Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 06, pp.52063-52066, June, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

PREVALENCE OF DIFFERENT BACTERIAL STRAINS AND THEIR ANTIMICROBIAL SUSCEPTIBILITY ISOLATED FROM THE PATIENTS WITH RESPIRATORY TRACT INFECTIONS AT THE TERTIARY CARE HOSPITAL, SBMCH, CHENNAI

***Dr. Binish Gulzar and Dr. Chitralekha Saikumar**

Department of Microbiology, Sree Balaji Medical College and Hospital, Chennai, Tamilnadu, India

ARTICLE INFO

Article History:
Received 23rd March, 2017
Received in revised form
30th April, 2017
Accepted 05th May, 2017
Published online 20th June, 2017

Key words:

Antibiogram,
Pathogens,
Nosocomial Infection,
RTI'S.

ABSTRACT

Aim and Objective: This study is aimed in determining the prevalence of different bacterial isolates and their antibiotic susceptibility pattern from the patients with respiratory tract infections.
Introduction: Respiratory tract infection is one of the most widespread infections that can affect the individuals of all the age Groups and have serious manifestations. There is an emerging antibiotic resistance among the pathogens causing RTI's that leads to therapeutic failures in these patients. So it is important to perform antibiotic susceptibility testing for the isolated organisms and development of appropriate antibiotic policies.
Materials and Methods: A total of 190 samples were collected from the patients at the tertiary care hospital, Chennai for a period of six months.
Result: Out of a total of 190 samples 152 were positive for microbial isolates. The predominant pathogen isolated in my study was *Klebsiella* spp 44 (29%) followed by Streptococcus spp 30 (19.7%), *Pseudomonas* aeruginosa 22 (14.4%), *Enterococcus* spp 14 (9.2%), *Staphylococcus aureus* 10 (6.6%), CONS 8(5.3%), *Acinetobacter* spp 7 (4.6%), Candida species 10 (6.6%), Proteus spp 5 (3.3%) and Escherichia coli 2 (1.3%) respectively.
Conclusion: Clinicians should prescribe the drugs according to the susceptibility pattern after isolating the etiological agent of the infection and this will further decrease the mortality and morbidity due to the disease.

Citation: Dr. Binish Gulzar and Dr. Chitralekha Saikumar, 2017. "Prevalence of different bacterial strains and their antimicrobial susceptibility isolated from the patients with respiratory tract infections at the tertiary care hospital, SBMCH, Chennai", *International Journal of Current Research*, 9, (06), 52063-52066.

INTRODUCTION

Respiratory tract infection is one of the most common infections that occurs worldwide. It is the leading cause of mortality and morbidity globally (BipinPrajapati *et al*., 2011). Respiratory tract infections are usually mild, at times self-limiting and transient. It accounts for more than 50 million deaths annually and is prevalent in both health care and community settings (Zafar *et al*., 2008). It is estimated that in USA, annually around 62 million people suffer from RTI's (National Institute of Allergy And Infectious Diseases, 2010). In Upper RTI's nasal passages, pharynx, larynx, epiglottis and tonsils are involved (Veloo *et al*., 2012). Lower respiratory tract infections involve the bronchi, bronchioles and alveoli of the lungs (Anderson *et al*., 1993). Since Upper respiratory tract is the reservoir of many commensals, infections are more common and frequent then the lower respiratory tract infections. As a result of any imbalance in this community due to multiple number of reasons like disturbance of the complex interaction between the host, environment and the organism can also lead to the RTI's. Various bacterial pathogens that are implicated as the infective agents of RTI's are Streptococcus spp, *Klebsiella pneumonia*, *Pseudomonas* aeruginosa, *Staphylococcus aureus*, *Enterococcus* spp etc. There is an inevitable increase and emerging resistance to various antimicrobials developed by these organisms due to multifactorial causes like inappropriate dosage and judicious use, over the counter availability of antibiotics, nosocomial infections etc. (Mahmoud Aly and Hanan H Balkhy, 2012). The purpose of this study is to assess the prevalence of various pathogens causing RTI's. (Zafar *et al*., 2008) Difference in the prevalence of microbial isolates among males and females and (National Institute of Allergy And Infectious Diseases, 2010) to determine the antibiotic sensitivity of bacteria isolated from the patients at the tertiary care hospital SBMCH, Chennai.

MATERIALS AND METHODS

Study population: In the present study, a total of 190 samples in the form of sputum and throat swab were collected

---

****Corresponding author:*** **Dr. Binish Gulzar**
Department of Microbiology, Sree Balaji Medical College and Hospital, Chennai, Tamilnadu, India.

aseptically from the patients with the clinical evidence of RTI's from both OPD and IPD for a period of 6 months from January 2016 to June 2016 at the tertiary care hospital SBMCH, Chennai.

Specimen collection

The samples were collected aseptically from 190 patients that constitute 160 sputum and 30 throat swabs respectively. Patients were instructed on collection of specimen aseptically. For the collection of sputum sample for microbiology culture and sensitivity the sampling technique involves the first morning sample, after proper mouth rinsing on empty stomach and before brushing the teeth. The sputum samples are collected in the sterile wide mouthed, well labelled containers with screw caps. Throat swabs are collected using sterile cotton swabs from the inner surface of the throat and finally the samples are transported immediately to the laboratory.

Bacteriology

The samples were inoculated on Nutrient agar, Mac-Conkey agar, Blood agar and Chocolate agar plates with a sterile wire loop. The inoculated plates were incubated at 37 ^{O}C 18- 24 hours and observed for the growth of bacterial colonies. The isolated bacteria were identified using morphological, microscopy and the conventional biochemical tests following the standard procedures (Sharma, 2008).

Antimicrobial sensitivity test

The Antimicrobial sensitivity of was done for the pathogenic strains with 10 antibacterial drugs using Kirby –Bauer disk diffusion method (Bauer *et al*., 1966). The commercially available antibiotic discs that were used for the study were Ampicillin (AMP) (10ug), Gentamycin (GEN) (10ug), Amikacin (AK) (30ug), Amoxicillin (AMX) (10ug), Ceftriaxone (CTX) (30ug), Ciprofloxacin (CIP) (05ug), Ofloxacin (OF) (5ug), Erythromycin (ER) (15ug), Cefotaxime (30ug), Cefuroxime (30ug), Clindamycin (CL)(10µg) and Cotrimoxazole (COT)(1.25+23.75µg) respectively. A lawn culture was done on MHA plates according to the0.5 McFarland's standards and inoculated plates are incubated at 37^{o} C for 18- 24 hrs. The antibiotic sensitivity was indicated by the inhibition zone sizes and the organisms were interpreted as sensitive and resistant by measuring the zones according to the CLSI guidelines.

RESULTS

Among 190 specimen that were screened for different pathogens of RTI's 38 showed normal flora in culture and the other 152 samples that were positive for microbial isolates were analyzed. This consists of 160 (84.2%) from sputum and 30 (15.8%) from throat swab (Table 1). According to my study respiratory tract infections are more prevalent in male than females (Table 2).

Table 1. Specimen for identification of respiratory pathogens

S.No.	Sample	No. of samples	Growth observed in percentage %
1	Sputum	160	122 (76.2%)
2	Throat swab	30	30 (100%)
	Total	190	152 (80%)

Table 2. Distribution of RTI among male and female at the TCH

S.No.	Sex	Number	%
1	Male	108	56.8%
2	Female	82	43.1%

Organisms isolated in my study were *Klebsiella* spp 44 (29%), Streptococcus spp 30 (19.7%), *Pseudomonas* aeruginosa 22 (14.4%), *Enterococcus* spp 14 (9.2%), *Staphylococcus aureus* 10 (6.6%), CONS 8(5.3%), *Acinetobacter* spp 7 (4.6%), Candida species 10 (6.6%), Proteus spp 5 (3.3%) and Escherichia coli 2 (1.3%) respectively (Table 3, Figure 2). And antibiotic susceptibility pattern shows Klebsiella and *Pseudomonas* are sensitive to most of tested antibiotics and Coagulase negative *Staphylococcus aureus*, *Acinetobacter* sp, Escherichia coli and *Enterococcus* sp showing resistance to most of the antibiotics. This shows that due to irrational and inappropriate use of the antibiotics has resulted in emerging resistance among these micro-organisms (Table 5, Figure 3).

Table 3. Organisms isolated from sputum and throat swab of patients with RTI's

S.No.	Causative organisms	Number	Percentage %
1	*Klebsiella* species	44	29%
2	Streptococcus species	30	19.7%
3	*Pseudomonas* aeruginosa	22	14.4%
4	*Enterococcus* species	14	9.2%
5	Staphylococcus species	10	6.6%
6	Coagulase negative staphylococcus	8	5.3%
7	*Acinetobacter* spp	7	4.6%
8	Candida spp	10	6.6%
9	Proteus spp	5	3.3%
10	Escheriichia coli	2	1.3%

Table 4. Percentage of GPC, GNB and Candida

S.NO	ORGANISM	% OF PATHOGEN
1	GRAM POSITIVE COCCI	40.8%
2	GRAM NEGATIVE BACILLI	52.7%
3	CANDIDA SPECIES	6.5%

Out of 152 positive cultured samples GPC constitutes 40.8%, GNB 52.7% and Candida spp 6.5% of the total isolates (Table 4).

So, RTI's is more common between 30 to 49years of age that is 39.4% of the reported cases in the study (Figure 2).

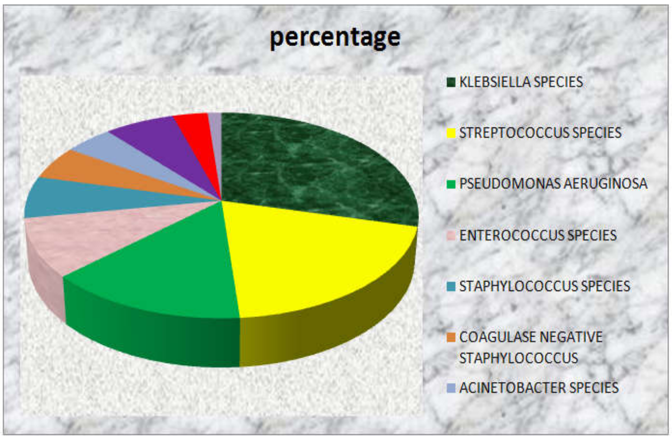

Figure 1. Percentage distribution of different pathogens causing RTI's

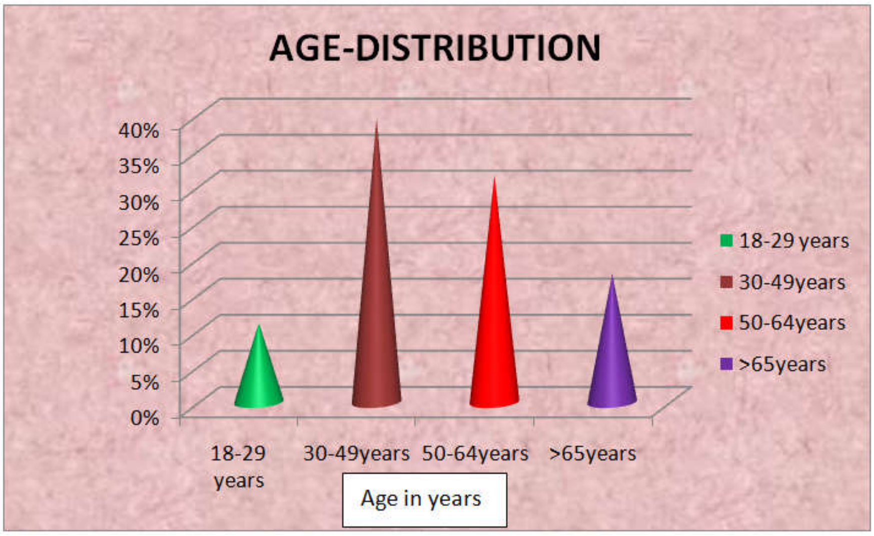

Figure 2. Age distribution of prevalence of RTI's

Table 5. Susceptibility of the isolates to commonly used antibiotics

S.No.	Antibiotics	*klebsiella* spp N=44	Streptococcus spp N=30	*Pseudomonas* aeruginosa n =22	*Enterococcus* spp N=14	*Staphylococcus aureus* N=10	Cons N=8	*Acinetobacter* spp N=7	Proteus spp N=5	*E.coli* n=2
1	Amikacin	97.7%	96.6%	90.9%	78.5%	90%	62.5%	57%	60%	50%
2	Ampicillin	72.7%	96.6%	81%	92.8%	30%	60%	42.8%	40%	50%
3	Amoxicillin	75%	86%	86.3%	71.4%	70%	62.5%	14.2%	60%	50%
4	Ceftriaxone	86.3%	80%	81.8%	64.2%	80%	62.2%	42.8%	80%	100%
5	Ciprofloxacin	81%	96.6%	90.9%	71.4%	40%	87.5%	42%	60%	50%
6	Erythromycin	81.8%	83.3%	90.9%	85.7%	60%	87.5%	28.5%	80%	0%
7	Cefotaxime	70.4%	73.5%	68.1%	ND	70%	62.5%	57.1%	40%	100%
8	Cefuroxime	59%	66.6%	72.7%	ND	40%	75%	28%	40%	100%
9	Ofloxacin	68.1%	83.3%	63.6%	64.2%	90%	62.5%	57.1%	60%	0%
10	Gentamicin	90.9%	93.3%	90.9%	78.5%	70%	87.5%	25%	80%	50%
11	Clindamycin	77.2%	86.6%	77.2%	50%	80%	37.5%	42.8%	60%	50%
12	Cotrimoxazole	79.5%	80%	86%	42%	60%	62.5%	71.4%	80%	50%
13	Azithromycin	79.5%	90%	90%	92.8%	80%	75%	71%	80%	100%

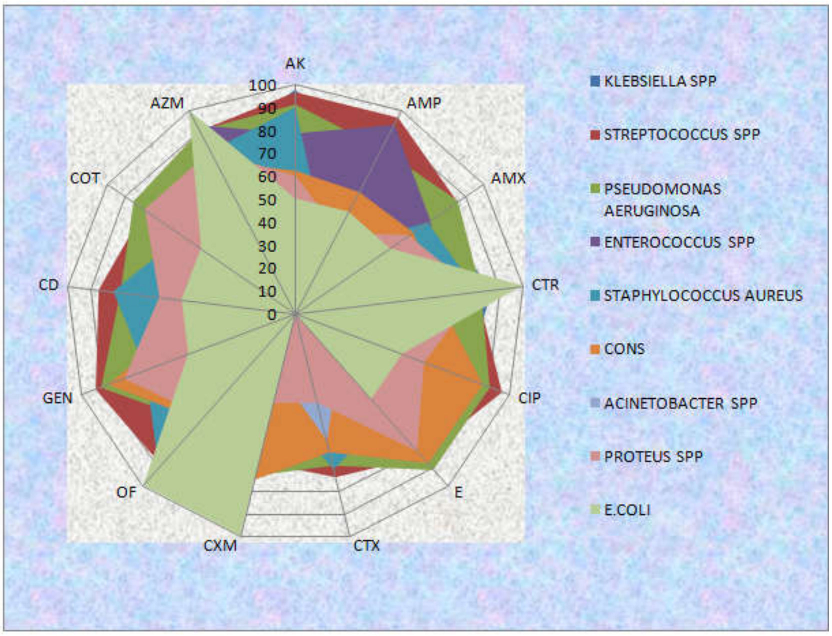

Figure 3. Antibiotic sensitivity pattern of the isolated organisms at the TCH

DISCUSSION

Out of total of 190 patients with RTI's the most common pathogen responsible is *Klebsiella* species followed by Streptococcus species, *Pseudomonas* spp, *Enterococcus* spp, *Staphylococcus aureus*, CONS, *Acinetobacter* spp, Candida spp, Proteus spp and *E.coli* respectively. According to my study gram negative bacteria are more prevalent pathogens responsible for causing RTI's then Gram positive bacteria. But among Gram negative bacteria, *Klebsiella* spp is the commonest and among Gram positive bacteria Streptococci spp is the predominant pathogen. The abundant occurrence of Gram negative bacteria may be due to certain factors like previous antibiotic therapy, prolonged hospitalization and past infections (WHO, 2012). There is an ultimate need for the antibiotics for empirical treatment that should be based on the isolated pathogens and their susceptibility as the early initiation of the appropriate treatment is important in reducing the mortality and morbidity in the patients with RTI's.

Conclusion

The study has shown that RTI's are more prevalent among the patients that are between 30-49 years. Most of the isolated pathogens showed resistance to many antimicrobials and this may be due to drug abuse, indiscriminate use of drugs, mutation of micro-organisms, nosocomial infections etc. So, it is recommended that proper antibiotic susceptibility testing will help in local prescribing policy that further will prevent the therapeutic failures and further decrease the morbidity and mortality in patients with RTI's.

Acknowledgement

I am grateful to the Department of Microbiology and Central Laboratory of SBMCH which have been supportive in all the possible ways for this study.

REFERENCES

Anderson, H., Esmail, A., Hollowell, J., Littlejohns, P., and Strachen D. 1993. Epidemiologically based needs assessment: lower respiratory disease. DHA Project Research Prograrnme; pp 6-12.

Bauer, AW., Kirby, WMM., Sherris, JC. and Turck, M. 1966. Antibiotic susceptibility testing by a standardized single disk method. *Am. J. Clin. Pathol*., 45: 493-496.

BipinPrajapati., NitibenTalsania., Sonaliya, K. N. 2011. A study on prevalence of acute respiratory Tract infections (ARI) in under five children in Urban and rural communities of Ahmedabad District, Gujarat, *Nat. J. Com. Med*., 2(2): 255-259.

Mahmoud Aly and Hanan H Balkhy. 2012. The prevalence of antimicrobial resistance in clinical isolates from Gulf Corporation Council countries. *Antimicrobial Resistance and Infection Control*, 1:26 doi: 10.1186/2047-2994-1-26

National Institute of Allergy and Infectious Diseases. Common cold (overview). Bethesda, USA: National Institute of Allergy And Infectious Diseases. 2010 (online).

Sharma, K. 2008. Manual of Microbiology: Tools and Techniques, (2nd Ed.) Ann Books Gopaljee Enterprises, Dehi, India. pp. 163- 165; 181-7.

Veloo, AC., Seme, K., Raangs, E., Rurenga, P., Singadji, Z., Wekema-Mulder, G., and van Winkelhoff, AJ. 2012. Antibiotic susceptibility profiles of oral pathogens. *Int J Antimicrob Agents*, Nov; 40(5):450-4.

WHO, 2012. Antimicrobial resistance: no action today, no cure tomorrow, World Health Day - 7 April.

Zafar, A., Hussain, Z., Lomama, E., Sibiie, S., Irfan, S., Khan, E. 2008. Antibiotic susceptibility of pathogens isolated from patients with community-acquired respiratory tract infections in Pakistan- the active study. *J. Ayub Med. Coll. Abbottabad*., 20(1): 7-9.

****