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Prevalence, Antibiogram of Bacterial Pathogens Associated with Otitis Media among Primary School Children in Ebonyi State

[1]Alo, M.N., [2]Anyim, C., [2]Okonkwo, E.C. and [2]Orji, J.O.
[1]*Department of Medical Laboratory Science and Technology, Ebonyi State University, P.M.B. 053, Abakaliki, Nigeria.*
[2]*Department of Applied Microbiology, Ebonyi State University, P.M.B. 053, Abakaliki, Nigeria.*

ABSTRACTS: *Otitis media is inflammation of the middle ear. 70 samples (male and female) of ear swab were collected from primary school pupils at school Ezzamgbo, Ohaukwu L.G.A. and community primary school Ibii, Afikpo in Afikpo L.G.A. all in Ebonyi State. 67 samples were positive for these organisms. The bacterial pathogens isolated include Staphylococcus epidermidis, Pseudomonas aeruginosa and Staphylococcus aureus. Staphylococcus epidermidis (47.8%) had the highest incidence of occurrence followed by Staphylococcus aureus (31.3%) and Proteus sp (15%) while the least was Staphylococcus epidermidis (20.9%). The organisms' antibiogram reveals that they were highly sensitive to gentamycin, erythromycin, ciprofloxacin, clindamycin, cotrimoxazole, ceftriaxone and augmentin. The bacterial pathogens responsible for otitis media are pathogenic, hence attempt should be made to reduce the factors militating the incidence of these pathogens in the community. Despite the effectiveness of these antibiotics which are sensitive against the bacterial pathogens, prudent use of the antibiotics is strongly recommended.*

Key: *Prevalence, antibiogram, bacterial pathogens, otitis media*

INTRODUCTION

Otitis media is inflammation of the middle ear. This is most commonly caused by the buildup of fluid behind the ear drum, as a result of a blockage to the Eustachian tube. Otitis media is more common in children, as their Eustachian tube is shorter and more horizontal than adults and is made up of more flaccid cartilage, which can impair its opening (Bluestone and Klien, 2001).

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 and 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 (Oyeleke, 2009). There are three common types of otitis media, acute purulent otitis media, otitis media with effusion and chronic suppurative otitis media (Berman, 1997). In otis media, the bacteria may be aerobic (e.g. *Pseudomonas aeruginosa*, *Escherichia coli*, *Staphylococcus aureus, Streptococcus pyogenes, Proteus mirabilis, Klebsiella species*) or anaerobic (e.g. Bacteroides, Peptostreptococcus, Proprionibacterium) (Saunders et al., 2009 and Brook, 1996).

The aim of the study is to ascertain the prevalence, antibiogram of infective bacterial agents responsible for otitis media of primary school children in Ebonyi State and to recommend the antimicrobial agent for its treatment.

MATERIAL AND METHODS

Study Population

A total of 70 pupils, 35 each from Practising School, Ezzamgbo, Ohaukwu L.G.A Abakaliki, Ebonyi State and Ibii Community Primary School, Afikpo, Afikpo L.G.A., Ebonyi State, with a total number of female being 33 and male 37 their ages ranging from 7-12 years.

Sample Collection

Pus or purulent discharges from cases of otitis media were collected from suspected primary pupils having the disease using sterile swab sticks as described by Kumurya et al., 2010.

Methodology

After collection of sample, the ear swabs were used to inoculate directly unto chocolate and MacConkey agar plates by streaking. The chocolate agar plates were incubated at 5% carbon dioxide in a candle jar and the MacConkey plates incubated aerobically at 37^0C for 24hours. After which plates were read and resultant colonies were subcultured on agar slants for subsequent identification.

Characterization and identification of bacteria isolates

The bacteria isolated were characterized based on colonial morphology, cultural characteristics and biochemical tests as described by Cheesbrough (2006). 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 inoculums 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.

RESULTS

The various results for the tests done are shown below.

Table 1: Bacterial pathogens isolated from primary school pupils with otitis media in relation to gender

Bacterial Pathogens	Isolates in Female	Isolates in Male	Total Number of Isolate	% of Total Isolates
Staphylococcus aureus	8	13	21	31.3
Pseudomonas aeruginosa	6	8	14	20.9
Staphylococcus epidermidis	11	21	32	47.8
Total	25	42	67	100

Table 1 shows the distribution of bacterial isolates from positive cases of otitis media in patients. *Staphylococcus epididermis* (47.8%) was the most prevalent organism isolated followed by *Staphylococcus aureus* (31.3%) and the least was *Pseudomonas aeruginosa* (20.9%).

Table 2: Antibiogram of *Staphylococcus aureus* from primary school pupils with otitis media

Antibiotic tested	**Sensitive**	**Resistant**
Ofloxacin (50 µg)	-	+
Erythromycin (10 µg)	+	-
Ciprofloxacin (5 µg)	+	-
Clindamycin (10 µg)	+	-
Gentamycin (20 µg)	+	-
Cephaplexin (30 µg)	-	+
Cotrimoxazole (50 µg)	+	-
Ampicillin (30 µg)	-	+
Ceftriaxone (30 µg)	+	-
Augmentin (30 µg)	+	-

Table 3: Antibiogram of *Pseudomonas aeruginosa* from primary school pupils with otitis media

Antibiotic tested	**Sensitive**	**Resistant**
Ofloxacin (50 µg)	+	-
Erythromycin (10 µg)	-	+
Ciprofloxacin (5 µg)	-	+
Clindamycin (10 µg)	-	+
Gentamycin (20 µg)	+	-
Cephaplexin (30 µg)	-	+
Cotrimoxazole (50 µg)	+	-
Ampicillin (30 µg)	-	+
Ceftriaxone (30 µg)	+	-
Augmentin (30 µg)	-	+

Table 4: Antibiogram of *Staphylococcus epidermidis* from primary school pupils with otitis media

Antibiotic tested	**Sensitive**	**Resistant**
Ofloxacin (50 µg)	-	+
Erythromycin (10 µg)	+	-
Ciprofloxacin (5 µg)	+	-
Clindamycin (10 µg)	+	-
Gentamycin (20 µg)	+	-
Cephaplexin (30 µg)	-	+
Cotrimoxazole (50 µg)	+	-
Ampicillin (30 µg)	-	+
Ceftriaxone (30 µg)		-
Augmentin (30 µg)	+	-

The results in Table 2, 3 and 4 showed the level of sensitivity and resistance of the isolates to some of the commonly used antibiotics.

DISCUSSION

Staphylococcus epididermis (31.34%) was the most prevalent organism causing otitis media followed by *Staphylococcus aureus* and the least was *Pseudomonas aeruginosa*. *S. aureus* is an opportunistic pathogens and a normal flora of skin, but when it gains entrance into the human body it causes infection to tissues and mucous membranes (Ekpo *et al*., 2007). This is in line with the work of Oyeleke (2009) and Oni et al. (2002) who also reported the *Staphylococcus epididermis, Staphylococcus aureus*, *Pseudomonas aeruginosa* and other bacteria in adult patients of otitis media. This study reveals that bacteria causing otitis media has prevalence among the male patients at the in the two primary schools sampled in Ebonyi State, Nigeria. These observations agrees with the reports of Oyeleke (2009) who reported the presence of bacterial agents responsible for otitis media in patient at Mina, Niger state, Nigeria. Hence the occurrence of otitis media were more prominent among male than female, the reason for this is incomprehensible. Oyeleke (2009) reported that the incident of otitis media has neither age limit nor socio-economic status. Subsequently, Ogisi et al. (1982) 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, Nigeria.

In Nigeria *Staphylococcus epididermis, Staphylococcus aureus* and *Pseudomonas aeruginosa* is the predominant organism causing otitis media in children (Egbe et al., 2010) commonly a disease of the developing world with malnutrition, overcrowding, substandard hygiene, frequent upper respiratory tract infections and under resourced health care all linked to low socio-economic status listed as risk factors (Acuin, 2007 and Lasisi et al., 2007). The poorer the rural communities have the highest prevalence (Ologe *et al*., 2003). All these factors were observed in this study which was carried out in a rural community in Ebonyi State with lack of adequate water supply, toilet facilities and under-resourced health care which predisposes to acquiring the agents of otitis media. Among the pupils observed, 8 complained of pain in the ear for over two weeks with no visible sign of suppuration. It should be noted that bacterial agents of otitis media were only considered in this study where culture as a means of isolation of the agents was used. Other agents of diseased also cause otitis media like viruses and fungi.

Antibiotics used in this study included ofloxacin, erythromycin, ciprofloxacin, clindamycin, gentamycin, cephaplexin, cotrimaxole, ampicilin, ceftriaxone, augmentine. *Staphylococcus aureus* was fully

susceptible to gentamycin, erythromycin, ciprofloxacin, clindamycin, cotrimoxazole, ceftriaxone, augmentin and resistant to ampicilin, ofloxacin, Cephaplexin, also *Staphylococcus epididermidis* showed similar antibiogram profile when compared to *Staphylococcus aureus*, while *Pseudomas aeruginosa* was sensitive to ofloxacine, ceftriaxone and cotrimaxole and persistent to other antibiotics used, the disc diffusion method for sensitivity pattern was used. Contrarily, the resistance of these organisms was 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.

Conclusion

The study reveals the efficacy of gentamycin and other sensitive antibiotics in the treatment of otitis media cause by any of the pathogens isolated.

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