

Full Length Research Paper

Screening for bacteria agents responsible for otitis media and their antibiogram

Oyeleke, S. B.

Department of Microbiology, Federal Universities of Technology, Minna Niger State. E-mail: droyeleke@yahoo.com.

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30 samples (male and female) of ear swab were collected from patients at general hospital Minna for examination of bacteria that causes otitis media. 26 samples were positive for these organisms. The organisms isolated include *Pseudomonas* sp., *Klebsella* sp., *Proteus* sp., *Escherichia coli* and *Staphylococcus aureus*. *Pseudomonas* sp., (54%) had the highest incidence of occurrence followed by *Klebsella* sp. (19%) and *Proteus* sp (15%) while the least was *S. aureus* (4%). The organisms' sensitivity test reveals that they were highly sensitive to gentamycin. The bacteria responsible for otitis media are pathogenic, therefore effort should be made to reduce the factors militating its occurrence of these pathogens in the community.

Key words: Otitis media, eustachian tube, salpingitis, gentamicin, prevalence, pathogenic.

INTRODUCTION

Otitis media is the infection associated with the malfunctioning of the middle ear due to pathogenic micro-organisms that are resident tentatively in the middle ear (Celin et al., 1992; Isah and Abubakar, 2003). In otitis media, the middle ear is usually affected due to colonization by pathogenic organisms. The damage causes the deficiency in hearing (Damoiseaux, 2005). Otitis media can be symptomatic and equally asymptomatic, when none of the physical signs accompanying the infection is noticed apart from the sever pains ensuing from the inner ear, it is then said to be asymptomatic but if there are evidences of mucus irritation and rashes on the external meatus, discharges in addition to the pains, such otitis media is said to be symptomatic (Alho et al., 1990, 1991, Damoiseaux, 2005).

Sources of infection in otitis media is solemnly dependent on the route by which infection reaches the middle ear and the chief route by which this occurs is the eustachian tube (Healy and Teele, 1977; Daly, 1997). The causes of infection in such cases are nasopharyngeal disease and in children this usually means adenoids. The causative infection may be in the nose or sinuses or in the oropharynx and tonsils (Eskola and Kilpii, 1999; Aroll, 2005). All these are conditions of ascending infection of the eustachian tube. In the early stages, the lower end of the tube is involved but as the salpingitis spreads further, the tube becomes blocked and the air within the middle ear is absorbed and is replaced by exudates, which may

later become purulent (Fingold, 1979; Grad, 2000; Marchetti et al., 2005)

Otitis media varies in complication depending on the level of severity and duration of the infection in relationship to the associated microorganism. There are 2 types of otitis media, of which each is subdivided based on the level of complication chronic suppurative otitis media (CSOM) and acute otitis media (AOM) (Klein, 1994; Oni et al., 2002). The organism often isolated in cases of acute otitis media as causative organisms are: *Haemolytic streptococci*, *Staphylococci*, *Heamophilus* or *Pneumococci* while gram negative bacilli are commonly associated with chronic otitis media particularly *Pseudomonas* and *Proteus* sp (Jokipii et al., 1977; Keith et al., 1978).

The isolated organism is the determinant of the antibacterial preparation necessary to curb the infection. The objective of the study is to examine and isolate the infective agents responsible for otitis media and to suggest the antimicrobial preparation effective for its treatment.

MATERIALS AND METHODS

Collection and analysis of samples

30 samples of ear discharges soaked swabs were collected from randomly selected patients (21 male and 9 females) non-residential infected patients' ear. These were then picked up in a sterile test tubes, avoiding contact of the stick with the external meatus in order to prevent contamination by the normal flora. The samples were

Table 1. Otitis media in relation to the gender of patient, numbers and types of isolate from each gender.

Organisms	Isolates in female	Isolates in male	Total number of isolates	% of total isolates
<i>Pseudomonas</i> sp.	4	10	14	54
<i>Klebsella</i> sp.	2	3	5	19
<i>Proteus</i> sp.	-	4	4	15
<i>E. coli</i>	1	1	2	8
<i>S. aureus</i>	1	0	1	4
Total	8	18	26	100

analysed and processed at the federal universities of technology, microbiology laboratory within 24 h of collection and without cognance to the age of the patients. The samples were then cultured on Macconkey agar plate (oxid) and blood agar plate by uniform streaking with the aid of a standard wire loop. The cultured plates were then incubated at 37°C in an incubator for 24 h (Gallamp). Discrete colonies were sub cultured onto nutrient agar (oxid) plates and incubated at 37°C for 24 h to obtain a single pure strain. Pure cultures were maintained on nutrient agar slants for further studies in the refrigerator at 4°C.

Characterization and identification of bacteria isolates

The bacteria isolated were characterized based on colonial morphology, cultural characteristics and biochemical tests as described by Cheesebrough (2003) and Oyeleke and Manga (2008). The biochemical tests that were carried out include; gram stain, catalase, oxidase, urease, methyl red test, coagulase, citrate utilization and Indole production.

Antimicrobial sensitivity test

A sterile swab was immersed into the bacterial suspension obtained from the discharge ear and excess fluid expressed against the inside wall of the test tube. The entire surface of the agar was inoculated with the suspension swab stick. After allowing the inoculum to diffuse into the agar, the antibiotics disk was placed on the medium and zones of inhibition produced after incubation at 37°C were measured. The diameter of the zones of inhibition also indicated the effectiveness and weakness of the antibiotics disk employed.

RESULTS AND DISCUSSION

Occurrence of otitis media infection

The result of the study reveals that 18 samples were positive for male while 6 were positive for females. It also reveals the prevalence of otitis media among the male patient than female patients.

Bacterial agents of otitis media

26 microbial isolates were characterized and identified which include *Pseudomonas* sp., *Klebsella* sp., *Proteus* sp., *E. coli* and *S. aureus*.

Pseudomonas sp. had the highest number of occurrence followed by *Klebsella* sp. and the least was *S. aureus*.

Table 1 shows the distribution of bacterial isolates from positive cases of otitis media in patients.

Antibiogram (Sensitivity) test pattern *Pseudomonas* isolates were 14 in numbers and their sensitivity by their zone of inhibition (mm) and the resistance are shown (-).

The result in Table 2 showed the level of sensitivity of the isolates to some of the commonly used antibiotics. Gram-negative organisms predominated the isolates with *Pseudomonas* sp. (54%), followed by *Klebsella* sp. (19%), *Proteus* sp. (15%) and *E. coli* (8%) while *S. aureus* (4%) was the least. (Table 3) the predominant organisms were all sensitive to gentamycin however they were resistant to the commonly used antibiotics as indicated by the result. In addition, *Klebsella* sp. and *E. coli* showed the highest resistance to the commonly used antibiotic such as septrin, chloramphenicol.

The study reveals that bacteria causing otitis media has prevalence among the male patients at the general hospital Minna, Niger state, Nigeria. These observations agree with the reports of Ogisi et al. (1982) who reported high incident of the same organisms causing otitis media in patient at the ear, nose and throat (ENT) surgery unit of university of Benin teaching hospital, Benin city, Edo state. The organisms isolated include *Pseudomonas* sp., *Klebsella* sp., *Proteus* sp., *E. coli* and *S. aureus*. However, *Pseudomonas* sp. was more frequent followed by *Klebsella* sp. and *Proteus* sp., while *S. aureus* has the least occurrences. This also agrees with the report of Oni et al. (2002) who also reported the occurrence of *Pseudomonas* sp. and other organisms in adult patient in Ibadan. These organisms were highly susceptible to gentamicin and moderately susceptible to other antibiotics, the insensitivity of these organisms were at variance with the result of Ogisi et al. (1978) and Keith et al. (1978) Oni et al. (2002) who reported that these organisms were moderately susceptible to commonly used antibiotics. The insensitivity of this organism to septrin and chloramphenicol may be due to drug abuse by the general public. The occurrence of otitis media were more prominent among male than female, the reason for this is obscured. The incident of otitis media has neither age li-

Table 2. Distribution of *Pseudomonas* sp. from cases of otitis media and their sensitivity to antibiotics (zone of inhibition (mm).

Antibiotic disc	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Sensitivity percentage (%)
Gentamicin	8	8	8	-	8	8	8	8	8	8	8	8	8	-	78
Tetracycline	7	7	7	-	7	-	-	7	7	-	7	7	-	-	57
Streptomycin	8	8	8	8	8	8	8	8	8	8	-	-	8	8	78
Ampicillin	7	-	-	-	-	7	-	7	7	7	-	-	7	7	50
Amoxicillin	7	-	-	7	8	7	7	7	7	-	7	-	7	7	71
Nitrofurantoin	7	-	-	-	7	-	8	8	7	-	8	7	-	-	50
Chloramphenicol	6	-	-	-	-	-	-	-	6	5	-	-	6	-	21
Septin	4	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Erythromycin	7	7	7	7	7	7	7	7	-	7	7	-	-	8	78
Cloxacillin	8	8	8	8	8	8	8	-	8	7	7	8	8	8	64

Table 3. Antibigram of the isolated organisms.

Antibiotic disc	No of isolates and zone of inhibition (mm)					Sensitivity percentage (%)
	<i>Pseudomonas</i> sp	<i>Klebsiella</i> sp	<i>Proteus</i> sp	<i>E. coli</i>	<i>S. aureus</i>	
Gentamicin	8	8	8	8	8	100
Tetracyclin	6	-	6	-	-	40
Streptomycin	6	7	-	3	-	45
Ampicillin	7	8	5	8	8	80
Amoxicillin	7	-	5	5	-	30
Nitrofurantoin	6	-	5	5	-	30
Chloramphenicol	5	-	5	-	7	50
Septin	7	-	-	5	-	25
Erythromycin	7	-	5	5	-	30

- Negative.

mit nor socio-economic status this is in contrast to Ogisi et al. (1982) who reported that the incidence of otitis media is strictly among- low income groups. The study reveals the efficacy of gentamycin in the treatment of otitis media cause by any of the pathogens isolated.

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