

# Non Allergic Rhinitis: Prevalence, Clinical Profile and Knowledge Gaps in Literature

Deepa Bhargava, Kamlesh Bhargava, Ahmed Al-Abri, Wameedh Al-Bassam, Rashid Al-Abri

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## Abstract

**Objectives:** Although Nasal symptoms induced by Non-allergic rhinitis (NAR) are a cause of wide spread morbidity; the disease is trivialized. There is a lack of Epidemiological studies on the prevalence of non-allergic rhinitis. In spite of being one of the commonest conditions presenting to the General practitioner and otolaryngologists, the clinical profile, diagnosis, and management outcomes are unknown. The objectives of the study were to examine the prevalence and clinical profile of non-allergic rhinitis in Oman. Secondary objective was to identify Knowledge gaps in literature with the aim of directing future research.

**Methods:** A cross sectional study of 610 consecutive adult patients presenting to the Ear, Nose and Throat clinic at Sultan Qaboos University Hospital is presented in this paper. The diagnosis of NAR was mainly based on step wise fashion; including a thorough clinical history and exclusion of other causes of rhinitis; all consecutive patients diagnosed with rhinitis (n=113) had a detailed history, nasal endoscopy, nasal smears, CT scans and an antihistamine response trial. The prevalence of NAR with its clinical profile was subsequently determined. Primary research articles and meta-analysis evaluated for the knowledge gap study were identified through MEDLINE search of English language literature published between 2000-2011.

**Results:** A total of 610 consecutive patients were studied. The overall prevalence of rhinitis was 18.5% (n=113). The prevalence of NAR was 7.5% (n=46). Cases of allergic rhinitis (5.7%; n=35), Chronic rhinosinusitis (1.8%; n=11), and miscellaneous causes (3.4%; n=21) were excluded. Among the rhinitis population (n=113), the prevalence of NAR was 57% (n=46). The major presenting symptoms included nasal obstruction (93%; n=43), postnasal drainage (78%; n=36), and rhinorrhea (62%; n=29). For the knowledge gap study; 115 Medline titles were reviewed, four systematic reviews, and 34 research papers were reviewed. The text of two recent otolaryngology text books was also reviewed, and the main results of the study revealed the prevalence of NAR had not

previously been studied in Oman. Although the recent text now clearly defines NAR, there is scant literature on the prevalence, diagnosis and management outcomes of NAR in the literature.

**Conclusion:** The study found that more than half of rhinitis patients suffered from NAR. There are no specific diagnostic tests for NAR; a thorough case history is the best diagnostic tool to date. A substantial knowledge gap exists in literature with relations to pathogenesis, clinical and laboratory diagnosis, as well as in reference to medical and surgical outcomes. Larger studies are required and management outcomes need to be studied.

**Keywords:** Nasal obstruction; Non allergic rhinitis; Seasonal rhinitis; NANIPER; NARES; Idiopathic rhinitis.

## Introduction

Chronic rhinitis presents a tremendous and common problem for the healthcare industry. Cases can be classified into specific syndromes recognized mainly by a pattern of symptoms and to a lesser extent by physical signs. In patients complaining of nasal obstruction, rhinorrhea, and sneezing after allergy has been ruled out; these patients may be diagnosed with vasomotor rhinitis - a blanket term, further investigations and workup are generally abandoned by most clinicians, while treatment is indiscriminate and with a varied, unknown response rate. The Oto-Rhino-Laryngology Head and Neck Surgery (ORLHNS) literature is lacking with regards to management outcomes in patients with non-allergic rhinitis (NAR).<sup>1</sup> Otolaryngology texts indicate the need for further epidemiological studies and research with reference to NAR.<sup>2</sup>

The term NAR is commonly applied to a diagnosis of any nasal condition in which the symptoms are identical to those seen in allergic rhinitis but an allergic etiology has been excluded.<sup>3</sup> Recent literature defines NAR as a syndrome in which some combination of sneezing, rhinorrhea, nasal congestion, and post nasal drainage is present over time, in the absence of a specific etiology. Other terms for this condition include vasomotor rhinitis, idiopathic rhinitis, non-allergic, non-infectious rhinitis and intrinsic rhinitis.<sup>4</sup>

The present study describes the prevalence and clinical profile of NAR in a tertiary care hospital in Oman. The knowledge gaps in literature were also identified to direct future research.

Rashid Al-Abri ✉, Deepa Bhargava, Ahmed Al-Abri, Wameedh Al-Bassam,

ENT Division, Department of Surgery, Sultan Qaboos University Hospital, Muscat, Sultanate of Oman.  
E-mail: ralabri@gmail.com

Kamlesh Bhargava

Department of Family and Community Medicine, College of Medicine and Health Sciences, Sultan Qaboos University, Sultanate of Oman.

## Methods

A Cross sectional descriptive study was conducted of all 610 consecutive patients presenting to the ENT Clinic at Sultan Qaboos University Hospital - a tertiary care center in Oman. The study was approved by the University Medical Ethics and Research Committee. The study participants consisted of 113 patients diagnosed with chronic rhinitis. The diagnosis of NAR was based on a thorough clinical history. The diagnosis was mainly achieved by a process of exclusion in a stepwise fashion as previously described in otolaryngology texts.<sup>1-4</sup> All males and females aged >18 years with a minimum duration of one year symptoms were included in the study.

**Step 1-** A complete history of symptomatology with regards to the onset of clinical conditions, timing of symptoms, exacerbating factors, environmental factors, systemic diseases, and use of drugs were obtained. The indicators for diagnosing NAR were; nasal symptoms like nasal obstruction, rhinorrhea, sneezing and the absence of positive allergy skin tests, or other forms of infective, allergic rhinitis.<sup>1-4</sup> Specific history of the following was also obtained: the absence of identifiable aeroallergen triggers, the presence of concurrent allergic conditions, family history of allergic rhinitis, respiratory irritants such as smoking sheesha, and inducers of exacerbation, (Fig. 1). Laryngopharyngeal reflux was also excluded.<sup>4</sup>

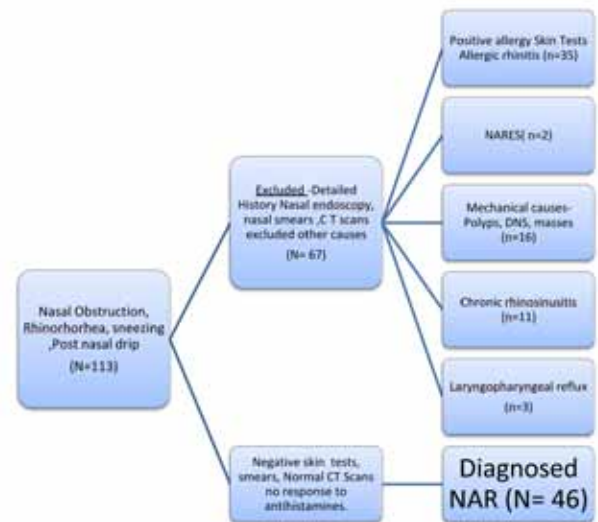
The distinguishing clinical features included nasal symptoms such as; nasal obstruction, rhinorrhea, sneezing postnasal drip, nasal irritation, anosmia, sleep disturbance, and fatigue. The subjective severity was recorded and each symptom was evaluated on the following scale: 0 = absent; 1 = Mild, (symptom was present but not annoying or troublesome); 2 = Moderate (symptom was frequently troublesome but did not interfere with normal activity or sleep; and 3 = Severe (symptom interfered with activities and sleep).

**Step 2-** A thorough physical examination was performed including a nasal endoscopy to exclude mechanical causes such as deviated nasal septum. A complete head and neck examination was also done, including: fogging test (by placing a steel spatula and observing the fogging produced by expired air and comparing right and left side, and the test was considered positive if no fogging was present in one side); Cottles test; and nasal endoscopies were performed to observe the following: nasal septum, degree of deviation, mucous membrane (mucosal edema, congestion), the presence of nasal discharge, endoscopic observation of inferior turbinate (hypertrophy), and shrinking of the turbinate after application of ephedrine 1% solution, as well as the external and internal nasal valve and middle meatus. An allergy skin test and CT of the Sinuses were done on all patients as part of the diagnostic protocol.

**Step 3-** Exclusion of allergic rhinitis by allergy skin testing of all patients.

**Step 4-** Computed Tomography to exclude sinusitis.

**Step 5-** Clinical trial of antihistamines; Lack of response to antihistamines (patients reporting no clinical improvement in symptoms) was the final indicator of diagnosis.



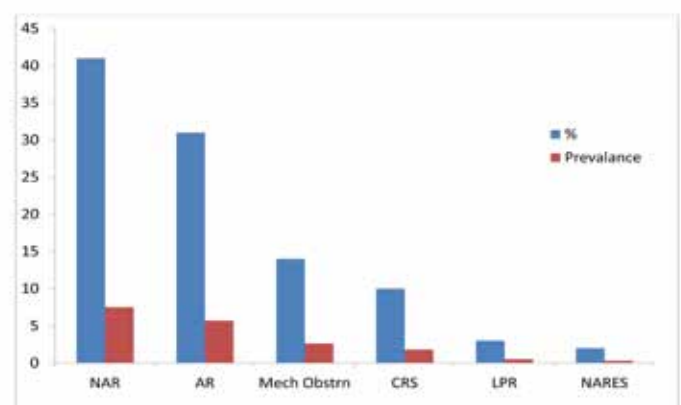
**Figure 1:** Shows the diagnosis algorithm and the patients excluded and included in the study.

In the knowledge gap study, primary research articles and meta-analysis evaluated for this study were identified through MEDLINE search of English language literature published between 2000 and 2011. The search targeted systematic reviews, meta-analysis, and diagnostic studies, as well as prevalence studies. The search also included hand search of the literature in the most recent otolaryngology text books, and the knowledge gaps were thus identified.

Statistical analysis was done using the SPSS package (version 13.0). The demographic data, clinical profile data were expressed as percentages

## Results

A total of 610 consecutive patients studied. The overall prevalence of rhinitis was 18.5% (n=113). The prevalence of NAR was 7.5% (n=46); while in the excluded cases, allergic rhinitis was 5.7% (n=35), Chronic rhinosinusitis was 1.8% (n=11), and miscellaneous causes were 3.4% (n=21). Among the rhinitis population (n=113), the prevalence of NAR was 57% (n=46). The major presenting symptoms included nasal obstruction 93% (n=43), postnasal drainage 78% (n=36), and rhinorrhea 62% (n=29). The exclusion and the prevalence of NAR are presented in Fig. 2.



**Figure 2:** Demonstrates the prevalence's of NAR.

The reported age of onset was 18-20 years in seven patients, while 27 patients reported aggravation of symptoms in the hot summer months and nasal obstruction was the most common symptom, followed by postnasal drip. The details of the clinical profile of patients diagnosed with Non Allergic Rhinitis are presented in Table 1.

**Table 1:** illustrates clinical profile and nasal examination findings of NAR.

Patient demographic Features	(n= 46)(%)
<b>Age</b>	
18-20 yr	12(26%)
21-30	13(28%)
31-40	12(26%)
>41	9(19.5%)
<b>Sex</b>	
Male	16(35%)
Female	30(65%)
<b>Symptoms</b>	
<b>Nasal obstruction</b>	
No obstruction	1(2%)
Mild	19(41%)
Moderate	17(37%)
Severe	9(19.5%)
<b>Sneezing</b>	
No sneezing	22(48%)
Mild to moderate	18(39%)
Moderate to severe	6(13%)
<b>Post nasal drip</b>	
No Post nasal drip	10(22%)
Mild to moderate	17(37%)
Moderate to severe	19(41%)
<b>Nasal irritation / itching</b>	
No Nasal irritation / itching	13(28%)
Mild to moderate	17(37%)
Moderate to severe	16(35%)
<b>Rhinorrhoea</b>	
No Rhinorrhoea	10(22%)
Mild	24(52%)
Moderate	12(26%)
Severe	0
<b>Sleep Disturbance</b>	
No Sleep disturbance	38(83%)
Mild to moderate	5(11%)
Moderate to severe	3(6.5%)
<b>Fatigue</b>	
No Fatigue	11(24%)
Mild to Moderate	27(59%)
Moderate to Severe	8(17%)
<b>Irritability</b>	
No irritability	9(19.5%)
Mild to moderate	26(56.5%)
Moderate to severe	11(24%)

**Table 1:** illustrates clinical profile and nasal examination findings of NAR.

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Nasal Examination	(n= 46) (%)
<b>Rhinohygrometry</b>	
Normal	5(11%)
Abnormal	41(89%)
<b>Cottles test</b>	
Normal	35(76%)
Abnormal	11(24%)
<b>Nasal Septal deviation</b>	
Normal	5(11%)
Abnormal	41(89%)
<b>Nasal Endoscopy Findings</b>	
Mucosal oedema	35(76%)
Turbinate hypertrophy	17(37%)
Nasal discharge	5(11%)
Turbinates fail to shrink with decongestants	7(15%)

The knowledge gap study which consisted of the assessment and review of 115 Medline titles including 4 systematic reviews, and 34 research papers, as well as 2 recent otolaryngology text books revealed that no study on the prevalence of NAR from Oman. Although the recent text now clearly defines NAR, there is scant literature on the prevalence, diagnosis and management outcomes of NAR in the literature.

## Discussion

The diagnosis of rhinitis is generally made on the basis of two or more nasal symptoms, which include nasal congestion, rhinorrhea, sneezing/ itching and impairment of smell for more than one hour on most days for over one year. There are no specific tests for NAR; a thorough case history is the best diagnostic tool to subdivide the condition into subgroups after differential diagnoses have been excluded.<sup>2</sup> The classification of subtypes is present in recent texts.<sup>1-3</sup>

The prevalence of pure chronic NAR represents 17-52% amongst the rhinitis population.<sup>4-6</sup> Of the patients that present to the otolaryngologists office, 50% are diagnosed with a form of NAR, and the rest are diagnosed with allergic rhinitis.<sup>1</sup> Prevalence of NAR in Oman was found to be 57% of the rhinitis population, these figures are very similar to the ones mentioned in literature.

The knowledge gaps in pathogenesis include; no single unifying theory of the pathogenesis for chronic NAR, and it may represent a group of incompletely-defined disorders.<sup>1-3,7</sup>

NAR, AR and infectious rhinitis have nasal hyper-reactivity to various stimuli. Unlike patients with AR for whom the etiology is well defined, the etiology and pathophysiology for the majority of patients with NAR are largely unknown. Although the term 'vasomotor' implies increased neuronal efferent traffic to the blood vessels supplying the nasal mucosa, this has never been proven.<sup>2</sup>

In all forms of chronic NAR, there is a variable component of autonomic deregulation including adrenergic, cholinergic and or non-adrenergic, non-cholinergic innervations of the nose.<sup>8-11</sup> Patients with NAR may display abnormal neurological findings; abnormal response to various neurogenic stimulation, heightened response to histamine, and cold stimulation of the nasal mucosa,<sup>12</sup> as well as diminished response to vasoconstrictive stimuli.<sup>13</sup>

Twenty seven patients reported exacerbation in hot summer months. The patho-physiology and mechanism of this temperature induced environmental rhinitis can be explained as thus; in Oman the atmospheric temperature varies from 35-48 degree centigrade in the summer months (May - August). When the nasal mucosa is exposed to high temperatures, there is a possibility of the mucosa drying up with a subsequent drying up of the cilia, this can lead to impairment of mucosal clearance and subsequent drying of the mucus, crusts formation which can lead to nasal irritation, trauma to the epithelial cells and neuron trauma while cleaning the nose.<sup>2</sup>

The nasal mucosa is subjected to frequent changes in temperature and humidity as the subject's environments keeps changing while they travel in cars and keep moving from indoors to outdoors. In the present study, the prominent symptoms found were nasal obstruction and the prominent sign was mucosal edema with inferior turbinate hypertrophy.

The nose has evolved in different racial groups to suit local environments.<sup>12,13</sup> The Arab nose is a large nose that could be evolved to increase the function of thermoregulation as the countries have a harsh hot climate. The pathological mechanisms of irritants such as temperature changes causing rhinitis are unclear. It has been postulated that these conditions result from an autonomic nervous system imbalance, including the adrenergic, cholinergic and or non-adrenergic, as well as non-cholinergic innervations of the nose. The symptoms caused by these factors can be explained on the basis of; non-IgE activated vasoactive mediators and changes in the composition of ground substances with interstitial edema. The ground substances changes may be a direct result of the insulting agent or may be mediated via histamines or kinins.<sup>14,15</sup>

Persistent irritation of the nasal mucosa may cause rhinitis. The most common irritants are dust fumes and chemicals, but pollution may play a role.<sup>14</sup> The enhanced susceptibility of the nasal mucosa leads to symptoms of rhinitis such as sneezing, watery rhinorrhea and nasal obstruction. As for the physiologic stimuli to the nose, temperature and moisture change, exercise, types of respiratory ventilation or body posture are well known.

Management outcomes for non allergic rhinitis are lacking from literature. A combination of local intranasal glucocorticosteroids and topical antihistamine azelastine has been recommended. Oral decongestants like pseudoephedrine 30-60 mg on symptomatic days can be given. However, there are no specific studies examining the clinical efficacy.<sup>4</sup>

Exercise is an important and frequently overlooked adjunct to therapy in patients with non-allergic rhinitis; vigorous exercise decreases nasal congestion by stimulating adrenergic receptors in the nasal mucosa.<sup>1</sup> Saline nasal douches have been proved to

improve the nasal functions.<sup>15</sup> Surgery has been recommended in recalcitrant cases to reduce the specific symptoms.<sup>1,2</sup> Several surgical approaches have been used in patients with severe chronic NAR.<sup>16-19</sup> These have been reported as uncontrolled case series. While it should be acknowledged that the strength of this study is its prospective collection of clinical data, it is also essential to highlight some of its most obvious limitations. Firstly, the number of patients was low and this should be expected for a condition diagnosed by exclusion, especially since the inclusion criteria were quite rigid; moreover, 35 patients with mixed etiology were excluded. Secondly, this condition belongs to a group of idiopathic rhinitis with not much evidence in literature, possible reason for this could be; difficult to prove, they are therefore underreported and under recognized. Failure to recognize NAR due to unawareness can lead to unnecessary medications and possibly unnecessary surgery exposing patient to adverse sequelae.

## Conclusion

This study demonstrated that the overall prevalence of NAR in Oman is 7% in Otolaryngology clinic and 57% of rhinitis patients may suffer from it. There are no specific diagnostic tests for NAR; a thorough case history is the best diagnostic tool to date. Many knowledge gaps exist in the literature with relations to pathogenesis, clinical and laboratory diagnosis and there is a large knowledge gap with reference to medical as well as surgical outcomes. Finally prognosis of NAR, surgical and medical management outcomes need to be further studied in larger study groups.

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## References

1. Joe stephanie, Benson Aaron. Nonallergic rhinitis. In: Cummings Otolaryngology Head & Neck Surgery. (Eds, Cumming CW, Flint PW, Harker LA, et al) Philadelphia, Pennsylvania: Mosby ; 2005; p. 990-999.
2. Claus Bachert. Nonallergic perennial rhinitis. In: Scott-Brown's Otorhinolaryngology Head and neck Surgery. (Eds Gleeson M, Browning G, Burton MJ, et al) Hodder Arnold Great Britain: Butterworth Co; 2008. p. 1408-1413.
3. Bousquet J, Khaltaev N, Cruz AA, Denburg J, Fokkens WJ, Togias A, et al. Allergic Rhinitis and its Impact on Asthma (ARIA) 2008 update (in collaboration with the World Health Organization, GA(2)LEN and AllerGen). Allergy. 2008 Apr ;63 Suppl 868-160.
4. Liberman PL. Chronic nonallergic rhinitis. In up to date- ed Corren J, Feldweg AM. 2011
5. Togias AK. Non allergic rhinitis, In: Allergic and nonallergic rhinitis: clinical aspects, Mygine N, Naclerio RM (Eds), Munksgaard, Copenhagen 1993. p159
6. Settupane RA, Charnock DR. Epidemiology of rhinitis: allergic and nonallergic. Clin Allergy Immunol 2007;19:23-34.
7. van Rijswijk JB, Blom HM, Fokkens WJ. Idiopathic rhinitis, the ongoing quest. Allergy 2005 Dec;60(12):1471-1481.



8. Adrian Drake-lee. Physiology of the nose and paranasal sinuses. In: Scott-Brown's Otorhinolaryngology Head and neck Surgery. (Eds Gleeson M, Browning G, Burton MJ, et al) Hodder Arnold, Great Britain: Butterworth Co; 2008. p. 1356-1371.
9. Braat JP, Mulder PG, Duivenvoorden HJ, Gerth Van Wijk R, Rijntjes E, Fokkens WJ. Pollutional and meteorological factors are closely related to complaints of non-allergic, non-infectious perennial rhinitis patients: a time series model. *Clin Exp Allergy* 2002 May;32(5):690-697.
10. Malcomson KG. The vasomotor activities of the nasal mucous membrane. *J Laryngol Otol* 1959 Feb;73(2):73-98.
11. Fokkens WJ. Thoughts on the pathophysiology of nonallergic rhinitis. *Curr Allergy Asthma Rep* 2002 May;2(3):203-209.
12. Papon JF, Brugel-Ribere L, Fodil R, Croce C, Larger C, Rugina M, et al. Nasal wall compliance in vasomotor rhinitis. *J Appl Physiol* 2006 Jan;100(1):107-111.
13. Jones AS, Lancer JM. Vasomotor rhinitis. *Br Med J (Clin Res Ed)* 1987 Jun;294(6586):1505-1506.
14. Graudenz GS, Latorre MR, Tribess A, Oliveira CH, Kalil J. Persistent allergic rhinitis and indoor air quality perception—an experimental approach. *Indoor Air* 2006 Aug;16(4):313-319.
15. Tomooka LT, Murphy C, Davidson TM. Clinical study and literature review of nasal irrigation. *Laryngoscope* 2000 Jul;110(7):1189-1193.
16. el-Guindy A. Endoscopic transseptal vidian neurectomy. *Arch Otolaryngol Head Neck Surg* 1994 Dec;120(12):1347-1351.
17. Dong Z. Anterior ethmoidal electrocoagulation in the treatment of vasomotor rhinitis. *Zhonghua Er Bi Yan Hou Ke Za Zhi* 1991;26(6):358-359, 383.
18. Mladina R, Risavi R, Subaric M. CO2 laser anterior turbinectomy in the treatment of non-allergic vasomotor rhinopathy. A prospective study upon 78 patients. *Rhinology* 1991 Dec;29(4):267-271.
19. Fernandes CM. Bilateral transnasal vidian neurectomy in the management of chronic rhinitis. *J Laryngol Otol* 1994 Jul;108(7):569-573.

## Statistics

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Describe statistical methods with enough detail to enable a knowledgeable reader with access to the original data to verify the reported results. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). Avoid relying solely on statistical hypothesis testing, such as *P* values, which fail to convey important information about effect size. References for the design of the study and statistical methods should be to standard works when possible (with pages stated). Define statistical terms, abbreviations, and most symbols. Specify the computer software used.