

Frequency of Fungal Nasal Polyposis and its Associated Risk Factors

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ABSTRACT

Objective: To find out the exact frequency of fungal nasal polyposis and its associated risk factors.

Methods: A descriptive cross-sectional study was conducted at ENT department of Jinnah Postgraduate medical center (JPMC) from August 2020 to March 2021. The demographic data, detailed history and clinical examination of all the participants were noted. Specimen was sent in formalin solution for histopathological examination while another was sent in normal saline for culture and sensitivity of fungal infection. Gomorri Methylamine Silver stain and Periodic Acid Schiff stain were used to confirm the fungal hyphae. Statistical Package for the Social Sciences (SPSS) version 20 was used to analyze the data. p-value of less than 0.05 was considered as significant.

Results: The mean age of the study participants was 30.29 ± 11.42 . On histopathological findings, the Fungal nasal polyposis was reported among 43% of the individual while remaining were having allergic type of polyps. Out of 84 positive fungal cases, about 65.7% were aspergillus while remaining 34.3% of mucormycosis. About 17.2% of the cases were having BMI less than 30 and have no significant association. It had been found that majority of patients (43%) were farmers while about 39.9% were immunocompromised. Very few of them (22.6%) were having personal history of allergy.

Conclusion: There is a high frequency of fungal nasal polyposis that is 43% in current setup. The disease is multifactorial and is predominant in farmers and in immunocompromised individuals.

Keywords: Nasal polyps, Fungal rhino-sinusitis, Chronic rhino-sinusitis, Fungal nasal polyposis

INTRODUCTION

The inflammation of nasal mucosa and paranasal sinuses are termed as rhino-sinusitis and is benign in nature. Its prevalence is about 13% globally⁽¹⁾. On the basis of duration of the disease, it is classified into acute type which is for less than 4 weeks, sub-acute type which has the duration of 4-12 weeks and the chronic type appear after 12 weeks. Chronic type of rhino-sinusitis is having higher prevalence than that of the acute or sub-acute type⁽²⁾. Focusing on the underlying pathology the fungal infections are considered as the most common causative agent and is also characterized by the presence of nasal polyposis⁽³⁾. That is why on the basis of fungal pathogenesis the chronic rhino-sinusitis is broadly classified into allergic fungal rhino-sinusitis (AFRS) and chronic rhino-sinusitis with nasal polyposis (CRFwNP)⁽⁴⁾. The underlying pathogenic mechanism is that the fungal spores are commonly found in the environment and is easy to inhale. After inhaling these spores, they form a colony in the nasal mucosa, paranasal sinuses and also in respiratory epithelium leading to either invasive or non-invasive type of lesion. There are many types of fungi that cause invasive type of lesion including aspergillus species and mucormycosis^(5,6).

The non-invasive type of lesion usually causes asymptomatic sinusitis while invasive type presents with multiple symptoms including nasal congestion, nasal obstruction, posterior nasal dripping and loss of sense of smell⁽⁷⁾. There is the formation of fungal balls in the non-invasive type of lesion while invasive type of fungal infection leads to polyposis which can extend up to the base of the skull. For differential diagnosis of invasive and non-invasive type of lesion, the histopathological examination is the gold standard⁽⁸⁾. Other tools used for diagnosis include radiological imaging like X-rays, CT scan and MRI but the confirmation and extent of disease can only be identified by histopathological findings which is done by applying special stains like Gomorri Methylamine Silver and Periodic Acid Schiff beside simple hematoxylin and eosin stains. Fungal nasal polyposis also has increased recurrence rate⁽⁹⁾.

There is a list of risk factors that may lead to fungal type of rhino-sinusitis with nasal polyposis, these include occupational exposure like farming, socioeconomic status, geographical location and health status of the individual^(10,11). Fungal nasal polyposis is one of the most common health related issue as its prevalence is dramatically increasing day by day⁽⁹⁾ so the aim of current study is

to find out the exact frequency of fungal nasal polyposis and its associated risk factors.

METHODOLOGY

A descriptive cross-sectional study was conducted at the ENT department of Jinnah Postgraduate medical center (JPMC) from August 2020 to March 2021. It was a tertiary care hospital and a referral point from the interior Sindh. Sample size was calculated by using the OpenEpi calculator and was 195. All the patients were included who were diagnosed as a case of nasal polyps on clinical examination while those were excluded who either had mass on clinical examination but was not polyp or did not come on follow up. Informed consent was taken from all the participants. The demographic data, detailed history and clinical examination of all the participants were noted. CT scan was done to assess the extent of the disease. Surgery was performed to take the specimen and sent in formalin solution for histopathological examination while another was sent in normal saline for culture and sensitivity of fungal infection. Gomorri Methylamine Silver stain and Periodic Acid Schiff stain were used to confirm the fungal hyphae.

Statistical Package for the Social Sciences (SPSS) version 20 was used to analyze the data. The numerical variables were presented as mean with standard deviation while categorical variables were presented in the form of frequency and percentages. The association between variables were calculated by using the chi-square while p-value of less than 0.05 was considered as significant.

RESULTS

About 195 patients were analyzed for the current study. The mean age of the study participants was 30.29 ± 11.42 . On histopathological findings, the Fungal nasal polyposis was reported among 43% of the individual while remaining were having allergic type of polyps. Out of 84 positive fungal cases, about 65.7% were aspergillus while remaining 34.3% of mucormycosis. Periodic acid-Schiff stain (PAS) and silver stain was used to confirm the fungal hyphae. The PAS stain manifested septate hyphae with aspergillus spores while silver stain found mucormycosis as a non-septate ribbon like hyphae as presented in Figure 1.

The study participants were divided into 4 age groups, among them majority of the affected cases of fungal nasal polyposis were noted in age group of 42-57 years with frequency

of 16.4% while very few were in age group including above 57 years of age (5.6%) but found no significant association with age. Looking over the socioeconomic status, majority of cases (23.7%) were in lower class population followed by middle class (15.9%) but the Chi-square reported no significant association. Male were the predominant than their female counterpart. About 17.2% of the cases were having BMI less than 30 and have no significant association. All the demographic characteristics of study participants and their association with Fungal nasal polyposis are presented in Table 1.

Some of the risk factors associated with Fungal nasal polyposis are presented in Figure 2. It had been found that majority of patients (43%) were farmers while about 39.9% were immunocompromised. Very few of them (22.6%) were having personal history of allergy.

Table 1 Demographic characteristics of study participants and their association with Fungal nasal polyposis

Variables	Fungal Nasal Polyposis (n = 84)	df	95% CI	p-value
Age (years)				
10-25	17 (8.8%)	4	6.02 - 8.41	0.21
26-41	24 (12.3%)			
42-57	32 (16.4%)			
≥ 57	11 (5.6%)			
Socioeconomic status				
Upper class	7 (3.6)	5	39.24 - 45.89	0.59
Middle class	31 (15.9%)			
Lower class	46 (23.7%)			
Gender				
Male	38 (19.5%)	3	3.19 - 7.40	0.12
Female	59 (30.2%)			
Body mass index				
≤ 30	34 (17.2%)	3	32.62 - 49.57	0.42
≥ 30	13 (6.7%)			

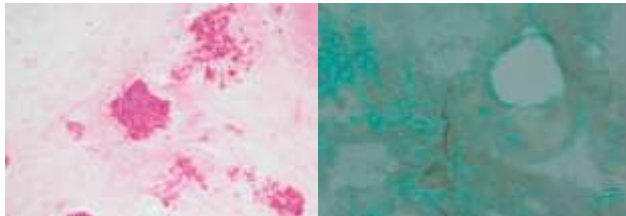


Figure 1 Presence of fungal hyphae on (a) hematoxylin and eosin stain (b) silver stain

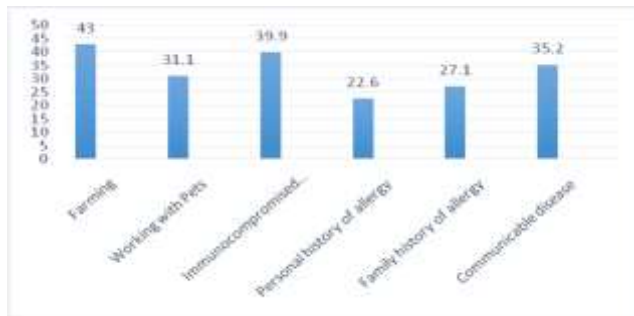


Figure 2 Risk factors associated with Fungal nasal polyposis

DISCUSSION

Nasal polyposis is the inflammation of the mucosa of paranasal sinuses and nasal cavity which appears like an outgrowth which is benign in nature. The pathogenesis includes the immune cells involvement that is T-helper cells consisting of Th-1 and Th-2 cells. There is increased expression of interleukin-12 (IL) and interferon-γ (INF-γ) in case of Th-1 cells while IL-4, IL-5 and IL-13 in case of Th-2 cells involvement(12, 13). It is one of the most common

clinical condition with innate type of immune response, affecting all age groups mainly including adults especially those who either have excessive exposure of air pollution or increased use of antibiotics.

Nasal polyposis does not depend upon any single etiological factor but in all cases inflammation remains the common factor. The underlying cause of nasal polyposis may be the allergy, any environmental pollutant or infection including viral, bacterial or fungal. Among these all causes, the fungal infection has gained special attention. Although a normal healthy adult is having fungi in his nasal mucosa, still fungi acts like an antigen in immune-compromised or hypersensitive individuals resulting in development of inflammatory cells along with some proteins which combinely damage the nasal mucosa and leads to superinfection by other inflammatory cells. On the other hand, sometimes there is formation of fungal ball which feels like a foreign body and presents with nasal polyposis(14-16).

There is a dramatically increase in number of cases of nasal polyposis with fungal infection. Current study reported the frequency of fungal nasal polyposis was 43% which is lower than that another study done in Abbasi Shaheed hospital Karachi, having frequency of 69.75% (9) likewise another study from Pakistan reported frequency of about 70% (17). In Iran the prevalence of fungal nasal polyposis is 8.1% (18) while in Saudi Arabia it is 12.1% (19). Focusing over the most common fungal species, the current study manifested that about 65.7% of the fungal infection was because of aspergillus while remaining 34.3% of mucormycosis. Likewise, Siddique et.al found 73.45% of the cases with aspergillus and 26.55% cases with mucormycosis(9) while Aziz et.al reported 64.3% of the cases with aspergillus(20).

Literature revealed that the fungal nasal polyposis can affect any age group, depending upon the immunity of the person. It has also been stated that the affected age group is usually from those who either use more antibiotics or are more exposed to air pollution(6). One of the study done in Peshawar found majority of cases in the age group of 20-29 years (21) but another study reported 62% of affected cases from age range of 21-40 years (22) while current study found that cases were mostly from 42-57 years of age group. These variations are because of the health status of the individual from the particular geographical area and socioeconomic variability. Current study also found that the most affected socioeconomic class was the lower class followed by middle class but with no significant association, same is found by Jawad et.al, in his study the majority cases were from lower socioeconomic status and had positive association(23). Studies reported that majority of females were having history of fungal nasal polyposis as compare to their male counterpart (20). The current study contradicted this finding by reporting male predominance over female but results were non-significant.

Looking over the associated risk factors, literature reported that farmers are three times more prone to develop fungal nasal polyposis (24, 25). Current study found 43% of the cases were having the occupation of farming. On the other hand, literature also revealed that immune-compromised individuals are at higher risk of developing fungal infection like Midhat et.al reported 22.2% of immune-compromised patients either having uncontrolled diabetes or any tumor, or on chemotherapy, were having history of fungal nasal polyposis (24). In the current study about 39.9% of positive cases were immunocompromised.

If the fungal nasal polyposis is diagnosed on culture and sensitivity, the antifungal treatment should be started, although there is a lack of guidelines for antifungal medication to cure sinusitis. Currently cortisone is prescribed which provides short term relief and more side effects like osteoporosis, increasing blood pressure and obesity. So there is a need of early recognition of disease and appropriate guidelines for prescribing antifungal medication to cure nasal polyposis.

CONCLUSION

Current study concluded that there is a high prevalence of fungal nasal polyposis that is 43% in current setup. The disease is

multifactorial and is predominant in farmers and in immunocompromised individuals. There is a need to consider the possibility of fungal nasal polyposis and its timely evaluation to prevent the intracranial complications.

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