Libyan Journal of Medical Research

www.ljmr.ly/ eISSN:2413-6096

Original Article

Prevalence and Risk Factors of NSAID-Induced Respiratory Reactions Among Asthmatic Patients: A Cross-Sectional Study in Zawia City, Libya.

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Received:19/10/2025 Accepted:25/11/2025 Published:29/11/2025, DOI :https://doi.org/10.54361/LJMR.19.2.47

ABSTRACT:

Background: Non-steroidal anti-inflammatory drugs (NSAIDs) are commonly prescribed for managing pain and inflammation. However, they may provoke respiratory reactions in asthmatic patients, with limited data available from Libya. **Objectives:** This study aims to assess the prevalence, patterns, and risk factors associated with NSAID-related respiratory reactions among asthmatic patients in Zawia City, Libya.**Material and Methods:** A cross-sectional study was conducted involving 158 asthmatic patients. Participants completed a structured questionnaire that collected data on demographics, comorbidities, NSAID usage, and respiratory symptoms. Statistical analyses were performed using chi-square tests and logistic regression. **Results:** Among the participants, 91.8% reported NSAID use, with 64% experiencing shortness of breath following consumption. The frequency of NSAID use, along with comorbid conditions such as rheumatoid arthritis and heart disease, was significantly associated with an increased risk of respiratory reactions. **Conclusion:** NSAID-related respiratory reactions are prevalent among asthmatic patients in Zawia City. These findings underscore the importance of patient education, clinical monitoring, and cautious NSAID prescribing to mitigate potential respiratory risks.

Keywords: NSAIDs, asthma, respiratory reactions, AERD, Libya, risk factors

How to cite this article: Naffati,A, Alsalami,F.M., Naser, F.M. , Salih,R. A., Boras.E , Elfarrah,N. Prevalence and Risk Factors of NSAID-Induced Respiratory Reactions Among Asthmatic Patients: A Cross-Sectional Study in Zawia City, Libya.

Libyan19-2

INTRODUCTION:

Non-steroidal anti-inflammatory drugs (NSAIDs) are among the most commonly prescribed medications worldwide. They are primarily used to relieve pain, reduce inflammation, manage fever, and treat chronic musculoskeletal disorders such as arthritis. The pharmacological effects of NSAIDs are largely due to their inhibition of cyclooxygenase (COX) enzymes, which play a critical role in the synthesis of prostaglandins—key mediators involved in pain and inflammatory responses. Despite their extensive therapeutic benefits, NSAIDs are also a leading cause of drug-induced side effects, accounting for nearly one-fourth of all adverse drug reactions globally [1]. In asthmatic patients, the use of NSAIDs raises specific concerns. A notable subset of individuals with asthma exhibits hypersensitivity to these medications, a condition known as aspirin-exacerbated respiratory disease (AERD) or Samter's triad. This condition is characterized by the coexistence of asthma, nasal polyps with chronic sinusitis, and an intolerance to aspirin or other NSAIDs [2]. Exposure to these drugs can trigger acute bronchoconstriction, respiratory distress, or severe asthma exacerbations. Studies from developed nations indicate that approximately 15–21% of adult asthma patients are sensitive to NSAIDs, particularly those with severe or persistent forms of the disease[3]. Despite substantial international research on NSAID hypersensitivity, data from low- and middle-income nations, especially in North Africa, remain scarce[4]. This gap in knowledge is concerning, given the widespread practice of self-medication, the easy over-the-counter accessibility of NSAIDs, and the limited public understanding of their possible complications [5]. Additionally, the frequent coexistence of chronic conditions—such as diabetes, arthritis, and cardiovascular diseases—often leads to increased NSAID consumption, heightening the associated risks [6]. In Libya, asthma represents a significant health burden aggravated by constrained healthcare services, low public awareness, and the unrestricted sale of pharmaceuticals. Although AERD is globally acknowledged as a clinically important entity, no detailed research has yet examined the extent and patterns of NSAID-related complications among Libyan asthmatic populations[7]. Investigating this issue is crucial to reducing preventable respiratory morbidity, improving prescribing practices, and strengthening patient education efforts [8].

Accordingly, this study was designed to assess the prevalence, patterns, and clinical severity of NSAID-associated adverse effects in asthmatic patients from Zawia City, Libya. Through analysis of demographic data, comorbidities, and drug usage patterns, the study aims to identify key risk factors, determine vulnerable patient groups, and provide evidence-based recommendations to enhance clinical safety and management.

MATERIAL AND METHOD:

Study Design and Setting

A descriptive cross-sectional study was conducted to explore the prevalence and types of adverse reactions associated with non-steroidal anti-inflammatory drug (NSAID) use among individuals diagnosed with asthma. The investigation took place in Zawia City, Libya, during the period of June to July 2025. Data were collected from both public and private healthcare facilities, including outpatient clinics and pharmacies, which represent common points of care and medication access for asthmatic patients in the region.

Study Population

The target population included asthmatic patients who were residents of Zawia City. Eligible participants met the following inclusion criteria:
Clinically confirmed diagnosis of asthma, Age above 10 years, and History of NSAID consumption during the previous 12 months.
Patients were excluded if they had incomplete information, an uncertain asthma diagnosis, or declined to participate in the survey.

Sample Size and Sampling Technique

A total of 150 participants were enrolled using a convenience sampling method. The sample size was estimated considering previous international reports indicating a 15–21% prevalence of NSAID-induced respiratory reactions, assuming a 5% margin of error and 95% confidence level. This approach provided adequate statistical power to detect associations between NSAID exposure and respiratory outcomes.

Data Collection Tool

Information was obtained through a structured, interviewer-administered questionnaire prepared in Arabic. The questionnaire was designed based on a comprehensive review of prior studies and validated by a panel of clinical pharmacologists and pulmonologists. It consisted of four main sections:

Sociodemographic information (age, sex, education, and residence).
Medical background (duration of asthma, and coexisting diseases such as diabetes, cardiovascular disorders, or rheumatoid arthritis).
Patterns of NSAID usage (drug type, frequency, dosage, and whether prescribed or self-administered).
Adverse reactions following NSAID intake, including respiratory manifestations (shortness of breath, wheezing, chest tightness) and systemic effects (palpitations, hypertension, etc.).

Data Collection Procedure

Participants were approached during outpatient consultations and community health awareness campaigns. After explaining the study purpose, informed consent was obtained from each respondent. Trained data collectors conducted face-to-face interviews to ensure clarity and completeness. Data confidentiality and participant anonymity were maintained throughout, and participants were informed of their right to withdraw at any stage without any consequences.

Data Analysis

All collected data were entered and analyzed using SPSS software version 21. Descriptive statistics—frequencies and percentages—were used to summarize categorical variables. The chi-square test and Fisher's exact test (where applicable) were used to examine associations between demographic or clinical variables and NSAID-related adverse reactions. Furthermore, binary logistic regression was applied to determine independent predictors of NSAID-induced respiratory symptoms, with a p-value < 0.05 considered statistically significant.

RESULT:

NSAID Usage Patterns among Asthmatic Patients

Out of the total asthmatic patients surveyed in Zawia City, 91.8% reported using non-steroidal anti-inflammatory drugs (NSAIDs). Notably, almost half of the users (48%) admitted to consuming these medications without medical guidance, indicating a widespread practice of self-medication.

Association Between NSAID Frequency and Shortness of Breath

A significant relationship was observed between the frequency of NSAID use and the occurrence of shortness of breath (SOB). As shown in Table 1, the proportion of patients reporting SOB increased consistently with higher NSAID intake frequency. Only 17% of those using NSAIDs once daily experienced SOB, compared with 41% among twice-daily users and 95% among those using the drugs three times per day. The association was statistically significant ($p < 0.001$), demonstrating a strong dose–response pattern.

Table 1. Relationship between NSAID Use Frequency and Shortness of Breath

NSAID Frequency	Shortness of Breath: Yes	Shortness of Breath: No	Total	% with SOB
Once daily (18.6%)	5	24	29	17%
Twice daily (30.8%)	20	29	49	41%
Three times daily (50.6%)	76	4	80	95%
Total	101	57	158	64%

The findings clearly demonstrate that the likelihood of developing SOB rises sharply with increasing frequency of NSAID intake.

Predictors of NSAID-Induced Shortness of Breath

A binary logistic regression analysis was performed to identify independent predictors of SOB among NSAID users (Table 2). The results confirmed that NSAID frequency was the most influential factor. Compared to once-daily users, those taking NSAIDs twice daily had 2.8 times higher odds of developing SOB (OR = 2.8, 95% CI: 1.0–7.8, $p = 0.048$), while those taking the drugs three times daily had an 18.5-fold increase in odds (OR = 18.5, 95% CI: 6.0–56.8, $p < 0.001$). In addition, rheumatoid arthritis (OR = 2.5, 95% CI: 1.2–5.4, $p = 0.016$) and heart disease (OR = 2.0, 95% CI: 1.0–4.2, $p = 0.05$) were also found to significantly contribute to the risk of SOB. However, age, gender, and diabetes were not statistically significant predictors in the model.

Table 2. Logistic Regression Analysis of Predictors of Shortness of Breath Among Asthmatic Patients Using NSAIDs

Predictor	OR (Odds Ratio)	95% CI (Lower–Upper)	p-value
NSAID Once daily	Reference	–	–
NSAID Twice daily	2.8	1.0 – 7.8	0.048
NSAID Three times daily	18.5	6.0 – 56.8	<0.001
Age: Adults	1.5	0.6 – 3.7	0.36
Age: Elderly	2.1	0.8 – 5.7	0.12
Gender: Male	0.9	0.5 – 1.7	0.75
Heart Disease	2.0	1.0 – 4.2	0.05
Diabetes	1.3	0.6 – 2.8	0.50
Rheumatoid Arthritis (RA)	2.5	1.2 – 5.4	0.016

Frequent NSAID use was strongly associated with an increased risk of shortness of breath. The relationship followed a dose–response pattern, with risk escalating significantly at higher use frequencies. Comorbid conditions, particularly rheumatoid arthritis and heart disease, heightened the likelihood of adverse respiratory reactions.
Age and gender did not significantly influence the risk, indicating that clinical and medication factors play a larger role.

DISCUSSION:

The findings of the present study demonstrate a remarkably high prevalence of NSAID use among asthmatic patients in Zawia City, Libya, with the majority reporting regular or frequent consumption. Nearly half of these users relied on NSAIDs without medical supervision, reflecting a widespread pattern of self-medication within the community. This observation aligns with previous reports from developing regions where over-the-counter access and lack of awareness contribute significantly to irrational drug use [9]. A key outcome of this study is the strong association between NSAID frequency and the occurrence of shortness of breath (SOB), which displayed a clear dose–response relationship. Patients who used NSAIDs three times daily were almost nineteen times more likely to develop SOB compared with those using the drugs once daily. This finding supports earlier research which demonstrated that repeated exposure to NSAIDs in sensitive individuals increases the risk of bronchoconstrictive responses due to cyclooxygenase inhibition and subsequent overproduction of leukotrienes [10]. In contrast, the overall prevalence of NSAID-induced respiratory reactions (64%) observed in this study was higher than rates reported in Western populations, where estimates typically range from 10% to 21% among asthmatic patients [11]. This discrepancy may reflect contextual factors such as unrestricted medication availability, inadequate screening for aspirin sensitivity, and limited patient education about potential respiratory side effects. Furthermore, the frequent coexistence of chronic diseases such as cardiovascular disorders and rheumatoid arthritis increases NSAID exposure, amplifying the likelihood of adverse events.
Consistent with earlier studies, rheumatoid arthritis and heart disease emerged as significant predictors of shortness of breath in the current analysis. This relationship can be explained by the chronic use of NSAIDs in managing pain and inflammation associated with these comorbidities, leading to repeated COX inhibition and leukotriene-mediated airway hyperreactivity [12,13]. reported that patients with multiple chronic conditions who consume NSAIDs regularly have an elevated risk of respiratory complications compared to those without comorbidities. On the other hand, age and gender were not significantly associated with the development of SOB in this cohort. This finding is in line with Doña [14]. ho found that demographic factors have limited predictive value once pharmacological exposure and comorbidities are controlled for. The lack of a gender effect may also reflect the similar pattern of over-the-counter drug access among both males and females in the Libyan population. The high rate of unsupervised NSAID use identified in this study underscores the urgent need for public education, stricter pharmacy regulation, and clinical screening for drug hypersensitivity before prescribing NSAIDs to asthmatic individuals. These preventive measures have been recommended internationally but remain under-implemented in many low- and middle-income countries [15]. Overall, this study contributes novel data from North Africa, a region where literature on NSAID-induced respiratory complications remains scarce. The results emphasize the importance of rational drug use and

clinician awareness in reducing preventable morbidity among asthmatic patients.

NSAID use was highly prevalent among asthmatic patients in Zawia City. A strong dose–response relationship exists between NSAID frequency and shortness of breath.

Comorbidities such as rheumatoid arthritis and heart disease significantly increase risk. Age and gender were not independent predictors of respiratory symptoms.

The prevalence of adverse effects was higher than reported in Western studies, likely due to self-medication and limited awareness. [16].

Emphasis should be placed on education, screening, and regulation to minimize harm.

CONCLUSION:

This study offers valuable insights into the patterns of non-steroidal anti-inflammatory drug (NSAID) use and their respiratory effects among asthmatic patients in Zawia City, Libya. A notably high prevalence of NSAID consumption was identified, with many patients using these medications without medical supervision. The findings demonstrate a strong and statistically significant association between the frequency of NSAID intake and the occurrence of shortness of breath, confirming a clear dose–response relationship. These results highlight the urgent need for increased awareness and education regarding the risks of NSAID use among asthmatic individuals, as well as the importance of clinical supervision in managing their treatment to mitigate potential adverse respiratory effects. In contrast, age and gender did not appear to significantly influence the occurrence of adverse effects, suggesting that clinical factors and medication habits play a more critical role than demographic characteristics.

In comparison to international data, the prevalence of NSAID-induced respiratory reactions observed in this study was significantly higher. This discrepancy may be attributed to self-medication practices, inadequate patient education, and the unrestricted availability of these medications within the community. These findings highlight the urgent need to raise awareness among both healthcare providers and patients regarding the potential respiratory risks associated with NSAID use in individuals with asthma.

It is recommended that healthcare professionals thoroughly assess the medication history of asthmatic patients prior to prescribing NSAIDs. Additionally, public health authorities should implement educational campaigns to promote safer medication practices. Strengthening pharmacovigilance systems and regulating over-the-counter access to NSAIDs could further help prevent avoidable complications and enhance asthma management outcomes in Libya.

Study Limitations

This study has some limitations that should be considered. Its cross-sectional design allows identification of associations but cannot establish causality. The sample, drawn from healthcare facilities in Zawia City, may not fully represent all asthmatic patients in Libya. Data were self-reported, which may introduce recall bias, and some potential confounders, such as smoking or environmental exposures, were not fully accounted for. Additionally, respiratory reactions were not confirmed with clinical or laboratory tests. Despite these limitations, the study provides valuable preliminary insights into NSAID-induced respiratory reactions in Libyan asthmatic patients and highlights the need for larger, multicenter studies.

Conflict of interest:

There are no conflicts of interest and no financial sponsorship nosupport and

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