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Research Article

Bacterial isolates in Throat Infected Patients and Multi-drug Susceptibility Patterns in Rural areas of Bangladesh

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Abstract:

A sore throat caused by pharyngitis is often seen in family medicine clinics. Pharyngitis can be caused by a number of infections namely bacterial, viral or fungal. Although bacterial and fungal infections mostly require antimicrobial therapy, viral causes are usually self-limiting. The present study was a prospective cross-sectional study aimed to isolate and identify the bacteria which cause throat infection and their antibiotic susceptibility in Sirajganj. Throat swabs were collected from 82 patients attended at Khawja Yunus Ali Medical

College and Hospital, Sirajganj. Identification of the isolates was done by inoculating them directly on blood agar, gram stain and biochemical tests. The Kirby-Baur disk diffusion method was used to test isolated organisms for their susceptibility to antibiotics. The major organisms isolated were Staphylococcus aureus (90.3%), E. coli (8.5%) and Klebsiella pneumoniae (1.2%). The maximum antibiotic sensitivity of the isolates was observed against meropenem, imipenem, gentamicin, cefuroxime, ceftriaxone and amoxicillin.

Keywords: Sore throat, Pharyngitis, Throat swab, *Staphylococcus aureus*

Introduction:

More than 2% and 5% of all outpatient primary care visits for adults and children are due to sore throat. There are peaks between late winter and early spring (Sadeghirad B *et al.*, 2017). A sore throat can be caused by inflammation of the pharynx.

A majority of throat infections in children and adults are caused by viruses. About one-third of sore throats in children aged 5 to 15 years are caused by Group A -hemolytic *Streptococcus* (GABHS). Only a small percentage of sore throats are caused by GABHS (Bisno AL *et al.*, 2002). Other bacteria which play an important role in throat infection

include *Staphylococcus aureus*, which is responsible for 38% of throat infection, *Klebsiella*, *E.coli*, *Haemophilus*, *Moraxella* also causes upper respiratory tract infection (Cheng-Ching *et al.*, 2012). Most of the time, the symptoms of pharyngitis include a sore throat and achy throat. There are different signs and symptoms depending on the cause. A sore throat is more likely to be caused by a viral infection. The sudden onset of a variety of symptoms in the absence of cough and coryza is suggestive of the most common form of pharyngitis (Bloomington, 2011). The specimen for

culture is obtained by swabbing the throat with a sterile swab from the surface of both tonsils and the posterior pharynx. The study aimed to isolate and

Materials and Methods:

Throat swabs were collected from 82 patients of different age groups attending Khawja Yunus Ali Medical College and Hospital, Sirajganj over a period of January 2020 to April 2020. Each swab is collected by a sterile cotton swab in good light and under the aseptic condition from an inflamed area before the patient is given any antibiotic.

Isolation and Identification:

The specimens were directly inoculated in the following culture media: (i) Sheep blood agar media to detect hemolytic properties of the isolates and (ii) MacConky's agar media for isolation of Enterobacteriaceae. Incubated overnight aerobically at 37°C.

Colony characteristics, Gram staining and biochemical tests were used to identify pure isolates. Standard microbiological methods were used to identify the bacterial species (CLSI, 2009). CLSI (Clinical and Laboratory Standards Institute) says that all the isolated organisms were tested for their susceptibility to antibiotics using the Kirby-Baur method (Cheeseborough M, 1999).

Results:

A total 82 throat swabs were collected from patients of three different age groups diagnosed with throat infection. Among them, 41 (50%) were male and 41 (50%) were female. The majority number of isolates (53.7%) were obtained from the age group 21 to 40 years followed by 24.4% from the age group 1 to 20 years and 21.9% in the age group >40 years (Table-1). Gram positive bacteria constituted 74 (90.3%)

identify the bacteria which caused throat infection and their antibiotic susceptibility in the rural areas of Bangladesh.

and gram-negative bacteria constituted 8 (9.7%) of the total isolates (**Fig. 1**). Among the identified bacterial isolates, the maximum number (90.3%) of isolates were *Staphylococcus aureus* whereas the minimum number of isolates were *E. coli* (8.5%) and *Klebsiella pneumoniae* (1.2%) shown in (**Fig. 2**).

A total number of 13 commonly prescribed antibiotics were tested against the isolated bacteria to demonstrate their susceptibility pattern. *Staphylococcus aureus* (97.3%) showed the highest sensitivity to meropenem and imipenem. cefuroxime (86.5%), ceftriaxone (83.8), amoxicillin (75.7%) and ampicillin (70.3%) are the other antibiotics against which *Staphylococcus aureus* also showed high degree of sensitivity. On the other hand, *Staphylococcus aureus* showed high degree of resistance to clarithromycin (100%), cephradine (81.1%), ceftazidime (79.7%), azithromycin (75.7%), ciprofloxacin (70.3%) and cefixime (68.9%) shown in **Fig. 3**.

E. coli showed highest sensitivity to imipenem (100%) and meropenem (85.7%) followed by ceftriaxone and ciprofloxacin (57.1%). Whereas 100% of *E. coli* showed resistance to ampicillin, Amoxicillin, Azithromycin and clarithromycin (**Fig. 4**). *Klebsiella pneumoniae* showed the highest (100%) sensitivity to cefuroxime, ceftriaxone, meropenem, gentamicin, ceftazidime, imipenem, azithromycin and cefixime. On the other hand, ciprofloxacin, clarithromycin and cephradine remain inactive (100%) against *Klebsiella pneumoniae*(**Fig.5**).

Table -1: Distribution of cases of throat infection according to gender in three age groups.

Age	Number of patients	Female patients		Male patients	
		No.	%	No.	%
Years	No.(%)				
1-20 Years	20(24.4%)	13	65.0	7	35.0
21-40 Years	44(53.7%)	20	45.5	24	54.5
>40 Years	18(21.9%)	8	44.4	10	55.6
Total patients, (%)	82(100%)	41	100	41	

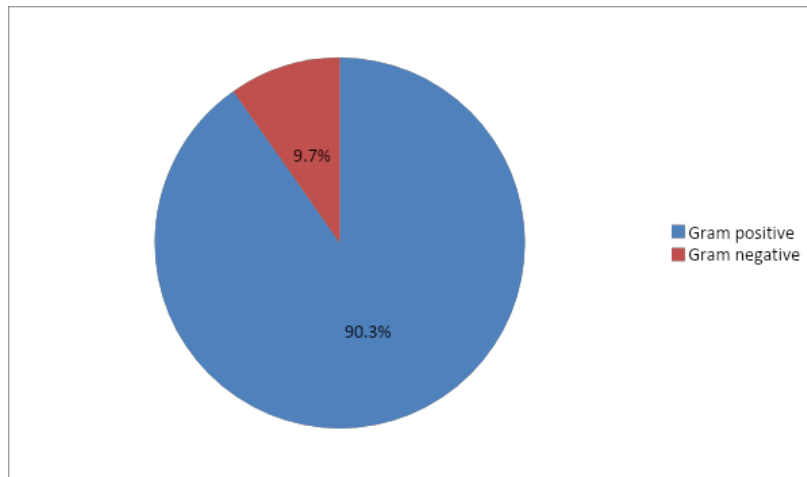


Fig. 1: Prevalence of Gram-positive and Gram-negative bacterial isolates.

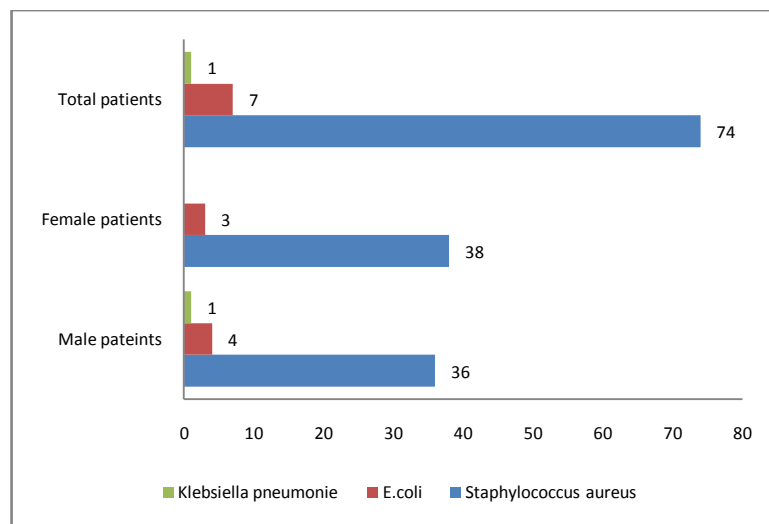


Fig. 2: Frequency of bacterial isolates according to gender.

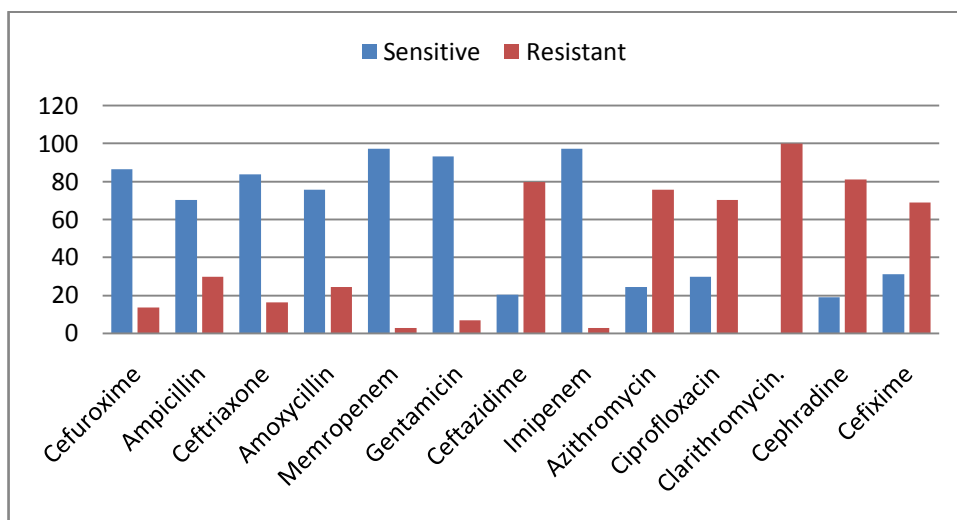


Fig. 3: Antimicrobials susceptibility of *Staphylococcus aureus*

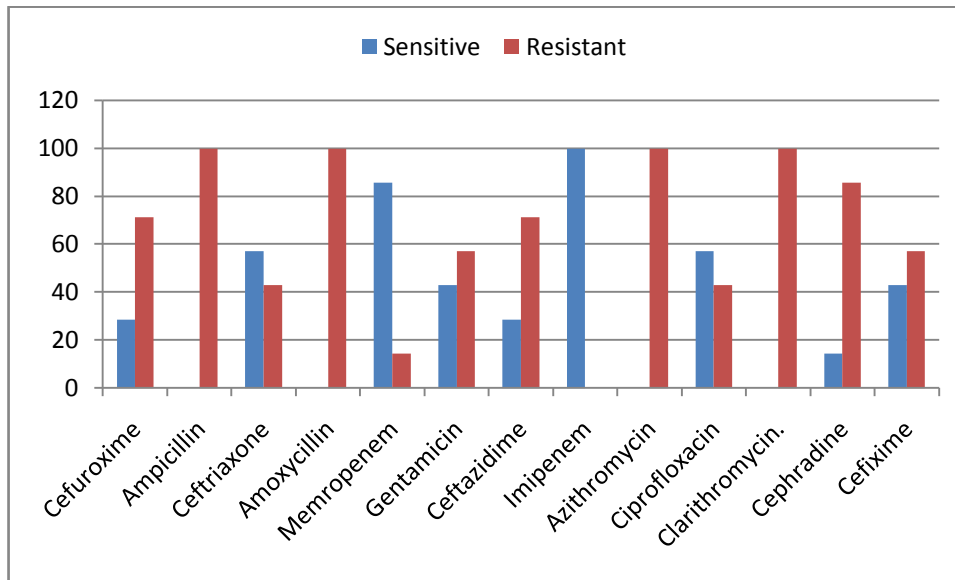


Fig. 4: Antimicrobials susceptibility of *E. coli*

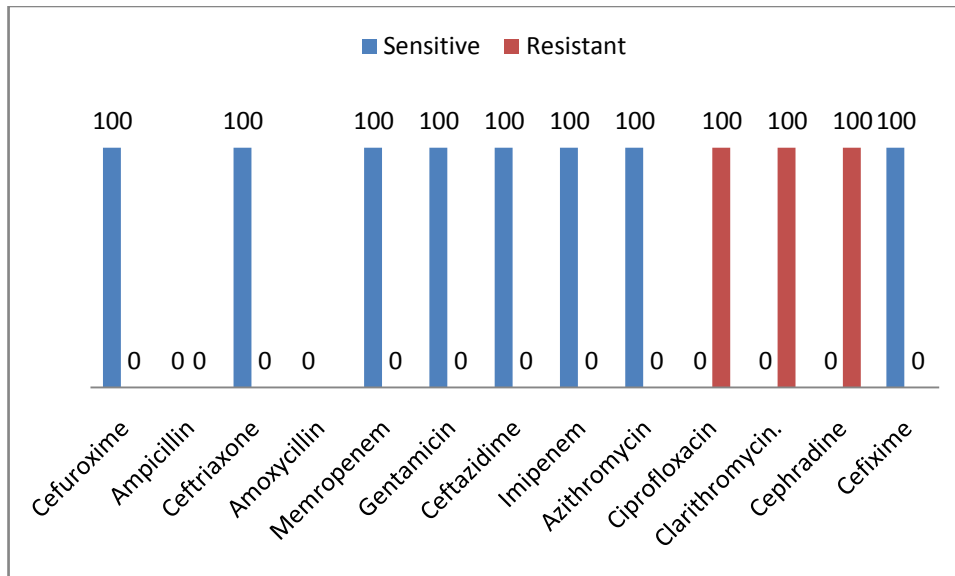


Fig. 5: Antimicrobials susceptibility of *Klebsiella pneumoniae*

Discussion:

A Sore throat is irritation or pain in the throat. It is commonly caused by pharyngitis or tonsillitis [6]. Throat infection can affect individuals of all age groups. In the present study revealed that *Staphylococcus aureus* was the most common cause of throat infection, which was in agreement with the findings of Raju *et al.*, 2012, Abdulrahman *et al.*, (2004), Yildirim *et al.*, (2003), *Staphylococcus aureus* isolated from throat infection may enter the throat from nasal canal as a normal flora, and also it

comprises teichoic and lipoteichoic acids as well as capsular polysaccharide which facilitates the adherence of these bacteria to epithelium.

E. coli and *Klebsiella pneumoniae* were isolated from 7 and 1 cases respectively. Several studies isolated Enterobacteriaceae from throat swabs (Yildirim *et al.*, 2003). Shah *et al.*, (2013), Ilham *et al.*, (2019) found that *E. coli* represented 12.5% and 5.2% of throat infections respectively, which shows similarity with our results.

Staphylococcus aureus was highly sensitive to meropenem, imipenem (97.3%), cefuroxime (86.5%), ceftriaxone (83.8%), amoxicillin (75.7%), ampicillin (70.3%). On the other hand, *Staphylococcus aureus* showed resistance to the commonly used antibiotics, ceftazidime (79.7%), cephadrine (81.1%), azithromycin (75.7%), ciprofloxacin (70.3%) and clarithromycin (100%). The study done by Moirangthem *et al.*, (2013) showed *Staphylococcus aureus* was highly sensitive to cefuroxime, ceftriaxone, erythromycin, and Ciprofloxacin, this result was in agreement with the present study with one exception, it is Ciprofloxacin which was found to be resistant. *E. coli* showed the highest sensitivity to Imipenem (100%) and Meropenem (85.7%) whereas showed resistance to ampicillin, amoxicillin, azithromycin, clarithromycin (100%), cefuroxime, ceftazidime (71.4%) and cephadrine (85.7%). The other gram-negative bacilli *Klebsiella pneumoniae* showed high sensitivity (100%) to cefuroxime, ceftriaxone, meropenem, gentamicin, imipenem, ceftazidime, azithromycin and cefixime and also showed resistance to ampicillin, ciprofloxacin, clarithromycin, cephadrine (100%).

Conclusion:

Throat infection can occur in all age groups. High prevalence was observed in age groups of 21-40 years in both sexes. *Staphylococcus aureus* is the most common cause of throat infections. Most of the organisms are resistant to the commonly used antibiotics. The emergence of highly resistant bacteria against commonly used antibiotics is at a frightening level. However, the majority of organisms are sensitive to Meropenem, Imipenem, Cefuroxime, Ceftriaxone and Gentamicin. Therefore, for effective treatment of throat infection, culture sensitivity of throat swab should be done.

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