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Correlation of Clinical Evaluation and Laboratory Tests of Ear Infections in Patients refereed to Ayatollah Rouhani Hospital, Babol, 2018 to 2019

Keyvan Kiakojuri[1], Saeid Mahdavi Omran[2,3], Ramazan Rajabnia[2,4,] Abazar Pournajaf[2], [4,] Abolfazl Davodabadi [2,4] Mohsen Karami[2,3], Mojtaba Taghizadeh Armaki[2,3*]

1. Department of Ear, Nose, and Throat, School of Medicine, Roohani Hospital, Babol University of Medical Sciences, Babol, Iran;
2. Infectious Diseases and Tropical Medicine Research Center, Health Research Center, Babol University of Medical Sciences, Babol, Iran;
3. Department of Medical Parasitology and Mycology, School of Medicine, Babol University of Medical Sciences, Babol, Iran;
4. Department of Microbiology, School of Medicine, Babol University of Medical Sciences, Babol, Iran

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ABSTRACT

Ear infection is one of the most common types of infections that can caused by fungal and bacterial agents. The precise diagnosis of the disease and identification of microbial agents is very important to prescribe the right drug and cure patients as soon as possible. The present study was to find the consistency of clinical findings and laboratory tests among patients suspected of ear infections over a one-year period. In this cross-sectional study conducted in 2018 to 2019, 134 ear samples of patients referred to the ENT clinic of Ayatollah Rouhani hospital of Babol were collected. These samples were analyzed and microbial agents were identified by direct examination and culture. The results were compared with an initial diagnosis from a physician. Out of the 84 patients clinically diagnosed for fungal infection, 67 cases (79.8%) were laboratory-approved, while the rate of bacterial- infection was 33 cases (66%). Our findings showed that the initial diagnosis of from a physician along with laboratory tests is necessary for accurate diagnosis and treatment of ear infections.

1. Introduction

Ear infections are acute, sub-acute or chronic external ear infections with major clinical symptoms including pain, inflammation, discharge, pus, itching and loss hearing ability (Szmuilowicz and Young, 2019). Because affected patients show with different complaints, a careful history and physical examination are very significant (Szmuilowicz and Young, 2019; Gharaghani, Seifi and Mahmoudabadi, 2015a).

The most common bacteria in ear infections were *Pseudomonas aeruginosa* and *Staphylococcus aureus*; however, other bacteria isolated from the outer ear infections include gram-negative bacilli, coagulase-negative *Staphylococci* (CoNS), *Enterobacteriaceae*, *Bacillus* species,

*Corresponding author: Dr. Taghizadeh Armaki
E-mail: mojtabataghizade@yahoo.com

Gram-positive *Cocci*, and *Diphtheriae* species (Addas et al., 2019).

The most common ear fungal infections include *Aspergillus* and *Candida* (Chowdhary, Sharma and Meis, 2017). In these patients, identification can be made by careful examination of the ear to look for black or white fungal colonies (Chowdhary et al., 2017).

The predisposing factors are usually age, weakened immune systems, foreign body entry into the ear canal, traumatic, scratching and manipulation with non-sterile devices, hot and humid air, swimming, and tinea unguium infection (Kiakojuri et al., 2019).

The ears, nose, and throat (ENT) specialist uses autoscopy to diagnose the infection (Kiakojuri et al., 2016). In acute bacterial ear infection, there is white mucus thickness, however in chronic infection is present blood secretion and granulation tissue (Osguthorpe and Nielsen, 2011). The type of ear fungal infection is effective in the color created (Wang et al., 2005).

The diagnose any illness by a specialist physician is an available different options (Gharaghani, Seifi and Mahmoudabadi, 2015b). The first step is an examining the clinical signs and symptoms of ear infections. In addition to paraclinical findings (radiography, CT-scans, MRIs, lab finding, pathology, etc.), it also plays an important role in this topic (Richardson and Johnson, 2008). A rare data is available about the correlation between clinical symptoms and laboratory tests of fungal and bacterial ear infections.

The aim of study was correlation of clinical evaluation and laboratory tests of ear infections in patients refereed to Ayatollah Rouhani hospital, Babol, 2018 to 2019.

2. Materials and Methods

This descriptive cross-sectional study was performed on patients referring to Ayatollah Rouhani Hospital for Hearing, Nose and Throat Clinic at 2018 to 2019. The patients were selected based on easy non-probability method. At first, after obtaining informed consent from patients, demographic information was recorded that including age, sex, and occupation, underlying disease, duration of ear manipulation with external devices, ear condition, swimming, and disease symptoms. Then, patients with symptoms of external ear infections were selected using an autoscopy by an otolaryngologist. Samples were collected by suction, sterile swab and ring and transferred to sterile container containing sterile normal saline and transferred to laboratory for microbiological tests. All samples were divided into two parts; part of the sample was used for direct examination test and culture for isolation of fungal isolates and the other part was used for isolation of bacterial agents. The Methylene blue staining was used for direct smear staining. The sabouraud dextrose agar with chloramphenicol (SC) was used for fungal agents and for bacterial agents blood agar and chocolate agar were used.

2.1. Statistical analysis

The results were compared with clinical findings and analyzed using Chi-square and McNemar's tests in SPSS 16 software. P <0.05 was considered as significant level.

3. Results

In the present study, 134 patients were evaluated, including 60 males (44.78%) and 74 females (55.22%) (Table 1). The mean age of these patients was 46.5 years with a standard deviation of 19.79 and a range of 1 to 105 years old. In the present study, women were more likely to have fungal infection than men, whereas bacterial infection was more common in men, which was statistically significant using chi-square method (Pvalue < 0.05). Out of the 84 patients clinically diagnosed for fungal infection, 67 (79.8%) were laboratory-approved, while the rate for bacterial-origin infection was 33 cases (66%) (Table 2). Using the kappa method, the coefficient of agreement between the two (clinical findings with laboratory results) was calculated to be 0.46, which is a positive and weak agreement. Thus, the positive predictive value for otomycosis was 79.8% and 66% for bacterial causes of otitis media (Table 2). Our results indicated the severity of different degrees of pain was seen in

50% of patients with fungal infection more than a bacterial infection, but itching and discharge were seen in 98.5% and 93.3% of all patients, respectively (Table 3). The clinical findings of tympanic membrane perforation and ulceration were indicated in 29.1% and 27.6% of all cases, respectively. The tympanic membrane perforation was more prevalent in bacterial infections (36%) than fungal infections (25%) (Table 3).

Table 1. Number and gender of patients with ear fungal and bacterial infections in the present study

Sex	Fungal infection	Bacterial infection	Total
	No. (%)	No. (%)	No. (%)
Male	29 (34.5)	31 (62)	60 (44.8)
Female	55 (65.5)	19 (38)	74 (55.2)
Total	84 (100)	50 (100)	134 (100)

Table 2. The association of clinical and laboratory diagnosis of otitis media in the present study

Clinical	Laboratory diagnosis		Total No. (%)	Positive predictive value (%)	Kappa coefficient
	Otomycosis No. (%)	Bacterial Otitis No.(%)			
Otomycosis	67 (79.8)	17 (34)	84 (62.7)	79.8	
Bacterial Otitis	17 (20.2)	33 (66)	50 (37.3)	66	0.46
Total	84 (62.7)	50 (37.3)	134 (100)		

Table 3. Clinical signs and symptoms of bacterial and fungal ear infections in the present study

Clinical signs	Clinical		Pvalue	Laboratory diagnosis		Pvalue	Total No. (%)
	Fungal No. (%)	Bacterial No. (%)		Fungal No. (%)	Bacterial No. (%)		
Pain	47 (56)	20 (40)	0.07	46 (54.8)	21 (42)	0.15	67 (50)
Itching	81 (96.4)	44 (88)	0.06	82 (97.6)	43 (86)	0.00[a]	125 (93.3)
Discharge	83 (98.8)	49 (98)	0.7	84 (100)	48 (96)	0.06	132 (98.5)
Canal wounds	27 (32.1)	10 (20)	0.13	28 (33.3)	9 (18)	0.05[a]	37 (27.6)
Ear tympanic perforation	21 (25)	28 (36)	0.17	25 (29.8)	14 (28)	0.8	39 (29.1)

[a]= Significantly

4. Discussion

Ear infection is an essentially caused by bacterial (*P. aeruginosa*, *S. aureus*, *S. epidermidis*, *S. pneumoniae*, *E. coli*, *P. mirabilis*) and fungal pathogens (*A. niger*, *A. fumigatus*, *A. flavus*, *C. albicans*)(Aneja, Sharma and Joshi, 2012).

A rare data is known about the correlation between of clinical symptoms and laboratory testing of fungal infections.

The direct examination test of vulvovaginal candidiasis has shown that the correlation between diagnosis based on clinical symptoms and laboratory testing is variable, indicating that observation of clinical symptoms without having laboratory-related documentation can lead to misdiagnosis and mistreatment (Nozhat and Zarei, 2016).

In a study of 98 patients with vaginal candidiasis, the association of clinical findings and laboratory results was 67.65%, although they did not find significant differences with some parameters such as odor and other criteria (Dermendzhiev et al., 2016).

In the other study, there is a difference in the diagnosis of pityriasis versicolor and in addition to the need for clinical examination, consideration has been given

to laboratory testing (Mikaeili et al., 2015b).

The other study was performed by Mikaeili et al (2015) found that the correlation between Wood light results and direct examination test for the identification pityriasis versicolor was only 44% (Mikaeili et al., 2015a).

In mixed bacterial and trichomonas vaginal infections, a laboratory finding was effective in the appropriate treatment of vaginal infections (Buyukbayrak et al., 2010, Gharaei, Ebrahimzadeh and shah bakhsh, 2014).

In totally, the compatibility of clinical symptoms and laboratory findings of ear infection diagnosis on 134 patients was 74.63%. This concordance in a study conducted by Nozhat et al. (2016) on 220 patients with vaginitis complaints was 62.9% (Nozhat and Zarei, 2016).

In a descriptive-analytic study carried out in Bandar Abbas during 2001-2002 in vaginitis, it was revealed that the presence of white discharge in 88% and 99% of the infections were caused by bacteria and fungi, respectively (Gharaei et al., 2014).

They concluded that failure to use laboratory methods often leads to misdiagnosis, so they suggested that in addition to clinical evaluation of the disease and patient complaints, consideration should also be given to laboratory diagnosis (Gharaei et al., 2014).

Among pulmonary bacterial infections, a study of 152 patients found that radiographs had sensitivity and specificity of 100% and 89.47%, respectively. Therefore, it was suggested that clinical signs and symptoms should be used in the absence of this method along with laboratory findings (mohamadi fard and ebrahimzadeh, 2014).

In another cross-sectional study in Rasht (North of Iran), the concordance between clinical diagnosis and histopathology results on oral lesions were evaluated. This study suggested that revision and accuracy of clinical signs of lesions are necessary for better diagnosis (Saravani et al., 2016).

In conclusion, our results suggested that its better, the confirmation of clinical findings of lesions is accompanied by laboratory identification.

Conflicts of interest

There are no conflicts of interest

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Refereces

Addas, F., M. Algethami, N. Mahmalji, S. Zakai and T. Alkhatib. (2019). Bacterial etiology and antimicrobial sensitivity patterns of ear infections at King Abdulaziz University Hospital, Jeddah, Saudi Arabia. Journal of Nature and Science of Medicine. 2: 147.

Aneja, K. R., C. Sharma and R. Joshi. (2012). Antimicrobial activity of Terminalia arjuna Wight & Arn.: An ethnomedicinal plant against pathogens causing ear infection. Brazilian Journal of otorhinolaryngology. 78: 68-74.

Buyukbayrak, E.E., B. Kars, A. Y. K. Karsidag, B. I. Karadeniz, O. Kaymaz, S. Gencer, Z. M. Pirimoglu, O. Unal, M. C. J. A. o. g. Turan and obstetrics. (2010). Diagnosis of vulvovaginitis: comparison of clinical and microbiological diagnosis. 282: 515-519.

Chowdhary, A., C. Sharma and J. F. Meis. (2017). Candida auris: a rapidly emerging cause of hospital-acquired multidrug-resistant fungal infections globally. PLoS pathogens 13.

Dermendzhiev, T., K. Hadzhieva, S. Dermendzhiev, M. J. B. Murdjeva and B. Equipment. (2016). Analysis of clinical and microbiological indicators of vulvovaginal candidiasis. 30: 1173-1178.

Gharaei, A., A. Ebrahimzadeh and A. shah bakhsh (2014). Survey of frequency, clinical findings and diagnosis methods for detection of trichomoniasis in women referred to gyncology clinic in

south-east of Iran. J Journal of North Khorasan University of Medical Sciences. 5: 803-810.

Gharaghani, M., Z. Seifi and A.Z.J.M. Mahmoudabadi. (2015b). Otomycosis in Iran: a review. 179: 415-424.

Gharaghani, M., Z. Seifi and A.Z. Mahmoudabadi. (2015a). Otomycosis in Iran: a review. Mycopathologia1.79: 415-424.

Ghasemi Moridani, S., Mohtasham, Z., Sazesh, S. (2005).Correlation between clinical and histopathological diagnosis of oral lesions surgery in the city of Rasht (2000-2002). The Journal of Islamic Dental Association of IRAN (JIDA). 17 (2): 95-99.

Kiakojuri, K., M.T. Armaki, R. Rajabnia, A. Pournajaf, M. Karami, A. Khademian and S.M.J.O. Omran .(2019). Outer ear infections in Iran: a review. 7: 1233.

Kiakojuri, K., S.M. Omran, B. Jalili, M. Hajiahmadi, M. Bagheri, E.F. Shahandashti and R.J.J. Rajabnia. (2016). Bacterial otitis externa in patients attending an ENT clinic in Babol, North of Iran. 32: 9-15.

Mikaeili, A., Z. Geravand, A. Ebrahimi and Y. Hamzavi. (2015a). comparison study of wood lamp & direct exam for diagnosis of superficial mycoses. Medical Laboratory Journal. 9: 8-12.

Mikaeili, A., Z. Geravand, A. Ebrahimi and Y. J. M. L. J. Hamzavi. (2015b). comparison study of wood lamp & direct exam for diagnosis of superficial mycoses. 9: 8-12.

Mohamadi fard, M. and Ebrahimzadeh, A. (2014). Matching of Clinical, Radiologic and Laboratory findings of Acute bacterial Community Acquired Pneumonia in adults admitted to Valiasr Hospital in 2011. J journal of ilam university of medical sciences. 22: 57-64.

Nozhat, F. and Zarei, M.J.K.J. (2016). Association between clinical symptoms and laboratory findings in the diagnosis of Candida vaginitis. 20: 173-179.

Osguthorpe, J.D. and Nielsen, D.R. (2011). Otitis externa: review and clinical update. South African Family Practice. 53: 223-229.

Richardson, M.D. and Johnson, E.M. (2008). Pocket Guide to Fungal Infection. John Wiley & Sons. Spafford, M. F. Otology/Neurotology.

Saravani, S., Tavakoli Amin., M. and H. Kadeh. (2016). Compatibility Rate of Clinical and Histopathologic Diagnosis of Oral Lesions in Zahedan Dental School during 1999-2015. Journal of Dental Materials and Techniques 5, 138-144.

Szmuilowicz, J. and Young, R. (2019). Infections of the ear. Emergency Medicine Clinics. 37: 1-9.

Wang, M.C., Liu, C.Y., Shiao, A.S. and Wang. T. (2005). Ear problems in swimmers. 68: 347-352.