

ORIGINAL ARTICLE

Clinical and Laboratory Findings in Otitis Media with Otitis Externa Presentations

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ABSTRACT

Infections of the middle ear which can damage the eardrum can be presented as external ear infections. The present study was performed to assess the clinical and laboratory findings of this disease in Babol, north of Iran. The study included 33 patients suffering from ruptured tympanic membrane with otitis externa presentations. Ear samples were removed using speculum, curette or a sterile loop by the ENT specialist. A part sample was spread on slide and the rest was cultured on blood agar and sabouraud dextrose agar supplemented with chloramphenicol (Sc) and transferred to the Microbiology and Mycology laboratories, Faculty of Medicine of Babol University of Medical Sciences. Out of the 33 patients with otitis media, 36.37% of patients were housewives and 93.93% of them had pus in their ears. Female were more infected from male. The main cause of tympanic perforation was chronic otitis. Bacterial and mixed Bacterial and fungal elements were observed in 54.55% and 21.21%, respectively. Gram positive and negative Bacteria, Gram positive Cocci and mixed mycelia and yeast were the most organisms in direct examination. Staphylococcus aureus and Streptococcus sp. were the common organisms isolated from middle ear exudates in culture media. Aspergillus spp. and Candida spp. were the most fungi in culture media. Due to the prevalence of bacterial and fungal species which were isolated from in this study, determining of the presence or absence of eardrum perforation in patients with otitis externa, can be helpful in the selection of therapy.

Key word: Otitis externa, Otitis media, Symptom

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INTRODUCTION

Otitis media with tympanic membrane perforation may be present as acute or chronic form [1]. These infections are on the rise in young children and even babies despite advances in medical science in developing countries [1-3]. Bombing and shelling [4-5], stroke [6-7] or manipulating the ear with objects can causes an increase risk of the disease [8]. Otitis media is seen in all age groups [9-10] and may be unilateral or bilateral [11]. An ear disease such as otitis media is one of the swimmers problems [12-13]. Hearing loss as important symptom [14], is associated with the size of the perforated eardrum [15-16]. However the exact mechanism of hearing loss and this relationship [10] Symptoms include weakness and impaired speech, which are common especially in children [17]. The source of these infections can be due to the movement of organisms into the middle ear from nose and throat or through the external auditory canal [1-2, 18]. On the other hand, some factors such as poor feeding habits or genetic disorders can be predisposing factors to aggravating the disease [19]. The disease will decrease using some disease prevention activities as well as vaccine [20]. The main organisms causing middle ear infections are bacteria such as *Staphylococcus*, *Haemophilus* and *Streptococcus* [21-22]. Fungi such as *Aspergillus* may

also be implicated in the middle ear infection in less than 10% of cases [23-24]. The ruptured eardrum may improved spontaneously or that requiring treatment or surgical repair to reduce infection [9,25], Drugs used in the treatment of this disease include oral cephalosporin [26] and amoxicillin [27]. Surgery is the best approach to improve hearing loss and repair ruptured eardrum [28], however, to prevent the emergence of resistance, drug therapy should be avoided due to spontaneous disease remission in high rate of infections [29-30]. Moreover, antifungal therapy is necessary before surgery if it is pathogenic fungi [23]. Middle ear infection symptoms include pain, pus, reduced hearing and even the possible spread of infection in the inner ear. Assessment and diagnosis of these lesions will help to prevent further complications. Therefore in this study, the frequency of tympanic membrane disruption with the outer ear symptoms was assessed in the ENT clinics in Babol .

MATERIALS AND METHODS

Sampling

The study included 33 patients suffering from ruptured tympanic membrane with otitis externa presentations who referred to the ear, nose and throat department at Ayatollah Rouhani Hospital, Babol during 2013-14. Bacterial or fungal otitis externa and patients with a history of surgery were excluded. Ear samples were removed using speculum, curette or a sterile loop by the ENT specialist. All information was collected in suitable situation and used only for the purpose of study. No softening material was used to remove ear samples to prevent impairment test. A part sample was spread on slide and the rest was cultured on blood agar (Merck , Germany) and sabouraud dextrose agar (Hi media, India) supplemented with chloramphenicol (Sc) and transferred to the Microbiology and Mycology laboratories, Faculty of Medicine of Babol University of Medical Sciences .

Diagnostic tests The Samples stained with Gram staining method and the slides were studied for presence of bacterial or fungal elements. Culture media were incubated at 37°C up to 48 hrs for the detection of bacteria; and up to 2 weeks at room temperature for the growth of fungi. Some specific approaches including subculture and biochemical methods for the detection of bacteria were performed according to conventional medical bacteriology laboratories. Macroscopic and microscopic morphology techniques and culture on CHROMagar Candida (HiCrome Candida Differential Agar, Himedia, India) were employed to detect fungi. Candida isolates were also identified by the presence of pseudomycelium, germ tube and vesicle formation (Chlamidoconidia) on human serum and corn meal agar medium (Micro Master Laboratories, India), respectively. Slide culture was used to determine filamentous fungi.

Analysis of the data

All patient information were obtained in private situations, and used only for research purposes. The collected data were entered in to the statistical software (SPSS) version 18 and statistical analysis was done afterwards. Based on the results, frequency quality and quantity data were discussed .

RESULTS AND DISCUSSION

Of the 33 patients, 25 (75.76%) patients are living in rural areas and the rest in urban areas. Of this, 14 (42.42%) were males and 19 (57.58%) were females. In one study conducted on 641 patients showed that 321 (50.08%) of them were females [9] Yasan *et al*. Showed that most subjects were women [10]. However, in some studies, the rates of HIV infection in men were more than women [31-33]. These differences may be due to the season [32] and the type of study and patients. According to the present study, the gender did not play a key role in the frequency of infection in the middle ear but previous ear infections on trauma are effective .

The mean age of patients was 41.00 ± 14.59 years range between 17-75 years. The average age of males and females was 34.93 ± 13.2 and 45.47 ± 14.24 years, respectively. Most participants (66/66%) were below the age of 45 years; and patients above 60 years had lowest prevalence (9/09%) (Table1). Several studies similar to the present study showed the middle ear infections are seen in all ages such as children [9, 21, 34]; although people aged 30-40 year are at risk of the disease more than other age brackets [7, 9-10, 33].

The cause of tympanic perforation were due to chronic otitis in 21 (63.64%) patients, trauma in 7 (21.21%) patients and 5 (15.15%) persons.

Most patient's job (36.37%) were housewives, followed by self-employed and students with rates of 27.27% and 15.15%, respectively (Figure 1).

Otorrhea, hearing loss and swelling were the main complaints among patients, while pain was seen in 26 (78.79%) persons. However, in most cases more than one of these symptoms and signs were observed. On physical examination almost all (93.94%) patients had pus in their ears. (Table2). Most patients complained of hearing loss in the current study which was noted in several studies [14, 21], indicated that

the degree of hearing loss in patients was related to ruptured eardrum in middle ear infections. It is noted that the perforation of tympanic membrane is the main cause of hearing loss [35]. In a comparative study, it was shown that the prevalence of hearing loss in patients with a ruptured eardrum was significantly higher than healthy individuals [33]. Naturally, the location of this rupture is involved in hearing loss [11]. One of the major symptoms in acute otitis media is ear discharge [1, 9]. It was observed in this study that 63.94% of patients complained from discharge from their ears and ENT specialist's observation reached the same conclusion .

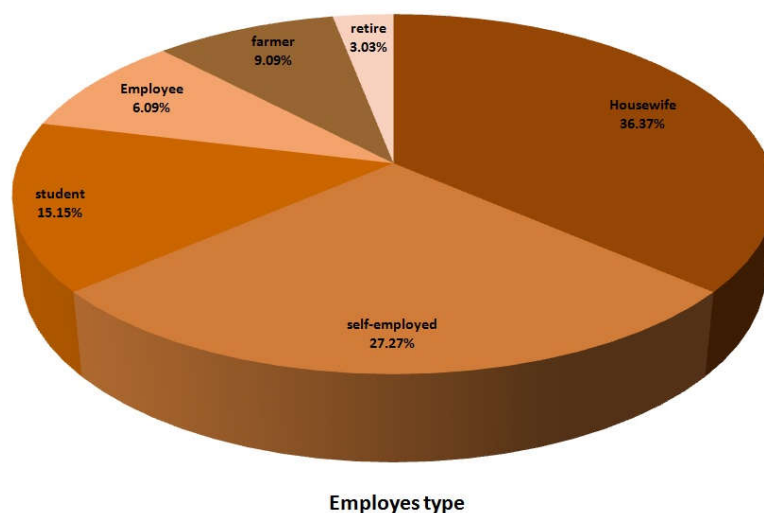


Figure (1): The resulting report of the percentage of the patient's jobs with otitis media

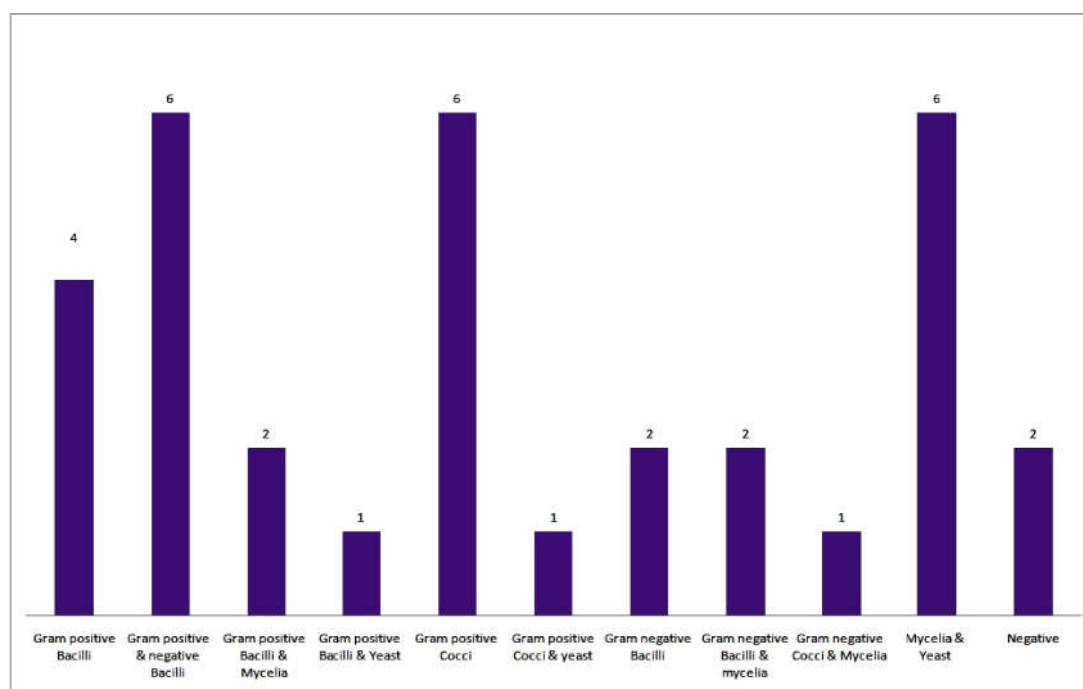


Fig. (2): Bacteria and fungi observed in direct examination of the middle ear samples

Table (1): Frequency of otitis media in patients who referred to Ayatollah Rouhani Hospital ,Babol, Iran

Age (year)	Male (%)	Female (%)	Total (%)
45<	11(33.33)	11(33.33)	22(66.66)
45-49	2(6.06)	6(18.19)	8(24.25)
60>	1(3.03)	2(6.06)	3(9.09)
Total	14(42.42)	19(57.58)	33(100)

Diagnosis of otitis media is based on symptoms and clinical findings. Although some mistakes may exist in diagnosis, especially by general practitioners [36-37]. Undoubtedly, the type of organism can be characterized after sample culture [38]. In the current study, the majority of each sample contained one organism, and 2 different types of organisms have been isolated from the culture medium in some samples. The same results were observed in a survey performed by Marchisio *et al.* in which they found that 51% of this disease was caused by multi organisms [21].

Direct examination of samples was showed that 54.55% of the samples contained bacteria ,21.21% of them had fungi and bacteria simultaneously and also 18.18% of pus samples had fungal elements alone. Most bacteria were Gram positive (39.39%) and the highest amount of fungal element (33.33%) was true mycelia (figure2).

Table (2): Signs and symptoms of middle ear infection in patients who referred to Rouhani Hospital, Babol, Iran

Characteristic	Symptom	Sign
	Number (%)	Number (%)
Swelling	27(81.82)	30(90.91)
Otorrhea	31(93.94)	31(93.94)
Hearing loss	28(84.85)	--
Pain	26(78.79)	--
Itching	2(6.06)	--

Total number of signs and symptoms is over 33, because usually more than one of them were observed in each patient

Table (3): Microorganisms isolated from middle ear infections, Rouhani Hospital, Babol, Iran

Organism (s)	Number	Percent
<i>Streptococcus</i>	5	15.16
<i>Streptococcus</i> & <i>A. niger</i>	2	6.06
<i>Staph. aureus</i>	2	6.06
Coagulase- negative <i>Staphylococcus</i>	4	12.12
Coagulase- negative <i>Staphylococcus</i> & <i>A. niger</i>	2	6.06
Coagulase- negative <i>Staphylococcus</i> & <i>A. flavus</i>	1	3.03
<i>Pseudomonas</i> & <i>A. flavus</i>	1	3.03
<i>Bacillus</i>	2	6.06
<i>Bacillus</i> & <i>A. fumigatus</i>	1	3.03
<i>Bacillus</i> & none- <i>albicans candida</i>	2	6.06
<i>Diphtheroid</i>	3	9.09
<i>Diphtheroid</i> & <i>A. niger</i>	1	3.03
<i>A. niger</i>	2	6.06
<i>Candida albicans</i>	1	3.03
None- <i>albicans candida</i>	1	3.03
Not grown	3	9.09
Total	33	100

After culture of pus samples, bacteria were the main etiology of infection (48.49%) and the association between bacteria and fungi was seen in 30.30% of samples. Fungal colonies were observed in 12.12% of cultures, alone. Coagulase-negative *staphylococci* and *Streptococci* with 21.21% were the main causes of otitis media. *Staphylococcus aureus* and *Streptococcus* sp. were the common bacterial which isolated from middle ear exudates in culture media. *Aspergillus* spp. (especially *A. niger*) and *Candida* spp. were the most fungi in culture media (Table 3). *Streptococcus* and *Staphylococcus* are the common causes of otitis media in the ongoing study, which connected well with direct examination results of pus samples. Marchisio *et al.* showed that *Streptococcus* and *Staphylococcus aureus* were also second and third contributing factors [21]. Guven *et al.* also found that *Streptococcus* spp. were the main cause of middle ear infection [31]. Although this study has similarities with other studies, some differences between these studies may be due to various reasons such as age of study, because all patients were studied in the existing study while Marchisio *et al.* only studied children. [21]. Grevers *et al.* found that the main cause of acute middle ear infection in children was *Haemophilus influenza* ; and *Streptococcus* spp. was the second cause of infections [39]. This organism was found to be the main cause of otitis media in Smith-Vaughan's study [22]. On the other hand, the economic and social situation of people can also affect the type of

organisms involved in the ear infection [40]. *Pseudomonas* spp. caused only about 3 percent of ear infection in the ongoing study, were the most common cause of infection in other studies [41]. Although *Staphylococcus aureus* isolates were low in number in this study, but this organism is important for rapid rupture of the tympanic membrane [42]. Fungi were isolated in 12.12% of otitis media cases in our study with a good coordination between direct examination agreeing to must studies [21, 41]. However, some research studies pointed to the presence of fungal infections of the middle ear. In a study 10% of patients with middle ear infection had fungal elements in direct examination [24]. Other studies were not found any fungal elements. The reason of this difference may be due to the lack of sample culture in specific media for fungi and lack of attention to the role of fungi in these infections .

The results of the present study on 33 patients with otitis media with external ear symptoms showed that their jobs were mostly housekeepers; and *Staphylococcus aureus* and *Streptococcus* were the major causes of the disease. Thus performing of specific approaches for isolation of bacterial and fungal species in patient with tympanic disorder and with otitis externa symptoms can help us to selecting the therapy for the patients in the future .

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COMPETING INTERESTS

The authors have declared that no competing interest exists.

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