## **Original Research Article**

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# Clinicopathological study of atrophic rhinitis

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#### **ABSTRACT**

**Background:** Atrophic rhinitis is a chronic nasal disease characterized by progressive atrophy of mucosa and underlying bone of turbinate's.1 Disease is also referred to as dry rhinitis, rhinitis sicca, open-nose syndrome, or ozena. It is classified into 2 types viz., primary and secondary. The cause of primary atrophic rhinitis is unknown. Histopathologically, primary atrophic rhinitis is characterized by squamous metaplasia and two characteristic types of vascular involvement (Type I and Type II). Type I is common (50-80%) where endarteritis obliterans, periarteritis and periarterial fibrosis of the terminal arterioles is seen. These patients benefit from the oestrogen therapy. Type-II is less common (20-50%) and is associated with capillary vasodilatation

**Methods:** This study was carried out in the Department of Otorhinolaryngology, Aarupadai Veedu Medical College and hospital, Puducherry between October 2015 and July 2017.51 patients of atrophic rhinitis of age 12 years to 95 years were included. Detailed history and complete ENT examination was done in all patients.

**Results:** In the present study atrophic rhinitis cases formed 0.34% of the total OPD attendance. Maximum number of patients belonged to the age group of 51-60 years (33.3%) followed by 61-70 years (27.5%). Disease was found to be more common in females (82.4%) female to male ratio was 4.7:1. Most common complaint of the patients was nasal crusting (96.1%) followed by nasal fetor (92.2). In present study, most of the patients had chronic symptoms for the past 1-5 years (45.1%) and 6-10 years (29.4%). 35 patients i.e. 68.6% showed bilateral atrophic rhinitis and 16 patients i.e. 31.4% showed unilateral atrophic rhinitis. In the present study, majority of patients belong to class V of Modified B G Prasad scale (47.1%). Severity of the disease was classified into 3 stages, that is, early, advanced, and late advanced, according to the findings in the nasal cavity as recommended by Ssali. The majority of patients 36 (70.5%) were in the advanced stage. Partial squamous metaplasia and total squamous metaplasia, were seen in 35.7% and 42.9% of patients respectively, denuded epithelium were noted in 9 patients i.e. 21.4%.

**Conclusions:** Incidence of atrophic rhinitis is in a decreasing trend. Females and people of age group 51-60 years are commonly affected. Bilateral atrophic rhinitis is more common. Lower socioeconomic status is a predisposing factor due to hygiene issues. Our institution being a tertiary care centre most patients presented with advanced stage of disease. Total squamous metaplasia is the commonest histological finding in patients with atrophic rhinitis.

Keywords: Atrophic rhinitis, Ozaena

#### INTRODUCTION

Atrophic rhinitis is a chronic nasal disease characterized by progressive atrophy of mucosa and underlying bone of turbinate's. Disease is also reffered to as dry rhinitis, rhinitis sicca, open-nose syndrome, or ozena.

Atrophic rhinitis is classified into 2 types viz., primary and secondary. The cause of primary atrophic rhinitis is unknown. Several hypothesis have been proposed, including nutritional deficiencies, heredity, endocrine factors, and bacterial infection with Klebsiella ozaenae and Bacillus foetidus.

In contrast, secondary atrophic rhinitis patients gives history of chronic granulomatosis, nasal surgery (e.g., turbinectomy, septal surgery), trauma, chronic rhinosinusitis, and irradiation. In some patients the fetor is so unbearable, even to spouses and friends, that the patient may suffer social ostracization.

Histopathologically, primary atrophic rhinitis is characterized by squamous metaplasia and two characteristic types of vascular involvement (type I and type II). Type I is common (50-80%) where endarteritis obliterans, periarteritis and periarterial fibrosis of the terminal arterioles is seen. These patients benefit from the oestrogen therapy. Type-II is less common (20-50%) and is associated with capillary vasodilatation.<sup>2</sup>

The incidence of primary atrophic rhinitis decreased markedly in the 20th century, but it is still frequently found in underdeveloped countries and is particularly prominent in India.

Clinical management of the disease is limited and frequently unsatisfactory. Patients need to irrigate their noses three or four times a day without cessation, since symptoms return when the artificial humidification is discontinued.

Surgical techniques involve narrowing the lumen, but permanent results are not always maintained. The procedure known to provide permanent relief from the symptoms is abolition of nasal respiration by surgical closure of the nostrils (Young's procedure). However, many patients do not accept this surgery, owing to the discomfort of breathing through the mouth and to the hyponasal voice.

The purpose of the present study is to know the recent trends in the clinical and pathological profile of patients with atrophic rhinitis.

## **METHODS**

This study was carried out in the Department of Otorhinolaryngology, Aarupadai Veedu Medical College and hospital, Puducherry, India from October 2015 to July 2017. A total of 51 patients of atrophic rhinitis of age 12 years to 95 years were included.

## Inclusion criteria

Inclusion criteria were patients having pale nasal mucosa with widened nasal cavity with or without crusting; all patients with nasal myiasis attending ENT OPD.

## Exclusion criteria

Exclusion criteria were allergic rhinitis; all cases with malignancy of nose and PNS.

Detailed history was obtained from all the patients included in the study. They were asked about their demography, social habits, socioeconomic factors and associated diseases. Complete ENT examination was done and complications were ruled out. Patients were subjected to routine laboratory investigations with specific emphasis on HB, CBC, RBSL, ESR, VDRL, ELISA, Slit skin smear examination, X-ray PNS, urine sugar and albumin level.

Patients were subjected diagnostic nasal endoscopy and nasal mucosal biopsy followed by histopathological examination of the same.

Results were statistically analyzed with z test.

### **RESULTS**

Atrophic rhinitis cases constituted 0.34% of the total OPD attendance. The maximum number of patients belonged to the age group of 51-60 years (33.3%) followed by 61-70 years (27.5%). In the present study youngest patient was 12 yrs old and the oldest 87 years. The disease was found to be more common in females (82.4%) and rest 17.6% were males. Female to male ratio was found to be 4.7:1.

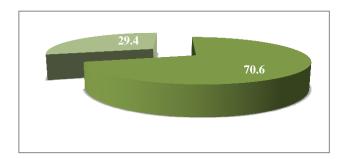


Figure 1: Gender distribution in atrophic rhinitis.

In our study the most common complaint of the patients was nasal crusting (96.1%) followed by nasal fetor (92.2%). Quite a good proportion of patients presented with epistaxis (70.6%) mostly due to nasal myiasis (66.7%). Other symptoms include nasal obstruction (58.8%), headache (52.9%), anosmia (52.9%), frequent cold (39.2%), hyposmia (39.2%), epiphora (19.6%) and nasal deformity (13.7%).

Based on the inclusion criteria all patients had pale nasal mucosa (100%) and widened nasal cavity (100%). Next common sign noted was nasal crusting (96.1%) followed by atrophy of IT (92.2%). Other clinical features in decreasing order of frequency include nasal fetor (88.2%), dryness of nasal mucosa (84.3%), wide choanal opening (76.5%), atrophy of MT (72.5%), nasal myiasis (66.7%), atrophy of pharyngeal mucosa (39.2%), septal perforation (17.6%), saddle nose deformity (13.7%) and maggots in tonsillar fossa (2%).

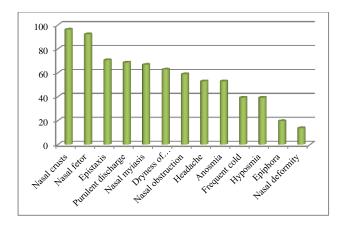


Figure 2: Symptomatology of atrophic rhinitis.

In present study, most of the patients had chronic symptoms for the past 1-5 years (45.1%) and 6-10 years (29.4%).

In present study 35 patients i.e. 68.6% showed bilateral atrophic rhinitis and 16 patients i.e. 31.4% showed unilateral atrophic rhinitis. It is notable that most of the patients with unilateral atrophic rhinitis had DNS or gave positive history of septal surgeries or other surgeries in one side of nose.

In the present study, majority of patients belong to class V of modified BG Prasad scale (47.1%). Rest patients belonged to class IV (39.2%) and III (13.7%). None of the patients belonged to class I and II.

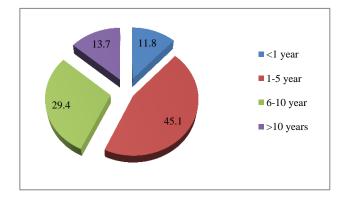


Figure 3: Duration of symptoms in atrophic rhinitis.

The severity of the disease was classified into 3 stages, that is, early, advanced, and late advanced, according to the findings in the nasal cavity as recommended by Ssali.<sup>6</sup> The majority of patients 36 (70.5%) were in the advanced stage.

Table 1: Laterality of disease in atrophic rhinitis.

Side	Patients		
	Number	Percentage (%)	
Unilateral	16	31.4	
Bilateral	35	68.6	

Table 2: Ssali classification for severity of disease in atrophic rhinitis.

Staging	Crusts	Odour	Atuonhy	Patients	
Staging	Crusts	Outur	Atrophy	Number	%
Early	Minimal	Mild fetor	Only at turbinates	7	13.7
Advanced	Lots	Foul	Generalized, including bones	36	70.5
Late advanced	extensive	Foul	Ulceration/bleeding, very large nasal cavities	8	15.6

Table 3: Histopathological features in atrophic rhinitis patients-status of mucous glands.

Status of mysosys slands	Patients		
Status of mucous glands	Number	Percentage (%)	
Absence of glands	14	27.5	
Reduction in size and number of glands	24	47.1	
Normal glands	10	19.6	

Table 4: Comparison of female to male ratio in different studies.

Study	Female	Male	F:M Ratio
Bunnag et al <sup>3</sup>	39	7	5.6:1
Sampan et al <sup>113</sup>	64	26	2.5:1
Present study	42	9	4.7:1

Stage of disease	Study	Study		
	Bist et al <sup>4</sup>	Bunnag et al <sup>3</sup>	Present study	
Early	13.3%	6.5%	13.7%	
Advanced	59.9%	84.8%	70.5%	
Late advanced	26.6%	8.7%	15.6%	

Table 5: Comparison of severity of disease in different studies.

In the present study out of the 51 patients, 9 patients did not give consent for biopsy and histopathological examination. Partial squamous metaplasia and total squamous metaplasia, were seen in 35.7% and 42.9% of patients respectively, denuded epithelium were noted in 9 patients i.e. 21.4%. Absence of glands and reduction in number & size of glands were noted in 27.5% and 47.1% of patients respectively. Normal glands were observed in 19.6% of patients.

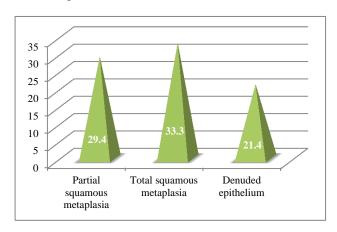


Figure 4: Histopathological features in atrophic rhinitis patients-status of epithelium.

In the present study it was noted that the typical pattern of vascular involvement in 29 patients i.e. 69.1% was corresponding to the type 1 vascular pattern characterized by endarteritis and periarteritis of the terminal arterioles as pointed out by Weir (1987) 13 patients included in our study had type 2 vascular involvement with dilated blood vessels.<sup>3</sup>



Figure 5: Histopathological features in atrophic rhinitis patients-vascular involvement.

#### DISCUSSION

Nearly one and a half century ago, in 1876 Fraenkel first described this chronic distressing condition, incurable yet not fatal. In spite of tireless efforts, the code of its etiology still remains unexplained. Many theories and hypotheses are put forth to explain this condition but have failed to catch general acceptance. Atrophic rhinitis is still a prevalent disease in India.

In present study total of 51 patients with atrophic rhinitis were studied and the study group consisted of 42 females i.e. 82.4% and 9 males i.e. 17.6%, female to male ratio was found to be 4.7:1

This is comparable to the study performed by Bunnag et al<sup>3</sup> where the female ratio was found to be 5.6: 1.In contrast the study conducted by Bist et al the female to male ratio was found to be 2.5:1.<sup>4</sup>

The age group of our study population ranged from 12 to 85 years with mean age of 49.4 years, whereas in the study conducted by Bunnag et al age group of the patients with atrophic rhinitis ranged from 17-59 years with mean age of 31 years, similar results were obtained in the study conducted by Bist et al where the study population were in age group between 12-70 years and mean age of 26 years.<sup>3</sup> The youngest patient included in our study was 12 year old, a diagnosed case of hypohidrotic ectodermal dysplasia, the oldest patient was 85 years old.

In our study it was found that 24 patients i.e. 47.1% were belonging to the class V of modified BG Prasad scale corresponding to the lower socioeconomic class. Around 20 patients i.e. 39.2% were found to belong to the upper lower class, class IV, and the rest 7 patients i.e. 13.7 were found to belong to class III, the lower middle class and none belonging to the upper and upper middle class. This is comparable to the study conducted by Bist et al were 72.2% patients were found to belong to lower socioeconomic class and the rest 27.8% were from middle class and none belonging to high class.<sup>4</sup>

In the present study the most common complaint of the patients was nasal crusting 96.1% followed by nasal fetor 92.2%. In accordance to the study conducted by Bist et al 100% patients presented with nasal crusts and 86.6% patients presented with nasal fetor and purulent discharge and in the study conducted by Bunnag et al 41.3% patients presented with nasal fetor and 43.5% patients presented with purulent discharge. In contrast, in the

study conducted by Bunnag et al nasal crusting was the presenting complaint in 54.3% patients.<sup>3</sup>

As this study was carried out in tertiary care hospital of rural area patients seeked medical attention only after significant morbidity had already occurred, suiting this situation 70.6% patients presented with epistaxis among which 66.7% was due to nasal myiasis. In contrast, to the study conducted by Bist et al where only 40% patients presented with epistaxis and 26.6% patients with nasal myiasis. In our study 58.8% presented to the OPD with nasal obstruction whereas in the study conducted by Bist et al 66.6% patients presented with nasal obstruction ond in the study conducted by Bunnag et al 37% patients presented with nasal obstruction.<sup>3</sup> In our study 52.9% presented with anosmia and 39.2% with hyposmia, whereas in study conducted by Bist et al 73.3% patients presented with anosmia and 13.3% patients with hyposmia and in the study conducted by Bunnag et al it was noted that 10.9% patients presented with anosmia.<sup>3,4</sup>

Headache was the presenting complaint in 52.9% patients in our study, whereas in study conducted by Bist et al 66.6% patients presented with headache. Frequent cold was the presenting complaint in 39.2% patients in our study, where as in the study conducted by Bist et al it was 26.6%, and that in study of Bunnag et al it was presenting symptom in 19.6% patients.<sup>3,4</sup>

In our study 19.6% presented with epiphora and 13.7% with nasal deformity, this is in contrast with the study conducted by Bist et al where 6.6% patients presented with epiphora and 5.5% with nasal deformity.

On basis of the inclusion criteria of our study all patients i.e. 100% patients included had pale nasal mucosa and widened nasal cavity. This is comparable to the study conducted by Bist et al where 100% patients had widened nasal cavity and 80% patients had pale nasal mucosa. Next common sign noted in our study was nasal crusting in 96.1% patients followed by atrophy of IT in 92.2%. In comparison, the study performed by Bist et al nasal crusting and atrophy of inferior turbinate was found in 100% patients. Nasal fetor was present in 88.2% patients in our study, whereas in study performed by Bist et al nasal fetor was noted in 86.6% patients. In the present study dryness of nasal mucosa was noted in 84.3% patients, wide choanal opening in 76.5%, atrophy of pharyngeal mucosa was noted in 39.2% and atrophy of MT in 72.5%. This is comparable to the study conducted by Bist et al where dryness of nasal mucosa was noted in 100%, wide choanal opening in 86.6%, atrophy of pharyngeal mucosa was noted in 40% and atrophy of MT in 50% patients.<sup>3,4</sup>

In the present study nasal myiasis was noted in 66.7% patients, this is in contrast to the study conducted by Bist et al in which nasal myiasis was noted in 26.6% patients. Maggot in tonsillar fossa was noted in 2% patients in our study. In our study patients septal perforation was noted

in 17.6% patients, saddle nose deformity in 13.7% patients, this is in comparison to the study conducted by Bist et al where septal perforation was noted in 13.3% patients and saddle nose deformity in 5.5% patients. In the present study it was noted that 70.5% patients were categorized as having advanced stage disease based on Ssali classification for severity of disease in atrophic rhinitis, 15.6% patients were grouped as having late advanced stage of disease and 13.7% patients as having early stage of disease.

In the study conducted by Bist et al 59.9% patients were labelled as having advanced disease, 13.3% patients as early stage of disease and 26.6% patients as having late advanced disease.<sup>4</sup> In another study conducted by Bunnag et al 84.8%, 8.7%, 6.5% patients were grouped as having advanced, late advanced and early stage of disease respectively.<sup>5</sup>

In the present study histopathological features were studied under 3 subgroups viz., status of epithelium, status of mucous glands and pattern of vascular involvement.

In our study partial squamous metaplasia was observed in 35.7% and total squamous metaplasia in 42.9% of patients, normal epithelium was noted in 21.4% patients. This is comparable with the study conducted by Bist et al<sup>4</sup> partial squamous metaplasia. Total squamous metaplasia and denuded epithelium was noted in 33.33%, 38.88% and 11.11% patients respectively. In another study conducted by Raveenthiran et al 64% patients had squamous metaplasia.<sup>5</sup> In the present study 47.1% patients had reduction in the number of glands and in 27.5% patients mucosal glands were absent. Normal glands were noted in 19.6% patients. This is comparable to the study conducted by Bist et al in which absence of glands was observed in 36.66% patients, reduction in size and number of glands in 46.66% patients and normal glands in 16.66% patients.<sup>4</sup> In another study conducted by Raveenthiran et al 50% patients had atrophic mucous glands.5

In the present study it was noted that the typical pattern of vascular involvement observed in 69.1% patients was corresponding to the type 1 vascular pattern and 30.9% patients included in our study had type 2 vascular involvement with dilated blood vessels. The above findings are comparable with the study performed by Bist et al where type 1 vascular involvement was noted in 67% patients and type 2 in 33% patients.<sup>4</sup> This is in contrast to the study conducted by Bunnag et al where type 1 vascular involvement was noted in 20% patients and type 2 in 80% patients.<sup>3</sup>

## CONCLUSION

Incidence of atrophic rhinitis is in a decreasing trend. Females and people of age group 51-60 years are commonly affected. Bilateral atrophic rhinitis is more

common. Lower socioeconomic status is a predisposing factor due to hygiene issues. Our institution being a tertiary care centre most patients presented with advanced stage of disease. Total squamous metaplasia is the commnest histological finding in patients with atrophic rhinitis. Reduction in size and number of mucosal glands and type 1 vascular pattern are commonly noted in atrophic rhinitis patients.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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