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Prescription Pattern in Smog-Triggered Asthma in Pakistan: A Cross-Sectional Observational Study

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ABSTRACT

In recent years, smog intensity has increased all over Pakistan, especially in the province of Punjab, causing severe health concerns in the public, especially in asthma patients. The Prescription pattern in this kind of smog-triggered asthma has not been studied yet. This study demonstrates the prescription pattern of medications as well as patients' factors that are associated with asthma, influencing the prescription pattern. A cross-sectional observational study was conducted in the DHQ Bhakkar. A total of 211 patients (≥18 years) having smog-triggered asthma were included in the study. Categorical variables were observed by descriptive statistics as frequencies and percentages. The Pearson chi-square test was performed to assess the associations of important factors with medications prescribed, with a significance $p<0.005$. Most prescribed medications were oral steroids (96.2%), followed by nebulized steroids (92.9%). Significant association of smoking was found with parenteral steroids ($\chi^2=7.897$, $p=0.005$), followed by theophylline ($\chi^2=6.237$, $p=0.013$), and magnesium ($\chi^2=7.291$, $p=0.007$). Similarly, male patients were prescribed oral steroids more frequently ($p=0.028$), anticholinergics ($p=0.041$), and magnesium ($p=0.036$) as compared to female patients. No significant association was found between age and prescription patterns. Smoking and gender are found to be major determinants in smog-triggered asthma prescription. The study emphasizes the need for proper prescription guidelines in smog-triggered asthma in Pakistan and across the world.

Keywords: Prescription Pattern, Prescription Evaluation, Smog, Smog-Triggered Asthma, Smoking.

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INTRODUCTION

Around the globe, with more than 300 million patients, asthma is considered one of the most common chronic diseases in the world (Turktas *et al*., 2010). As Pakistan is among the populous countries of the world, its prevalence in Pakistan is about 4.3%, and around 20 million patients are suffering from this disease all over the country (Maqbool *et al*., 2025). Several factors are involved that contribute to the increasing cases of this chronic disease in Pakistan, including the socioeconomic status of people, lifestyle practices, genetic causes, and increasing air pollution (O'Lenick *et al*., 2019). Asthma usually occurs due to reasons specifically exposure to allergy-causing agents, vigorous exercise, respiratory tract infections, and use of NSAIDS that can cause serious respiratory conditions, eventually obstruction of airways (Jindal *et al*., 2012).

Despite the other factors, smog is a leading factor contributing to asthma nowadays in Pakistan. Air pollution is the leading cause of smog in various cities of Pakistan, which in turn leads to asthma exacerbations in patients who are already suffering from asthma. Pollutants, mainly SO2, NO2, and O3, are the leading cause of hospitalization of asthma patients (Pant *et al*., 2019)Previous studies have demonstrated the association of air pollution with asthma exacerbations. When these pollutants come in contact with the skin and airways, they cause serious damage to the body (Guan *et al*., 2016; Szyszkowicz et al., 2016). Pakistan's air quality index is constantly lower than all intermediate goals of the WHO (> 35 g/m3) (Air, 2019).

Drug utilization evaluation is necessary while assessing the current prescription practices in asthma management. In prescription evaluation, it is studied about the drug prescribing pattern as well as drug usage pattern, the drug's quality as well as safety and efficacy, compliance with national guidelines, and international guidelines (Adhaulia *et al*., 2020). This evaluation is done to assess the rationality of therapy being prescribed to asthma patients. It is necessary to ensure that the current prescribing of asthma medication is in line with international guidelines. For the management of asthma, global guidelines are revised continuously in order to optimize medical therapy using stepwise asthma therapy accordingly. Global Initiative for Asthma (GINA) guidelines have specifically mentioned inhaled therapy for asthma management. This therapy helps to administer drugs in the airways directly to retain more of the drug in the airways (Chou *et al*., 2015).

The purpose of asthma management is to primarily control the asthma exacerbations using pharmaceutical medication therapy as well as non-drug therapy. We usually need long-term treatment for asthma management, which can affect the patient's compliance due to the cost of therapy, as well as adherence to the therapy *(Prasad et al*., 2015). Many drugs are prescribed to treat asthma severity, including short-acting bronchodilators (SABA), long-acting bronchodilators (long-acting beta 2 agonists [LAβAs]), or long-acting muscarinic antagonists (LAMAs]. Short-acting bronchodilators in combination with one or more long-acting bronchodilators are used for immediate relief as well as moderate to severe asthma management, while inhaled corticosteroids (ICS) are considered the central treatment of Asthma (Maqusood *et al*., 2016). Sometimes, combination therapy is also given as a stepwise approach to asthma management.

METHODS AND MATERIALS

A cross-sectional observational study was conducted to assess prescription patterns in smog-triggered asthma management in DHQ Bhakkar, which is a tertiary care hospital in Bhakkar city of Pakistan. It took place from December 2025 to February 2026. The study was executed in the Outpatient Department as well as the Pulmonology Wards of DHQ Bhakkar with the consent of patients or their caregivers. The study included 211 patients who were

diagnosed with asthma from various urban and rural areas who were either admitted to wards or were being treated in outpatient departments of hospitals. Patients were recruited through purposive non-probability sampling, and the sample size was determined using power analysis.

Inclusion and Exclusion Criteria

Patients who were diagnosed with bronchial asthma and their asthma got triggered due to smog association, either male or female, within the age limit of 18 and above. The consent of patients was included, who were willing to participate. Patients who were diagnosed with bronchial asthma but were not triggered due to smog association, and were below 18, as well as patients who were not willing to participate in the study.

Data Collection

Prescription evaluation was assessed using the prescriptions of patients who were admitted to wards as well as those who were treated in the outpatient department, using a data collection form. The DCF included detailed demographic data of patients, smog association with asthma exacerbations, medications category being prescribed (such as parenteral steroids, oral steroids, nebulized steroids or other classes of drugs), non-medication therapy (such as nebulizer, oxygen etc.), tests being performed in hospital settings (such as FEV1, spirometry, chest X ray), clinical outcomes as well as laboratory data from patient medical records. The prescriptions were assessed thoroughly and evaluated according to the guidelines of the WHO.

Data Analysis

Data were analyzed using SPSS version 27. The categorical variables, including age, gender, education, smoking status, occupation, and the presence of atopic eczema, were presented in Frequencies and percentages. 211 patients were included in this cross-sectional observational study. To summarize the demographic and clinical characteristics of the study population, descriptive statistics were applied. Pearson's Chi-Square (χ^2) test was applied to analyze the association between patients' characteristics and prescribed medications. There were three different sets of cross-tabulation that were applied: smoking status versus prescribed medications, age group versus prescribed medications, and gender versus prescribed medications. $P<0.05$ was set as Statistical significance.

RESULTS AND FINDINGS

Patient Demographics

A total of 211 patients were enrolled in this study. The majority of patients were of older age, with the largest group of patients being 61 years and above (27.5%, n=58), followed by patients who were aged between 41–50 years (22.7%, n=48), and those between 51–60 years (22.7%, n=47). The patients aged between 31–40 were (19.9%, n=42), whereas the least represented group was of younger patients who aged between 18–30, 7.6% (n=16). Both genders' participation was almost equal, with 107 males (50.7%) and 104 females (49.3%). Among patients, the majority were non-educated patients (n=144, 68.2%), while 67 patients (31.8%) were educated.

Having said that, the majority of patients were those who were non-office workers, representing (70.1%, n=148), and 63 patients (29.9%) were those who were active office-going workers. Out of 211 patients, 26.5% of the patients (n=56) were smokers, while (73.5%, n=155) were those who do not smoke. None of the patients had atopic eczema diagnosed.

Table 1
Patient Demographics

Demographics	(n) Frequency and %
Age	
18-30	16 (7.6%)
31-40	42 (19.9%)
41-50	48 (22.7%)
51-60	47 (22.3%)
60 and above	58 (27.5%)
Gender	
Male	107 (50.7%)
Female	104 (49.3%)
Education	
Educated	67 (31.8%)
Non-Educated	144 (68.2%)
Smoking Status	
Smokers	56 (26.5%)
Non-Smokers	155 (73.5%)
Pack Size Per Day (if smokes)	
<0.5 (less than half)	13 (6.16%)
0.5-1	18 (8.5%)
>1	25 (11.85%)
Occupation	
Office worker	63 (29.9%)
Non-office worker	148 (70.1%)
Eczema	
Present	0 (0.00%)
Absent	211 (100%)

Prescribed Medications

The most prescribed medicine among all was oral steroids, which were administered to 96.2% of patients (n=203). The second most prescribed were nebulized steroids (92.9%, n=196), followed by other drugs, which were non-asthmatic (95.3%, n=201). Almost half of the patients were prescribed short-acting beta agonists (SABA) (46.9%, n=99). 47 patients (22.3%) were prescribed anticholinergics, while 44 patients (20.9%) were prescribed parenteral steroids.

Ipratropium and salbutamol combination was prescribed to 55 patients (26.1%), while 2 patients were prescribed ipratropium only. The least prescribed medications were theophylline (9.5%, n=20) and magnesium (9%, n=19).

Table 2
Medications Prescribed

Medications	(n) Frequency and %
Parenteral Steroids	
Yes	44 (20.9%)
No	167 (79.1%)
Oral Steroids	
Yes	203 (96.2%)
No	8 (3.8%)
Nebulized Steroids	
Yes	196 (92.9%)
No	15 (7.1%)
SABA	
Yes	99 (46.9%)
No	112 (53.1%)
Theophylline	
Yes	20 (9.5%)
No	191 (90.5%)
Anticholinergics	
Yes	47 (22.3%)
No	164 (77.7%)
Magnesium	
Yes	19 (9%)
No	192 (91%)
Ipratropium Bromide and Salbutamol	
Both Yes	55 (26.1%)
Both No	154 (73%)
Ipratropium Only	2 (0.9%)
Other Drugs	
Yes	201 (95.3%)
No	10 (4.7%)

Prescribed Diagnostic Tests

X-ray was the most prescribed diagnostic test among all that were prescribed to 66 patients (31.3%). 63 patients (29.9%) were prescribed an oxygen saturation measurement, followed by an ECG in 57 patients (27%).

Spirometry, including FEV1 and CBC were prescribed to each of the 53 patients (25.1%). The least prescribed diagnostic tests were Microbiological tests (15.6%, n=33), followed by Peak Expiratory Flow (PEF) performed in just 5 patients (2.4%).

Table 3
Diagnostic Tests Prescribed

Diagnostic Tests	(n) Frequency and %
Spirometry and FEV1	
Yes	53 (25.1%)
No	158 (74.9%)
Oxygen Saturation	
Yes	63 (29.9%)
No	148 (70.1%)
Chest Xray	
Yes	66 (31.3%)
No	145 (68.7%)
ECG	
Yes	57 (27%)
No	154 (73%)
Microbiological Tests	
Yes	33 (15.6%)
No	178 (84.4%)
CBC	
Yes	53 (25.1%)
No	158 (74.9%)

Association of Smoking Status with Prescribed Medications

A statistically significant association was found between smoking status and three prescribed medications upon applying the chi-square analysis. The most prescribed medications to smokers were Parenteral Steroids (33.9%), in comparison to non-smokers (16.1%), with a statistically significant difference of (χ^2=7.897, p=0.005, df=1).

Second most prescribed was Theophylline, which was prescribed to smokers (17.9%) in comparison to non-smokers (6.5), with a statistically significant difference of (χ^2=6.237, p=0.013, df=1). Another statistically significant association was found in Magnesium prescription to smokers (17.9%) as compared to non-smokers (5.9%) with a difference of (χ^2=7.291, p=0.007, df=1).

There was no association found between the prescription of Oral steroids, SABA, Nebulized steroids, anticholinergics, ipratropium, and Salbutamol combination or other drug therapy with the smoking status (p>0.005).

Table 4

Association of Smoking Status and Medications Prescribed

Medication	Non-Smokers (n=155)		Smokers (n=56)		p-value
	Yes, n (%)	No, n (%)	Yes, n (%)	No, n (%)	
Parenteral Steroids	25 (16.1%)	130 (83.9%)	19 (33.9%)	37 (66.1%)	0.005
Oral Steroids	149 (96.1%)	6 (3.9%)	54 (96.4%)	2 (3.6%)	0.920
Nebulized Steroids	141 (91.0%)	14 (9.0%)	55 (98.2%)	1 (1.8%)	0.071
SABA	71 (45.8%)	84 (54.2%)	28 (50.0%)	28 (50.0%)	0.590
Theophylline	10 (6.5%)	145 (93.5%)	10 (17.9%)	46 (82.1%)	0.013
Anticholinergics	32 (20.6%)	123 (79.4%)	15 (26.8%)	41 (73.2%)	0.344
Magnesium	9 (5.8%)	146 (94.2%)	10 (17.9%)	46 (82.1%)	0.007
Ipratropium + Salbutamol	39 (25.2%)	116 (74.8%)	18 (32.1%)	38 (67.9%)	0.354
Other Drugs	146 (94.2%)	9 (5.8%)	55 (98.2%)	1 (1.8%)	0.225

Association of Age Groups with Prescribed Medications

There was no statistically significant difference or association found against all nine prescribed medications ($p>0.005$). While SABA was found to be prescribed in older ages, it had $p=0.089$, which is not statistically significant.

Table 5

Association of Age and Medications Prescribed

Medication	18–30 (n=16)	31–40 (n=42)	41–50 (n=48)	51–60 (n=47)	≥61 (n=58)	p-value
Parenteral Steroids	5 (31%)	4 (10%)	13 (27%)	9 (19%)	13 (22%)	0.230
Oral Steroids	15 (94%)	41 (98%)	46 (96%)	45 (96%)	56 (97%)	0.967
Nebulized Steroids	15 (94%)	39 (93%)	46 (96%)	44 (94%)	52 (90%)	0.808
SABA	8 (50%)	12 (29%)	22 (46%)	26 (55%)	31 (53%)	0.089
Theophylline	1 (6%)	6 (14%)	2 (4%)	2 (4%)	9 (16%)	0.143
Anticholinergics	3 (19%)	9 (21%)	13 (27%)	8 (17%)	14 (24%)	0.802
Magnesium	3 (19%)	6 (14%)	4 (8%)	1 (2%)	5 (9%)	0.197
Ipratropium + Salbutamol	6 (38%)	7 (17%)	14 (29%)	13 (28%)	15 (26%)	0.712
Other Drugs	14 (88%)	42 (100%)	45 (94%)	46 (98%)	54 (93%)	0.217

Association of Gender with Prescribed Medications

A statistically significant association of gender was found with three prescribed medications. 99.1% Male patients were prescribed oral steroids as compared to female patients (93.1%) with a statistically significant difference of (χ^2=4.857, p=0.028, df=1). Similarly, male patients were also frequently prescribed anticholinergics (28%) in comparison with female patients (16.3%), with a statistically significant difference of (χ^2=4.164, p=0.041, df=1). As compared to female patients (4.8%), male patients were prescribed magnesium more frequently (13.1%) with a statistically significant difference of (4.8%) (χ^2=4.409, p=0.036, df=1). Remaining medications, including Parenteral steroids, Nebulized steroids, SABA, Theophylline, Ipratropium, and Salbutamol combination, and other drug therapy, showed no statistically significant association with gender.

Table 6

Association of Gender and Medications Prescribed

Medication	Male (n=107)		Female (n=104)		p-value
	Yes, n (%)	No, n (%)	Yes, n (%)	No, n (%)	
Parenteral Steroids	27 (25.2%)	80 (74.8%)	17 (16.3%)	87 (83.7%)	0.112

Oral Steroids	106 (99.1%)	1 (0.9%)	97 (93.3%)	7 (6.7%)	0.028
Nebulized Steroids	100 (93.5%)	7 (6.5%)	96 (92.3%)	8 (7.7%)	0.745
SABA	50 (46.7%)	57 (53.3%)	49 (47.1%)	55 (52.9%)	0.955
Theophylline	13 (12.1%)	94 (87.9%)	7 (6.7%)	97 (93.3%)	0.179
Anticholinergics	30 (28.0%)	77 (72.0%)	17 (16.3%)	87 (83.7%)	0.041
Magnesium	14 (13.1%)	93 (86.9%)	5 (4.8%)	99 (95.2%)	0.036
Ipratropium + Salbutamol	29 (27.1%)	78 (72.9%)	26 (25.0%)	78 (75.0%)	0.342
Other Drugs	104 (97.2%)	3 (2.8%)	97 (93.3%)	7 (6.7%)	0.180

DISCUSSION

This cross-sectional observational study was performed to analyze the prescribing pattern of medications among 211 patients with diagnosed asthma and respiratory conditions. The study examined the association between certain demographics, including smoking status, gender, and age, with the prescription of medicines. The results provide insight into how different characteristics of patients influence the management of asthma in hospital settings.

Oral steroids (96.2%) as well as nebulized steroids (92.9%), being the most prescribed, showed the continuous prescribing pattern of corticosteroids among other medications. According to recent prescribing guidelines, including those of Global Initiative for Asthma (GINA) as well as of Global Initiative for Chronic Obstructive Lung Disease (GOLD), also suggested as the first-line therapy for asthma (Hoque & Nayak, 2025). Studies have shown the extensive use of corticosteroids in the management of asthma exacerbations (Heatley *et al.*, 2023). Up to 96% prescriptions of corticosteroids show that most patients were brought with moderate to severe asthma conditions and therefore needed systemic therapy in some hospital settings, as mild treatment would have been an inappropriate practice. Studies showed up to 55% rise in the prescription of corticosteroids in the past two decades for the management of asthma exacerbations (Liang, 2025). Up to 95.3% use of other drugs suggests polypharmacy in many patients suffering from various comorbidities that are usually encountered in hospital settings. Short-acting beta-agonists (SABA) used in almost half of the patients (46.9%) reflect the role of bronchodilators in asthma management and also align with the step-wise management framework of GINA (Hoque & Nayak, 2025).

Smoking status showed a predominantly high statistically significant association with the prescription of medicines among all other demographic variables. Smokers were prescribed mostly with parenteral steroids (33.9% vs. 16.1%), theophylline (17.9% vs. 6.5%), and magnesium (17.9% vs. 5.8%) in comparison with non-smokers, with the significance of p=0.005, p=0.013, p=0.007, respectively. The frequent prescription of parenteral steroids in smokers shows the severity of asthma exacerbations in this group.

Oral corticosteroids would be inappropriate in this state, and therefore, intravenous corticosteroids are usually administered. Exacerbations of asthma are triggered mostly by smoking; hence, it is considered one of the major risk factors for prolonged and severe exacerbations of asthma (Sharma *et al*., 2024). Another important reason for prescribing parenteral steroids instead of oral corticosteroids in smokers is the corticosteroid resistance in smokers that occurs because of suppression of certain enzymes due to smoking (Ito *et al*., 2007; Milara *et al*., 2023). Another piece of evidence for the prescription of parenteral steroids is the American Journal of Medicine's recommendation of parenteral steroids in active smokers because of the less effectiveness of inhaled steroids (Lewis *et al*., 2021). Higher rates of theophylline prescription are an important finding of this study (Vandamme & Hainaut, 2022). Theophylline can exert its effects even at low plasma concentrations by activating HDAC2, as this activation gets impaired by smoking (Milara *et al*., 2023). Theophylline prescription is also proven relevant by the American College of Clinical Pharmacy, as it is a proven clinical adjunct therapy when there is insufficient activity of inhaled therapies (Boylan *et al*., 2023). Magnesium is also frequently prescribed to smokers. Both GINA and the British Thoracic Society have recommended magnesium sulphate (MgSO4) in acute asthma treatment (Asthma, 2008). Magnesium's capability of blocking calcium channels, as well as its anti-inflammatory activity also the reason for being prescribed in asthma exacerbations(Cazzola et al., 2015). Magnesium prescription in smokers is almost three times that of non-smokers, which shows the severity of exacerbations of these patients, as bronchodilators are also added despite first-line management. There was no significant association of oral steroids, nebulized steroids, SABA, anticholinergics, or other drugs with smoking in this study. It shows that these drugs are relevant to smoking, but are prescribed to almost every patient regardless of smoking status.

There was no statistically significant association between any age group and the prescription of any of the medications mentioned. Nevertheless, SABA was found to be prescribed more in older patients (p=0.089), but it could not surpass the limit of significance. Prescription of frequent SABA in older patients antagonizes the previous findings that older patients need more pharmacological management (Nici *et al*., 2020).

Anticholinergics (p=0.041), Magnesium (p=0.036), and Oral steroids (p=0.028) were mostly prescribed to males as compared to females. Oral steroids are more commonly prescribed in males (99.1% vs 93.3%), which shows the severity or condition of patients. Studies show that the male response to asthma treatment is more promising than that of females (Rogliani *et al*., 2022). Another reason found in literature is the difference in pharmacokinetics and pharmacodynamics in both genders, with women showing more immune expressions as well as better steroid expression, due to which less therapy is needed in women (Calzetta *et al*., 2025). There is already present evidence in studies that proves the frequent prescription of anticholinergics in males as compared to females, as in this study (28.0% vs. 16.3%), with a significance of p=0.041. Anticholinergics are mostly prescribed in COPD, which historically occurs more in males compared to females. The Lung Health Study also demonstrated the gender specific difference in the treatment of COPD, showing that males get more bronchodilatory effect from anticholinergics (Calzetta *et al*., 2017). Magnesium prescription in males (13.1% vs. 4.8%) contrasts with the findings observed in the smoking

association. Another reason for the prescription is MgSO4 as an add-on broncho dilatory therapy, along with the prescribed first-line therapy (Rovsing *et al*., 2023). Also, if an asthma patient is getting continuous anticholinergic therapy, then the prescription of magnesium becomes justified. No association of nebulized steroids, SABA, theophylline, ipratropium, and salbutamol combination and other drugs with gender-based prescription was seen. It shows clearly that the prescribing pattern was unbiased regardless of gender.

Another pattern found in this study was diagnostic test prescription, which reflects the greater importance of physiological and imaging tests as compared to microbiological tests for respiratory conditions. Most prescribed test investigations include chest x-ray (31.3%), followed by oxygen saturation measurement (29.9%). This prescription is also because of the cost-effectiveness of these tests, along with rapid results. To avoid the risk of dyspnea and other cardiac diseases in patients receiving theophylline and bronchodilators, an ECG was performed in 27% of cases. Spirometry, including FEV1, was performed in 25.1% of patients, as pulmonary functioning tests are not frequently performed in acute hospital settings. About 2.4% prescription of PEF tests show their role in management or also could be due to a lack of certain machines in hospital settings.

The study is considerably significant at both the clinical and public health levels in Pakistan, where smog is causing severe health concerns. The prescription pattern in diseases that are triggered due to smog is still under-research despite the fact that Punjab is considered one of the most smog-affected areas in the world. For patients already diagnosed with diseases, medication evaluation is necessary to determine how medications are prescribed, particularly in asthma, which gets triggered due to environmental factors, mainly smog. Clinically, prescribing patterns in smog-triggered asthma patients in various demographic conditions are documented, which suggests that prescribing patterns in asthma patients vary with the patients whose condition was triggered due to smog. This is a cross-sectional study and does not include follow-up, which is a limitation of this study. Similarly, the absence of atopic eczema limits the generalizability of the study.

CONCLUSION

The study shows the prescription pattern of medications to 211 patients who were brought in due to smog-triggered asthma exacerbations in a tertiary care hospital in Pakistan. Oral and nebulized corticosteroids, being the central therapy for asthma management according to international guidelines, were the most prescribed medications. Smoking was the most significant variable, which showed an association with the prescribing pattern. Parenteral corticosteroids, theophylline, and magnesium were the medications prescribed most to the smokers. Another important demographic variable was gender specific prescribing, with prescription of oral corticosteroids, anticholinergics, and magnesium most to the male patients as compared to female patients. In comparison to these variables, age was not found to be associated with the prescribing pattern. Diagnostic tests were also performed, with X-ray imaging being the most prescribed investigation. Physiological investigations were preferred over pulmonary function tests because of the lack of machinery for pulmonary function tests, as well as the rapid results of physiological and imaging tests.

FUTURE RESEARCH DIRECTIONS

The findings as well as the limitations of this study provide a roadmap for future research in these areas. Future studies should include the direct relation of smog with the severity of asthma exacerbations by comparing the quality of air with patients' clinical and demographic data. Gender-specific prescribing patterns in the study also suggest sex-stratified research in asthma patients. There is also a need for a longitudinal study design on smog-

triggered asthma, as a cross-sectional study is not enough to cover all aspects to strengthen generalizability. The study findings also suggest developing prescription guidelines specifically for smog-triggered asthma patients. The pharmacoeconomic factor of smog-triggered asthma prescribing is another dimension that needs to be studied in the future.

DECLARATION

Ethical Consideration: This study strictly adhered to the Declaration of Helsinki and relevant national and institutional ethical guidelines. Informed consent was obtained. All procedures performed in this study were consistent with the ethical standards of the Declaration of Helsinki. The study was conducted according to ethical standards for research involving human participants. Ethical considerations and approval were obtained from the Institutional Review Boards of hospitals. A written consent form was collected from all patients with assurance of confidentiality as well as privacy of their data.

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Similarity Index/ Plagiarism: The similarity index was checked, and it is 6% that is well below the threshold value of 19%, whereas each source is less > 5%.

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