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Original Research Article

Bacteriological Study on Upper Respiratory Tract Infections

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Abstract:

Introduction: Microbial pathogens such as bacteria, virus, fungi as well as parasites can cause Upper respiratory tract infections (URTIs). With these a study was conducted to find the various bacteria responsible for URTIs and also their antimicrobial pattern.

Materials and methods: Study was conducted in the department of Microbiology, GSL Medical College, from March to July 2023. Individuals clinically diagnosed with URTIs, aged >18 years, who submitted informed consent were included. Throat swab was collected from the study participants from posterior pharyngeal wall and also from the tonsils. Swabs were transferred immediately to the microbiology laboratory for the later process. Samples were inoculated immediately on sheep blood agar, chocolate agar and MacConkey agar. The inoculated plates were incubated at 37°C overnight under 5% – 10% carbon dioxide atmospheres.

Results: During the study period, total 133 samples were collected, male female ratio was .9. Gender wise, 31%, 45% were culture positive (CP); statistically there was no significant difference. More CP results were identified in 28 – 59 years group, *Stahylococcus aureus* was predominant isolate.

Conclusion: URT infections are common among female, age group 29 – 58 years is commonly prone for the infections. *Stahylococcus aureus* is the predominant pathogen.

Key words: Among, Infection, Isolate, Gender, and Participant.

Introduction

Upper respiratory tract (URT) is the common area which can prone for various infections such as tonsillitis, pharyngitis, nasopharyngitis, otitis media and sinusitis; this can be a threat to all age group [1]. In low-income and middle-income countries, respiratory tract infection (RTI) is considered to be one of the major public health problems [2]. Microbial pathogens such as bacteria, virus, fungi as well as parasites can cause Upper respiratory tract infections (URTIs).

Usually during the vial URTIs recovery occurs [3] but usually the problem comes with bacterial URT infections only. The common bacterial pathogens that can cause URTIs are *Haemophilus influenzae* type b, *Streptococcus pneumoniae*, *Streptococcus pyogenes*, *Corynebacterium diphtheriae*.

Some of these are floral members also hence the carrier state is a commonest issue among those individuals [4].

The URTIs may be mild but can lead to mortality and morbidity also [5]. Indiscriminate usage of the antimicrobials is the burning issue which can be a contributor factor for increased mortality [6]. The excessive antibiotics usage not only leads to drug resistance, but also unnecessary expenditure, side effects and so on. With these a study was conducted to find the various bacteria responsible for URTIs and also their antimicrobial pattern.

Materials and Methods:

Settings: Study was conducted in the Department of Microbiology, GSL Medical College.

Duration of study: Study was conducted for 6 months, February 2023 to July 2023.

Sampling method: Random sampling was considered in this study.

Inclusion criteria: Individuals clinically diagnosed with URTIs, aged >18 years, who submitted informed consent were included in the study.

Exclusion criteria: Individuals aged <18 years, who didn't submitted informed consent and those without URTS were excluded in the study.

Sample size: All the individuals who satisfy the inclusion criteria during the study period were included in the study.

Ethical approval: Study protocol was approved by the institutional ethical committee.

Throat swab was collected from the study participants from posterior pharyngeal wall and also from the tonsils. Swabs were transferred immediately to the microbiology laboratory for the later process. Samples were inoculated immediately on sheep blood agar, chocolate agar and MacConkey agar. The inoculated plates were incubated at 37°C overnight under 5% – 10% carbon dioxide atmospheres.

The plates were observed up to 48 hours. If no growth was noted even after 48 hours of incubation, the culture was declared negative. If there was any growth, initially the colonies were identified based on colony morphology and cultural characteristics then processed for Gram staining and also a battery of biochemical tests as per the protocol [mobile article] for the identification. Simultaneously antibiotic sensitivity testing was done on Kibry bauer disc diffusion method [7].

Results:

During the study period, total 133 samples were collected. In this, 49% (63) were male and 51% (70) were female and the male female ratio was .9. Gender wise, 31%, 45% were culture positive (CP), and 16.5%, 26.5% were culture negative (CN), in male, female, respectively; statistically there was no significant difference (Table 1).

In this report age of the participants was ranged between 8 to 72 years. Age wise, 9% (12) patients were included in <18 years age group, 11% (15) in 19 – 28 years group, 21% (28) in 39 – 48 years group, 16% (21) in 49 – 58 years group, 12% (16) in 59 – 68 years group and 13% (17) in ≥ 69 years age group (Table 2). Age wise, CP results were 4.5%, 6%, 16.5%, 14%, 12%, 6% and 5.3% respectively in <18 years, 19 – 28 years, 39 – 48 years, 49 – 58 years, 59 – 68 years and ≥ 69 years age group. Whereas, the CN results were, 4.5%, 5.3%, 4.5%, 3.75%, 3.75%, 6%, 7.5% in <18 years, 19 – 28 years, 39 – 48 years, 49 – 58 years, 59 – 68 years and ≥ 69 years age group (Table 2).

In this study, total 96 (100%) bacteria were isolated. Isolate wise, 30% (29) were *Stahylococcus aureus*, 12.5% (12) were *Stretococcus pyogenes*, 16% (15) were Escherichia coli, 22% (21) were *Klebsiella pneumoniae* and 20% (19) were *Pseudomonas aeruginosa* (Table 3).All the isolates showed good sensitivity to Ciprofloxacin, aminoglycosides. Sensitivity was poor to penicillins and cephalosporins. No significant resistance was noted to higher antibiotics like imipenem, piperacillin tazobactum, vancomycin and linezolid.

Table 1: Gender wise distribution of the study participants; n (%)

Gender	CP	CN	Total
Male	41 (31)	22 (16.5)	63 (47.5)
Female	45 (34)	35 (26.5)	70 (52.5)
Total	**86 (64)**	**57 (43)**	**133 (100)**

Table 2: Age wise distribution of the study participants; n (%)

Age	CP	CN	Total
<18	6 (4.5)	6 (4.5)	12 (9)
19 – 28	8 (6)	7 (5.3)	15 (11)
29 – 38	22 (16.5)	6 (4.5)	28 (21)
39 – 48	19 (14)	5 (3.75)	24 (18)
49 – 58	16 (12)	5 (3.75)	21 (16)
59 – 68	8 (6)	8 (6)	16 (12)
≥ 69	7 (5.3)	10 (7.5)	17 (13)
Total	**86 (65)**	**57 (43)**	**133** (100)

Table 3: Bacterial isolates among the study participants

Isolate	Number	%
Stahylococcus aureus	29	30
Stretococcus pyogenes	12	12.5
Escherichia coli	15	16
Klebsiella pneumoniae	21	22
Pseudomonas aeruginosa	19	20
Total	**96**	**100**

Discussion

In this report, CP results were 34% (45), 31% (41) respectively among the female and male. In CP cases the male, female ratio was 0.9. In this study, female predominance was identified. In a study by throat 3 et al. out of the 1,110 clinical samples which were screened, 71.1% (789) were CP. In this, the investigators reported that 54.62% (431) were male participants and 45.37% (358) were female participants and the male female ratio was 1.1.

Usually there was a common belief that in countries such as India, males were involved in more outdoor activity. Even in the report by Mizrahi A et al. also, the study was conducted in 2013 [8]. Where this study was conducted in 2019 and both gender is involved in the outdoor activity. So almost similar CP was detected among the gender in this study.

Age wise, CP results were maximum (16.5%) in 29 – 38 years age group followed by 39 – 48 yeas group (14%), 49 – 58 years group (12%). Age wise, 29 – 58 years is the peak time for the outdoor activity as well as for the habituating habits in the form of smoking, alcohol and so on. Hence maximum CP results were detected in 29 – 58 years age group (57; 32.5%). In one study also bacterial URT were reported to be common among youngsters [9]. It was reported that age is an important factor that influence the flora of the URT. If there is any abnormality in this flora, automatically the pathogens start growing cause infections [10, 11, 12]. With this, with age, the URT infections are also should increase. Whereas in this report, due to more outdoor activity, the rate of infections are more in some age groups. The other important issue was, among the children <5 years, URTI were reported to be the important cause of mortality [13].

Bacteria, namely, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* were clinically important as they cause various infections [14, 15, 16]. Isolate wise, in this study, *Staphylococcus aureus* was the predominant pathogen (30%; 29) followed by *Klebsiella pneumoniae* (22%; 21), *Pseudomonas aeruginosa* (20%; 19), *Escherichia coli* (16%; 15) and *Stretococcus pyogenes* (12.5%; 12). In a study by Li ming et al. *Staphylococcus aureus* was reported to be the common pathogen that causes URT infections [1]. *Stretococcus pneumoniae* is the most common cause of URT infections [17]. But in this study we could not report the isolate; this is one of the limitations of the study. Studies reported a high prevalence of this [18, 19].

In the available literature, different antibiotics sensitivity patterns were reported. Due to increase as well as indiscriminate usage of antibiotics, drug resistance is the burning problem in the medicine. But in this report, the isolates were sensitive to the commonly used antimicrobials and no significant drug resistance was identified.

Conclusion: URT infections are common among female, age group 29 – 58 years is commonly prone for the infections. *Staphylococcus aureus* is the predominant pathogen.

Limitations of the study: Small sample size, short duration of the study is the limitations of the study.

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