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## Bacterial isolates of the respiratory tract infection and their current sensitivity pattern among patients attending Aminu Kano Teaching Hospital Kano, Nigeria

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**ABSTRACT:** The study was carried out to isolate and identify the common Bacteria causing respiratory tract infections among patients attending Aminu Kano Teaching Hospital between August and October, 2008, and the current sensitivity patterns of the isolated Bacteria to common commercially antibiotic prepared disc.. Forty three (43) Bacterial pathogens were isolated from two hundred sample (200) collected, *Streptococcus pneumonia* (25.6%) takes the highest percentage of occurrence, followed by *Klebsiella pneumonia* (20.9%), *Escherichia coli* (20.9%) and *Staphylococcus aureus*, (16.3%) respectively. Others include *Proteus species* (4.7%) *Pseudomonas aerations* (4.7%), *Haemophilus influenza* (4.7%) and *Serratra species* (2.3%) as well. Age range between 20 – 29 and 30 – 39 takes the highest percentage of pathogen isolated. The sensitivity patterns of the isolated Bacterial to commercially antibiotic prepared disc indicated that drugs likes ceftriaxone, ceftazidine, ciprofloxacin, ofloxacin gentamicin and chloramphenicol show activity on all the pathogens isolated.

**Key words:** Isolate, Bacteria Respiratory tract infections, sensitivity.

### Introduction

Respiratory tract is the part of the human system that plays a vital role in breathing process. In human, the respiratory system can be subdivided into an Upper respiratory tract and a Lower respiratory tract based on anatomical features.(Perkin, 2003). The respiratory tract is constantly exposed to microbes due to the extensive surface area, for instance, the lungs have an exposed internal surface area of approximately 500m<sup>2</sup>. (Underwood, 1992).

Respiratory infection can be upper or lower tract; the upper respiratory tract infection is a non specific term used to described acute infections involving, the nose Para nasal sinuses, pharynx, larynx and epiglottis; most URIs occur more frequently during the cold winter months. Upper respiratory tract infections are mostly caused by viruses. Group A beta hemolytic streptococci (GABHS) cause 5% to 10% of cases of pharyngitis in adults (Nichol, Ehlinger and Heilley, 2005).

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Other less common causes of bacterial pharyngitis include group C beta hemolytic us *Streptococci*, *Corynebacterium diphtheria*, *Neisserice gonorrhea*, *Arcanobacterium haemolyticum*, *Chlamydia Pneumonia*, *Mycoplasma pneumonia*. (McGinn and Ahlaw, 2003). *Streptococcus pneumonia*, *Haemophilus influenza* and *Mirabella catarrhal* is are the most common organisms that cause bacterial super infection of viral acute sinusitis – less than 10% of cases of acute tracheobronchitis are cause by *Bordetella pertusis*, *Bardetella parapertusis*, *Mycoplasma pneumonia*, or *C. pneumonia*. Transmission of organisms causing URIs occurs by aerosol, droplet, or direct hand – to hand contact with infected secretions, with subsequent passage to the snares or eyes (Musher,2003). Thus transmission occurs more commonly in crowded conditions. Lower respiratory tract infections generally occur only when lung defense mechanisms are not functioning properly lung function can be impaired by such things as the chronic inflammation that accompanies cigarette smoking or contained exposure to other irritant. (www.Mamma.com , 2008). Lower respiratory tract infections place a considerable strain on the health budget and are generally more serious than upper respiratory infection. Since 1993 there has been a slight reduction in the total number of deaths from lower respiratory tract infection. However in 2002, they were still the leading cause of deaths among all infectious diseases and they accounted for 3.9 million deaths worldwide and 6.9% of all deaths that year, (WHO, 2004).

## **Materials and Methods**

### **Study Area**

The research was carried out at Aminu Kano Teaching Hospital, Kano Nigeria. The population studied, was a heterogeneous population of different age group, ethnicities and educational status. Biodates and other information's were collected via the counselor's after obtaining informs consent from each patient with the assurance that all information's obtained would be treated confidentially.

### **Sample Collection**

Early morning's sputum "before eating" was aseptically collected from 200 patients attending Aminu Kano Teaching hospital, between August and November, 2008.

### **Sample Preparation**

#### **Inoculation/Culturing**

The sample collected were aseptically inoculated on to the surface of prepared dried blood and chocolate (heated blood) agar plate, using a sterilize wire loop. The blood agar plate were incubated aerobically while the chocolate agar plate were incubated in a carbon dioxide enriched environment (10°C CO<sub>2</sub>) using anaerobic jar both the inoculated agar plates were incubated at the same temperature for 18 to 24 hour (Cheesbrough, 2005).

#### **Plate Reading**

The incubated agar plates were observed for the following characteristics; growth of the pathogens, size of colony, shape of colony, elevation, colour, odour, pigmentation, heamolysis and swarming movement. (Cheesbrough , 2005).

#### **Gram – Reaction**

Gram – reaction was carried out in order to differentiate the bacteria into gram –positive and gram – negative. A bacterial colony was spread in a thin film over a slide and air dried. The smear were fixed by flaming a heat fixed smear were covered with a basic purple dye for 30 – 60 seconds and the dye is washed off with clean water. Then the smear were covered with lugol's to dine (a modant) and washed off with

clean water. Both gram positive and gram – negative bacteria appear purple. The slide was then washed with ethyl alcohol (a decolorizes) and water. Now the gram – positive cells are purple and the gram – negative cells are colourless. Safranin were added as counter stain, and the slide was washed, dried and examined under microscopically. (Tortora, , 2004).

#### Biochemical Test:

The biochemical tests were carried out for the confirmation and identification of the bacteria isolated. The following test wares carried out are below Catalase, Coagulase, Urease, Citrate, Indole, Oxidase, Motility, Satellites (none, Biochemical Test), Triple Sugar Iron (TSI) Test.

#### Sensitivity Screening

The isolates were swabbed onto prepared nutrient agar plates and standard antibiotic disc were placed, this was incubated at 37°C for 24 hours. Sensitivity of the isolates were determined by measuring the diameter of each zone of inhibition around each disc the value obtained were compared with the standard chart provided (Cheesbrough, 2005).

### Results and Discussion

From Table 1, eight species of bacteria were isolated from 200 patients attending Aminu Kano Teaching Hospital, Kano, this give the total of 43 bacteria. *Streptococcus pneumoniae* (25.6%) takes the highest percentage of occurrence, followed by *Klebsiella pneumoniae* (20.9%). *Escherichia coli* (20.9%) and *Staphylococcus aureus* (16.3%), while others are of fewer occurrences, this include proteus species (4.7%), *Pseudomonas aeruginosa* (4.7%), *Haemophilus influenzae* (4.7%) and *Serratia species* (2.3%). These results agree with the study done by Roloy, (2000) in which *Streptococcus pneumonia* takes the highest percentage of occurrence, (33%). On the other hand the results disagree with study conducted by Richard (2000) in which Nosocomial infections in combined medical surgical intensive care units in the United State; where *Staphylococcus aureus* was the most frequently reported isolate (17%) *Pseudomonas aeruginosa* (15.66%), followed by *enterobacter species* (10.9%) and *Klebsiella pneumoniae* (7.0%).

As in Table .2 Age range between 20 – 29 and 30 – 39 takes the highest percentage of pathogens isolated (23.5%, 18.6%) respectively. While age range of 30 – 39 and 20 – 29 was the highest percentage of non pathogen isolated (22.9% and 19.86%) respectively. Males have the highest pathogen isolated as compared with the females. (Tables 3 & 6) which showed a significant differences (Table 4 ) Antibiotic such as ceftazidime, Ciprofloxacin, Rocephine and Chloramphenicol showed activity on *Streptococcus pneumonia* and *Staphylococcus aureus*. While Augmenting, Amoxicillin and gentamicin show activity only on *Streptococcus pneumoniae*, but Antibiotic such as Gentamicin, Augmenting, Ceftazidime, Ciprofloxacin, and Rocephine show activity on all the pathogens, while Amoxicillin, cotrimoxazole, Nitrofurantoin and tetracycline show activity only on some of the pathogen while *Pseudomonas aeruginosa* and *Klebsiella pneumoniae* are resistance to most of the antibiotics.

**Table1:** Bacterial Pathogens isolated from the respiratory tract of patients

S/N	Pathogens Isolated	No. of Isolates	% of Occurrence
1	<i>Streptococcus pneumoniae</i>	11	25.6
2	<i>Klebsiella pneumoniae</i>	9	20.9
3	<i>Escherichia coli</i>	9	20.9
4	<i>Staphylococcus aureus</i>	7	16.3
5	<i>Proteus specie</i>	2	4.7
6	<i>Haemophilus influenzae</i>	2	4.7
7	<i>Pseudomonas aeruginosa</i>	2	4.7
8	<i>Serratia specie</i>	1	2.3
Total		43	100%

**Table.2:** Bacterial pathogens isolated from patients in relation to Age

Age	No. of patients examined	Pathogens isolated	Non. Pathogens isolated
0 – 9	17	5 (11.6%)*	12 (7.4%)*
10 – 19	27	6 (13.9%)	21 (13.4%)
20 – 29	41	10 (23.5%)	31 (19.8%)
30 – 39	44	8 (18.6%)	36 (22.9%)
40 – 49	25	6 (13.9%)	19 (12.1%)
50 – 59	17	4 (9.3%)	13 (8.3%)
60 – 69	18	2 (4.7%)	16 (10.2%)
70 – 79	11	2 (4.7%)	9 (5.7%)
Total	200	43 (100%)	157 (100%)

\*Percentage in parentheses.

**Table3:** Bacterial pathogens isolated from patients in relation to sex

Sex	No. of patients examined	No. of pathogens isolated	Non pathogens isolated
Female	99 (49.5%)*	20 (46.5%)*	79(50.3%)*
Male	101 (50.5%)	23 (53.5%)	78 (49.7%)
Total	200 (100%)	43 (100%)	159 (100)

\*Percentage in parentheses.

**Table 4:** Sensitivity of gram positive Bacterial isolates of the respiratory tracts

Bacterial isolates	Antibiotics										
	AUG	AMX	ERY	TET	GEN	COT	CXL	CHC	CAL	CIO	C.R.O
<i>Streptococcus pneumoniae</i>	++	++	-	-	++	-	-	++	+++	+++	+++
<i>Staphylococcus aureus</i>	-	-	-	-	-	-	-	++	++	++	++

Key:

- = Resistant

+++ = Highly sensitive/effective

++ = Moderately sensitive/effective

+ = Sensitive/effective

**Table 5:** Sensitivity patterns of Bacterial isolates (Gram – negative) of the respiratory tracts.

Bacterial isolates	Antibiotics										
	AMX	COT	NIT	GEN	OFX	NAL	TET	AUG	CAZ	CIP	C.R.O
<i>Pseudomonas aeruginosa</i>	-	-	-	-	++	-	-	-	++	++	++
<i>Escherichia coli</i>	±	+++	-	+	++	-	++	+	+++	+++	+++
<i>Klebsiella pneumoniae</i>	-	-	-	++	+++	-	-	+	++	++	+++
<i>Proteus species</i>	-	++	-	+++	++	-	-	+	++	++	+++
<i>Haemophilus infekunzae</i>	++	-	-	++	++	-	-	++	++	++	+++
<i>Serratia specie</i>	-	-	+	++	++	+	-	++	++	++	+++

Key:

- = Resistant

+++ = Highly sensitive/effective

++ = Moderately sensitive/effective

+ = Sensitive/effective

### Conclusion and Recommendations

In conclusion, the results obtained showed that eight number of Bacteria species were isolated from the respiratory tract of patients attending Aminu Kano Teaching Hospital, in which *Streptococcus pneumonia* account the highest percentage of occurrence (25.6%). Similarly, this have shown that the number of patients examined as well as pathogens isolated from male are slightly higher than that of female, i.e. there was a significant difference. Furthermore resistance were encountered to most of the antibiotics by *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Klebsiella pneumonia* finally the results have also pointed out the best antibiotic that will be in use for the treatment of respiratory infections, such as ceftriaxone/Rocephine, ceftazidime, ciprofloxacin, ofloxacin Gentamicin and chloramphenicol.

Since there were cases of resistance especially with *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Klebsiella pneumonia*, therefore antimicrobial susceptibility test should be encourage on daily routine basis so as to figure out the best antibiotic for treatment of respiratory infections. Extensive use and misuse of antimicrobial drugs should be avoided; this will reduces the emergence of drugs resistance. New generation antibiotic especially third and fourth generation should be used in the treatment of respiratory tract infections.

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