Occurrence of *Moraxella catarrhalis* amongst Children in a Primary Health Care in Ekpoma-Nigeria

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Abstract

Against the back drop of increasing incidence of nosocomial infections among children attending Ujoelen–Ekpoma, primary healthcare centre in Edo central district, the occurrence of *Moraxella catarrhalis* was investigated. A total of 400 samples comprising ear swabs (200) and nasal swabs (200) was collected from children 0 -10 years old over a four month period. The specimens were grown on blood agar made selective with colistin, vancomycin and trimethoprim incubated at 28°C in a 5% CO_2 atmosphere. A total of 19 (4.75%) isolates of *M.catarrhalis* was obtained. Specimens from ear swab gave the highest isolation rate 12(6.0%) while nasal swab was 7 (3.5%). Antibiotic sensitivity test showed isolates were 100% sensitive to amoxicillin- clavulanate, 94% (Erythromycin) and 90% (ciprofloxacin). There was a high level of resistance to tetracycline (100%) and penicillin (98%). The prevalence of β- lactamase in the isolates was 16(84%). Antibiogram of cured isolates revealed that resistance to antibiotics used is plasmid- mediated. This is of serious public health implication considering the fact that vaccine trial against *M.catarrhalis* is still on-going, therefore beta lactam drugs should be avoided in treatment regimen for *Moraxella* infections.

{**Citation:** Osagie R. N. Esumeh F. I., Eyaufe, A. A., Momodu, E., Adeleke,G. Occurrence of *Moraxella catarrhalis* amongst children in a primary health care in Ekpoma-Nigeria. American Journal of Research Communication, 2013, 1(3): 97-101} www.usa-journals.com, ISSN: 2325-4076.

Introduction

Moraxella (Branhamella) catarrhalis, formerly called *Neisseria catarrhalis* or *Micrococcus catarrhalis* is a Gram-negative, aerobic diplococcus frequently found as a normal commensal of the upper respiratory tract (Jawetz *et al*., 1976; Johnson *et al.,* 1981). The genus *Moraxella* also includes the normal human microflora of the genital tract (Strohl *et al.,* 2001). Members of the genus are non-motile, non-fermentative catalase positive and oxidase positive bacteria (Brooks *et al.,* 2004). The organism produces distinctive grey-white, dry and bristle colonies on blood and chocolate agar, which can easily be lifted off the medium with a wire loop and many strains of *Moraxella catarrhalis* produce beta-lactamase (Cheesebrough, 2004). *Moraxella catarrrhalis* is considered the third most common cause of middle ear infections (otitis media) and sinusitis in children and it has also been attributed to bronchitis, neonatal ophthalmia as well as urinary tract infections (Thorpe, 2003). Hospital outbreaks of respiratory disease due to *Moraxella catarrhalis* have been described (Richards *et al.*, 1993).

Aim of study

The study aims at investigating the occurrence frequency amongst different age groups and sex in children.

Materials and methods

A total of 400 swab samples (ear swab 200, nasal swab 200) were collected from children within the age range (0-10yrs) by a clinician. Ear and nasal throat swabs were inoculated onto blood agar made selective by the addition of colistin(6µg/ml), vancomyin(3µg/ml) and trimethoprim(3µg/ml). Incubation was at 280C for 24-48hrs in a 5% CO2 atmosphere. After incubation, discrete colonies were streaked out on chocolate agar. Further identification was done using other biochemical reactions. Isolates were examined for beta lactamase production using Nitrocephic discs (Becton Dickinson Sparks, MD) impregnated with nitrocephin (a chromogenic substance). A change in colour from yellow to red indicates a positive test for beta-lactamase production. The antibiotic pattern of isolates was studied using Kirby-Bauer disk diffusion method. An 18 – 24hrs old culture of the test organism was grown in sterile normal saline, transferred to Mueller Hinton agar and incubated at 37°C for 24hrs. Sensitivities were determined using the National Committee for Clinical Laboratory Standard (NCCLS) formerly (CLSI).

Results

Table 1: Laboratory characteristics used in the identification of *M .catarrhalis*

Characteristics	Result
Colony Morphology	Non- Pigmented, Opaque, Smooth, does not adhere to agar
Growth on Blood agar (Made Selective by adding Colistin, vancomycin & Trimethoprim)	Positive
Growth on nutrient agar	Positive
Gram Stain	Gram negative diplococci
Oxidase	Positive
Deoxyribonucleic (DNAase)	Positive
Nitrate reduction test	Positive
Sugar fermentation test, With glucose, maltose, Lactose and sucrose	Negative
Superoxide Test (30% Catalase test (3%)	Positive

Table 2: Prevalence of *M. catarrhalis* amongst subjects

Source of *M. catarrhalis* (children 0-10yrs) Specimen			
Parameters	**Nasal swab**	**Ear swab**	**Total**
Sample size	200	200	400
No of Isolates	7	12	19
%occurrence	3.5	6.0	4.8

Table 3: Percentage (%) susceptibility of *M. catarrhalis* isolates to antibiotics used

Children		
Antibiotics	**Sensitive (S)**	**Resistant (R)**
AMX-CLA(10µg)	100	-
PCN (10µg)	2	98
AMP (10µg)	27	73
CEF (30µg)	58	42
CEX (30µg)	37	63
CPX (30µg)	89	11
CHL (30µg)	73	27
CFX (30µg)	63	37
ERY (15µg)	94	6
TET (30µg)	-	10
RFP (5µg)	52	10
β-lactamase	84	16

CHL- Chloramphenicol, **AMX-CLA**- Amoxicillin clavulanate, **CEF** – Cefaclor, **AMP**- Ampicillin, **CFX**- Cefuroxime, **ERY**- Erythromycin, **PCN** – Penicillin, **TET**- Tetracycline, **CEX**- Cephalaxine

Discussion

Moraxella catarrhalis of otitis media and pnuemonia in children (Enright *et al.,*1994). Strains were confirmed phenotypically by conventional carbohydrate assimilation profiles, tributyrin hydrolysis, Gram stain colony characterization, growth on selective agar and β-lactamase production (Bell *et al.,*1998). From the clinical samples collected, ear swabs gave the highest percentage (6.0%) of isolates.This does not differ markedly with that of Akinjogunla and Enabulele (2010) who obtained a 7.3% prevalence rate from ear swab.

The antibiotic sensitivity and resistance of *M.catarrhalis* showed a 100% sensitivity to amoxicillin-clavulanate in isolates obtained, this is closely followed by Erythromycin (94%). A resistance of 100% was observed in tetracycline followed by penicillin (98%), which is in consonance with the report of Anita *et al.,*(2010) and Akinjogunla and Eghafona(2011) where a 100% sensitivity to amoxicillin clavulanate and 86% resistance to penicillin was reported.

β-lactamase production was detected in 16(84%) out of the 19 isolates obtained. This is in agreement with the pattern that was reported by Froom *et al.,* (1997) where >80% of *M.catarrhalis* isolates obtained from clinical samples were β-lactamase producers.

Conclusion

The finding emphasizes the need to modify both diagnostic procedures for acute otitis media (AOM), pneumonia, bronchitis and antimicrobial dosing practices among laboratory staff and clinicians. The overuse and misuse of antibiotics and increased beta-lactamase production has triggered an increase in antibiotic resistance (Winstanley and Spencer 1986).

Ackowledgements

Ambrose Alli University Tertiary Education Trust Fund, Edo State- Nigeria, Esan West LGA, Primary HealthCare Unit, Ekpoma-Edo State.

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