PROXIMATE ANALYSIS OF SPUTUM SAMPLES FOR *STREPTOCCUS PNEUMONIAE* IN BENISHEIKH GENERAL HOSPITAL, BORNO STATE, NIGERIA

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ABSTRACT

Streptococcus pneumoniae cause life-threatening disease of respiratory tract. It is the most important of all the tropical disease in terms of morbidity and mortality. Across-sectional study on relationship between *Streptococcus pneumonia,* age and sex was carried out at Benisheikh General Hospital, Kaga Local Government Area (L.G.A), Borno State, Nigeria. Variables assessed were sputum sample for *Streptococcus pneumoniae*, age (No. of years) and sex (male and female). A total of 211 patients were examined, comprising 118 (55.9%) male and 93 (44.10%) female, 122 (57.8%) of the study population were adult and 98 (42.2%) adolescent. One hundred and thirty 130 (61.6%) of the patient had *Streptococcus pneumoniae* infection in their sputum. *Streptococcus pneumoniae* infection of these 74 (35.1%) were males while 56 (26.5%) were female but the difference was not found to be statistically significant (P>0.05) infection rate was higher among the adult 82 (38.8%), than the adolescent 48 (22.8%) and the difference was not found to be statistically significant (P>0.05). The study indicated a strong correlation between age, sputum and prevalence of *Streptococcus pneumoniae*. Thus, the information in this study is helpful in knowing the final solution of life-threatening disease and checking out to formulate the control strategy in future.

Keywords: Proximate Analysis, Sputum, *Streptococcus pneumoniae*.

INTRODUCTION

Pneumonia is a disease caused by the gram-positive *Streptococcus pneumoniae*, found in the upper respiratory tract. However, disease usually occurs only in those individuals with predisposing factors such as viral infections of the

respiratory tract, physical injury to the tract, alcoholism or diabetes. About 60 to 80% of all respiratory diseases known, pneumonia is caused by *Streptococcus pneumoniae*. An estimated 150,000 to 300,000 people in the United States contact this form of pneumonia annually, and between 13,000 to 66,000 death results. (Snippe, H. 1995).

The prevalence of *Streptococcus pneumoniae* resistance in the Tropical Africa, South African including the study area is penicillin – resistant strains are increasing. An association between HIV infection and *Streptococcus pneumoniae* resistant to penicillin and tetracycline has been reported by Paul *et al* (1994). Protection is good against deep *pneumococcal* infections (especially septicemia and meningitis). Immunization is suggested for those at highest risk of infection including those 65 years or older and generally should be a single lifetime dose. Lysenko *et al* (2005). *Streptococcus pneumoniae* and conjunctivitis severe infections can occur in the elderly and those already in poor health or immune-suppressed. Risk of infection is increased following planectomy. Monica C. (2000).

In tropical and developing countries, *Streptococcus pneumoniae* is a major pathogen, responsible for acute lifer-threatening pneumonia and bacteria in those co-infected with HIV. It is also a common cause of childhood pneumonia and serious infections in patients with sickle cell disease (Gilks, 1997). Incidence of *Streptococcus pneumoniae* infections among patient attending tuberculosis clinics in Ekpoma, Nigeria (Egwu .E. 2006) observed that age group 1 – 9 years was mostly affected by *Streptococcus pneumonia* and that children had the highest incidence of both *streptococcus pneumoniae*, and that children had the highest incidence of both *Streptococcus pneumoniae* and mycobacterium tuberculosis followed by farmers. A high incidence of *pneumonococcal* bacteria usually occur in infants under 2 years of age, low in teenagers and young adults and high in people above 60 years when immunity is low due to age. Musher D. (1997).

Treatment is usually with Beta-lactam antibiotic. In the 1960s, nearly all strains of *Streptococcus pneumoniae* were susceptible to penicillin, but since that time, there has been an increasing prevalence of resistance, especially in areas of high antibiotic use. Peterson L.R (2006). An amoxicillin and clavulanic acid combination (*Coamorclave/Augmentin*) is often used to treat *otitis* media.

2

Baddour *et al* (2006). The incidence of penicillin resistance *Streptococcus pneumoniae* (*pneumonococcus*) has risen steadily worldwide and now complicates diagnostic and treatment strategies for infections due to this organism. Taiwo (2004).

The aim is to assess sputum samples of patients attending Benisheikh General Hospital for *Streptococcus pneumoniae* and to determine its degree of phatogenicity. And thus the information in this study is helpful in knowing the final solution of the disease in the study region and checking out to formulate the control strategy in future.

PATIENTS AND METHODS
Sampling Method
Every patient that was brought to the consulting room was eligible to be part of the study. Two hundred and eleven patients were enrolled during the survey period and subject to the patient's consent and agreement. A patient was given clean wide necked, leak proof container to cough deeply to produce a sputum specimen. Whereas in children mucopus aspirated from the nasopharynx of the patient. The sample were examined in a biological safety cabinet, the specimen was then incubated in a carbon dioxide enriched candle jar for 37^0C over night. After the blood and chocolate agar cultures were examined, significant growth of *Streptococcus pneumoniae* identified and confirmed by optochia disc sensitivity method. Which is the deal confirmatory biochemical test of *Streptococcus pneumoniae*, pneumonia are sensitive to optochia *(ethylhydrocupreine hydrochloride)*, when impregnated with 5ug of optochia and placed on a primary sputum culture and the plate incubated aerobically. Subsequently, a rapid presumptive identification was done to determine the zone of inhibition of at least 10mm.

Staining Procedure
The samples (sputum) were stained as described by Sir Hans Christian Gram Staining Procedure to distinguish between gram positive and gram negative organism.

The dried smear was stained and further treated with Lugol's iodine for 30 seconds, (i.e. mordant). The smear was then washed with water and decolorized with 95% alcohol with continued application until no more colour appears to flow from the preparation and finally washed off using buffered distilled water.

The smear was counter stained with neutral red (or safrainine) for 1-2 minutes. The slide was washed with distilled water and allowed to air dry and was examined under oil immersion objective lens (x 100) of a light microscope. (Gram positive appear purple and while negative appears pinkish).

Antibiotic Sensitivity Test (Disc Method)
The isolated organism from the sputum sample (*Streptococcus pneumoniae* were evenly spread into a plate of chocolate agar with a standard wire loop. The multi-disc impregnated with antibacterial agents were removed aseptically and placed at the centre of the medium using a sterile forceps and pressed evenly.

The disc was gently picked and applied on the surface of the agar plate with flamed forceps to avoid interference of external organism or to prevent contamination by external organism. The plate placed in a candle jar was incubated at 37^0C for 18-24hrs after which the sensitivity patterns was read.

DATA ANALYSIS
Data assessable were analyzed using PEPI, the computer programme for epidemiology and established using chi-square test at 95% confidence limit.

RESULTS
Result of the 211 patients studied 118 (55.9%) were males and 93 (44.1%) were female as shown in table 1. Majority of the adult with 122 (57.8%) were between 14 to 70 years while 89 (42.2%). Adolescents, there was however no statistical difference between ages (x^2 = 0.060, df = 0.44). Table 2 shows the Assessment of sputum for *Streptococcus pneumoniae* infection by age and sex. A total of 211 patient's sputum samples were examined for *Streptococcus pneumoniae*, 130 (1.6%) were infected while 81 (38.4%) were negative of the 89 adolescent examined. 48 (22.8%) had *Streptococcus pneumoniae* in their sputum while 82 (38.8%) of 122 adults were infected. Infection rate was higher among the adolescent than in adults and the difference was found to be statistically significant (x^2 = 3.84, df = 1, p = 0.05). Of the 118 males examined, 74 (35.1%) were infected while the corresponding figure for female infected was 56 (26.5%) out of 93. Although more males than females were *Streptococcus pneumoniae* positive, the difference was not found to be statistically significant (x^2 = 0.14, df = 1, p = 071).

The antibiotic (drugs) sensitivity pattern of positive *Streptococcus pneumoniae* samples show at 0 (0.0) of samples were sensitive to penicillin, 28 (21.5%) were sensitive to ciprofloxacin, 22 (16.9%) were sensitive to *streptomycin*, 20 (15.4%) were sensitive to Erythromycin, 15 (11.5%) were sensitive to Rafampin, 15 (11.5%) were sensitive to Gentamycin, 12 (9.2%) were sensitive to Norfloxacin and 18 (13.8%) were sensitive to Lincocin respectively.

DISCUSSION

The prevalence of *Streptococcus pneumoniae* observed in this study was 61.6%. The high prevalence of *Streptococcus pneumoniae* could be attributable to increasing resistance and tolerance to penicillin in geographical location of Borno State, and tropical countries. Gilks (1997).

The prevalence of *Streptococcus pneumoniae* infection was statistically higher among adult than adolescent. This suggests that age is an important factor in the aetiology of *Streptococcus pneumoniae* among the studied population. This agrees with highest incidence of *Streptococcus pneumoniae* among patients attending clinic in Ekpoma, Nigeria. Egwu *et al* (2006).

CONCLUSION

In conclusion the study showed a strong correlation between age and *Streptococcus pneumoniae* infection. A high incidence of *pneumonococcal* bacteria is usually low in teenagers and young adults and high in older people when immunity is low due to age. The information in this study is helpful in knowing the final solution to *Streptococcus pneumoniae* infection in Benisheikh and checking out to formulate the prevention strategy in future.

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