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PROSPECTIVE STUDY OF USAGE OF ANTIBIOTICS AT A TERTIARY CARE TEACHING HOSPITAL

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ABSTRACT

Antibiotics are the pillars of the modern medical care and play a major role in the treatment of infectious diseases where it reduced both morbidity and mortality from infections. Inappropriate use of antibiotics may fail to achieve desired therapeutic outcome which may results in the development of adverse effects and emergence of resistance. Objective of this study is to assess the prescribing pattern of antibiotics in infectious diseases and drug evaluation using WHO prescribing indicators. A prospective observational study carried out in departments of General Medicine, General Surgery, Pediatrics in Sri Venkateshwara Ramnarain Ruia Government General Hospital, a tertiary care hospital in Tirupati, for a period of 3 months with sample size of 175. The majority of the patients prone for infectious diseases (32%) were in age group of 0 – 10 years, males were more prone (64%). Most of the patients were hospitalized for 5 – 7 days (52%). On average highest number of drugs per prescription was 7 drugs. Number of antibiotics prescribed was 1 drug (80%). Among 236 antibiotic drugs, Cephalosporins (40.25%) are the most prescribed category of drugs followed by penicillin (21.61%). Among 175 patients only 58 patients (33.14%) have the knowledge of antibiotics. Prescription pattern and usage of antibiotics in the study was compared with WHO Prescribing indicators. Effective intervention are required to reduce inappropriate antibiotic prescriptions.

KEYWORDS: Antibiotics, Infectious diseases, EDL, WHO prescribing indicators.

Introduction:

Pathogenic microorganisms cause disease in humans, animals, plants as well as in other species. An infectious disease or microorganism can only transfer from person to person if specific circumstances are satisfied [1]. Only when all six links in the chain are intact can this process, known as the chain of infection, take place. If this chain is broken at any the links, the infection's spread is halted [Figure 1].

There are Six Links in the chain:

- **Disease-causing microbes (Agent):** These pathogens are what lead to contagious illnesses. These are typically parasites, fungi, bacteria, or viruses.
- **Reservoir:** The host serves as the reservoir (source), allowing the infection to survive and possibly develop into a more advanced stage. Microorganisms can be found in humans, animals, and the environment, among other places. A person may occasionally have a disease yet not be ill or exhibiting any symptoms. The term "colonized" may be used to describe this sort of carrier. Standing water, a human who has the flu or syphilis, or a dog that has rabies are all examples of reservoirs [2].
- **Mode of Escape:**
 - **Respiratory Tract:** When a person is infected, microorganisms are expelled from their body as sprays of droplets when they breathe, talk, sing, cough, or sneeze. Additionally, secretions from the nose and throat allow microbes to escape.
 - **Gastrointestinal Tract:** When food or water tainted with faeces is consumed, pathogenic germs enter the body of a new host (fecal/oral pathway).
 - **Mucous Membrane:** Absorption of microorganisms through exposed eyes, nose and mouth.
 - **Skin:** Microorganisms enter the body when a person comes into contact with wound drainage or skin secretions.
- 4. **Mode of Transmission:** Pathogenic transmission occurs in numerous manners, frequently reliant on the organism's ecology. Pathogenic agents can be spread from animal-to-animal or animal-to-human via different transmission ways. Generally, pathogen transmission may occur through two types of contact, direct and indirect, in which there are various mechanisms are involved [3].
 - **Transmission via direct contact:** Indirect transmission, an infected host transmits a disease directly to another host via direct contact. The pathogens that pass through this manner are extremely sensitive to the environment and cannot be sustain at the outer surface of the host for any length of time. For example, sexually transmitted diseases (STDs) are caused by the pathogens which are transmitted through blood, semen, or saliva.
 - **Transmission via indirect contact:** Indirect transmission takes place when an agent is required for the essential transfer of the pathogen from an infected host to a susceptible host. The pathogen may be either

animate or inanimate. e. Animate transmission agents determined as disease vehicles containing water, air, and food, although inanimate agents also comprise fomites.

5. Mode of Entry: The path for the microorganism to get into a new host (the reverse of the portal of exit). The mode of entry refers to the method by which the pathogens enter the person. Pathogens enter the body by:

- inhalation (e.g., respiratory tract)
- ingestion (e.g. .GI tract)
- absorption (e.g., mucous membranes of eyes)
- break in skin (e.g., needle stick, cut)
- introduction by medical procedures (e.g., catheters)

6. Susceptible Host: The future host is the person who is next exposed to the pathogen. The microorganism may spread to another person but does not develop into an infection if the person's immune system can fight it off [4, 5]. They may however become a 'carrier' without symptoms, able to then be the next 'mode of transmission' to another 'susceptible host'. Once the host is infected, he/she may become a reservoir for future transmission of the disease [6].



Figure 1: Chain of infection

AIM: The main aim of our study is to analyze the prescribing patterns of antibiotics in infectious diseases at a tertiary care teaching hospital.

OBJECTIVES:

- To identify the age group prone to infections.
- To assess drug utilization patterns of antibiotics.
- To identify the knowledge of antibiotics in patients.
- To assess drug evaluation using WHO prescribing indicators.

MATERIALS AND METHODS:

Study Design: A Prospective Study

Study Site: The study was conducted in SVRRGGH (Sri Venkateshwara Ramnarain Ruia Government General Hospital), tertiary care teaching hospital in the departments - General Medicine, General Surgery, Paediatrics.

Study Duration: 3 Months (January – April 2023)

Study Population: 175 Patients

Study Materials:

- Patient data collection proforma
- WHO prescribing indicators
- Essential Medicine List

Study Criteria:

Inclusion Criteria: Patients of all age group of either gender who prescribed with antibiotics for infectious diseases in inpatient department of General Medicine, General Surgery and Pediatrics were included in the study.

Exclusion Criteria:

- Patients unwilling to participate in the study
- Patients taking antibiotics therapy for other than infectious diseases.

Method Of Data Collection:

- A Prospective study was carried out by obtaining the permission of institutional review board, Sri Padmavathi School of Pharmacy, Tiruchanoor, Tirupati, A.P, India.
- We collected the patient data from the case sheets with antibiotic therapy for infectious diseases from the inpatient departments of General Medicine, General Surgery and Paediatrics through a specially designed proforma.
- A specially designed proforma was used to obtain the patient data regarding demographic details and antibiotic therapy provided by direct medication history interview and patient counselling which was carried out during ward round participation.
- WHO prescribing indicators are used to identify the prescribing patterns and compared with standard values of WHO indicators.
- After collecting the information from the patient case sheet, patient interview was performed and patients are counselled regarding antibiotics.

- Patient education regarding the drug usage, dosing, duration, frequency, risks and benefits associated with antibiotics were educated.
- Further patients are informed regarding abstinence and the beneficial effects of antibiotics.

RESULTS:

Out of 175 patients, 56 patients (32%) were under the age group of 0 – 10 Y followed by 32 patients (18.28%) were under the age group of 51 – 60 Y followed by 26 patients (14.85%) were under the age group of 41 – 50 Y followed by 19 patients (10.85%) were under the group of 61 – 70 Y followed by 16 patients (9.14%) were under the age group of 31 – 40 Y followed by 9 patients (5.14%) were under the age group of 11 – 20 Y followed by 8 patients (4.57%) were under the age group of 21 – 30 Y, 71 – 80 Y and 1 patient (0.57%) was under the age group of 81 – 90 Y respectively, as presented in Figure 1.

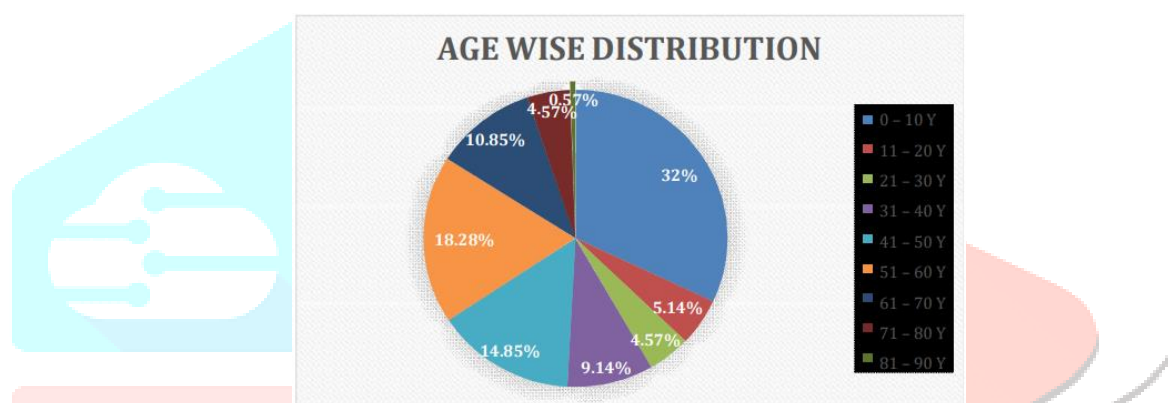


Figure 1: Age Wise Distribution

Among 175 patients, 112 Males (64%) are easily exposed to usage of antibiotic when compared to Females. whereas 63 Females (36%) are exposed to usage of antibiotics respectively. 91 patients (52%) were hospitalized for 5 – 7 Days followed by 50 patients (28.57%) were hospitalized for 2 – 4 Days followed 27 patients (15.42%) were hospitalized for 8 – 10 Days followed by 5 patients (2.85%) were hospitalized for 11 – 13 Days and remaining 2 Patients (1.14%) were hospitalized for 14 – 16 Days respectively. 112 Males (64%) are easily exposed to usage of antibiotic when compared to Females. whereas 63 Females (36%) are exposed to usage of antibiotics respectively.

91 patients (52%) were hospitalized for 5 – 7 Days followed by 50 patients (28.57%) were hospitalized for 2 – 4 Days followed 27 patients (15.42%) were hospitalized for 8 – 10 Days followed by 5 patients (2.85%) were hospitalized for 11 – 13 Days and remaining 2 Patients (1.14%) were hospitalized for 14 – 16 Days respectively. 70 patients (40%) were admitted in General Surgery Department followed by 60 patients (34.28%) were admitted in Pediatrics Department and other 45 patients (25.71%) were admitted in General Medicine Department respectively.

Prescribing pattern of Antibiotics:

27 patients (15.42%) were prescribed with 7 drugs per prescription followed by 26 patients (14.85%) were prescribed with 8 drugs per prescription followed by 24 patients (13.71%) were prescribed with 10 drugs per prescription and 1 patient (0.57%) was prescribed with 2 drugs per prescription respectively. Only 58 patients (33.14%) have the knowledge of antibiotics and other 117 patients (66.85%) don't have the knowledge of antibiotics respectively. 166 patients (94.85%) Adherence to prescription and other 9 patients (5.14%) Non-adherence to prescription respectively, as shown in figure 2, 3.

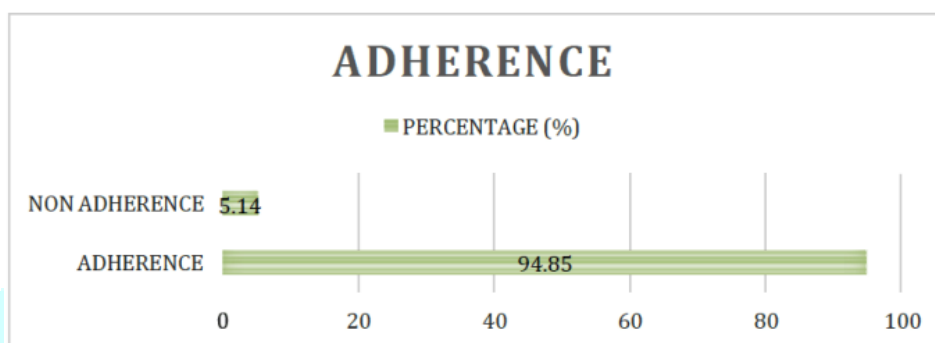


Figure 2: Adherence

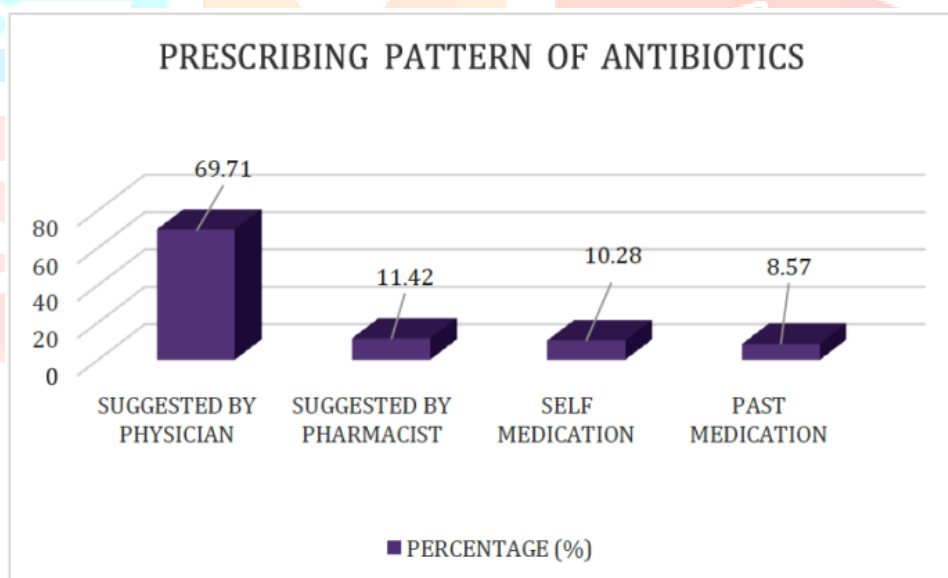


Figure 3: Prescribing pattern of Antibiotics

Out of 175 patients, more than 122 patients (69.71%) take antibiotics suggested by Physician followed 20 patients (11.42%) take antibiotic suggested by Pharmacist followed by 18 patients (10.28%) take antibiotics by Self Medication and remaining 15 patients (8.57%) take antibiotic from Past Medication respectively. 80 patients (45.71%) were prescribed with 1 antibiotic followed by 43 patients (24.57%) were prescribed with 2 antibiotics followed by 39 patients (22.28%) were prescribed with 3 antibiotics followed by 8 patients (4.57%) were prescribed with 4 antibiotics and 1 patient (0.57%) was prescribed with 5 antibiotics and remaining 4 patients were not prescribed with antibiotics respectively.

Physical Activity:

Out of 175 patients, 42 patients (24%) do their physical activity 3 Days/Week followed by 25 patients (14.28%) do their physical activity 5 Days/Week followed by 12 patients (6.85%) do their physical activity 7Days/Week and other 40 patients (22.85%) don't perform any physical activity and remaining 56 patients (32%) are Pediatrics under the age group of 0 – 10 Years were excluded in this study respectively, as shown in Figure 4. 19 patients (10.85%) face stress 3 Days/Week followed by 39 patients (22.28%) face stress 5 Days/Week followed by 61 patients (34.85%) face stress 7 Days/Week and remaining 56 patients (32%) were under the category Pediatrics with age group of 0 – 10 Years were excluded in this study respectively, as shown in Figure 5.

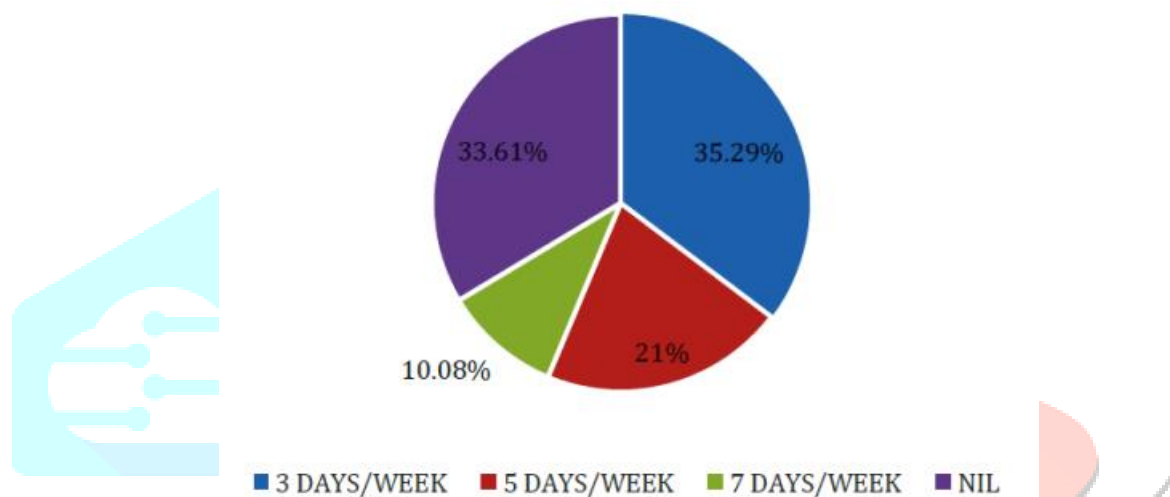


Figure 4: Physical Activity

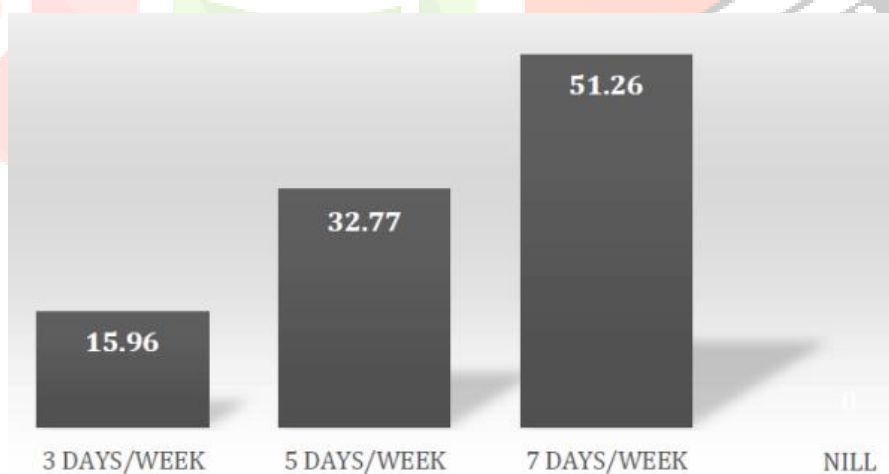


Figure 5: Reports on Stress

Categories Of Antibiotics Prescribed:

Among the 9 Categories of antibiotics prescribed, Cephalosporins 95 (40.25%) were the most commonly prescribed antibiotic, followed by Penicillin 51 (21.61%) followed by Nitroimidazoles 39 (16.52%) and the least prescribed antibiotic were Carbapenems 5 (2.11%) and Polypeptides 4 (1.69%) respectively. Out of 95 Cephalosporins the highest prescribed cephalosporins is Ceftriaxone 64 (67.36%) followed by cefotaxime 21 (22.10) and Cefoperazone + Salbactam 8 (8.42%) and least prescribed was cefaxone 2 (2.10) respectively. Out of 51 Penicillin antibiotics the most prescribed antibiotic was Amoxicillin + Clavulnic Acid that is 46 (90.19%) followed by Piperacillin + Tazobactam with 3 (5.88%) and least prescribed antibiotic is Ampicillin 2 (3.92%) respectively. Out of 14 Fluroquinolones the most prescribed antibiotic is Ciprofloxacin that is 12 (85.71%) and least prescribed fluroquinolones is Norfloxacin and Levofloxacin that is 1 (7.14%) respectively, as shown in Figure 6, 7.

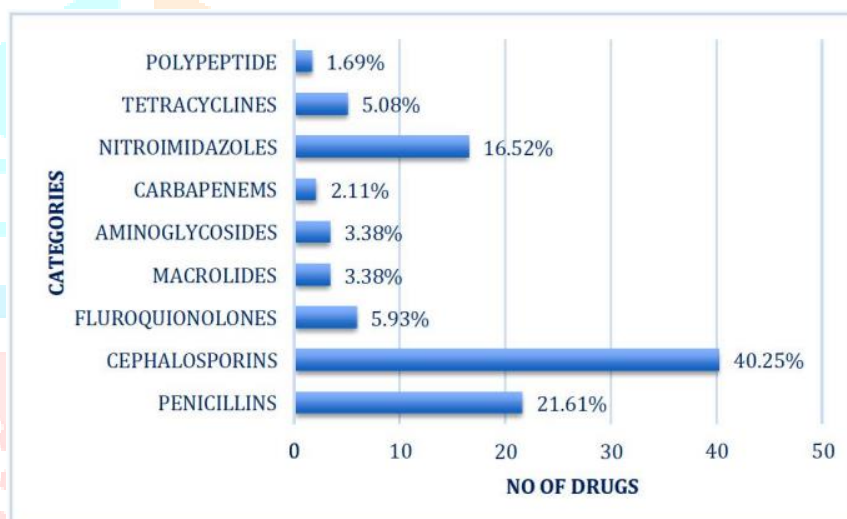


Figure 6: CATEGORIES OF ANTIBIOTICS PRESCRIBED

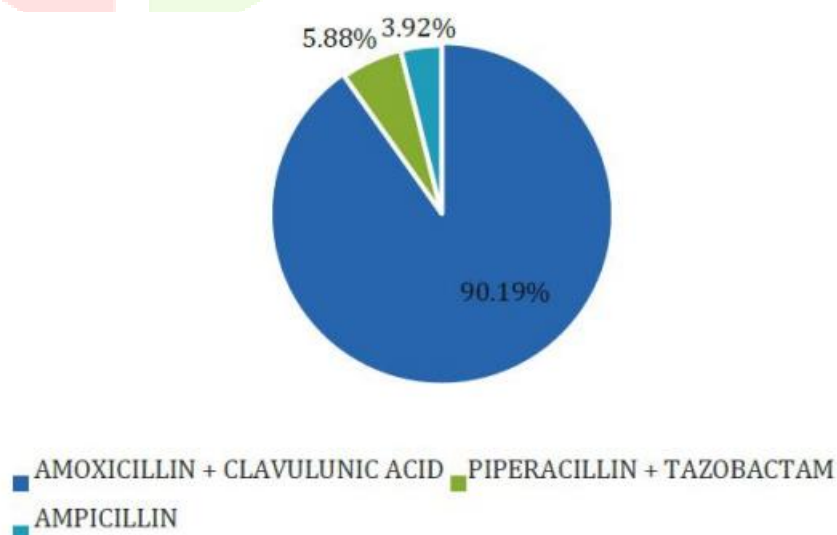


Figure 7: Penicillin

Out of 78 Other type of antibiotic Metronidazole used in 39 (50%) followed by Doxycycline 12 (15.38%) followed by Azithromycin and Amikacin 8 (10.25%) and followed by Vancomycin 4 (5.12%) and least is Linezolid 2 (2.56%) respectively, as shown in Figure 8, 9.

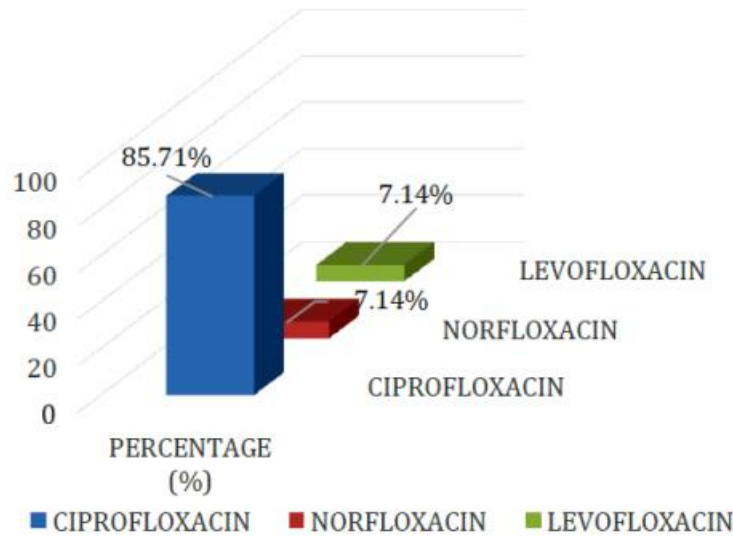


Figure 8: Fluroquinolones

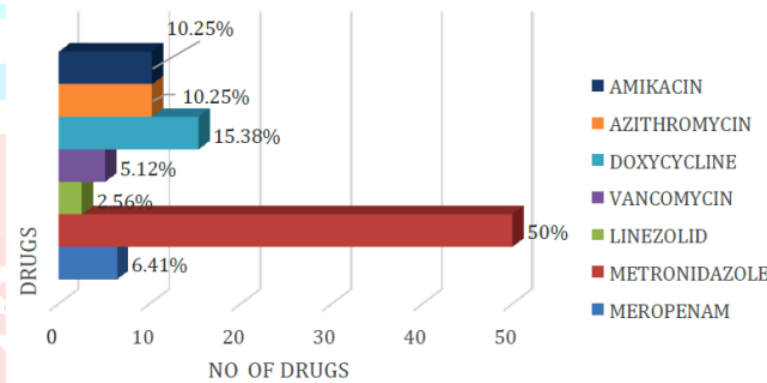


Figure 9: Other type of antibiotics

DISCUSSION:

In the present study a total 175 inpatients diagnosed by infectious diseases were considered in this study where 56 patients (32%) were under the age group of 0 – 10 Y followed by 32 patients (18.28%) were under the age group of 51 – 60 Y followed by 26 patients (14.85%) were under the age group of 41 – 50 Y followed by 19 patients (10.85%) were under the group of 61 – 70 Y followed by 16 patients (9.14%) were under the age group of 31 – 40 Y followed by 9 patients (5.14%) were under the age group of 11 – 20 Y followed by 8 patients (4.57%) were under the age group of 21 – 30 Y, 71 – 80 Y and 1 patient (0.57%) was under the age group of 81 – 90 Y respectively which were similar to study done by G.Sireesha et.al., studies.[7, 8] Among 175 patients out of which Males 112 patients (64%) suffering from infections were more than Females 63 patients (36%) respectively, this is due to weak humoral and cellular immune responses in males makes them more susceptible to infections which is similar

to the findings of R.P. Priyadarshini et.al.[9] In this case study, the duration of hospitalization was from 2 – 16 Days, where most of the patients were hospitalized for 5 – 7 Days was 91 patients (52%) followed by 50 patients (28.57%) were hospitalized for 2 – 4 Days followed 27 patients (15.42%) were hospitalized for 8 – 10 Days followed by 5 patients (2.85%) were hospitalized for 11 – 13 Days and remaining 2 Patients (1.14%) were hospitalized for 14 – 16 Days respectively which is Dissimilar to Abhishek Pradhan et.al., study.[37] In the present study among 175 patients, 70 patients (40%) were admitted in General Surgery Department followed by 60 patients (34.28%) were admitted in Paediatrics Department and other 45 patients (25.71%) were admitted in General Medicine Department respectively which is not similar to findings of Palikhe, N et.al., study.[10] Out of 175 Prescriptions, 27 patients (15.42%) were prescribed with 7 drugs per prescription followed by 26 patients (14.85%) were prescribed with 8 drugs per prescription followed by 24 patients (13.71%) were prescribed with 10 drugs per prescription and 1 patient (0.57%) was prescribed with 2 drugs per prescription respectively which is opposite to the finding of James Prah et.al., study.[11]

Among only 58 patients (33.14%) have the knowledge of antibiotics whereas the other 117 (66.85%) don't have the knowledge about the antibiotic respectively which is opposite to the study of Ali Hassan et.al.,[12] Out of 175 patients, 166 patients (94.85%) Adherence to prescription and other 9 patients (5.14%) Non-Adherence to prescription respectively. In present case study of 175 patients, more than 122 patients (69.71%) take antibiotics suggested by Physician followed 20 patients (11.42%) take antibiotic suggested by Pharmacist followed by 18 patients (10.28%) take antibiotics by Self Medication and remaining 15 patients (8.57%) take antibiotic from Past Medication respectively. In the study Out of 175 patients who received the antibiotic for the treatment of infection where, 80 patients (45.71%) were prescribed with 1 antibiotic followed by 43 patients (24.57%) were prescribed with 2 antibiotics followed by 39 patients (22.28%) were prescribed with 3 antibiotics followed by 8 patients (4.57%) were prescribed with 4 antibiotics and 1 patient (0.57%) was prescribed with 5 antibiotics and remaining 4 patients were not prescribed with antibiotics respectively where this information correlates with the study Palikhe N et.al., study[13] Out of 175 patients, 42 patients (24%) do their physical activity 3 Days/Week followed by 25 patients (14.28%) do their physical activity 5 Days/Week followed by 12 patients (6.85%) do their physical activity 7 Days/Week and other 40 patients (22.85%) don't perform any physical activity and remaining 56 patients (32%) are Pediatrics under the age group of 0 – 10 Years where excluded in this study respectively. Out of 175 patients, 19 patients (10.85%) face stress 3 Days/Week followed by 39 patients (22.28%) face stress 5 Days/Week followed by 61 patients (34.85%) face stress 7 Days/Week and remaining 56 patients (32%) were under the category Pediatrics with age group of 0 – 10 Years were excluded in this study respectively. Among the 9 Categories of antibiotics prescribed, Cephalosporins 95 (40.25%) were the most commonly prescribed antibiotic, followed by Penicillin 51 (21.61%) followed by Nitroimidazoles 39 (16.52%) and the least prescribed antibiotic were Carbapenems 5 (2.11%) and Polypeptides 4 (1.69%) respectively, this is due to the fact that it covers majority of the suspected microorganisms this data correlates with the study of Gamal Kenawy et, al.,[41] Out of 95 Cephalosporins the highest prescribed cephalosporins is Ceftriaxone 64 (67.36%) followed by cefotaxime 21

(22.10) and Cefoperazone + Salbactam 8 (8.42%) and least prescribed was cefaxone 2 (2.10) respectively. Out of 51 Penicillin antibiotics the most prescribed antibiotic was Amoxicillin + Clavulonic Acid that is 46 (90.19%) followed by Piperacillin + Tazobactam with 3 (5.88%) and least prescribed antibiotic is Ampicillin 2 (3.92%) respectively. Out of 14 Fluroquinolones the most prescribed antibiotic is Ciprofloxacin that is 12 (85.71%) and least prescribed fluroquinolones is Norfloxacin and Levofloxacin that is 1 (7.14%) respectively. Out of 78 Other type of antibiotic Metronidazole used in 39 (50%) followed by Doxycycline 12 (15.38%) followed by Azithromycin and Amikacin 8 (10.25%) and followed by Vancomycin 4 (5.12%) and least is Linezolid 2 (2.56%) respectively. In total number of 236 antibiotics the most prescribed antibiotic was Ceftriaxone 64 (67.36%) followed by Amoxicillin + Clavulonic Acid 46 (90.19%) followed by Metronidazole 39 (50%) And the least prescribed drug is Linezolid 2 (2.56%) followed by Norfloxacin ad Levofloxacin 1 (7.14%) respectively because Ceftriaxone is used to treat many infections as it acts as broad spectrum of antibiotics which is similar to study of H. Doddayya et.al.[14]

CONCLUSION:

Antibiotics are among the class of drugs with the most potential impact on preventable mortality. The demand for the antibiotics in the treatment of various infections is increasing rapidly due to the development of resistance of the microorganisms towards antibiotics. Out of 175 patients analyzed from 3 different inpatient department of General Surgery, General Medicine, Paediatrics. More than 32% of the patients were admitted in paediatrics and administered with antibiotics. More over males are highly prone to infectious diseases and also frequently exposed to antibiotics. This case study also provides a detailed information regarding about the knowledge of antibiotics in public. Antibiotic category of cephalosporins were highly prescribed among the patients followed by penicillin respectively. The government should take a necessary measure to create an awareness program/campaign to educate the people regarding the antibiotic usage, problems associated with frequent usage of antibiotics.

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