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Research Article

ANALYSIS OF PRESCRIPTION PATTERN OF ANTIBIOTICS AND RISK FACTORS IN PATIENTS WITH RESPIRATORY TRACT INFECTIONS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Antibiotic utilization review can be used to compare the observed prescribed drug use for the treatment of a certain disease with current recommendations or guidelines, deviation from standard guidelines. To study the Prescribing Patterns of antibiotics, and risk factors in Respiratory tract infections.It was single centered, observational study conducted by random selection of patients. Based on diagnosis, the study population was categorized into 8 groups: asthma COPD, Pneumonia, Tuberculosis sinusitis, pharyngitis, tonsillitis and other disease conditions. The study population was interviewed after obtaining verbal informed consent for information on the risk factors, and other pertinent information like demographics, diagnosis, treatment and drug utilized. Of the total 120 patients included in the study, 55% were male and 45% were female. Total no. of antibiotics prescribed during the study period was 174. Most commonly prescribed drug was name ceftriaxone (class: cephalosporin)**.** The study revealed that the prescribing pattern was partially in accordance with referred literature. Most commonly prescribed antibiotic was ceftriaxone (cephalosporin's), the average percentage of antibiotics utilization was found to be highest in pneumonia. The highest risk factor among all the individuals was tobacco use (18.18%). The highest risk factor in males was tobacco use (28.7%) .The highest risk factor in females was Diabetes mellitus (23.86%).

Keywords: Pharyngitis, Tonsillitis, Diabetes mellitus.

INTRODUCTION

Respiratory tract infections are any infection of the respiratory tract.Based on the origin it is divided into two types. They are

- Upper respiratory tract infection.
- Lower respiratory tract infection.

Upper respiratory tract infection (URTI)

URTI is an infectious process of any of the components of upper airway. Infection of the Infection of the specific areas of the URT can be named specifically. Examples includes

- Rhinitis (infection of nasal cavity).
- Sinusitis (infection of sinuses located around the nose).
- Nasopharyngitis (common cold, infection of nares, pharynx, uvula and tonsils).
- Pharyngitis (inflammation of pharynx, uvula and tonsils.
- Epiglottitis (inflammation of upper portion of larynx and epiglottis.

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- Laryngitis (inflammation of larynx) [1].

Lower respiratory tract infection (LRTI)

LRTI is an acute infection of the trachea (windpipe), airways and lungs, which make up the lower respiratory system. LTRIs include

- Bronchitis.
- Bronchiolitis.
- croup (Laryngotracheobronchitis) and
- Pneumonia [2].

Tetracycline and amoxicillin are first-choice antibiotics. In case of hypersensitivity, newer macrolides, such as azithromycin, roxithromycin or clarithromycin, are good alternatives in countries with low pneumococcal macrolide resistance. National/local resistance rates should be considered when choosing a particular antibiotic. When there are clinically relevant bacterial resistance rates against all first-choice agents, treatment with levofloxacin or moxifloxacin may be considered LRTI

Clinical effects of the antibiotic treatment should be expected within 3 days and patients should be instructed to contact their doctor if this effect is not noticeable. Seriously ill patients, i.e. having at least two of the following symptoms/characteristics, should already be seen 2 days after the first visit: high fever; tachypnea; dyspnea; relevant comorbidity; aged .65 yrs. All patients or persons within their environment should be advised to contact their doctor again if: fever exceeds 4 days; dyspnea gets worse; patients stop drinking; or consciousness decreases [3].

The guidance of empiric initial antimicrobial treatment should follow: 1) general patterns of expected pathogens according to pneumonia severity and additional risk factors; 2) regional and local patterns of microbial resistance; 3) considerations of tolerability and toxicity of antimicrobial agents in the individual patient.

In patients with severe exacerbations of COPD (Group C patients), those who may have difficult-to-treat microorganisms (P. aeruginosa) or potential resistances to antibiotics (prior antibiotic or oral steroid treatment, prolonged course of the disease, more than four exacerbations per year and FEV1 ,30%), sputum cultures or endotracheal aspirates (in mechanically ventilated patients) are recommended [4].

The more frequently isolated microorganisms in Group A are H. influenza followed by S. pneumoniaeand M. catarrhalis. Amoxicillin, ampicillin or tetracycline are antibiotics that can be used, but in countries with high levels of antibiotic resistances of S. pneumoniaethis may be a concern. In addition, 20–30% of strains of H. influenzaeare b-lactamase producers and are resistant to penicillin. A retrospective study on COPD exacerbations found that amoxicillin was associated with a higher rate of relapse.

Amoxicillin-clavulanate is active against S. pneumoniaeand H. influenzae. However, this antibiotic has to be used in high dosages (875 and 125 mg amoxicillin and clavulanate, respectively) in order to obtain high concentrations in serum and in bronchial secretions above the MIC of the majority of the strains resistant to penicillin [5]. The new formulation of 2,000 and 125 bid (amoxicillin and clavulanate, respectively) may be useful for this purpose. Resistances of S. pneumoniaeto macrolides can be as high as 30–50% in some European countries (e.g. France, Spain); therefore, they are not generally recommended. In addition, most of the strains of H. influenzaeare resistant to clarithromycin. However, most of the trials in this group of patients have shown a good effectiveness of macrolides compared with other antibiotics, which could be related to their anti-inflammatory effect. Telithromycin is a ketolide derived from macrolides that: 1) presents a low rate of resistance. 2) is effective against S. pneumoniaeresistant to penicillin and macrolides; 3) shows excellent antimicrobial activity against atypical; and 4) is more effective than azithromycin against H. influenzae. It presents low side-effects, good penetration and excellent pharmacokinetic properties. It is also a potential antibiotic to be considered. However, the clinical experience is still limited; therefore, it is not recommended[6].

In Group B, in addition to amoxicillin-clavulanate, the new quinolones have to be considered. Levofloxacin and moxifloxacin are active against most of the strains of S. pneumoniaeand H. influenzaeand achieve high concentrations in bronchial secretions several times higher than the required MIC to treat these microorganisms. In addition, they are active against Gram negative bacilli other than P. aeruginosa. These characteristics make these antibiotics very convenient to treat the exacerbations in this group of COPD patients. The oral route is preferred, but in some situations the parenteral route has to be used. In this case, the same antibiotics recommended above can be given parenterally. The administration of a single dosage every 24 h in the case of moxifloxacin is a potential advantage [7].

Bronchiectasis is a structural derangement of the bronchial wall that is characterized by airway dilatation and bronchial wall thickening. As a result of this abnormality, chronic inflammation and airway colonization are characteristic findings. The etiology of bronchiectasis is unknown in 50% of cases [8].

In patients with Tuberculosis, when DOT is used, drugs may be given 5 days per week and the necessary number of doses adjusted accordingly. Although there are no studies that compare 5 with 7 daily doses, extensive experience indicates this would be an effective practice. DOT should be used when drugs are administered <7 days per week Based on expert opinion, patients with cavitation on initial chest radiograph and positive cultures at Completion of 2 months of therapy

should receive a 7-month (31-week) continuation phase.(vitamin B6), 25–50 mg/day, is given with INH to all persons at risk of neuropathy (example pregnant women; breastfeeding infants; persons with HIV; patients with diabetes, alcoholism, malnutrition, or chronic renal failure; or patients with advanced age). For patients with peripheral neuropathy, experts recommend increasing pyridoxine dose to 100 mg/day.

Alternatively, some US tuberculosis control programs have administered intensive-phase regimens 5 days per week for 15 doses (3 weeks), then twice weekly for 12 doses [9].

OBJECTIVES
• To study the Prescribing patterns of drugs used in Respiratory tract infections.
• To study the prevalence of Risk factors associated with the use of Drugs in Respiratory tract infections.

METHODS AND METHODOLOGY

Inclusion Criteria Includes
• Patients in R.I.C.U
• Patients in Medicine department suffering from Respiratory tract infections.
• Patients who are willing to give informed consent for the study.
• Patients of age above 18 years are included.
• Patients of both genders.

Exclusion criteria
• Pregnant and lactating women are excluded from the study.
• Pediatrics patients are excluded

RESULTS
Patient Population Demographics

Table 1. Distribution of patients based on Gender

Gender	Patients	Percentage
Male	66	55
Female	54	45
Total	**120**	**100**

Table 2. Distribution of patients based on Age groups and Gender

Gender	Age Group						
	19-30	31-40	41-50	51-60	61-70	71-80	81-90
Male	9	5	14	13	21	4	0
Female	19	4	11	4	11	5	1

Table 3. Distribution of patients based on Diseases

Disease	Male	Female	Percentage (%)
Asthma	**7**	**13**	**16.6**
Copd	**19**	**3**	**18.3**
Pneumonia	**19**	**10**	**24.1**
Tuberculosis	**9**	**6**	**12.5**
Tonsilitis	**2**	**4**	**5**
Sinusitis	**4**	**10**	**11.6**
Pharyngitis	**1**	**0**	**0.8**
Others	**3**	**10**	**10.8**

Table 4. Distribution of patients based on smoking habits

Gender	Smokers	Non-Smokers
Females	**4**	**50**
Males	**47**	**19**

Table 5. Distribution of underlying co-morbidities in patients

Co-morbid conditions	No. of male patients	No. Of female patients
Diabetes mellitus	7	7
Hypertension	5	8
Anemia	9	0
Hypothyroidism	0	0

DM + HTN	6	7
DM + HTN + Hypothyroidism	0	2
DM + Anemia + Hypothyroidism	0	2
HTN + Anemia	0	1
HTN + Hypothyroidism	0	24
NONE	39	3

PRESCRIBING PATTERNS
Table 6. Average antibiotic utilization in patients

Disease	No. of patients (%)	No. of antibiotics prescribed (%)	Average no. of antibiotics prescribed (%)
Tonsillitis	5.0	5.75	1.15
Pharyngitis	0.83	1.14	0.3
Sinusitis	11.66	9.7	1.2
Asthma	16.66	13.79	1.20
COPD	18.33	17.81	1.02
Pneumonia	24.16	21.83	1.10
Tuberculosis	12.5	13.21	0.94
Others	10.83	16.6	0.65

Interpretation: The percentage of average number of antibiotics prescribed in total population was found to be highest in asthma and sinusitis

Table 7. Percentage utilization of Antibiotics in different diseases

Disease	Antibiotic usage (%)
Pharyngitis	1.14
Sinusitis	9.77
Tonsillitis	5.74
T. B	12.6
Pneumonia	22.4
COPD	18.3
Asthma	13.2
Others	16.0
Total	100

Interpretation: The percentage utilization of antibiotics was highest in pneumonia.
Table 8. Antibiotic utilization in different respiratory tract infections

Antibiotics	Diseases								Total	% of total no of antibiotics
	Pharyngitis	A.S	Tonsillitis	T.B	Pneumonia	COPD	Asthma	Others		
Penicillins										
Ampicillin	0	3	0	0	4	2	1	0	10	5.7%
Piperacillin	0	0	0	0	0	0	0	3	3	1.72%
Amoxicillin	1	1	4	0	1	1	6	1	15	8.6%
Clavulanic acid	0	1	0	3	4	4	1	3	16	9.19%
Amoxicillin +clavulanic acid	0	1	0	5	4	7	9	1	27	15.5%
Piperacillin + tazobactam	0	0	0	0	0	0	0	0	0	0%
Cephalosporins										
Cefotaxime	0	0	1	0	1	0	0	1	3	1.72%
Cefixime	0	3	0	2	0	0	2	2	9	5.17%
Ceftriaxone	0	3	2	8	17	8	4	5	47	27.01%
Cefor	0	0	2	0	0	0	0	0	2	1.14%

									Total	Percentage
Fluoroquinolones										
Levofloxacin	0	0	0	0	0	2	0	3	5	2.87%
Ciprofloxacin	0	1	1	0	0	0	0	0	2	1.14%
Doxyfloxacin	0	0	0	0	0	1	0	0	1	
Moxifloxacin	0	1	0	1	0	0	0	0	2	1.14%
Macrolides										
Azithromycin	0	1	0	3	5	3	0	6	18	10.34%
Anti-Tubercular										
Rifampicin	0	0	0	0	1	1	0	1	3	1.72%
Aminoglycosides										
Amikacin	1	2	0	1	1	2	0	2	9	5.17%
Cephalosporin +Penicillin										
Cefoperazone + Sulbactam	0	0	0	0	0	0	1	1	2	1.14%
Total	**2**	**17**	**10**	**23**	**38**	**31**	**24**	**29**	**174**	

Interpretation: ceftriaxone (27%) is the highest antibiotic utilized in different respiratory tract infections

Table 9. Total risk factors among all the RTI patients

| Risk factors	Males	Percentage of risk factors in males	Females	Percentage of risk factors in males	Total risk factors	Percentage of risk factors
HTN	16	12.0	18	20.45	34	15.45
DM	16	12.0	21	23.86	37	16.8
Blood lipids	8	6.0	4	4.5	12	5.4
Obesity	3	2.27	4	4.5	7	3.1
Impaired pulmonary function	15	11.3	11	12.5	26	11.8
Unhealthy diet	9	6.8	6	6.81	15	6.8
Tobacco use	38	28.7	2	2.27	40	18.18
Air pollution & Allergens	19	14.3	16	18.18	35	15.9
Age & Hereditary	4	3.03	6	6.81	10	4.5
Occupational agents	4	3.03	0	0	4	1.8

Fig 1. Distribution of patients based on Sex
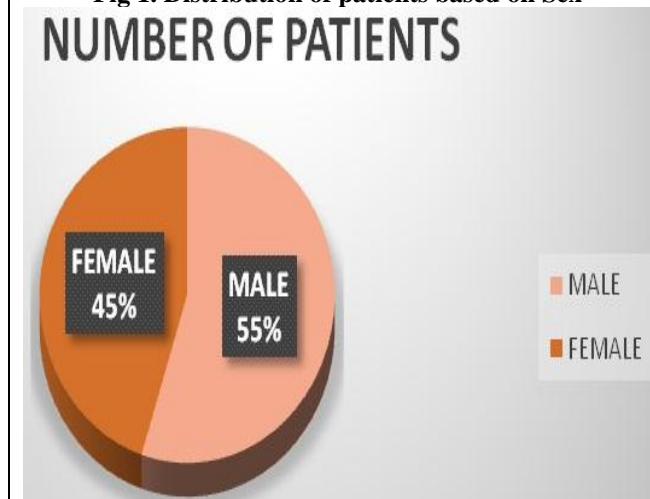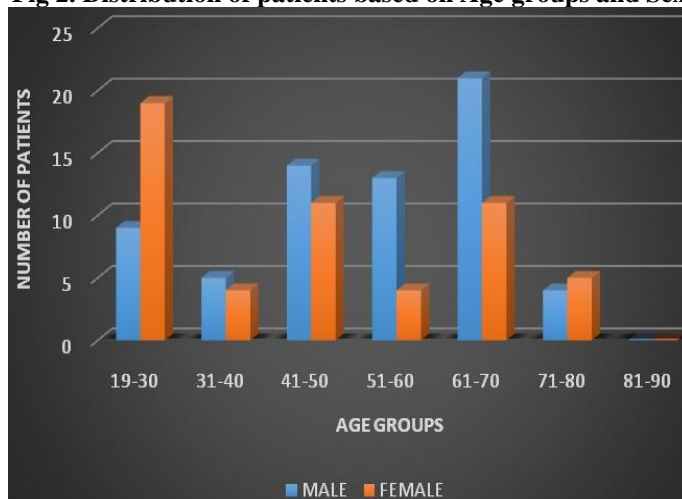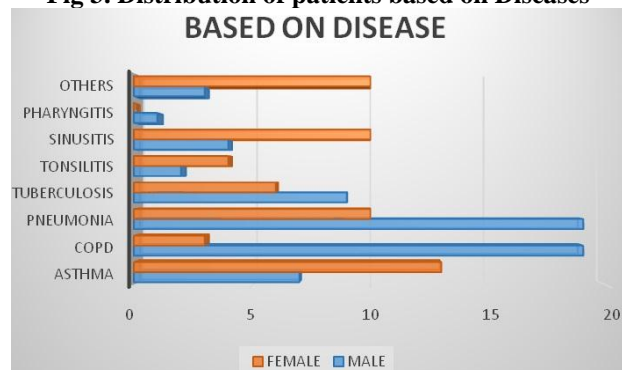

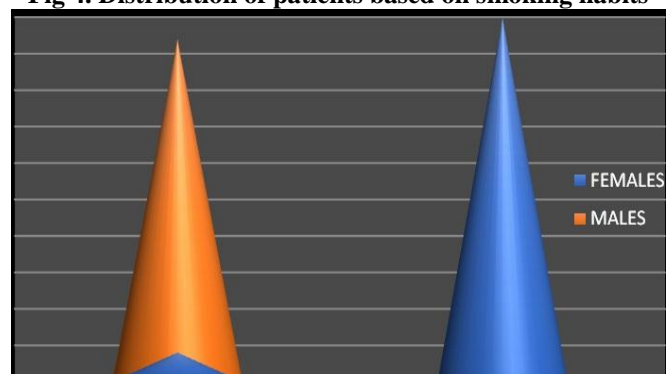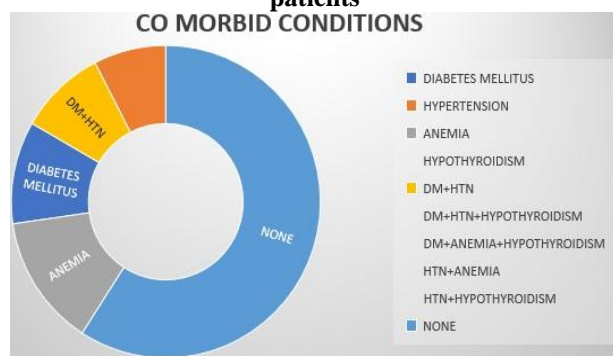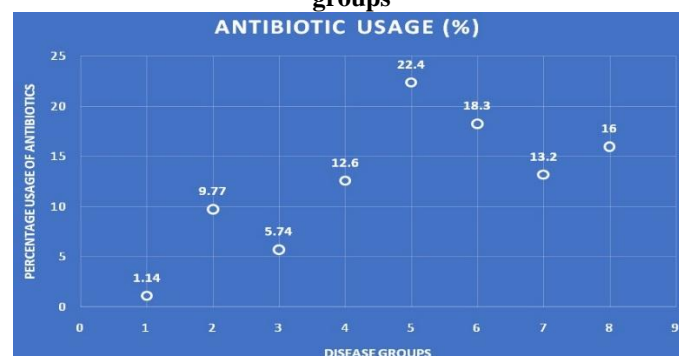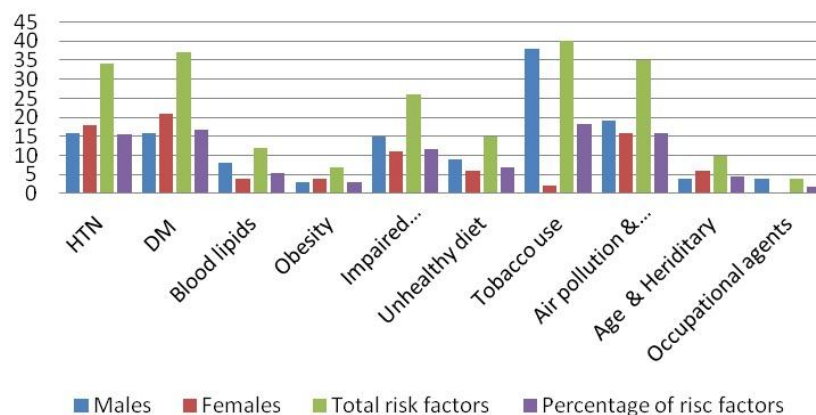Fig 2. Distribution of patients based on Age groups and Sex

Fig 3. Distribution of patients based on Diseases

Fig 4. Distribution of patients based on smoking habits

Fig 5. Distribution of underlying co-morbidities in patients

Fig 6. Percentage usage of antibiotics in different disease groups

Fig 7. Total risk factors among all the RTI patients

Interpretation: Tobacco use (18.18) was found to be the highest risk factor in patients with RTI

CONCLUSION

In the present study it was observed that 6 different classes of antibiotics - macrolides, penicillin's, cephalosporin's, aminoglycosides, fluoroquinolones, tetracyclines were prescribed for different respiratory diseases which was almost similar to other studies[10]. In any country, a large number of socio-cultural factors contribute to the ways drugs are prescribed. Our study was on the prescribing patterns of antibiotics & Risk Factors in patients suffering from respiratory tract infections. In our study population, it was observed that male patient (55%) were slightly higher than female patients (45%). Total number of antibiotics prescribed during the study period was 174 1. These finding were in partial accordance with the literature. Most commonly prescribed antibiotic was ceftriaxone (cephalosporins).

The percentage of average antibiotic utilization was highest in pneumonia (22. 4%).The highest utilized antibiotic was ceftriaxone with 27.01%%. The highest antibiotic utilized in males with LRTI was ceftriaxone 31.6 % and URTI was ampicillin (25%) and amikacin

(25%.) The highest drug utilized in females with LRTI was ceftriaxone 23.8 % and URTI was amoxicillin 26.6%.

Risk factors was studied and analyzed in all the subjects [11]. The highest risk factor in females with LRTI was found to be diabetes mellitus (26.3%) and URTI was found to be air pollution (46.6%) and allergens[12]. Similarly the highest risk factor in males with LRTI was found to be tobacco use(26.9%) and URTI was found to be tobacco use and air pollution and allergens (26.6%&26.6%) [13].

ACKNOWLEDGEMENT
Nil

CONFLICT OF INTEREST
No interest

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