

Study of First Line Antibiotics in Lower Respiratory Tract Infections in Children

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Abstract: Lower respiratory infections are the most common infection in children. Antibiotics are the most commonly prescribed drug for children. Based on this a prospective observational study performed in Department of Paediatrics, at RMMCH, Annamalai University, TamilNadu, period of study 6 months; Between November 2015 and April 2016. Totally 100 patients in paediatrics ward with LRTI who satisfy the inclusion and exclusion criteria were enrolled. The objective of this study is to study the prescribing pattern of first line antibiotics in lower respiratory tract infections in children, to document the adverse drug reactions(if any), to study the cost effective treatment pattern. Our study shows that male patients and patients of age group of 4months -5years are mostly affected with LRTI. Bronchiolitis (34%) was the major incidence in children who admitted with LRTI. The major category of first line antibiotic prescribed was penicillin (60%) followed by cephalosporins, among this amoxicillin-clavulanic acid was the most common antibiotic prescribed followed by cefotaxime + amikacin. Majority of drugs were given by intravenous route of administration. Single antibiotic therapy was commonly used. A total of 6 ADRs were found in which nausea and vomiting, redness and swelling at injection sites were common. Ampicillin + gentamicin were the cost effective treatment pattern.

Keywords: LRTI, antibiotics, prescription pattern, ADR, cost effective treatment pattern, paediatrics.

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I. Introduction

Lower respiratory tract infections (LRTIs) including bronchitis (viral and bacterial), pneumonia bronchiolitis are among the most common paediatric diseases encountered in primary care, and are responsible for a large burden of avoidable morbidity and mortality in childhood[1].The presentation of these condition will depend on age, infecting organisms, and site of infections. In the developing countries the incidence of respiratory tract infections in infants and young children are high. The use of antimicrobial agents, especially antibiotics has become a routine practice for the treatment of paediatric illness [2]. The efficiency of antibiotic therapy depends on timely onset of treatment, rational selection of the drug, and dosing regimen [3]. The inappropriate use of medication, overuse and misuse of antibiotics, drug related problems, unnecessary use of expensive drugs were common. So the prescribing pattern should be monitored and evaluated, and if needed modified to make the treatment more rational and cost effective.

II. Materials And Methods

This study was conducted in ward of Paediatrics, Rajah Muthiah medical college hospital, Annamalai Nagar, TamilNadu, which is 1260 bedded multi-speciality tertiary care teaching hospital from the period of November 2015 to April 2016.The institutional ethical committee of our hospital approved our study. A total of 100 pediatric in patients with LRTI who satisfies inclusion criteria were included in study. A written informed consent was obtained from the patient/guardian. Data collected from patient case sheet and recorded in a specially designed data collection form.

Inclusion criteria:

Patient aged 2 months to 12 years admitted in paediatric ward with LRTI.

Exclusion criteria:

Any child who is readmitted for same illness within 2 weeks duration.

Patients not willing to participate.

Patients with co-morbidities such as cardiac disorders.

III. Results

The results were obtained from 100 patients in paediatrics ward, who were enrolled into the study.

Table 1: DEMOGRAPHIC DATA BASED ON GENDER

SL. No.	Sex	No. of Patients	% of Patient
1	Male	62	62%
2	Female	38	38%

Figure 1: DEMOGRAPHIC DATA BASED ON GENDER:

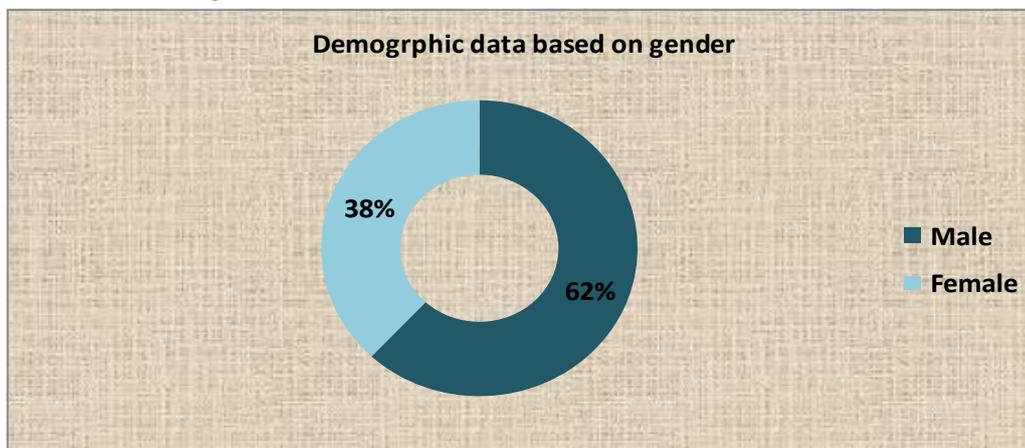


Table 2: AGE WISE DISTRIBUTION:

SL. No.	AGE	MALE	%	FEMALE	%	TOTAL	%
1	4Weeks-3Months	15	65.2%	8	34.8%	23	23%
2	4Months-5yrs	45	61.6%	28	38.4%	73	73%
3	5-12yrs	2	50%	2	50%	4	4%

Figure 2: AGE WISE DISTRIBUTION:



Table 3: DISEASE WISE DISTRIBUTION:

SL. NO	DISEASE	NO. OF PATIENTS	% OF DISTRIBUTION
1	BRONCHOPNEUMONIA	28	28%
2	WALRI	15	15%
3	BRONCHIOLITIS	34	34%
4	BRONCHITIS	4	4%
5	Non specified LRTI	19	19%

Figure 3: DISEASE WSIE DISTRIBUTION:

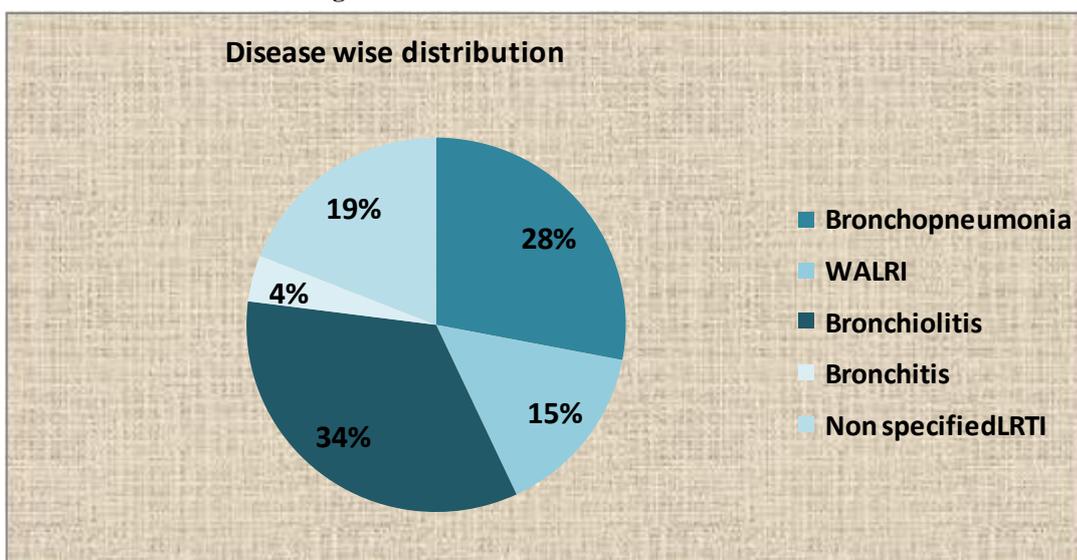


Table 4: AGE WISE DISTRIBUTION OF DISEASES:

SL. NO	AGE GROUP	BRONCHOPNEUMONIA (%)	BRONCHIOLITIS (%)	WALRI (%)	BRONCHITIS (%)	Non specified LRTI (%)
1	4Weeks-3Months	5	17	-	-	1
2	4Months-5yrs	22	17	13	4	17
3	5-12yrs	1	-	2	-	1

Figure 4: AGE WISE DISTRIBUTION OF DISEASES:

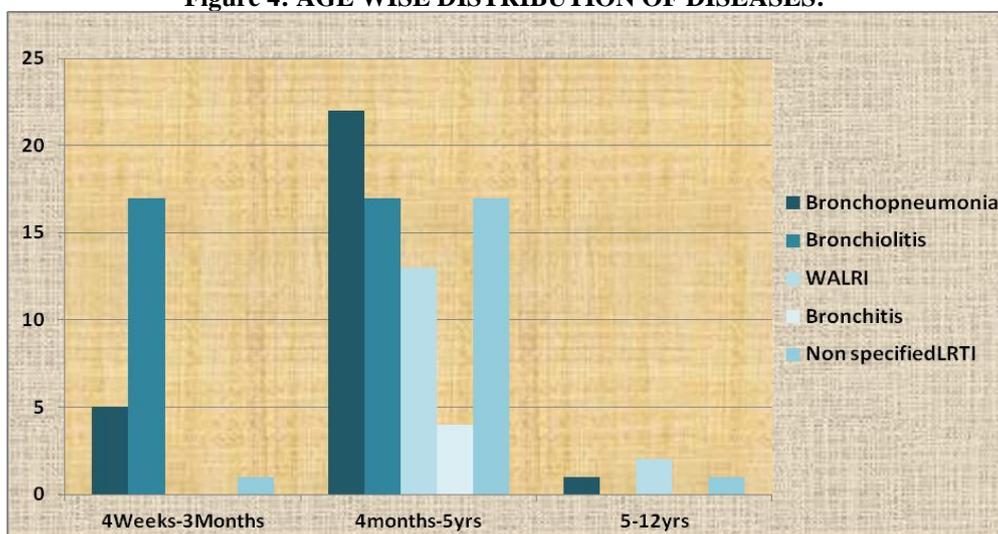


Table 5: CATEGORIES OF ANTIBIOTICS PRESCRIBED:

SL. NO	CATEGORY	NO OF PRESCRIPTIONS	% OF PRESCRIPTION
1	PENICILLIN	60	60 %
2	CEPHALOSPORINS	43	43 %
3	AMINOGLYCOSIDES	39	39 %

Figure: 5 CATEGORY OF ANTIBIOTICSPRESCRIBED:

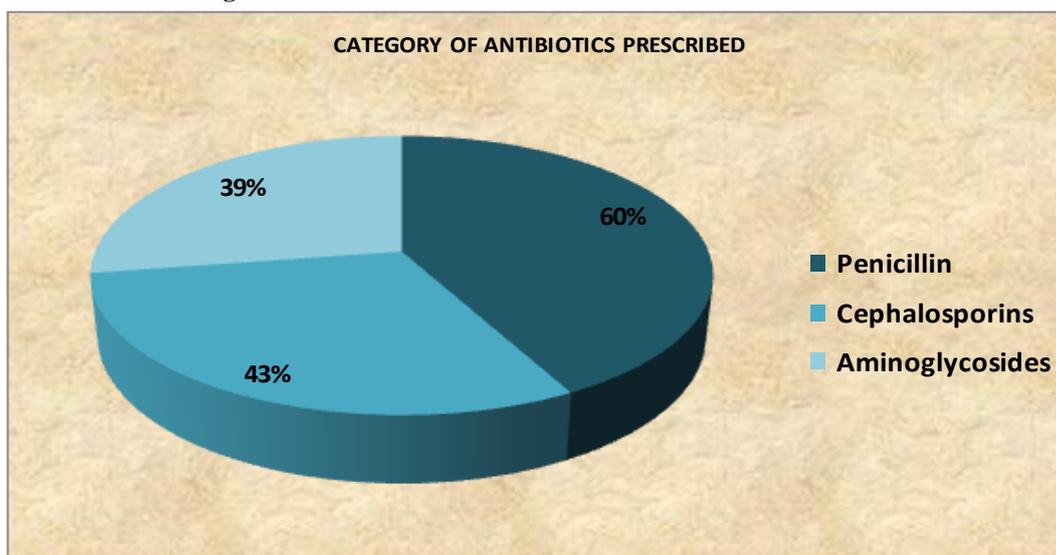


Table 6: PRESCRIBING PATTERN OF FIRST LINE ANTIBIOTICS

ANTIBIOTICS	NO OF PRESCRIPTIONS	% OF PRESCRIPTION
PENICILLIN:-		
Amoxicillin-clavulanic acid	31	31 %
Ampicillin	9	9 %
Ampicillin-cloxacillin	7	7 %
PENICILLIN+AMINOGLYCOSIDES:-		
Ampicillin+Gentamycin	5	5 %
Amoxicillin-clavulanicacid+Amikacin	3	3 %
Ampicillin-cloxacillin+Gentamycin	2	2 %
PENICILLIN+CEPHALOSPORIN+AMINOGLYCOSIDES:-		
Ampicillin-cloxacillin +Cefotaxime+Amikacin	1	1 %
Amoxicillin-clavulanic acid +Ceftriaxone+Amikacin	1	1 %
Ampicillin-cloxacillin +Ceftriaxone+Amikacin	1	1 %
CEPHALOSPORINS:-		
Cefotaxime	9	9 %
Ceftriaxone	5	5 %
CEPHALOSPORINS+AMINOGLYCOSIDES:-		
Cefotaxime+Amikacin	21	21 %
Ceftriaxone+Amikacin	5	5 %

Figure 6: PRESCRIBING PATTERN OF FIRST LINE ANTIBIOTICS:

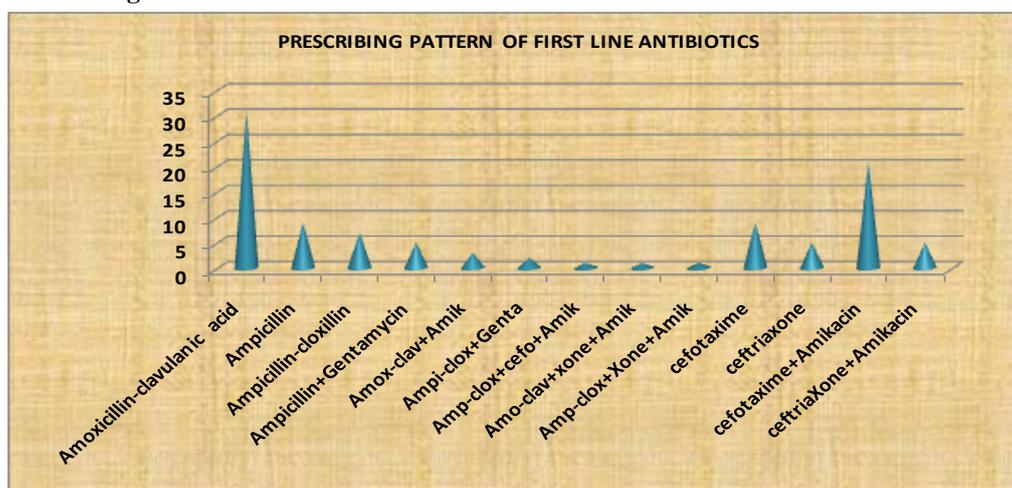


Table 7: ROUTE OF ADMINISTRATION:

Route of administration	No of patients	Percentage
Injection	96	96 %
Oral	4	4 %

Figure7: ROUTE OF ADMINISTRATION:

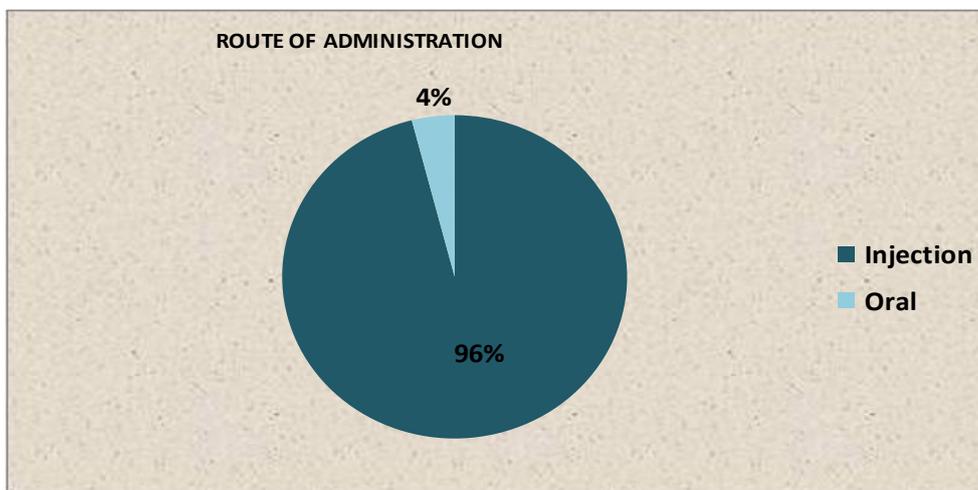


Table 8: ANTIBIOTIC THERAPY REGIMEN:

TYPE OF THERAPY	NO OF PRESCRIPTIONS	% OF PRESCRIPTIONS
Single antibiotic therapy	61	61
Dual antibiotic therapy	36	36
Triple antibiotic therapy	3	3

Figure 8: ANTIBIOTIC THERAPY REGIMEN:

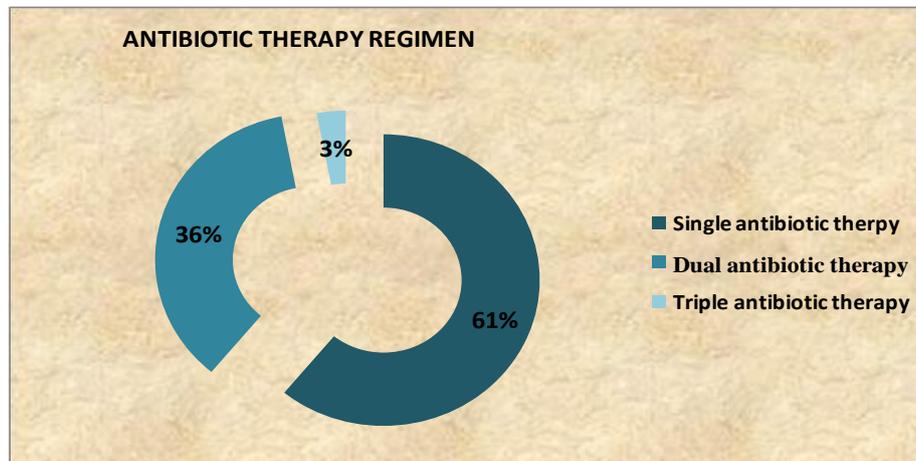
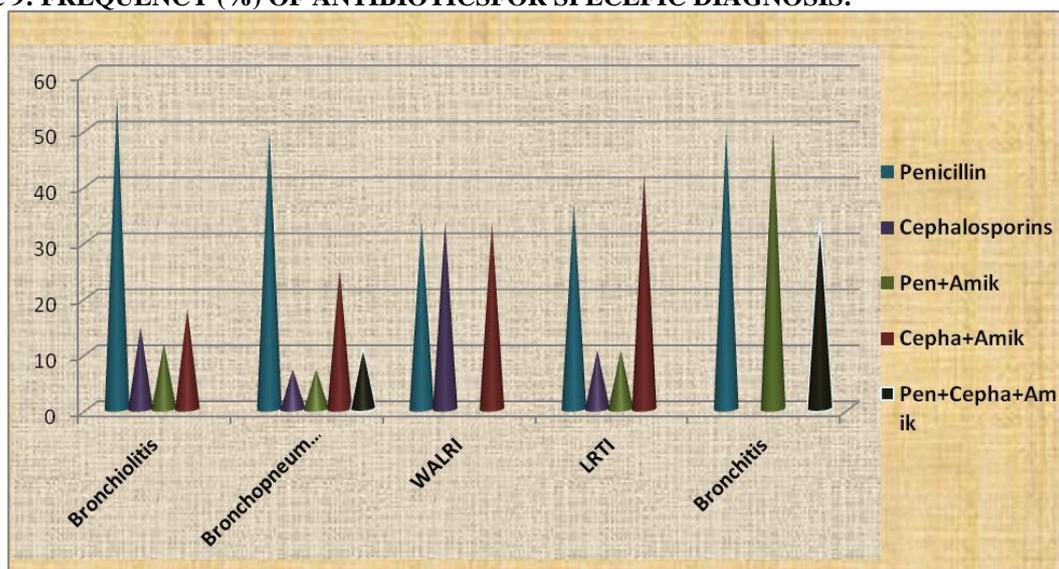


Table9: FREQUENCY (%) OF ANTIBIOTICS FOR SPECIFIC DIAGNOSIS:

	Penicillin	cephalosporin	Pen+Amin	Cepha+Amin	Pen+Amin+cepha
BRONCHIOLITS	55.8	14.7	11.7	17.8	-
BRONCHOPNEUMONIA	50	7.1	7.1	25	10.8
WALRI	33.3	33.3	-	33.3	-
Non specified LRTI	36.8	10.5	10.5	42.1	-
BRONCHITIS	50	-	50	-	-

Pen+Amin-Penicillin+Aminoglycosides, **Cepha+Amin**-Cephalosporins+Aminoglycosides, **Pen+Amin+Cepha**-Penicillin+Aminoglycosides+Cephalosporins

Figure 9: FREQUENCY (%) OF ANTIBIOTICS FOR SPECIFIC DIAGNOSIS:



Pen+Amin-Penicillin+Aminoglycosides, Cepha+Amin-Cephalosporins+Aminoglycosides, Pen+Amin+Cepha-Penicillin+Aminoglycosides+Cephalosporins

ADVERSE DRUG REACTIONS (ADRs)

Table10: GENDER & AGE WISE DISTRIBUTION OF ADRs:

SL. No.	AGE	MALE	%	FEMALE	%	TOTAL	%
1	4Weeks-3Months	2	100 %	-	-	2	33.3 %
2	4Months-5Yrs	2	50 %	2	50 %	4	66.6%
3	5-12yrs	-	-	-	-	-	-

Figure10: GENDER & AGE WISE DISTRIBUTION OF ADRs:

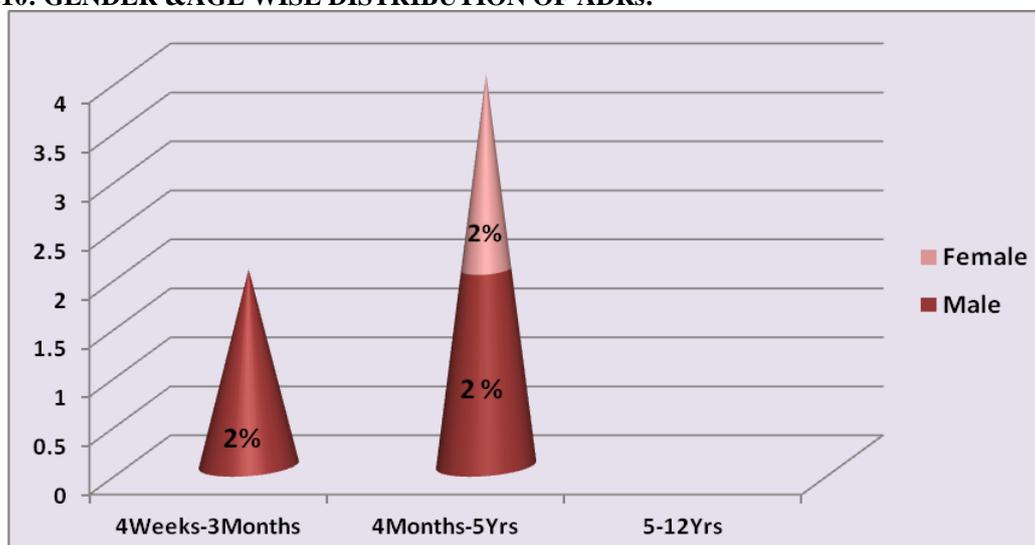


Table 11: ANTIBIOTICS CAUSE ADRs:

CATRGORY	NAME OF DRUGS	NO OF ADR	% OF ADR
PENICILLIN	Amoxicillin+clavulanate	1	16.6 %
	Ampicillin+Cloxacillin	1	16.6 %
AMINOGLYCOSIDES	Amikacin	1	16.6 %
CEPHALOSPORINS	Cefotaxime	3	50%

Figure 11: ANTIBIOTICS CAUSE ADRs:

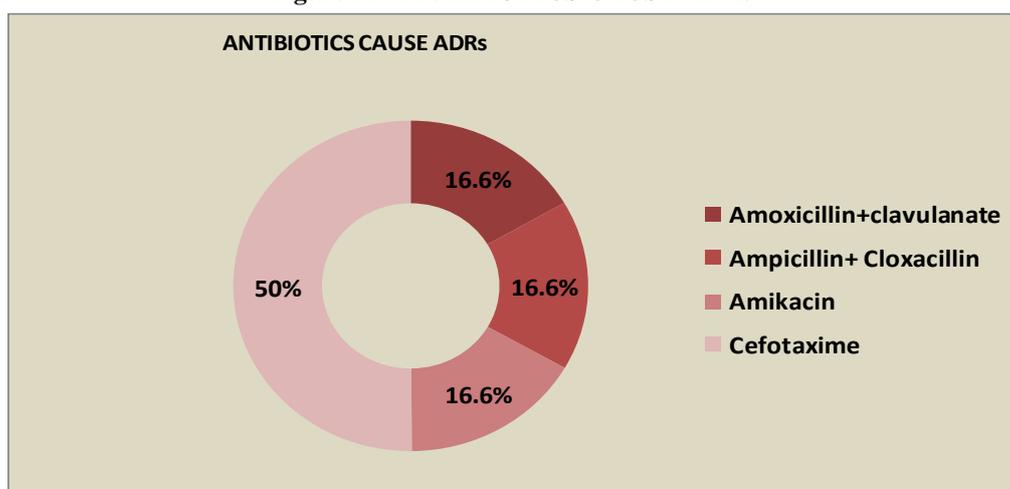
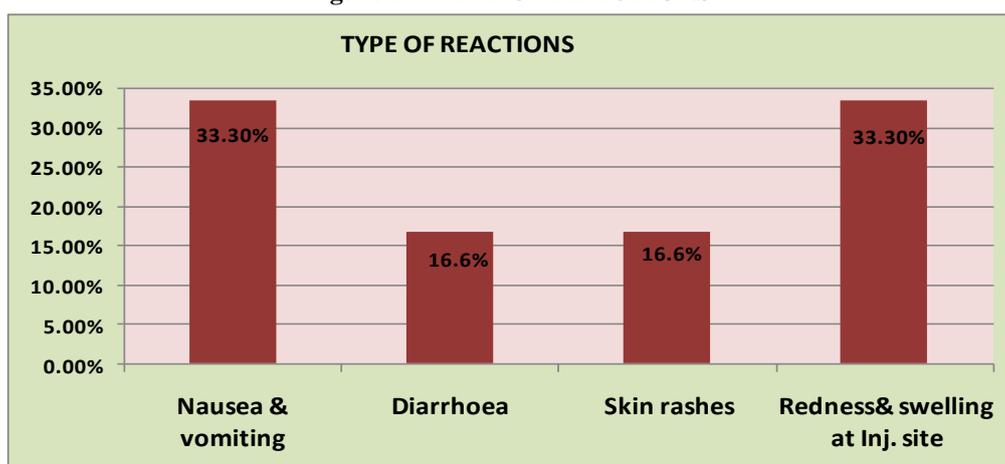


Table 11: TYPE OF REACTIONS:

TYPE OF REACTIONS	NO OF ADR	% OF ADR
Nausea& vomiting	2	33.3 %
Diarrhea	1	16.6 %
Skin rashes	1	16.6 %
Redness & swelling at Inj. Site	2	33.3 %

Figure 11: TYPE OF REACTIONS:



COST EFFECTIVE TREATMENT PATTERN:-

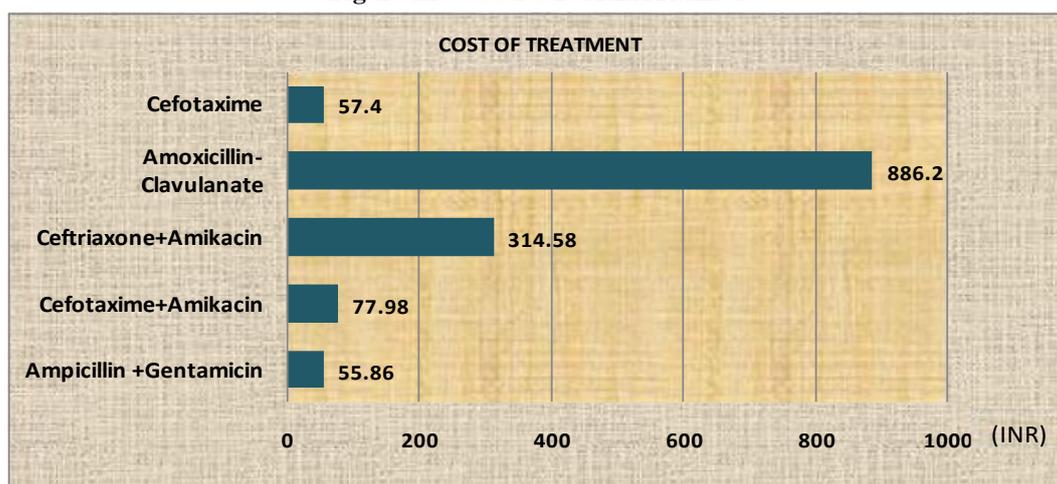
The main age group in the study was found to be 2months-2years. Average stay of patient in hospital was found to be 7days. Injection is the major route of administration.

Table12: COST OF TREATMENT:

Treatment Pattern	Cost per vial (INR)	Daily dose	Daily Dose Cost (INR)	Total Cost for 7days (INR)	Total Cost Of Treatment Pattern (INR)
Ampicillin + Gentamicin	(500mg) 4.11 (80mg) 2.93	750 mg 50 mg	6.15 1.83	43.05 12.81	55.86
Cefotaxime + Amikacin	(1g) 11.72 (100mg) 2.94	700 mg 100 mg	8.20 2.94	57.4 20.58	
Ceftriaxone + Amikacin	(1g) 60 (100mg) 2.94	700 mg 100 mg	42 2.94	294 20.58	314.58
Amoxicillin-clavulanate	(300mg) 76	500mg	126.6	886.2	886.2
Cefotaxime	(1g) 11.72	700 mg	8.20	57.4	57.4

Treatment Pattern	Total Cost Of Treatment Pattern for 7 days (INR).
Ampicillin +Gentamicin	55.86
Cefotaxime +Amikacin	77.98
Ceftriaxone +Amikacin	314.58
Amoxicillin- clavulanate	886.2
Cefotaxime	57.4

Figure 12: COST OF TREATMENT



IV. Conclusion

Patient demographics:

A total of 100 patients were enrolled in the study, out of this 62 patients [62%] were male and 38 patients [38%] were female. Higher prevalence of LRTI was seen in the age group 4 months-5years. The incidence of bronchiolitis [34%] is more common in children then followed by bronchopneumonia [28%].

Prescribing pattern of first line antibiotics in LRTI:

- The most common category of antibiotics prescribed is penicillin [60%], cephalosporins[43%], amino glycosides[39%]. Amoxicillin-clavulanic acid is the most commonly prescribed antibiotic because of its broad spectrum of activity ,followed by cefotaxime-amikacin[21%].
- Single antibiotic therapy, was the most common type of therapy used in this study, it accounts for [61%] of all the prescription and [36%] of prescriptions that had dual antibiotic therapy.
- Injection is the major route of administration of antibiotics in children with LRTI [4].

Adverse drug reactions:

Out of 100 patients, 6 ADR's are found which include nausea and vomiting (2), redness and swelling at the injection site (2), diarrhea (1), skin rashes (1). Among these 4 ADR's occurred in age group of 4months-5years and 2 ADR's in age group 2weeks-4months.

Cost effective treatment pattern:

An average hospital stay of patient was found to be 7days. Ampicillin +gentamicin is the cost effective treatment pattern (INR 55.86 for 7DAYS), Amoxicillin-clavulanic acid is the costly treatment pattern (INR 886). The study concluded that antibiotics are prescribed on clinical judgments in majority of the patients[5]and provides an overall pattern of antibiotic usage[1]. Antibiotics are not recommended for Bronchiolitis unless there is concern about complications such as secondary bacterial infection.

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