	3.842		23.92	2.827	
BMI category	18.5 to 24.9 kg/m^2	8.08	4.073	0.463	23.60	2.566	0.622
	25 to 29.9 kg/m^2	7.23	3.427		23.91	3.011	
	More than 30 kg/m^2	7.27	3.981		24.17	2.558	

Table 5: *Comparison of HARQ-S and ACT over different demographic variable.*

Discussion

Asthma is a common chronic respiratory ailment that affects both adults and children [14]. Asthma can be controlled by bronchodilators, corticosteroids, or both, depending on the severity of the condition [15]. However, some accompanying medical conditions can worsen asthma symptoms leading to uncontrolled asthma [16]. Laryngopharyngeal reflux (LPR) is one of these conditions. However, it is still debatable if the treatments of LPR can improve asthma control [17].

The present investigation aimed to explore the impact of treating LPR using proton pump inhibitors on controlling asthma symptoms in uncontrolled patients. The present study demonstrated that all the patients had a cough, while 59.3% had wheezing, and 55.2% had

shortness of breath as signs of poor control of asthma. As for controllers, 42.1% of patients used beta-agonist inhalers four days/week, while all the included patients used inhaled corticosteroids daily.

Asthma symptoms evaluation was carried out through ACT and HARQ-S scores. The mean ACT score in the first visit was 16.37 ± 2.74, which indicates a partial control for asthma symptoms, while the average score for the ACT at the end of follow up after eight weeks of treatment was 23.88 ± 2.73, which shows that asthma was significantly well controlled using proton pump inhibitor (p value < 0.001).

As for the HARQ-S score, the mean score at the time of diagnosis was 34.51 ± 14.82, which indicates a poor control for asthma symptoms, while the average score was 7.52 ± 3.80 after treatment, which shows a significantly good control for asthma (p value < 0.001). Age group significantly affected the asthma control through HARQ-S score (p value = 0.023), where patients aged between 51 to 60 showed the best asthma control after treatment.

The management of laryngopharyngeal reflux to control asthma has been examined in different settings. Kilic., *et al*. [17] examined the relationship between the treatment of LPR and GERD on one side to the control of asthma symptoms on the other side. However, Kilic., *et al*. [17] recruited pediatric patients. Kilic., *et al*. [17] revealed no association between LPR management and the control of asthma symptoms.

On the contrary, the present study showed that the treatment of LPR could significantly improve the control of asthma symptoms after eight weeks of treatment using omeprazole 20 mg twice daily; however, the recruited population in the present study were non-smoking adults without any other chronic respiratory diseases.

Moreover, Hunchaisri [18] compared the use of omeprazole versus the use of omeprazole and domperidone in patients with LPR and uncontrolled asthma. Through including 70 patients, Hunchaisri [18] demonstrated that the combination therapy was not superior to omeprazole monotherapy in the treatment of LPR and subsequent control of asthma symptoms [18].

The findings of Hunchaisri [18] support the outcomes of the present study, where omeprazole monotherapy showed effectiveness in treating LPR and control asthma after eight weeks of treatment, evaluated through ACT and HARQ-S scores.

Also, Zalvan [19] evaluated the use of different regimens to treat LPR and control asthma. These regimens included a Mediterranean diet, PPI, and alkaline water. Although PPI was effective in the treatment of LPR, Zalvan [19] showed that it did not significantly differ from the Mediterranean diet and alkaline water.

Although the findings of Zalvan., *et al*. [19] supports the present study, it encourages designing future studies to compare PPI versus other regimens to explore their impact on the control of asthma through the treatment of LPR.

Additionally, the present study had some limitations; the study did not compare patients on PPI to a control group; also, the study was carried out in only one center, which might reduce the findings' external validity. This is considered the first investigation to investigate the impact of laryngopharyngeal reflux management using PPI on asthma control in the Saudi population.

Conclusion

The management of laryngopharyngeal reflux using a proton pump inhibitor, namely omeprazole 20 mg twice daily, can result in a significant improvement in the control of asthma symptoms. These findings should guide pulmonologists and otolaryngologists in managing asthmatic patients with persistent symptoms despite the use of asthma controllers. More extensive studies with more robust designs are needed to confirm the findings of this study and compare patients on PPI with the control group.

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