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Prevalence, Usage Patterns and Side Effects of Nasal Decongestants Among the General Population in Arar City: A Cross-Sectional Study

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Abstract **Background:** Nasal congestion, characterized by blocked airflow in the nasal cavity, is a common clinical symptom often caused by structural abnormalities, infections, or allergic rhinitis. Nasal decongestants are frequently used for symptomatic relief; however, excessive use can lead to complications such as rhinitis medicamentosa and other adverse effects. Despite their widespread use, public awareness of appropriate usage practices remains limited. **Objective:** This study aims to assess the prevalence, usage patterns and associated side effects of nasal decongestants among adults in the Northern Border Governorate, Saudi Arabia, while highlighting knowledge gaps in safe usage practices. **Methods:** A cross-sectional study was conducted among 436 adults aged ≥18 years using a structured, validated questionnaire. Data on demographics, duration of use and reported side effects were collected and analyzed using SPSS (version 22). Chi-square and t-tests were employed to assess associations between nasal decongestant use and demographic variables such as age, gender, marital status and education. **Results:** Of the 436 participants, 64% reported using nasal decongestants. Usage was significantly higher among individuals aged 31-45 years ($p = 0.001$), married individuals ($p = 0.001$) and those with higher education levels ($p = 0.001$). Common usage reasons included the common cold (39%) and nasal obstruction (16%). Pharmacists were the primary source of guidance (43.4%), while physician recommendations accounted for only 19.4%. Alarmingly, 59.1% reported prolonged use (3-5 days) and 9.3% exceeded the recommended 5-day limit. Side effects were prevalent, with dryness (55.9%), anxiety (54.1%) and headache (51.6%) being the most frequently reported. **Conclusion:** The study reveals a high prevalence of nasal decongestant misuse, with extended use and reliance on non-professional advice contributing to significant side effects. These findings highlight the urgent need for targeted public awareness campaigns emphasizing the risks of prolonged decongestant use and promoting safe practices. Improved pharmacist training and stricter regulatory control of over-the-counter decongestants are essential. Future research should explore long-term health impacts, investigate self-medication behaviors and assess the efficacy of educational interventions in reducing misuse.

Key Words Nasal decongestants, prevalence, cross-sectional study, side effects, public awareness, pharmacist guidance

INTRODUCTION

Nasal congestion is a common clinical symptom characterized by impaired airflow due to obstruction within the nasal cavity [1]. It frequently presents as a primary complaint in upper respiratory tract disorders [2]. Among the various causes, allergic rhinitis is the most prevalent trigger for nasal congestion [1]. Other contributing factors include upper respiratory tract infections and structural abnormalities such as septal deviation, choanal atresia, concha bullosa and adenoid enlargement [2].

The underlying pathophysiology of nasal congestion is multifaceted, involving mucosal inflammation, increased

venous congestion, nasal discharge and tissue swelling. Additionally, structural issues within the nasal passage can further exacerbate airflow obstruction [2].

Nasal decongestants are widely used to manage nasal congestion arising from ENT conditions [2]. These medications exert their effects by stimulating alpha-adrenergic receptors, causing vasoconstriction and reducing mucosal edema, thereby improving nasal airflow [3,4]. Common nasal decongestants include pseudoephedrine, phenylephrine, xylometazoline and oxymetazoline, which are available as oral formulations or topical sprays/drops [5]. While effective for short-term symptom relief, nasal decongestants are recommended for use no longer than 4 to 5 days to minimize the risk of adverse effects, notably Rhinitis Medicamentosa (RM), also known as "rebound congestion". The RM is characterized by secondary nasal mucosal injury resulting from chronic vasoconstriction and ischemic changes due to prolonged or excessive use [6,7].

In addition to RM, nasal decongestants may induce side effects linked to sympathetic nervous system activation, including insomnia, hallucinations, tremors and convulsions. Conversely, some users may experience central nervous system depression, resulting in sedation, apnea and impaired concentration. Other common side effects include headache, dizziness, euphoria, tinnitus, blurred vision, ataxia and fluctuations in blood pressure [3].

Research highlights a growing concern regarding public misuse of nasal decongestants, with individuals often exceeding recommended usage durations. A previous study conducted in Al-Qassim, Saudi Arabia, revealed limited public awareness about proper decongestant use and potential side effects [3]. However, there remains a significant knowledge gap regarding public awareness and usage patterns in Arar City, particularly concerning self-medication practices, misuse risks and associated complications.

To address this gap, the present study aims to evaluate the prevalence, usage patterns and associated side effects of nasal decongestants among the general population in the Northern Border Governorate, Saudi Arabia. Additionally, this research seeks to explore the influence of demographic factors such as age, gender, marital status and education on decongestant use. Understanding these trends is crucial for developing targeted educational interventions to promote safer medication practices and mitigate the risk of adverse outcomes.

METHODS

Study Setting

This study was conducted in the Northern Border Governorate, Saudi Arabia, targeting adult residents to assess nasal decongestant usage patterns and associated side effects.

Study Design and Population

A cross-sectional study design was employed to collect data from 436 adults aged 18 years and above residing in the Northern Border Governorate, Saudi Arabia. Prior to participation, the study's aims and objectives were clearly explained to each participant and informed consent was obtained to ensure voluntary participation.

Sampling Tool

A structured, well-designed questionnaire in Arabic was developed after a comprehensive review of relevant literature to ensure content validity and relevance to the study objectives. The questionnaire underwent a pilot test among a small sample to assess clarity, reliability and cultural appropriateness. Necessary adjustments were made before full-scale distribution.

Sample Size

The sample size was calculated using Epi Info software (version 7.2.4.0) with the following parameters:

- Expected prevalence level: 50%
- Margin of error: 5%
- Confidence level: 95%

The calculated sample size was 384 participants. To account for potential non-response, a 10% increase (38 participants) was included, resulting in a final sample size of 436.

Sampling Method

Participants were selected using convenience sampling, ensuring diverse representation across demographic factors such as age, gender and residence (urban/rural). Although convenience sampling may introduce selection bias, efforts were made to maximize participation across varied population groups to improve the study's representativeness.

Data Collection

A self-administered questionnaire was utilized to collect data. The questionnaire included the following key sections:

- **Sociodemographic Information:** Age, gender, occupation and education level
- **Nasal Decongestant Usage Patterns:** Duration of use, reasons for use and sources of guidance (e.g., pharmacist, physician)
- **Side Effects:** Participants were asked to report any adverse effects experienced during or after decongestant use

To minimize response bias, participants were encouraged to answer honestly and efforts were made to ensure their privacy during data collection.

Inclusion Criteria

- Adults aged 18 years or older who were willing to participate in the study

Exclusion Criteria

- Healthcare sector workers to avoid biased responses based on professional knowledge
- Individuals under 18 years of age

Statistical Analysis

Data were analyzed using SPSS software (version 22). Descriptive statistics such as frequencies and percentages were employed for categorical variables, while means and standard deviations were used for continuous data. The independent t-test was applied to analyze quantitative data and the chi-square test or Fisher's exact test was used to assess associations between nasal decongestant use and categorical variables such as age, gender, marital status and education level. The significance threshold was set at $p<0.05$.

RESULTS

A total of 436 adult participants were enrolled in the study. The sample consisted of a higher proportion of males (59.2%) compared to females (40.8%). The majority of participants (59.9%) were in the 31-45 age group, followed by the 18-30 age group (20.4%) and those aged above 45 years (19.7%), indicating a predominance of middle-aged participants.

Most participants resided in urban areas (64%), while 36% were from rural regions. Regarding marital status, 53.4% were married, while 36.5% were single, 6.2% widowed and 3% divorced. Educational attainment varied, with 55.7% having university-level education, 33.3% completing secondary education or below, 7.3% holding postgraduate degrees and 3.7% being non-educated (Table 1).

The study found no significant difference in nasal decongestant use between males and females ($p = 0.98$), suggesting that gender was not a determining factor.

Age was significantly associated with nasal decongestant use ($p = 0.001$). Participants in the 31-45 age group showed the highest usage rates, while younger individuals (18-30 years) reported lower usage.

There was no significant difference in nasal decongestant use between urban and rural residents ($p = 0.94$), indicating uniform accessibility or usage trends across different regions. Marital status demonstrated a significant association with nasal decongestant use ($p = 0.001$). Married individuals reported higher usage rates, potentially reflecting family health habits or shared medication practices.

Education level was also significantly associated with nasal decongestant use ($p = 0.001$). Participants with university or postgraduate education had higher usage rates, while non-users were more frequently individuals with lower educational attainment (secondary or non-educated) (Table 2).

Among the 436 participants, 279 (64%) reported using nasal decongestants, while 157 (36%) were non-users, as shown in Figure 1.

The majority of users (59.1%) reported using nasal decongestants for 3-5 days, while 30.5% limited use to three days or less. However, 9.3% reported using nasal decongestants for longer than five days, exceeding the recommended duration.

Regarding guidance, pharmacists were the primary source of advice (43.4%), while 19.4% of users consulted physicians. Notably, 24.7% relied on family

Table 1: Demographic characteristics of participants

	No	%
Sex		
Male	258	59.2
Female	178	40.8
Age		
18-30	89	20.4
31-45	261	59.9
45	86	19.7
Residence		
Urban	279	64.0
Rural	157	36.0
Marital status		
Single	159	36.5
Married	233	53.4
Widow	27	6.2
Divorced	13	3.0
Education		
Non educated	16	3.7
Secondary and below	145	33.3
Universal	243	55.7
Postgraduate	32	7.3

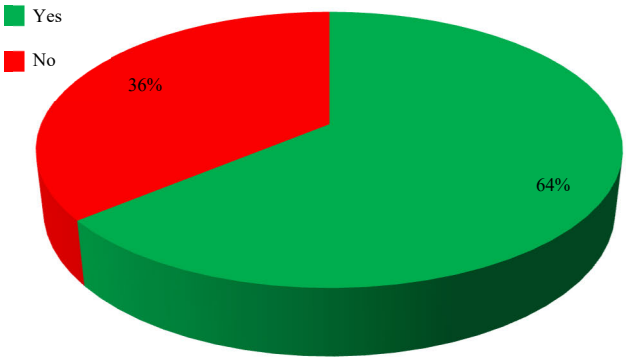

Figure 1: Prevalence of nasal decongestant use

Table 2: Comparison between nasal decongestant users and non-users based on demographic factors

	Nasal decongestant use				
Variables	Yes	%	No	%	p-value
Sex					
Male	165	59.1	93	59.2	0.98
Female	114	40.9	64	40.8	
Age					
18-30 years	37	13.3	52	33.1	0.001
31-45 years	170	60.9	91	58.0	
>45 years	72	25.8	14	8.9	
Residence					
Urban	260	93.2	19	6.8	0.94
Rral	146	93.0	11	7.0	
Marital status					
Single	122	43.9	37	24.0	
Mrried	123	44.2	110	71.4	0.001
Widow	23	8.3	4	2.6	
Dvorced	10	3.6	3	1.9	
Education					
Non educated	5	1.8	11	7.0	
Secondary and below	72	25.8	73	46.5	
Uiversal	180	64.5	63	40.1	0.001
Pstgraduate	22	7.9	10	6.4	

Table 3: Nasal decongestant use pattern and frequency of side effect

	No.	%
Duration		
3 days	85	30.5
3-5 days	165	59.1
>5 days	26	9.3
Recommended by		
Physician	54	19.4
Pharmacist	121	43.4
Family	69	24.7
Friends	24	8.6
Myself	8	2.9
Reason of use		
Nasal obstruction	44	16.0
Common cold	110	39.0
Itchiness	69	25.0
Sneezing	24	9.0
Rhinosinusitis	8	3.0
Allergic rhinitis	20	7.0
Side effect		
Anxiety		
yes	151	54.1
no	128	45.9
Headache		
yes	144	51.6
no	135	48.4
Dryness		
yes	156	55.9
no	123	44.1

recommendations and 8.6% followed advice from friends, highlighting a significant reliance on non-professional sources (Table 3).

DISCUSSION

This study provides valuable insights into the clinical, behavioral and demographic characteristics associated with nasal decongestant use in the Northern Border Governorate, Saudi Arabia. The findings reveal notable trends in usage patterns, contributing to the understanding of factors influencing self-medication practices and the prevalence of associated side effects.

A significant finding in this study is the higher prevalence of nasal decongestant use among middle-aged individuals (31-45 years old). This age group demonstrated the highest usage rates, which may be attributed to greater susceptibility to nasal congestion due to lifestyle factors, occupational exposure, or increased awareness of over-the-counter (OTC) treatments. Similar findings in previous studies suggest that age is a key factor influencing self-medication behaviors [8,9].

Despite expectations that urban residents would have greater access to OTC medications, no significant difference was observed between urban and rural populations in nasal decongestant use ($p = 0.94$) [10,11]. This uniformity may reflect improved accessibility to nasal decongestants through neighborhood pharmacies, ensuring availability even in less densely populated regions. However, given that the study sample was predominantly urban (64%), this observation should be interpreted with caution, as it may not fully capture potential rural-specific patterns.

A significant correlation ($p = 0.001$) was observed between nasal decongestant use and higher education levels. Participants with university or postgraduate education reported greater usage rates, which aligns with previous research linking higher education to proactive health practices and greater medication awareness [9,11,12]. While educated individuals may be more informed about OTC medications, the reliance on pharmacists and non-professional sources for guidance (rather than physicians) underscores a gap in proper counseling and awareness of safe decongestant use.

Marital status was significantly associated with nasal decongestant use ($p = 0.001$), with married individuals reporting higher consumption rates. This trend may reflect shared household behaviors, where family members commonly exchange advice on medications. Additionally, family obligations may prompt married individuals to seek faster symptomatic relief, contributing to their increased use of nasal decongestants [12,13].

The study highlights a concerning pattern of extended nasal decongestant use. While the recommended usage limit is typically 3-5 days to avoid rebound congestion (rhinitis medicamentosa), 59.1% of users reported taking nasal decongestants for 3-5 days and 9.3% reported prolonged use beyond five days [13,14]. This extended usage significantly increases the risk of developing rhinitis medicamentosa and other side effects.

The reliance on pharmacists (43.4%) and non-professional advice sources such as family and friends (33.3%) further raises concerns. Although pharmacists are a common source of guidance in OTC medication use, this trend reflects a lack of physician involvement, with only 19.4% of participants seeking medical advice for decongestant use. This is consistent with the American Rhinologic Society's concerns about the dangers of self-medication for nasal congestion. The study underscores the need for enhanced pharmacist training to provide clearer guidance on the safe use of nasal decongestants and ensure proper referral to healthcare professionals when necessary.

The high prevalence of side effects among decongestant users highlights the risks associated with misuse. Dryness (55.9%), anxiety (54.1%) and headache (51.6%) were the most frequently reported side effects, aligning with previous studies that identified these issues as common adverse outcomes of nasal decongestant use [15,16]. The frequent reporting of anxiety and headache symptoms may reflect systemic side effects associated with sympathomimetic decongestants like pseudoephedrine and phenylephrine.

Recommendations and Public Health Implications

The findings underscore an urgent need for targeted public awareness campaigns to educate the population on the appropriate use of nasal decongestants, emphasizing safe usage durations and the risks of prolonged use. Educational materials should particularly focus on individuals in the 31-45 age group, who were identified as the primary users.

Pharmacists should be equipped with the necessary resources and training to provide comprehensive advice on nasal decongestant use, including appropriate dosing instructions, warnings about prolonged use and guidance on alternative treatments. Additionally, healthcare professionals should actively engage with patients to provide clear instructions on symptom management and reinforce the importance of medical consultation for persistent nasal congestion.

Given the identified misuse patterns, policymakers should consider implementing stricter regulatory measures for OTC nasal decongestants, such as improved labeling, warning signs and clearer dosage instructions.

CONCLUSION

This study highlights key trends in nasal decongestant use and associated risks. By addressing gaps in public awareness, pharmacist guidance and physician involvement, preventive strategies can mitigate the risk of nasal decongestant misuse and its adverse effects. Future research should explore long-term health impacts, investigate seasonal patterns in nasal decongestant use and assess the effectiveness of educational interventions designed to promote safer medication practices.

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Conflict of Interest

The authors declare no conflict of interest related to this study. The research was conducted independently, with no financial, commercial, or institutional influences that could have biased the results or conclusions.

Ethical Consideration

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the local bioethical committee at Northern Border University prior to data collection. Informed consent was obtained from all participants before their inclusion in the study. Participants were informed about the study's objectives, methods and their right to withdraw at any time without any consequences. Confidentiality and anonymity were strictly maintained throughout the research process and all data were securely stored and accessible only to the research team.

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