BACTERIOLOGICAL STUDY OF EAR DISCHARGE IN BIR HOSPITAL

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ABSTRACT

Discharge from the ear is one of the commonest symptoms of infections of the ear. With a view to study the major strains of bacteria encountered in ear discharges, this study was conducted in Microbiology Laboratory, Bir Hospital. The study was conducted for a period of 6 months from January 2000 - July 2000. A total of 224 samples of aural discharges of the outpatients were collected and analysed for bacterial growth. These samples were cultured with the use of standard microbiological techniques and the antibiotic sensitivity pattern of the isolates was also studied in vitro with the use of disc diffusion method. Among 224 patients, 50.9% were male and 49.1% were female and the age of the patients varied from 6 months to 76 years. Majority of the patients with discharging ear belonged to the age group 11-20 years. Bacterial growth was found in 82.6%. The bacterial isolates were of 13 different species. *Staphylococcus aureus* was the most frequently isolated organism (49.4%) followed by *Pseudomonas aeruginosa* (20.9%). Other organisms isolated were Coagulase negative Staphylococci (CONS), *Streptococcus spp., Bacillus sps., Escherichia spp., Proteus spp., Enterobacter spp., Klebsiella spp., Acinetobacter spp., Edwardsiella spp.* The prevalence of gram positive bacterial isolates was higher than gram negative bacterial isolates. 58.0% of samples showed positive correlation with direct smear gram stain and culture results. Among the antibiotics used, Ciprofloxacin was found to be the most effective (80.2%) for overall bacterial isolates followed by Gentamicin (68.9%). The result of antibiotic sensitivity was almost similar to gram positive as well as gram negative isolates.

Key Words: Aural discharge, Gram stain, culture, sensitivity.

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INTRODUCTION

Discharge from the ear is one of the commonest symptoms of infections of the ear.[1] Ear Infection occupies the seventh position among Top Ten OPD Diseases in Nepal (1.29%) as stated by the Annual Report, 1998/99.[2]

Infection of the ear may be categorized into otitis externa (infection of external ear) and otitis media (infection of middle ear). Because ear infections are apparently innocuous to begin with, minimum mortality is incurred by ear disease in comparison to other diseases and the ignorance of the consequences of the disease; ear infections are not taken seriously. However, infections of the middle ear cavities may lead to grave sequelae if spread occurs to the bony labyrinth, the nerves, venous sinuses or even the brain. They may also end up by permanently handicapping the host by disabling hearing. Though the sense of hearing may not be given due importance, the dual role that it plays by aiding the development of speech in children must not be overlooked.

Therefore, proper knowledge of the causative agents and an adequate control of the infection at an early stage are mandatory. The eradication of infection will not be achieved until the task of identifying the proper antibiotic is carried out.

The identification of the causative agent or predominant organism and the determination of its sensitivity to the antibiotic chosen may, therefore serve as useful guides in planning the treatment of a patient. Moreover, the bacteriology of otitis, like other infections, may from to time present important variations. Such changes can only be fairly assessed in the course of a systemic bacteriological study .[3]

A study carried out in Malaysia by Indudharan et al., to analyze the organisms isolated from the culture of ear swabs and their sensitivity to various antibiotics showed that out of 382 swabs examined, the major organisms isolated were *Pseudomonas aeruginosa* (27.2%) followed by *Staphylococcus aureus* (23.6%). The sensitivity of *P. aeruginosa* was 100% to ceftazadime, 98.9% to ciprofloxacin, 96.3% to gentamicin and 95.4% to Polymyxin B, whereas the sensitivity of *S. aureus* was 98.6% to ciprofloxacin, 97.4% to Cloxacillin sodium, 96.5% to cotrimoxazole and 90.7% to gentamicin. *Pseudomonas aeruginosa* was almost completely resistant to Ampicillin (97.6%) and chloramphenicol (96.6%) whereas *S. aureus* was mostly resistant to ampicillin (73.8%) and polymyxin B (98.3%).[4]

Similar study carried out by Shah, A., in Tribhuvan University Teaching Hospital, Nepal showed that *Staphylococcus aureus* the predominant organism isolated from discharging ear.[5]

MATERIALS AND METHODS

This study was conducted on outpatients presenting to Ear Nose Throat outpatients in Bir Hospital, Kathmandu, Nepal. The sample collected for this study was the pus or discharge from the ear. Fine swab sticks were prepared with the help of absorbent material like cotton-wool mounted on a wooden rigid stick and were sterilized in an autoclave. The discharge was collected in two consecutive swab sticks for each sample, one for the preparation of a smear for microscopy and the other for the seeding of cultures.[6]

A total of 224 samples were collected from the outpatients with discharging ear. The samples transported to the laboratory were subjected to microbial examination as soon as possible. In some cases when immediate examination was not possible, the sample was prevented from desiccation using Stuart's transport media.

Direct gram stained smear was prepared and examined for the presence of pus cells and morphology of bacteria. Different bacteria present in the aural discharge samples were isolated by streak plate method using Nutrient Agar (NA), Mac Conkey agar (MA), Sheep Blood Agar (BA) and Chocolate Agar (CA). The plates were incubated at 37°C for 24 hours. The various isolated colonies were streaked onto nutrient agar (NA) plates to obtain pure culture of the organisms isolated. Bacterial isolates were identified following the standard microbiological technique on the basis of their colonial and morphological characteristics and biochemical properties.

Antibiotic sensitivity pattern of the bacterial isolates was assayed following a modified Kirby- Bauer disc- diffusion method.[7] Bacterial cells were grown at 37°C in 5 ml of peptone water for about 4 hours using pure cultures as inoculum. The turbidity developed was compared with that of standard barium sulphate. Broth cultures were swabbed onto Mueller- Hinton agar to achieve a lawn of confluent bacterial growth and antibiotic discs of standard concentrations were placed on each plate. The plates were incubated at 37°C for 18 to 24 hours. Organisms were classified as sensitive or resistant to an antibiotic according to the inhibition zone surrounding each antibiotic disc as listed by the manufacturer. Organisms considered to be of intermediate resistance were scored as sensitive.

Antibiotics tested and standard disc concentrations were as follows : Ciprofloxacin (Cf), 5µg;Chloramphenicol (C) 30µg; Gentamicin (G), 10µg; Cotrimoxazole (Co), 25µg; Ampicillin (A), 10µg; Erytromycin (E),15µg; Tetracycline (T), 30µg; Cloxacillin (Cx),5µg; Amoxycillin (Am) 10µg & Carbenicillin (Cb),100 µg and Polymyxin B (Pb), 300µg (for *Pseudomonas aeruginosa* only).

RESULTS

Of the total aural discharge samples analyzed, 82.6% of the samples showed positive growth, while 17.4% samples showed no growth in any culture media. Among the 185 samples with positive growth, 132 samples (71.35%) showed growth of single isolate and 53 samples (28.64%) showed growth of multiple isolates. The pattern of microbial isolates showed that 52.5% of total isolates were gram positive bacteria, 44.17% were gram negative bacteria and 3.29% were fungal species. 58.04% of samples showed positive correlation with direct smear gram stain and culture results.

Table I : Agewise and Genderwise Distribution of Samples

Age interval (years)	Male	Female	Total no. of Samples	
			No.	Percentage
0-10	34	27	61	27.2
11-20	36	32	68	30.4
21-30	22	28	50	22.3
31-40	9	13	22	9.8
41-50	6	6	12	5.4
51-60	4	3	7	3.1
61-70	3	-	3	1.3
71-80	-	1	1	0.5
Total	**114**	**110**	**224**	**100**

Table II : Correlation between Direct smear (Gram Stain) and Culture Result

S. N.	Nature of Correlation	Number	Percentage
1	DS- Bacteria and pus cells observed CR- Positive Growth	127	56.7
2	DS- Only bacteria observed, no pus cells CR- Positive growth	3	1.34
3	DS- Only bacteria observed, no pus cells CR- Positive growth	1	0.45
4	DS- Only pus cells, no bacteria CR- Negative growth	49	21.88
5	DS- Only pus cells, no bacteria CR- Negative growth	31	13.84
6	DS- No bacteria and no pus cells CR- Positive growth	4	1.78
7	DS- No bacteria and no pus cells CR- Negative growth	5	2.23
8	DS- Bacteria and pus cells observed CR- Negative growth	4	1.78
	Total	**224**	**100**

DS- Direct Smear

CR- Culture Result

A total of 243 different organisms were isolated. The organisms identified include *Staphylococcus aureus* 49.4%, coagulase negative staphylococci (CONS) 1.2%, *Streptococcus spp*. (other than *Pseudomonas aeruginosa* 21.0%, *Escherichia coli* 6.6%, *Proteus mirabilis* 5.3%, *Proteus vulgaris* 3.7%, *Enterobacter spp.*(3.3%, 8 different fungal species 3.3%, *Klebsiella pneumoniae* 1.6%, *S. pneumoniae*) 1.2% & *Edwardsiella tarda* 0.4% and 8 different fungal species 3.3%.

With regard to susceptibility of the isolates towards the various antibiotics, we noticed that Ciprofloxacin was the most effective antibiotic (80.2%) followed by Gentamicin (69.0%). Ampicillin was found to be the least effective (21.5%) antibiotic for all bacterial isolates.

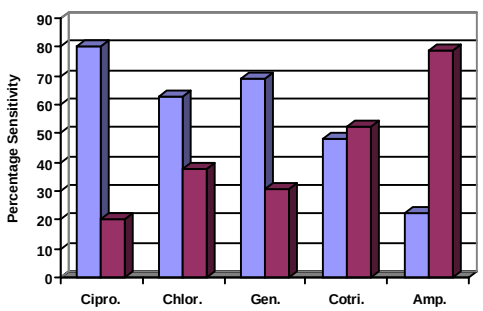

Fig. 1 : Antibiotic Sensitivity Pattern

The antibiotic sensitivity pattern of gram positive isolates showed that the most sensitive antibiotic was Ciprofloxacin (87.3%), followed by Gentamicin (73.8%) and Chloramphenicol (69.8%). The least effective antibiotic was Amoxycillin (35.7%) and Ampicillin (28.6%).

The most effective antibiotic for gram negative isolates was found to be Ciprofloxacin (76.4%) followed by Gentamicin (61.3%) and Chloramphenicol (47.2%). The least effective antibiotic was Ampicillin (4.7%).

DISCUSSION

With a view to find out the microbial organisms responsible for discharging for discharging ear and the antibiotic sensitivity pattern of commonly isolated organisms; it is important in the management of ear infections to know the bacterial aetiology so that antimicrobial treatment can be properly directed.

The study deals with the microbial analysis of ear discharge, isolation and identification of different bacteria and antibiotic sensitivity pattern of the isolates.

The results of this study showed that 71.3% samples showed positive growth. 58.0% of samples showed positive correlation with direct smear gram stain and culture results. The results of this study in regard to microbial analysis of ear discharge are similar to other studies.

This study led to the isolation of 243 microorganisms comprising 13 different species. Isolation of *Staphylococcus aureus* was the highest (49.4%) followed by *Pseudomonas aeruginosa* (21.0%), *Escherichia coli, Proteus mirabilis, Proteus vulgaris, Enterobacter spp.,* sequentially, and others. Maximum isolates were recovered from the patients with age group 11-20 years indicating that the disease incidence was high in the patients in the second decade of life. The isolation of *Pseudomonas aeruginosa*, coliforms, *Proteus spp.* and *Staphylococcus aureus* are usually encountered during otitis externa.[8] Among them, *Pseudomonas aeruginosa* is more indicative of 'otitis externa malignans'.[9] *Pseudomonas aeruginosa* and coliforms like *Escherichia coli, Klebsiella spp., Enterobacter spp.*, and *Proteus spp.*, are the organisms usually encountered during chronic otitis media.[10]

The isolates were found most sensitive towards Ciprofloxacin (80.2%), followed by Gentamicin (69.0%). Ampicillin was found to be the least effective antibiotic (21.5%) for all the bacterial isolates. The antibiotic sensitivity pattern was almost similar to gram positive as well as gram negative isolates.

CONCLUSION

Out of 224 samples of ear discharges, 82.6% samples showed positive growth. Out of the 185 positive samples, 71.3% showed growth of single isolate whereas 28.6% showed growth of multiple isolates. Altogether, 13 different types of organisms were isolated out of which *Staphylococcus aureus* was the predominant organism (50.6%), followed by *Pseudomonas aeruginosa* (21.0%). The antibiotic sensitivity pattern of the isolates showed that the most sensitive antibiotic was Ciprofloxacin (80.2%) followed by Gentamicin (69.0%). Ampicillin was found to be almost resistant to all isolates (78.4%).

Early and precise diagnosis of the infective disease of the ear is decisive in order to administer the correct antibiotic therapy and avoid complications. The indiscriminate or inappropriate use of antibiotics, especially inadequate dosages and for an insufficient length of time should be discouraged. The incidence, prevalence and severity of ear discharge can be reduced by regular monitoring and surveillance of the cases.

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