



Original Research Article

Clinical and Demographical Findings of Otitis Externa in Adult Patients Who Referred to Roohani Hospital, Babol, Iran

S. Mahdavi Omran¹, B. Jalili², R Rajabnia³ and K. Kiakojsuri^{4*}

¹Infectious Diseases & Tropical Medicine Research Center, Department of Medical Parasitology and Mycology, Faculty of Medicine, Babol University of Medical Sciences, Babol, Iran

²Faculty of Medicine, Babol University of Medical Sciences, Babol, Iran

³Department of Microbiology, Faculty of Medicine, Babol University of Medical Sciences, Babol, Iran

⁴Dept. of ENT, Roohani Hospital, Faculty of Medicine, Babol University of Medical Sciences, Babol, Iran

*Corresponding author

A B S T R A C T

Keywords

Otitis externa, Clinical finding, Symptom, Sign

Acute otitis externa is an inflammatory process of the external ear canal and is a common clinical problem in general medicine. Regarding the effect of high humidity of weather in Mazandaran province (North of Iran) on prevalence of otitis externa, this study was performed to determine the clinical finding of this disorder. This descriptive cross-sectional study was performed on 128 patients with otitis externa appearance. The demographic data were collected via a questionnaire, and then the discharge samples were removed from the ear canal by using speculum and were put on the slide and cultured on appropriate media. The result showed that 106 patients (82.81%) lived in rural areas and the 22 others (17.19%) in the city area. The mean age was 44.02±16.69 years old. Most of the patients' complaints were related to inflammation and hearing loss with 89.84%, for both groups. Edema and discharge were seen in 93.75% and 85.16%, respectively. The results of the direct examination showed the highest frequency (55.47%) for bacterial elements; and culture of the smear in appropriate media showed the high frequency of bacterial and fungal co-infection (57.81%). *Bacillus* spp., *Aspergillus niger* and coagulase negative *Staphylococcus* were the most common organisms. According to these results and to the highest prevalence of co infection between bacteria and fungi, we propose to culture and then treat for fungal and bacterial infection, if they were grown on media.

Introduction

Otitis externa is an inflammatory process that affects the external ear canal. The cutetype affects 4 out of every 1,000

affects 4 out of every 1,000 people in America, annually (Sander, 2001; Osguthorpe and Nielsen, 2006). According

to some studies, this condition can interfere in the daily lives of 36% of patients with an average of 4 days (Sander, 2001). This process is usually localized with topical treatment; however in 65% of cases, doctors prescribe systemic therapies. Acute otitis externa is usually seen in high humidity, warm swimming pool, and the use of hearing aid is associated with local trauma (Osguthorpe and Nielsen, 2006; Mosges *et al.*, 2011; Beers and Abramo, 2004). The main manifestations of otitis externa are otalgia and otorrea; ear discomfort from itching to severe pain is another manifestation (Sander, 2001; Osguthorpe and Nielsen, 2006; Kurnatowski and Kurnatowska, 2007). Symptoms are more severe in bacterial causes of otitis externa than the others. Otagia, fever, lymphadenopathy and other symptoms may be seen (Sander, 2001; Ong and Chee, 2005; Ninkovic *et al.*, 2008). Cleaning the ear canal, placing wicks and topical or systemic antibiotics are used for treatments; it may be simple or difficult (Sander, 2001; Olina *et al.*, 2002). According to absent of study about the clinical and demographical features of otitis externa in Babol City (North of Iran) in recent years and also there is little information on the demographic characteristics of this disease, thus, this study was performed to detect this illness in patients who suffered from it according to clinical and laboratory findings.

Materials and Methods

This descriptive cross-sectional study was done on all patients with otitis externa who referred to health centers in Babol in 2013. People who have ruptured tympanic, otitis media with a history of surgery (except for a successful surgery and tympanoplasty or myringoplasty) were excluded from this study. The total samples were 139 cases.

A questionnaire containing the demographic data, the history of previous treatments and the reason for his or her visit to the clinic was completed for all patients. If they were suitable cases, the discharge samples were picked up by the ENT specialist.

The sample was removed from the ear by using ear speculum or with the help of suction curette or a sterile loop. A portion of the sample was spread on a slide glass and stained with Gram's Method. Two separate samples were inoculated in culture media for growth of bacteria on Chocolate agar (HiMedia India) and fungi on Sabouraud dextrose agar (Biolife Itali). Plates were incubated at room temperature and at 37°C for growth of fungi and bacteria, respectively.

Otitis externa is identified based on the positive results of bacteria or fungi in direct examination and also related to the positive result for their growth. The organisms were identified according to macroscopic and microscopic morphology appearances for fungi and biochemical tests for bacteria.

Ethics

All the demographical and other information were collected confidentially, and all information was incubated in suitable place.

Statistics

Statistical analyses were done using Statistical Package for Social Sciences (SPSS) Version 18. Giving characterization data obtained through frequency tables and charts was necessary. The statistical significance in all tests was 0.05, thus, a p-value less than 0.05 was considered as the statistical difference.

Result and Discussion

The result showed that 106 patients (82.81%) lived in rural areas and 22 (17.19%) in the city area. There is no significant difference between the two groups ($p < 0.001$). Among these patients, 60 (46.88%) of them were males and 68 (53.12%) females, there was not a statistically significant difference between the two groups ($p = 0.2$).

The mean age of the patients was 44.02 ± 16.69 years. The 3 age groups were young ($45 >$ years), middle aged (45 -60 years), elderly ($60 <$ years). Young patients had the most frequency (58.59%); followed by elderly (16.41%). The results showed that young age was more than the other age groups ($p < 0.001$). Housekeeper (37.5%) and Self-employed (17.98) were more than other jobs (Table 1).

The duration of otitis among these patients showed that they had this disease since more than 5 years ago. The most frequency related to the course of illness was seen in those who suffered less than a month and between one and six months (Table 2).

Most of the patients had previous treatment (72.66%). Combination therapy was more than (53.91%) single therapy (18.75%). The combination of oral antibiotics, ear drops and suction was the most prevalent drugs (16.41%) (Table 3).

The patients with otitis externa symptoms showed different types of signs. Most of these complaints were related to inflammation (swelling) and hearing loss 89.84% (115 cases), both of them, followed by discharge (87.5%) and pain (79.69%), itching had the lowest prevalent in patients (10.16%). Edema, discharge and adenopathy

were seen in 93.75%, 85.16% and 0.78%, respectively.

The color of discharge was different from white to black. Most color of discharges were white (38.28%), followed by yellow 24.22% (Table 4).

The results of direct examination of smears showed bacterial elements had the highest frequency (55.47%), followed by co infection between bacteria and fungi (35.94%). Fungal elements were observed in 8.59% of smears.

The culture of smear in appropriate media showed co infection between bacteria and fungi with the highest frequency (57.81%) followed by fungi (19.53%) and bacteria (16.41%); 6.25% of cultures were negative for growth of bacteria or fungi. *Bacillus* spp. (37 cases), *A. niger* (31 cases) and *Staphylococcus* coagulase negative (23 cases) were the most common organisms in cultures. Other more organisms were *Diphtheroid* spp. (20 cases), *Pseudomonas* spp. (14 cases) and *Candida albicans* (8 cases), respectively.

One hundred and twenty-eight samples were studied from external auditory canal of the patients' ears suffering from otitis externa. Among them, 46.88% were males and 53.12% females, which are in agreement to other results performed in other cities of Iran (Saki *et al.*, 2013; Nemati *et al.*, 2014). In a study, 44.5% of patients with otitis externa were females and rest were males (Battikhi and Ammar, 2004). Cheong *et al.* in Singapore on 91 patients with otorrhea reported that 52.7% of patients were males (Cheong *et al.*, 2012). These studies had a controversy around the frequency of otitis externa in males and females. It may be due to swimming, climate and job.

As result of our study, almost all studies showed that otitis externa were diagnosed in people under 45 years old (Kazemi and Ghiasi, 2005; Saki *et al.*, 2013; Nemati *et al.*, 2014). This change of disease from elder to middle-age may be due to some changes about lifestyle and also living in city and jobs such as housekeeping and self-employment in our study.

In our study, inflammation (swelling) and hearing loss with 89.84% were the most clinical signs in patients. Battikhi and Ammar (2004) found pain as the most common symptom (97.2%) in patients with otitis externa In his study, the lowest common symptoms were itching and hearing impairment (Battikhi and Ammar, 2004). In other studies on patients with otomycosis, the most common symptom was purities (Shokohi *et al.*, 2001; Pontes *et al.*, 2009). Pain was the most prevalent sign in patients with otitis externa in other studies (Al-Asaaf and Farhan, 2000). The prevalence of clinical findings in our study was edema (93.75%). Al-Asaaf and Farhan (2000) reported erythema was the most common clinical findings in patients with

otitis externa (Al-Asaaf and Farhan, 2000). These differences could be due to the different types of microorganisms causing the disease, the patient's immune system, duration of disease and the anatomy of the ear (Hirsch, 1992). On the other hand, almost all of our patients had erythematic findings, but other researchers did not mention it.

In our study, 72.66% of patients' had previous treatment; these issues can provide a good condition for ear canal infection resistance (Lucente, 1993; Schaefer and Baugh, 2012).

Among the 128 positive smears, 8 samples (6.25%) were negative for growth of fungi or bacteria. In one study, 20.14% of swab specimens were negative for the growth of any microorganisms (Ninkovic *et al.*, 2008). Russell *et al.* reported that only 40% of their cases were positive for the isolation of microorganisms (Russell *et al.*, 1993). Some of the causative differences may be due to preparation of samples for culture.

Table.1 Demographic data from patients with otitis externa, Babol (No.128)

Variables	Subgroups	Number	Percent
Age (year)	<45	75	58.59
	45-60	32	25
	>60	21	16.41
Employ	Housekeeper	48	37.5
	Employee	25	19.53
	Retired	4	3.12
	Self-employed	23	17.98
	Student	10	7.81
	Driver	4	3.12
	Farmer	6	4.69
	Unknown	8	6.25

Table.2 Duration of otitis externa in patients who referred to Roohani Hospital

Course of diseases	Number	Percent
Week<1	5	3.91
Month<1	25	19.53
1-6 Month	24	18.75
6-12 Month	16	12.5
1-5 Years	7	5.47
>5 Years	3	2.34
Unknown	48	37.5
Total	128	100

Table.3 Previous treatment in patients who suffered from otitis externa, Babol

Treatment	Number	Percent
Without any treatment	35	27.34
Oral AB	6	4.69
Ear drop	18	14.06
Oral AB+ Injection AB	1	0.78
Oral AB+ Ear drop	17	13.28
Injection AB+ Ear drop	1	0.78
Oral AB+ Injection AB+ Ear drop	4	3.12
Suction and washing	4	3.12
Ear drop+ Suction and washing	13	10.16
Oral AB+ Ear drop+ Suction and washing	21	16.41
Oral AB+ Injection AB+ Ear drop+ Suction and washing	8	6.26
Total	128	100

AB: Antibiotic

Table.4 The color of discharge in macroscopically examination from patients with otitis externa

Colors	Number	Percent
White	49	38.28
Black	21	16.41
Yellow	31	24.22
Pussy	1	0.78
Brown	10	7.81
Light Brown	16	12.5
Total	128	100

Culture of positive smears showed co-infection between bacteria and fungi with the high frequency (57.81%). In a study, from a total of 267 organisms otitis externa,

68.16% of them were aerobes or mixed, fungi were seen in 30.71% (Enoz *et al.*, 2009). The mixed growth of bacteria and fungi were observed in some studies

(Shokohi *et al.*, 2001; Saki *et al.*, 2013). Of course almost all of studies showed that bacteria had more frequency from fungi (Shokohi *et al.*, 2001; Saki *et al.*, 2013; Nemati *et al.*, 2014).

As our results, some researchers found *Staphylococcus coagulase negative* was the most common bacteria (Kalantar *et al.*, 2006; Saki *et al.*, 2013). But in other studies showed different results on bacteria in ear canal (Shokohi *et al.*, 2001; Bineshian *et al.*, 2006). *A. niger* and *C. albicans* the most common fungi in our study, were observed in other researches (Shokohi *et al.*, 2001; Kazemi and Ghiasi, 2005).

In conclusion, the results of this study showed a co infection between bacteria and fungi. According to this result, we propose to conduct a future research about the preparation of a treatment guideline protocol with lower cost and faster treatment.

Acknowledgements

The present manuscript is an approved project of Babol University of Medical Sciences. We thank Mr. Hosseini E. Mr. Bagheri M. and also Mrs. Marayamossadat Shafii for their cooperation and assistance in the clinic and laboratory work, and to Dr. Evangeline Foronda for the English editing this manuscript.

Authors' Contribution

K. Kiakojuri arranged the ear sample collection and primary design, R. Rajabnia and S. Mahdavi Omran designed the study, wrote and edited the manuscript, and B Jalili carried out the examination.

Financial Disclosure

We thank the Babol University of Medical Sciences for the approve (8929512, 19 Dec 2009) and financial support of this study.

Funding

Babol University of Medical Sciences financially supported this study.

References

- Al-Asaaf, S.M., Farhan, M.J. 2000. Otitis externa in a localized area at the South of Jordan. *Saudi Med. J.*, 21(10): 928–930.
- Battikhi, M.N., Ammar, S.I. 2004. Otitis externa infection in Jordan. *Clinical and microbiological features. Saudi Med. J.*, 25(9): 1199–1203.
- Beers, S.L., Abramo, T.J. 2004. Otitis externa review. *Pediatr. Emerg. Care.*, 20(4): 250-256.
- Bineshian, F., Irajian, G., Koochak Alavi, S.K., Fredonian, M.R. 2006. A Study on the Frequency of Fungal Agents in Otitis Externa in Semnan. *Iran. J. Pathol.*, 1(4): 141–144.
- Cheong, C.S., Tan L.M., Ngo, R.Y. 2012. Clinical audit of the microbiology of otorrhoea referred to a tertiary hospital in Singapore. *Singapore Med. J.*, 53(4): 244–248.
- Enoz, M., Sevinc, I., Lapena, J.F. 2009. Bacterial and fungal organisms in otitis externa patients without fungal infection risk factors in Erzurum, Turkey. *Braz. J. Otorhinolaryngol.*, 75(5): 721–725.
- Hajjartabar, M. 2004. Poor-quality water in swimming pools associated with a substantial risk of otitis externa due to *Pseudomonas aeruginosa*. *Water Sci. Technol.*, 50(1): 63–67.
- Hirsch B.E. 1992. Infections of the external ear. *Am. J. Otolaryngol.*, 13(3): 145–155.

- Kalantar, E., Mosaei, M., Ekrami, A., Pedram, M. 2006. Isolation and antimicrobial susceptibility of bacteria from external ear canal of cancer patients at Shafa Cancer Hospital-Ahwaz. *J. Cancer Res. Ther.*, 2(1): 17–19.
- Kazemi, A., Ghiasi, S. 2005. Survey of otomycosis in north- western area of Iran(1447- 2004). *J. Mazandaran Univ. Med. Sci.*, 15(48): 112–119.
- Kurnatowski, P., Kurnatowska, AK. 2007. Treatment of fungal infections of upper respiratory tract and ear. *Otolaryngol. Pol.*, 61(3): 280–285.
- Lucente, F.E. 1993. Fungal infections of the external ear. *Otolaryngol. Clin. North Am.*, 26(6): 995–1006.
- Mosges, R., Nematian-Samani, M., Eichel, A. 2011. Treatment of acute otitis externa with ciprofloxacin otic 0.2% antibiotic ear solution. *Ther. Clin. Risk Manag.*, 7: 325–336. doi: 10.2147/TCRM.S6769.
- Nemati, S., Hassanzadeh, R., Khajeh Jahromi, S., Delkhosh Nasrollah Abadi, A. 2014. Otomycosis in the north of Iran: common pathogens and resistance to antifungal agents. *Eur. Arch. Otorhinolaryngol.*, 271(5): 953–957.
- Nikaeen, M., Hatamzadeh, M., Vahid Dastjerdi, M., Hassanzadeh, A. 2009. Predictive indicators of the safety of swimming pool waters. *Water Sci. Technol.*, 60(12): 3101–3107.
- Ninkovic, G., Dullo, V., Saunders, N.C. 2008. Microbiology of otitis externa in the secondary care in United Kingdom and antimicrobial sensitivity. *Auris. Nasus. Larynx.*, 35(4): 480–484.
- Olina, M., Cametti, M., Guglielmetti, C., *et al.* 2002. External otitis. *Recent. Prog. Med.*, 93(2): 104–107.
- Ong, Y.K., Chee, G. 2005. Infections of the external ear. *Ann. Acad. Med. Singapore*, 34(4): 330–334.
- Osguthorpe, J.D., Nielsen, D.R. 2006. Otitis externa: Review and clinical update. *Am. Fam. Physician.*, 74(9): 1510–1516.
- Pontes, Z.B., Silva, A.D., Lima Ede, O., *et al.* 2009. Otomycosis: a retrospective study. *Braz. J. Otorhinolaryngol.*, 75(3): 367–370.
- Russell, J.D., Donnelly, M., McShane, D.P., Alun-Jones, T., Walsh, M. 1993. What causes acute otitis externa? *J. Laryngol. Otol.*, 107(10): 898–901.
- Saki, N., Rafiei, A., Nikakhlagh, S., Amirrajab, N., Saki, S. 2013. Prevalence of otomycosis in Khuzestan Province, south-west Iran. *J. Laryngol. Otol.*, 127(1): 25–27.
- Sander, R. 2001. Otitis externa: a practical guide to treatment and prevention. *Am. Fam. Physician.*, 63(5): 927–36; 941–942.
- Schaefer, P., Baugh, R.F. 2012. Acute otitis externa: an update. *Am. Fam. Physician.*, 86(11): 1055–1061.
- Shokohi, T., Âhanjan, M., Kasiri, A. 2001. Bacteriological and Mycological study of external otitis in-patients referred to ENT clinic of Boo Ali Sina Hospital in Sari in summer 1999. *J. Mazandaran Univ. Med. Sci.*, 11(32): 1–11.