Open Access Journal

Indian Journal of Medical Research and Pharmaceutical Sciences

January 2016; 3(1) ISSN: ISSN: 2349-5340

Impact Factor (PIF): 2.672

STUDY OF PRESCRIBING PATTERN OF ANTIBIOTICS IN THE MANAGEMENT OF VARIOUS INFECTIOUS DISEASES IN WARANGAL REGION

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Keywords: *Mono, dual, triple, ceftriaxone, salbactum, comorbiditis, prophylactic, empirical, definitive*

Abstract

The main objective of the study is to assess the prescribing patterns of antibiotics Prescribing frequency of Antibiotics according to Diagnosis, Mono therapy / Dual therapy / Triple therapy & their treatment outcomes& to know prescribing frequency of Emperical, prophylactic or definative therapy of antibiotics in the management of various infectious diseases. This is a prospective observational study conducted in Warangal hospital, Vishwas super specialty hospital, Varma Chest hospital, SVR Multi specialty hospital & Adithya hospitals of Warangal region between march 2014 and September 2014. Data was obtained from patient's interviews and medical records of 200 patients admitted in the hospital. Of the 200 patients studied the predominant age group was 30-40years (22%).The most frequent infectious diseases are Gastrointestinal infections in 41 patients is 20% and Urinary tract infections in 41 patients is 20% and the least was skin infection(Herpes Zoaster) standing with 1%. And the most frequently used antibiotics belongs to the class of cephalosporins (45.37%) , flouroquinolones -ofloxacin & ciprofloxacin (14.09%) anti anerobics-metronidazole & ornidazole (12.33%) followed by pencillins-amoxacillin & ampicillin (11.89%) and tetracyclines –doxycycline (9.471%). Studies revealed that 63 patients (32%) are treated with triple and 63 patients (31%) with dual therapy followed multiple therapy 52 patients (26%) and mono therapy 22 patients (11%). In mono therapy the most frequently used antibiotics were ceftriaxone with 13 patients (59%) and ofloxacin with 3 patients (14%). In dual therapy two types are being prescribed as (Dual combination therapy) in 37 patients and individual therapy (mono + mono) in 26 patients of which in dual combination therapy. In triple (Dual + mono) therapy (cefoperazone + salbactam) combination with doxycycline is the most frequently prescribed drug in 7 patients (18%) and (cefoperazone + salbactam) + ofloxacin combination in 3 patients (8%). In our study multiple therapy was prescribed in about 52 patients of which (amoxicillin and clavulanicacid)+(ceftriaxone + tazobactam) combination was used in about 2 patients (4%). Present study reveals that definitive therapy was prescribed in 164 patients (82%) following prophalytic therapy in 26 patients (13%) and empirical therapy in 10 patients.

Introduction

The term antibiotic is used as a synonym for antibacterial used to treat bacterial infections in both people and animals.[1]

A chemical substance that is important in the treatment of infectious diseases, produced either by a micro-organism or semi-synthetically, having the capacity in dilute solution to either kill or inhibit the growth of certain other harmful microorganisms without significant toxicity to the human or animal host.[1]

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The term antibiotic was first used in America in the 1700s and was unrelated to its current use. First use to describe compounds that killed micro-organisms was in France in the 1800's, and antibiotic defined by Pierre Vaillemin in 1890 as any compound or chemical injurious or destructive to living matter, especially microorganisms.
Its first defined use as a noun was by Waksman (the discoverer of streptomycin) in the 1940's, which emphasized two key defining properties that have influenced revised definitions that followed. These properties were that (a) the compound was produced naturally by micro-organisms or prepared synthetically & semi synthetically (b) and exerts its effect by direct interaction with a micro-organism.

Antibiotics are the first line of defense against many infections. Since penicillin was introduced in the 1940's, scientists have developed more than 150 antibiotics to help stop the spread of infectious diseases.
The ability of antibiotics to cure previously fatal infectious diseases has led to the notion that they are 'miracle drugs' with 'powers' that widely exceed those which can be attributed to their actual pharmacological properties. In most developed countries, antibiotics are the second most widely used class of drugs after simple analgesics.

Duration of Antibiotic Therapy

The duration of antibiotic therapy needs to be sufficient to control the bacterial infection and prevent relapse. When optimising therapy for an infection, consider the person's immune status, the infecting agent and the focus of infection.
The optimal duration of antibiotic therapy for many infections is well defined, such as for UTIs and pneumonia.

Longer exposure to antibiotics can contribute to resistance:

Several trials have demonstrated that longer antibiotic therapy encourages the development or acquisition of antibiotic-resistant organisms.
Longer exposure also appears to have risks and harms for the patient, such as:

- Increased risk of adverse effects from antibiotic therapy, such as diarrhoea, nausea and vomiting.
- Difficulties with adherence.
- Costly treatment for some antibiotics.

Stopping antibiotics before end of recommended treatment:

Non-adherence with antibiotic therapy may be more common than most General practitioners realise. If a person takes an inadequate course of antibiotics, they may relapse and require further treatment. This increases the risk of developing resistance, as it would expose the person to antibiotics for longer.**GENERAL PRINCIPLES OF**

General principles of antibiotic prescribing

1. Only prescribe antibiotics for bacterial infections if:
    - Symptoms are significant or severe
    - There is a high risk of complications
    - The infection is not resolving or is unlikely to resolve
2. Use first-line antibiotics first
3. Reserve broad spectrum antibiotics for indicated conditions only

The following information is a consensus guide. It is intended to aid selection of an appropriate antibiotic for typical patients with infections commonly seen in general practice. Individual patient circumstances and local resistance patterns may alter treatment choices.[2]

Selection of the Appropriate Antibiotic Depends On

1. Knowledge of organism's natural resistance
2. Pharmacological properties of the antibiotic toxicity, binding, distribution, absorption
   achievable levels in blood, urine
3. Previous experience with same species
4. Nature of patients underlying pathology

5. Patient's immune status

What is an ideal antibacterial

• Selective target – target unique
• Bactericidal – kills
• Narrow spectrum – does not kill normal flora
• High therapeutic index – ratio of toxic level to therapeutic level
• Few adverse reactions – toxicity, allergy
• Various routes of administration – IV, IM, oral
• Good absorption
• Good distribution to site of infection and Emergence of resistance is slow

Methods of antibiotic prescribing

Antibiotics are prescribed for three reasons:

- **Prophylaxis** – where administration is designed to prevent serious infection in a defined at-risk situation
- **Empiric therapy** – where a clinical syndrome that may be due to infection is managed before evidence confirming the presence of infection or its cause is available
- **Directed therapy** – where antibiotics are aimed at micro-organisms which have been confirmed as the cause of an infection.
- For each type of therapy, there are principles that aim to minimize the use of antibiotics and also ameliorate the selection of antibiotic resistance.[3]

A) Prophylaxis:

- Successful prophylactic antibiotic use depends on three principles.
- The individual patient should be at high risk of infection, the likely infecting organisms and their susceptibilities should be known, and prophylaxis should only be administered at the time of risk
  An example is the management of contacts of a case of meningococcal meningitis, who should be offered chemoprophylaxis at the time of greatest risk of developing the
  infection (rifampicin or ciprofloxacin is commonly used).
- Lengthy prescriptions, such as before and after surgery, provide no additional protection and may promote selection of resistant organisms.

B) Empirical Therapy:

Treatment of existing infections Choice of empirical therapy:

- An initial clinical assessment allows the pathology to be defined and a reasonable estimate of the likely infecting organism.
  For example, community acquired pneumonias in immune competent hosts are usually caused by a relatively small pool of organisms which includes S. pneumoniae.
- Other important clinical factors include the severity of illness, immune status of the patient and other co-morbidities, and infected prosthetic implants such as joint replacements or prosthetic valves.
- Infections associated with prosthetic materials are more difficult to eradicate without first removing the device.
- Before commencing antibiotic therapy, it is vitally important to obtain appropriate samples for culture. Once antibiotics have been administered, culture and sensitivity
  Information is difficult to obtain, as the responsible organism may not proliferate in the laboratory.
- Suspected cases of meningitis are an exception to this rule. A first dose of antibiotic should be given as soon as the diagnosis is considered, as it has been demonstrated that delays before the administration of antibiotics increase the risk of mortality.

Broad spectrum vs narrow spectrum:

- **Broad-spectrum antibiotics** such as b-lactam / b-lactamase inhibitor combinations (co-amoxiclav and piperacillin–tazobactam), third generation cephalosporins, quinolones, and carbapenems are useful for initial empirical therapy in critically ill patients.
- They allow a greater range of pathogens to be covered, but should be altered to a more targeted therapy once culture and susceptibility reports are available.
- Broad-spectrum agents are more likely to lead to selection of resistant organisms, including fungi, and some agents, particularly third-generation cephalosporins and quinolones have the propensity to cause antibiotic-associated diarrhoea.
- **Narrow spectrum agents** (e.g. penicillin, trimethoprim and flucloxacillin) are preferred, where possible, as they are less likely to provoke the development of resistance and are less likely to be associated with Clostridium difficile.[2]

Duration of empiric therapy:

- In hospital, the patient should be reassessed after 24–48 hours of empiric antibiotic therapy to decide whether infection is unlikely (cease therapy) or whether a firm diagnosis can be made (modify therapy as appropriate.
- In community practice, as a general rule, the minimum duration of treatment recommended in Therapeutic Guidelines: Antibiotic should be prescribed

C) Directed therapy:

- When the cause of an infection is confirmed, antibiotic therapy is aimed at those micro-organisms. The confirmation may come from clinical or pathological information.
- Microbiological confirmation is preferred as it gives the greatest assurance that the correct antibiotic drug has been chosen.
- The involvement of a specific pathogen may be implied by evidence from microscopy, culture or direct detection through nucleic acid amplification.
- For example, a sputum sample obtained from a patient with community-acquired pneumonia may grow *Streptococcus pneumoniae*, and it is then the clinician's job to choose the best antibiotic regimen to treat the pneumonia. The prescribed regimen would be referred to as **definitive therapy** because the causative organism is known.

Therapeutic Guidelines:

- Antibiotic provides evidence-based recommendations for directed therapy for common infections.
- Correct selection of the antibiotic drug, its dosage and route are crucial to minimizing the emergence of resistance during therapy.
- For instance, the common practice of prescribing prolonged (more than 10 days) monotherapy with oral ciprofloxacin for Pseudomonas aeruginosa respiratory infection usually leads to stable high level ciprofloxacin resistance in this organism.
  Another common pitfall is the use of oral monotherapy with rifampicin, fusidic acid or ciprofloxacin for infections due to MRSA, as resistance usually emerges during treatment. In both these circumstances, more resistant bacteria are created that frequently cause therapeutic difficulty in the patient or indeed another person who acquires the resistant strain from the treated patient.

Materials and methods

- **Data collection:**
  The following details of the patients admitted to medical wards will be collected and documented in suitably designed data collection form.

A) The patient's demographic data such as age,gender.

B) Disease specific information like present complaints, medical and medication history, current medication, Currently prescribed antibiotics, Reason for indication.
C) Diagnosis.
- Separation of data which is related to antimicrobial agents (treatment).

1. Study population:
200 patient data cards were collected.

2. Criteria:

Inclusion criteria:
- 18years of age to 90 years.
- In patients of either sex of any age undergoing treatment with different of the classes of Antibiotics.

Exclusion criteria:
- Patients who are not prescribed with antibiotics.
- Patients of either sex of any age undergoing treatment in emergency department.
- The out patients are not included in the study.

3. Locus of the study:
Warangal Hospital,Vishwas Hospital,Varma Hospital,SVR Hospital Adithya Hospital.

4. Plan of the study:
- **1 month**
  Literature collection.
- **15 days**
  Study site selection and obtaining permission.
- **15 days**
  Methodology development.
- **3 months**
  Collection of data from the patients and assessment of data .
- **1 month**
  Dissertation writing .

Results
- Present study mainly aimed at assessing the prescribing patterns of antibiotics in the management of various infectious diseases in 200 in patients were included in the study and prescribing patterns are studied in them.

Table 1: Gender distribution

Gender	Males	Females
No. of patients	114	86

Indian Journal of Medical Research and Pharmaceutical Sciences
January 2016; 3(1) ISSN: ISSN: 2349-5340
Impact Factor (PIF): 2.672

Figure 1: Represents percentage Gender distribution

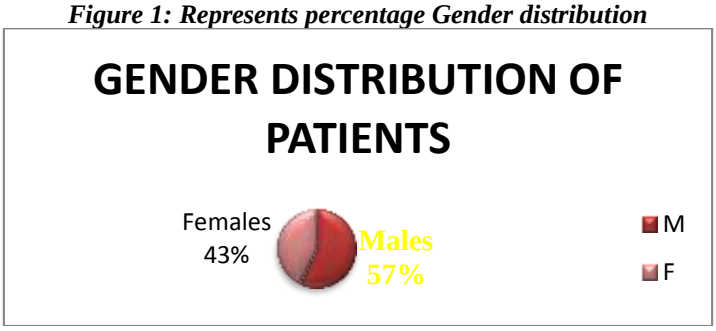

Table 2: Age wise Distribution of patients

AGE	NO.OF PATIENTS	PERCENTAGE (%)
<20	17	7
20-30	53	21
30-40	54	22
40-50	43	17
50-60	25	10
60-70	28	11
70-80	17	7
80-90	10	4
90-100	1	1

Figure 2: Represents percentage Age wise distribution of patients

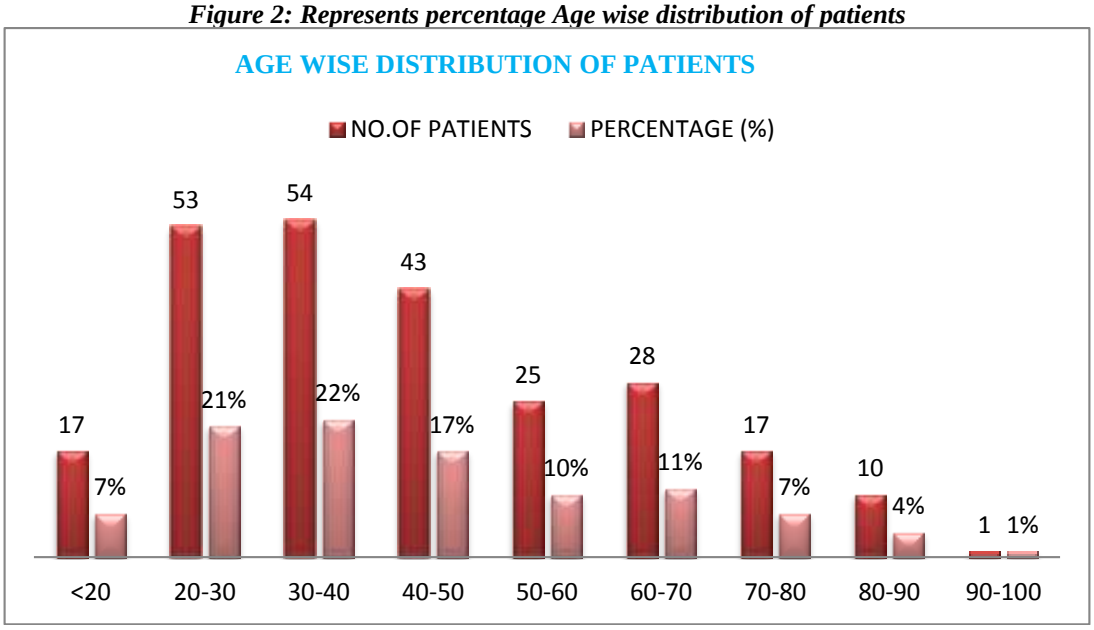

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Table 3: Infectious diseases

SL.NO.	INFECTIOUS DIEASES	NO. OF PATIENTS	PERCENTAGE (%)
1	Gastroenteritis	41	20 %
2	Urinary tract infection	41	20 %
3	Typhoid	22	11 %
4	Pneumonia	23	11 %
5	Malaria	19	9 %
6	Hepatitis	19	10 %
7	Tuberculosis	11	6 %
8	Lower respiratory tract infection	10	5 %
9	Dengue	9	5 %
12	Tubercular meningitis & meningitis	2	1 %
13	Dysentery	2	1 %
14	Herpes zoaster	1	1 %
15	TOTAL	200	100%

Figure 3: Represents percentage no. of patients with Infectious diseases

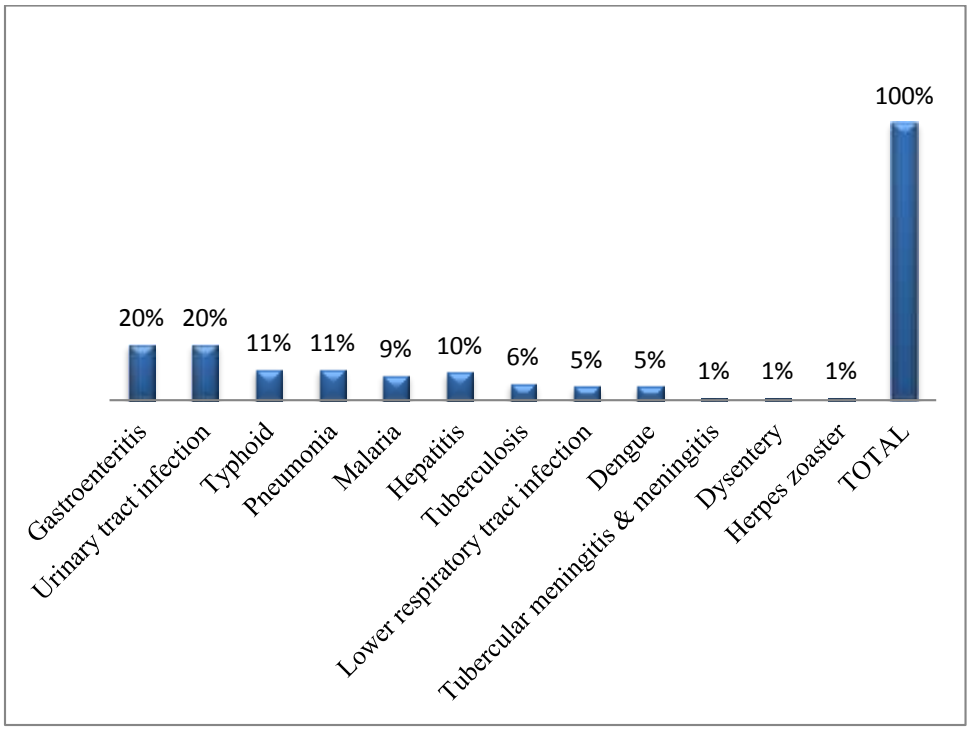

Table 4: Comorbiditis:

COMORBIDITIS	NO .OF PATIENTS	PERCENTAGE (%)
NO	103	51
SINGLE	52	26
DUAL	30	15
MULTIPLE	15	8
TOTAL	200	100

Figure 4: Represents Percentage No. of patients with different Comorbiditis

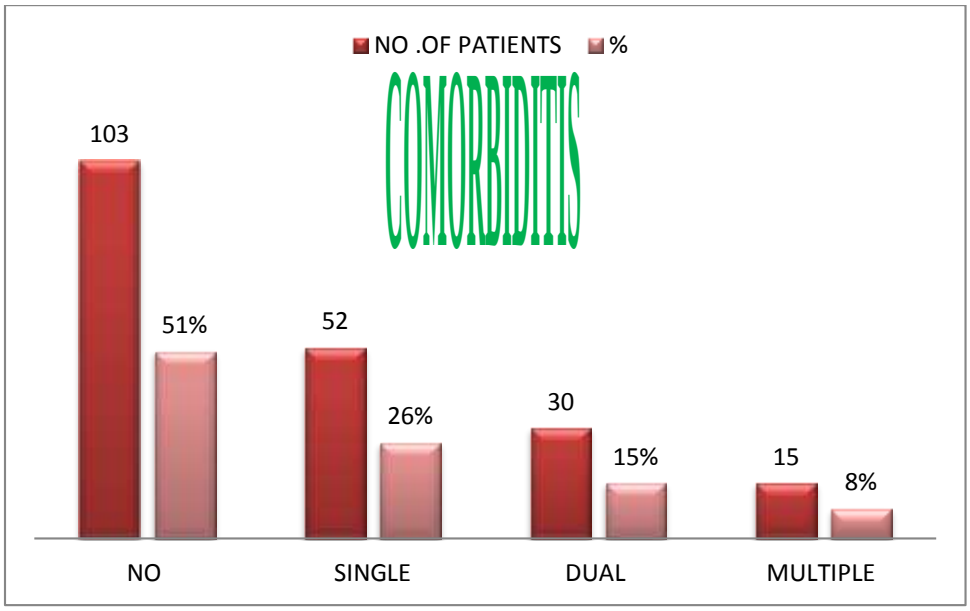

Table 5: Department wise prescribing percentage of antibiotics

DEPARTMENT	NO. OF PATIENTS	PERCENTAGE
Gastroenterology	62	31
General medicine	52	26
Pulmonology	44	22
Kidney & Urology	40	20
Neurology	2	1
TOTAL	200	100

Figure 5: Department wise prescribing percentage of antibiotics

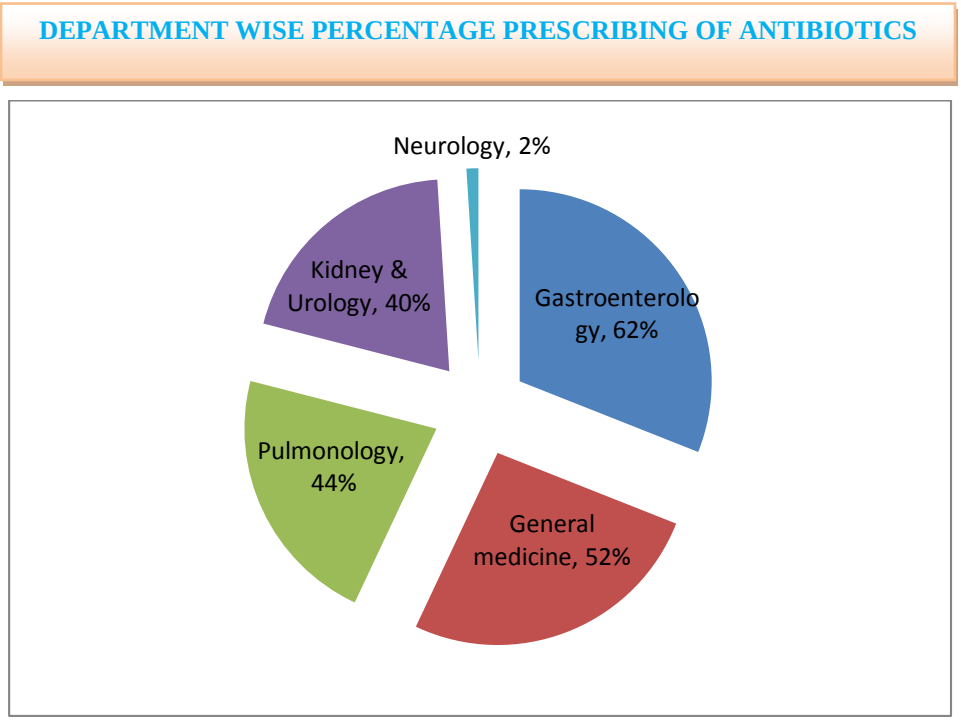

Table 6: Day wise Antibiotics therapy & Total percentage use of antibiotics

SL. NO.	ANTIBIOTIC	1ST DAY	2ND DAY	3RD DAY	4TH DAY	5TH DAY	6TH DAY	TOTAL	%	CLASS
1	Metronidazole	1	38	12	3			54	11.89	AA
2	Ceftriaxone	49		1	2	1		53	11.67	IIIC
3	Ofloxacin	26	20	3	2	1		52	11.45	FQ
4	Cefaperazone+Salbactum	41	4					46	10.13	IIIC+BLI
5	Doxcycline	1	32	8	2			43	9.47	T
6	Piperacillin+ Tazobactum	24		3	1			28	6.16	P+BLI
7	Rifamixin		3	18	4			25	5.50	NSA
8	Amoxicillin+ clavulanic acid	9	5	3				17	3.74	P+BLI
9	Azithromycin	7	4	4	1			16	3.52	M
10	Cefuroxime		1	8	2		1	12	2.64	IIC
11	Ceftriaxone+ salbactum	12						12	2.64	IIIC+BLI
12	Ceftriaxone +salbactum	9	1					10	2.20	IIIC+BLI
13	Amikacin	1	3	1	3			8	1.76	AG
14	Amoxacillin	2	2	1	3			8	1.76	P
15	Cefixime	1	4	1	1			7	1.54	IIIC

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16	Ofloxacin+ ornidazole	3	1	2		1		7	1.54	FQ+AA
17	Cefpodoxime		5	1				6	1.32	IIIC
18	Linezolid		5		1			6	1.32	OX
19	Levofloxacin	1	3	1				5	1.10	FQ
20	Clindamycin		2	2				4	0.88	L
21	Mofloxacin	1		1		1		3	0.66	FQ
22	Meropenem	2		1				3	0.66	CBPNM
23	Cefipime+ tazobactum	3						3	0.66	IVC+BLI
24	Cilastatin+ imepenem	1		1				2	0.44	CBPNM
25	Clarithromycin	1			1			2	0.44	M
26	Ciprofloxacin	1			1			2	0.44	FQ
27	Cefipime		2					2	0.44	IVC
28	Clarithromycin		1	1				2	0.44	M
29	Ornidazole		2					2	0.44	AA
30	Cefditoren pivoxil				2			2	0.44	IIIC
31	Faropenem					2		2	0.44	CBPNM
32	Norfloxacin+ Tinidazole				1			1	0.22	FQ+BLI
33	Cefuroxime+Clavulanic acid				1			1	0.22	IIC+BL
34	Meropenem+ sulbactum			1				1	0.22	CBPNM +BLI
35	Pefloxacin		1					1	0.22	FQ
36	Pencillin		1					1	0.22	P
37	Aztreonam		1					1	0.22	MNBC
38	Sulfamethoxazole +Trimethoprim	1						1	0.22	S
39	Cefaperazone+Tazobactum	1						1	0.22	IIIC+BLI
40	Cefaperazone	1						1	0.22	IIIC
41	Cefotaxime+ Salbactum	1						1	0.22	IIIC+BLI

Figure 6: Represents total percentage use of antibiotics

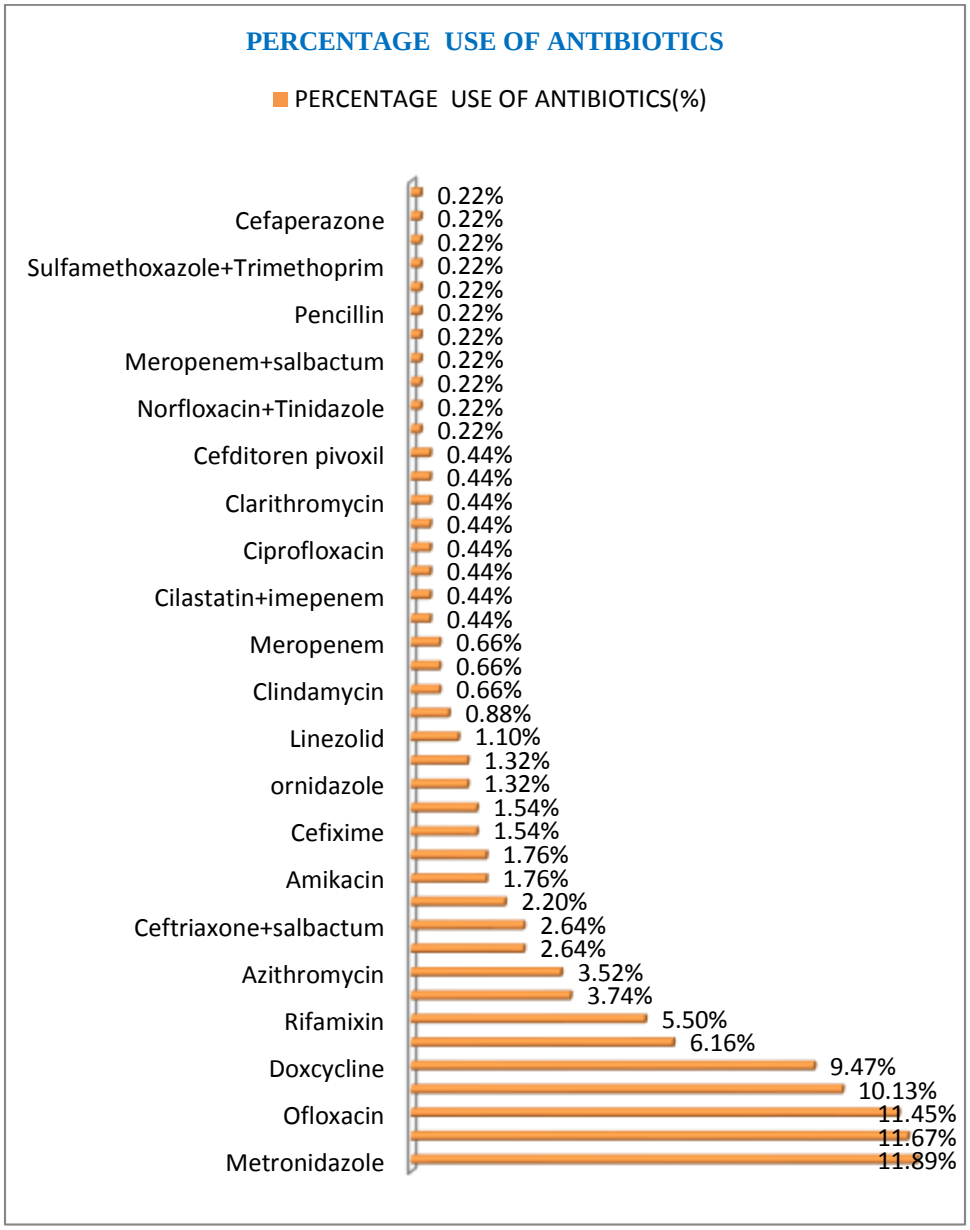


Table 7: Represents percentage use of various classes of antibiotics

S.NO	ANTIBIOTIC CLASS	PERCENTAGE USE (%)
1.	Cephalosporins	45.37 %
2.	Flouroquinolones	14.09 %
3.	Anti anerobic (anti-amoebic)	12.33 %
4.	Pencillins	12.33 %
5.	Tetracyclines	9.47 %
6.	Non synthetic antibiotic	5.50 %

7.	Aminoglycosides	1.76 %
8.	Carbapenem	1.76 %
9.	Oxazolidine dione	1.32 %
10.	Lincosamines	0.88 %
11.	Macrolides	0.44 %
12.	Monobactums	0.22 %
13.	Sulphonamides	0.22 %

Figure 7: Represents percentage use of various classes of antibiotics

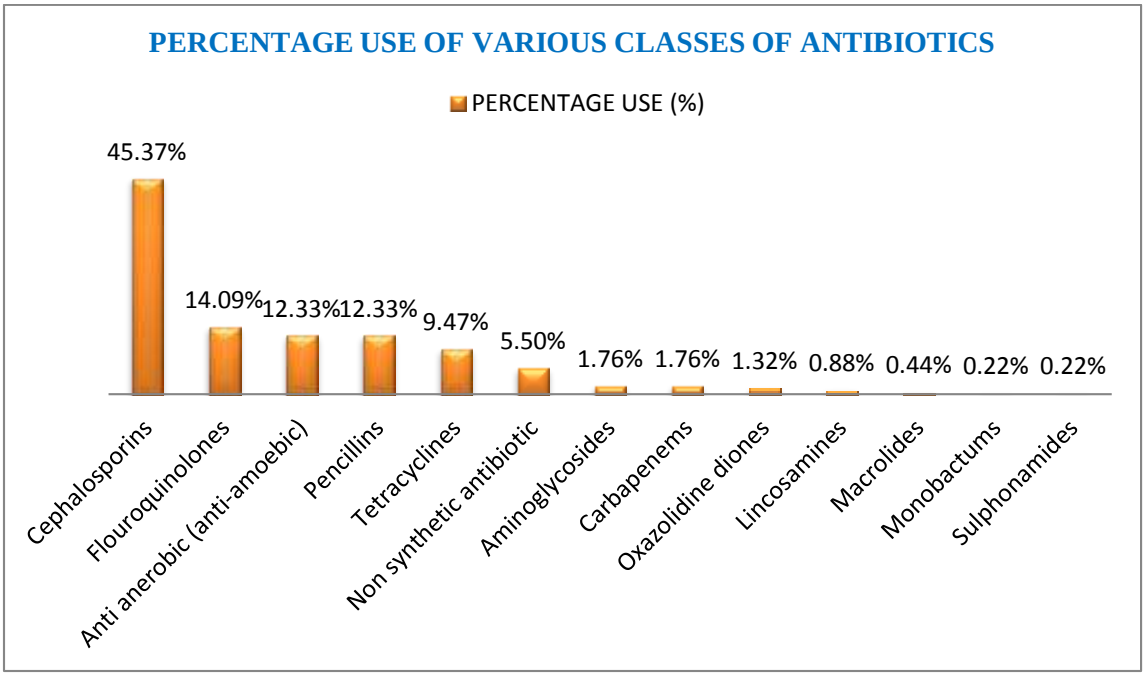


Table 8: Type of therapy

TYPE OF THERAPY	NO.OF PATIENTS	PERCENTAGE NO.OF PATIENTS (%)
MONO	22	11
DUAL	63	31
TRIPLE	63	32
MULTI	52	26
TOTAL	200	100

Figure 8: Represents percentage No. of patients with Type of therapy

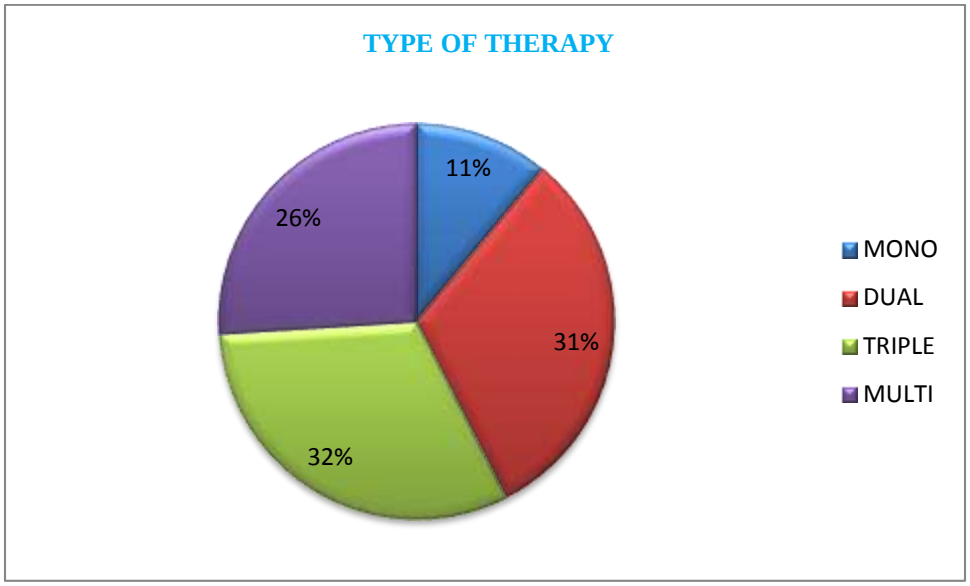


Table 9: Monotherapy

DRUG	CATEGORY	DOSE	NO .OF PATIENTS	PERCENTAGE (%)
CTX	IIIC	1 gr	13	59
O	FQ	200 mg	3	14
ATZ	M	500 mg	2	9
CLTM	M	500mg	1	5
AM	P	1gr	1	5
MTZ	A.A	500mg	1	4
CO	FQ	200mg	1	4
TOTAL			22	100%

Figure 9: Represents percentage No. of patients on Monotherapy

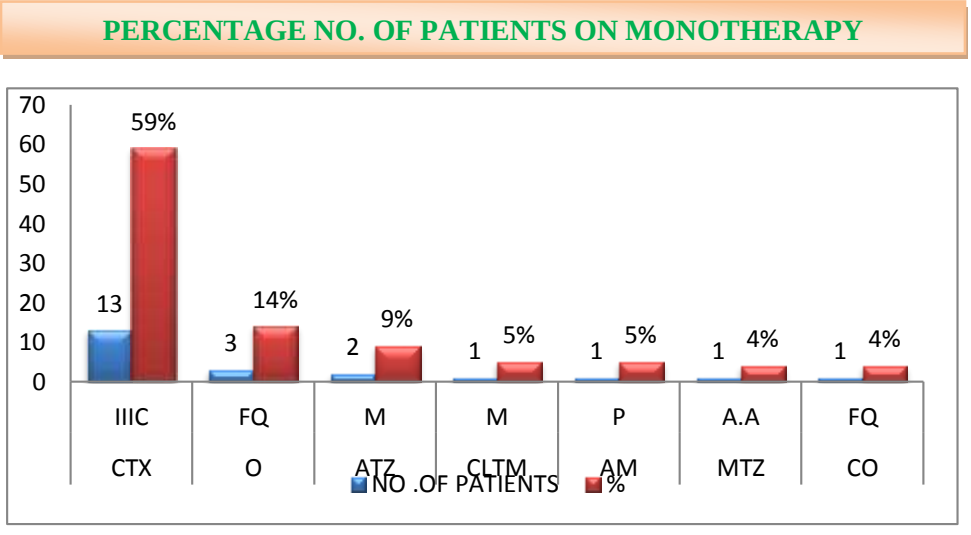


Table 10: Dual therapy (combination)

DRUG	CATEGORY	DOSE	NO .OF PATIENTS	PERCENTAGE (%)
(CPZ+SLB)	IIIC+BLI	1.5GR(8),3GR(2),2GR(1)1GR(5)	16	43
(CTX+TZB)	IIIC+BLI	1.5GR(4),1.25GR(1),1GR(1)	6	16
(AM+CA)	P+BLI	1.25 GR(4),625MG(1)	5	14
(CTX+SLB)	IIIC+BLI	1.5GR(3),1GR(1)	4	11
(PPC+TZB)	P+BLI	4.5GR	3	8
(O+ODZ)	FQ+AA	200+500MG	2	5
(CPZ+TZB)	IIIC+BLI	1.5GR(1)	1	3
TOTAL			37	100

Figure 10: Represents % No.of patients Dual therapy (combination)

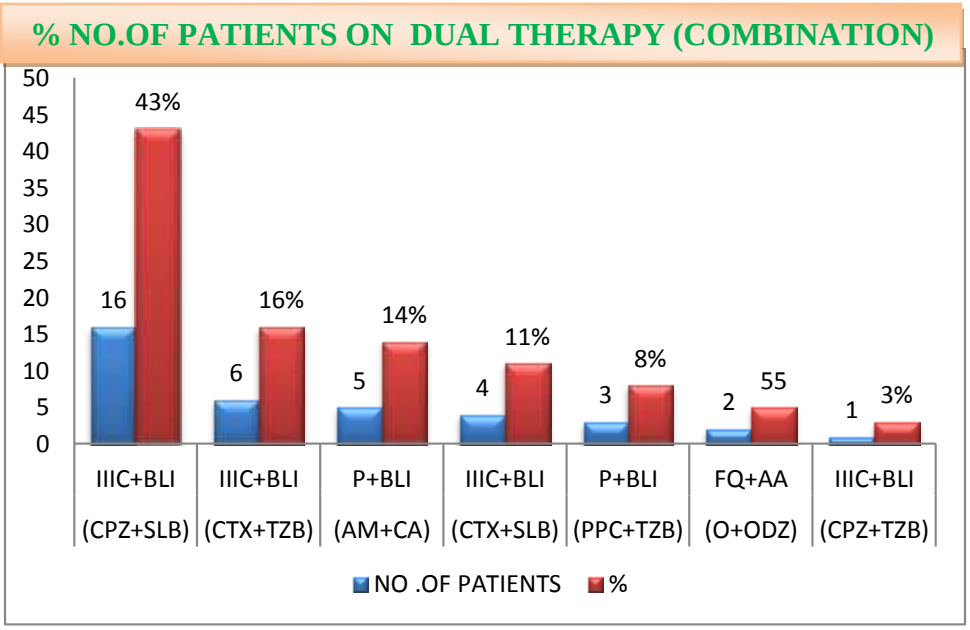


Table 11: Dual individual therapy (Mono+Mono)

SL.NO.	DRUG 1	CATEGORY	NO .OF PATIENTS	PERCENTAGE (%)
1.	CTX+DOX	IIIC+T	8	30
2.	O+MTZ	FQ+AA	5	19
3.	CTX+CFP	IIIC+IVC	2	7
4.	CPZ+DOX	IIIC+T	1	4
5.	CTX+ATZ	IIIC+M	1	4
6.	CTX+CFX	IIIC+IIIC	1	4
7.	CTX+CPDX	IIIC+IIIC	1	4
8.	ATZ+CFX	M+IIIC	1	4
9.	CTX+MTZ	IIIC+AA	1	4
10.	CTX+PEN	IIIC+P	1	4

11.	O+DOX	FQ+T	1	4
12.	MRP+LNZ	CBPNM+OX	1	4
13.	O+RFX	FQ+NSA	1	4
14.	O+ODZ	FQ+AA	1	4
	TOTAL		26	100

Figure 11: Represents % No. of patients on Dual individual therapy (Mono + Mono)

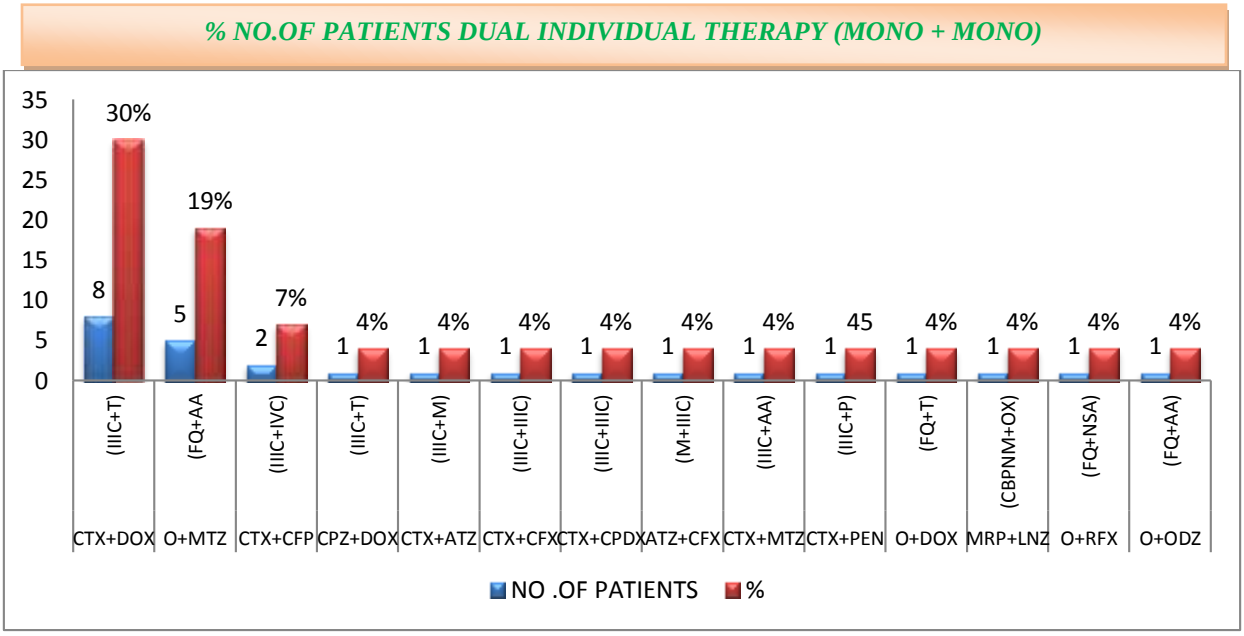


Table 12: Triple therapy (DUAL +MONO)

SL.NO.	DRUG (COMBINATION+D1)	CATEGORY	NO .OF PATIENTS	PERCENTAGE (%)
1.	(CPZ+SLB)+DOX	(IIIC+BLI)+T	7	18
2.	(CPZ+SLB)+O	(IIIC+BLI)+FQ	3	8
3.	(PPC+TZB)+O	(P+BLI)+FQ	3	8
4.	(PPC+TZB)+MTZ	(P+BLI)+AA	3	8
5.	(AM+CA)+MTZ	(P+BLI)+AA	2	5
6.	(CTX+SLB)+DOX	(IIIC+BLI)+T	2	5
7.	(CPZ+SLB)+CPDX	(IIIC+BLI)+IIIC	2	5
8.	(AM+CA)+CTX	(AM+CA)+IIIC	2	5
9.	(CFP+TZB)+DOX	(IV+BLI)+T	1	3
10.	(CFT+SLB)+O	(IIIC+BLI)+FQ	1	3
11.	(CPZ+TZB)+DOX	(IIIC+BLI)+T	1	3
12.	(CPZ+SLB)+ODZ	(IIIC+BLI)+AA	1	3
13.	(CTX+SLB)+AK	(IIIC+BLI)+AG	1	3
14.	(CTX+SLB)+AM	(IIIC+BLI)+P	1	3

15.	(CTX+SLB)+CFX	(IIIC+BLI)+IIIC	1	3
16.	(CTX+SLB)+O	(IIIC+BLI)+FQ	1	3
17.	(CTX+TZB)+CPDX	(IIIC+BLI)+IIIC	1	3
18.	(PPC+TZB)+AK	(P+BLI)+AG	1	3
19.	(PPC+TZB)+CLND	(P+BLI)+L	1	3
20.	(PPC+TZB)+CLTM	(P+BLI)+M	1	3
21.	(PPC+TZB)+PRLO	(P+BLI)+FQ	1	3
22.	(SFM+TMP)+DOX	(S+T)+T	1	3
23.	(AM+CA)+ATZ	(P+BLI)+M	1	3
24.	(AM+CA)+LO	(P+BLI)+FQ	1	3
	TOTAL		40	100

Figure 12: Represents % no. of patients on Triple therapy (DUAL +MONO)

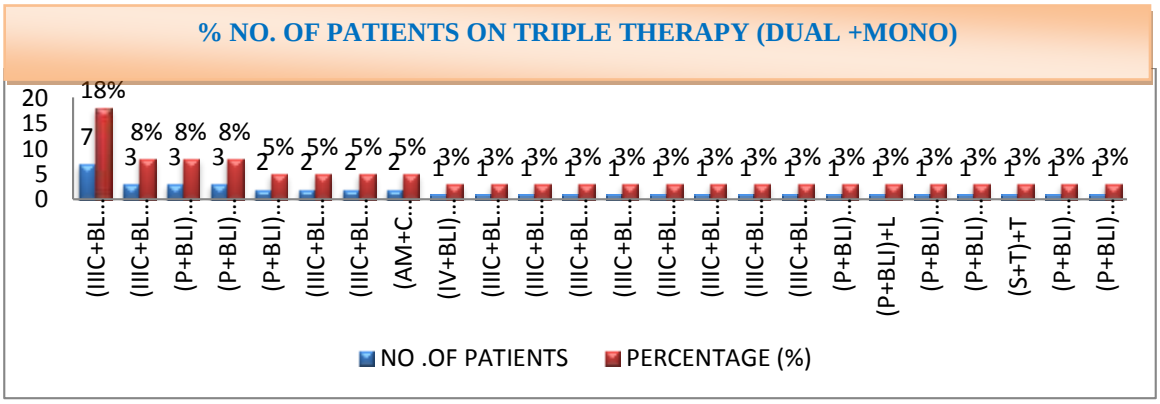


Table 13: Triple therapy (INDIVIDUAL)

SL.NO.	DRUG 1+2+3	CATEGORY	NO .OF PATIENTS	PERCENTAGE (%)
1	O+MTZ+RFX	FQ+AA+NSA	6	26
2	CTX+MTZ+RFX	IIIC+AA+NSA	3	13
3	O+MTZ+DOX	FQ+AA+T	3	13
4	AK+MTZ+RFX	AG+AA+NSA	1	5
5	AM+MTZ+RFX	P+AA+NSA	1	5
6	ATZ+CFRX+MTZ	M+IIC+AA	1	5
7	CTX+AM+MTZ	IIIC+P+AA	1	5
8	CTX+ATZ+CFRX	IIIC+M+IIC	1	4
9	CTX+DOX+ATZ	IIIC+T+M	1	4
10	CTX+DOX+CFRX	IIIC+T+IIC	1	4
11	CTX+DOX+CLND	IIIC+T+L	1	4
12	MRP+MTZ+CFRX	CBPNM+AA+IIC	1	4
13	CTX+MTZ+DOX	IIIC+AA+T	1	4
14	CTX+MTZ+O	IIIC+AA+FQ	1	4
	TOTAL		23	100

Figure 13: Represents Triple therapy (INDIVIDUAL)

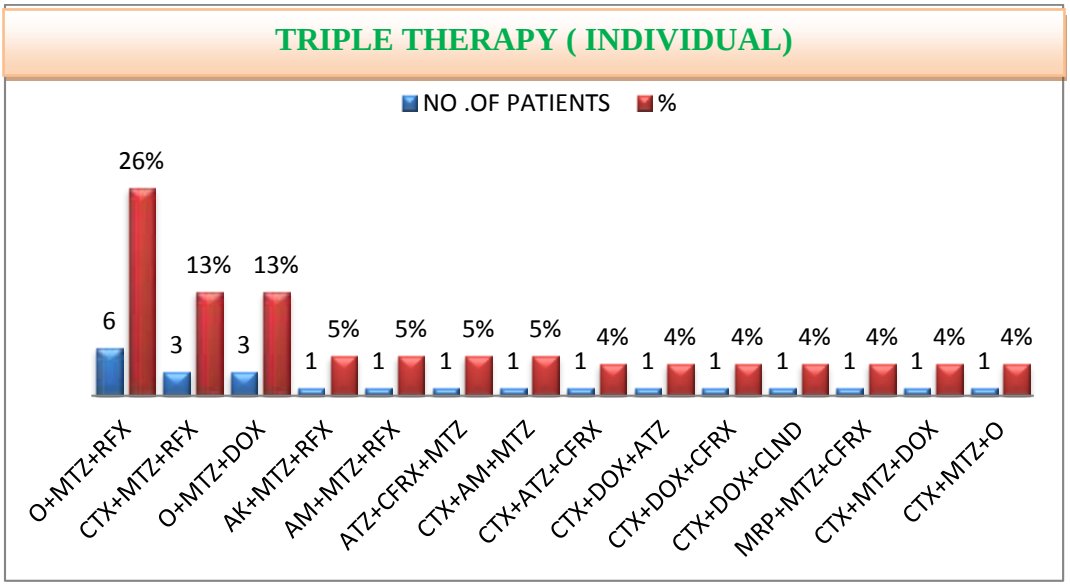


Table 14: Multiple therapy

SL.NO.	DRUG 1+2+3+4+5	CATEGORY	NO .OF PATIENTS	PERCENTAGE (%)
1	(AM+CA)+(CTX+TZB)	(P+BLI)+(IIIC+BLI)	2	3.57 %
2	(CPZ+SLB) +O+AK	(IIIC+BLI) +FQ+AG	1	1.785 %
3	(PPC+TZB)+O+CFRX	(P+BLI)+FQ+IIC	1	1.785 %
4	(CPZ+SLB)+CPDX+O	(IIIC+BLI)+IIIC+FQ	1	1.785 %
5	(AM+CA)+MTZ+AM	(P+BLI)+AA+AG	1	1.785 %
6	(CIL+IPM)+LNZ+MTZ	(CBPNM)+OX+AA	1	1.785 %
7	(CPZ+SLB)+DOX+CFRX	(IIIC+BLI)+T+IIC	1	1.785 %
8	(CPZ+SLB)+LO+(AM+CA)	(IIIC+SLB)+FQ+(P+BLI)	1	1.785 %
9	(CFP+TZB)+LO+CFX	(IIIC+BLI)+FQ+IIIC	1	1.785 %
10	(PPC+TZB)+DOX+LO	(P+BLI)+T+FQ	1	1.785 %
11	(CPZ+SLB)+DOX+CLND	(IIIC+BLI)+L	1	1.785 %
12	(PPC+TZB)+O+ATZ	(P+BLI)+FQ+M	1	1.785 %
13	(CPZ+SLB)+MTZ+(O+ODZ)	(IIIC+BLI)+AA+(FQ+AA)	1	1.785 %
14	(CTX+SLB)+MTZ+ATZ	(IIIC+BLI)+AA+M	1	1.785 %
15	(CPZ+SLB)+O+MTZ+(AM+CA)	(IIIC+BLI)+ FQ+AA+(P+BLI)	1	1.785 %
16	(CPZ+SLB)+(AM+CA)+RFX+O+FPM	(IIIC+BLI)+(P+BLI)+NSA+FQ+CBPNM	1	1.785 %
17	(CPZ+SLB)+O+MRP+CFDTRP	(IIIC+BLI)+FQ+CBPNM+IIIC	1	1.785 %
18	(CPZ+SLB)+MTZ+(IPM+CIL)+CFRX	(IIIC+BLI)+AA+(CBPNM)+IIC	1	1.785 %
19	(CPZ+SLB)+DOX+ATZ+(PPC+TZB)+MO+CFRX	(IIIC+BLI)+T+M+(P+BLI)+FQ+IIC	1	1.785 %
20	(CPZ+SLB)+(O+ODZ)+RFX+DOX	(IIIC+BLI)+(FQ+AA)+NSA+T	1	1.7855 %
21	(CPZ+SLB)+MTZ+(O+ODZ)	(IIIC+BLI)+AA+(FQ+AA)	1	1.785 %
22	(CTX+SLB)+MTZ+DOX+RFX+CTX	(IIIC+BLI)+AA+T+NSA+IIIC	1	1.785 %

23	(CTX+TZB)+O+MTZ+AK	(IIIC+BLI)+FQ+AA+AG	1	1.785 %
24	(CTX+TZB)+ATZ+CPDX+(AM+CA)	(IIIC+BLI)+M+IIIC+(P+BLI)	1	1.785 %
25	(O+ODZ)+RFX+MO+MTZ	(FQ+AA)+NSA+FQ+AA	1	1.785 %
26	(PPC+TZB)+LO+DOX+MTZ	(P+BLI)+FQ+T+AA	1	1.785 %
27	(PPC+TZB)+LNZ+(MRP+SLB)+(AM+CA)	(P+BLI)+OX+(CBPNM+BLI)+(P+BLI)	1	1.785 %
28	(PPC+TZB)+LNZ+DOX+CFRX	(P+BLI)+OX+T+IIC	1	1.785 %
29	(PPC+TZB)+DOX+LO	(P+BLI)+T+FQ	1	1.785 %
30	(PPC+TZB)+O+MTZ+CO	(P+BLI)+FQ+AA+FQ	1	1.785 %
31	(PPC+TZB)+O+CFRX+CLTM	(P+BLI)FQ+IIC+M	1	1.785 %
32	(PPC+TZB)+AZTR+O+MTZ	(P+BLI)+MNBC+FQ+AA	1	1.785 %
33	(PPC+TZB)+O+DOX+RFX	(P+BLI)+FQ+T+NSA	1	1.785 %
34	(PPC+TZB)+LNZ+CFRX	(P+BLI)+OX+IIC	1	1.785 %
35	ATZ+CFX+(AM+CA)	M+IVC+(P+BLI)	1	1.785 %
36	ATZ+DOX+(PPC+TZB)	M+T+(P+BLI)	1	1.785 %
37	CFX+CLND+CTX+LNZ	IVC+L+IIIC+OX	1	1.785 %
38	CTX+ATZ+(PPC+TZB)	IIIC+M+(P+BLI)	1	1.785 %
39	CTX+DOX+(PPC+TZB)+ATZ+FPM	IIIC+T+(P+BLI)+M+CBPNM	1	1.785 %
40	CTX+MTZ+DOX+RFX+O	IIIC+AA+T+NSA+FQ	1	1.785 %
41	CTX+DOX+(AM+CA)	IIIC+T+(P+BLI)	1	1.785 %
42	CTX+MTZ+RFX+CFX	IIIC+AA+NSA+IVC	1	1.785 %
43	CTX+(CPZ+SLB)+MTZ+O	IIIC+(IIIC+BLI)+AA+FQ	1	1.785 %
44	DOX+(CPZ+SLB)+MTZ+(CFRX+CA)	T+(IIIC+BLI)+AA+(IIC+BLI)	1	1.785 %
45	MO+MTZ+DOX+(NO+TNZ)	FQ+AA+T+(FQ+AA)	1	1.785 %
46	O+MTZ+RFX+AK	FQ+AA+NSA+AG	1	1.785 %
47	O+MTZ+(O+ODZ)	FQ+AA+(FQ+AA)	2	3.57
48	O+AK+MTZ+RFX+(O+ODZ)	FQ+AG+AA+NSA+(FQ+AA)	1	1.785 %
49	O+MTZ+RFX+CTX	FQ+AA+NSA+IIIC	2	3.57 %
50	O+MTZ+RFX+DOX	FQ+AA+NSA+T	1	1.785 %
51	O+(CPZ+SLB)+RFX	FQ+(IIIC+BLI)+NSA	1	1.785 %
52.	O+(CPZ+SLB)+MTZ+CFDTRP	FQ+ (IIIC+BLI)+AA+IIIC	1	1.785 %
	TOTAL		56	100 %

Figure 14: Represents Multiple therapy

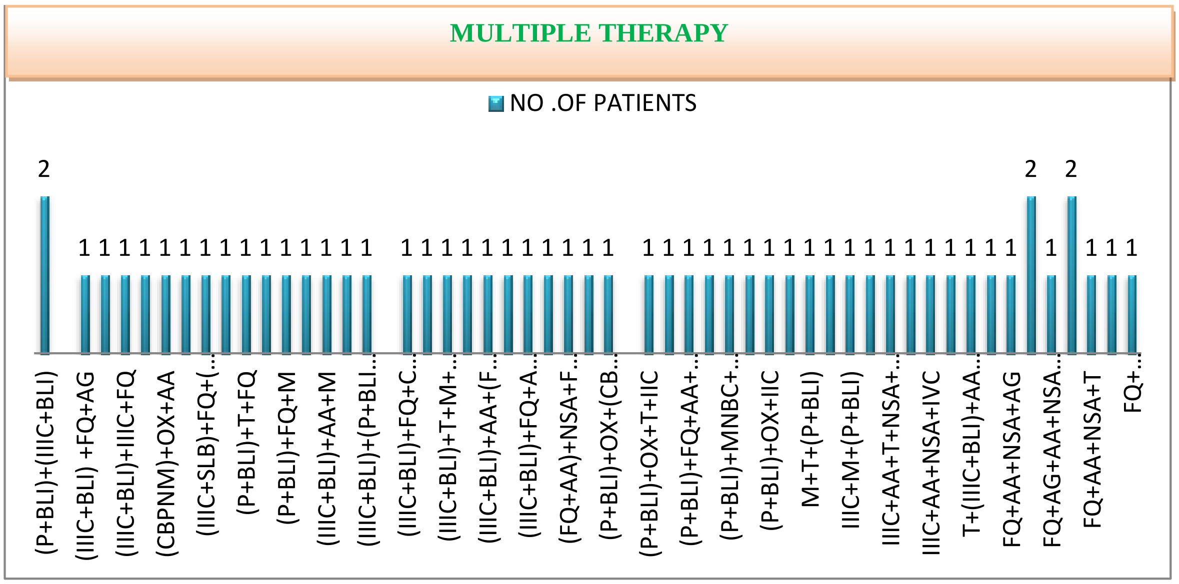


Table 15: Prescribing methods of antibiotics

TYPE OF THERAPY	NO.OF PATIENTS	PERCENTAGE (%)
PROPHYLACTIC	26	13
EMPERICAL	10	5
DEFINATIVE	164	82
TOTAL	200	100

Figure 15: Represents Percentage prescribing methods of antibiotics

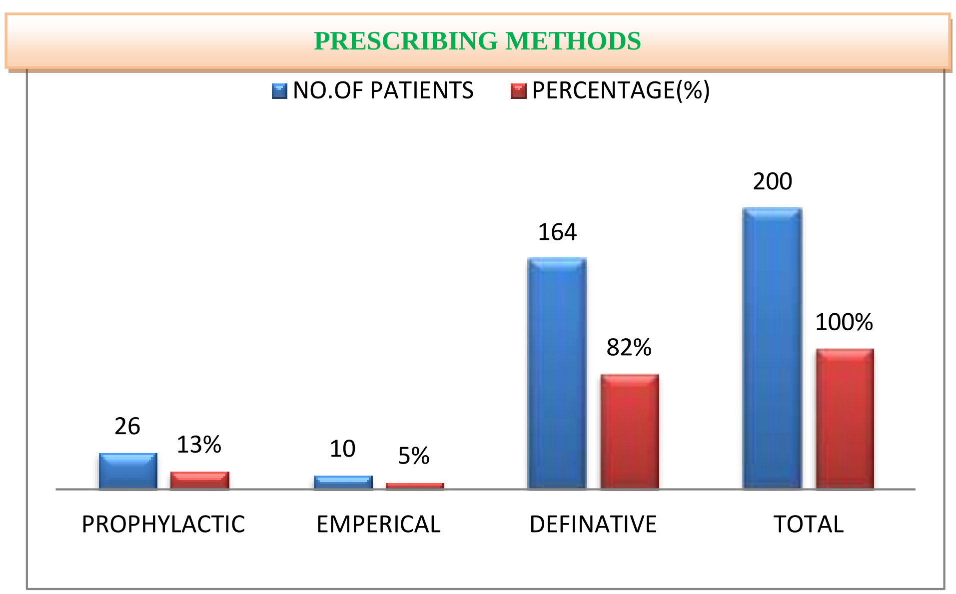
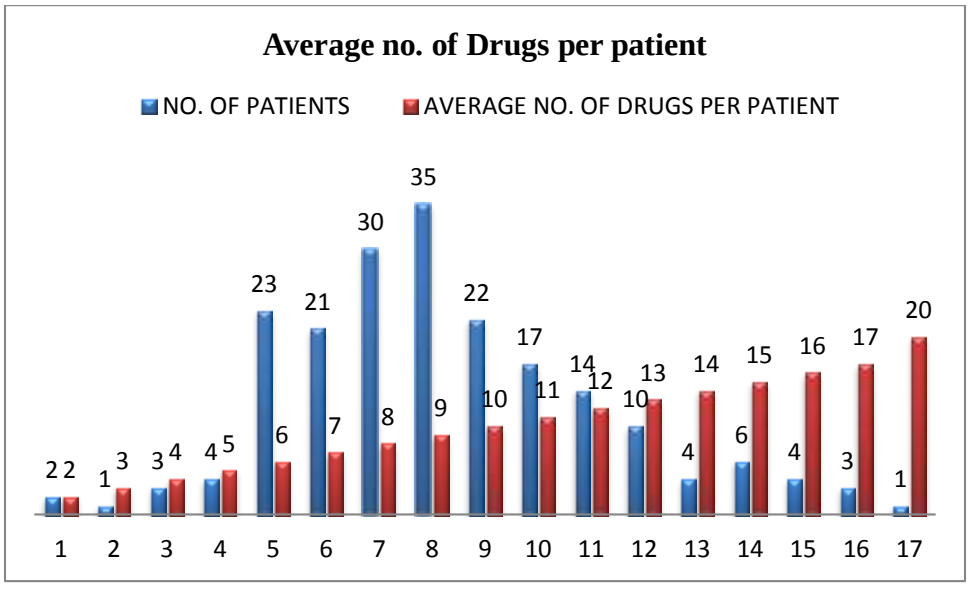


Table 16 : Average no. of Drugs per patient

NO. OF PATIENTS	AVERAGE NO. OF DRUGS PER PATIENT
2	2
1	3
3	4
4	5
23	6
21	7
30	8
35	9
22	10
17	11
14	12
10	13
4	14
6	15
4	16
3	17
1	20
Total=200	Avg = 10.11

Figure 16 : Represents average no.of drugs per patient

AVERAGE NO.OF DRUGS PER PATIENT

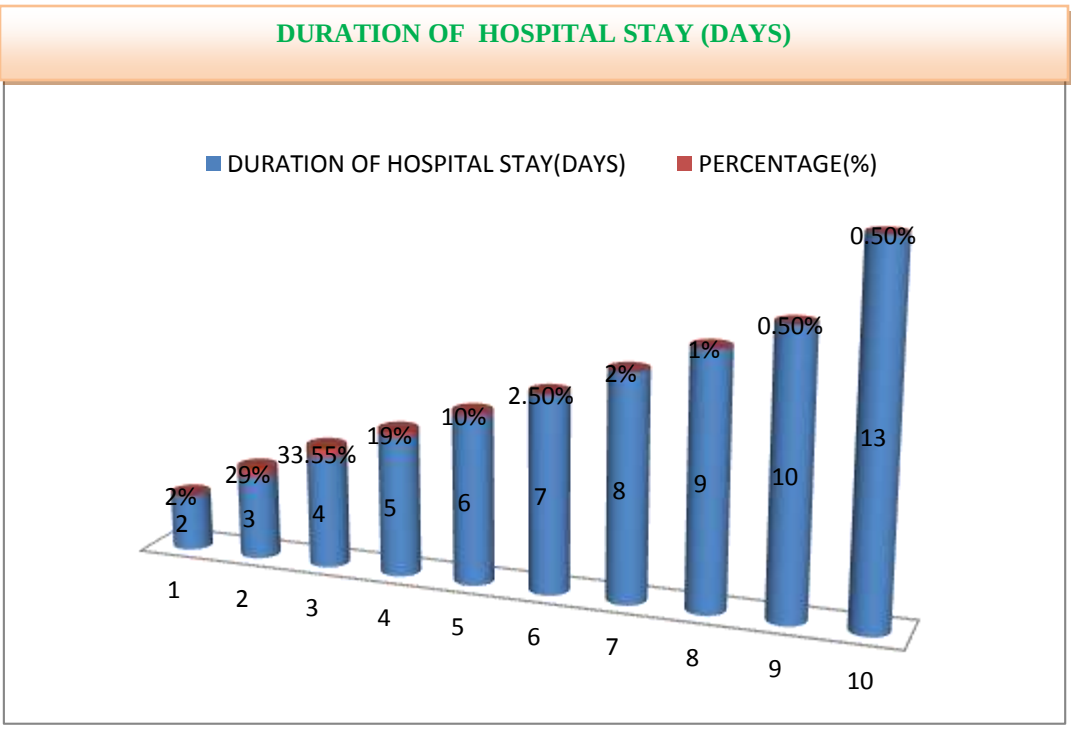


Indian Journal of Medical Research and Pharmaceutical Sciences
January 2016; 3(1) ISSN: ISSN: 2349-5340
Impact Factor (PIF): 2.672

Table 17 : Duration of hospital stay (days)

SL.NO.	DURATION OF HOSPITAL STAY(DAYS)	NO. OF PATIENTS	PERCENTAGE(%)
1.	2	4	2 %
2.	3	58	29 %
3.	4	67	33.55 %
4.	5	38	19 %
5.	6	20	10 %
6.	7	5	2.5 %
7.	8	4	2 %
8.	9	2	1 %
9.	10	1	0.5 %
10.	13	1	0.5 %
		Total=200	

Figure 17 : Duration of hospital stay (days)



Discussion

The present study was conducted in the Warangal hospital including various departments to explore the prescribing patterns of antibiotics in the management of various infectious diseases. The present study includes the sample of 200 in patients who attended the hospital.

Demographic & medication details were collected from patients and data was assessed for further results.

In the present study it was observed that of the 200 patients studied maximum number were in males 114(57%) than females 86(43%) which was in accordance to Azizullah *et al.*[3]

Careful literature shows that there is no co-relation between gender and occurance of infections.
22% of patients are in age group of 30-40years.
The most frequent infectious diseases are Gastrointestinal tract infections in 41 patients is 20% and Urinary tract infections in 41 patients is 20% and the least was skin infection (Herpes Zoster) standing with 1%.
In our study, patients presented with no comorbidities stood in highest number i.e., 103 patients is 51% and single comorbidity seen in 52 patients is 26% and dual comorbidities seen in 30 patients is 15% and multiple comorbidities seen in 15 patients i.e., 8%. This was in concordance with the study conducted by Azizullah *et al.*[3]
And the most frequently used antibiotics belongs to the class of cephalosporins (45.37%) , flouroquinolones - ofloxacin & ciprofloxacin (14.09%) anti (amoebics) anerobics- metronidazole & ornidazole (12.33%) followed by pencillins-amoxacillin & ampicillin (11.89%) and tetracyclines –doxycycline (9.471%).This was in concordance with the study conducted by Remesh *et al.*[4]
In our study as if Gastrointestinal infections and urinary tract infections are more prevalent, ceftriaxone ,metronidazole, and ofloxacin are the most frequently used antibiotics.
Of the 200 patients studied, 63 patients (32%) are treated with triple and 63 patients (31%) with dual therapy followed multiple therapy 52 patients (26%) and mono therapy 22 patients (11%).
In mono therapy the most frequently used antibiotics was ceftriaxone with 13 patients (59%) and ofloxacin with 3 patients (14%). Mono therapy was mostly prescribed in typhoid and urinary tract infectious diseases.
In dual therapy two types are being prescribed as (Dual combination therapy) in 37 patients and individual therapy (mono + mono) in 26 patients of which in dual combination therapy (cefoperazone and salbactam) combination is the most frequently prescribed antibiotic (43%). In about 16 patients, followed by (Ceftriaxone and tazobactam) in 6 patients (16%), (amoxicillin and clavulanic acid) in 5 patients (14%), (ceftriaxone and salbactam) in 4 patients (11%), and (piperacillin and tazobactam) in 3 patients (8%).
Of the 26 patients of dual individual therapy (Mono + mono) ceftriaxone + doxycycline is the most frequently prescribed drugs together in 8 patients (30%) and followed by ofloxacin + metronidazole in 5 patients (19%).
In triple (Dual + mono) therapy (cefoperazone + salbactam) combination with doxycycline is the most frequently prescribed drug in 7 patients (18%) and (cefoperazone + salbactam) + ofloxacin combination in 3 patients (8%) and (piperacillin + tazobactam)+ ofloxacin combination in 3 patients (8%); (piperacillin + tazobactam) + metronidazole in 3 patients (8%).
In triple individual therapy ofloxacin + metronidazole + rifamixin are prescribed in about 6 patients (comprising of 26%, ceftriaxone + metronidazole + rifamixin in about 3 patients, 13% and ornidazole + metronidazole + doxycycline in about 3 patients (13%).
In our study multiple therapy was prescribed in about 52 patients of which (amoxicillin and clavulanic acid)+(ceftriaxone + tazobactam) combination was used in about 2 patients (4%) and ofloxacin + metronidazole + (ofloxacin + ornidazole) 2 patients (4%), ornidazole + metronidazole + rifamixin + ceftriaxone in about 2 patients (4%).this was in concordance with the study conducted by Shobna *et.al.*[5]
Present study reveals that Definitive therapy was prescribed in 164 patients (82%) following prophalytic therapy in 26 patients (13%) and empirical therapy in 10 patients.
Comprising of 5% results reveal that average of drugs per patients was found to be 9 in about 35 patients and 8 in about 30 patients.
Results reveal that duration of hospital stay was 4 days in about 67 patients (33.5%) mostly in gastroenteritis and urinary tract infections and respiratory tract infections with multiple comorbidities.
13 days duration of hospital stay of 1 patient found in urinary tract infection + gastroenteritis + sepsis infection.The results were in concordance with the previous study conducted by Olubenga *et al.*[6-8]

Conclusion

The study provides important information about Prescribing pattern of antibiotics in the management of various infectious diseases in Warangal region.
During the study the maximum number of patients i.e.,22 were found to be in the age group of 30-40years.
The prescribing pattern of antibiotics used to treat various infectious diseases reveals that the most frequently prescribed antibiotic class is cephalosporins and the least is sulphonamides and monobactums.
Dual therapy and triple therapy were maximally used in about 126 patients of which the most frequently prescribed antibiotic combinations are (cefaperazone+salbactum) and (ceftriaxone+tazobactum)

The Gastrointestinal tract infections were present as a major infections in majority of patients is 62 during the study period and the least is central nervous system infection- meningitis in about 2 patients.
Diabetes mellitus was found to be present as a major comorbidity condition in majority of patients along with hypertension, anemia and acute kidney infections.
Our results show that the choices of antibiotic reasonably comply with national and international guidelines in the management of infectious diseases.
There is a ample scope of imposing the prescribing pattern of antibiotics by keeping the number of medicines as low as possible and the samples of microbiological testing should be taken by hospital laboratory assistants under the supervision of physicians before initiating antibiotic treatment.
Hence the clinical pharmacist must be considered as the integral part of the multi disciplinary health care team. They should be involved in collection and presentation of prescribing date as a part of clinical audit.

Acknowledgement

The authors are very much thankful to the superintendent of Warangal hospital, Aditya hospital, Viswas hospital, Sri Venkata ramana hospital and Amrutha hospital Warangal for providing the information and their valuable infrastructure to carry out the project successfully.

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