INNSPUB

International Journal of Biosciences | IJB |
ISSN: 2220-6655 (Print), 2222-5234 (Online)
http://www.innspub.net
Vol. 13, No. 1, p. 291-296, 2018

RESEARCH PAPER OPEN ACCESS

Bacterial isolates and antibiotic susceptibility of ear infections in Iraqi patients

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Key words: Ear swabs, bacterial infection, otitis media, Amikacin, antimicrobial sensitivity.

http://dx.doi.org/10.12692/ijb/13.1.291-296 Article published on July 30, 2018

Abstract

This study was undertaken for review the frequency of isolation of different bacteria species from Iraqi patients reporting with ear infections and to examine their antibiotic susceptibility pattern. During the period from February 2017 to August 2017. Ear swabs samples were collected from 80 Iraqi patients and controls for bacterial species isolation of ear infection and in vitro antimicrobial sensitivity test for positive culture was done. The positive results of culturing and isolated from otitis media patients, the Pseudomonas spp. was the highest in incidence 15 (30%) , followed by Proteus spp 14 (28%) , while antimicrobial sensitivity test, the bacteria which isolated from the ear swabs was sensitive to Amikacin (AK 29%) ,while Cefotaxime (CTX 19%) was poor antibacterial drug activity than others antibacterial drugs. The present study revealed that *Pseudomonas spp.* was more species isolates from ear swabs from the patients with otitis media. Amikacin was more sensitive and effective antibacterial drug activity than others antibacterial drugs.

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Introduction

Ear infection is an inflammation of the ear and ear discharge is one of the most common signs of ear infection (Variya *et al., 2002*), it has different forms with the otitis media being the most common and occurs mostly in children.

The frequency of this infection in children is due to the shorter length of the Eustachian tube and is more horizontal in children than in adults (Weiner and Collison, 2003). About 65-330 million people be in pain from ear infections worldwide, and 60% of them suffer from hearing impairment (Wood field and Dugdale, 2008). Otitis media, is infection of the middle ear and usually related with upper respiratory tract infection. It can occur at any age but 60-80% of children with recurrent otitis media (Kalcioglu *et al.,* 2006).

Infections of otitis media can be asymptomatic or symptomatic or acute symptomatic, infections are characterized by symptoms such as moderate to severe pain, rashes ear discharge (pus), irritation and sometimes fever (Damoiseaux 2005). Sources of ear infections include bacteria, viruses and fungi, with bacteria being the most common cause (Bello *et al.,* 2011). Depending on the clinical presentation otitis media can be divided into 2 types: Acute otitis media (AOM), Chronis superlative otitis media (CSOM) (Oni *et al.,* 2002). Early diagnosis may avert the possibility of complications correlated with such infection as meningitis, brain abscess, subdural abscess and lateral sinus thrombosis (Pendido *et al.,* 2005).

The infection was attributed to several bacterial species such as *Pseudomonas aeruginosa, Proteus vulgaris, Proteus mirabilis and Staphylococcus aureus* (Pajor *et al.,* 2006; Hafidh *et al.,* 2006). The emergence of highly resistant strains of both gram positive and gram negative bacteria can suppress the most effective antibiotics such as extended spectrum beta lactamase (ESBL) and the variable pattern of antibiotic efficacy to stimulate the concept of this action (Motayo *et al.,* 2012).

This research was achieved to evaluate the frequency of isolation of diverse bacteria species from Iraqi patients reporting with ear infections and to examine their antibiotic susceptibility pattern.

Materials and methods

The collection of samples and processing

Ear swabs samples were collected from 50 Iraqi patients and 30 controls for bacterial species isolation of ear infectionby using a sterile swab stick at medical city in Baghdad from February 2017 to August 2017. The ear swab samples were immediately inoculated on Mac Conkey and Blood agar plates on Microbiology unit of the laboratory, these plates were incubated aerobically at 37°C for 24 to 48 hours. All positive cultures were identified by their characteristic appearance on their respective media, Gram-staining reaction and confirmed by the pattern of biochemical reactions using the standard method which include; urease, catalase, coagulase, , citrate utilization, oxidase and indole test (Cheesbourgh 1991).

Antibiotic sensitivity testing

Antimicrobial susceptibility testing was performed for all positive culture according to the criteria of the (CLSI) clinical and laboratory standards institute (CLSI 2007). Bacterial suspension was prepared and was adjusted to a McFarland solution 0.5 and inoculated onto Muller Hinton agar (HiMedia, India). Before the application of single antibiotic discs and subsequently incubated at 37°C aerobically for 18-24hrs.Antibiotic discs used were include :Amikacin (AK 30) , Cephalothin (CE 30µg), cefotaxime (CTX 10µg), ceftazoline (CZ 30µg) , ciprofloxacin (CIP 5), piperacillin (PIP 30µg), Imipenem (IMP 10), Netilmicin (NET 30µg).

Statistical analysis

Data analysis was done by using SPSS version 21.0 software and Microsoft Excel 2013. Categorical data formulated as count and percentage. And Chi-square test was used to characterize the correlation of these data. A p-value of less than 0.05 was considered as statistical significance.

Results

Study population

The data that was gathered in this study was depicted in Table 1 which represent which represent the distribution of the patients according to their gender, Table 2 which represent the percentage of Bacteriological etiology isolated from the ear swabs and Table 3 which shows the sensitive and resistant of antibacterial drugs, the total of 80 samples of ear swabs collected from patients and control. A total of 50 patients were collected with 26 (52%) samples of males and 24 (48%) females.

The mean of the age of patients was 29.5±12.91.

Table 1. Distribution of Patient and Healthy Control According the Gender and age.

	patient		Control			Mean of age	SD	P value
	No.	%	No.	%	patient	29.5	12.91	0.042
Male	26	52	15	50	Control	31.5	12.33	P<0.05Significant
Female	24	48	15	50				
Total	50	100	30	100				

Bacteriological etiology isolated from the earswabs

A total of 50 samples from the patients , the positive results of culturing and isolated from otitis media patients, the Pseudomonas spp. was the highest in incidence 15 (30%) , followed by Proteus spp 14 (28%). Less common organisms are *E. coli* and *S. aureus Enterobacteracea*. While no growth 12(24%) in patients samples and no growth in healthy controls as clearly shown in Table 2, figure (1).

Table 2. The frequency and percentage of Bacteriological etiology isolated from the ear swabs.

bacteria culture	No.	%
E.coli	3	6
Enterobacteracea	3	6
NO growth	12	24
Proteus spp	14	28
pseudo spp	15	30
S. aureus	3	6
	50	100

Antibacterial susceptibility testing

in this study, almost the bacteria which isolated from the ear swabs were sensitive to Amikacin (AK 29%) and Ceftazoline (CZ 23%). While Cefotaxime (CTX 19%), Ciprofloxacin (Cip 17%) and Netilmicin (NET 17%) were poor antibacterial drug activity and more resistant than others antibacterial drugs (table 3).

Discussion

Observations

In these results it was found to be commoner among the males 52% more than females 48%, which was agreed with study done by (Afolabi *et al.* 2012). The observation in this study was that Gram-negative bacteria were the predominant isolates when compared to Gram-positive bacteria, *Pseudomonas aeruginosa* was the most predominant isolate with an occurrence 15 (30%) , followed by Proteus spp 14 (28%). Similar findings have been observed in Ireland (Mukassabi 2007), Pakistan (Arshad *et al.,* 2004) and Greece (Bardanis *et al., 2003*), Nigeria (Tobih *et al.,* 2006*;* Wariso and Ibe, 2006), which reported that *P. aeruginosa* was the most common bacteria isolated types of the cases of otitis media.

Data Analysis

Antibiotic susceptibility was done on all isolates using the most commonly prescribed antibiotics, almost the bacteria which isolated from the ear swabs were sensitive to Amikacin (AK 29%) and Ceftazoline (CZ

23%). While Cefotaxime (CTX 19%), Ciprofloxacin (Cip 17%) and Netilmicin (NET 17%) were poor antibacterial drug activity and more resistant than others antibacterial drugs. This susceptibility to isolated bacteria provides evidence of the bacterial resistance of many antimicrobial agents by means of multiple drug resistance (MDR), this difference in the sensitivity profile may be due to frequency of usage of these drugs for the therapy of ear infections in different geographic locations (Elmanama *et al.,* 2014).

Table 3. The sensitive and resistant of antibacterial drugs.

Antibacterial drugs	R	%	S	%
Amikacin (AK)	9	23.6	29	76.3
Cephalothin (CE)	16	42.1	22	57.9
Cefotaxime (CTX)	19	50	19	50
Ceftazoline (CZ)	15	39.5	23	60.5
Ciprofloxacin (Cip)	17	44.7	21	55.3
Piperacillin (PIP)	16	42.1	22	57.9
Imipenem(IMP)	16	42.1	22	57.9
Netilmicin(NET)	17	44.7	21	55.3

Socio-economic factors

Otitis media is a serious concern for health care around the world, not only because of the distress caused by the patient and his family, but because of the great economic occurrence depending on the component and socio-economic factors (Ologe and Nwawolo, 2002).

A high prevalence has been reported among the, American Indians, Eskimos, Australian aboriginal children and black in South Africans. Poor living conditions, poor hygiene, nutrition and overcrowding have been suggested as a basis for the widespread spread of CSOM of developing countries (Ologe and Nwawolo, 2002). Pseudomonas aeruginosa was the most common bacterial organism found in the middle ear of the respondents with chronic suppurative otitis media which is similar to findings elsewhere (Brook and Frazier, 1996).Proteus spp was predominant (28%) based on results of the middle ear culture of the respondents compared to some other studies where it was found to be the most common in Egypt and second most common in other studies in Ibadan (Bluestone 1996; Oni *et al.,* 2001). In other studies, *S. aureus* and *Proteus spp*. were the predominant pathogens of CSOM (Brobby and Zadik, 1987).

This Study

This study disagree with another study in Gaza that indicated the ceftriaxone and ciprofloxacin were the most effective drugs when compared to other drugs tested against the Gram-positive and Gram-negative bacteria (Elmanama *et al.,* 2014).Sharma *et al* indicated that Amikacin is an effective antibiotic against Gram-negative organisms (Sharma *et al.,* 2004). Afolabi *et al.,* 2002 indicated that ciprofloxacin can serve as a first line of therapy, in contrast to Oni *et al* 2001 who recommended penicillin as first line of therapy and quinolone as second line. Previous workers have established gentamicin as the most sensitive agent (John, 1991; Ibekwe *et al.,* 1997). In 2013 (Ahmad 2013) proved behavioral change of microorganisms, showing more sensitivity to quinolones, gentamicin and cephalosporin.

Finally, the difference in the results of antibiotics in many researches is due to the bad use of antibiotics, which led to the emergence of resistance strains of antibiotics.

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