



ASSESSMENT ON PRESCRIBING PATTERNS OF DRUG USAGE AND DRUG INTERACTIONS IN RESPIRATORY DISEASES

Ujwal Mashetty, Syed Raziuddin Quadri, Narender Boggula, Vasudha Bakshi and
Mounika Tejaswi Gorle*

*Department of Pharmacy Practice, School of Pharmacy, Anurag Group of Institutions, Venkatapur, Ghatkesar,
Telangana, India.

*Corresponding Author Email: mounikancharla91@gmail.com

ABSTRACT

Back ground: Respiratory tract infections are major pathological infections, affecting the organs and tissues. Keeping this consideration, the present study was undertaken to analyse the drug utilization pattern of respiratory tract infections. **Objectives:** To determine the prescribing patterns of drug use, and to know the most effective route of administration and for detection of drug interaction. **Methods:** A prospective observational study was conducted on respiratory diseases in both Inpatient and outpatient department of Yashoda Hospital, Secunderabad for a period of six months. The data collection was designed and samples were collected. **Results:** A total 150 subjects were collected and analysed. Inpatients were 47 (31.33%), outpatients were 103 (68.66%). Most frequently occurred disease were Cough in males 14 (9.33%), females were 20 (13.33%), and least common disease were found to be Pneumonia females were 3 (2%). Foremost drug prescribed was ceftriaxone 77 (51.3%), modest prescribed drugs were esomeprazole 24 (16%) and Atorvastatin 24 (16%). Chief category of drug prescribed Corticosteroids 64 (42.7%), moderate were anti-histamines 41 (27.33%) and negligible were phosphodiesterase inhibitors 1 (0.7%). Drug interactions in our analysis major 4 (3.8%), moderate 5 (49.29%), minor 7 (27.9%). Most effective route of drug administration in our study was found to be per oral (PO). **Conclusion:** Prescribing pattern of various drugs was observed and antibiotics were mostly prescribed. Safest route of drug administration was per oral. More number of drug interactions was found, rational use of drugs is very important to give the quality of treatment.

KEY WORDS

Respiratory tract infections, antibiotics, anti-histamines, pulmonary Koch's, chronic obstructive disease, reactive airway disease.

INTRODUCTION

Respiratory tract infections are a major reason seek for a medical care. These pathological infections are affecting the organs and tissues that make the gas exchange possible in higher organisms, and include conditions of the upper respiratory track, trachea, bronchi, bronchioles, alveoli, pleura and pleural cavity¹. Respiratory diseases range from mild and self-limiting such as common cold to life threatening conditions and

are more common in cold weather climates. "A Respiratory Tract Infection (RTI) is defined as any infectious disease of the upper and lower respiratory tract." Infectious diseases remain a significant threat to public health, posing risks to individuals regardless of age, sex, ethnic background, socioeconomic status, or lifestyle, and 10-15% is due to acute lower respiratory tract infections (ALRTI's)^{2,3}.

Upper Respiratory Tract Infections (URTI)

Upper respiratory tract infections (URTI) are caused by an acute infection which includes nose, sinuses, pharynx or larynx, commonly includes tonsillitis, pharyngitis, laryngitis, otitis media, sinusitis and the common cold are resolve spontaneously. More than 200 viruses can cause URTI's. Common cold does not require antimicrobial agent unless it is complicated by acute otitis media with effusion, tonsillitis, sinusitis and lower respiratory tract infections. Prescribing inappropriate spectrum antibiotic, indication of an antibiotic for little/no sign of bacterial infection prolonged courses for minor infections and overuse of parenteral preparations are the general errors observed in the antibiotic usage, which results in an avoidable adverse effect, increase in health care costs and resistance to antibiotics for the community. Management of URTI'S includes non-pharmacologic therapy which may ameliorate the rhinorrhea and cough^{4,5}.

Lower Respiratory Tract Infections (LRTI)

Symptoms of lower respiratory tract infection is pneumonia, can also applied to other infections include lung abscess and acute bronchitis; symptoms are shortness of breath, weakness, fever, coughing and fatigue. Influenza affects both the upper and lower respiratory tracts.¹¹ Bronchitis and bronchiolitis are inflammatory conditions of the large and small elements, respective to the tracheobronchial tree. The inflammatory process does not extend to the alveoli. Bronchitis frequently is classified as acute or chronic⁶.

Objectives

To identify the drug usage and drug related events in inpatients and outpatient in a multi-speciality hospital.

Specific objectives

- To determine the prescribing patterns of drug use.
- Detection of the drug-reactions.
- To analyse the drugs usage in different diseased conditions in Respiratory diseases.
- To know the most effective route of drug administration.
- Most probably used drugs.

Need for the study

Respiratory diseases are more frequently and are mostly treated with antibiotics and other respiratory drugs. Main aim is to know the prescribing pattern of drugs. Most of the drugs prescribed in the respiratory diseases and frequently used drugs. Many of the

diseases are been and to provide the rational drug use and appropriate treatment. And decrease polypharmacy and to provide accurate drugs. Determine the drug interactions and minimize the effects. For any diseases frequently, antibiotics are being prescribed as it is unnecessary and this may lead to immune resistance. Most of the respiratory diseases are due to allergies or viral infection, for this an appropriate drug therapies need to be given. It is need to follow the rational drug use for the good therapeutic effects ad this leads for patient to recover soon from the disease and to decrease interactions.

MATERIALS AND METHODS

Study site

The study was carried out in the Respiratory Department of Yashoda Hospital, Secunderabad, Telangana, India.

Study design

The study was descriptive, qualitative and prospective observational study.

Study duration

The study was conducted over a period of six months from September 2017 to March 2018.

Study criteria

Both inpatients and outpatients treated in the respiratory department.

Inclusion criteria

- Patient's both male and female are included.
- Above 4 years shall be included.
- Patient's both in inpatient and outpatient included.

Exclusion criteria

- Patient's both male and female below 4 years of age.
- Pregnant, lactating and women.

Source of data

All the relevant and necessary data was collected from.

- Patient case notes.
- Outpatient Department cards.
- Treatment charts.

METHODOLOGY

Development of patient data collection form

Relevant information from the study population was collected by using specially designed data collection form. The data collection forms had provisions for collecting key information like demographics, date of admission/visit to the hospital and date of discharge,

diagnosis, current and relevant past medical conditions, past medication history.

Computerization of data collection forms

The data collection and assessment from designed for use in this study was computerized using Microsoft Access 2016 and Microsoft Excel 2016 for easy storage, accessibility, retrieval and analysis of data.

Patient population

All the prescriptions of outpatients and inpatients who were treated in the respiratory department was reviewed on the daily basis.

Data collection and Documentation

All the relevant and necessary data such as demographic details like age, sex, etc. and medication details like most prescribed drugs, categorization of the drug classes, drug interactions, most effective route of drug administration, disease pattern, and concomitant diseases. All the collected data was documented in a suitably designed data collection form and transferred into a specially designed electronic format of data collection form. Data for only “first encountered prescriptions” were collected for all patients attending the outpatient.

Data analysis

All collected data was subjected to analysis with respect to various parameters such as pattern of use including the details of the diagnosis, medication received, dosage forms, indications and their percentage values were calculated. The drugs received by the patients were classified based on the class, mostly prescribed and dosage forms and the percentage values of each parameter were calculated. All the drug interactions are calculated according to their category and type of interaction found i.e. major, moderate and minor. Disease pattern is also differentiated. Specially prescribing patterns of antibiotics have been calculated and their percentages were calculated.

Ward Distribution

Inpatient

Total 150 samples were collected inpatients were 47 (31.33%). On gender distribution males were 25 (53.2%), and females were 22 (46.8%) The detail of ward distribution of study population is presented in the above Figure 1. outpatients were 103 (68.66%). On gender distribution males were 53 (51.5%), and females were 50 (48.5%) The detail of ward distribution of study population is presented in the Figure 2.

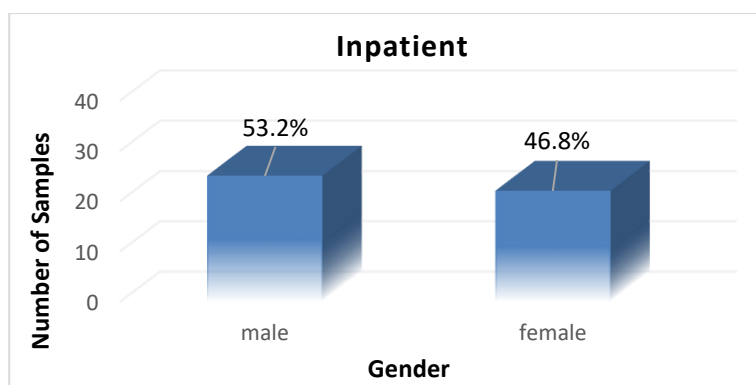


Figure 1: Inpatient

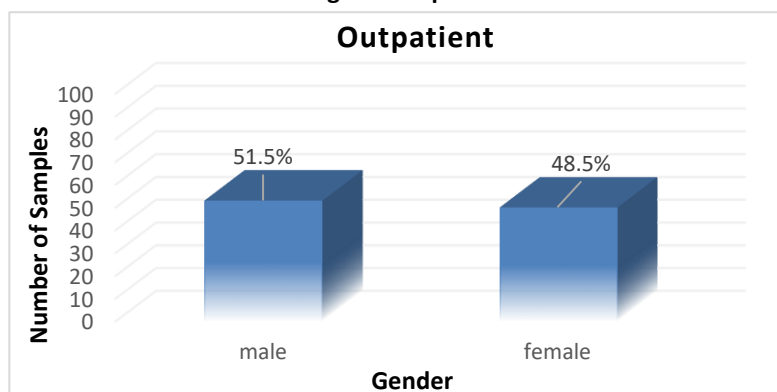


Figure 2: Outpatient

Age wise distribution

Patient data collected was evaluated and characterized under different age group with respect to wards, male and female. The findings in our study of outpatient department of age groups of 3-18 years males were 3 (2.90%), and females were 2 (2%), 41-50 males were 7 (6.80%), females were 12 (11.70%), 51-59 males were 8 (7.80%), females were 10 (9.80%), ≥ 60 males were 18

(17.50%), females were 12 (11.70%). age groups of inpatient 19-30 males were 1 (2.12%), 31-40 females were 4 (8.50%). 41-50 males were 2 (4.30%), females were 2 (4.30%). 51-59 males were 8 (17.02%), females were 5 (10.60%). ≥ 60 males were 14 (29.80%), females were 11 (23.40%). The detail of demographic details of study population is presented in Figure 3.

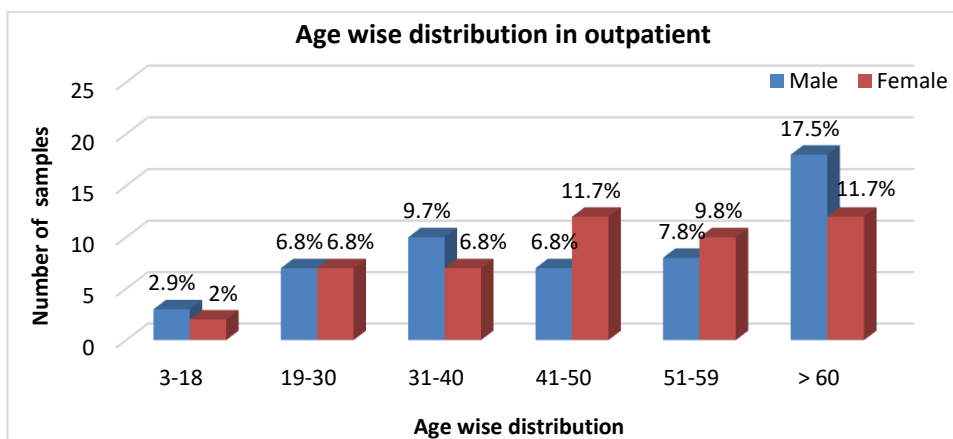


Figure 3: Age wise distribution in outpatient

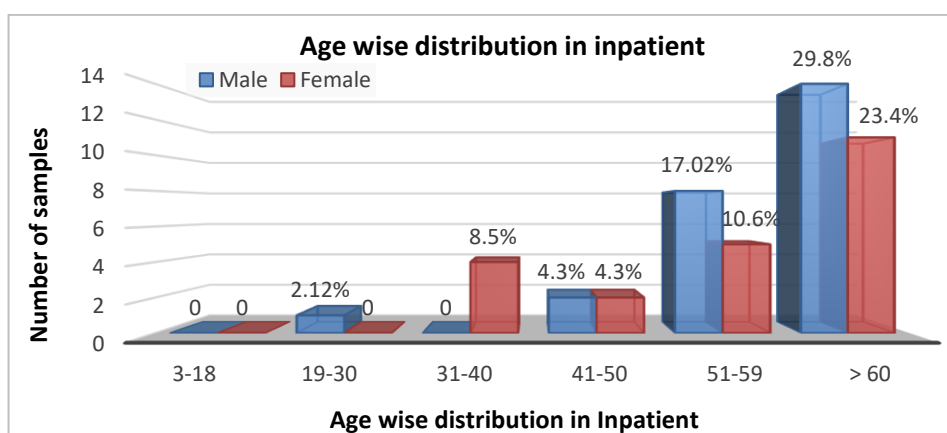


Figure 4: Age wise distribution in inpatient

Diseases pattern

In our study many diseases were studied but most probably were Cough in males 14 (9.33%), females were 20 (13.33%), Reactive Airway Disease (RAWD) males were 12 (8%), females were 6 (14%), Chronic Obstructive Pulmonary Disease (COPD) males were 8 (5.33%), females were 2 (1.33%), Pulmonary Kochs

males were 8 (5.33%), females were 10 (6.70%), Acute Lower Respiratory Tract Infections (LRTI's) male were 6 (4%), females 5 (3.33%), Asthma males were 3 (2%), Pneumonia females were 5 (3.33%), bronchitis males were 2 (1.33%), females were 6 (4%). These are the popularly found. The detail of diseases of study population is presented in the Figure 5.

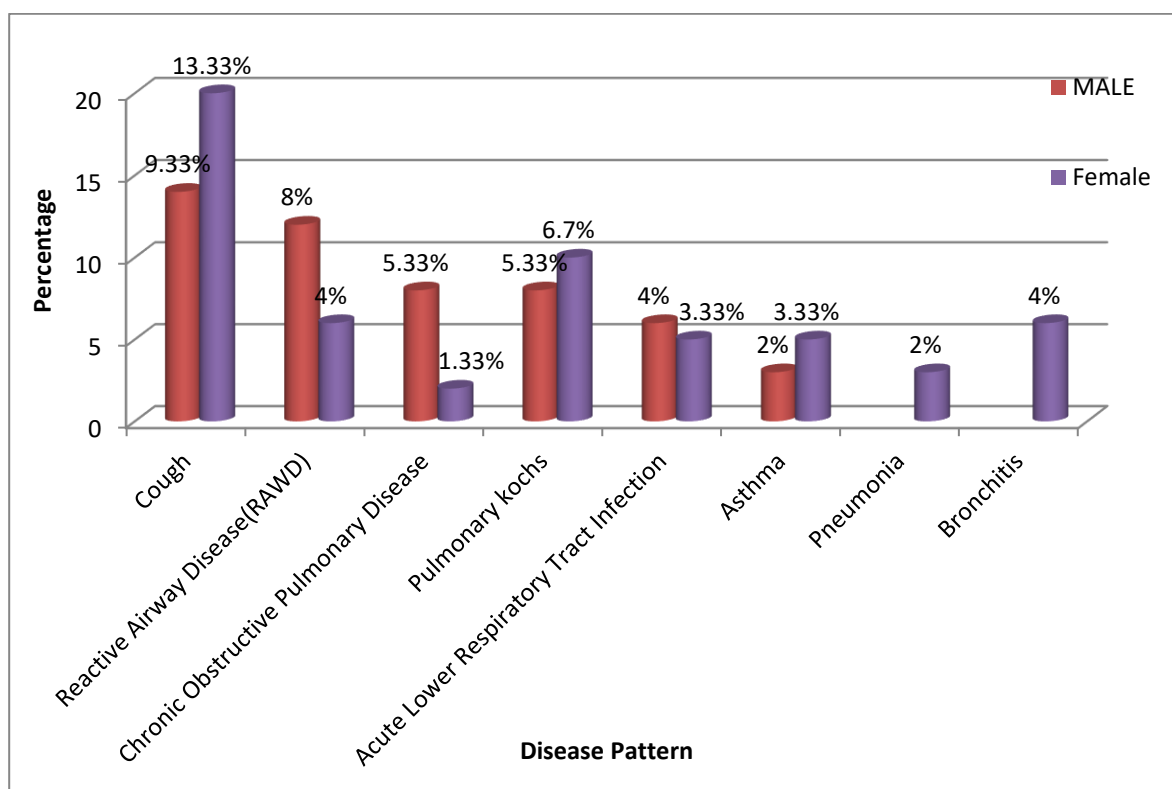


Figure 5: Diseases pattern

Concomitant diseases

In our study with respect to the respiratory diseases associated with concomitant diseases are also found with respect to patient's conditions, Acute Lower Tract Infection (LRTI) with Diabetes mellitus, Pulmonary Koch's with diabetes mellitus (DM) and Hypertension (HTN), Chronic Obstructive Pulmonary Disease (COPD) associated with diabetes mellitus (DM) and Gastroesophageal Reflux (GER), Acute Lower Respiratory Tract Infection with Hypertension (HTN) and Hypothyroidism, Bronchitis with diabetes mellitus (DM) and Chronic Kidney Disease (CKD) and Hypertension

(HTN), Pulmonary Koch's with diabetes and Hypertension (HTN) and Chronic Kidney Disease (CKD), Acute Lower Respiratory Tract Infection (LRTI) with Coronary Artery Disease (CAD) and type 2 Diabetes Mellitus (DM) and Hypertension (HTN), Bronchitis with hypertension and Parkinson's Disease (PD), Chronic Obstructive Pulmonary Disease with compressive Neuropathy. Over all respiratory diseases evaluated these are the concomitant diseases found in our study. The detail concomitant diseases of study population are presented in the Figure 6.

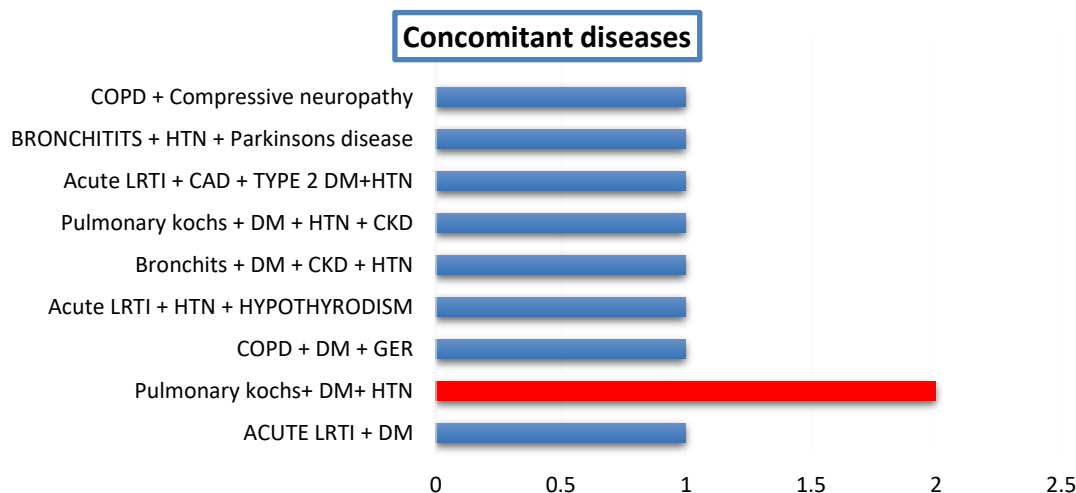


Figure 6: Concomitant diseases

Distribution of drugs by drug category

Drugs prescribed in our study are been classified according to the class of drugs. Total 150 samples were collected, frequently prescribed drugs, chiefly

corticosteroids 64 (42.7%). temporarily anti-histamines 41 (27.33%), Trivial phosphodiesterase inhibitors were 1 (0.7%). The detail of distribution of drug category of study population is presented in above Figure 7.

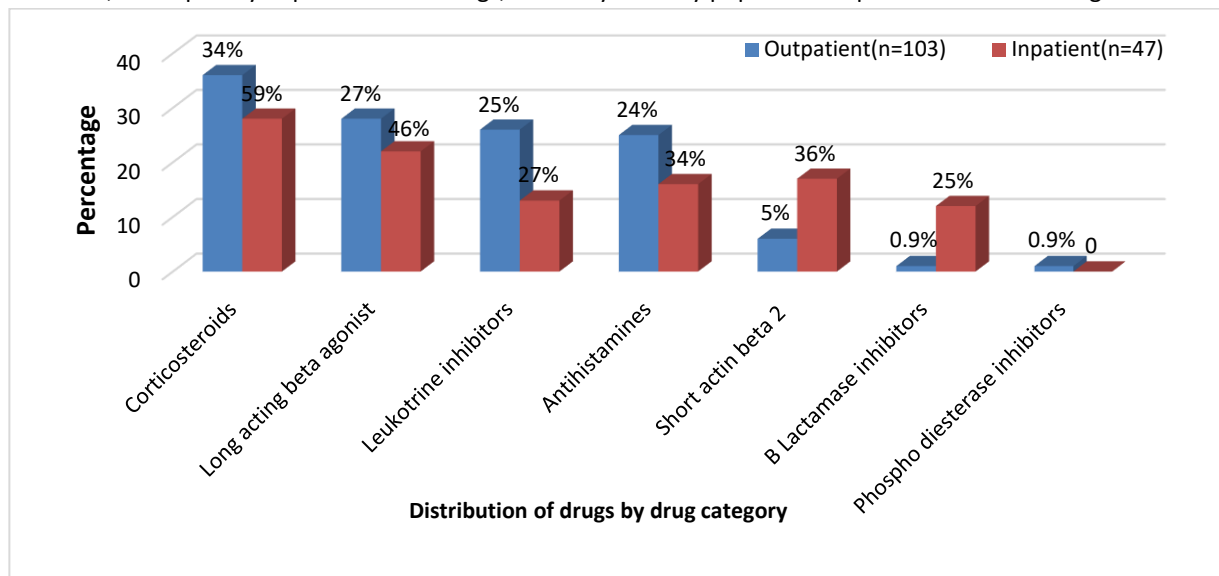


Figure 7: Distribution of drugs by drug category

Prescribing pattern of antibiotics

Antibiotics are regularly prescribed in many cases as on evaluation of the prescriptions it is found to be anti-tuberculosis 56 (37.3%) drugs are more prescribed in

the combinations. Minimum Floroquinolones 13 (8.70%) were prescribed. And finally, Cephalosporins 9 (6%) was given. The detail number of antibiotics of study population is presented in the Figure 8.

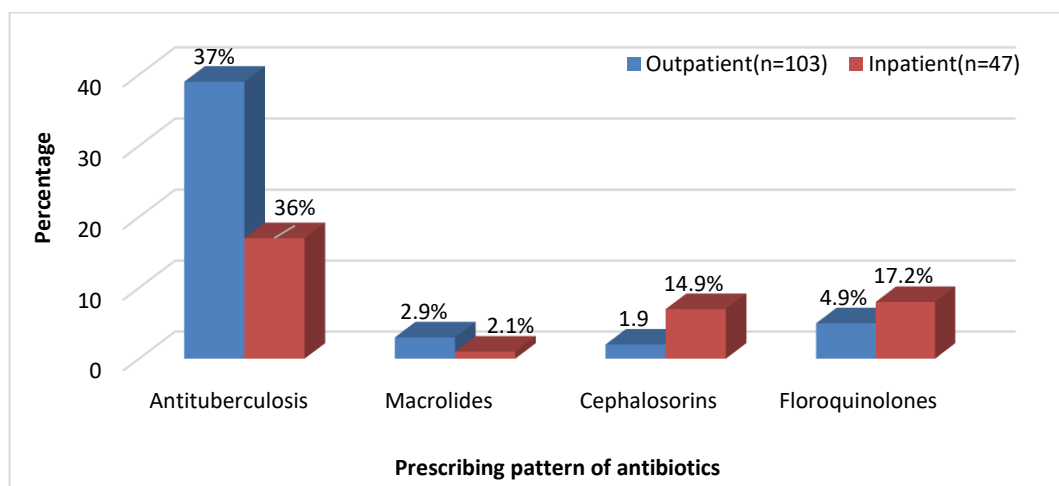


Figure 8: Prescribing pattern of antibiotics

Most prescribed drug

In our study 150 prescriptions were analyzed and findings represents that some of the drugs are prescribed. Most frequently ceftriaxone 77 (51.30%),

secondary prescribed drug rifampicin + isoniazid 31 (20.6%) least prescribed levocetirizine 17 (11.32%). The detail of most prescribed drugs of study population is presented in Figure 9.

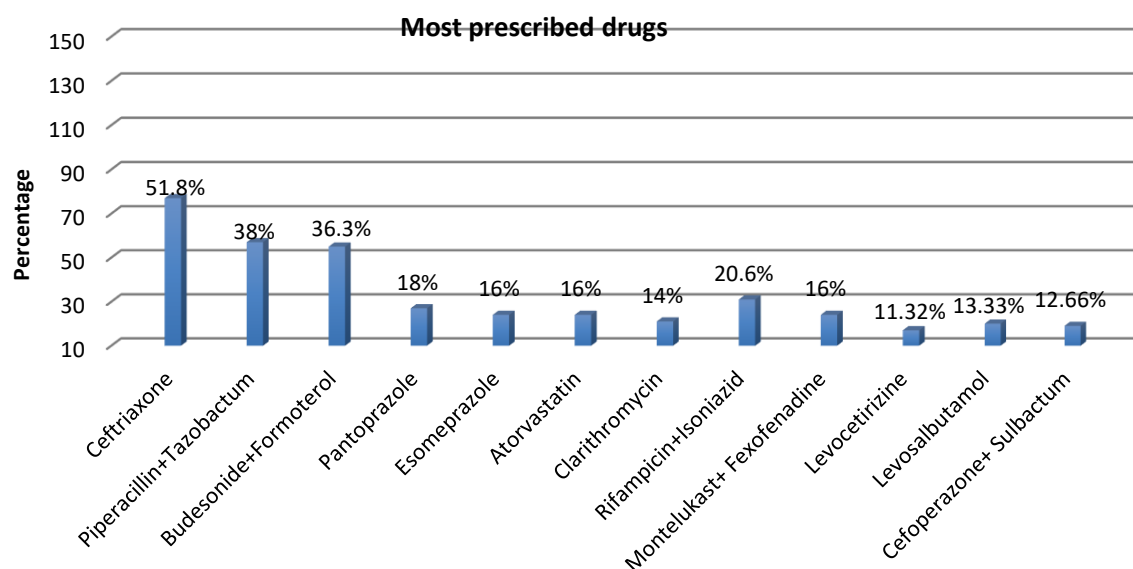


Figure 9: Most prescribed drugs

Drug interactions

In our study inpatient patient's prescription analysis of the study has been done. evaluated and findings of drug interaction were found based on the category these are

categorized as major, moderate & minor. The details of overall drug interactions found in the study population are presented in Figure 10.

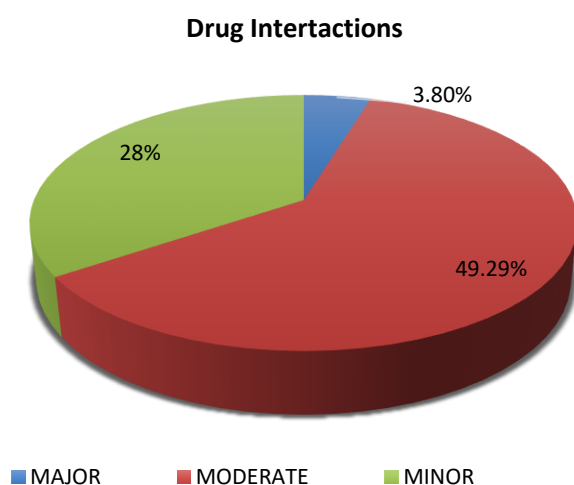


Figure 10: Drug interactions

Major drug interactions

Major drug interactions were found clarithromycin + clopidogrel 2 (1.30%), it inhibits CYP 3A4 will reduce clopidogrel, clarithromycin + atorvastatin 2 (1.30%) clarithromycin will increase the level of atorvastatin, hydrocortisone + methyl prednisolone 1 (0.6%) will increase the level of methyl prednisolone by affecting

hepatic CYP3A4 metabolism, indomethacin + sulfasalazine 1 (0.6%) increases anticoagulation, increases serum potassium. overall Major drug interactions were 4 (3.80%). The details of major drug interactions found in our study population are presented in the above Figure 11.

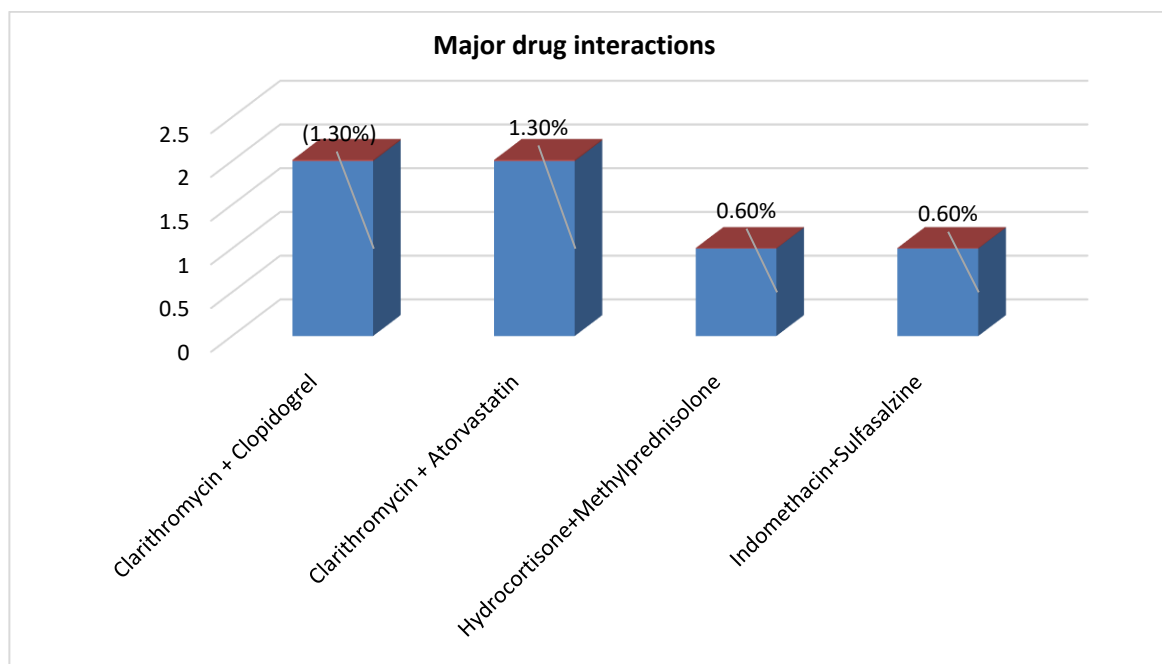


Figure 11: Major drug interactions

Moderate drug interactions

Moderate drug interactions found were Budesonide + Montelukast 16(10.60%) will decrease the levels of montelukast by affecting hepatic enzyme, Budesonide + Methyl prednisolone 12 (8%) will increase the level of methyl prednisolone by affecting hepatic intestinal enzyme cyp3A4 metabolism, Clarithromycin + Formeterol 13 (9%) both increases qtc interval, isoniazid

+pyridoxine 11 (7.33%) isoniazid increases levels of pyridoxine by unspecified interaction mechanism, piperacillin + Dalteparin 22 (14.70%) piperacillin increases effects of dalteparin by anticoagulation. overall Moderate drug interactions found in our study 6 (55.89%). The details of moderate drug interactions found in our study population are presented in the above Figure 12.

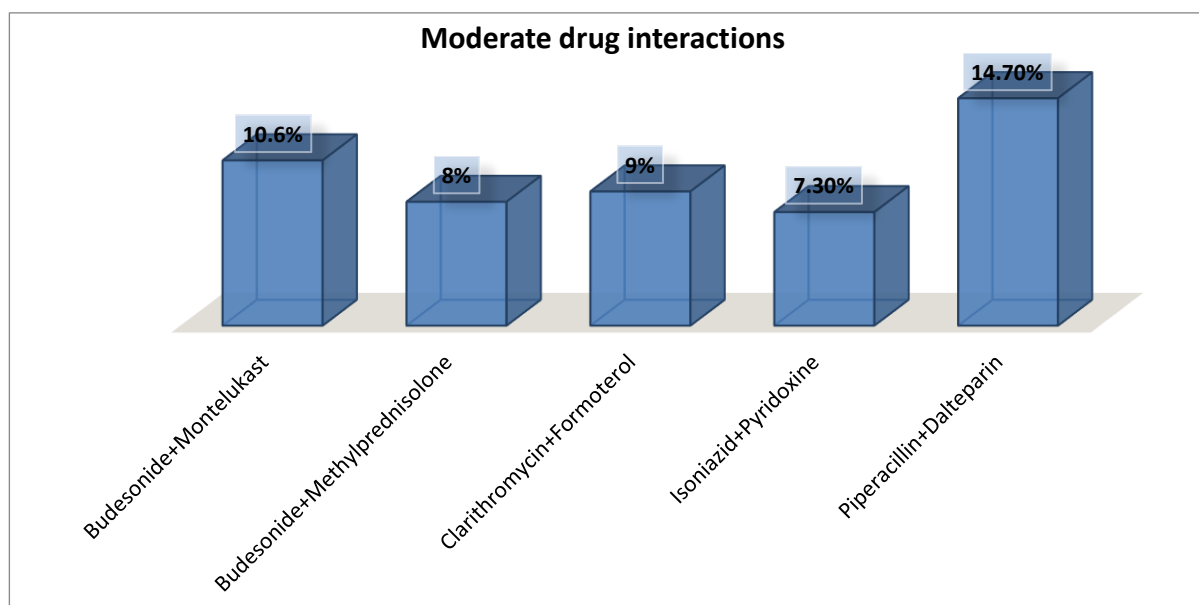


Figure 12: Moderate drug interactions

Minor drug interactions

In our study minor drug interactions were Loratidine + Azithromycin 10 (6.7%) increases level of azithromycin by p glycoprotein, diltiazem + Atorvastatin 6 (4%) will increase the level of atorvastatin by affecting hepatic intestinal enzyme CYP3A4 metabolism, Fexofenadine + Loratidine 5 (3.33%), Atorvastatin + Fexofenadine 6 (4%) will increase the level of fexofenadine by P-glycoprotein efflux transporter, Telmisartan + Torsemide 5 (3.33%)

telmisartan increases and Torsemide decreases serum potassium, Metronidazole + Atorvastatin 5 (3.33%), metronidazole will increase the level or effect of atorvastatin by affecting hepatic enzyme CYP3A4 metabolism, Formoterol + chlorthalidone 5 (3.33%) both decreases serum potassium. Overall analysis of the prescriptions represented minor drug interactions 7 (27.9%). The detail minor drug interactions found in our study population are presented in the Figure 13.

Minor Drug Interactions

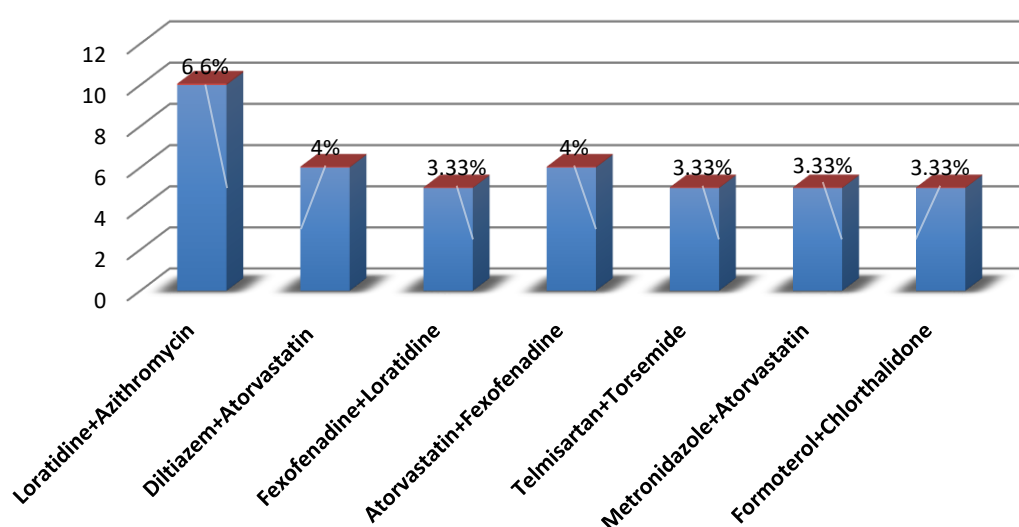


Figure 13: Minor Drug Interactions

Dosage form of drugs

Drugs are prescribed in different dosage forms based on the patient condition dosage is been decided. Most probably prescribed dosage form of drug per oral (PO)

401 (59.10%), intravenous (IV) were 157 (23.20%), Nebulization (P/N) 107 (15.80%), Subcutaneous (sc) 5 (0.73%). The detail of dosage form of study population is presented in the Figure 14.

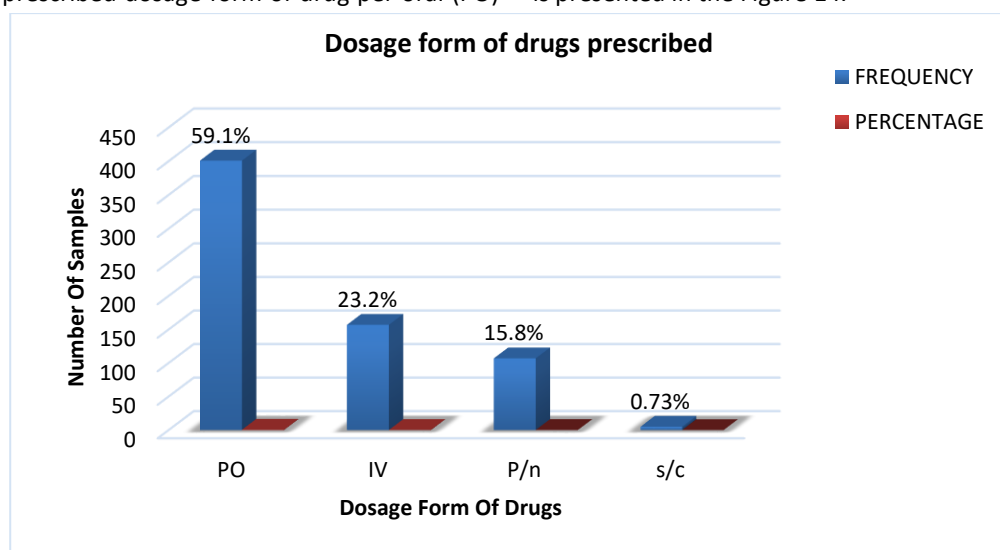


Figure 14: Dosage form of drugs

DISCUSSION

Total 150 samples were collected inpatients were 47 (31.33%), males were 25 (53.2%), and females were 22 (46.8%). outpatients were 103 (68.66%), males were 53 (51.5%), and females were 50 (48.5%). In our study total sample of 150 was collected among that age wise distribution has been done. Major respiratory diseases in outpatient were found >60years age group males were 18 (17.5%), females were 12(11.7%). Moderate age group of 41-50years males were 7 (6.8%), females were 12 (11.7%). Minor age group of 3-18years males were 3 (2.9%), females were 2 (2%). Major age group in inpatient >60years males were 14 (29.8%), females were 11 (23.4%). Moderate age group 41-50years males were 2 (4.3%), females were 2 (4.3%). Minor age group 19-30years males were 1 (2.12%).

In our study many diseases were studied but most probably occurred cough in males 14 (9.33%), females were 20 (13.33%). Moderately found disease Pulmonary Koch's males were 8 (5.33%), females were 10 (6.70%). Pneumonia is found to be in females were 5 (3.33%). in our study total 150 samples were analysed and findings represent the different class of drugs are prescribed in different conditions. Most probably prescribed drugs were corticosteroids 64 (42.70%). Moderately prescribed category of drugs was anti-histamines 41 (27.33%). Least prescribed category drugs were phosphor-di-esterase inhibitors 1 (0.7%). A total of 4869 drugs were prescribed, 2754(56.56%) antibiotics, 675(13.8%) bronchodilators, 630(12.93%) corticosteroids, 303(6.22%) antacids, 507(10.41%) in miscellaneous category respectively. 2562(52.61%) oral, 1491(30.62%) injectable and 816(16.75%) inhalational drugs were prescribed. Numbers of Fixed dose combinations were 645(13.24%). 8.32 drugs were prescribed per prescription. 2409(49.47%) drugs were prescribed from national essential medicine list 2015. 4320(88.72%) drugs were prescribed by their brand names.

150 samples were collected and evaluated and findings of prescribing pattern of antibiotics were found to be, in our study most probably prescribed were anti-tubercular drugs 56 (37.3%). Moderately prescribed antibiotics were Fluoroquinolones 13 (8.7%). Least prescribed antibiotics were Macrolides 4 (2.7%). In our study 150 prescriptions were analysed and findings represents that some of the drugs are prescribed frequently such as, largely prescribed Ceftriaxone 77

(51.30%). Moderately Budesonide + Formoterol 55 36.30%. lastly Levocetirizine 17 (11.32%), Levo salbutamol 20 (13.33%), cefoperazone + sulbactam 19 (12.66%).

Drug interactions

In our study inpatient patients Prescription analysis of the study has been done. evaluated and findings of drug interaction were found based on the category these are categorized as Major, Moderate & Minor. Major 4 (3.8%), Moderate 5 (49.29%), Minor 7 (27.9%). Overall study Moderate drug interaction were more when compare to major and minor.

Dosage form of drugs

Overall 150 sample the drugs are prescribed in different dosage forms based on the patient condition dosage is been decided. Most probably prescribed dosage form of drug per oral (PO) 401 (59.10%), intravenous (IV) were 157 (23.20%), Nebulization (P/N) 107 (15.80%), Subcutaneous (sc) 5 (0.73%). On evaluation found that per oral route are the most effective route and safest route of dose administration.

CONCLUSION

In our study 150 subjects were collected and results were analysed. Males were more prone to respiratory diseases when compare to females. most frequently occurred diseases found to be in age group of >60years and least diseases occurred in age group of 3-18years. Overall diseases seen in females were affected more than males. Females were more affected by cough than males. Males 8 (5.3%) were more effected in Chronic obstructive pulmonary disease rather than females 2 (1.3%). Males 12 (8%) were more prone to reactive air way disease than females 6 (4%). Females 10 (6.7%) were more liable to pulmonary Koch's than males 8 (5.3%). Acute lower respiratory tract infection males were more affected than females 5 (3.3%).

Patient's data was collected, on evaluation findings represent the most frequently prescribed drugs are corticosteroids 64 (42.70%), long acting beta 2 agonist were 50 (33.33%), leukotriene inhibitors were 39 (26%), anti-histamines 41 (27.33%), short acting beta 2 agonist were 23 (15.33%), beta-lactamase inhibitors 13 (8.7%), phosphodiesterase 1 (0.7%). These are the class of drugs used most frequently. Antibiotics were anti-tubercular drugs 56 (37.3%), Fluoroquinolones were 13 (8.7%), Cephalosporins 9 (6%), Macrolides were 4 (2.7%). Drug interactions overall in our study major 4 (3.8%),

moderate 5 (49.29%), minor 7 (27.9%). Numbers of drug interactions were more in moderate drug interactions. Most probably prescribed dosage form of drug per oral (PO) 401 (59.10%), intravenous (IV) were 157 (23.20%), Nebulization (P/n) 107 (15.80%), Subcutaneous (sc) 5 (0.73%). Most effective route of drug administration in our study was found to be per oral (PO).

Limitations

- Cost evaluation was not performed.
- Follow up was not done.
- Further studies need to be carried out on larger population so as to generalize the data.

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CONFLICT OF INTEREST

Author declares that there is no conflict of interest to disclose.

SPONSORSHIP

Nil.

REFERENCES

1. Beg MA, Dutta SB, Bawa S, Kaur A, Vishal S, Kumar U., Prescribing trends in respiratory tract infections in a tertiary care teaching hospital. *Int J Res Med Sci*, 5:2588-91, (2017).
2. File TM., The epidemiology of respiratory tract infections. *Semin Respir Infect*, 15(3):184-94, (2000).
3. Papadopoulos NG, Psarras S., Rhinoviruses in the pathogenesis of asthma. *Curr Allergy Asthma Rep*, 3(2):137-45, (2003).
4. Woodhead M., Guidelines for the management of adult lower respiratory tract infections. *Clin Microbiol Infect*, 17(Suppl 6):E1-E5, (2011).
5. Singer Leshinsky., Pulmonary tuberculosis: Improving diagnosis and management. *Journal of the American Academy of Physician Assistants*, 29(2):20-5, (2016).
6. Beg MA, Dutta SB, Bawa S, Kaur A, Vishal S, Kumar U., Prescribing trends in respiratory tract infections in a tertiary care teaching hospital. *Int J Res Med Sci*, 5:2588-91, (2017).
7. Divya Kancherla., A Study on prescribing pattern of antibiotics in respiratory tract infections in a tertiary care. *International Journal of Recent Scientific Research*, 6(6):4558-63, (2015).
8. Joseph N, Bharathi DR, Sreenivasa B, Nataraj GR, George N, Safdar M., Prescribing pattern of drugs in upper respiratory tract infections in pediatric out patients. *Int J Contemp Pediatric*, 3:1006-8, (2016).
9. Errabelly P, Ramavath V, Afreen A, Sanaboina A., Analysis of the prescribing patterns of antibiotics in respiratory tract infections at department of medicine at a tertiary care hospital. *Int J Pharm Sci Res*, 6(7):2963-67, (2015).
10. Resmi TM, CI Sajeeth, Thangamani S., *International Journal of Pharmacy and Pharmaceutical Research*, 6(3):78-86, (2016).
11. Gajbhiye VP, Kale RS, Vilhekar KY, Bahekar SE., Drug utilization study on antimicrobials use in lower respiratory tract infection in pediatric intensive care unit of rural tertiary care hospital. *J Med Soc*, 30:146-8, (2016).
12. Shruthi KV, Basavaraj Bhandare, Adarsh E., Prescribing pattern of drugs in paediatric in-patients with lower respiratory tract infection at a tertiary care hospital. *World Journal of Pharmacy and Pharmaceutical Sciences*, 5(4):2396-2409, (2016).
13. Gupta CN, Chatterjee K., Prescription pattern of antibiotics in respiratory disorders in a tertiary care teaching hospital in Eastern part of India. *Int J Res Med Sci*, 5:1430-33, (2017).
14. Pandey A, Tripathi P, Pandey RD., Prescription pattern in asthma therapy at Gorakhpur hospitals. *Lung India*, 27(1):8-10, (2010).
15. Shimpi RD, Salunkhe PS, Bavaskar SR, Laddha GP, Kalam AA, Patel K., Drug utilization evaluation and prescription monitoring in asthmatic patients. *Internat J Pharma Biol Sci*, 2(1):117-22, (2012).
16. Rani Samyuktha Velamakanni, Vasudha Bakshi, Yaso Deepika Mamidiseti, Narender Boggula., Pattern of usage of anti-epileptic drugs in a tertiary neuro care unit in india. *American Journal of Pharmtech Research*, 8(1):218-231, (2018).
17. Anil K, Tiwari HK, Kulkarni SK., Drug utilization assessment in Asthma Therapy through prescription monitoring. *Indian Journal of Hospital Pharmacy*, 2:70-72, (2004).

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***Corresponding Author:**

Mounika Tejaswi Gorle*

Email: mounikancharla91@gmail.com