IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Prescribing Pattern Of Antimicrobial Agents Amoung In- Patient With Respiratary Infection In The Depertment Of General Medicine: A Record Based Study In A Tertiary Care Centre In Mandya

Dr. JACOB N THOMAS, NISHA M, POOJA J, POOJA P
Bharathi College of Pharmacy, Bharathinagara Mandya.

Abstract:Respiratory tract infection is defined as number of infectious diseases which involve Upper and Lower respiratory tract infection. Antimicrobial agents are the therapeutic substance used to treat the infections caused by different types of microbes by killing or preventing the growth of microorganisms. Improper utilization of antibiotics, particularly broad-spectrum ones, for treating respiratory tract infections can lead to antibiotic resistance. **OBJECTIVES**: To describe the prescribing pattern of antimicrobial agents in respiratory tract infection in the Department of General Medicine, and to describe the rational use of antimicrobial agents among these patients. **METHODOLOGY**: A record based study was carried out involving in-patients general medicine, for a period of 6 months in MIMS hospital. Ethical clearance was obtained prior to the study. The patient data was collected by using well designed patient data collection form and their prescription were recorded and subjected to analysis. **RESULT**: A study of 100 patients found that males (54%) had a higher incidence of respiratory tract infections (RTIs) than females (46%), with smoking alcoholism being major risk factors. The most commonly prescribed antimicrobials were antibiotics, and antiviral and the major antibiotics are cephalosporins, macrolides, and the antivirals were Tamiflu used. And the average hospital stays of 3-4 days and lower respiratory tract infections (LRTIs) being the most common diagnosis. The combination of 2 drug therapy (40.66%), was commonly used then monotherapy. CONCLUSION: out of 100 patient's male patients were highly predominance male than female; most common age group was 60-70 years with the risk factor like smoking and alcoholic. From this study, it is concluded that cautions and judicious use of antibiotics will reduce the burden of multi-drug resistance and thereby enabling better management.

KEY WORDS: Rational use of antibiotics, Prescribing pattern of antibiotics, antimicrobial agents, Antibiotic resistance.

INTRODUCTION

Respiratory tract infection is defined as number of infectious diseases involving the upper and lower respiratory tract Upper respiratory tract infection includes acute infections like, tonsillitis, pharyngitis, laryngitis, sinusitis, otitis media and common cold. Lower respiratory tract infection causes the inflammation of the air passage within the lung, like Bronchitis, Pneumonia.

Antimicrobial agents are the therapeutic substance used to treat the infections caused by different types of microbes by killing or preventing the growth of microorganisms by targeting key steps in cellular metabolism such as the synthesis of biological macromolecules, the activity of cell enzymes, or cellular structures**.** Penicillin's, cephalosporins, macrolides are the most used antibiotics for respiratory tract infections

The World Health Organization (WHO) stated that more than 50% of antibiotics are irrationally prescribed. Antibiotics are currently the most commonly prescribed drugs in hospitals worldwide.However, the inappropriate use of antibiotics contributes to the development of bacterial resistance.

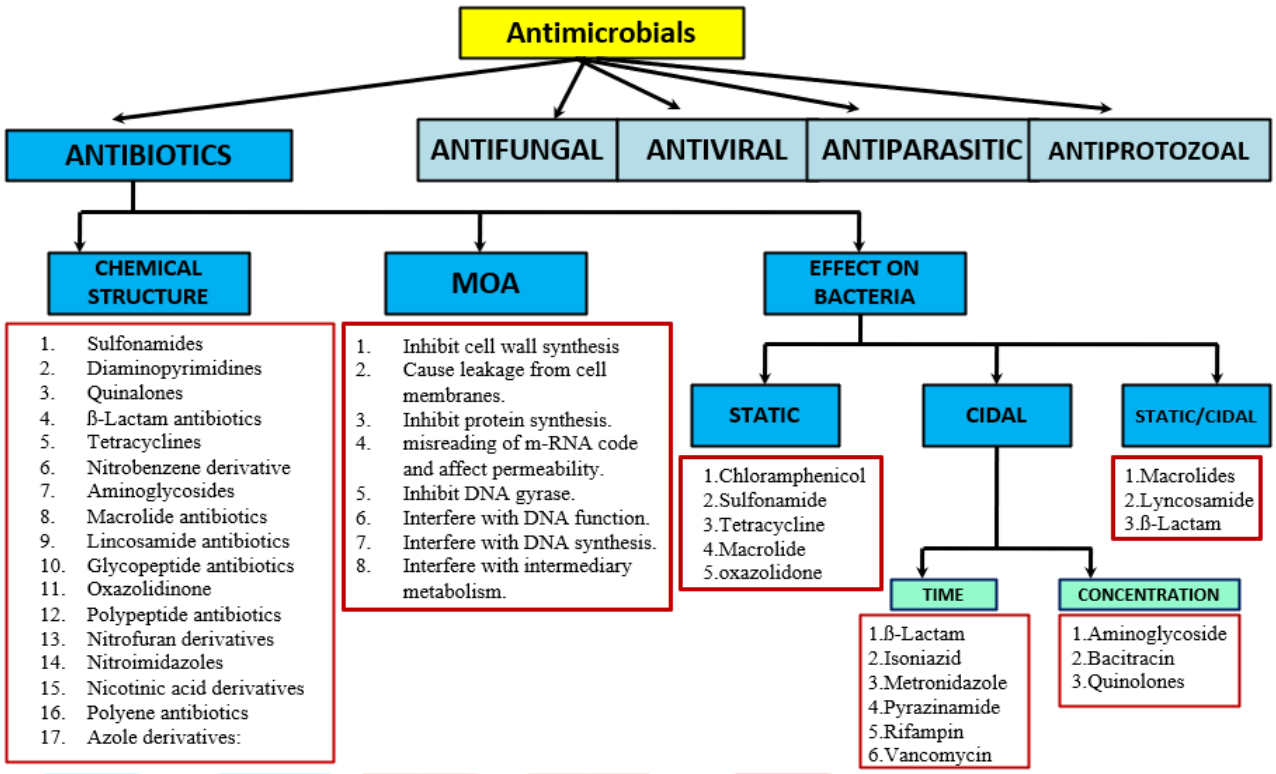
Antimicrobial resistance (AMR) developed when potentially harmful microbe changes in a way that reduces or eliminates the effectiveness of the antimicrobial resistance. The appropriate use and malprescription of antimicrobial resistance are increasing the incidence of antimicrobial resistance. Antimicrobial resistance is the ability of a microorganism to stop the antimicrobial resistance from working against it or failure of the drug to inhibit the growth of a microorganism at clinically achievable concentration.

Antimicrobial resistance is detected in all parts of the world; it is one of the greatest challenges to global public health today and the problem. is growing Currently. The center's for Disease control and Prevention warns health professionals to work in improving antibiotics prescribing practice and use in human health care and recommends the establishment of an Antibiotic Stewardship Program

Antibiotic stewardship program (ASP) is a harmonized program that promotes the appropriate prescribing pattern and the of antibiotics to improve patient outcomes, reduce microbial resistance and decrease the spread of infections.[6]

In 2007 definition by the Society for Health care Epidemiology of America (SHEA) defines Antimicrobial Sensitivity (AMS)as a "set of coordinated strategies to improve the use of antimicrobial medications with the goal to enhance patient health outcomes, reduce antibiotic resistance and decrease unnecessary cost. ASP is the using of right antibiotic at the right time at the right dose for the right duration.

CLASSIFICATION OF ANTIMICROBIAL AGENTS



PREVALANCE IN INDIA

Results from a study involving 3,671 under the age of 30 revealed a 50.4% prevalence of Acute Respiratory Infections (ARIs) in the previous month. The prevalence was notably higher among residing in rural areas at 54.2% compared to those in urban areas at 46.7%

($p = 0.01$). Gender-wise, boys reported a 51.4% prevalence of ARIs while girls reported 49.4%. The researchers identified living in rural areas ($p = 0.01$) and parental smoking ($p = 0.04$) as significant factors associated with ARIs in the multivariate analysis. They suggest interventions like reducing parental smoking in households could potentially lower the incidence of ARIs.

PREVALANCE IN WORD

Antimicrobial resistance poses a severe threat to human health and development. Globally, antimicrobial resistance was directly connected to 1.27 million deaths in 2019.Antimicrobial resistance has been mostly linked to ineffective antibiotic use, both in terms of frequency and prescription choice.[8] The difficulty in discovering novel antibiotics in recent years has increased antimicrobial resistance, weakening the efficiency of treating resistant illnesses.Older people living in long-term care facilities (LTCFs) face a higher risk of antibiotic resistance, as does the rate of global population aging. Has considerably increased the demand for LTCFs·

AWARE ANTIBIOTICS

In 2017, the world health organization (WHO) develops the access, watch, and reserve (AWaRe)classification system of antibiotics as part of AMS this was a grate milestone in the fight against tool became available to organize the antibiotics.

Access

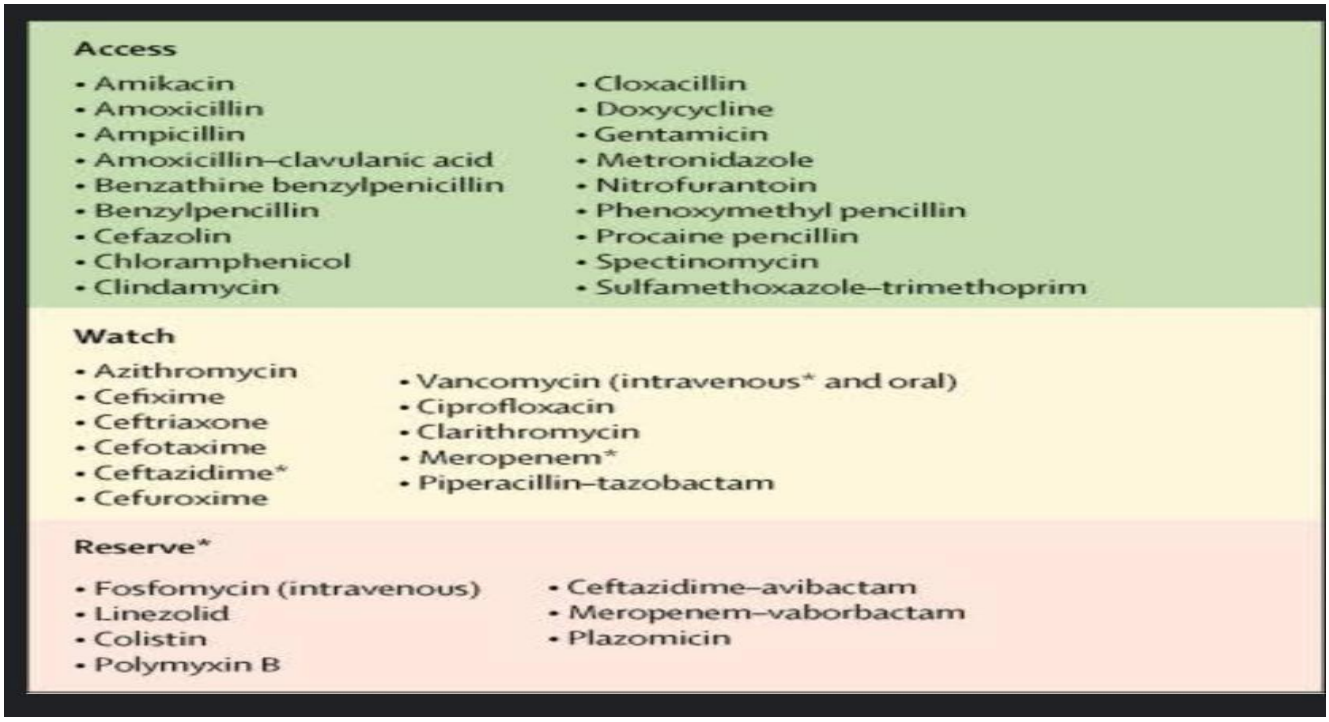
Accessantibiotics have a narrow spectrum of activity, lower cost, a good safety profile and generally low resistance potential. They are recommended as empiric first or second choice treatment options for common infection.

Watch

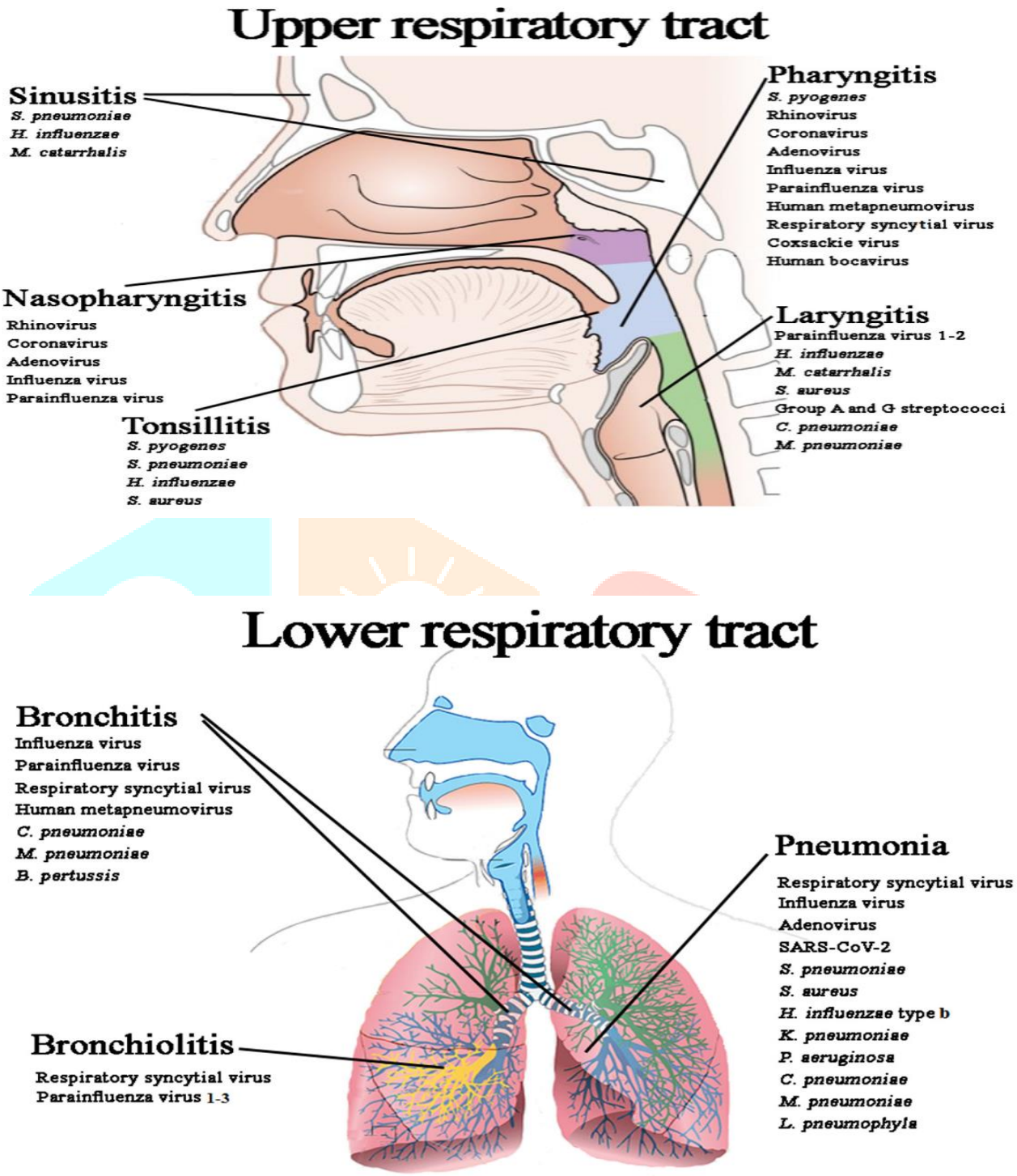
Watch antibioticsare broader-spectrum antibiotics, generally with higher costs and are recommended only as first-choice options for patients with more severe clinical presentations or for infections where the causative pathogens are more likely to be resistant to Access antibiotics (e.g. upper urinary tract infections) They are used as first- or second-line options for only a limited number of indications.

Reserve

Reserve antibiotics are last choice antibioticsused to treat multidrug-resistant infections. These antibiotics will need intense monitoring. These antibiotics should only be used under specific conditions to conserve their effectiveness.



TYPES OF RESPIRATORY INFECTIONS



RESEARCH METHODOLOGY

For the study, protocol, and patient's proforma were designed and submitted to IRB for approval- After getting IRB approval the following tasks were performed.

STUDY SITE:

The study was conducted adult patients being treated for respiratory infections in Department of General Medicine of Mandya institute of medical science and Teaching hospital (MIMS teaching hospital). It is a 500 bedded tertiary care teaching hospital having different specialties like medicine, surgery, orthopedics, pediatrics and gynecology etc. the hospital provides healthcare services in and around Mandya and nearby villages.

STUDY DESIGN:

This was a record based study conducted in inpatient department of MIMS and Teaching hospital.

STUDY PERIOD:

This study was conducted for a period of 6 months. 4 months of data collection, 2 months of data analysis and write up.

SAMPLE SIZE:

Using the formula $n= 4pq/d^{2;}$ where p=The prevalence of infection =15, q=(100-p) =85 and d= (absolute error) = 5.9

$n = 4\times15\times85/34.81=146.5 \cong 150$

SAMPLING METHOD:

All available records of study period will be taken.

STUDY APPROVAL:

Ethical clearance was obtained from the Institutional Ethics Committee of MIMS.

STUDY CRITERIA:

Inclusion Criteria:

- Records of adult patients being treated for respiratory infections in Department of General Medicine

Exclusion Criteria:

- Nil

Method of Data Collection (study tools):

All the relevant data will be obtained from the patient who visited Department of general medicine MIMS, Mandya and a special proforma was prepared with the below data.

Following information will be collected:

1. Socio-demographic details like name, age, sex.
2. Details of patient's diagnostic criteria.
3. Details on treatment taken by the patients.

ANALYSIS OF RESULT

Descriptive statistics like Mean with suitable known parametric statistics has been applied in the present study. Simple percentage calculation will be conducted to arrive at the conclusion of our study. Data will be entered in Microsoft Excel and Word has been used to generate graphs, tables etc.

RESULTS AND DISCUSSION

1. PREVALANCE STUDY BASED ON GENDER

We had done the analysis in the 150 cases in the department of general medicine out of 150 patients 81 (54%) patients were found to be males and 69 (46%) patients were found to be female, our study shows that the number of male patients were highly increased

Table 1: Distribution of patients based on gender (n = 150)

GENDER	NUMBER OF PATIENTS	PERCENTAGE
MALE	81	54%
FEMALE	69	46%
TOTAL	150	100%

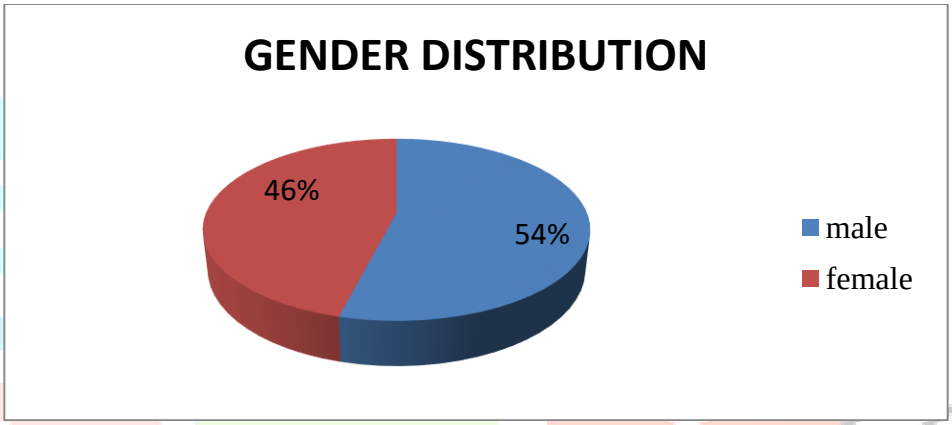


Figure 1: Distribution of patients based on gender

2. PREVALANCE STUDY BASED ON AGE GROUP

Out of 150 patients enrolled in the study from the inpatient department of general medicine, the majority of the patients with the age group of 61-70 years (24%) are majorly infectively, followed by the age of 41- 50 years (2.66%) and 51 -60 years i.e. (20.66%), more than 70 years (18.66%) , 31-40 years i.e. (8.66%) , and 17 -0 30 years (5.33%)

Table 2: Distribution of patients based on age in years (n = 150)

AGE IN YEARS	NUMBER OF PATIENTS	PERCENTAGE
17-30 YEARS	8	5.33 %
31-40 YEARS	13	8.66%
41-50 YEARS	34	22.66 %
51 -60 YEARS	31	20.66 %
61-70 YEARS	36	24.00%

MORE THAN 70 YEARS	28	18.66%

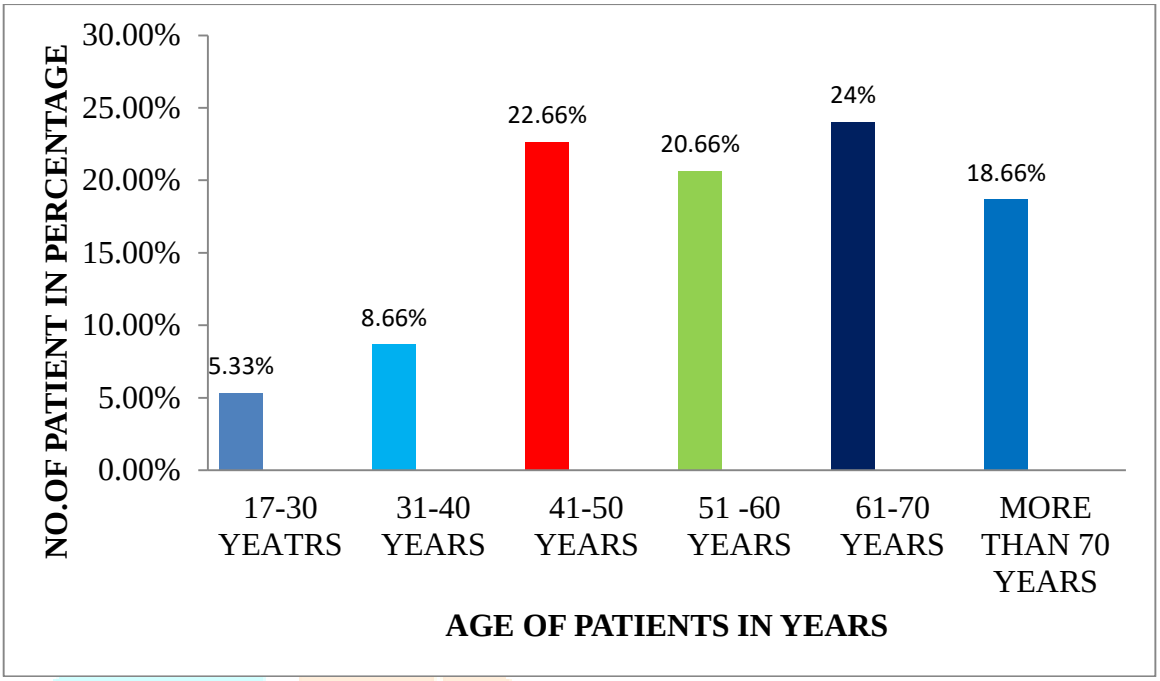


Figure 2: Distribution of patients based on age in years

3. DETAILS ON THE DISTRIBUTION OF MALE PATIENTS BASED IN THE HABBIT OF SMOKING

In our study out of 150 patients, the number of male patients were found to be 81 (54%), among them, the number of patients having the habit of smoking were found to be 64 patients (79.01%) were observed as smokers, and the nonsmoking were found as 17 patients (20.98%)

Table 3: Distribution of male patients based on the habit of smoking (n = 81)

HABBIT OF SMOKING	NOOF MALE PATIENTS	PERCENTAGE
SMOKERS	64	79.01%
NON SMOKERS	17	20.98%

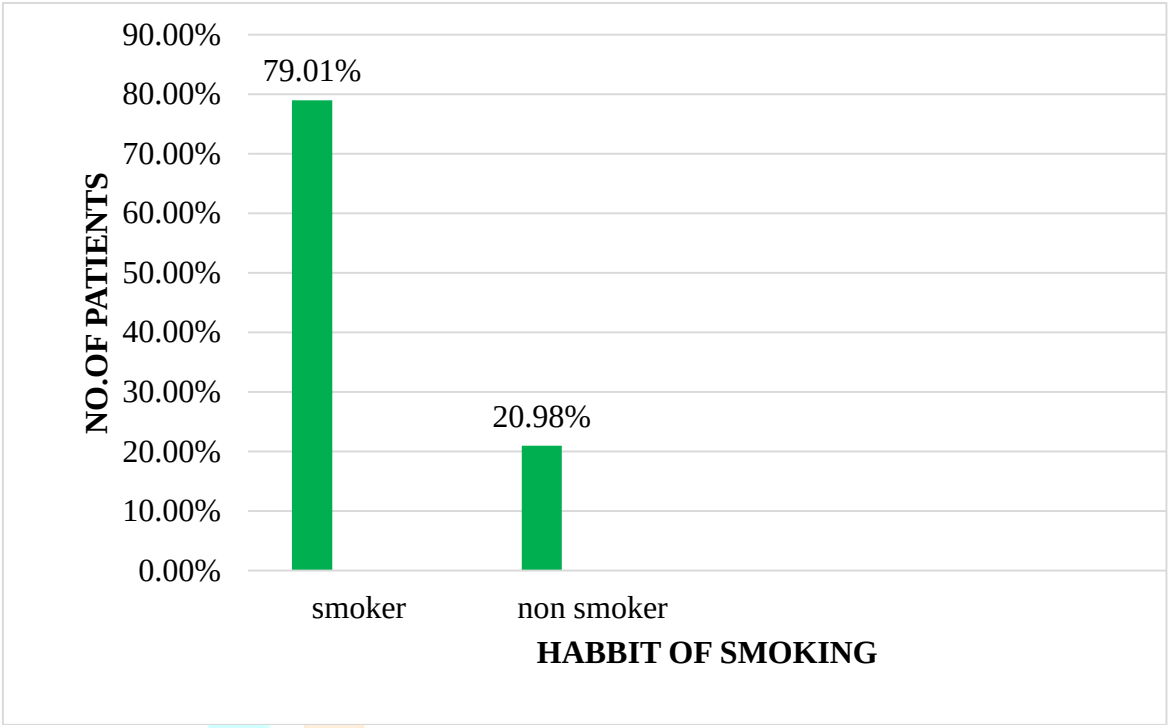


Figure 3: Distribution of male patients on the habit of smoking

4. DETAILS ON THE DISTRIBUTION OF NO. OF FEMALE PATIENTS BASED ON THE HABBIT OF SMOKING

In our study out of 150 patients, the number of female patients were found to be 69 (46%) among them the number of patients having the habit of smoking were found to be 12 patients (17.39%%) were observed as smokers, and the nonsmoking were found as 57 patients (82.60%)

Table 4: Distribution of female patients based on the habit of smoking (n = 69)

HABBIT OF SMOKING	NOOFFEMALEPATIENTS	PERCENTAGE
SMOKERS	12	17.39%
NONSMOKERS	57	82.60%

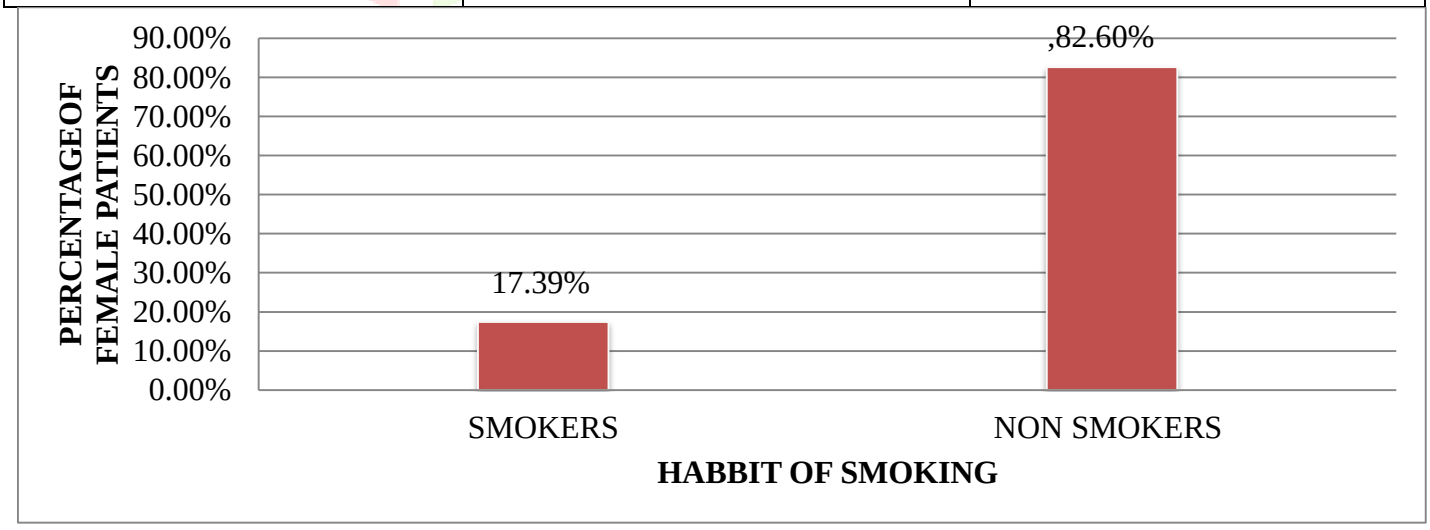


Figure 4: Distribution of female patients on the habit of smoking

5. DETAILS ON THE DISTRIBUTION OF MALE PATIENTS BASED ON THE HABBIT OF ALCOHOL

In our study out of 150 patients, the number of male patients were found to be 81 (54%) among them, the number of patients with alcoholic were found to be 44 patients (54.32%%) were observed as alcoholic, and the non alcoholic were found as 37 patients (45.67%)

Table 5: Distribution of male patients based on habit of alcoholic (n = 81)

HABBITOF ALCOHOLIC	NOOFMALE PATIENTS	PERCENTAGE
ALCOHOLIC	44	54.32%
NONALCOHOLIC	37	45.67%

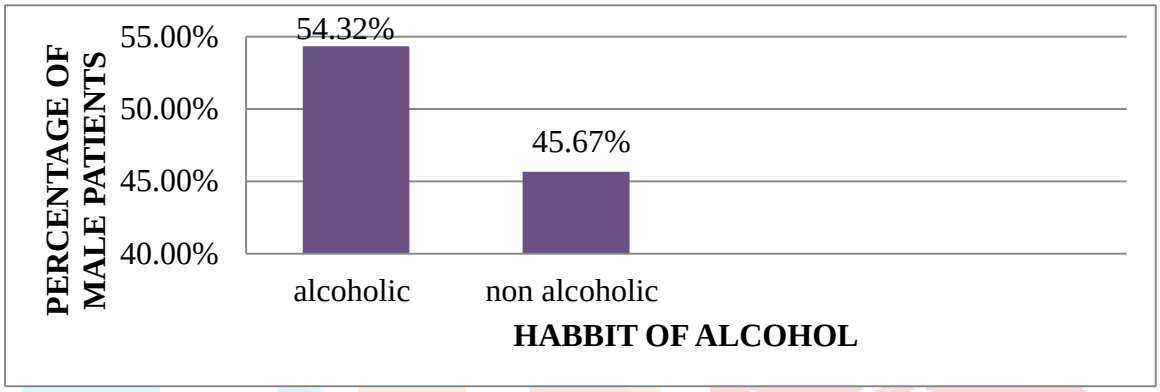


Figure 5: Distribution of male patients on the habit of alcohol

6. DETAILS ON THE DISTRIBUTION OF FEMALE PATIENTS BASED ON THE HABBIT OF ALCOHOL

In our study out of 150 patients, the number of female patients were found to be 69 (46%) among them the number of patients with alcoholic were found to be 5 patients (7.24%) were observed as alcoholic, and the non-alcoholic were found as 64 patients (92.75%)

Table 6: Distribution of female patients based on habit of alcoholic (n = 69)

HABBIT OF ALCOHOL	NOOFFEMALE PATIENTS	PERCENATGE
ALCOHOLIC	5	7.24%
NON-ALCOHOLIC	64	92.75%

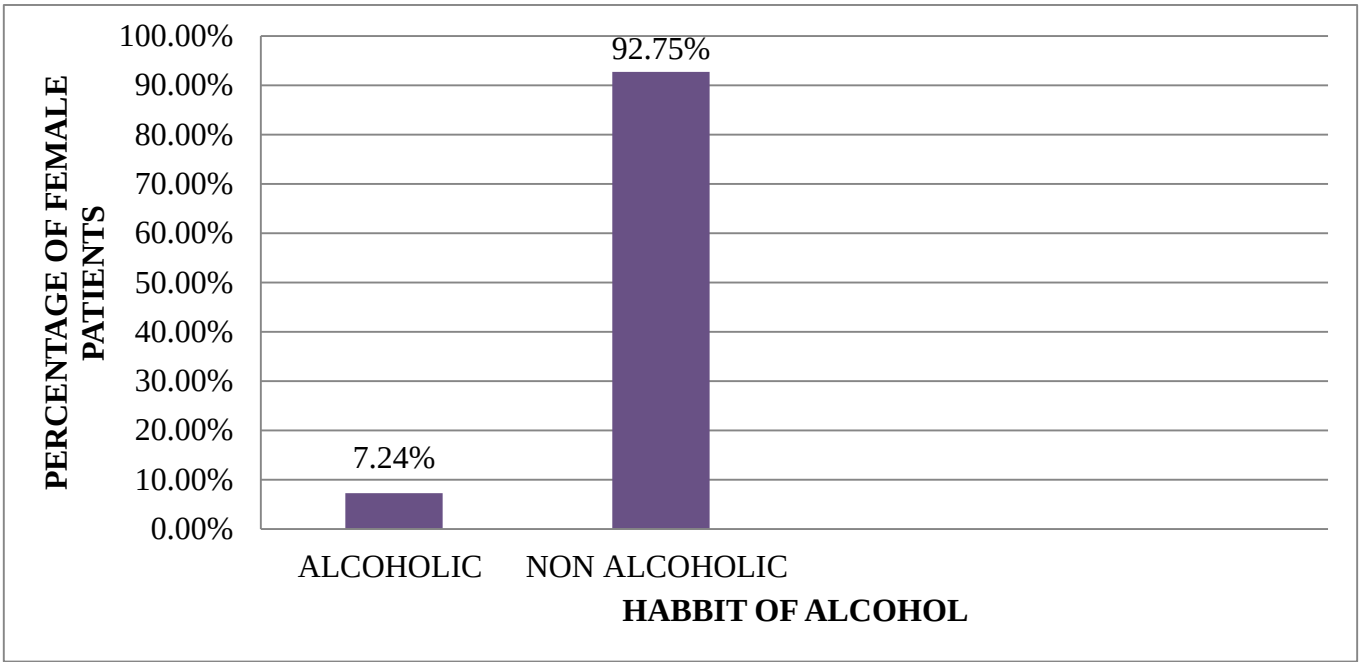


Figure 6: Distribution of female patients on the habit of alcohol

7. PREVALANCE OF TYPES OF RESPIRATORY TRACT INFECTION

Respiratory tract infection is the most common infections disease, which is followed by types of respiratory tract infections that is lower respiratory tract infection (LRTI) and upper respiratory tract infection (URTI), in our study observed that URTI were found to be 3 patient (2%) and LRTI were found to be 147 patients (98%)

Table 7: Distribution on the patients based on types of respiratory tract infection (n= 150)

TYPE OF RESPIRATORY TRACT INFECTION	NO. OF PATIENTS	PERCENTAGE
URTI	3	2 %
LRTI	147	98%

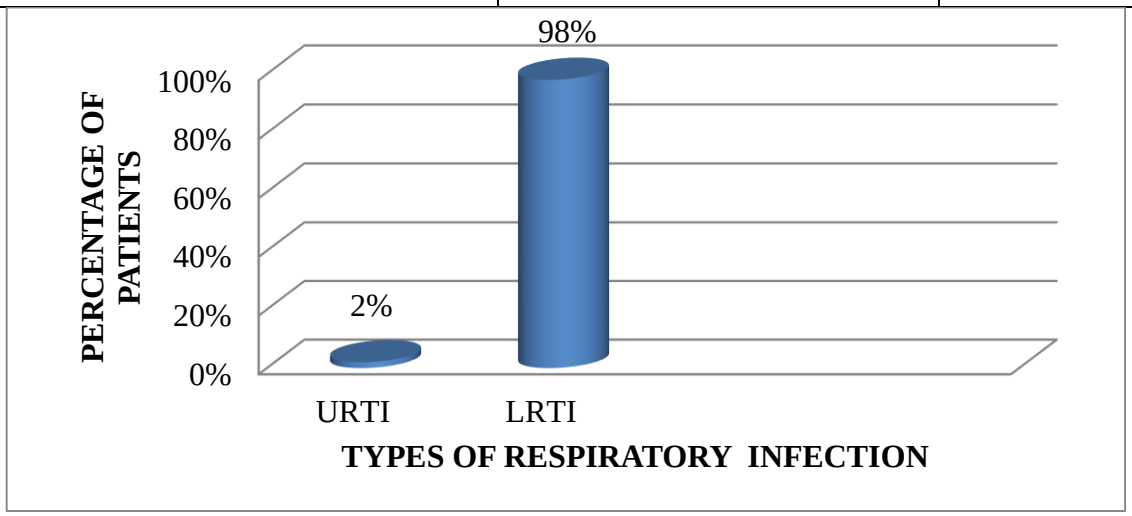


Figure 7: Distribution on the patients based on types of respiratory tract infection

8. PREVALANCE OF DIFFERENT TYPE OF UPPER RESPIRATORY TRACT INFECTION

In our study we observed that different type of URTI that is majorly otitis media i.e. 2 patients (66.66%) followed by tonsillitis 1 patients (33.33%)

Table 8:

Distribution of types of URTI

TYPES OF URTI	NO OF PATIENTS	PERCENTAGE
OTITIS MEDIA	**2**	**66.66%**
TONSLITIS	**1**	**33.33%**

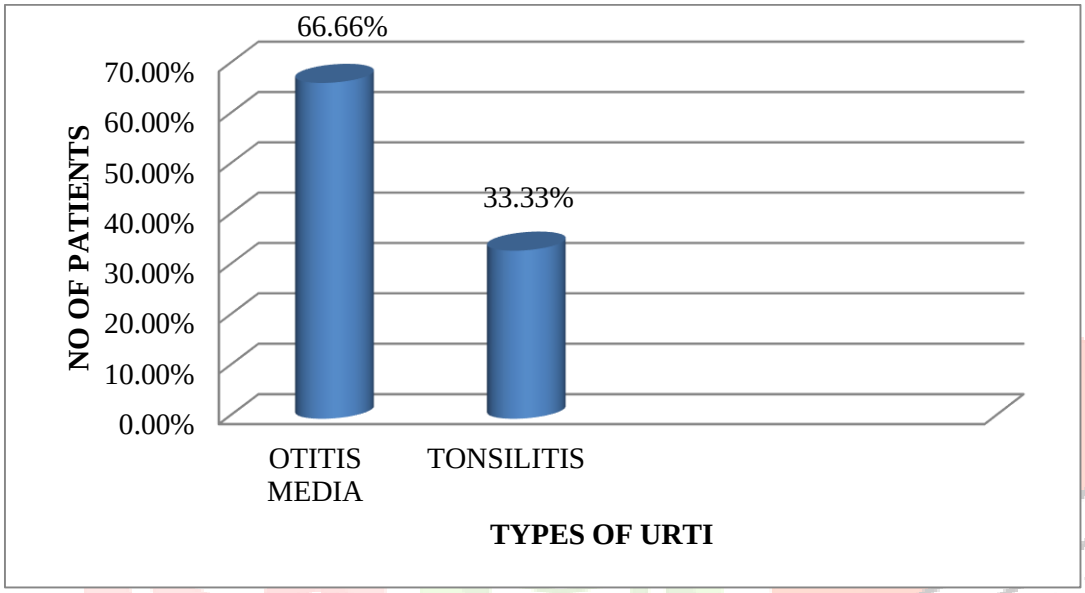


Figure 8: Distribution types of URTI

9. PREVALANCE OF DIFFERENT TYPE OF LOWER RESPIRATORY TRACT INFECTION

In our study, we observed that the different types of lower respiratory tract infection that is, majorly pneumonia and bronchitis. out of 150 patients,118 patients (78.66%) were found as pneumonia and 30 patients (20%) were found as bronchitis, and 2 patients (133%) were found as both pneumonia and bronchitis

Table 9: Distribution of patient based on LRTI (n =150)

TYPES OF LOWER RESPIRATORY INFECTION	NO. OF PATIENTS	PERCENTAGE
PNEUMONIA	118	78.66%
BRONCHITIS	30	20.00%
PNEUMONIA + BRONCHITIS	02	1.33%

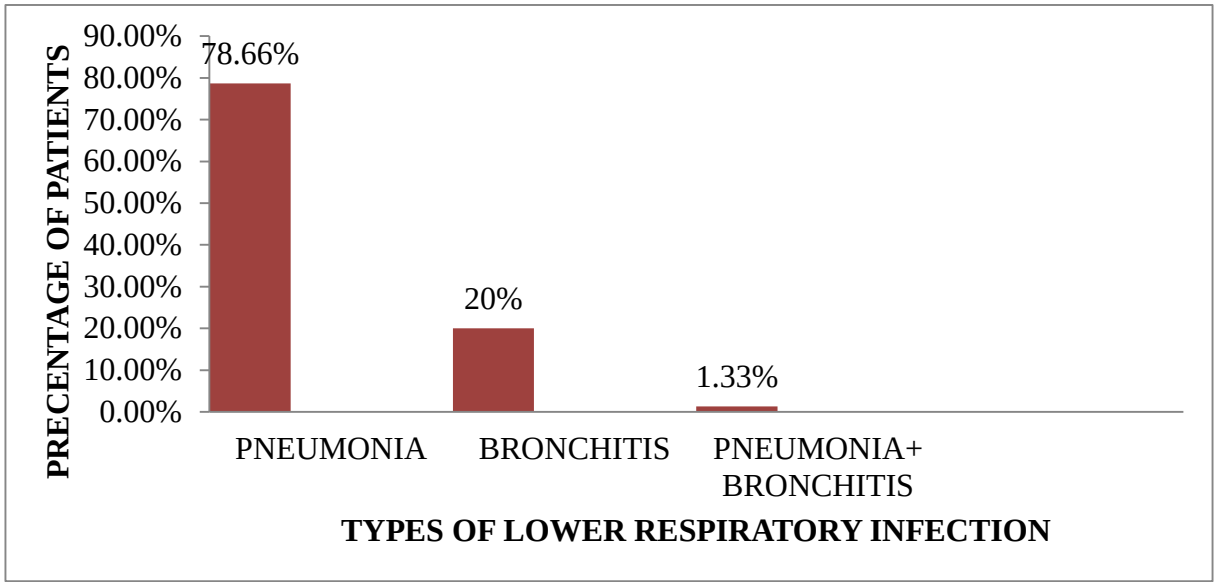


Figure 9: Distribution of patient based on LRTI

10. TYPES OF EXAMINATIONS USED

Out of 150 patients, our study observed that the 91 patients were found with the use of examination among them, 33 patients (36.26%) were found with the sputum culture test, 25 patients (27.47%) were found with the chest x ray examination, and 15 patients (16.48%) were found with the CT thorax examination and 15 patients (16.48%) were found with both (sputum and chest x ray)and 3 patients (3.29%) were found with the AV Doppler examination

Table 10: Distribution of Patient based on type of examinations used (n =91)

TYPE OF EXAMINATION	NO. OF PATIENTS	PERCENTAGE
SPUTUM CULTURE TEST	33	36.26%
CHEST X RAY	25	27.47%
SPUTUM CULTURE + CHEST X RAY	15	16.48%
CT THORAX	15	16.48%
AV DOPPLER	03	3.29%

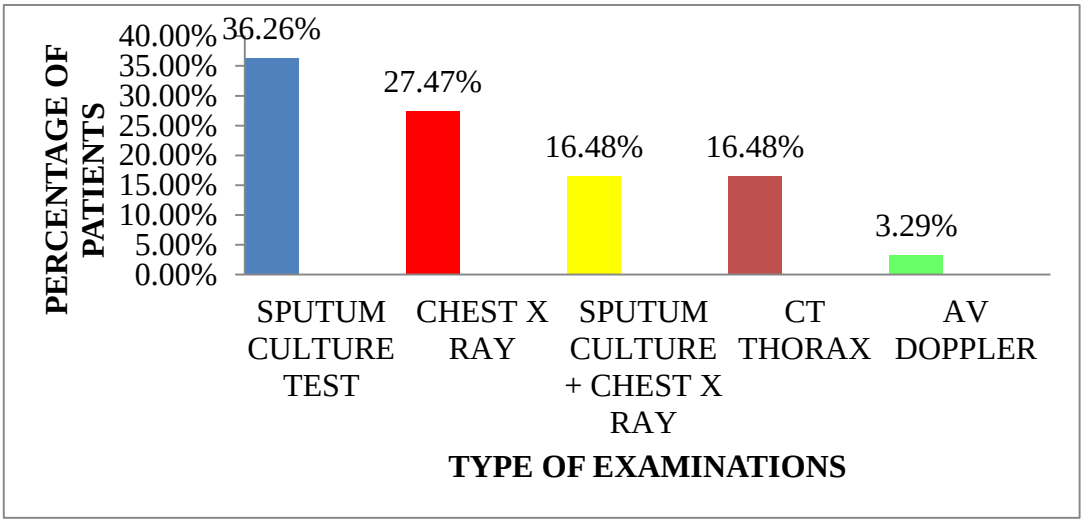


Figure 10: Distribution of Patient based on type of examinations used

11. DETAILS ON THE DURATION OF HOSPITALIZATION

Our study observed that the number of days of hospitalization was found to be greater than 1 week i.e.8 days the number of patients were 5(3.33%) and minimum was less than 1week i.e. 145patients (96.66%)

Table 11: Distribution of patient based on duration of hospitalization (n = 150)

DURATION OF HOSPITALIZATION	NO. OF PATIENTS	PERCENTAGE
LESS THAN 1 WEEK	145	96.66%
GREATER THAN 1 WEEK	5	3. 33%

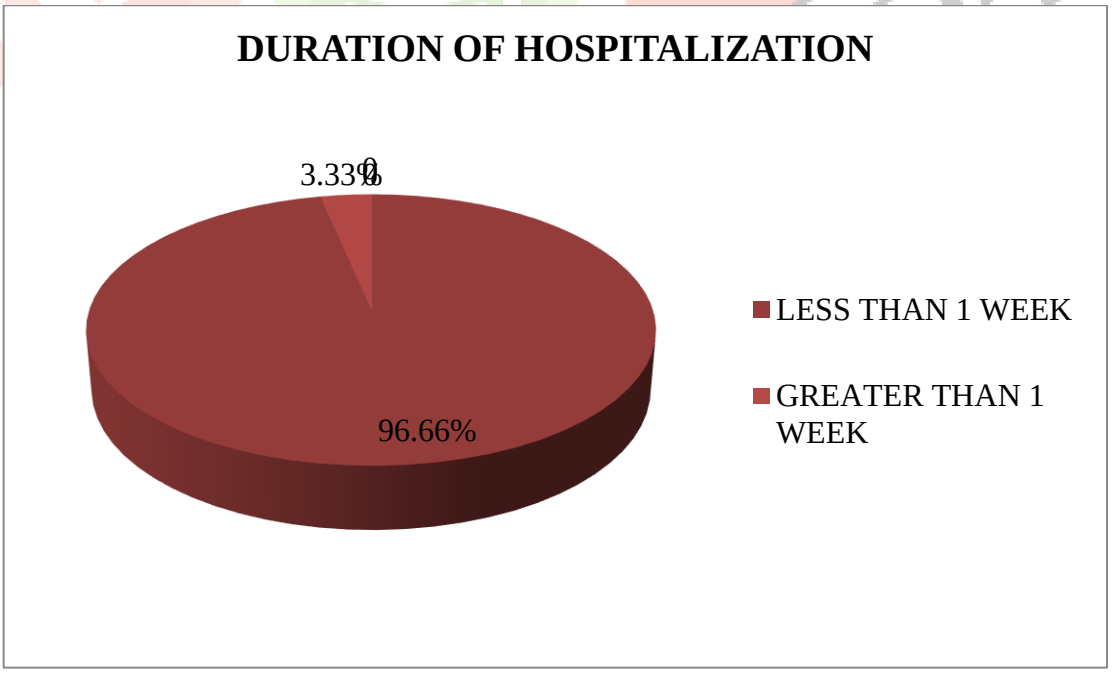


Figure 11: Distribution of patient based on duration of hospitalization

12. PRESCRIBING PATTERN OF ANTOMICROBIAL AGENTS

Out of 150 patients, prescribed the most commonly antimicrobial agents were antibiotics and antiviral agents among them antibiotics were prescribed for 144 patients (96%) and antiviral agents were prescribed for 6 patients (4%)

Table: 12 Distribution of antimicrobial agents (n =150)

ANTIMICROBIAL AGENTS	NO. OF PATIENTS	PERCENATGE
ANTIBIOTICS	144	96%
ANTIVIRAL	6	4%

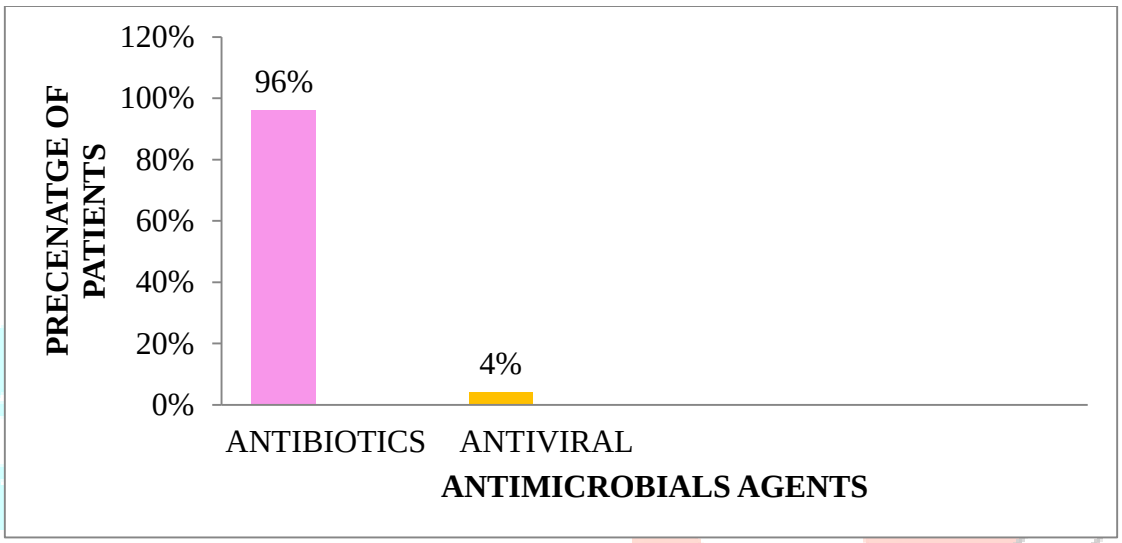


Figure 12: Distribution of antimicrobial agents

13. PRESCRIBING PATTERN OF ANTIBIOTICS

Out of 150 patients, cephalosporin is the major class of antibiotics which is highly prescribed 115 (76.66%) followed by macrolide group 70(46.66%), aminoglycosides 2 (133%), carbapenems 17(11.33%) penicillin's beta lactamase inhibitors 15(10%) penicillin's 11 (7.33%)

Ceftriaxone is most commonly prescribed antibiotics in our study i.e. 115 (76.66%) followed by azithromycin i.e. 70(46.66%) cefixime i.e.61 (40.66%), meropenem i.e.17(11.33%), piperacillin – tazobactam i.e.15(10%), amoxiclav i.e. 11 (7.33%), amikacin i.e. 2 (1.33%), cefotaxime i.e. 2 (1.33%)

Table 13: prescribing pattern of antibiotics (n=150)

DRUG NAME	NO. OF PATIENTS	PERCENTAGE
CEFTRIAXONE	115	76.66%
AZITHROMYCIN	70	46.66%
CEFIXIME	61	40.66%
MEROPENEM	17	11.33%
PIPERCILLIN – TAZOBACTAM	15	10.00%
AMOXICLAV	11	7.33%

AMIKACIN	02	1.33%
CEFOTAXIME	02	1.33%

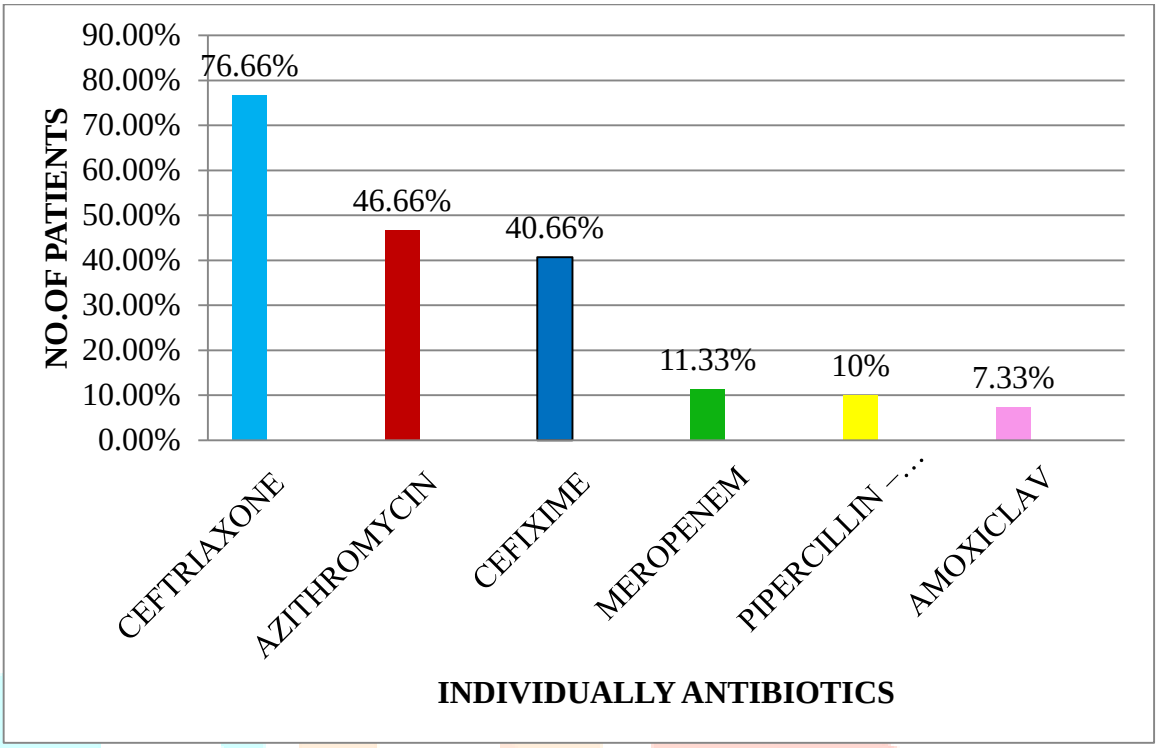


Figure 13: prescribing pattern of antibiotics

14. DISTRIBUTION OF ANTIBIOTICS DURING DISCHARGE

The commonly prescribed antibiotics during discharge is cefixime i.e84(56%), followed by azithromycin 33(22%), amoxiclav 18(12%), cefotaxime 15(10%),

Table 14: Distribution of antibiotics during discharge (n= 150)

ANTIBIOTIC	NO. OF PATIENTS	PERCENTAGE
CEFIXIME	84	56%
AZITHROMYCIN	33	33%
AMOXICLAV	18	12%
CEFOTAXIME	15	10%

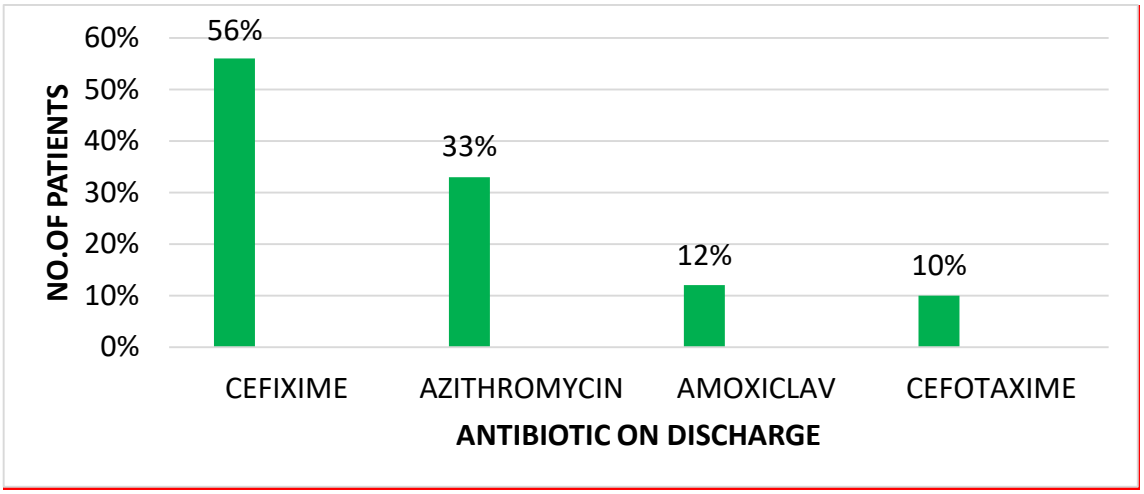


Figure 14: Distribution of antibiotics during discharge

15. DETAILS ON THE DISTRIBUTION OF COMBINATION OF DRUGS PRESCRIBED

Out of 150 patients 61 are received combination of 2 drugs i.e. (40.66%) followed 50 patients are received single drug therapy i.e. (33.33%), 31 patients are received combination of 3 drugs i.e. (20.66%), 8 patients were received combination of 4 drugs (5.33%)

Table 15: Distribution of patients based on the combination of drugs prescribed (n=150)

DRUG THERAPY	ANTIBIOTICS	NO. OF PATIENTS	IN PERCENTAGE
ONE DRUG THERAPY	CEFTRIAXONE	28	18.66%
	AZITHROMYCIN	10	6.66%
	MEROPENEM	4	2.66%
	AMOXICLAV	3	2%
	PIPERACILLIN	3	2%
	CEFIXIME	2	1.33%
TWO DRUG THERAPY	CEFTRIAXONE + AZITHROMYCIN	28	18.66%
	CEFTRIAXONE + CEFIXIME	18	12%
	AZITHROMYCIN + AMOXICLAV	4	2.66%
	AMIKACIN +AMOXICLAV	4	2.66%
	CEFTRIAXONE + PIPERACILLIN	2	1.33%
	MEROPENEM + AZITHROMYCIN	2	1.33%
	CEFOTAXIME + CEFIXIME	2	1.33%
	CEFTRIAXONE + AMOXICLAV	1	0.66%
	CEFTRIAXONE + AZITHROMYCIN + CEFIXIME	22	14.66%

THREE DTRUG THERAPY	CEFTRIAXONE + AZITHROMYCIN + MEROPENEM	6	4 %
	CEFTRIAXONE + AZITHROMYCIN + AMOXICLAV	2	1.33%
	CEFTRIAXONE + AZITHROMYCIN + PIPERACILLIN	1	0.66%
FOUR DRUG THERAPY	CEFTRIAXONE + AZITHROMYCIN + CEFIXIME +MEROPENEM	4	2.66%
	CEFTRIAXONE + AZITHROMYCIN CEFIXIME+ PIPERACILLIN	1	0.66%
	CEFTRIAXONE + AZITHROMYCIN AMOXICLAV+ PIPERACILLIN	1	0.66%
	CEFTRIAXONE + AMOXICLAV + CEFIXIME +MEROPENEM	1	0.66%
	CEFTRIAXONE + CEFOTAXIME CEFIXIME+ PIPERACILLIN	1	0.66%

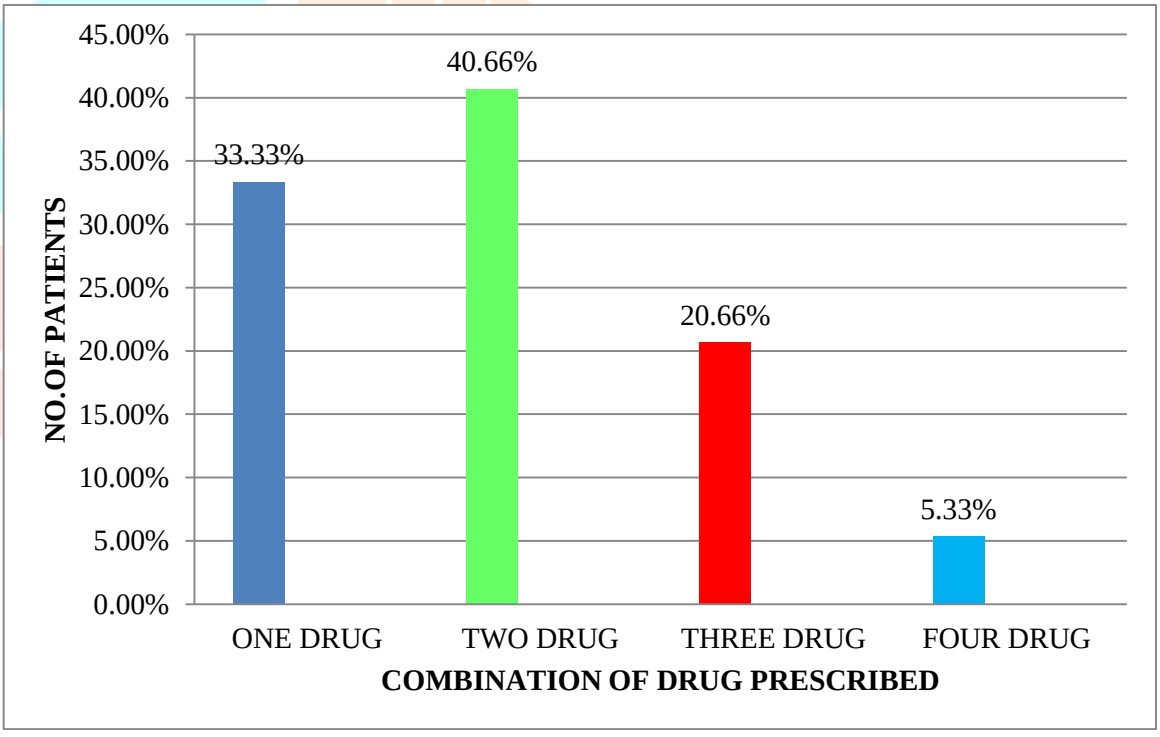


Figure 15: Distribution of patients based on the combination of drugs prescribed

CONCLUSION: This study gives an overview of the prescribing pattern of antibiotics, rational use of antibiotics in the study area.

The most commonly diagnosed disease among the respiratory tract infection in the in -patients department of general medicine was found to be LRTI. The most commonly prescribing antibiotics for respiratory tract infection were cephalosporins, macrolide aminoglycosides, carbapenems, penicillin's beta lactamase inhibitors, penicillin's. Two drug combinations of antibiotics were more prescribed than monotherapy and triple therapy.

From this study, it is concluded that cautions and judicious use of antibiotics will reduce the burden of multi-drug resistance and thereby enabling better management. The incidence of medication error was found to be low and there will be no life-threatening events. We the clinical pharmacists play a major role in the early detection and prevention of medication errors and improve the quality of care to the patients.

ACKNOWLEDGMENT

I would like to thank guide of my institute for the support and the health professionals in MIMS hospital in accomplishing this research work.

REFERENCES

1. KEITH L, DOBROCHASOV D, FIKAR CR. PODIATRIC MEDICAL RESOURCES ON THE INTERNET: A FOURTH UPDATE. JOURNAL OF THE AMERICAN PODIATRIC MEDICAL ASSOCIATION. 2002 1;92(9):516-523.
2. L, Mandel CEO chair tom mihaljen, MD, 2021(9);23-26 https://my.clevelandclinic.org/health/articles/4022-upper-respiratory-infection
3. Dr. avni serasiya https://samarpanphysioclinic.com/upper-respiratory-tract-infection wold health report. WHO 2015- 2022 :33-38
4. Laryngitis- linked in VIRUSES AND FUNGI ASSOCIATED WITH RESPIRATORY TRACT INFECTION (linkedin.com)
5. Upper respiratory tract infection - Wikipedia
6. Prevention Wikipedia. Upper respiratory tract infection - Wikipedia
7. Davies. Davies D Origins and evolution of antibiotics resistance, Microbial Mol Bio Rev ,2010 May 5 ;74 (3); 413 – 433; Doi ;10, 1128 /MMBR.00016 -10. Fortin É, Platt RW, Fontela PS, Buckeridge DL, Quach C. Predicting antimicrobial resistance prevalence and incidence from indicators of antimicrobial use: what is the most accurate indicator for surveillance in intensive care units? PLoS One. 2015 28;10(12): e0145
8. Jangra S, Bhyan B, Chand W, Saji J, Ghoghari R. To assess prescribing pattern of antibiotics in department of paediatric at tertiary care teaching hospital. Journal of Drug Delivery and Therapeutics. 2019, 15;9(2):192-196.
9. World Health Organization. Global antimicrobial resistance surveillance system (GLASS) report: early implementation 2020. World Health Organization; 2020, 25; 515-520.
10. Mahmood LS, Al Shatari SA, Khalel MI, Sadiq MQ. Knowledge, practice and attitude of employees working at some Iraqi ministries about the use of antibiotics: across sectional study. Iraqi New Medical Journal. 2019,23 ;5(9); 35 – 40.
11. Barlam TF, Cosgrove SE, Abbo LM, MacDougall C, Schuetz AN, Septimus EJ, Srinivasan A, Dellit TH, Falck-Yatter YT, Fishman NO, Hamilton CW. Executive summary: implementing an antibiotic

stewardship program: guidelines by the Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America. Clinical Infectious Diseases. 2016, 15;62(10):1197-1202.

12. Huang Y, Wei WI, Correia DF, Ma BH, Tang A, Yeoh EK, Wong SY, Ip M, Kwok KO. Antibiotic use for respiratory tract infections among older adults living in long-term care facilities: a systematic review and meta-analysis. Journal of Hospital Infection. 2023 1; 131:107-121.
13. Hsia Y, Lee BR, Versporten A, Yang Y, Bielicki J, Jackson C, Newland J, Goossens H, Magrini N, Sharland M, Irwin A. Use of the WHO Access, Watch, and Reserve classification to define patterns of hospital antibiotic use (AWaRe): an analysis of paediatric survey data from 56 countries. The Lancet Global Health. 20191;7(7):e861-871.
14. Remesh A, Salim S, Gayathri AM, Nair U, Retnavally KG. Antibiotics prescribing pattern in the in-patient departments of a tertiary care hospital. Archives of pharmacy practice. 2013;4(2-2013):71-76.
15. Bradley BT, Bryan A, Fink SL, Goecker EA, Roychoudhury P, Huang ML, Zhu H, Chaudhary A, Madarampalli B, Lu JY, Strand K. Anti-SARS-CoV-2 antibody levels measured by the AdviseDx SARS-CoV-2 assay are concordant with previously available serologic assays but are not fully predictive of sterilizing immunity. Journal of Clinical Microbiology. 2021,9(9):10-128.
16. Mathew R, Sayyed H, Behera S, Maleki K, Pawar S. Evaluation of antibiotic prescribing pattern in pediatrics in a tertiary care hospital. Avicenna Journal of Medicine. 2021(01):15-19.