ORIGINAL ARTICLE

Frequency of Fungal Involvement in Nasal Polyposis

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ABSTRACT

Objective: To observe the involvement of fungi in nasal polyp
Setting: Study was carried out from September 2008 to May 2010, on twenty six patients in the Department of Microbiology, Basic Medical Sciences Institute (BMSI), Jinnah Postgraduate Medical Centre (JPMC), on the specimens (nasal polyps) from tertiary care hospital.
Study design: Cross sectional study
Method: Specimen were taken from the department of ENT of different tertiary care hospitals and processed for the diagnosis by potassium hydroxide mount and mycological culture in the department of Microbiology, BMSI. Potassium hydroxide mounts was microscopically evaluated for the presence of thread-like branching structures (hyphae) or beaded spherical structures (spores). If present, it was considered as a positive test. Mycological culture was done using Sabouraud's dextrose agar at 25ºC and at 37ºC. Observation for growth was done periodically for 4 weeks; if growth was present then the pathogen was identified by cultural characteristics and microscopy.
Statistical method: Descriptive statistics for KOH mount and mycological culture of the type of fungus and organisms were evaluated. Data was collected and results tabulated
Result: In 17 specimens the fungal culture was positive and in 2 specimens fungal element was observed only on microscopy while in seven specimens no fungal involvement was seen.
Conclusion: There is a high frequency of involvement of fungus in nasal polyps.
Key words: Nasal polyp, fungal infection, Aspergillus infection, fungal culture

INTRODUCTION

Nasal polyposis is a chronic inflammatory disease of the mucous membrane in the nose and paranasal sinuses presenting as pedunculated smooth, gelatinous, semitranslucent, round or pear shaped masses of inflamed mucosa prolapsing into the nose[1].

It is believed that nasal polyps are formed as a result of frequent local swelling of nasal or sinus mucosa, which enlarge by increasing sub-mucosal edema and then expose to the airway and cause symptoms. However, the main cause of polyp formation is not exactly understood[2]

Primary symptoms of nasal polyposis are nasal blockage, nasal congestion, hyposmia or anosmia and if associated with chronic sinusitis a purulent nasal discharge. Secondary symptoms comprise post nasal drip, rhinorrhea, facial pain, headache and sleep disturbance[3]. Most theories consider polyps to be ultimate manifestation of chronic inflammation. Therefore, conditions leading to chronic inflammation in the nasal cavity can lead to nasal polyps[4]

Fungal Infection: Fungal infections of nose and paranasal sinuses are not uncommon. They can infect other areas of the body, but respiratory tract infections are far more common than the others. Aspergillus is the commonest infective fungus of the nose and paranasal sinus[5] With increasing numbers of immunocompromised patients (Diabetics, the patients with chronic renal failure, chronic malnutrition and the persons on prolonged corticosteroid and antibiotic treatment) the fungal infections of nose and paranasal sinuses has been on rise. It was rarely noticed before eighties but the condition is now diagnosed easily with the introduction of endosinuscopy and the better diagnostic facilities and the incidence of fungal infections has increased dramatically in recent years[6] and frequent recurrence of polyps are also observed[2]

Patients with anatomic abnormalities of the paranasal sinuses that impair drainage, such as nasal polyps or chronic inflammatory states, are vulnerable to fungal colonization in these areas. Areas of mucosal injury may cause pooling of mucus and subsequent colonization by fungus[7]

Recently, fungal elements were suspected to be the causative agent of chronic rhinosinusitis and a fungal

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etiology was found to underlie severe nasal polyposis[8].

Organisms: The fungal agents isolated from paranasal sinuses include *Aspergillus, Mucor, Histoplasma, Coccidiodies,Candida*,[9] *Acremonium, Curvularia, Fonsecaea* , *Penicillum*[6]*. Aspergillus spp.* are the most common colonizers of the sinuses[7].

Fungi are found mainly in air, dust, soil, plants, and decaying organic matter. They adhere to dust particles and are inhaled and deposited on the nasal and paranasal sinus mucosa. The warm, moist environment of the upper respiratory tract is an ideal environment for the proliferation of these organisms.[10] However, they are rarely pathogenic because host resistance is high except under favorable growth conditions in highly susceptible individuals[2].

Pathogenesis: The role of fungal infection as cause or effect in nasal polyps is difficult to determine because of the ubiquitous nature of fungal spores. But recent studies show that these polyps may also be caused by fungal infection of the sinunasal mucosa[5,11] Therefore, nasal polyp formation and growth may be initiated by both fungal infectious and non-infectious inflammation[12,13]. Both fungal infection and a local allergic process to fungal colonization of sinunasal mucosa had effect in the nasal polyp formation[8].

Classification: Fungal infection of nose and paranasal sinuses are classified into two groups: the non invasive and invasive. Non-invasive includes mycetoma and allergic fungal sinusitis. The invasive comprises the chronic indolent form, which presents slowly progressive bone erosion, and fulminant form[14].

Allergic and non-invasive has been described together as extramucosal disease while invasive and fulminant are both variants of tissue invasive disease[15].

MATERIAL & METHODS

The study includes 26 patients presented with nasal polyp who were admitted for surgery in the Department of Otorhinolaryngology, tertiary care hospital, Karachi during the period of from September 2008 to February 2010. Clinical examination performed by ENT surgeon, includes ear, nose, throat and general examination. Face was examined to observe any apparent deformity (e.g. any asymmetry of the face, any swelling on the face in the sinus region, cheek, and nasal deformity). Nose and throat were examined to observe the effects of nasal obstruction. Eyes were examined for any orbital involvement (proptosis, hypertelorism, telecanthus and impaired vision by the Ophthalmologist. Laboratory investigations included complete blood picture, clotting profile, urine exam, blood sugar, and immunoglobulin estimation, specially the Ig E.

Radiological examination included the X-ray of paranasal sinuses with water's View. CT-scan was done for observing the sinuses, bony erosion, orbital and intracranial extension. Surgery was tailored according to the need of the patient. After surgery, samples were divided into two parts under sterile process in operation room. one part was placed in formalin for histopathology and the other in sterile normal saline and was sent to Microbiology department for fungal stain and fungal Culture of specimen.

The study was carried out in the Department of Microbiology, BMSI, JPMC, Karachi, and were processed for the diagnosis by 10% potassium hydroxide mount and mycological culture. Data was collected and results tabulated. All patients who presented with nasal polypi clinically, with suspicion of fungal sinusitis based on radiological evidence and peroperative findings referred by ENT department of tertiary care hospital were included in the study. There was no exclusion on any other medical ground.

Data collection procedure: Specially designed proforma was used for data collection. All the specimens provided by ENT Department with clinical diagnosis of nasal polyp were included. Specimens were sent to Microbiology Department, BMSI, JPMC, Karachi with a prescribed request form with complete history including age, sex, address, duration of the disease, socioeconomic condition, any concomitant disease and treatment history etc. Twenty six patients who were clinically diagnosed as a case of nasal polyp were included in the study. Among these patients 13 (50%) were female while 13 (50%) were male and their age ranged between 11-50 years.

Processing of specimen: Processing of specimen was done for direct microscopy by 10% Potassium hydroxide mounts and mycological culture.

Potassium hydroxide mounts: Specimen was placed on a slide and a drop of KOH was added. A cover slip applied with gentle pressure to drain away excess KOH. Now slides were microscopically evaluated for the presence of thread-like branching structures (hyphae) or beaded spherical structures (spores). If present, it was considered as a +ve test.

Mycological culture: Culture was done by using Sabouraud's dextrose agar at 25ºC and at 37ºC. Observation for growth was done periodically for 4 weeks. If there was growth, pathogen was identified by cultural characteristics and microscopy.

Microscopy of Positive culture: For observing the microscopic features of the isolates, lactophenol cotton blue stain (LPCB) was used. A piece of colony (fungal growth) was taken with the help of sterilized needle and put on a clean (flamed) slide containing one drop of lactophenol cotton blue stain. Then the

slide was observed under microscope using low X10 and high X40 power objectives. The reason for keeping the specimen at room temperature and body temperature; it tells about dimorphism because dimorphic fungi will appear as mold at room temperature while as yeast at body temperature.

RESULT

Twenty six patients who were clinically diagnosed as a case of nasal polyp were included in the study. Among these patients 13 (50%) were female while 13 (50%) were male and their age ranged between 11-50 years. Among these twenty six patients thirteen (50%) were female and forty thirteen (50%) were male. Age range was from 16 to 50 years. Maximum patients were between the age ranges of 21-30(42.31%) years. Six (23.08%) patients were between 11-20 years of age while five (19.23%) were between 31-40 years of age and four patients (15.38%) between the 41-50 years of range.

Table I: Sex incidence

Sex	=n	%age
Male	13	50
Female	13	50
Total:	26	100%

Out of 26 patients included in this study 13 were males and 13 were females.

Table II: Age group Distribution

Age (in years)	=n	%age
16-20	6	23.08
21-30	11	42.31
31-40	5	19.23
41-50	4	15.38
Total	26	100%

Age of the patient ranged from 16 years to 50 years. Mean age is 29 years

Table III: Occupation

Occupation	=n	%age
Household	10	38.46
Student	4	15.38
School teacher	1	3.85
Farmer	1	3.85
Laborers	4	15.38
Shopkeepers	4	15.38
Service	1	3.85
No occupation	1	3.85
Total	26	100%

Household females topped the list (38.47%)

Table IV: Socioeconomic condition

Status	=n	%age
Good	Nil	0
Fair	1	3.85
Average	4	15.38
Poor	21	80.77
Total	26	100%

As assessed by locality space of residence, earning members in the family, monthly income and number of dependents, the numbers of poor patients are more i.e. 21 out of 26 patients

Table V: Presentation at the time of admission

Presentation	=n
Nasal Obstruction(Nasal Polyp)	26
Impaired sense of smell	16
Nasal deformity	14
Headache	11
Sneezing	10
Proptosis	8
Impaired hearing	5
Intracranial Extension	4
Impaired vision	4
Sore Throat	4
Swelling Cheek	2
Asymmetry of Face	2
Blood discharge from nose	2
Frontal sinus swelling	1
Loss of vision	1
Epiphora	1
Pain in Temporal region	1
Difficulty in speaking	1

In almost all the patients nasal obstruction and nasal polyp were found. 19 patients (73.08%) presented with bilateral nasal polyp. In majority of the patients more than one complains was present. Impaired sense of smell present on right side in 15 patients. Proptosis present in 8 patients. In majority of the patients more than one sinus was involved, maxillary sinus involvement topped these patients. In more than 50% of the patients there is past history of nasal surgery.

Table VI: Duration of illness

Duration	=n
1-6 months	7
6 months-1year	6
1-2 years	6
2-3 years	3
3-5 years	2
> 5 years	2
Total:	26

Table VII: Fungal culture

Culture	=n
Aspergillus species	10
Aspergillus flavus	06
Aspergillus fumigates	01
Fungal culture negative (Microscopy +)	02
Fungal culture negative	07

DISCUSSION

In this study it occurred mostly in the age group of 20-30 years (range 11-50 years) with a mean age of

29 years. Most of the patients belonged to the low socioeconomic group. The common factor irrespective of socio-economic status was unhealthy living environment and lack of awareness. Most of the affective were living in overcrowded and damp places. Nasal allergy and sinusitis were the common features. Many of the patients initially avoided proper treatment because of low literacy. They went to Hakims, quacks and homeopaths and also to general practitioner in their vicinity and hence referral to proper specialist was delayed. They used many medicines in this period including various antibiotic, nasal drops etc. Poor personal hygiene as obvious from their appearance compounded the problem.

No male and female preponderance was observed as sex incidence was equal in our study which is consistent with the study of Kordbacheh et al.[8] while the study of Waxman et al. showed a marginal preponderance[16]. Among the 13 females 11 were housewives which is in accordance with the study of Kordbacheh et al[8]. Of the 13 male sufferers majority were labourers and shopkeepers. While according to Kordbacheh et al[8]. The people who had more prevalence of fungi in their nasal polyps had a long time exposure to dust at work or in their house. This factor was also observed in our study and is related to the occupation of the patients. The disease does not show any relation to the ethnic group.

Patient in our series presented with nasal obstruction as the main complaint. Impaired sense of smell, nasal deformity, headache, sneezing, proptosis, impaired hearing, sore throat, swelling cheek, asymmetry of face, intracranial extension, impaired vision were the other features. Bleeding from nose, swelling in frontal sinus region, loss of vision, epiphora, and pain in temporal region and difficulty in speaking were also registered as some of the complaints. It is quite evident from the above chart that more than one symptom was present in majority of the patients. All the cases presented with nasal obstruction secondary to nasal polyposis, which were identical to the other studies conducted by Razmpa[2] Jonathan[17] and Panda[18].

In our study 8 patients also presented with proptosis similar to the observations in north India by Panda et al[18] and also by Daghistani et al[19] Heier reported cases of fungal sinusitis in immunocompetent young adults with proptosis[20].

The patients who presented with swelling of cheek, swelling in the frontal sinus region, proptosis and intracranial extension; all of this category were among the late referrals. Allergic nasal polyposis has been found to harbor Aspergillus quite frequently[21]. This may be the cause for some facial disfigurements[21]; as found in our patients.

In our study 2 patients were diabetic and rests of the 24 patients were healthy otherwise. Among the diabetics, who presented with loss of vision of right eye, the blood sugar level was uncontrolled. Noninvasive and invasive forms of fungal sinusitis are not necessarily discrete and may coexist in the same patient[30]. Clinical features of orbital involvement or computed tomography manifestations of extra sinus spread should alert the clinician to the possibility of invasion[22].

Aspergillus is the most common infection of paranasal sinuses and usually appears as chronic sinusitis in otherwise healthy persons. In our study, Aspergillus species was isolated in seventeen in a total of twenty six samples, which is in accordance with the study of Razmpa[2] and. Kordbacheh[8]. Aspergillus flavus was observed in most of the cases which is consistent with the study of Razmpa[2] and Kordbacheh[8].

Fungal culture report revealed Aspergillus species in 10 and Aspergillus flavus in 6 patients while fumigatus was in one patient. In 2 patients report was positive for fungus on microscopy only. It was negative in 7 patients on microscopy as well as by culture method. Panda et al[18] and Chhabara et al[23] in India conducted the study and found Aspergillus flavus in 79.7% and in 9 out of 11 patients respectively. Kameswaran et al[24] conducted the study in Saudi Arabia, Abha and identified Aspergillus flavus as the causative agent in the study while Daghistani et al[19] conducted the study in Saudi Arabia but in a different area, Jeddah and found Aspergillus fumigatus as the pathogen in the study. Jonathan et al[17] found both Aspergillus flavus and fumigatus study.

CONCLUSION

1. Allergic aspergillus sinusitis occurs mostly in poor community living in overcrowded and damp environment. It was common in both sexes and more frequently involved between 20-30 years.
2. No definite relationship was found between allergic aspergillus sinusitis and immuno-suppression.
3. All cases presented with nasal obstruction due to nasal polyposis; however patients presented with complications including the nasal deformity, proptosis, swelling of the cheek. These patients were among the late referrals.
4. 12 of our patients already had gone through surgery in the form of nasal polypectomy, reflective of the high recurrence rate of disease.
5. CT finding of intrasinus calcification were found to be helpful in differentiating fungal from nonfungal sinusitis. Also this is the best way to identify the extent, bone destruction, intracranial spread and orbital involvement.
6. Although preoperative assessment and planning is necessary, the final decision regarding surgical

debridement was tailored peroperatively according to the individual needs and the magnitude of the problem.
7. Aggressive nasal polyposis and multisinus involvement is a hallmark of fungal sinusitis.
8. Thick brown to green cheesy material with concretions, from the sinuses is very pathognomonic of allergic aspergillus sinusitis.
9. Aspergillus species was found in 17 cases, reflecting the high incidence of allergic aspergillus sinusitis in our hospitals.
10. Postoperative Itraconazole is necessary in all the cases where the fungal culture is positive.
11. Systemic and topical steroid play an important role in prevention of recurrence.

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