IJAAR PUBLISHING® DOI: 10.46654

International Journal of Advanced Academic Research | ISSN: **2488-9849**
Vol. 8, Issue 3 (March, 2022) | www.ijaar.org

MICROBIOLOGY OF OTITIS MEDIA IN CHILDREN IN ILORIN, KWARA STATE, NIGERIA

***[1,2]Omosigho, Omoruyi Pius, [2]Izevbuwa, Osazee Ekundayo, [3] Lawal, Kafilah Opeyemi, [2]Osaiyuwu, Osarenren Clement** and **[3]Mustapha Abdulrazaq**

[1]Department of Medical Laboratory Science, Faculty of Applied Health Sciences, Edo State University, Uzairue
[2]Department of Medical Laboratory Science, College of Health Sciences, Igbinedion University, Okada.
[3]Department of Medical Laboratory Science, Faculty of Pure and Applied Science, Kwara State University, Malete.
*** Corresponding Author: omosighoop@gmail.com**

ABSTRACT

Otitis media (OM) is an inflammatory disease of the mucosal lining of the middle ear that is frequently caused by the accumulation of fluid usually behind the blocked Eustachian tube. Otitis media is a serious healthcare concern worldwide, especially among children, leading to diverse health related problems and discomfort.It is a huge burden, not only because of the distress it causes the patient and their family, but also because of the substantial economic challenges it imposes on the health care system.This study was conducted specifically to determine the prevalence of bacteria associated with Otitis media among children in Kwara state and also to determine the risk factors predisposing children to Otitis media in Ilorin, Kwara state. Middle ear swab samples were aseptically obtained from the consented participants observing international best practices. A total of 400 children aged 0- 10 years who presented to the study area with signs and symptoms of OM including those at the children out–patient department and those attended to at the otorhinolaryngology clinics of General Hospital Ilorin who also conformed to the inclusion criteria were included in this study. The specimens were cultured immediately following standard operating procedures to isolate, characterize and identify the various bacterial species present in the samples and also, antibiotic susceptibility testing was performed on the pure cultures to demonstrate the sensitivity and resistance of specific antibiotics to the bacteria isolates. Out of the four hundred samples collected from the middle ear of the children participants, 172 (43.0%) of the samples showed significant bacteria growth and 228(57.0%) showed no growth. The highest OM prevalence was observed in children aged0-2 (59.3%) and least among children aged 7-10 years with a prevalence of 9.3%. OM was more prevalent among the female participants in this research (53.5%) than the male counterparts (46.5%) the commonest bacteria agent of OM was Escherichia coli (52.3%) and Pseudomonas aeruginosa accounted for the least infection with a prevalence of (10.7%), Rural dwellers had more OM than urban dwellers. Varying degrees of susceptibility variation was observed among the antibiotics used in this research. OM is still a major health concern among children especially those in rural communities living in crowded environments with poor sanitation. Hence it is imperative for Government to improve awareness about OM and improve the living condition of citizens especially those residing in the rural communities. Proper sanitary practices should also be advocated in schools, daycare facilities and homes in order to mitigate the menace associated with OM.

Keywords: Otitis media, middle ear, Kwara State, ELISA. Microorganisms, children

Introduction

Otitis media (OM) is an inflammatory disease of the mucosal lining of the middle ear that is frequently caused by the accumulation of fluid usually behind the blocked eustachian tube (Nussinovitch *et al*., 2004). It is one of the commonest reasons for the under-five children's visitations to the general practitioners (Cripps and Kyd, 2003). Acute otitis media (AOM) is characterized by the rapid onset of symptoms like otalgia, fever, vomiting and accumulation of fluid in the middle ear cavity (Kong and Coates, 2009). Globally, over 700 million cases of AOM are diagnosed among children under-five annually (Monasta *et al*., 2012). A patient is said to have recurrent AOM (RAOM) after being diagnosed of three episodes of AOM within six months or over four episodes in 12 months, and this is usually noticed in about 65% of children in their first five years of life (Rovers, 2008). Hearing loss is one of the commonest complications at a critical developmental stage of the individual's life (Cripps and Kyd, 2003).

Otitis media with effusion (OME) usually resolves spontaneously within 3 months, however if this fails to happen few percentages of these children would experience persistent fluid in the middle ear for more than 3 months (Sharma *et al*., 2004).Some of the significant risk factors include poor living conditions, overcrowding, lack of access to medical care, environmental factors and exposure to cigarette smoke, Others include cultural, seasons of the year and family history of middle ear infections(Fatemiwo *et al*., 2017). Initiation of infection in otitis media depends on the route of infection to the middle ear, and this could be caused by complications arising from diseases of nasopharyngeal areas, sinuses, oropharynx and tonsils (Oyeleke, 2009). OM is commonly prevalent in children because of their shortness and more horizontal Eustachian tube that contain flaccid cartilage than in adults. This usually impairs the opening of the tube in children and facilitate the accumulation of fluids with the ultimate blockage (Elmanama *et al*., 2014).

The most common bacteria involved in the otitis media are *Haemophilus influenzae, Streptococcus pnuemoniae, Streptococcus pyogenes, Staphylococcus aureus, Moraxella catarrhalis* and *Pseudomonas aeruginosa* (Mora *et al*., 2002; Fatemiwo *et al*., 2017). Other important organisms that have been implicated in otitis media include *Bacillus* spp, *Escherichia coli* and *Proteus* spp (Sharma *et al*., 2004). In view of the well-known growing fact about microbial population and drug resistance all around the globe (Rossolini *et al*., 2007), an effective monitoring of the predominant bacterial and other microbial pathogens is important to inform new treatment strategies of this infection since, paucity of information exist as regards this subject Matter in Kwara State (Cripps and Kyd, 2003). The study aimed at providing information on the pattern of bacterial pathogens of acute otitis media in Kwara State, Nigeria.

Sampling Techniques

A Random sampling technique method was used for collection of samples over a particular period of time. All children with Signs and symptoms of otitis media attending the study site will be recruited into the study.

Sample Collection, Isolation and Processing

The ear discharge was collected using sterile swabs under aseptic precautions with the aid of an aural speculum, prior to the instillation of any topical medication. A minimum of three samples were taken. It was then transported to the laboratory for processing. First swab used

for direct Gram stain and KOH mount, second swab for bacterial culture and the third swab for fungal culture based on the KOH mount.

Methods: Middle ear swabs were collected from 200 children aged 0-10 years (at the children Out-Patient and Otorhinolaryngology Clinics of General hospital Ilorin)., The specimens were cultured for aerobic bacterial organisms and their sensitivity determined. Samples of the ear discharge were promptly plated into freshly prepared Chocolate, Blood agar and MacConkey agar. The blood and MacConkey agar plates was incubated aerobically at 37^{o}C for 24 hours while the chocolate agar plates was incubated microaerobically (5% CO_2) using the candle jar extinction technique (Brook *et al*., 1995) After the 24 hour incubation period, the plates was examined for growth and individual colonies were further analysed for their physical characteristics such as morphology, colour (pigmentation), odour and in case of blood agar, haemolysis. No anaerobic cultures were carried out and mycobacteria were searched for. Gram stain was carried out on all cultured isolates. Thereafter, characterization to species level was carried out using standard bacteriological methods (Cheesbrough 2006). Antibiotic susceptibility tests with multi-discs was carried out for various drugs using the disc diffusion method (Cheesbrough 2006). Choice of the antibiotics to be tested for was based primarily on knowledge of commonly available antibiotic discs. Zones of inhibition for each antibiotic, if formed will then measure to the nearest millimeter and documented. Interpretation of these results in terms of resistance or susceptibility will be according to accepted protocol (Cheesbrough 2006).

Antimicrobial Susceptibility

Antimicrobial susceptibility of bacterial isolates will be determined by using 0.5% MacFarland standard Kurby Bauer disc diffusion method following the Clinical and Laboratory Standards Institute (CLSI) guidelines (CLSI, 2018). Eleven antimicrobials agent was tested: ciprofloxacin (30ug) , trimethoprim-sulfamethoxazol e(30ug), Pefloxacine (30ug), Septrin(30ug), ofloxacin (30ug), Gentamicin (30ug) , ampicillin(30ug), amoxicillin-clavulanic acid(30ug), gatifloxacin (30ug), Streptomycin(30ug), Chloramphenicol(30ug), Amoxicillin and nalidixic acid (CLSI, 2018).

Isolates were subjected for antibiotic susceptibility testing by employing Kirby-Bauer standard disc diffusion method on Muller- Hinton agar according to CLSI guidelines (M100-S24)

Antimicrobial susceptibility testing by Kirby-Bauer Disc diffusion method
With a sterile bacteriological wire loop 3-5 well isolated identical colonies were picked up and emulsified in 5ml of sterile distilled water, then it was compared with McFarland's turbidity before use.

A sterile cotton swab was dipped into it and pressed firmly against the wall of the test tube to remove excess broth from the swab.

Dried surface of Mueller Hinton agar plate was swabbed in three directions 60^{0} each time to ensure an even and complete distribution of the inoculums over the entire plate.

Inoculated plate was allowed to dry for 3 to 5 minutes with the lid in place before adding the antibiotic discs.

The antimicrobial discs were placed on the surface of the agar using forceps. Not more than 6 discs were placed in the plate.

After overnight incubation at 37^0C, the diameter of zone of inhibition was measured in mm.

Interpretation of Zone of inhibition diameters were done according to CLSI guidelines.

Data Analysis

The data generated from this study shall be analyzed by the statistical software SPSS version 22 (SPSS Inc. Chicago, Illinois) for windows. The statistical testing shall be used to evaluate bacteria in OTM patients. Categorical variables shall be compared using the chi-square test while for comparison of continuous variables, student T- test shall be used. P- Value < 0.05 shall be taken to be statistically significant.

Results

A total number of four hundred (400) ear swab samples were collected from children within age of 0-10 years.

Table 1 Prevalence of Otitis Media among Children in Ilorin

As shown on Table 1, out of the two hundred samples collected from the middle ear of the children; 172 (43.0%) of the samples showed growth and 228 (57.0%) showed no growth. Thus, the prevalence of otitis media among the children studied was 43.0%.

Table 1 Prevalence of otitis media among children in Ilorin

Culture	Frequency	Percentage (%)
Growth	**172**	**43**
No growth	**228**	**57**
Total	400	100

Table 2: Distribution of Isolate Otitis Media in Children in Ilorin

Table 2 shows descriptive analysis of isolates of otitis media in children in Ilorin, which are Escheriachia *coli* (52.3%), Staphylococcus *aureus* (37.2%) and Pseudomonas *aeriginosa* (10.5%). There was statistical significance association of age, sex and location of Residence between those that had growth and those without growth in their otitis media ear at p-value < 0.05.

Table 2: Distribution of Isolate Otitis Media in Children in Ilorin

Isolate	Frequency	Percentage
E.coli	90	52.3
S.aureus	64	37.2
Pseudomonasspp	18	10.7
Total	86	100

Table 3: Age Distribution of Otitis Media among Children in Ilorin

Table 3 shows the distribution of age of otitis media among the participants. Majority of the otitis media positive were within 0-2 years (41.9%) with mean age 4.21±2.83 years.

There was statistical significance association of age between those that had growth and those without growth in their otitis media ear at p-value < 0.05.

Table 3: Age Distribution of Otitis Media among Children in Ilorin

Age (Yrs)	No Growth	*E. coli*	*S. aureus*	*Pseudomonas aurigunosa*
0-2 N=67	**62(46.2)**	**50(37.3)**	**44 (32.8)**	**8 (5.9)**
3-6 N=69	**78(56.5)**	**34(24.6)**	**14 (10.1)**	**6 (4.3)**
7-10 N=64	**88(68.7)**	**6(4.6)**	**6 (4.6)**	**4 (3.1)**
	228	**90**	**64**	**18**

P.VALUE =0.03

Table 4: Gender Distribution of Otitis Media among Children in Ilorin
Table 4 shows Gender distribution among the participant. Most of the participant are females (53.5%).

There was statistical significance association of gender between those that had growth and those without growth in their otitis media ear at p-value < 0.05

TABLE 4: Gender Distribution of Otitis Media among Children in Ilorin

Gender	No Growth	*E. coli*	*S.aureus*	*Pseudomonas aurigunosa*
Male N=156	**76(48.7)**	**34(21.7)**	**40 (25.6)**	**6 (3.8)**
Female N=244	**152(62.2)**	**56(22.9)**	**24 (9.8)**	**12 (4.9)**
	228	**90**	**64**	**18**

P.VALUE =0.04

Table 5: Residence Distribution of Otitis Media among Children in Ilorin

Table 5 shows the distribution of residence among the participants. Majority resides in rural area (50.0%). There was statistical significance association of location of Residence between those that had growth and those without growth in their Otitis media ear at p-value < 0.05.

Table 5: Residence Distribution of Otitis Media among Children in Ilorin

Location	No Growth	*E. coli*	*S.aureus*	*Pseudomonas aurigunosa*
Urban N=110	**84(76.3)**	**10(12.7)**	**12(10.9)**	**4(1.8)**
Semi-urban N=136	**76(54.5)**	**40(30.3)**	**16(12.1)**	**4(3.0)**
Rural N=154	**68(44.1)**	**36(23.3)**	**40(25.9)**	**10(6.4)**
	228	**86**	**68**	**18**
				P.VALUE =0.01

Table 6: Educational Status Distribution of Otitis Media among Children in Ilorin
Table 6 shows the distribution of Educational Status among the participant**.** Most of the children are in primary school (34.9%).

There was no statistical significance association of school status between those that had growth and those without growth in their otitis media ear at p-value < 0.05.

Table 6: Educational Status Distribution of Otitis Media among Children in Ilorin

School Status	No Growth	*E. coli*	*S.aureus*	*Pseudomonas aurigunosa*
Daycare N=37	**32(43.2)**	**26(35.1)**	**12(16.2)**	**4(5.4)**
Nursery N=50	**56(56)**	**20(20)**	**20(20)**	**4(4)**
Primary N=71	**82(57.7)**	**34(23.9)**	**24(16.9)**	**2(1.4)**
Junior SS N=42	**58(69.0)**	**10(11.9)**	**8(9.5)**	**8(9.5)**
	228	**90**	**64**	**18**
				P.VALUE =0.15

Table 7: Distribution of Parent Educational Status

As shown on Table 7 majority of the guardian/parents had primary (40.7)% level of education and most of their house members do not smoke (79.1%).

There was statistical significance association of education of guardian/parents and between those that had growth and those without growth in their otitis media ear at p-value < 0.05.

Table 7: Parent Educational Status Distribution of Otitis Media among Children in Ilorin

School Status	No Growth	*E. coli*	*S. aureus*	*Pseudomonas aurigunosa*
None N=31	**22(35.5)**	**24(38.7)**	**14(22.5)**	**2(3.2)**
Primary N=66	**62(46.9)**	**36(27.2)**	**24(18.5)**	**10(7.5)**
Secondary N=64	**84(65.6)**	**20(15.6)**	**22(17.1)**	**2(1.5)**
Tertiary N=39	**60(76.9)**	**10(12.8)**	**4(5.1)**	**4(5.1)**
	228	**90**	**64**	**18**
				P.VALUE =0.01

Table 8: House Hold Size Population of Otitis Media among Children in Ilorin

Table 8 shows the household size of the participants. Most children leave in household with population size ≥4 (57.0%). There was no statistical significance association of Size of house hold population between those that had growth and those without growth in their otitis middle ear at p-value < 0.05.

Table 8: House Hold Size Population of Otitis Media among Children in Ilorin

Size	No Growth	*E. coli*	*S. aureus*	*Pseudomonas aurigunosa*
≤ 3 N=182	**108(59.3)**	**40(21.9)**	**20(10.9)**	**14(7.6)**
≥ 4 N=218	**120(55.0)**	**50(22.9)**	**44(20.1)**	**4(1.8)**
	228	**90**	**64**	**18**
				P.VALUE =0.54

Table 9: Smokers Distribution of Parent Otitis Media among Children in Ilorin
Table 9 shows the smokers distribution of parent of the participants. Most of their house members do not smoke (79.1%). There was no statistical significance association of, Guardian/household member that smoke at home between those that had growth and those without growth in their otitis middle ear at p-value < 0.05.

Table 9: Smokers Distribution of Parent Otitis Media among Children in Ilorin

No	No Growth	*E. coli*	*S. aureus*	*Pseudomonas aurigunosa*
Smokers N=86	**50(58.1)**	**16(18.6)**	**16(18.6)**	**4(4.6)**
Non-smokers N=314	**178(56.6)**	**60(19.1)**	**62(19.7)**	**14(4.4)**
	228	**76**	**78**	**18**

P.VALUE =0.86

Table 10: Occupational Distribution of Parent of Otitis Media among Children in Ilorin
Table 10 shows the occupational distribution of parent of the participants. Majority of their parents/guardians are Traders (32.6%).

There was no statistical significance association of school status, occupation of parent/guardian between those that had growth and those without growth of Otitis media in their ear at p-value < 0.05.

TABLE 10: Occupational Distribution of Parent of Otitis Media among Children in Ilorin

Occupation	**No Growth**	***E. coli***	***S. aureus***	***P.aurigunosa***
Civil Servant N=102	**70(68.6)**	**14(13.7)**	**14(13.7)**	**4(3.9)**
House wife N=56	**30(53.5)**	**8(14.2)**	**14(25)**	**4(7.1)**
Trader N=112	**56(50)**	**40(35.7)**	**12(10.7)**	**4(3.5)**
Apprentices N=82	**44(53.6)**	**20(24.3)**	**14(31.8)**	**4(4.8)**
Student N= 48	**28(58.3)**	**8(16.6)**	**10(20.8)**	**2(4.1)**
	228	**90**	**64**	**18**

P.VALUE =0.37

Table 11: Distribution of Discharge from the Otitis Media Ear among Children in Ilorin

As shown on table 11, majority of the children had discharge from the left side 50 (58.1%) and 36 (41.9%) had discharge from the right side.

Table 11: Distribution of Discharge from the Otitis Media Ear among Children in Ilorin

PARAMETERS	FREQUENCY	PERCENTAGE
Right Side	**72**	**41.9**
Left Side	**100**	**58.1**
Total	N=172	100

Table 12: Distribution of Various Isolates among Those with Growth in Their Otitis Media Ear

As shown on table 12, *Escherichia coli* (52.3%) were the predominant bacteria isolated in sample, followed by *Staphylococcus aureus* (37.2%), *Pseudomonas aeruginosa* (10.5%).

Table 12: Distribution of Various Isolates among Those with Growth in Their Otitis Media Ear

ISOLATE	FREQUENCY	PERCENTAGE
Escherichia coli	**90**	**52.3**
Staphylococcus aureus	**64**	**37.2**
Pseudomonas aueriginosa	**18**	**10.5**
Total	N=172	100

Table 13: Antibiotic Susceptibility of Tested Isolates

Table 13 shows antibiotic susceptibility of isolated bacteria. E.*coli* is more sensitive to Sulfamethoxazole-trimethoprim (95.6%) and more resistant to Augmentin (4.4%). S.*aureus* is more sensitive to Amoxicillin(100%) and more resistant to Ciprofloxacin(15.6%) and Sulfamethoxazole-trimethoprim (15.6%). P.*aeruginosa* is less sensitive to Ciprofloxacin (88.9%) and more resistant to pefloxacin (11.1%).

Table 13: Antibiotic Susceptibility of Tested Isolates

	OFX		PEF	CN	AU	CPX	SXT	S	CH	CEP
Escherichia coli										
Sensitive	80(88.9%)		82(91.1%)	80(88.9%)	86(95.6%)	84(93.3%)	86(95.6%)	84(93.3%)	84(93.3%)	76(84.4%)
Resistance	10(11.1%)		8(8.9%)	10(11.1%)	4(4.4%)	6(6.7%)	4(4.4%)	6(6.7%)	6(6.7%)	14(15.6%)
	N=90									
Staphylococcus aureus										
	APX	RD	AMX	CN	E	CPX	SXT	S	CH	CEP
Sensitive	62(96.9%)	62(96.9%)	64(100%)	54(84.4%)	60(93.7%)	54(84.4%)	54(84.4%)	60(93.7%)	62(96.9%)	62(96.9%)
Resistance	2(3.1%)	2(3.1%)	0(0%)	10(15.6%)	4(6.3%)	10(15.6%)	10(15.6%)	4(6.3%)	2(3.1%)	2(3.1%)
	N=64									
Pseudomonas aeruginosa										
Sensitive	18(100%)		18(100%)	18(100%)	18(100%)	16(88.9%)	18(100%)	18(100%)	16(88.9%)	18(100%)
Resistance	0(0%)		0(0%)	0(0%)	0(0%)	2(11.1%)	0(0%)	0(0%)	2(11.1%)	0(0%)
	N=18									

KEY : OFX - Ofloxacin
PEF –Pefloxacin
CN-Gentamycin
AU –Augmentin
CPX –Ciprofloxacin
SXT –Sulfamethoxazole-trimethoprim
S –Streptomycin
CH –Chloranphenicol
E –Erythromycin
APX –Ampiclox
RD –Rocephin
AMX – Amoxicillin

Discussion

Otitis media is a serious healthcare concern worldwide, not only because of the distress it causes the patient and their family but also because of the substantial economic burden it imposes on the health care system.

The prevalence rate of growth in otitis media infection in this study was 43.0%. This was lower compare to the reports In Nigeria, studies by (Ogbogu *et al.,* 2013) had shown the prevalence to be 84.55% in University of Benin. Also, a high prevalence of (91.2%) has been

reported among the Eskimos, American Indians ,praakash *et a*l.,(2013), Australian aboriginal children and among black South Africans Ologe *et al.,* (2002). Poor living conditions, overcrowding, poor hygiene and nutrition have been suggested as a basis for the widespread prevalence of otitis media in developing countries. The lower prevalence rate in this study may be a changing trend in the prevalence rate of otitis media ear in Nigerian children.

Ear infection was commonest among infants compared to the older kids. Thirty six of the children with middle ear infections (41.9%) were aged 2 years and below. Middle ear infections are known to mostly affect young children. These results are similar to findings from other studies reporting that most children will have had an ear infection by their third birthday (Kong and Coates, 2009; Qureishi *et al.,* 2014). This is attributed to immature immunity coupled with an atomical characteristics of the Eustachian tube in young children as opposed to adults (Qureishi *et al.,* 2014). Our study found significant gender differences in prevalence of middle ear infections, which is similar to reports of female preponderance in other studies (Ologe *et al.,* 2002; Kamal *et al.,* 2004).Our study found a relationship between location of residence and middle ear infections and found that children living in rural areas were more likely to have middle ear infections than those in urban environments. Many studies show that poor residence is a risk factor for developing middle ear infections, especially considering overcrowding, malnutrition, and poor hygiene (Morris, 2012).Despite the fact that 57.0% of subjects with otitis media Ear live in overcrowded houses (≥4), there was no statistically significant association between the prevalence of otitis media ear and overcrowding in this study. This is consistent with the finding of other researchers in Malaysia (Qureishi *et al.,* 2014). The fact that the effect of overcrowding depends on the size of the rooms and its ventilation pattern may be the reason for this finding. Ocupation of the parents/guardian was not found to be significance with middle ear infection.

Education of the parents/guardians was found to be significance to otitis media. Children wereless likely to have a middle ear infection if their parent or guardian was more educated compared to being uneducated. Protective effects of parental education have been described in other studies (Karunanayake *et al.,* 2016).Thus there is a need to provide health education especially targeting lowly or uneducated parents whereas at the same time strengthening education and raising awareness in schools. This study did not find any statistical significant relationship between otitis media ear and passive smoking from parental cigarette smoking habit. This support reports by other researchers (Zeisel *et al.,* 2002). This may be because cigarette smoking in our society is commonly by males who are usually away from home to work, thus reducing the period of contact with the children. The findings in this study indicate that type of cooking fuel has significant relationship with otitis media ear. This is consistent with the finding in other reports (Igbal *etal*., 2011). The reason may be due to the fact that in this study, otitis media ear was more common in the low socio-economic classes which are usually associated with poor housing where their kitchens are commonly located in secluded place with the effect of smokes emitted from kerosene stoves or firewood.

In this present study, majority of the children had discharge from the left side 50 (58.1%) and 36 (41.9%) had discharge from the right side. majority of the participants had ear discharge for duration between 2-4 months from right side (58.3%) and left side (56.0%). The most common type of discharge from the right (41.7%) and left (42.0%) side was watery discharge. Intermitent discharge was the most pattern of discharge from the right (44.4%) and left side (40.0%). This is is similar to the reports by other researchers (Ologe *et al.,* 2002).

Selection of any antibiotic is influenced by its efficacy, resistance to bacteria, safety and cost. Knowledge of the local microbial pattern causing otitis middle and their antibiotic sensitivity

is therefore essential to start an effective and cost-saving treatment (Igbal *etal*., 2011). Escherichia coli, *Pseudomonas aeruginosa and Staphylococcu aureus* were the main organisms found in this study which is consistent with previously documented studies in literature (Ologe *et al*., 2003, Igbal *et al*, 2011). Not all the antibiotic used were found to be sensitive to the isolated bacteria in otitis middle ear. In India, Singh *et al*. (2012)found ciprofloxacin as the most susceptible antibiotic while Ologe *et al*. (2003) in Ilorin, Nigeria found cloxacillin to be most susceptible.

Conclusion

Otitis media is still a childhood problem among children under ten: It is more prevalent among females than males, the commonest agent implicated being *Escherichia coli*, followed by *Staphylococcus aureus*. Not all the antibiotics used were found to be sensitive for the bacteria.

REFERENCES

Brook, I. and Santosa, G. (1995). Microbiology of chronic suppurative otitis media in children in Surabaya, Indonesia. *International journal of pediatric otorhinolaryngology*. 31(**1**):23-28.

Cheesbrough, M. (2006). District laboratory practice in tropical countries. 2nd ed. *New York: Cambridge University Press*. Pp 240-245.

Cripps, A.W. and Kyd, J. (2003). Bacterial otitis media: current vaccine development strategies. *Immunology and cell biology.* 81(**1**):46- 51.

Elmanama, A.A., Tayyem, N.E.A., Allah, S.A.N. (2014). The bacterial etiology of otitis media and their antibiogram among children in Gaza Strip, Palestine. Egyptian *Journal of Ear, Nose, Throat and Allied Sciences.* 15(**2**):87-91.

Iqbal, K., Muhammad, I.K., Luqman, S.(2011). Microbiology of chronic suppurative otitis media: Experience at Dera Ismail Khan Gomal. *Journal of Medical Sciences*. 9:189-193

Karunanayake, W. Albritton, D. C. Rennie (2016). Ear infection and its associated risk factors in first nations andrural school-aged Canadian children," *International Journal of Pediatrics*, vol. 2016, Article ID 1523897, 10 pages,

Kong, K. and Coates, H.L. (2009). Natural history, definitions, risk factors and burden of otitis media. *The Medical Journal Of Australia*. 191(**9**):39-43

Kamal N., A. H. Joarder, A. A. Chowdhury, and A. W. Khan, (2004)."Prevalence of Chronic Suppurative Otitis Media among the children living in two selected slums of Dhaka City Qureishi *Bangladesh Medical Research Council Bulletin*. 30(**3**), 95–104,.

Monasta, L., Ronfani, L., Marchetti, F., Montico, M., Vecchi Brumatti, L., Bavcar, A. (2012). Burden of disease caused by otitis media: systematic review and global estimates. *PloS one*. 7(**4**):e36226.

Mora, R., Barbieri, M., Passali, G., Sovatzis, A., Mora, F., Cordone, M. (2002). A preventive measure for otitis media in children with upperrespiratory tract infections. *International journal of pediatric otorhinolaryngology*. 63(**2**):111-118.

Morris P., "Chronic suppurative otitis media," *BMJ ClinicalEvidence*, vol. 2012, article 0507, 2012.*E*. 9.

Nussinovitch, M., Rimon, A., Volovitz, B., Raveh, E., Prais, D., Amir, J. (2004). Cotton-tip applicators as a leading cause of otitis externa. *International Journal of pediatric otorhinolaryngology*. 68(**4**):433-435.

Ogbogu P.I., Eghafona N.O., Ogbogu M.I.(2013). Microbiology Of Otitis Media Among Children Attending A Tertiary Hospital In Benin-City. *Nigeria.Journal Of Public Health And Epidermiology*.5(**7**):280-284.

Ologe, F.E., Nwawolo, C.C. (2002).Prevalence of chronic suppurativeotitis media (CSOM) among childrenin a rural community in Nigeria. NigerPostgrad Med J. 9:63-6

Ologe, F.E., Nwawolo, C.C. (2003). Chronicsuppurative otitis media in schoolpupils in Nigeria. East Afr Med J.80:130-4.

Oyeleke S. (2009). Screening for bacteria agents responsible for otitis media and their antibiogram. African Journal of Microbiology Research. 3(**5**):249-252.

Otitis media with effusion. (2004). *Pediatrics*. 113(**5**):1412-14129.

Paperella, M.M., Jung, T.K., Goycoolea, M.V. (1991). Otitis media with effusion. Paperella, Shumrick. Vol. II. *Otology and Neuro-otology*. 3rd edition. Philadelphia: W.B. Saunders. Pp1317-1342.–1236.

Prakash R, Jiyal D, Negiv, Pal S, Siama .M, Siama N, (2013). Microbiology of chronic supperative otitis media in a tertiary health care setup in Uttarakland state India north. *AM J Medical Sci* .**282**-287.

Qureishi, A., Lee, Y., Belfirld, K., Birchall, J.P. and Daniel, M. (2014). Update on Otitis Media-Prevention and treatment. Dove press Infection and Drug Resistance. **7**: 15-24.

Rossolini, G.M., Mantengoli, E., Docquier, J., Musmanno, R.A., Coratza, G. (2007). Epidemiology of infections caused by multiresistant gramnegatives: ESBLs, MBLs, panresistant strains. *Microbiologica-Bologna.* 30(**3**):332.

Rovers, M.M. (2008). The burden of otitis media. *Vaccine*.26(**7**):2-4.

Sharma, S., Rehan, H.S., Goyal, A., Jha, A.K., Upadhyaya, S., Mishra, S. (2004). Bacteriological profile in chronic suppurative otitis media in Eastern Nepal. *Tropical doctor*. 34(**2**):102-104.

Zeisel SA, Roberts JE, Burchinal M, Meebe E, Henderson FW. A longitudinal study of risk factors for otitis media in African American children. Maternal Child Health Journal 2002;6(3):189-93.

Fayemiwo, S.A., Ayoade, R.A., Adesiji, Y.O., Taiwo, S.S. (2017). Pattern of Bacterial Pathogens of Acute Otitis Media in A tertiary Hospital South Western, Nigeria. *African Journal of Clinical Experimental Microbiology*. 18(**1**): 29-34.