

Prevalence of Otitis Media in Okada Community, Edo State, Nigeria

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Abstract

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Aim. To determine the prevalence of otitis media in Okada, a rural community in Nigeria, and the effect of age and gender on its prevalence as well as susceptibility profile of the bacterial agents in the community.

Material and Methods. Ear discharge from 500 (240 males and 260 females) patients with signs and symptoms of otitis media were processed to recover bacterial agents. Susceptibility test was performed on all bacterial isolates.

Results. Male gender was a significant ($P = 0.011$) risk factor for acquiring otitis media (male Vs female; 36.25% Vs 25.38%. OR = 1.671 95 CI = 1.139, 2.454). Age significantly ($P < 0.0001$) affected the prevalence of otitis media with children within the age range of 0 – 5 years having the highest prevalence of 78.41%. *Pseudomonas aeruginosa* was the predominant bacteria isolate causing otitis media generally and in both gender. All bacterial isolates showed were poorly susceptible to the antibacterial agents used as less than 50 percent of any bacteria genera were susceptible to any antibacterial agent.

Conclusion. An overall prevalence of 30.6% of bacteriologically proven otitis media was observed in this study. The prevalence were higher in males and in children 5 years and younger. Following the high level resistance observed, rational use of antibacterial agents is advocated.

Introduction

Otitis media, both acute and chronic, is highly prevalent worldwide [1]. The socio-economic impact of otitis media is great with an estimated direct and indirect cost of diagnosis and management exceeding 5 billion dollars annually [2]. Otitis media is reported to be common in children [3]. Exposure to smoke, crowded living conditions and low socio-economic class are among the risk factor of otitis media [3, 4]. These three conditions are common in rural settings.

A number of studies have reported a higher prevalence of otitis media in rural settings [4, 5]. However, majority of these studies have focused on clinical diagnosis with little or no report on bacteriological aetiology of otitis media in a rural setting. To our knowledge, there is no report on the prevalence of otitis media in Okada (rural community), Edo State, Nigeria. Against this background, this study is aimed at determining the prevalence of otitis media as well as effect of gender and age on the prevalence. The bacteria aetiology and susceptibility profile will also be assessed.

Materials and Methods

Study Area: The study was carried out at Igbinedion University Teaching Hospital, Okada, Edo State, Nigeria from March 2008 to February 2009. Okada, a rural community, is the Headquarters of Ovia North East Local Government Area of Edo State. The occupants are mainly farmers. However, lecturers, students, Hospital staff and civil servants are also residents in the community although to a lesser extent.

Study Population: A total of 500 (240 males and 260 females) patients with signs and symptoms of otitis media were recruited for this study. Their ages were noted. Ear discharge were collected from each patient and transported to the laboratory immediately for analysis. Verbal informed consent was obtained from each patient and parents or guardians in case of children prior to specimen collection. The Ethical Committee of Igbinedion University Teaching Hospital approved the protocol for this study.

Specimen Processing: The specimens were processed according to a previously described method [6]. Briefly, specimens were inoculated onto blood, chocolate, and MacConkey agar plates. All plates were incubated for 24 hours aerobically with the exception of chocolate agar that was incubated in a candle jar. Emergent colonies were identified according to standard bacteriological methods [7]. Disc susceptibility test was performed according to NCCLS method [8].

Statistical Analysis: The data obtained were analyzed using Chi (X^2) square test and odd ratio analysis, using the statistical software INSTAT®.

Results

Male gender was a significant ($P=0.011$) risk factor for acquiring otitis media (OR = 1.671 95 CI =

Table 1: Effect of age and gender on prevalence of otitis media.

Characteristics	No. tested	No. infected (%)	OR	95% CI	P value
Gender					
Male	240	87 (36.25)	1.671	1.139, 2.454	
Female	260	66 (25.38)	0.598	0.408, 0.878	0.011
Age (years)					
0 – 5	88	69 (78.41)			
6 – 11	62	14 (22.58)			
12 – 17	58	13 (22.41)			
18 – 23	97	17 (17.53)			
24 – 29	94	15 (15.96)			
30 – 35	55	15 (27.27)			
≥ 36	46	10 (21.74)			< 0.0001

OR = odd ratio; CI = confidence interval.

1.139, 2.454) (Table 1). Patients that were 5 years or younger have significantly ($P < 0.0001$) higher prevalence of otitis media compared with other children and adults. *Pseudomonas aeruginosa* was the most prevalent bacterial agent of otitis media generally and in both gender. This was followed by *Staphylococcus aureus* while *Streptococcus pyogenes* was the least (Table 2).

Table 2: Prevalence of bacterial agents of otitis media.

Organisms	Males (%)	Females (%)	Total (%)
<i>Escherichia coli</i>	7 (7.61)	4 (5.80)	11 (6.83)
<i>Klebsiella species</i>	8 (8.70)	6 (8.70)	14 (8.70)
<i>Proteus species</i>	10 (10.87)	7 (10.14)	17 (10.56)
<i>Pseudomonas aeruginosa</i>	35 (38.04)	26 (37.68)	61 (37.89)
<i>Staphylococcus aureus</i>	26 (28.26)	23 (33.33)	49 (30.43)
<i>Streptococcus pyogenes</i>	6 (6.52)	3 (4.35)	9 (5.59)
Total	92 (57.14)	69 (42.86)	161 (100)

The antibacterial susceptibility profile of the bacterial isolates revealed high level resistance as susceptibility of bacterial isolates to any antibacterial agent was less than 42.0% (Table 3). Erythromycin, tetracycline, ampicillin and chloramphenicol were not active against any of the bacterial isolate.

Table 2: Prevalence of bacterial agents of otitis media.

Organisms	No. of isolates	PEF	CIP	CN	AMX	E	TE	AUG	SXT	AMP	C
<i>Escherichia coli</i>	11	1 (9.09)	3 (27.30)	1 (9.09)	1 (9.09)	0	0	1 (9.09)	0	0	0
<i>Klebsiella species</i>	14	3 (21.43)	4 (28.60)	3 (21.43)	1 (7.14)	0	0	1 (7.14)	2 (14.29)	0	0
<i>Proteus species</i>	17	4 (23.53)	7 (41.18)	4 (23.53)	0	0	0	2 (11.76)	0	0	0
<i>Pseudomonas aeruginosa</i>	61	21 (34.43)	23 (37.70)	14 (22.95)	0	0	0	0	0	0	0
<i>Staphylococcus aureus</i>	49	19 (38.78)	17 (34.69)	12 (24.49)	0	0	0	0	0	0	0
<i>Streptococcus pyogenes</i>	9	2 (22.22)	3 (33.33)	1 (11.11)	1 (11.11)	0	0	1 (11.11)	1 (11.11)	0	0

PEF: Pefloxacin; CIP: Ciprofloxacin; CN: Gentamicin; AMX: Amoxicillin; E: Erythromycin; TE: Tetracycline; AUG: Amoxicillin/clavulanate; SXT: Sulfamethoxazole-trimethoprim; AMP = Ampicillin; C: Chloramphenicol.

Discussion

The prevalence of otitis media has been reported to be higher in developing countries compared to advanced countries [9]. A number of studies have shown higher prevalence of otitis media in rural settings compared to urban settings [4, 5]. This study focused on the prevalence of otitis media in Okada - a rural community.

An overall prevalence of 30.6% of patients with signs and symptoms of otitis media had bacterial aetiology. This is higher than previous reports [4, 5]. The prevalence of otitis media differs between geographical locations and developing countries have been reported to have higher prevalence than developed countries [9]. This may explain the findings in this study. It is important to note that in the other studies otitis media was diagnosed by clinical examination as oppose to culture in this

study. It has been reported that middle ear fluid without bacteria may contain viruses, *Chlamydia trachomatis* and *Mycoplasma pneumoniae* are possible pathogens [3,10] as well as fungi [11]. Virological, fungi, chlamydia and mycoplasma culture or studies were not carried out and thus may be responsible for culture negative otitis media.

Male gender was observed to be a significant risk factor for otitis media. This is in agreement with previous reports [3,12]. It has been reported that children less than 6 years are more prone to otitis media due to shorter and more horizontal eustachian tube, lower immunity of children compared to adults and the fact that bacteria adhere better to epithelial cells of children than adults [3,12,13]. This was observed in this study as children 5 years and younger have a significantly higher prevalence of otitis media (78.41%). *Pseudomonas aeruginosa* was the most predominant isolate causing otitis media generally and in both gender. This is in agreement with studies in Nigeria [14,15], but differs from studies in developed countries where *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Moraxilla catarrhalis* predominate [3,12,16,17]. Geographical locations has been reported as one of the factors that determine bacteria agents of otitis media [18, 19]. Other isolates recovered in descending order were *Staphylococcus aureus*, *Proteus* species, *Klebsiella* species, *Escherichia coli* and *Streptococcus pyogenes*. These isolates are known agents of otitis media.

The susceptibility profile of the bacteria isolates recovered revealed high level resistance. Prescription of antibiotics without laboratory guidance as well as over the counter sales of antibiotics without prescription as rife in the Nigerian setting and have been suggested as possible reasons for increase resistance observed in the country [20, 21]. The hospital serves the Okada community and other neighbouring communities, although patients visit the hospital as last resort when other forms of treatment have failed. This may explain the high resistance observed.

Otitis media in the rural setting follows the same epidemiology as that of the urban setting in Nigeria. Although the prevalence recorded in this study (30.6%) is lower than that recorded in urban settings (95.5%) in Nigeria [15]. This may indicate lower prevalence in our rural community compared to urban and contrast with findings from studies outside Nigeria where rural had higher prevalence [3, 5].

In conclusion an overall prevalence of 30.6% was

observed in Okada community with males having higher prevalence. *Pseudomonas aeruginosa* was the predominant bacteria isolate causing otitis media. Susceptibility profile was generally poor and rational use of antibiotics is advocated.

References

1. Infante-Rivard C, Fernández A. Otitis media in children: frequency, risk factors, and research avenues. *Epidemiol Rev.* 1993;15(2):444-65. [PMID:8174666](#).
2. Alsarraf R, Jung CJ, Perkins J, Crowley C, Alsarraf NW, Gates GA. Measuring the indirect and direct costs of acute otitis media. *Arch Otolaryngol Head Neck Surg.* 1999;125(1):12-8. [PMID:9932581](#).
3. Li WC, Chiu NC, Hsu CH, Lee KS, Hwang HK, Huang FY. Pathogens in the middle ear effusion of children with persistent otitis media: implications of drug resistance and complications. *J Microbiol Immunol Infect.* 2001;34(3):190-4. [PMID:11605810](#).
4. Aich ML, Biswas AC, Ahmed M, Joarder MAH, Datta PG, Alauddin M. Prevalence of otitis media with effusion among school going children in Bangladesh. *Bangladesh J Otorhinolaryngol.* 2009;15(1):31-34.
5. Minja BM, Mchemba A. Prevalence of otitis media, hearing impairment and cerumen impaction among school children in rural and urban Dar es Salaam, Tanzania. *Int J Pediatr Otorhinolaryngol.* 1996;37(1):29-34. [doi:10.1016/0165-5876\(96\)01363-8](#) [PMID:8884404](#).
6. Chessbrough M. *District Laboratory Practice in tropical countries*, vol. 2. Cambridge University Press: Cambridge, 2000.
7. Cowan ST, Steel KJ. *Manual for the identification of medical bacteria* 2nd edn. Cambridge: Cambridge University Press, 1974.
8. National Committee for Clinical Laboratory Standards. *Approved Standard M2 – A5 for antibacterial disc susceptibility test*. Villanova, PA., 1993.
9. Lasisi AO. *Otolaryngological Practice in Developing Country: a profile of met and unmet needs*. East Central Afri J Surg. 2008;13(2):101-104.
10. Block SL. Causative pathogens, antibiotic resistance and therapeutic considerations in acute otitis media. *Pediatr Infect Dis J.* 1997;16(4):449-56. [doi:10.1097/00006454-199704000-00029](#) [PMID:9109158](#).
11. Supiyaphun P, Luengvarinkul S. Mycotic infection of the middle ear and temporal bone. *Srinagarind Hosp Med J.* 1987;2(1):62-68.
12. Koksai V, Reisli I. Acute otitis media in children. *J Ankara*

Med Sch. 2002;56(1):19–24.

13. Shimamura K, Shigemi H, Kurono Y, Mogi G. The role of bacterial adherence in otitis media with effusion. *Arch Otolaryngol Head Neck Surg.* 1990;116(10):1143-6. [PMID:2206498](#).

14. Oguntibeju OO. Bacterial isolates from patients with ear infection. *Indian J Med Microbiol.* 2003;21(4):294-5. [PMID:17643052](#).

15. Nwabuisi C, Ologe FE. Pathogenic agents of chronic suppurative otitis media in Ilorin, Nigeria. *East Afr Med J.* 2002;79(4):202-5. [PMID:12625677](#).

16. Brook I, Gober AE. Microbiological characteristic of persistent otitis media. *Arch Otolaryngol.* 1998;124:1350–2.

17. Bluestone CD, Stephenson JS, Martin LM. Ten-year review of otitis media pathogens. *Pediatr Infect Dis J.* 1992;11(8

Suppl):S7-11. [doi:10.1097/00006454-199208001-00002](#)
[PMID:1513611](#).

18. Ogisi FO, Osamor JY. Bacteriology of chronic otitis media in Benin. *Nig Med J.* 1982;12:187–190.

19. Herzon FS. Ear and sinus infections. In: Brillman JC, Quenzer RN (ed). *Infectious diseases in emergency medicine.* Little, Brown and Company: Boston, 1992: pp. 867–885.

20. Omoregie R, Eghafona NO. Urinary tract infection among asymptomatic HIV patients in Benin City, Nigeria. *Br J Biomed Sci.* 2009;66(4):190-3. [PMID:20095127](#).

21. Okeke IN, Lamikara A, Edelman R. Socio-economic and behavioural factors leading to acquired bacterial resistance to antibiotics in developing countries. *Emerg Infect Dis.* 1999;5(1):18–27. [doi:10.3201/eid0501.990103](#)
[PMID:10081668](#).