

Prevalence of Fungal Rhinosinusitis in Patients Presenting with Nasal Polyps

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ABSTRACT

Aim: To see the prevalence of fungal rhino sinusitis in patients presenting with nasal polyposis.

Study design: Cross-sectional study.

Place and duration of study: Department of Otorhinolaryngology and Head and Neck surgery, PIMS, Islamabad from 1st October 2021 to 31st March 2022.

Methodology: Patients presenting with nasal polyps fulfilling our inclusion criterion in ENT Department in PIMS. Eighty patients presenting with nasal polyps for surgery after admitting them and the specimen was sent for fungal culture.

Results: Sixty nine patients showed positive culture for fungal rhino sinusitis and only 11 patients were negative for fungal growth. Among 69 patients 51 patients were males and 18 were females. Eighty five percent male patients showed fungal growth while 90% females showed fungal growth.

Conclusion: The nasal polyps is closely related to fungal infection, so all patients presenting with nasal polyps are suggested to undergo fungal culture and work-up should be done for fungal rhino sinusitis to rule fungal infection is suggested, so that early diagnosis is made and earliest treatment is started for the disease.

Key words: Nasal polyps, Fungal culture, Fungal rhino sinusitis

INTRODUCTION

Fungi are plant like organisms that lack chlorophyll, since the lack chlorophyll, so the dependent on an external source for food and nourishment. Fungi share with bacteria the important ability of breaking down food into simpler molecules for food and energy and the central decomposers of the world. The mostly feed on dead organisms and break them down into simpler compounds for their energy requirements, and in this process they decompose the dump and debris.¹ The essential part of the human and animal world and also found in the normal flora of human and animal bodies, and sometimes start consuming the living organism, it is this point where they become a threat for the living bodies including humans as well, and their eradication becomes vital for survival, otherwise they can play havoc to precious life. At this point anti-fungal comes into action and eradicate the body from pathogenic fungi².

From the past 30 years, after the development of successful method of transplantation techniques of organs and successful treatment of chronic disease like diabetes mellitus and development of immunosuppressant like cyclosporine, that fools the immunity against transplanted organs and over use of antibiotics, the fungal infections are on the rise, unfortunately the disease process is very little understood, so it present at a very latter stage, when preserving life becomes a very difficult task and consumes a very large amount of wealth and precious resources^{1,2}.

In addition to immunosuppressive individual, the disease process has now become very much prevalent in the immunocompetent and young individuals, so it has become a challenge for the modern medicine treatment¹.

In humans the fungus is part of flora of nasal cavity. It causes infections of the nasal cavity and sinuses. The mechanism in which these opportunists become pathogenic and invades the mucosa and causes rhino sinusitis is poorly understood. New theories are trying to explain the mechanism but none are successfully explaining the disease process. A range of acute and chronic manifestations are described. Several fungal organisms are involved in these including aspergillus, sedosporium, alternaria, curvularia and mucor².

Broadly fungal rhino-sinusitis is divided into two major

categories, Invasive and Non-invasive depending upon the mucosal and bone invasion³. Furthermore, the patient's state of immune-competence is of importance in deciding the aggressiveness of the disease process. Newer strategies including surgical and medical modalities are introduced to cope with the disease. But despite all efforts fatalities of 25 to 100% have been reported⁴. For this reason the prime importance is given to earliest diagnosis, to cope the disease at early stage before it breaks the natural anatomical and immunological barriers. For this purpose the potential target individuals are recognized and worked up for early diagnosis of the disease. The pathophysiology of the disease process still remains largely unknown, as no specific factors are recognized. Interestingly it is seen that, it is largely associated with nasal polyps. Recently Ponikau et al⁵ have suggested that practically all nasal polyps and chronic rhino sinusitis is of fungal etiology. Another study has shown that 80% of patients having fungal infections have nasal polyps.⁶ So there seems to be close pathophysiologic relationship of the two entities i.e. nasal polyp and fungal rhino sinusitis.

The word nasal polyp has Greek origin. Polypous means many feet. In most of the cases, it arises from middle meatus and ethmoidal clefts⁷. These are overgrowths of the nasal mucosa. The prevalence of nasal polyps is from 1-4%⁸ and slight male predominance⁹, but some studies have shown it up to 32%¹⁰. These patients have very high IgE and eosinophilia in blood¹¹.

The clinical picture shows great variability, ranging from a single small polyp to complete polypoidal transformation of the whole mucosa¹². The primary symptoms of nasal polyps are nasal blockage, congestion, hyposmia, anosmia and if associated with chronic sinusitis a prevalent discharge. Nasal obstruction and smell impairment is reported in 75% of the cases. These symptoms have important impact on life quality. Other less important symptoms are post-nasal drip, rhinoria, headache and sleep disturbance.

In Juntendo University, Tokyo, Japan revealed that 45% patient with nasal polyps showed amplification of fungal DNA on polymerase chain reaction¹³. Another study done in Cairo university, Egypt in July, 2011 showed that 92% of patients with nasal polyps showed fungal rhino sinusitis¹⁴.

A study done in Gazi university school of medicine, Ankara, Turkey in July, 2007 showed 50% cases of fungal colonization in 30 patient with massive nasal polyposis¹⁵.

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MATERIALS AND METHODS

This cross-sectional study was conducted at Department of ENT Head and Neck Surgery, Pakistan Institute of Medical Sciences, Islamabad from 1st October 2021 to 31st March 2022 and 80 patients were enrolled. All patients above 12 years presenting with nasal polyps with no upper limit of age and irrespective of gender were included. Patients not fit for surgery, general anesthesia, pregnant patients, patients not willing to opt for surgery and already proven cases of fungal rhino sinusitis were excluded. The patients were recruited on the basis of medical history, drug history and the relevant history regarding nasal polyps. Informed consent was obtained from all the patients prior to any surgical intervention as a part of ethical concern. Patients were informed about their inclusion in the study regarding surgery, the benefits and the risks involved. Polypectomy was performed by consultant under G/A. Tissue samples were sent for culture in different media like potato dextrose agar or sabouraud dextrose agar and patients were asked to follow up with the report. The data was entered and analyzed using SPSS-20. This study was approved by the Institutional Ethical Review Board.

RESULTS

Sixty nine patients showed fungal growth on culture while 11 patients did not. The positive patients made 86.3% of the study population and negative patients made 13.8% of the study population. The maximum patients were in the age group of 31-40 years followed by 51-60 years age group. The mean age of the patients was 41.65±13.78 years. The male and female ratio was approximately 3:1. The total number of males was 60 and the total no of females were 20. The male made 75% of the study population and females made 25% of the study population. Fifty one (85%) males were positive for fungal culture and out of 20 females 18(90%) were positive for fungal culture (Tables 1-2).

Table 1: Demographic information of the patients (n=80)

Variable	No.	%
Gender		
Male	60	75.0
Female	20	25.0
Culture specimen		
Negative	11	13.8
Positive	69	86.2

Table 2: Comparison of age according culture specimen (n=80)

Age (years)	Culture specimen		Total
	Negative	Positive	
12-20	3	5	8
21-30	1	7	8
31-40	3	25	28
41-50	1	11	12
51-60	3	13	16
61-70	0	8	8
Total	11	69	80

DISCUSSION

From the last two decades allergic fungal rhinosinusitis has increasingly been worked upon and defined. Historically it was mistaken for invasive sinus tumor as there was aggressive bone erosion process and invasion in the nearby tissues, skull base and brain involvement, but now it is believed to be due aerosolized fungal elements. In the immunocompetent host it causes allergic reaction leading to allergic fungal rhinosinusitis but in the immunocompromised individuals it causes invasive fungal rhinosinusitis, with further division in granulomatous and non-granulomatous varieties. Most patients of allergic fungal rhinosinusitis have a long history of allergic rhinitis, chronic rhinosinusitis, nasal polyposis. There is collection of thick, viscid mucin which causes obstruction of the sinuses^{5,6}.

In 1976 Safirstein first described this condition. He noted that the collection of nasal polyposis, crust formation and sinus cultures were similar to bronchopulmonary Aspergillosis, a benign process. It was later in 1980 that it was accepted as a benign process which causes expansion of the sinuses. In 1989 Robson described it as allergic fungal rhinosinusitis that was caused by multiple fungi, not only aspergillus⁸.

Patients with allergic fungal rhinosinusitis often presents with symptoms of airway obstruction, allergic rhinitis and chronic sinusitis with nasal congestion, purulent rhinorhea, post nasal discharge and headache. The symptoms develop slowly over the period of time so that the patient is unaware of the disease process. If facial disfigurement is present, the patient is unaware most of the time and often it is pointed out by close contacts of the patient. Pain is uncommon presentation of the disease process and if present is mostly due to bacterial infection of the sinuses or complication^{10,12}.

Approximately 5-10% of patients affected by chronic rhino sinusitis are diagnosed to have Allergic fungal sinusitis. Atopy is very closely related to the disease and 90% of patients demonstrated elevated specific IgE level to one or more fungal elements. The disease frequently develops in patients who have long standing disease of the sinuses and prolong use of antibiotics. The antibiotic use alters the flora of the nasal and sinus cavities and leads to fungal invasion by the opportunist fungal invaders. Similarly patients on immunosuppressant therapy also have high chances to develop the disease due to uninhibited environment. Patient with disease like diabetes, AIDS, leukemias also have high incidence rate of the disease as there is compression of the immunity due to the underlying co-morbid state. All these states leads to fungal proliferation in patients^{7,9}.

The prevalence of nasal polyps is considered to be around 4%, while the incidence increases with age and is more prevalent among 40-70 years. The disease is seen more commonly among adults. Nasal polyps is seen in a variety of disease states like Sampter's triad, Kartegener syndrome, fungal rhinosinusitis, the underlying mechanism is mostly due to edema, stasis of secretions, ciliary dysmotility and allergy to different environmental factors. All these factors lead to polyp formation in the nasal mucosa and then a positive self perpetuating process^{4,5}.

In the present study, the population size was 80 patients between 12-70 years. Out of these 83.6% (69 patients) showed positive culture for fungi.

Similar study was done in North India in Delhi from 2002 to 2010 in University College of Medical Sciences and Guru Tegh Bahadur Hospital. This study consisted of 161 patients. Fungal Culture was positive for 93% of the patients. Aspergillus species were present in 70% of the positive patients¹⁶.

Another study was done in Asia in this region in ZHOU Bing Department of Otorhinolaryngology, Beijing Tong Ren University, Beijing. In this study 19 patients were included. In 19 patients, 13 patients (68.4%) displayed characteristics of fungal structures.¹⁷

Similar study was done in another institute in First Affiliated Hospital of Beifang, Zhangjiakou, China. In this study, instead of biopsy, fungal specific PCR was used for study. In this study 89.2% had positive results for fungal DNA while it was positive in 66.7% in control subjects¹⁸.

Another study was done in South-Eastern Asia in Saudi Arabia, King Faisal University. In this study 91 patient were included. In 91 patients, 11 patients had positive histopathology report which made 12.1% of the population¹⁹.

This study showed that 75% patients were male and 25% patients were female. 85% male were positive while 90% of females were positive for fungal culture. These studies show the close relationship between nasal polyps, chronic rhinosinusitis and fungal infection. Fungal elements were very high in patients with nasal polyps which showed that nasal allergy and polyposis play great role in causing fungal infection, although fungal elements are already present in normal individuals.

CONCLUSION

Looking at the close relationship between nasal polyps and fungal rhinosinusitis it is encouraged that further research should be done to prevent the disease at the onset as once the disease is established, review of literature shows that the mortality ranges from 25 to 100%. The pathogenesis needs to be uncovered to see how one disease leads to another and what environmental conditions are involved in inciting these disease processes as allergy also plays a great role. A broad based research is needed to meet these information gaps. So it is highly recommended that future studies should be done.

Conflict of interest: Nil

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