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Incidence and management of otitis extera

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Abstract:
Otitis externa is the generic term for any inflammatory condition of the external auditory meatus (EAM). It may be a local phenomenon or part of a generalised skin condition. Otitis externa can be subdivided into acute, recurrent-acute and chronic. Erythema and swelling of the EAM skin with variable discharge/moist debris. Otitis externa was most common during the third decade of life, with significant difference between males & females and house wives were mostly affected. Infective otitis externa is much commoner than reactive type. Unilateral otitis externa was as twice as bilateral infection. The commonest predisposing factors were self cleaning of the ear followed by exposure to water. The study included 100 patients (114 ears) with otitis externa for the period from the April, 2009 to January, 2010 all are seen at the ENT department of Rizgary Teaching Hospital. Data concerning the patient's age, sex, occupation, side of affection, predisposing factors, the symptoms of otitis externa, the types of otitis externa and treatment, were collected and analyzed. In our study among 107 ears, 50% of ears (54) were treated with aural wick using antibiotic/steroid for those with bacterial infection and anti fungal ointment, for those with fungal infection. All the patients showed good response, while in the remaining 50% of ears (53) aural drops used, of same component of the aural wick, in which only19 ears (35%) of them showed good response while the remaining ears 34 ears (64%) showed no response so the treatment changed to an aural wick with good response and the explanation for that the aural wick is put directly by the otolaryngologist to the external auditory meatus as that confirm the patient was received the treatment and the direct application of the drug to the site of the inflammation, in contrast the use of drop give poor result may be the faulty use of the drop by the patient or not follow the instruction of the usage of the drop regarding the dose , time and the way of application of the drop, beside that the extensive edema of the canal will not allow the direct contact of the drug or reaching it to site of the inflammation that make the proper dose not taken by the patient.

Key words: Otitis externa, bacterial infection, anti fungal ointment, otolaryngologist

1. Introduction

Otitis externa [1-2] is the generic term for any inflammatory condition of the external auditory meatus (EAM). It may be a local phenomenon or part of a generalised skin condition. Otitis externa can be subdivided into acute, recurrent-acute and chronic.

Aetiology of otitis externa [1-2]

The cause is usually infective (bacterial or fungal) but non-infectious/ dermatological processes should not be forgotten.

- **Bacterial:** 80% - Staphylococcus aureus, Pseudomonas aeruginosa, Bacillus proteus
- **Fungal:** 10% (Aspergillus 80%, Candida 20%); mixed bacterial/ fungal infections common
- **Viral:** Otitis externa Haemorrhagica (bullous myringitis), Herpes Zoster and Simplex
- **Dermatological:** Eczema / seborrhoeic dermatitis / psoriasis (don't forget hypersensitivity/ allergy to topical drops)

Symptoms [2]

- Pain and/or discomfort limited to the EAM (itching through to severe pain)
- Deafness (conductive)
- Pre- and post-auricular lymph node enlargement/ tenderness

Signs [2]

Erythema and swelling of the EAM skin with variable discharge/moist debris.

Anatomy/physiology of the EAM [2-5]

The EAM is unique in being the only skin-lined cul-de-sac in the body. It is warm and humid and exfoliated skin provides an ideal growth medium for bacteria and fungi. The canal skin is unique in that it is continually migrating laterally carrying debris with it.

Cerumen is protective being acidic and hydrophobic. In addition it contains lysozymes that inhibit bacterial growth. Too much or too little cerumen predisposes to otitis externa.

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Hair helps prevent entry of foreign bodies, however too much prevents migration and can add to cerumen build up, (particularly in older males where the hairs can have the effect of acting like steel rod reinforcing in concrete!).

Predisposing factors [1-6]

- Anatomical – a narrow canal, excessive wax production
- Moisture – swimming, perspiration, high humidity
- High environmental temperatures
- Mechanical removal of cerumen
- Trauma – e.g. cotton-buds, fingernails, hearing aids, ear plugs, hair grips, paper clips etc.
- Chronic dermatological disease –e.g. eczema, psoriasis, seborrhoeic dermatitis, acne
- Immuno-compromised
- Contaminated water (possibly)

Otitis externa [4-9]

- **Acute – bacterial:** scanty white mucoid discharge (occasionally thick)
- **Chronic – bacterial:** can be bloody often granulation tissue present
- **Fungal:** white to off-white discharge, but may be black, grey, bluish-green or yellow; black or white conidiophores on white hyphae associated with aspergillus

Otitis media with perforated tympanic membrane [8-13]

- **Acute** – purulent white to yellow mucus with deep pain
- **Serous** – clear mucus, especially in the presence of allergies
- **Chronic** – intermittent purulent mucus without pain
- **Cerebrospinal fluid leak** – clear, thin and watery discharge
- **Trauma** – bloody mucus
- **Osteomyelitis** – discharge and odour

Management [12-16]

Ear toilet

Most important is the removal of as much debris as possible. This is best achieved with suction (+/- microscopy but dry mopping or gentle curettage with a Jobson Horn probe as an alternative. Cotton buds (other than for mopping out discharge around the meatal opening) are best avoided as they tend to push the debris further into the canal. 'Tissue spears' – tissue twisted into a point and inserted into the canal about 2cm then allowed to absorb the discharge (and repeated as required) – can help clear a watery discharge and obtain deeper access when about to instil new drops.

Culture

Culture and sensitivity is indicated if there is not a rapid response to first line topical drops. The sample should be taken from the deeper debris using a wire/cotton swab to reduce secondary bacterial contaminants.

Topical therapy

Antibiotic (or anti-fungal)/steroid drops. If the symptoms are worsening in spite of drops, consider an allergy/ hypersensitivity to the drops. A wick is required for the very narrow or occluded canal (1/2 inch ribbon gauze or compressed foam such as a 'Pope' wick) as it helps deliver drops to the deeper part of the canal. The steroid component is important to settle the oedema.

2. PATIENTS AND METHODS

The study included 100 patients (114 ears) with otitis externa for the period from the April, 2009 to January, 2010 all are seen at the ENT department of Rizgary Teaching Hospital.

Data concerning the patient's age, sex, occupation, side of affection, predisposing factors, the symptoms of otitis externa, the types of otitis externa and treatment, were collected and analyzed.

In this study, our patients were not receiving any treatment (local or systemic) before attendance, so those already receiving treatment were excluded. Examination was done by head light, an auroscope and sometimes operating microscope.

Microorganisms were cultured by swabbing from the external auditory meatus using sterilized swab sticks from the external auditory canal. In bilateral cases both ears were swabbed and transported to microbiological department in laboratory unit of Rizgary Teaching Hospital.

All the debris and wax were meticulously removed by suctioning under microscopy.

From total 114 ears, 54 ears were treated with aural wick impregnated with topical ointment (antibiotic/steroid) applied to those with bacterial infection whereas antifungal ointment to those with fungal infection, in other 53 ears were given topical drops (antibiotic/steroid) used for those with bacterial infection and those with fungal infection anti fungal drops used, and remaining 7 ears, 5 were its dermatological cause treated with other treatment in form of shampoo and creams for the auricle and 2 of cases were given systemic antibiotics.

The patients are seen again after 3 days and 7 days, each time examination carried out and the process of meticulous suction-clearance and application of the same treatment until the patient improved. Results were collected in tables, and figures.

3. RESULTS

3.1 Ages and sex distribution:

This study comprised 100 patients with otitis externa and ages ranged from 11 to 70 years (the mean age is 40.5 years). The peak age incidence of otitis externa was in the third decade (21-30).

Table 1: Age distribution in otitis extera

Age of the patients	No. of the patients
0-10	2
11-20	17
21-30	35
31-40	20
41-50	14
51-60	9
61-70	3

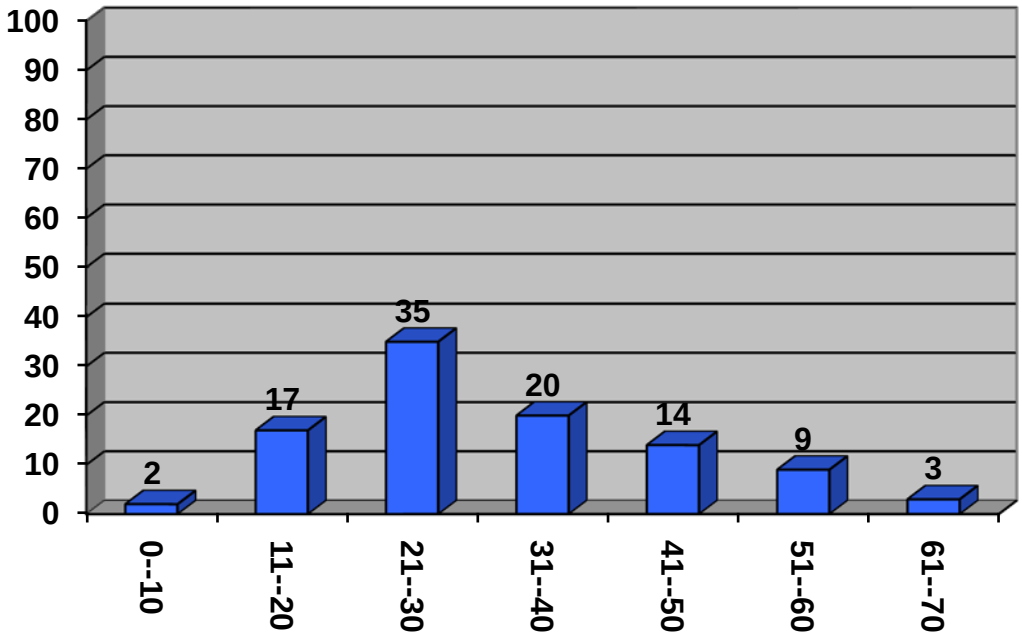

Figure 1: Age distribution in otitis extera

While the sex distribution we found Female incidence is 69%, while male is 31%.

Table 2: Sex distribution of otitis externa

Sex of the patients	No. of the patents
Male	31
Female	69

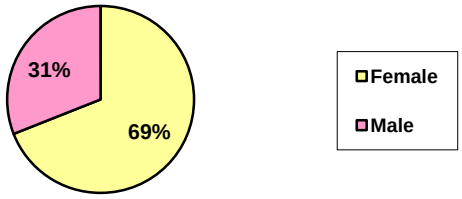

Figure 2: Sex distribution of otitis externa

3.2 Occupation Distribution:

Regarding the occupational distribution, 36% of patients were house wives, 24% students, 23% workers, while 9% teachers and only 8% were retired

Table 3: Occupational distribution in otitis externa

Occupation	No. of the patients
House wives	36
Students	24
Workers	23
Teachers	9
Retired	8

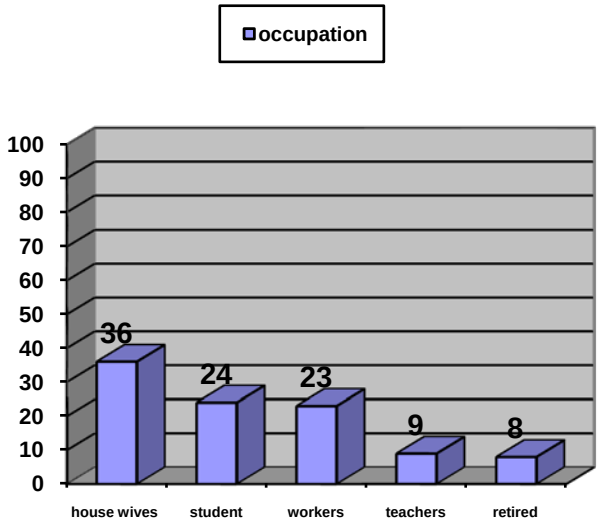

Figure 3: Occupational distribution in otitis externa

3.3 Side of affection:

The right ear was involved in 42% of patients, the left ear in 44% of patients where as in 14% of patients both ear were involved, this means that unilateral otitis externa (86%) was more common than bilateral one (14%).

Table 4: Incidence of involved side of otitis externa

Side of affection	**No. of the patients**
Left side	44
Right side	42
Both ears	14

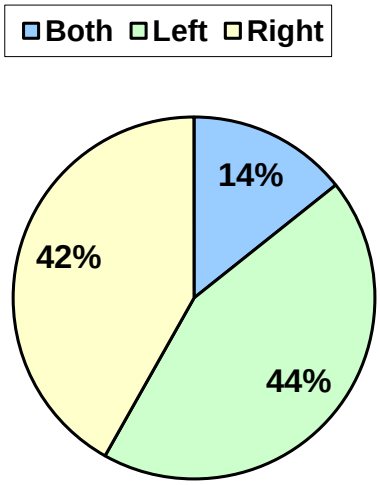

Figure 4: Incidence of involved side of otitis externa

3.4 The predisposing factors:

The most common predisposing factors were self induced trauma (by cotton bud, match stick, hair clips etc.) in 51% of patients. Water entrance to the affected ear during bathing and swimming in 33% of patients. Where as in 12% of patients there was history of chronic suppurative otitis media. In addition uncontrolled diabetes mellitus was found in 2% of patients and the remaining 2% of patients there was history of middle ear surgery (mastoidectomy) with persistent ear discharge.

Table 5: Predisposing factors in otitis externa

Predisposing factors	**No. of patients**
Self cleaning of the ear	51
Bathing and Swimming	33
Chronic suppurative otitis media	12
Ear operation (Mastoid)	2
Diabetes mellitus	2

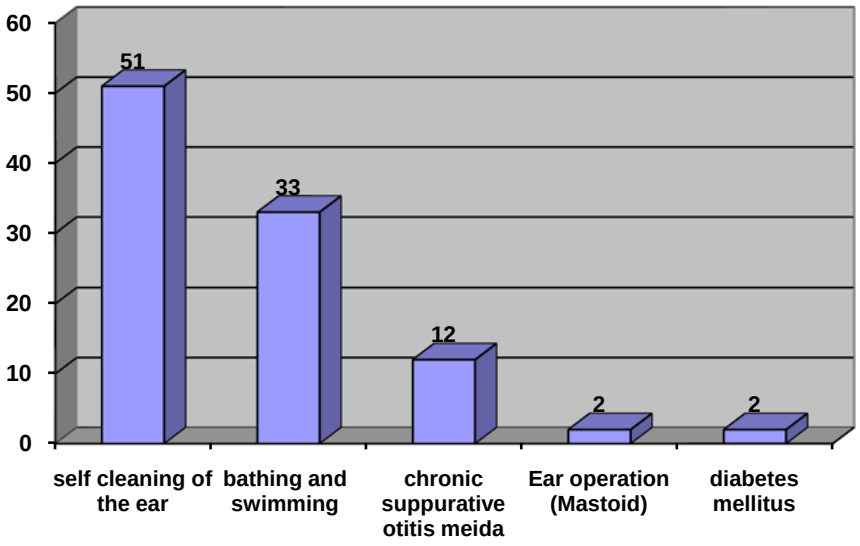

Figure 5: Predisposing factors in otitis externa

3.5 The presenting symptoms:

Otalgia was present in majority of the patients at presentation (85%); however there was an additional symptom including deafness in 70%, ear itching in 57% of patients. While only in 47% of patients there was purulent ear discharge.

Table 6: The incidence of symptoms of otitis Externa

Symptoms of otitis externa	Percentage
Otalgia	85
Deafness	70
Itching	57
Discharge	47

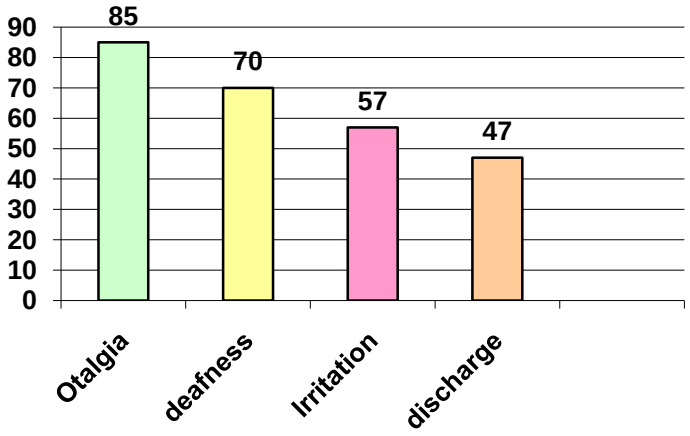

Figure 6: The incidence of Symptoms of otitis extera

3.6 Clinical examinations:

On clinical examination, diffuse otitis externa found in 67% patients, fungal debris in 20% patients, local otitis externa (localized swelling) in 6% patients (4 of them were big boil) and non infectious dermatological cause of otitis externa 4%, where as in only 1.7% malignant otitis externa were found.

Table 7: Clinical examination

Clinical examination	No. of the ears
Diffuse otitis externa	77
Fungal debris (otomycosis)	23
Localized otitis externa	7
Non infectious dermatological	5
Malignant otitis externa	2

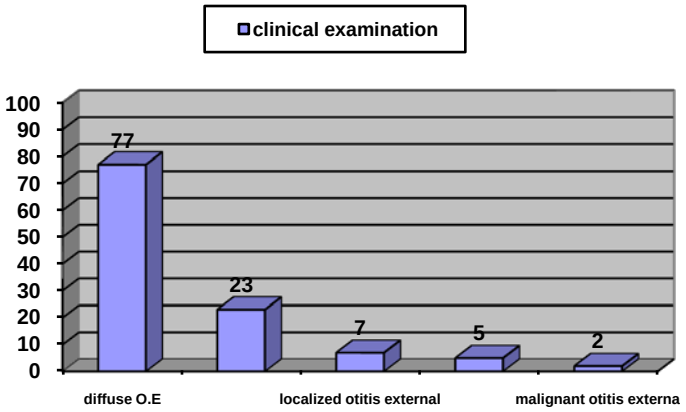

Figure 7: Clinical examination

3.7 Recurrence of attacks:

Among one hundred patients, 31% patients had history of recurrent infection (usually 2-3 times). Most of these patients (31 patients) having bad habit of self cleaning of the ear and frequent bathing and swimming and patients have chronic suppurative otitis media.

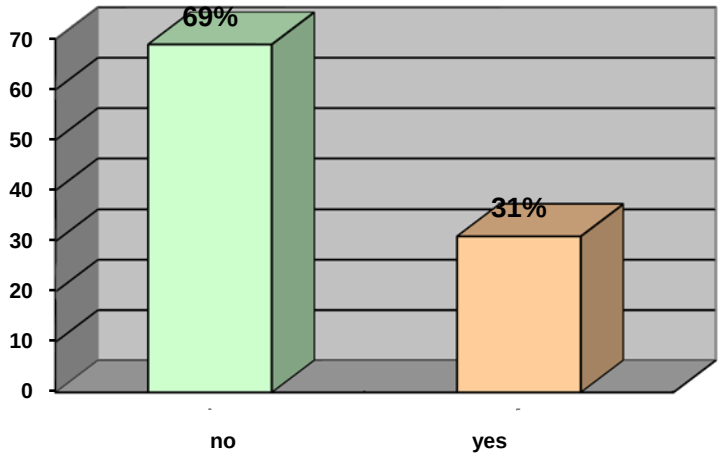

Figure 8: Incidence of recurrent otitis externa

3.8 Aural cultures:

The cultures were positive for Bacteria in 64% of patients, fungi in 21% of patients, where as in 15% of patients the cultures were negative.

Table 8: Organisms found in aural cultures

Organisms found in aural cultures	**Percentage**
Bacteria	64
Fungi	21
Non	15

Among 64% of patients of isolated bacterial cultures, the commonest bacteria were pseudomonas aeruginosa in 36 (56%) patients, staphylococcus aureus in 15 (23%) patients, staphylococcus albus in 10 (15%) patients, streptococcus viridance in 1 (1.6%) patient and proteus in 2 (3%) patients.

Table 9: Incidence of Bacteria found in aural cultures

Bacteria found in aural culture	**No.**
Pseudomonus aeruginosa	36
Staphylococcus aureus	15
Stuphylococcus albus	10
Proteus	2
Streptococcus viridance	1

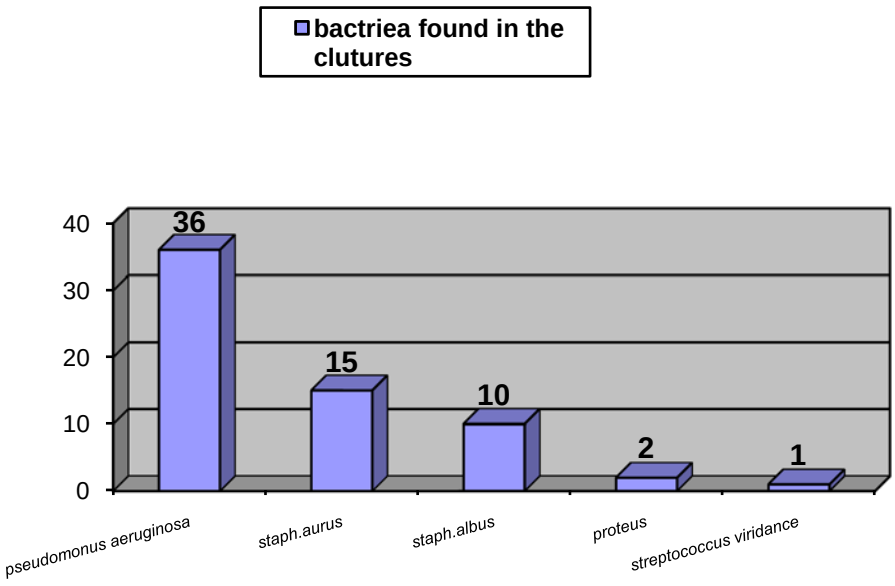

Figure 9: Organisms found in aural cultures

Among 21% of patients of fungal cultures, aspergillous species was the commonest fungal organisms found in 14 patients (66.6%), where as in 5 patients (23.88%) Candida albicans and in 2 patient (9.52 %) candida + aspergillous were found.

Table 10: Incidence of fungi found in aural cultures

Fungi found in the aural cultures	**No.**
Aspergillous species	14
Candida albicanus	5
Mixed fungi	2

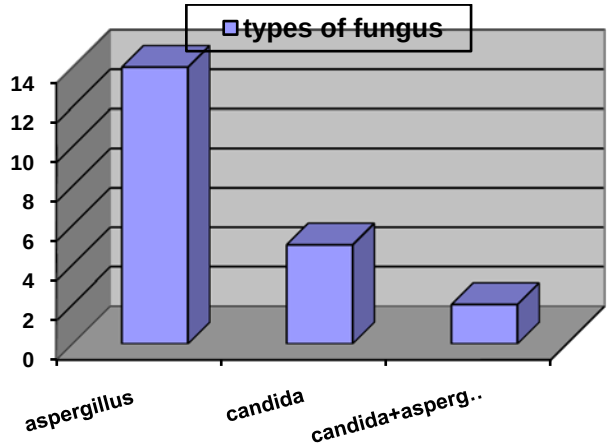

Figure 10: Incidence of fungal growth in aural cultures in otitis externa

3.9 Response to Topical Treatment

In 54 ears we used aural wick impregnated with antibiotic/steroid in case bacterial infection or impregnated with antifungal ointment to those with fungal infection all of them showed good response.

while in the remaining 53 ears were aural drops of same component of wick used in bacterial infection and same antifungal component as ear drop used in those with fungal infection, 19 ears (35%) responded well to the treatment where as 34 ears (64%) showed no response in the 3rd day, so the treatment changed to aural wick of which there has been a good response. Statistically this result is highly significant.

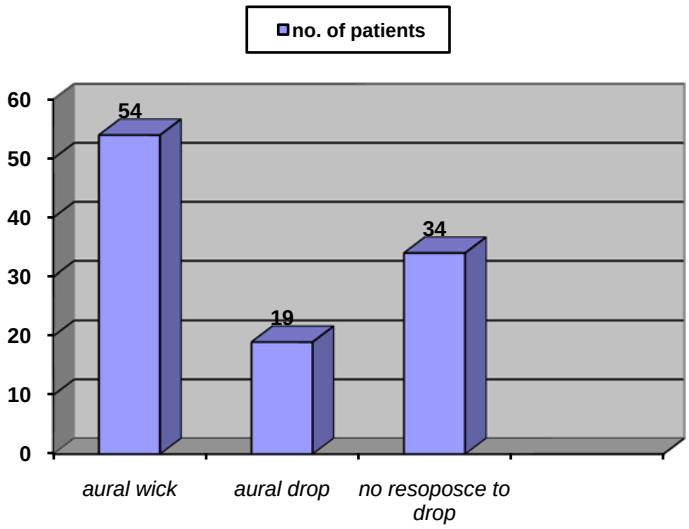

Figure 11: Response to topical treatment (d freedom 1=3.8x>df =signig.defer. =p<0.05)

3.10 Types of Otitis Externa:

According to the classification otitis externa divided into two groups, the infective group it was the commonest group 109 patients (95.6%), while the reactive group it was only 5 patients (4.35%).

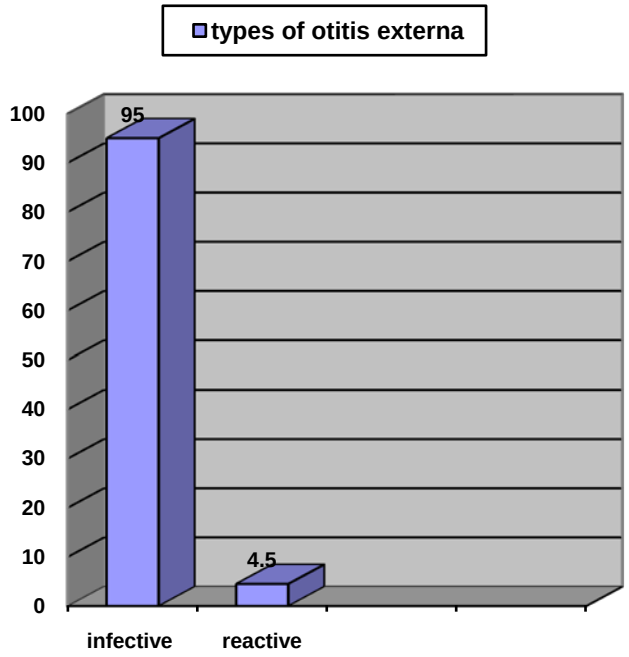

Figure 12: Type of otitis externa according to the classification

4. DISCUSSIONS:

In this study, regarding age incidence, otitis externa was common in the third decade and 70% of all patients occurring between 11-30 years of age. These data is comparable with results presented by Al-Naddawi, 2000 [14] regarding age incidence, he showed that there is a sharp reduce of infection above 30 years of age and with Perez et al, 1995 [15] who documented that the average age was 32 years for patients attended an emergency section of external ear infection in Spain hospital.

Hawke, M., S.Krajden,1984 [16] stated that the maximum age incidence lies between 10-30 years old and Tang H. ,1983 [17] offered that 11-30 years old are commonest age groups which are probably due to the habit of self cleaning of the ear in adult life and the pursuits of swimming activities in the early adult life.

Tang M.,1983 [17] offered explanation for high incidence of females (62%) in his study of otitis externa, which compatable with our study in which incidence of female about 69%,while male 31% most probable explanation is using hair clips as bad habit in self cleaning the ear ,in contrast other studies show no difference in sex incidence as in Hawke, M., S.Krajden,1984 [16] stated that males and females affected with similar frequencies and non significant differences of sex were reported also by Battikihi et al,2004 [18] , and Sanjiv K.,2004 [6].

Regarding the occupational distribution, 24% of patients were students, 36 %were house wives, 23% workers, while 9% teachers and only 8% retired, so young group were affected more probably because of frequent swimming and self cleaning activity in such group age and this results is compatable with Sanjiv K.,2004 [6] who documented that otitis exerna is more likely to affect aquqtic athletes as a result to excessive water exposure and self cleaning that result in reduction in cerumen thereby causing drying of the meatus and pruritis which then lead to scratching and trauma to the skin of the external canal.

Regarding the incidence of involved side, in this study there was no significant difference between right (42%) and left (44%) ear, with unilateral infection as twice as bilateral infection, the above data has been supported by Tang M.,1983 [17] who offered no explanation for this difference after analyzing various causative factors.

This study shows that the commonest predisposing factor is self cleaning of the ear (51%) followed by exposure to water (30%), Whereas Tang M.,1983 [17], Loh et al,1998 [19], Nussinovitch M. et al,2004 [20] and Robert S.2001[21] confirm that self cleaning was the most

common predisposing factors because cleaning your ears can remove the protective wax layer and lead to infection, especially if the canal is injured during cleaning. our findings were also in concordant to those reported above.

While exposure to water regarded as commonest predisposing factor Tang M., 1983 [17] were described by Walling A.D., 1999 [22],Bell D.N.,1985 [23] and Halton B.K, 1997 [24], since excessive moisture elevate the PH of the meatus making it alkalin and removes the cerumen, once the protective cerumen is removed keratin debris absorbs the water which creates nourishing medium for growth of microorganisms.

Otalgia was the predominant symptom in otitis externa in our study followed by deafness, irritation and purulent discharge, which are in agreement with previous studies Tang M., 1983[17], Hawke, M., S.Krajden, 1984 [16], Halpern M.T., 1999 [25], Al-Assaf SM, 2000 [26], and Leung et.al. 2000 [27].

Purulent discharge is the commonest type of discharge which is in concordant with other studies Zaky et.al, 1976 [28] while it disagree with study done by Al-Naddawi, 2000 [14], and Quinin F.P., 2000 [29] who stated that purulent discharge is often seen with only otitis media.
Among 100 total patients, 31% patients had history of recurrent infection (usually 2-3 times) most of these patients (31 patients) having bad habit of self cleaning of the ear and frequent bathing and swimming, in addition of recurrent attacks in those with chronic suppurative otitis media and mastoid ear surgery (2 patients)and this result is compatable with Tang M., 1983 [17] he showed that 48% of his cases with acute otitis externa has history of recurrent infection and 90% of these patients having the habit of self cleaning of the ear with frequent bathing and swimming.

Diffuse otitis externa is the most usual type seen on clinical examination in our study (67%) followed by fungal infection in 20% and local otitis externa (boil) in 6%. This result was In accordance with Tang M., 1983 [17] he claimed that diffuse otitis externa is commonest condition of the external ear encountered by the general practitioner and otologist

Regarding pathogens cultured from the ear, bacterial infection (64%) were more than fungal infection (21%), while negative results found in (15%) probably due to viral infection or could be false negative results. Manni K.K.1984 [30],, David Oscuthorpe 2003 [31] and David R. 2004 [32], also confirmed the lesser percentage of fungi than bacteria, while other studies Tang M., 1983 [17], Amigot et.al., 2003 [33] defined that fungi as most common pathogens causing Otitis externa, and probably factors like humidity and temperate weather might played a major role in making fungal infection more than bacterial infection.

Between the bacterial cultures, the predominant one was Pseudomonas aeruginosa (56%) followed by Staphylococcus aureus (23%) and Staphylococcus albus (15%). These results were similar to those reported by previous studies Clark et. al., 1997 [11], Holten B.K, 1997 [24] and Ong Y.K.2005 [34] while other studies like Tang M., 1983 [17] and Kuczkoweski et. al., 2000 [35] disagree with ours as that the predominant bacterial species is Staphylococcus aureus.

In this study, Aspergillous species (14%) were more than Candida species (5%) between fungal cultures; this result is similar to the study done by Manni K.K, 1984 [30] he suggested that fungal infection is the result of prolonged treatment of bacterial otitis externa that alters the flora of the ear canal.

In our study among 107 ears, 50% of ears (54) were treated with aural wick using antibiotic/steroid for those with bacterial infection and anti fungal ointment .for those with fungal infection. All the patients showed good response, while in the remaining 50% of ears (53) aural drops used, of same component of the aural wick, in which only19 ears (35%) of them showed good response while the remaining ears34 ears(64%) showed no response so the treatment changed to an aural wick with good response and the explanation for that the aural wick is put directly by the otolaryngologist to the external auditory meatus as that confirm the patient was received the treatment and the direct application of the drug to the site of the inflammation, in contrast the use of drop give poor result may be the faulty use of the drop by the patient or not follow the instruction of the usage of the drop regarding the dose , time and the way of application of the drop, beside that the extensive edema of the canal will not allow the direct contact of the drug or reaching it to site of the inflammation that make the proper dose not taken by the patient.

Holten B.K, 1997 [24] and Ong Y.K.2005 [34], revealed that the combination of ear cleaning, ear wicks, and topical medications is most effective for treatment of otitis externa and use of a single topical drop intervention or oral antibiotics may be effective but is less well supported, while Loh et al,1998 [19] showed that the prevailing treatment for otitis externa is still a topical antibiotic rather than oral antibiotic because (A) can be

delivered at external high concentrations directly to the site of infection,(B) is bactericidal and (C) can facilitate a rapid clinical and bacteriological cure, and that the inclusion of asteroid with a topical antibiotics appear to modestly improve the clinical time to cure and relief of symptoms compared with topical antibiotic treatments alone, nevertheless, a study on 39 cases with acute otitis externa found that a 2 week course of topical antibiotic\steroid was no more effective than steroid alone, he also showed that some time the canal is so ;swollen shut; that is necessary to use a wick which act as a vehicle for the drops and to help draw inflammatory fluid from the ear canal.

5. CONCLUSIONS

Otitis externa was most common during the third decade of life, with significant difference between males & females and house wives were mostly affected. Infective otitis externa is much commoner than reactive type. Unilateral otitis externa was as twice as bilateral infection. The commonest predisposing factors were self cleaning of the ear followed by exposure to water. Otalgia is the most predominant symptom. Acute diffuse otitis externa is the most frequent type. Bacterial growth is the predominant microorganisms found in cultures, of which

Pseudomonas aeruginoza is the commonest one. Aspergillous species is the frequent fungal growth. Response to aural wick as treatment is much better than aural drops.

6. RECOMMENDATION

Can be divided into:

A- General: includes education about the importance of care the external auditory meatus which are:

i. Avoid manipulation of the external auditory meatus to scratch or poke the ear canal with fingers, cotton wool buds and etc. because they may cause irritation and push wax or debris further into the ear. The ear cleans itself, and bits of wax will fall out now and then.

ii. Avoidance of water exposure during bathing and swimming. You can do this by wearing a tightly fitting cap that covers the ears. Some swimmers use silicone rubber earplugs, but only use them if they do not irritate the skin in your ear canal.

B- Specific: as in compare with other studies the use of topical aural wick is better than topical drop so we recommend using aural wicks soaked with an antibiotic-steroid ointment/anti fungal in the treatment of otitis externa.

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