A CLINICAL AND MYCOLOGICAL STUDY OF OTOMYCOSIS AMONG RURAL POPULATION IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Fungal infection of the external ear canal and auricle is a common source of concern to the otolaryngologist. It is highly prevalent in hot, humid and dusty areas of the tropics and subtropics. Refractory cases of Otomycosis pose a challenge to the clinician to determine whether the external ear disease is an isolated entity, or related to any other systemic disorder, or the result of an underlying immunodeficiency disorders. Otomycosis can also be associated with chronic middle ear disease and open mastoid cavity infection. The various synonyms such as 'Singapore ear', 'hot weather ear' or 'mildew ear' were all caused by bacterial agents but not by fungal agents as previously suspected. Thorough understanding of anatomy and physiology of the external ear canal is necessary for Management of the otomycosis. Knowledge of the microbiology of potential pathogens and familiarity with clinical presentation is necessary for accurate and timely diagnosis.

Key words: Otomycosis, culture, KOH mount, aspergillus, candida, clotrimazole.

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INTRODUCTION: Diabetic Foot Ulcers is the most common ca use of chronic wounds throughout the world. The lifetime risk of a person with diabetes developing a foot ulcer could be as high as 25 percent, and it is believed that every 30 seconds a lower limb is lost somewhere in the world as a consequence of diabetes. Diabetic foot ulcers are the single biggest risk factor for nontraumatic foot amputations in persons with diabetes2. The peculiar characteristic is the refusal of the diabetic foot ulcer to heal despite the best wound care management. The worldwide prevalence of diabetes estimated to be 9.3 percent in 2021. By theyear2030, it is estimated that 366 million persons in the worldwillhavediabetes.In2021it is estimated that 72.96 million Indian people are diabetic with prevalence of 7.8%.Chronic wounds area tremendous burden to the health care system, accounting for about $20 billion in health care costs per year worldwide. Many techniques have been tried over the centuries to heal chronic leg ulcers. Although there exists no ideal wound dressing in the management of chronic wounds, especially diabetic foot ulcers have seen many new developments. Recent studies have shown that application of a sub atmospheric pressure in a controlled manner to the wounds itehas got an important role in assisting wound healing. The treatment of diabetic foot wounds requires a multidisciplinary approach.3 Treatment of peripheral vascular disease (PVD), infection and of pathological plantar pressure playa significant role in the overall management of the selesions. Topical treatment of wounds using advanced wound dressings has, unfortunately, not yet populariz

INTRODUCTION: otomycosis was described by Andrall and Gaverret as superficial fungal infection of the outer ear canal[1]Refractory cases of Otomycosis pose a challenge to the clinician to determine whether the

external ear disease is an isolated entity, or related to any other systemic disorder, or the result of an underlying immunodeficiency disorders[2]. Otomycosis can be acute, sub-acute or chronic. It is characterized by exudative inflammation and pruritus from which a number of fungi and bacteria can be isolated.[3] Otomycosis is usually unilateral otitis that is characterized by inflammation, pruritus and scaling in earcanal.[4]The prevalence of Otomycosis has been reported to be as low as 9%and as high as 30.4% in patients presenting with Otitis or inflammatory conditions of the ear.[5] Otomycosis is prevalent worldwide but more common in warm humid climates, and warm seasons (summer). Otalgia, hearing loss, severe discomfort, suppuration, pain due to deeper tissue inflammation and aural fullness due to moist debris within the canal are the presentingcomplaints[6]. Predisposing factors of Otomycosis include Absence of cerumen, Water in the canal, Narrow EAC, Atopy, allergy, humid environment and immunosuppression are other factors attributed in the pathogenesis Preservatives in most ear drops (Benzalkonium) or steroids themselves may be causative agents through atopic and non - atopic allergic mechanisms, that may or may not involveIgE.[7] Otomycosis can also be associated with chronic middle ear disease and open mastoid cavity infection. The various synonyms such as 'Singapore ear', 'hot weather ear' or 'mildew ear' were all caused by bacterial agents but not by fungal agents as previously suspected[8].Thoroughunderstanding of anatomy and physiology of the external ear canal is necessary for Management of the otomycosis. Knowledge of the microbiology of potential pathogens and familiarity with clinical presentation is necessary for accurate and timely diagnosis9. Control of infection can be obtained by topical antifungals and cleaning of fungal debris from the external canal. It is to be stressed that there are no reports on the toxicity of antifungal drugs in literature[5].

we describe the spectrum of clinical features, types of fungi and management of patients diagnosed newly with otomycosis in the ENT OPD of V.M.K.V. Medical College and Hospitals, Salem.

METHODS:

A cross sectional prospective study with 100 patients with clinically diagnosed Otomycosis and are not on prior treatment attending OPD of ENT, VMKVMCH, SALEM of all ages were included in our study between December 2017 to June 2019.

After proper history taking and thorough clinical examination, patients were subjected to routine blood investigations and endoscopic ear examination. After otoscopic examination, a clinical diagnosis of otomycosis was made. A swab was taken from debris in the external auditory canal and subjected to 10% KOH preparation. The swabs were then sent to the microbiology department. No transport media was used. Swabs were immediately inoculated over SDA agar media and incubated for 48-72 hours at 37°c.

Patients were given 1%CLOTRIMAZOLE for one week.

Patients were followed up after 1 week, 2 weeks, 3 weeks and progress were noted in terms of reduction of symptoms and signs.

RESULTS:

In our study, the study population is between the ages 6 to 73 with the minimum age being 6years and maximum is 73 years with the mean of 40.04

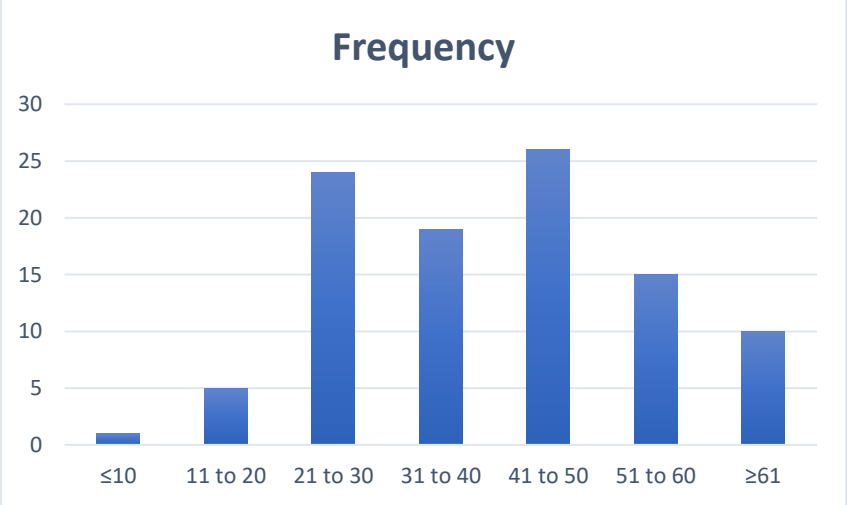
Table 1: mean age

	Mean	Std. Deviation
Age	40.04	14.917

Table 2: frequency of age distribution

Age	Frequency	Percent
≤10	1	1.0
11-20	5	5.0
21-30	24	24.0
31-40	19	19.0
41-50	26	26.0

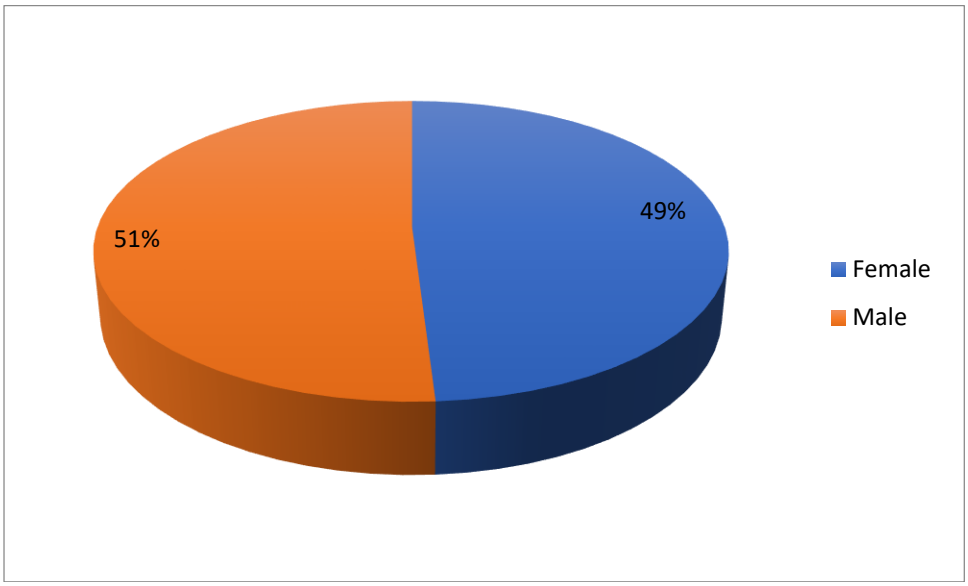
51-60	15	15.0
≥61	10	10.0
Total	100	100.0



26% of patients are in the range of 41-50 years, followed by 24% in the age group of 21-30 years.

Table 3: sex distribution

Sex	Frequency	Percent
Female	49	49.0
Male	51	51.0
Total	100	100.0

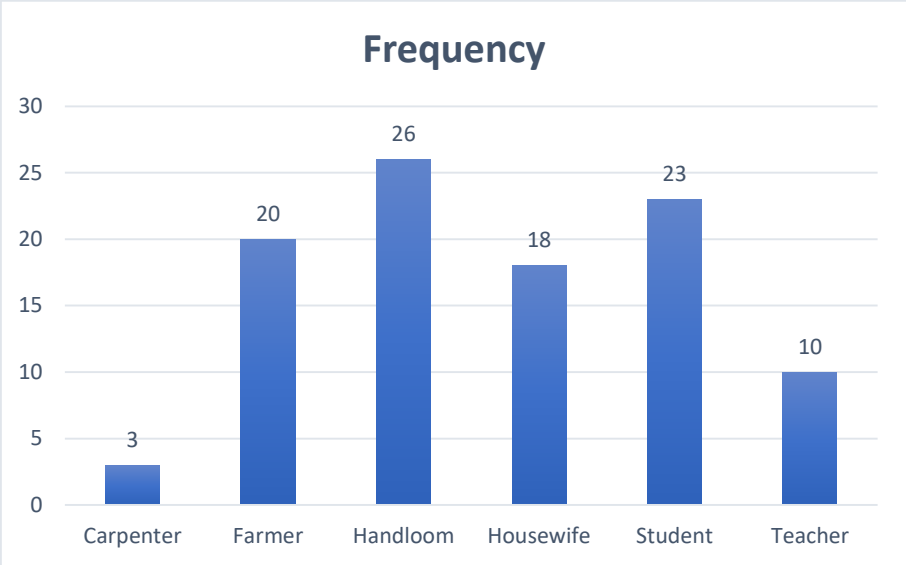


51% of patients are male and 49% of patients are female.

Table 4: frequency distribution of occupation of study population

Occupation	Frequency	Percent
Carpenter	3	3.0
Farmer	20	20.0

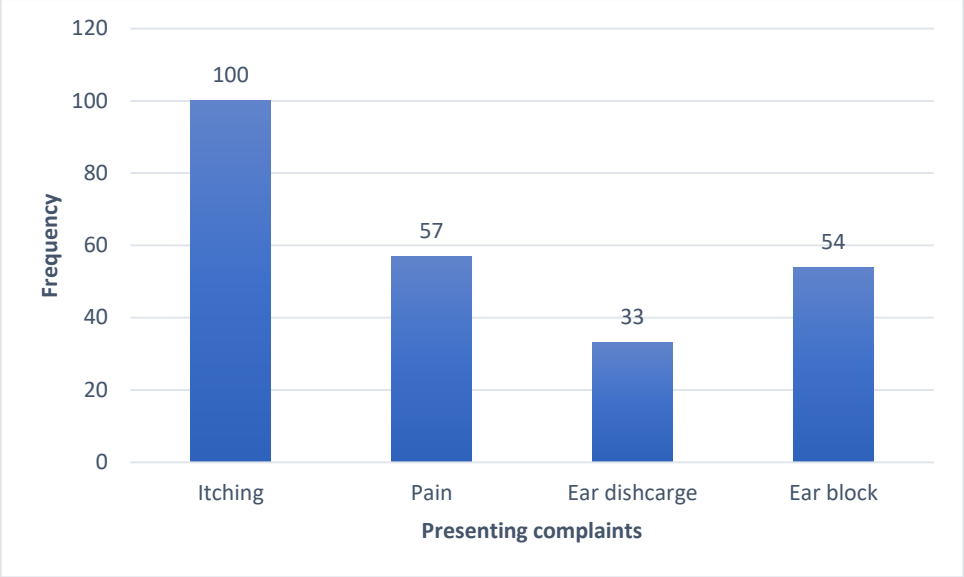
Handloom	26	26.0
Housewife	18	18.0
Student	23	23.0
Teacher	10	10.0
Total	100	100.0



26% of patients were handloom workers, 23% were students and 20% were farmers

Table 5: frequency distribution of symptoms

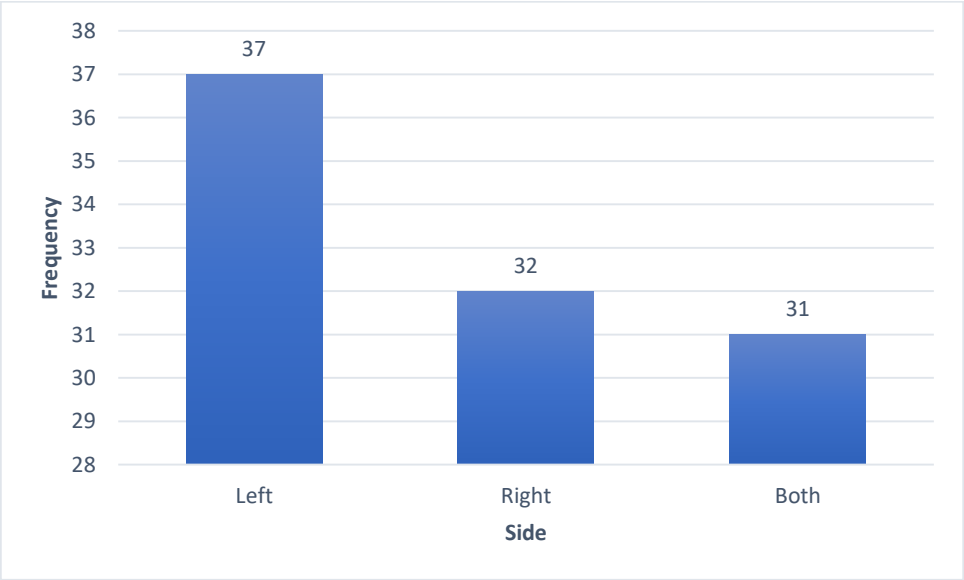
Symptoms	**Frequency**	**Percent**
Itching	100	100.0
Pain	57	57.0
Ear discharge	33	33.0
Ear block	54	54.0



100% of patients had itching, 57% had pain, 54% had ear block and 33% had ear discharge.

Table 6: frequency distribution of side of the disease

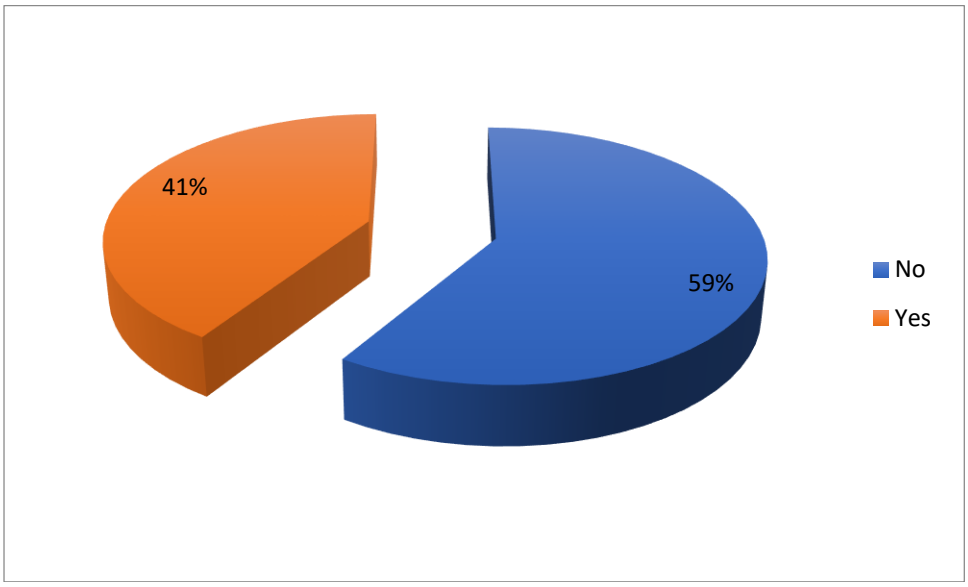
Side	Frequency	Percent
Left	37	37.0
Right	32	32.0
Both	31	31.0



The disease was unilateral in 69% of patients out of which 37% had left-sided disease and 32% had right-sided disease. 31% of patients had bilateral disease.

Table 7: entry of water into ears

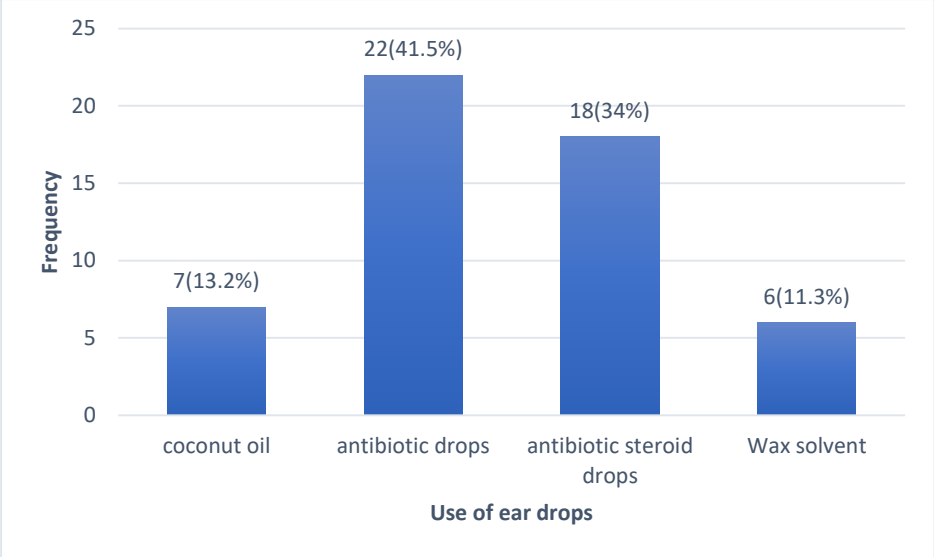
Water entry into ears	Frequency	Percent
No	59	59.0
Yes	41	41.0
Total	100	100.0



41% of patients had entry of water into ears during swimming or while taking bath and 59% does not have a history of entry of water into ears

Table 8: use of ear drops

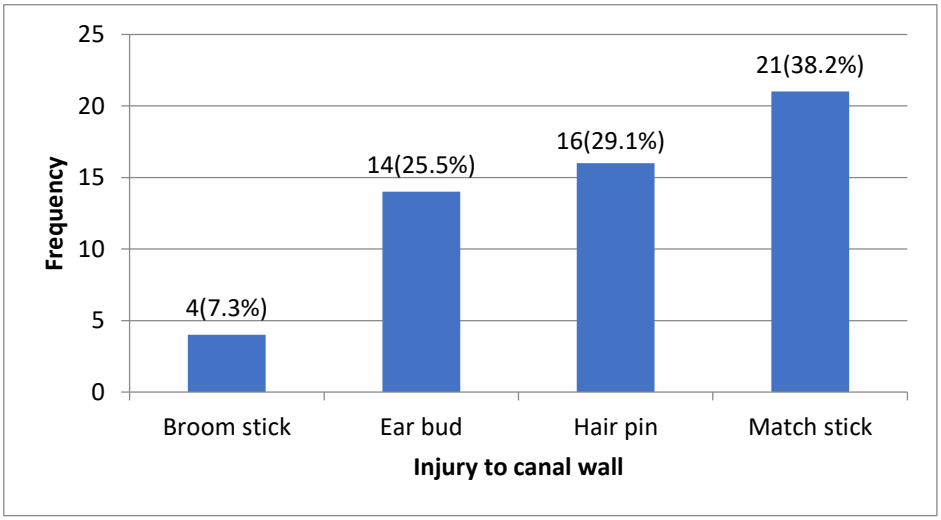
Use of ear drops	Frequency	Percent
coconut oil	7	13.2
antibiotic drops	22	41.5
antibiotic steroid drops	18	34.0
Wax solvent	6	11.3
Total	53	100.0



53% of patients had a history of use of ear drops of which 22 were using antibiotic drops, 18 were using antibiotic steroid drops, 7 were using coconut oil and 6 were using wax solvent.

Table 9: frequency of injury to the canal wall

Injury to the canal wall	Frequency	Percent
Broomstick	4	7.3
Earbud	14	25.5
Hairpin	16	29.1
Matchstick	21	38.2
Total	55	100.0

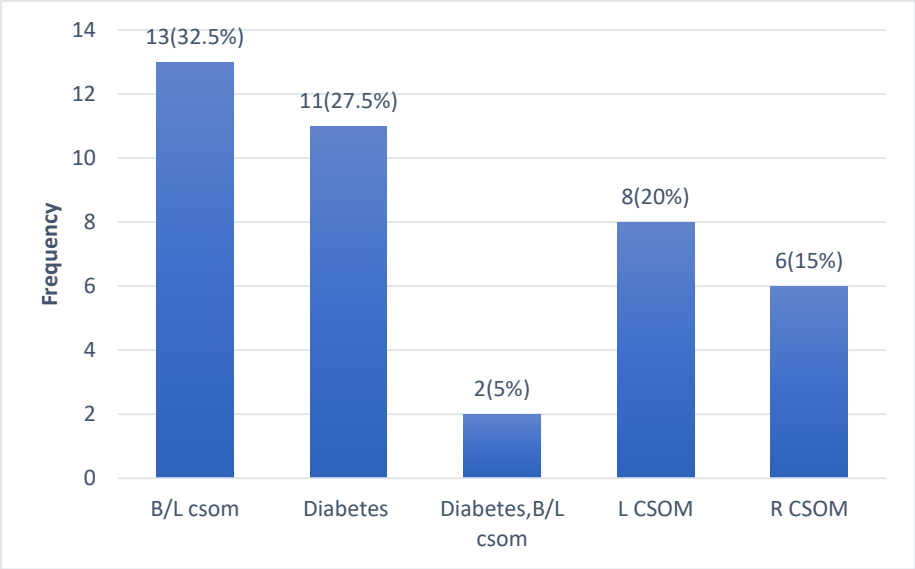


55% of patients had a history of injury to the canal wall due to self-cleaning. 21 patients used matchstick, 16 patients used hairpin, 14 patients used earbuds and 4 patients used broomstick to clean the ears.

Table 10: frequency of associated disease

Associated disease	Frequency	Percent

B/L CSOM	13	32.5
Diabetes	11	27.5
Diabetes, B/L CSOM	2	5.0
L CSOM	8	20.0
R CSOM	6	15.0
Total	40	100.0



40 patients had associated disease like CSOM or diabetes out of which 13 patients had bilateral CSOM, 11 patients had diabetes only, 2 patients had diabetes and CSOM, 8 patients had L CSOM and 6 patients had R CSOM.

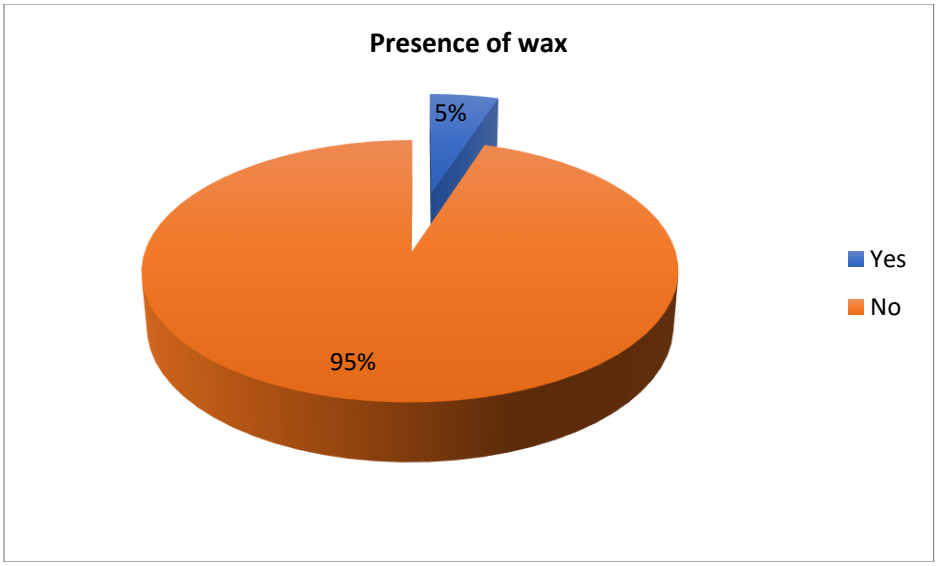
Table 11: frequency of fungal debris in the external auditory canal

External auditory canal	Frequency	Percent
brownish black debris	8	8.0
black debris	60	60.0
greyish debris	5	5.0
white debris	2	2.0
purple black debris	4	4.0
whitish cotton debris	8	8.0
yellow brown debris	4	4.0
yellowish brown debris	1	1.0
yellow white debris	1	1.0
yellowish black debris	4	4.0
yellowish white debris	3	3.0
Total	100	100.0

60 patients had black debris in the external auditory canal, 8 patients had brownish-back, 8 patients had whitish cotton debris, 5 patients had greyish debris, 4 patients had purple-black, 4 patients had yellow-brown, 4 patients had yellowish-black debris.

Table 12: frequency of presence of wax

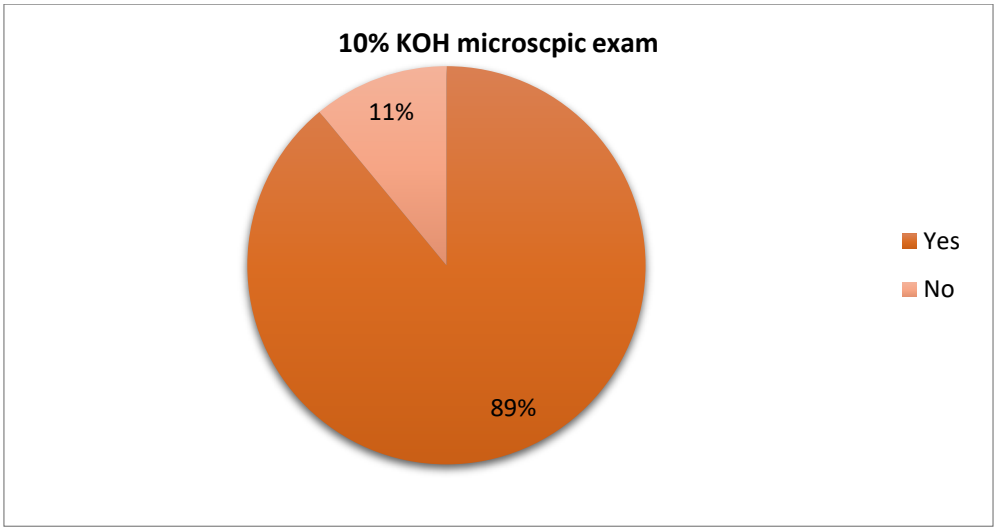
Presence of wax	Frequency	Percent
Yes	5	5.0
No	95	95.0
Total	100	100.0



95% of patients didn't had wax on examination and 5% of patients had wax.

Table 13: 10% KOH microscopic examination

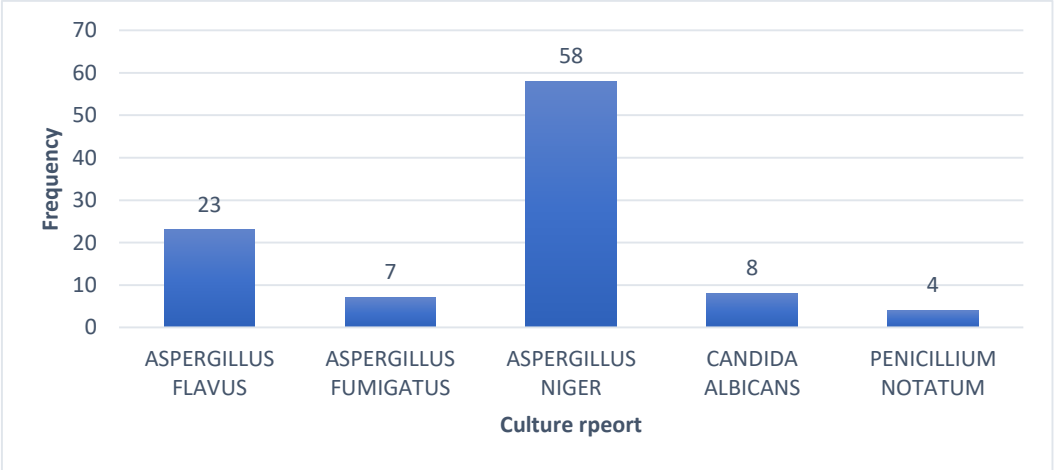
10% KOH microscopic exam	Frequency	Percent
Yes	89	89.0
No	11	11.0
Total	100	100.0



Fungal elements were seen in 89% of cases in KOH mount.

Table 14: culture report

Culture report	Frequency	Percent
ASPERGILLUS FLAVUS	23	23.0
ASPERGILLUS FUMIGATUS	7	7.0
ASPERGILLUS NIGER	58	58.0
CANDIDA ALBICANS	8	8.0
PENICILLIUM NOTATUM	4	4.0
Total	**100**	**100.0**

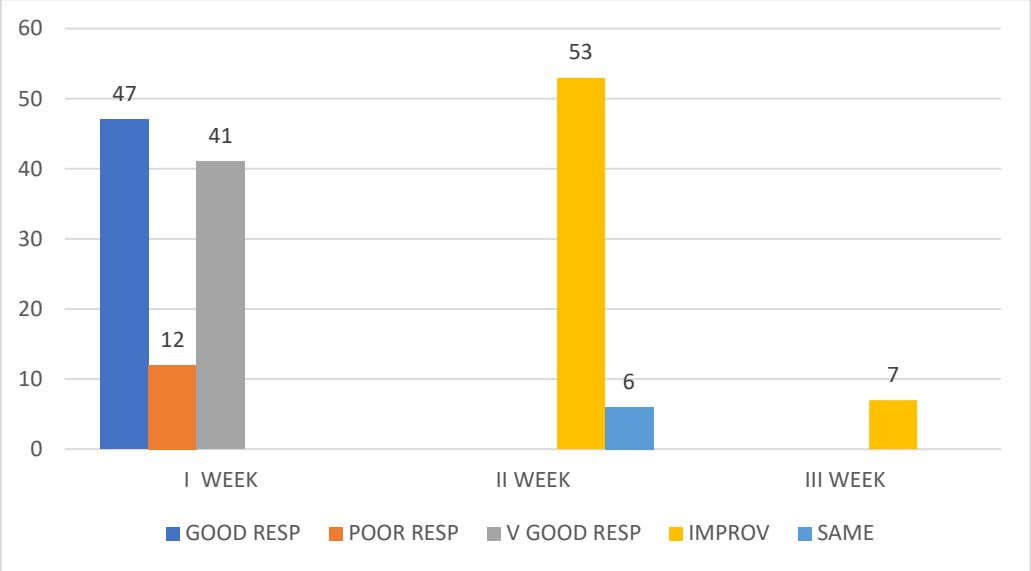


Culture of ear swabs shows 88% of patients had aspergillus species as the causative agent out of which aspergillus niger was found in 58% of cases, 23% showed aspergillus flavus, 7% showed aspergillus fumigatus. 8% of patients had candida albicans and 4% had penicillium notatum.

Table 15: follow up

	I WEEK	II WEEK	III WEEK

GOOD RESP	47	-	-
POOR RESP	12	-	-
V GOOD RESP	41	-	-
IMPROV	-	53	7
SAME	-	6	-
Total	100	59	7



41 patients had very good response to treatment, 47 patients had good response and 12 patients had poor response. Out of these, 53patients had improvement in second week and 6 patients were the same. 7 patients had to continue their treatment for three weeks.

DISCUSSION:

The above observations are discussed below

AGE:

In our study, otomycosis was found to occur between ages 6 to 73. Youngest case being 6years and oldest is 73years. The majority of patients are middle aged and young adults. Incidence in the 40-50years age group is 26% and among 11-30 years age group is 29%. These age groups predominantly include students, housewives, handloom workers and farmers. Housewives are exposed to the damp environment and dusty conditions doing household chores. Handloom workers are exposed to dust and cotton fibers which harbor the fungal spores. Farmers and Students are exposed to dusty environments in the fields. This is in accordance with Haja AN, Shaik KM, Siva Subba Rao P[10] who had an incidence of 29% among 21-30 yrs age group and 9% among 41–50 yrs age group. Prakash S. B, Leelatejaswini R. M, Deekshita V[11], had 60% among the age group of 11-30. Yehia MM and Al Habib HM and Shehab NM[12] had 48%, KO Paulose and S. All Khalifa[4] had 41%, Baveja and Dhingra[13] had 50%.

SEX:

In our study, the incidence of otomycosis is found to be more among males (51%). Incidence among female is (49%) this is in accordance with Sampath Chandra Prasad, Subbannayya Kotigadde, Manisha Shekhar, et al[14] who had 63% of male patients and 37% of female patients. Ahuja S, Bansal A, Pandey A, et al[15] had similar incidence more among males (51%) and in females (49%) Prakash S. B, Leelatejaswini R. M, Deekshita V[11] had majority of male patients in their study. Baveja Dhingra PL, Natarajan R[13]. found that incidence was found more among males (64%). In India males usually work in fields that have dusty environments with fungal spores. they also prone to self-cleaning of ears with dusty fingers that predispose to fungal infection. Yehia MM, and Al Habib HM. and NM Shehab[12] found incidence more among females.

LATERALITY DISTRIBUTION:

In our study, the disease was unilateral in 69% of patients out of which 37% had left sided disease and 32% had right sided disease. 31% of patients had bilateral disease. This is in accordance with Sampath Chandra Prasad, Subbannayya Kotigadde, Manisha

Shekhar, et al[14] who had unilateral disease in 95% of patients and Prakash S. B, Leelatejaswini R. M, Deekshita V[11] had 90% of unilateral disease. KO Paulose, Al Khalifa, P. Shenoy and RK Sharma[8] had 87% and T.Mugliston and G.O. Donghue[16] had 89% unilateral disease.

OCCUPATION INCIDENCE:

In our study, the majority of patients (26%) are handloom workers in the surrounding villages with cold and damp working conditions. The next group with the highest incidence is students (23%) followed by farmers (20%).

Handloom workers work near the machinery which generate heat and dust which predisposes infection. Farmers work in fields where the environment is dusty and mixed with fungal spores. Students who are active in outdoor sports are also exposed to similar conditions and cleaning of the ear with dirty hands predispose to infections. Yehia MM, and Al Habib HM. and NM Shehab[12] found that the resulting dust from sweeping the floor or in dusty environments mixed with fungal spores predisposes to infections.

PRESENTING COMPLAINTS:

In our study, the main presenting complaint was itching in 100% of patients followed by pain in 57%, followed by ear block in 54% and ear discharge in 33% of patients.

The itching was the predominant complaint. Often patients give a history of urge to clean the ear with fingertip or any sharp instrument like hairpin. This will lead to unnecessary trauma to ear facilitating the epithelial invasion of fungus leading to pain. Accumulation of fungal debris will lead to ear blockage. Ahuja S, Bansal A, Pandey A, et al[15] had similar findings with 89% of patients complaining of itching and pain.Sangavi AKB, Peerapur B, Gummadi N[17] had majority of patients complaining of itching and pain.

PREDISPOSING FACTORS:

The predisposing factors that are taken into consideration are the entry of water into ears during bath or swimming, trauma to ear, use of ear drops, associated disease. In our study, 41% of patients had entry of water into ears during swimming or while taking bath and 59% does not have a history of entry of water into ears. 53% of patients had a history of use of ear drops of which 22 were using antibiotic drops, 18 were using antibiotic steroid drops, 7 were using coconut oil and 6 were using wax solvent. 55% of patients had a history of injury to the canal wall due to self-cleaning. 21 patients used match stick, 16 patients used hair pin, 14 patients used ear buds and 4 patients used broom stick to clean the ears. 40 patients had associated disease like CSOM or diabetes out of which 13 patients had bilateral CSOM, 11 patients had diabetes only, 2 patients had diabetes and CSOM, 8 patients had L CSOM and 6 patients had R CSOM.

The most predominant predisposing factor was trauma to the external auditory canal by matchstick followed by hairpin and ear buds followed by the use of ear drops followed by the entry of water into ears. This is in accordance with Prakash S. B, Leelatejaswini R. M, Deekshita V[11] who had 70% of patients with trauma to the ear, indiscriminate use of ear drops in 65% followed by swimming 30%.Sangavi AKB, Peerapur B, Gummadi N[17]had 81.2% of patients with a history of habitual self-cleaning followed by swimming in 6.3% of patients. Priti Agarwal, Leimapokpam Sumitra Devi[18] found trauma due to self-cleaning as the major predisposing factor followed by the use of mustard oil and swimming.

The lipid mantle layer formed by the cerumen has long been considered as the key factor for the protection of the canal wall. Frequent irrigation of this external layer is thought to be the reason for recurrent otomycosis in people who take frequent baths in tropical climates. In diabetes mellitus, a high level of glucose in the tissues may favor the growth of fungi in the external auditory canal.

In our study 75.5% gave a history of use of antibiotic drops. This is in accordance with the studies of Bibu Pradhan, RatnaTuladhar, Ramchaya[19] who found 36% giving similar predisposing factors. Many authors attribute the recent increase in the incidence of otomycosis to the increasing use of antibiotic and steroid ear drops, systemic and local steroid usage. However, Mugliston T and O'Donoghue[16] noted that there was no significant increase in the incidence of otomycosis with the widespread use of topical antibiotic and steroid drops.

PRESENCE OF WAX:

In our study, 95% of patients didn't have wax in their ears this is in accordance with Prakash S. B, Leelatejaswini R. M, Deekshita V[11] found that 90% of patients didn't have wax. This proves the antifungal properties of wax. Priti Agarwal, Leimapokpam Sumitra Devi[18] found that the presence of excessive wax with poor aural hygiene favors growth of fungi.

OTOSOPIC FINDINGS:

In our study, 60 patients had black debris in the external auditory canal, 8 patients had brownish back, 8 patients had whitish cotton debris, 5 patients had greyish debris, 4 patients had purple black, 4 patients had yellow brown, 4 patients had yellowish black debris.

FUNGAL DISTRIBUTION:

In our study, fungal elements were found in 89% of cases in 10% KOH mount. Similar findings were found by Ahuja S, Bansal A, Pandey A, et al[15] who got 10% KOH positive in87% of cases culture of ear swabs shows 88% of patients had aspergillus species as the causative agent out of which aspergillus niger was found in 58% of cases, 23% showed aspergillus flavus, 7% showed aspergillus fumigatus. 8% of patients had candida albicans and 4% had penicillium notatum.

This is in accordance with Prakash S. B, Leelatejaswini R. M, Deekshita V[11]who cultured Aspergillus species in 79% of cases, Aspergillus niger-61%, A. fumigatus -13%, A flavus -5%. The next predominant species was candida albicans -15%. Ahuja S, Bansal A, Pandey A, et al[15] isolated 67% of aspergillus niger and 11% of aspergillus flavus.

A.niger grows on cerumen, epithelial scales and debris deep in the external canal, the resulting plug of mycelium and debris causes irritation, itching, pain, and deafness. Beany GPE and Broughton A[20] found that aspergillus species were known to produce antibiotics which eliminate bacterial complicators. Probably this could be attributed to the fact that in this study the debris obtained from the ear canal was non purulent.

TREATMENT:

After the clinical diagnosis was made, patients were given 1% clotrimazole for one week and patients were followed up for three weeks. In our study, 88% of patients had good improvement and 12 patients had a poor response after the first week. Out of these, 53patients had improvement in second week and 6 patients were the same. 7 patients had to continue their treatment for three weeks. This is similar to findings by Prakash S. B, Leelatejaswini R. M, Deekshita V[11]who found clotrimazole to be markedly effective in the treatment of otomycosis. Ko Paulose, Al Khalifa, P.Shenoy, RK Sharma[8]who found improvement in range of 89% by using clotrimazole.

On the contrary study by Mohamed Anwarullah and P. Jaykar[21] found that Tolnaftate was the most effective antifungal agent (97.5%) in the treatment of otomycosis

CONCLUSION:

Otomycosis is a common condition in countries like India where the weather is favorable for the growth of fungi.

In our study we found the disease to be more common in the male population especially handloom workers and farmers. The aspergillus genera of fungus were the most common causing otomycosis. The disease was found to be predominantly unilateral. Trauma to external auditory canal, use of antibiotic and steroid ear drops were found to be the most common predisposing factors, 10% KOH mount was found positive in 89% of cases, clotrimazole was an effective drug for otomycosis.

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