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ANTIMICROBIAL RESISTANCE OF BACTERIAL AGENTS OF THE UPPER RESPIRATORY TRACT IN A TERTIARY CARE LABORATORY, SRINAGAR, JAMMU & KASHMIR, INDIA

Deepanshu Sharma*1, Sharik Ul Islam*2, Sourbh Thakur*3,
Dr. Vinay Kumar*4
*1,4Assistant Professor, Department, Paramedical Sciences, DBU Mandi Gobindgarh, Punjab, India.
*2Student (M.Sc. Medical Microbiology), Department, Paramedical Sciences, DBU Mandi Gobindgarh, Punjab, India.
*3Student (M.Sc. Medical Biochemistry), Department, Paramedical Sciences, DBU Mandi Gobindgarh, Punjab, India.
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ABSTRACT

The purpose of the study was to identify the bacteria that affect the upper respiratory tract and the antibiotic susceptibility patterns of isolates. The tertiary care laboratory at Dr. Qadri's Hematology Center & Clinical Laboratory, Srinagar, Jammu & Kashmir, India, collected the throat swab samples from 250 patients suspected of having an upper respiratory tract infection (URTI) and injected them into the culture medium. Only 228 patients had a proven bacterial infection.. The cultural, morphological, and biochemical traits of the isolated organisms on medium allowed for their identification. The most common bacterial isolate was found to be Staphylococcus aureus (45.61%), followed by hemolytic streptococci (22.51%). A hemolytic streptococci, Escherichia coli, and Haemophilus influenzae were among the remaining bacteria, while 34 (14.91%) were recognised as Klebsiella penumoniae, 19 (8.33%) as Pseudomonas aeruginosa, and the remaining strains were hemolytic streptococci. All Staphylococcus species were resistant to ampicillin, co-trimoxazole, and penicillin. All of the isolates had at least one antibiotic resistance. For gentaruicin, cefixine, and ceftazidime, respectively, the overall rates of resistance were all relatively modest.

Keywords: Antibiotic, Susceptible, Resistant, Acute Respiratory Infection, Bacteria.

I. INTRODUCTION

One of the most significant infectious disorders in the globe is renal respiratory tract infection. In critically ill patients in underdeveloped nations, this infection is the main cause of morbidity and mortality[1,2,3]. After birth, respiratory tract infections (RTIs), which affect the upper or lower respiratory tract, are rather common[4]. RTIs, which include the common cold, sore throat, earache, laryngitis, otitis media, sinusitis, and mastoiditis, are the most prevalent illnesses in humans and have been well-documented[4,5] These infections are more frequently dismissed as being minor inconveniences that merely cause short discomfort since they frequently look trivial[6]. Children and adults alike frequently experience respiratory infections, especially those that affect the upper respiratory tract. These infections have a significant economic impact due to both lost productivity at work and the frequent prescription of antibiotics by doctors, even though the underlying cause of the infection almost certainly isn't bacteria[7].. On the other hand, the most typical cause of primary care consultations is respiratory tract infections[8]. It is acknowledged that eliminating the causes of respiratory tract infections is essential[9], but in recent years, the selection of empirical treatments for some respiratory tract infections has become more difficult due to the rise in antibiotic resistance among the major microbial causes of respiratory infections in the community[10]. According to reports, pneumonia caused by secondary bacterial infections is the most significant lower respiratory tract complication. Preventive measures should be taken by monitoring acute RTIs in defined populations to keep an eye on prevailing pathogens and identify population groups at particular risk. Haemophilus influenza, Staphylococcus aureus, Streptococcus pneumonia, Klebsiella pneumonia, and Streptococcus pyogenes are some of the most common bacterial pathogens that have been identified following complex influenza virus infections[13,14].

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To our knowledge, there is limited information on the prevalence of various bacterial pathogens and their antibiotic resistance patterns in Srinagar, India. Hence, the aim of this study was to determine the prevalence and antimicrobial susceptibility rates of bacterial strains isolated from thoat specimens obtained from a in a tertiary care laboratory dr qadri's hematology center & clinical laboratory, Srinagar, Jammu & Kashmir, India.

II. METHODOLOGY

250 people in total participated in the trial, but only 228 had a bacterial infection that could be identified. 108 of the 228 patients were men and 120 were women. The study's participants ranged in age from 10 to 60, with a mean age of 35. The purpose of the study was explained to each subject, and they were all given the assurance that any information they provided would be kept private. Then, it was asked for their verbal agreement and cooperation to take part in the study. The study was conducted after receiving ethical permission. The following requirements had to be met for the patients to be included in the study: they had to have URTIs, be sent to clinics or hospitals, and not be taking any antibiotics at least for the previous week. The large majority (78%) of them had runny nose and sore thoat while sinusitis was the least noted. The symptoms lasted for 3-14 days.

III. RESULTS AND DISCUSSION

Bacterial cultures on 228 throat samples in total yielded positive results. S. aureus made up 104 isolates (45.61%), hemolytic streptococci were found in 52 (22.81%), Klehsiella pneumonia was found in 34 (14.91%), Pseudomonas aeruginosa was found in 19 (8.33%), hemolytic streptococci were found in 11 (4.83%), E. coli was found in 5 (2.91%), and H. influenzae was found in three (1.32%). Of the 228 isolates found, 53% were found in females versus 47% in males. Table 1 displays the isolates' susceptibility profiles to several antibiotics. S. aureus was resistant to co-trimoxazole, ampicillin, and penicillin. All of the isolates' susceptibilities to penicillin were found to be the lowest. In general, gentamicin and cefixime showed good effectiveness against the isolates. At least one antibiotic could not be used on any of the isolates. The overall rates of resistance were generally low for gentamicin, cefixime and ceftazidime respectively. However, penicillin had the highest resistance (100%).

Table 1. Prevalence and antimicrobial susceptibility (%) of bacterial strains recovered from throat swabs.

Bacterial strains	N (%)	*P	CRO	E	GN	AM	AN	CP	CFM	C	COT	CAZ
S.aureus	104 (45.61%)	0	31.73	28.84	97.11	0	34.62	40.39	99.04	76.92	0	94.2
β haemolytic streptococci	52 (22.81%)	0	44.23	46.15	96.15	48.08	25	38.46	92.31	82.69	38.46	88.46
K. pneumoniae	34 (14.91%)	0	5.88	73.53	97.06	44.12	2.94	73.53	91.18	61.76	29.41	88.24
P.aeruginosa	19 (8.33%)	0	5.26	47.37	84.2	0	52.63	78.95	89.47	63.16	26.32	78.95
α haemolytic streptococci	11 (4.83%)	0	36.37	54.55	90.91	9.09	18.18	45.45	81.82	63.64	27.27	72.73
E.coli	5 (2.19%)	0	20	60	80	0	40	20	100	100	20	80
H.influenzae	3 (1.32%)	0	33.33	66.67	100	33.33	66.67	33.33	100	66.67	0	66.67

n=228

*P = Penicillin; CRO = Ceftriaxone; E = Erythromycin; GN = Gentamicin; AM = Ampicillin; AN = Amikacin; CP = Ciprofloxacin; CFM = Cefixime; C = Chloramphenicol; COT = Co-trimoxazole: CAZ = Ceftazidime

The prevalence and antibiogram of bacteria causing URTIs among patients at a rural health centre were the main subjects of the investigation. One of the most significant infectious disorders in underdeveloped nations is respiratory tract infection. Numerous nosocomial and community-acquired illnesses are known to be caused by the increasingly lethal bacterium Staphylococcus aureus[18,19]. Staphylococcus aureus was the most prevalent pathogen observed in the majority of the population (45.61%) in our investigation. Staphylococcus aureus has been a significant problem to doctors due to its unsettling capacity to develop resistance to antimicrobial agents[20,21]. Hence, before selecting an antibacterial, the clinician must first consider the likely causative organism. Knowledge of the prevalent organisms and their current sensitivity is of great help in choosing an antibacterial.

In a study on the epidemiology of respiratory tract bacterial pathogens carried out by Varotto et al. (2001), P. aeruginosa has been reported as the most prevalent organism (24%) followed by S. pyogenes (18%), S. aureus (17%) and K. pneumoniae (8%)[22]. In an Indian study carried out by Kumari et al. (2007) on bacterial isolates from respiratory tract of ICU patients, the percentage isolation rate for P. aeruginosa, Klebsiella spp., Entervbaeter spp. Have been reported 21.5, 19 and 8 respectively[3].

As shown in **Table 1**, the bacterial isolates in order of the frequency in our study were S. aureus (45.61%), β hemolytic streptococci (22.81%) and Klebsiella pneumoniae (14.91%), which is not comparable to the two above mentioned studies.

Gentamicin and cefixime were generally the most effective antibiotics against the isolates, according to the results of the antibiotic susceptibility investigation (Table 1). Hemolytic streptococci and K. pneumoniae had sensitivity rates to gentamicin of 96.15% and 97.06%, respectively, whilst S. aureus showed a 97.11% sensitivity rate. Their widespread use is the main factor that favours the development of antibiotic resistance[23]. It is noteworthy that because to its manner of administration—exclusively by injection—and the exorbitant cost of acquisition, gentamicin and cefixime are likely less misused than other antibiotics. These elements might be to blame for the low rate of drug resistance seen for these substances.. The significant levels of susceptibilities of the isolates to gentamicin, cefixime, and ceftazidime, which are less frequently used, contrast with the high rates of resistance to penicillin (100%) and co-trimoxazole (76.8%), which are frequently purchased over-the-counter in drug stores. This suggests a relationship between antibiotic use and the level of drug resistance encountered in this study, as previously suggested in another study[23].

First, infections in locations where antimicrobial agent penetration is constrained and therapeutic concentration levels are thus more challenging to achieve have been linked to an increase in antibiotic resistance. Additionally, it might prevent infections from being eliminated in respiratory tract infections treated with conventional antibiotic therapy regimens[9]. To choose an antibiotic therapy that is clinically successful for the illnesses, precise knowledge of the local epidemiology and antimicrobial resistance patterns of the pathogens is crucial[24].

IV. CONCLUSION

The majority of the isolates were highly resistant to the tested antibiotics. This disturbing phenomena may be caused by a variety of factors, including improper and inappropriate use of antimicrobial drugs during empiric therapy and a lack of effective infection control measures. This issue highlights the significance of conducting an antibiotic susceptibility test prior to empirical therapy.

Both minor hospital settings and tertiary hospitals must conduct surveillance of bacterial infections and track their antibiotic susceptibility pattern. Changing the primary antibiotic used on a regular basis (every six months or a year), similar to crop rotation to improve soil fertility, could prevent the emergence of resistant microbes in the wards[25].This study was done only for outpatients. Further study should be carried out for inpatients in surgery, medicine, wounds and post operative cases for best results. These types of data will help in designing and validating the accuracy of guidelines for empirical treatment of upper respiratory tract infections.

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