

An Observational Study to Evaluate Fungal Elements by Potassium Hydroxide Mounts in Chronic Otitis Media

Chandan Kumar¹, Vandana², Satyendra Sharma³

¹Assistant Professor, Department of ENT, Nalanda Medical College and Hospital, Patna, Bihar, India

²Tutor, Department of Pathology, Nalanda Medical College and Hospital, Patna, Bihar, India.

³Associate Professor, Department of ENT, Nalanda Medical College and Hospital, Patna, Bihar, India

Received: 04-11-2021 / Revised: 23-11-2021 / Accepted: 29-12-2021

Corresponding author: Dr. Vandana

Conflict of interest: Nil

Abstract

Aim: Study of fungal elements by potassium hydroxide mount in chronic otitis media.

Methods: This retrospective study conducted in the Department of ENT, Nalanda Medical College and Hospital, Patna, Bihar, India. Total 100 Patients chronic otitis media were included with no history using ear drops for last one week and using two sterile swabs without touching the external auditory canal, ear discharge was taken from middle ear and placed in sterile container and sent for microbiology laboratory for culture and potassium hydroxide (KOH) mount respectively.

Results: We found that 16% KOH rate positive with 9.5-22.5% probable range for KOH positivity 95% CI which will impact in modification of treatment in chronic otitis media and were effectively treated with antibiotic and antifungal ear drops and 7 patients were required oral antibiotics as well. *Pseudomonas* was found to be common bacteria among 100 samples and 50 samples were showing no growth and 8 out of 50 samples were showing positive for KOH mount. In our study, 10/16(62.5%) was found to be aspergillus, 4/16(25%) was found to be candida and 2/16 (12.5%) was found to be other saprophytic species.

Conclusions: We conclude that in patients with COM, send ear discharge for both culture and sensitivity and KOH mount and it should be routine and always consider combined therapy i.e., antibiotic and antifungal drugs.

Keywords: Chronic otitis media, KOH mount, Combined therapy, Prevalence.

This is an Open Access article that uses a fund-ing model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited

Introduction:

Otomycosis or fungal otitis external has typically been described as fungal infection

of the external auditory canal with infrequent complications involving the middle ear [1].

Fungi can either be the primary pathogen or be superimposed on bacterial infections or can be secondary pathogen in previously perforated tympanic membrane. Chronicity of ear discharge is important factor in the cause of fungal infection of otitis media. It causes humid condition in the ear and alters the pH to alkaline. Epithelial debris which eventually helps the growth of fungus. Topical use of steroid and antibiotics cause the fungal infection in the middle ear. Use of only antibiotics either topically or systemically in these patients will not help in clearing the inflammation instead it will promote the fungal growth by making favorable environment in the middle ear [2].

The incidence of COM is higher in the developing countries owing to poor nutrition, unhygienic living conditions, lack of health education and scarcity of health care services. In the present times the indiscriminate use of broad-spectrum antibiotics, corticosteroids, cytotoxic chemotherapy as well as the increased incidence of conditions accounting for immune deficiency has led to the increase prevalence of superadded fungal infection in COM. In a number of previous studies, it has been suggested that the irrational and excessive use of topical antibiotic and steroids for all cases with COM, promotes the growth of [3,6]. *Aspergillus* and *Candida* spp. are the most frequently isolated fungi in patients with otomycosis [7]. Factors that predispose to otitis external include absence of cerumen, high humidity, increased temperature, bacterial otitis external, corticoid therapy, swimming [8] and local trauma –caused by sharp objects like sticks or hearing aids. Cerumen has a pH of 4 to 5 and so suppresses bacterial but conducive for fungal growth. Aquatic sports, including swimming and surfing, are particularly associated with otomycosis because repeated exposure to water results in removal of

cerumen and drying of the external auditory canal [9]. Otomycosis is predominantly unilateral [10], found in all age groups, but majority of the cases of otomycosis occur in patients aged 21 -30 years with equal male – female distribution [11]. This study was taken to assess the prevalence of fungal elements positivity in ear discharge of the patients with COM.

Material and Methods

This observational study was carried out in the Department of ENT, Nalanda Medical College and Hospital, Patna, Bihar, India.

Methodology

Total 100 Patients chronic otitis media were included with no history using ear drops for last one week and using two sterile swabs without touching the external auditory canal, ear discharge was taken from middle ear and placed in sterile container and sent for microbiology laboratory for culture and potassium hydroxide (KOH) mount respectively. These swabs taken by a single surgeon to maintain uniformity. Collected bacterial culture reports and KOH mount reports and calculated all culture and KOH positive reports and treated the patient with antibiotic and antifungal or antifungal ear drops alone for 3 weeks according to culture and KOH reports. Patients who were not resolved from ear drops, treated with oral antibiotics and oral antifungals or oral antifungals for 20 days along with ear drops, according to culture and KOH reports.

Results

The age range of study participants was found to be 8 months to 77 years (Table 1). Females were found to be more common than males (Table 2). Overall prevalence rate KOH positivity was found to be 17% (Table 3).

Table 1: Age distribution

Age	N=100	%
Below 10	11	11
10-20	8	8
20-30	35	35
30-40	27	27
40-50	10	10
50-60	5	5
Above 60	3	3

Table 2: Sex wise distribution

Age group (years)	No. of cases	%
Male	44	44
Female	56	56
Total	100	100

Table 3: KOH mount positivity

Total no. of cases	No. of cases KOH +ve	KOH +ve rate (%)	95% CI
100	16	16	9.5-22.5

Our study showed that among 100 patients of either sex between age group 8 months to 77 years diagnosed with COM, 16 (16%) patients showed KOH positivity which is clinically and statistically found to be significant and probability of KOH positive in future will be in between 9.5-22.5%.

Table 4: Culture reports

Bacteria	No. of cases	Percentage
<i>Pseudomonas</i>	25	25
MRSA	8	8
<i>Klebisella</i>	5	5
<i>Acinetobacter</i>	4	4
CONS	4	4
<i>Staphylococci aureus</i>	3	3
<i>Coagulase positive staph</i>	2	2
<i>E. coli</i>	2	2
<i>Proteus mirabilis</i>	1	1
No growth	50	50
Total	100	100.0

In our study, *Pseudomonas* was found to be common bacteria among 100 samples and 50 samples were showing no growth and 8 out of 50 samples were showing positive for KOH mount.

Table 5: KOH mount reports

Fungus	No. of cases	%
<i>Aspergillus species</i>	10	62.5
<i>Candida species</i>	4	25
Other saprophytes	2	12.5
Total	16	100

Most common fungal pathogen was found to be *Aspergillus*

Discussion

COM is the chronic inflammation of the mucosal lining of middle ear cleft and usually presents with ear discharge in affected ear. In India, due to temperate climate with heavy monsoons, CSOM is a major complaint encountered in ENT clinics. It has multiple etiological factors and recurrence of the disease is common. Due to use of antibiotic and/or steroid topical ear drops leading to favorable environment to the fungi growth in the middle ear. Fungal infection in the middle ear cleft leads to recurrences of the ear discharge in COM and if not treated the same, leads to failure in the treatment [12].

In our study, overall prevalence rate KOH positivity was found to be 16% comparable to other studies like, Ghosh et al states that, out of 130 cases, 34 were found fungal positive having the prevalence rate 26.15% [13]. Roy et al states that, out of 200 cases, 74 (37%) were positive on culture. Culture positivity was more in chronic otitis media (COM) without any active discharge 45.2% than in chronic suppurative otitis media (CSOM, 29.5%) [14]. Statistically calculated probable range of KOH positivity was not calculated any of the above studies.

In our study, out of 100 samples, 25 samples were *Pseudomonas*, 50 samples were showing no growth and other bacteria were MRSA (7), *Klebsiella* (5), *Acinetobacter* (4), CONS (4), *Staphylococci* (3), *Escheria coli* (2), *Proteus mirabilis* (1). *Aspergillus* was found to be more common among fungal growth. Similar to the study done by Gandhi

et al states that, out of the 245 samples studied for bacterial and fungal isolates, 225 samples showed growth of pathogens, 20 samples did not show any growth, 201 samples showed bacterial growth, The most predominant organism was *Staphylococcus aureus*, 24 samples showed fungal growth, *Aspergillus* SPS being the predominant isolate [15].

In our study, 10/16(62.5%) was found to be *aspergillus*, 4/16(25%) was found to be *candida* and 2/16 (12.5%) was found to be other saprophytic species. Similar to the study done by Kumar et al study reported that, among the fungal etiology in CSOM, the most commonly isolated organisms are *Aspergillus species* and *Candida species* [16]. Chauhan et al states that a total of 70 samples with 36.36% (12/33) *Aspergillus fumigatus* was found to be predominant fungal isolate. While 30.30% (10/33) *Aspergillus niger*, 18.18% (6/33) *Candida albicans*, 6.06% (2/33) *Aspergillus terreus*. A few i.e., 3.03% (1/33) each of *Candida tropicalis*, *Rhizopus species* and *Paecilomyces species* were also observed [17].

We have treated all patients were treated with 4 weeks antibiotics and antifungal ear drops for 4 weeks but 6 patients were not improved with ear drops so oral antifungals given to dry the ear.

Conclusion

We conclude that in patients with COM, send ear discharge for both culture and sensitivity and KOH mount and it should be routine and

always consider combined therapy i.e., antibiotic and antifungal drugs.

Reference

1. Ho T, Vrabec JT, Yoo D. Otomycosis: Clinical features and treatment implications. *Otolaryngology - Head and neck surgery*. 2006;135:787-791.
2. Sachdev VP, Bhatia JN. A survey of otitis media in PGI, Chandigarh. *Ind J Otolaryng*. 1965; 17:134-9
3. Baurah PC, Aggarwal SC, Arora MML, Mehra YN: Clinical and microbiological studies in suppurative otitis media in Chandigarh. *Ind Jour Otolaryng* 1972;24:151-160.
4. Kunelskaya YY: Significance of fungal flora in C.S.O.M. *VestnOtorinolaringol* 1969,13:28-32.
5. Larina TN, Seemenova VI: Candidamycosis in children. *Vestnotorinolaringol* 1967, 27:59-61.
6. Sen Gupta RP and Kacker SK: Otomycosis. *Ind Jour Med Scien* 1978, 32:5-7
7. Vennewald I, Klemm E. Otomycosis: Diagnosis and treatment. *Clin Dermatol*. 2010;4;28(2):202-11.
8. Ozcan KM, Ozcan M, Karaarslan A, Karaarslan F. Otomycosis in Turkey: predisposing factors, etiology and therapy. *J Laryngol Otol*. 2003; 117:39-42
9. Kujundzic M, Braut T, Manestar D, et al; Water related otitis externa. *Coll Antropol*. 2012;36(3):893-7.
10. Satish HS, Viswanatha. B, Manjuladevi. M. A Clinical Study of otomycosis. *IOSR Journal of Dental and Medical Sciences*. 2013;5(2): PP 57-62 .
11. Chander J, Maini S, Subrahmanyam S, Handa A. Otomycosis--a clinicomycological study and efficacy of mercurochrome in its treatment. *Mycopathologia*. 1996;135(1):9-12.
12. Lubis YM, Dharma, Chaidir AZ, Refilda, Fachrial E. Profile of chronic suppurative otitis media patients with positive fungal culture in Medan, Indonesia. *J Chemical Pharmaceutical Res*. 2016;8(1):23-6.
13. Ghosh A, Rana A, Prasad S. Prevalence of Fungal Infection in Chronic Suppurative Otitis Media: A Study at Tertiary Care Hospital in Western Uttar Pradesh. *Indian J Microbiol Res*. 2015;2(3):159-62.
14. Ghosh RR, Pal S, Ghosh M, Samaddar D, Banerjee M. Prevalence of Fungal infection in chronic otitis media: A study at a tertiary care hospital in Eastern India. *Int J Curr Microbiol App Sci*. 2015;4(3):684- 90.
15. Gandhi VV, Sree PN, Kalyani M. A Study on Etiological Agents with Special Reference to Fungal Isolates causing Chronic Suppurative Otitis Media in a Tertiary Care Hospital. *Int J Curr Microbiol App Sci*. 2016;5(11):508-14.
16. Yadav RK, Gaurav K, Bansal M, Jaiswal A. Fungal profiling in patients with chronic suppurative otitis media: a microbiological study. *Int J Contemporary Med Res*. 2016;3(8):2271-4.
17. Chauhan J. Bacterial and fungal profile in Chronic Suppurative Otitis Media in a tertiary care hospital in Uttarakhand. *IOSR J Pharmacy Biological Sci*. 2019;14(1):38-44.