WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.074
Volume 8, Issue 6, 754-782. Research Article ISSN 2277– 7105

ASSESSMENT OF ANTIBIOTICS UTILIZATION AMONG HOSPITALIZED PEDIATRIC PATIENTS IN BASAVESHWARA TEACHING AND GENERAL HOSPITAL GULBARGA

Md. Amin Sohail, Wasim Akram, Nadira Sultana, Ammarah, Kalyani Biradar* and Mohammad Asadullah Ansari

India.

Article Received on
12 March 2019,

Revised on 01 April 2019,
Accepted on 22 April 2019,

DOI: 10.20959/wjpr20196-14778

***Corresponding Author**
Kalyani Biradar
India.

INTRODUCTION

Antibiotics are the key drugs for treatment of infections and are among the most commonly prescribed drugs in Paediatrics. Worldwide population constitute of about 28% of children and infants who are most susceptible to diseases due to under development of immune system. Several studies reported that 50% to 85% of children receive antibiotics in developed and developing countries prescribed by physicians. In addition, Paediatric groups are among the most vulnerable population groups to contact illnesses and cause harmful effects of drugs due to differences in pharmacodynamic and pharmacokinetics. The use of antimicrobial agents, especially antibiotics has become a routine practice for the treatment of paediatric illnesses.[1]

Worldwide, infants and children represent a higher proportion of the population. 28% of the world's total population is accounted by Children younger than 15 years of age. There are various reports of irrational use of antibiotics in pediatrics. Drug resistance is the reduction in effectiveness of a drug in curing a disease or improving a patient's symptoms and it is an important factor in the development of antibiotic resistance. Prescription patterns for pediatric patients containing broad-spectrum antibiotics were analyzed in this study. Several professional societies have issued guidelines designed to reduce the use of antibiotics world-wide by means of various control strategies.[2]

Medicine use is rational (appropriate, proper, correct) when patients receive the appropriate medicines, in doses that meet their own individual requirements, for an adequate period of

time, and at the lowest cost both to them and the community. Irrational (inappropriateimproper, incorrect) use of medicines is when one or more of these conditions are not met. Worldwide, it is estimated that over half of all medicines are prescribed, dispensed or sold inappropriately. Prescribing practices are a reflection of health professional's abilities to determinate among the various choices of drugs and determine the ones that will most benefit the patients. The study of prescribing pattern is a part of the medical audit and seeks to monitor, evaluate and if necessary, suggest modification in prescribing practices to make medical care rational and cost effective. Appropriate drug utilization it terms of efficacy, safety, convenience and economic aspects at all levels in the chain of drug use. Epidemiological evaluation of medicine use in the elderly is now a highly visible topic, but drug utilization studies in pediatric population have been limited. The assessment of medicine utilization is important for clinical, educational and economic purpose. Infants and children represent a large part of the population in developing countries.[3]

An adverse reaction to an antibiotic is "any response to a drug which is noxious and unintended, and which occurs at doses used in man for prophylaxis, diagnosis, or treatment. The true prevalence of antibiotic allergy is unknown. In ambulatory children followed in prospective studies, the incidence of adverse drug reactions ranges from 0.75% to 4.5%. The percentage of those attributable to drug allergy is not known because few population-based studies are available, and most reports are of individual patients or groups of patients.[4]

Many studies across the globe have shown the inappropriate utilization of antibiotics which are being prescribed for common childhood illnesses which were not caused by bacteria and leads to irrational use of antibiotics which significantly contributes to antibiotic resistance, side effects and cost of the therapy.

"In general, drug utilization studies are carried out to identify appropriate usage of drugs in terms of medical, social and economic aspects. Similarly, the present study will be planned with an aim to determine to the antibiotic utilization in hospitalized paediatrics.[5]

There is potential for error in every aspect of the use of antibiotics, the most widely used class of drugs in hospitals. Optimal use of antibiotics is important because of emerging resistance to commonly used antibiotics. Efforts to improve the quality and reduce the cost associated with antibiotic use are unlikely to be successful unless the improvement program

is multidisciplinary and includes expertise from the infectious disease, pharmacy, microbiology, and hospital epidemiology services.[6]

According to WHO, rational drug use is defined as "patients receive medicines appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time and at the lowest cost to them and their community." In the present era, irrational use of drugs is well thoughtout as a global problem. There are many factors that manipulate prescribing pattern which include deficient in training and education, heavy patient load and demands to prescribe. Antibacterials are the most imperative weapons in our hands. Hence, evaluation can be done by making audit of prescribing and dispensing indicators.[7]

Antibiotic resistance (ABR) refers to the resistance to antibiotics that occurs in bacteria that cause infections. The resistant bacteria can withstand the effect of the antibacterial drug (antibiotic) to make it ineffective. Antimicrobial resistance (AMR) on the other hand is a broader term, encompassing resistance to drugs to treat infections caused by other microbes as well, such as parasites, viruses and fungi.Antibiotics that were originally effective against a particular bacteria are becoming ineffective. Drugs of choice are being replaced by second line of drugs which are expensive and have greater side effects. The situation is grave, as there are no new class of antibiotics developed since late 1980s. The antibacterial drug pipeline is near-empty, particularly for gram-negative bacteria such as Escherichia coli and Klebsiella that cause common infections such as respiratory and urinary tract infections and are becoming resistant.Health and Economic Burden of ABR.There is a need to better understand the burden of ABR on health and economy. In the US, at least 2 million illnesses and 23,000 deaths per year are caused by antibiotic resistance. Direct annual healthcare cost is estimated to be as high as USD 20 billion with additional productivity losses of up to USD 35 billion.7 In the European Union (EU), resistant bacteria are estimated to result in about 25,000 deaths per year and EUR 1.5 billion of healthcare and productivity losses. In India, out of the two lakh children that die in the first four weeks of their lives, about 30 percent are attributable to Methicillin-resistant Staphylococcus aureus (MRSA) and bacteria which produce extended spectrum beta-lactamases (ESBL).How ABR Develops ABRis strongly linked with antibiotic use, misuse and overuse in humans and animals. Use of antibiotics puts selective pressure – a natural process – on bacteria, making them resistant against the antibiotic used. Overuse and misuse of antibiotics accelerates the emergence and spread of

ABR. Resistance develops due to mutations in bacteria – that cause certain changes –and makes theantibiotic ineffective. The structural and chemical changes leading to resistance to an antibiotic include decreased bacterial cell wall permeability to the drug; alteration of the drug binding site at cell wall; induced chemical modification of the drug and normal function of bacteria bypassing the drug effected enzyme or pathway.[8]

International AMR policies aim at prudent use of antimicrobials and infectious disease prevention, combined with surveillance of resistance and antimicrobial use. In 2001, the WHO published its Global Strategy for Containment of Antibiotic Resistance, which involves all these factors. In 2004, the WHO investigated which diseases are considered a health threat with a pharmaceutical gap. The results were reported in its "Priority medicines for Europe and the world" document, which lists the antimicrobials needed to address these threats. FIP has been monitoring WHO policies. In response to AMR rising up the global health agenda, in 2008 FIP issued its "Statement of policy — control of antimicrobial resistance", through which FIP takes responsibility for professional leadership through a range of AMR activities. In 2014, the WHO invited FIP and other stakeholders to contribute to its report "Antimicrobial resistance: Global report on surveillance 2014".[9]

OBJECTIVES

- The present study was carried out by the following objectives.

Main objective

- To assess the utilization of antibiotics among hospitalized pediatric patients.

Specific objectives

- To Evaluate the usage of antibiotics among paediatric (In-Patients) in BTGH.
- Demographic details of paediatric In-Patients.
- To assess the diagnostic pattern of Paediatric In- Patients.
- To assess the class of antibiotic prescribed, dosage and duration.
- To analyze the prescription pattern of paediatrics in a tertiary care hospital and to assess the antibiotic usage in paediatric population.

REVIEW OF LITERATURE

Choudhury DK et. al., the study was to determine the antibiotic prescriptions pattern and to analyze the rationale use of antibiotic in Paediatric in-patient department of Gauhati Medical College & Hospital, Guwahati, Assam. An observational and prospective study was carried out for 1 month. The details of the patients were being recorded in a specific format and results were analyzed by descriptive statistic and expressed as mean ±SD. Out of 200 patients, 132 prescriptions received antibiotics, where 77 were male child and 55 were female child. The mean age of the patients was 4.13 ± 3.75 years. The number of antibiotics per prescription was 1.41 ± 0.67. The duration of antibiotic therapy was 6.05 ± 3.45 days and length of hospitalization was 8.91±5.35. In our study, 71% of paediatric patients were on single antibiotic and most of the paediatric patients were receiving parental preparation. Maximum Antibiotic prescriptions were found in the age group of 5-12 years. Cephalosporins (41.5%) were the most commonly prescribed antibiotic group. The most commonly found antibiotics combination in our study were Amoxycillin and Clavulanic acid & Cefotaxime and Sulbactum. The antibiotic prescription should be done in accordance with WHO guidelines and rational strategies should be implemented in order to control antibiotic use mainly focus on patient population especially in children and infants.[1]

Vidyaviswanad et al., Antibiotics are commonly prescribed drugs in pediatrics. Monitoring and control of antibiotic usage and detailed knowledge of antibiotic prescribing practice is important these days. The main objective of this study is to analyze the prescription pattern of pediatrics in a tertiary care teaching hospital and to assess the antibiotics usage in pediatric population. A randomized study was done in a tertiary care teaching hospital. Patients less than 13 years of age and those visiting the hospital on regular basis were included in the study. The Antibiotic usage by the patients was examined and a high incidence of polypharmacy was reported. From this study it can be concluded that it is mandatory to prepare guidelines for antibiotic prescription and use appropriate drugs for the disease rather than prescribing multiple drugs. Key words: Prescription pattern, Pediatrics, Antibiotic usages, Polypharmacy.[2]

P. Yanadaiah et al., Antibiotics are the most commonly prescribed drugs in paediatrics and can be a biggest threat of growing resistance in children. It is always preferable to choose a single drug with a narrowest spectrum effective for pathogen. Combination antibiotic therapy may provide synergistic effect but there is a chance of getting drug resistance particularly in

paediatrics. Paediatrics, a specialized population is at a significant risk for drug related problems in particular when they exposed to multiple drug therapy and complex illness. Monitoring and control of antibiotic usage and detailed knowledge of antibiotic prescribing practice is important now-a-days. The aim of our study was to analyse the Utilization of antibiotics in paediatric department of Sri Venkata Ramnaraine Ruia Government General Hospital (SVRRGGH), Tirupathi. A Prospective observational study was carried out for 3 months using patient data collection proforma and clinical significance of 120 individual cases were recorded. The data were analysed by descriptive statistics. The utilization of antibiotics in emergency ward, general ward and ICU were observed. More number of prescriptions was observed in the emergency ward (53.33%). Most of the paediatric patients receiving parenteral preparations (81.8%) and 55.62% of prescriptions were based on empirical therapy. In our study 66.66% of paediatric patients were on single antibiotic. Cephalosporins (42.2%) were the most commonly prescribed antibiotics in three departments followed by Pencillins (22.7%) and least prescribed group was Fluroquinolones (2.13%). This information was helpful to analyse the clinical judgment on selection of antibiotics in paediatrics of SVRRGGH.[9]

C. Moorthi et al., Children and infants are the most susceptible group toward various diseases than adults due to under development of immune system. Paediatric healthcare providers face huge challenges in day to day practice due to lack of knowledge about the appropriate drugs. Most paediatric prescriptions carries antibiotics which has become a routine practice in the treatment of common paediatric illnesses which were not caused by bacteria and leads to irrational use of antibiotics which significantly contributes to antibiotic resistance, side effects and cost of the therapy. In general, drug utilization studies are carried out to identify appropriate usage of drugs in terms of medical, social and economic aspects. Similarly, the present study was conducted in seven randomly selected potential community pharmacies with an aim to determine the proportion common paediatric illnesses in and around Erode city and rational use of antibiotics for the same. Study results have shown that the cold and its related ailments were predominant paediatric illnesses followed by diarrhea and its related ailments. All paediatric prescriptions carried antibiotics and found to be irrational except few prescriptions. Paediatric healthcare providers should implement the standard treatment guidelines developed by appropriate authorities to provide quality service by preventing irrational use of antibiotic/ drugs.[6]

Kelley R. et al., To determine the incidence and type of antibiotic use variances at our institution Thirty-five (8.2%) of 428 patients reviewed over 12 months had a total of 49 variances: failure to treat (3), treatment of contaminant/colonizer (2), use of more costly agent (l0), failure to revise therapy (8), inappropriate route (2), inappropriate empiric antibiotic (4), incorrect dose (3), unnecessary multiple antibiotics (6), inappropriate drug (8)) and prolonged prophylaxis (3).[9]

Sriram. S, et al., Emergence of resistant bacterial pathogens has increased concerns about antibiotic prescribing patterns. The aim of the study was to assess the antibiotic use in pediatric patients. The study was carried out in a 500 bedded multispeciality tertiary care teaching hospital at Coimbatore for the period of eight months from May 2007 to December 2007. During the study period, all inpatients of the pediatric ward that were prescribed with antibiotics were screened. The study result showed that there were a total of 214 (52.5%) cases prescribed with antibiotics. The major disorders for which antibiotics were prescribed included acute gastroenteritis (15%), lower respiratory tract infections, (14.5) upper respiratory tract infections (13.5%) and pyrexia of unknown origin (13.5%). In only 13.6% of the cases culture and sensitivity test was done and in 9.3% of the cases, micro-organisms were isolated. The organisms isolated were Streptococcus pneumoniae (3.7%), Staphylococcus aureus (1.9%), Pseudomonas aeruginosa (0.9%) and E.coli (2.8%). The most commonly prescribed antibiotic class was cephalosporins (68.2%). The most frequently prescribed antibiotic was cefuroxime (22.9%) and the commonly used antibiotic combination was cephalosporin with aminoglycoside (6.5%). The study result showed that ampicillin was the antibiotic used commonly to treat acute gastroenteritis (75%); cefuroxime for both lower respiratory tract infections (81.3%) and asthma (50%); amoxicillin/clavulanate potassium for both upper respiratory tract infections (41.4%) and pyrexia of unknown origin (34.5%); ceftriaxone/sulbactum for both acute otitis media and seizure disorder (69.2%) respectively.[5]

K Shamshy et al., The present study is aimed to determine the prescribing pattern of anti-microbial agents (AMAs) in paediatric patients in a tertiary care hospital in Tamilnadu, India. Altogether 273 patients, 147 males (53.8%) and 126 females (46.2%), were enrolled. Highest rate of AMDs prescription was observed for children aged between 1-5 years. Overall 149 (54.58%) patients were treated with a monotherapy and 78 (28.57%), 41 (15.23%) and 5 (1.83%) patients were treated with two, three and four drug therapies respectively. Most of the patients reported with pneumonia (17.22%), bronchitis (14.28%), acute gastro enteritis

(AGE13.92), viral fever (10.62%), enteric fever (6.23%), whooping cough (5.49%) and others. Among 273 patients, culture test was performed in only 14 cases i.e. (5.13%), only 6 specimens showed positive culture result. Sensitivity analysis was done in 6 cases [UTI (2), pneumonia (2), cellulitis (1) and sepsis (1)]. In all cases the patients were found to be resistant to 6-7 antibiotics. Cephalosporins (38.83%), Aminoglycoside (22.78%) and penicillin derivatives (18.87%) were choice of AMAs for paediatric patients. For 80.95% cases only I.V. route, 5.86% cases only oral route and 13.19% cases both oral and I.V. routes of drug administration were used. Significant difference was found between disease encountered and age of the patients (chi square is equal to 102, $P<0.01$). Majority of patients were prescribed drugs irrationally without doing any laboratory investigations. Overall extensive poly-pharmacy and poly-pharmacy among antimicrobial agents was noticed. Receives both parenteral and oral therapy and 2.1% receives oral therapy alone. So the most preferable route for antimicrobial therapy in paediatric inpatients is parenteral but careful administration of antimicrobials is very essential in pediatric patients. The most commonly prescribed drugs of other classes were assessed and found that intravenous fluids (32.97%) and antiasthmatic drugs (22.34%) were more frequently prescribed classes in this study. Significant difference was found between disease encountered in patients of different ages (chi square is equal to 102, $P<0.01$). ADRs like fever, rashes and diarrhoea were reported with ceftriaxone, penicillin and amikacin respectively (Table 7). Nimesulide has been prescribed in the study, but the use of the drug is strictly banned for the children up to the age of 12 by DTAB(Drugs Technical Advisory Board). DCGI (Drug Controller of Government of India) has finally decided to ban the drug based on the recommendation of DTAB14. The low use of Quinolones (3.05%) indicates that due to the toxic effects of quinolones in childrens they are not prescribed by pediatricians. Ciprofloxacin, one of the most commonly prescribed quinolone, needs proper monitoring.[10]

Ghafur, Laxminarayan et al. The study of Davy et al pointed to important consideration in which a large proportion of prescribed antibiotics within hospital settings was not appropriate. This consideration has been further confirmed by the study of Ashiru-Oredope et al (2012) in which researchers reported that about 50% of antibiotic use is inappropriate. It has been realized that both increasing and abuse of antibiotics in hospitals, health care facilities and the community are of the reasons standing beyond the progress of bacterial resistance (Shankar et al., 2003). According to this context, there should be a wise use of available antibiotics.[11]

Osowicki et al., the objectives were to describe antimicrobial use and to analyze the appropriateness of this antimicrobial use in hospitalised Australian children. Study sample included 1373 patients, of whom 46% were prescribed at least one antimicrobial agent. It has been found that there were elevated levels of antibioics in haematology and oncology wards (76%) and pediatric intensive care units (55%). The total number of antibiotiics prescribed was 1174, of which 47% were for community-acquired infections, 15% for hospital-acquired infections and 37% were for prophylaxis.[12]

Hangoma et al., conducted a study to identify trends of the antibiotic prescribing among physicians and compare agreement of antibiotic prescribing with adopted National treatment guidelines. Study sample included 385 patients. Study findings showed that about 70% of patients received antibiotics. The results showed about 31.4% of patients, who received antibiotics, had bacterial culture.[13]

Sviestina and Mozgis et al., conducted a study to evaluate antibiotic use for surgical prophylaxis in paediatric acute appendicitis before and after introduction of the hospital guidelines. The researchers found that irrespective to the discussion and acceptance of the guidelines with surgeons and further there was two month introduction period, only few positive trends were observed with the antibiotic treatment guidelines. Accordingly, the need to develop new ways of promoting adherence to the guidelines and appropriate antibiotic use.[14]

Murni et al Conducted a study to implement a multifaceted infection control and antibiotic stewardship programme and evaluate its effectiveness on hospital-acquired infections (HAIs) and antibiotic use. Study findings indicated that there was a great reduction in HAIs from 22.6% in the preintervention period to 8.6% in the postintervention period. Also a great reduction in inappropriate antibiotic use from 43% to 20.6%. The use of hand hygiene was increased from 18.9% to 62.9%. Inhospital mortality rate decreased from 10.4% to 8%. a study to identify the uropathogens and their antibiotic susceptibility among children with urinary tract infection treated at Prince Hashem Bin Al-Hussein hospital. Study findings showed that about 75% of isolates were due to Escherichia coli, and 25% were caused by non- Escherichia coli pathogens. It was also found that pediatric urinary tract uropathogens are highly resistant to commonly used oral antimicrobial agents such as Cephalexin and Trimethoprim Sulfamethoxazole[15]

Melaku et al A study done in Tamilnadu, India indicated that cephalosporins were the most often prescribed class of antimicrobials (56.36%) followed by penicillins (40.36%) and aminoglycosides (36.36%). Combinations of antimicrobials commonly given were Ceftriaxone + Amikacin (28 cases), Co-amox-clavulanate + Amikacin (20 cases) and Piperacillin + Tazobactum + Netilmicin (17 cases).The average number of antimicrobials prescribed per patient was 1.54. The commonest route of administration was injection (58.25%). Next common was oral route (38.20%) followed by topical application (3.53%). Among the individual antimicrobials Coamox-clavulanate was the most commonly prescribed (30.54%) followed by Amikacin (29.45%) and Ceftriaxone (20%). Lower respiratory tract infection (LRTI) was the commonest diagnosis in this study, accounting for 108 cases followed by acute gastroenteritis.[16]

Belay Yimam et al. The study from Bishoftu Hospital, East Ethiopia explored that among the most commonly prescribed antibiotics, Ceftriaxone accounted for 73 (43.50%) followed by Gentamicin 43 (25.60%. And also the most common reasons for which drugs was prescribed were pneumonia followed by gastroenteritis which made up 72 (56.25%) and 12 (9.40%) of the indications respectively. Out of the 242 total number of medication prescribed, parenteral route was accounted for 201 (83.1%) and the proportion of drugs prescribed in generic name was high which was 234 (97.5%)[13] A study done in another part of Ethiopia, Hawassa University Referral Hospital showed that the percentage of antibiotics prescribed from essential drug list (EDL) and list of drug for referral hospital (LDRH) of Ethiopia was 1251 (90.6%) and 1381 (100%), respectively. The maximum number of drugs per prescription was 6 while the maximum number of antibiotic prescribed per-prescription was 3. The maximum number of injectable prescribed per prescription was 5 whiles the maximum number of generics per prescription was 6. The maximum number of antibiotics prescribed from either EDL or LDRH per prescription was 3. The mean number of antibiotics prescribed per-prescription was 1.18±0.813. The mean number of injection prescribed per-prescription was 1.48±0.766. Seven hundred fifty (64.2%) of the prescriptions were mono drug prescriptions from which 517 prescriptions (44.2%) were single antibiotic prescriptions. The most frequently prescribed single antibiotic was penicillin G crystalline 146 (28.4%), followed by Ceftriaxone 128 (24.9%), Cloxacillin injection 66(12.84%), Ampicillin injection 58 (11.28%), Gentamicin 51 (9.92%) and Chloramphenicol injection 28 (5.45%). Four hundred sixteen (35.6%) of the prescriptions were multiple antibiotic prescriptions and from

these the combination of Ampicillin and Gentamicin took the largest portion with 113(27%), followed by Chloramphenicol.[17]

METHODOLOGY

Study site

Department of Pediatrics Basaveshwar Teaching and General Hospital, Kalaburagi.

Study duration

The study was carried out for a period of six months.

Study design

A Prospective and Observational Study.

Study Criteria

The study was carried out by considering the following criteria.

Inclusion Criteria

- Paediatric in-patient with antibiotic prescribed.
- Paediatric in-patient of both gender.

Exclusion Criteria

- The pediatric patients who are admitted in NICU and PICU.
- Pediatric in-patients with other critical conditions like coma, convulsion, shock and seizures.
- Paediatric OPD pediatric patients.

Source of data

The data of the study was collected by using the following source.

- Case sheets of paediatric in- patients.
- Lab reports of pediatric in-patients.

METHODOLOGY

The study was conducted at the department of pediatrics at Basaveshwar teaching and general hospital (BTGH). Patients admitted to the department of pediatricswere enrolled in the study by considering the inclusion and exclusion criteria after taking consent from the

parent/guardians of patients. The following data was collected from case sheets of In-patients and from lab reports in a specially designed data collection form. (Annexure-II)

- Demographic profile of the pediatric patients.
- Diagnosis of the case.
- Co-morbid conditions of paediatric patients.
- Condition of the patient at the time of admission and discharge.
- Details of antibiotics prescribed (name, class, strength, routes of administration etc).
- Dose and dosing frequency.

Ethical committee approval for the study

Prior to the study, Institutional Ethical Committee clearance was obtained from the Institution Review Board.

RESULTS

Gender Wise Distribution Of Pediatric Patients

Gender wise distribution of the patients enrolled in the study. This results showed that out of 150 patients 80 (53%) were males and 70(46%) were females.

Table 1: Gender Distribution of Pediatric Patients.

Gender distribution	Number of patients	Percentage (%)
Male	80	53%
Female	70	46%
Total	**150**	

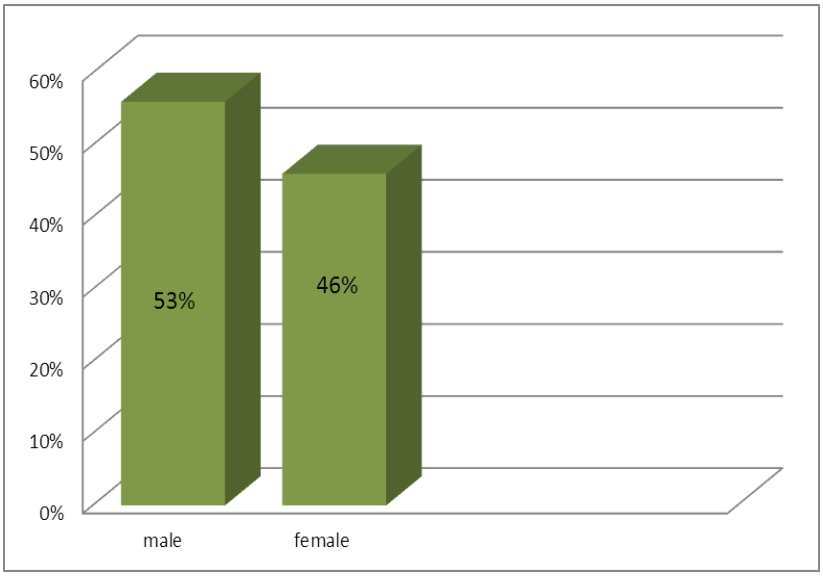


Figure 1: Gender distribution of Pediatric Patients.

Agewise Distribution of Pediatric Patients

Age wise distribution of pediatric patients enrolled in the study. The results showed that 70 (46%) were children followed by infants 30 (20%) and Neonates 50 (33%).

Table 2: Age wise distribution of pediatric patients.

Age Distribution	Number of patients	Percentage (%)
Neonates (upto 1 month)	50	33%
Infants (1 month – 1 year)	30	20%
Children (2- 14 years)	70	46%
Total	**150**	

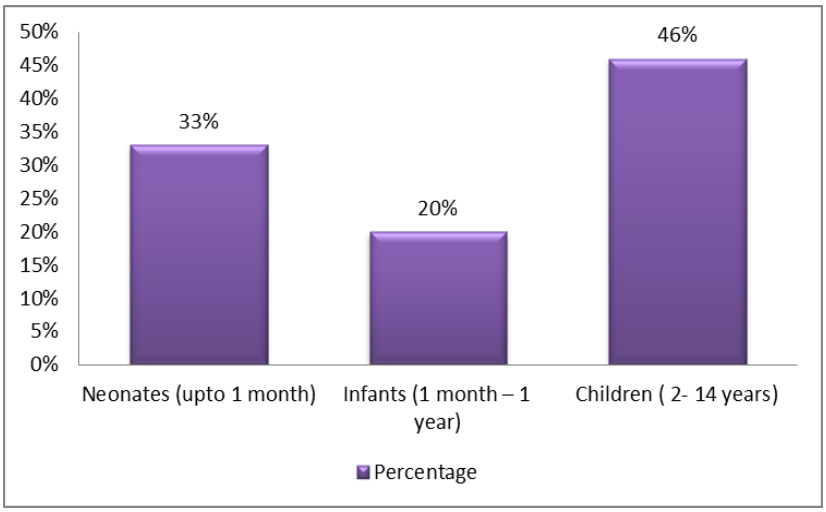


Figure 2: Age wise classification of pediatric patients.

LITERACY STATUS OFPARENTS/ GUARDIANS OF PEDIATRIC PATIENTS

Literacy status of parents/guardians of the pediatric patients enrolled in the study. The results showed that, 94(62%) were illiterate followed by 44(29%) were literate, 12(8%) were highly qualified.

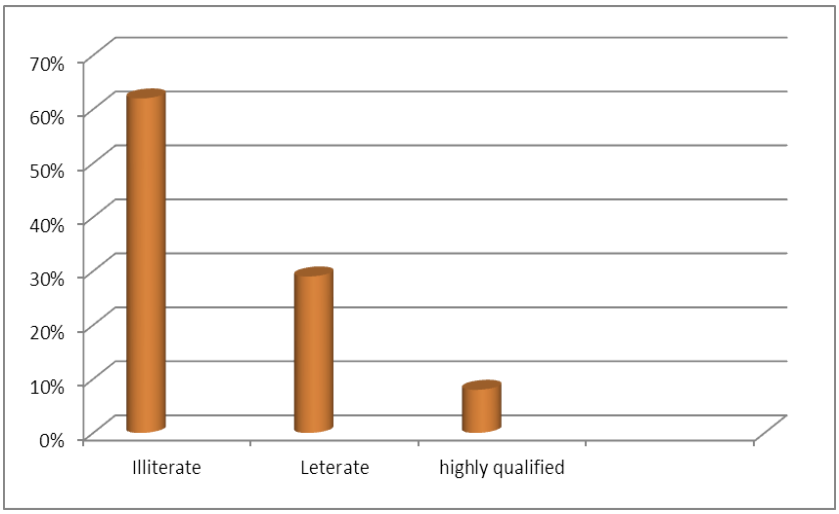
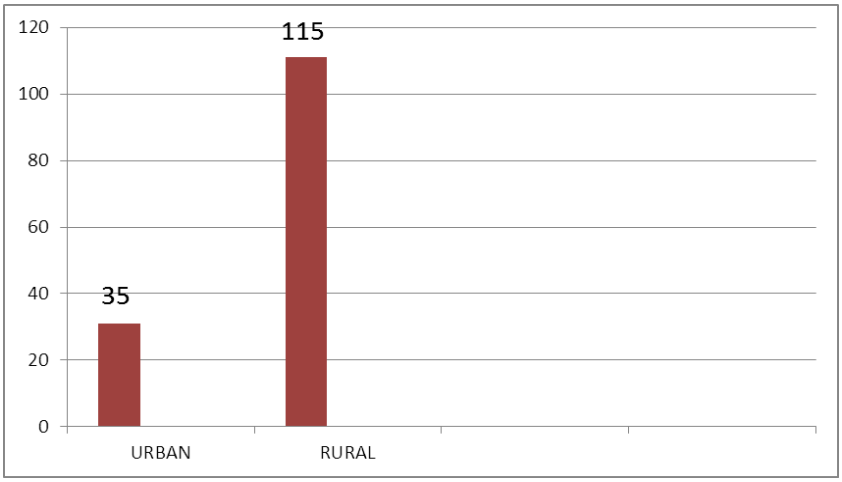


Figure 3: Parents/Guardians Literacy status.

Patient Residential Status

Patients life status of the pediatric patients enrolled in the study. The results showed that, 35were urban followed by 115 were rural.



Figur 4: Patient's life status.

Diagnose Wise Distribution Of Patient's

Diagnose wise distribution of patient enrolled in the study. The results showed that, Among 150 patients we found that most of the patients were diagnosed with gastroenteritis(GE) 33 patients (22%) followed by pneumonia 25(16%), meningitis 19 (12%), birth asphaxia with respiratory distress(BA with RD) 14(9%), septicemia 12(8%), and respiratory tract infections(RTI) 10(6%) and urinary tract infections(UTI) 8(5.3%), Intestinal obstruction 6(4%), cerebral lesion 4(2.6%), nephrotic syndrome 3(2%) and viral hepatitis were diagnosed 3(2%) patients of each condition. Other diseases like IUGR,, liver abscess, malaria, diphtheria were also found.

Table 3: Diagnose wise distribution of patients.

Indication	No of patients	Percentage %
Gastroenteritis	33	22%
Pneumonia	25	16%
Meningitis	19	12%
Ba with rd	14	9%
Septicemia	12	8%
Rti	10	6%
Uti	8	5.3%
Intestinal obstruction	6	4%
Cerebral lesion	4	2.6%
Nephrotic syndrome	3	2%
Viral hepatitis	3	2%
Others	13	8%

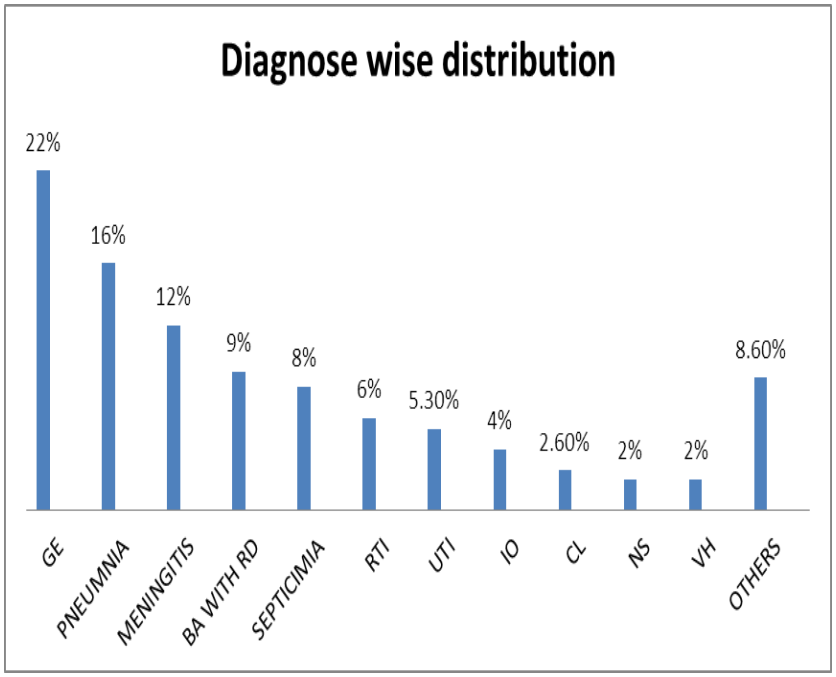


Figure 5: Diagnose wise distribution of patients.

Pathogenic organisms identified

Pathogenics organisms enrolled in the study. The result showed that, the organisms identified were Pseudomonas aeurogenosa 4 Patients (2.6%), Followed by E.coli 4 Patients (2.6%), S.pyogenes 3 Patients (2%), Klebsiella 1Patient (0.6%), S, aureus 1 Patient (0.6%), Enterococus 2 Patients (1.3%), Corynebacterium 1 Patient (0.6%), S.Pneumonia 5 Patients (3.3%).

Table 4: Pathogenic organisms identified.

Organisms	Number of patients	Percentage%
Pseudomonas aeurogenosa	4	2.6%
E. Coli	4	2.6%
S. Pyogenes	3	2%
Klebsiella	1	0.6%
S. Aureus	1	0.6%
Enterococus isolated	2	1.3%
Corynebacterium	1	0.6%
S. Pneumonia	5	3.3%

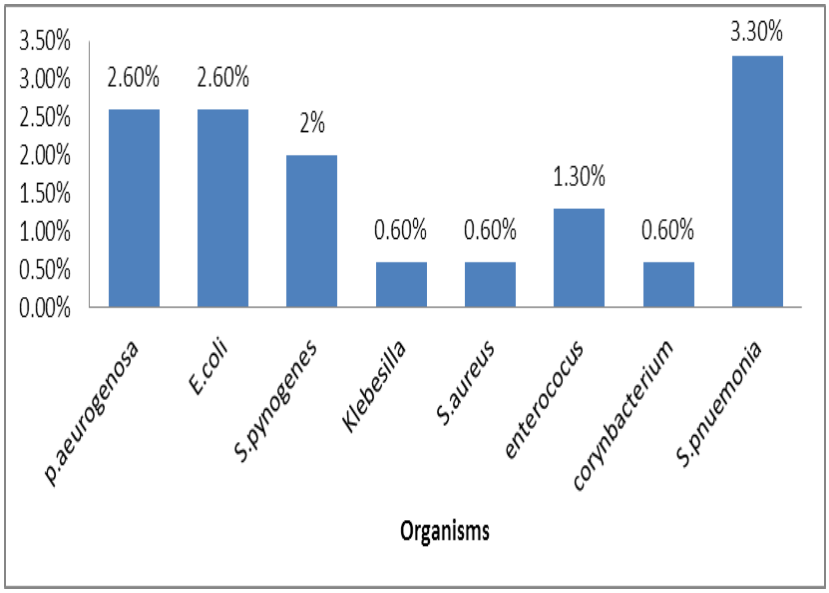


Figure 6: Pathogenic organism isolated.

Diagnostic Pattern Percentage In Different Age Groups

Diagnostic pattern percentage in different age groups enrolled in the study. The results showed that gasteroentiritis neonate (0), infants (10), children (23) followed by pneumonia neonate(4), infant(3), children(18), meningitis neonate (4), infants(3), children (12), BA with RD neonate(14), infants(0), children (0), Sepsis in neonates(11), infants (1), RTI infants(2), children (8), UTI children (8), Viral Hepatitis children (3), Nephrotic syndrome children (3), Intestinal obstruction Neonate (1), infant (1),children (4), cerebral lesion children (4) and others (13).

Table 5: Diagnostic Pattern percentage number in different age group.

Diagnosis	Neonates	Infants	Children
GE	-	10	23
Pneumonia	4	3	18
Meningitis	4	3	12
BA withRD	14	-	-
Sepsis	11	1	-
RTI	-	2	8
UTI	-	-	8
Viral hepatitis	-	-	3
NS	-	-	3
IO	1	1	4
CL	-	-	4
Others	3	-	10

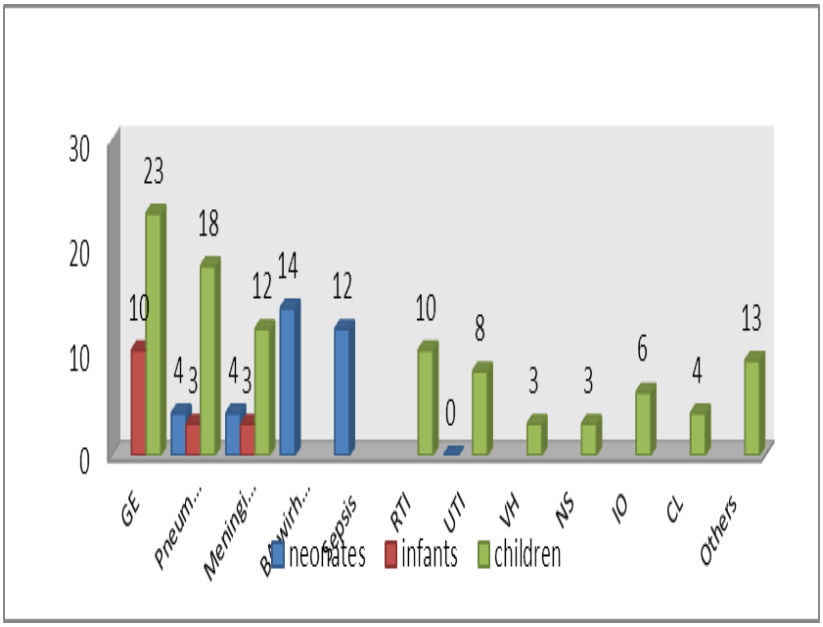


Figure 7: Diagnostic pattern percentage number in different age groups.

Duration of Hospital Stay

Duration of hospital stay enrolled in the study. The result shows as follows.

Table 6: Duration of hospital stay.

Diagnosis	Duration of hospital stay(days)	No of patient
Gastroentiritis	6	5
	9	5
	4	6
	8	2
	3	6
	5	4
	2	3
	7	2
Pneumonia	7	4
	8	2
	9	2
	10	2
	4	11
	16	2
	22	2
Meningitis	4	6
	6	6
	2	7
Sepsis	1	6
	3	4
	4	2
UTI	5	4

	6	4
RTI	11	4
	5	6
BA WITH RD	5	6
	18	2
	3	7
Intestinal Obstruction	8	6
Viral Hepatitis	5	2
	3	1
Cerebral lesion	5	4
Nephrotic syndrome	9	2
	10	1

ROUTE OF ADMINISTRATION OF ANTIBIOTICS

Route of Administration of Antibiotics in Pediatric Patients enrolled in the study. The results showed that, 142 (94.6%) were given by Intravenous route followed by 8 (5.3%) were given by Oral route.

Table 7: Route of Administration of Antibiotics in Pediatrics.

Route of Administration	Number of cases	Percentage (%)
Intravenous	142	94.6%
Oral	8	5.3%
Total	**150**	

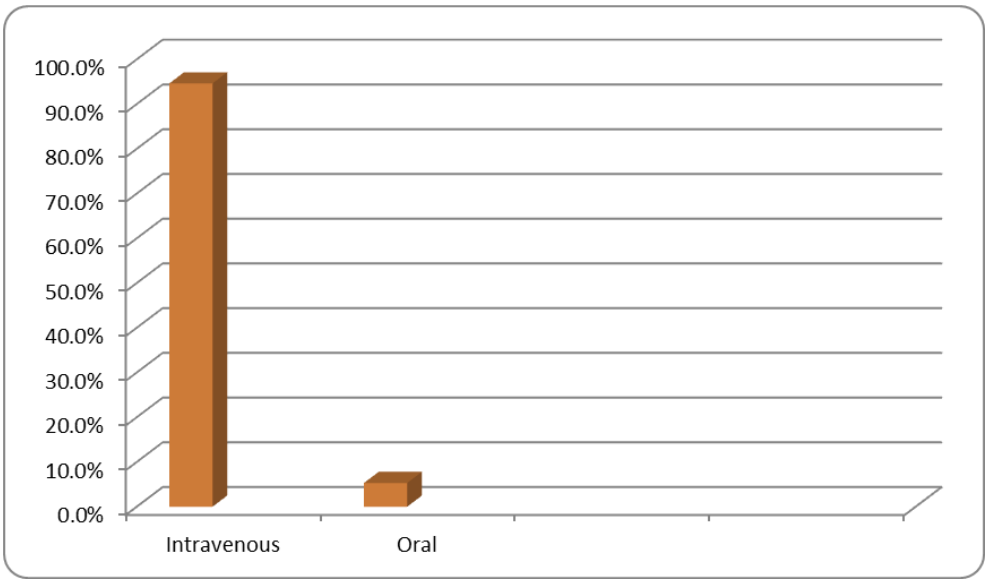


Figure 8: Route of Administration of Antibiotics in Pediatrics.

NUMBER OF ANTIBIOTICS PRESCRIBED PER PRESCRIPTION

Number of antibiotic prescribe per prescription enrolled in the study. The results shows that 3neonates prescribed with one antibiotic, 32 neonates were prescribed with two antibiotics, 12 neonates prescribed with three antibiotic were as 3 neonates were prescribed with more than three antibiotic, 7 infants prescribed with one antibiotic, 15 infants prescribed with two antibiotic, 7 infants prescribed with three antibiotic, 1 infant prescribed with more than three antibiotic, 26 children prescribed with one antibiotic,28 children prescribed with two antibiotic,11 children prescribed with three antibiotic,5 children prescribed with more than three antibiotic.

Table 9: Number of Antibiotic Prescribed Per Prescription.

	One antbiotic	Two antibiotic	Three antibiotic	More than three
Neonate	3	32	12	3
infants	7	15	7	1
Children	26	28	11	5

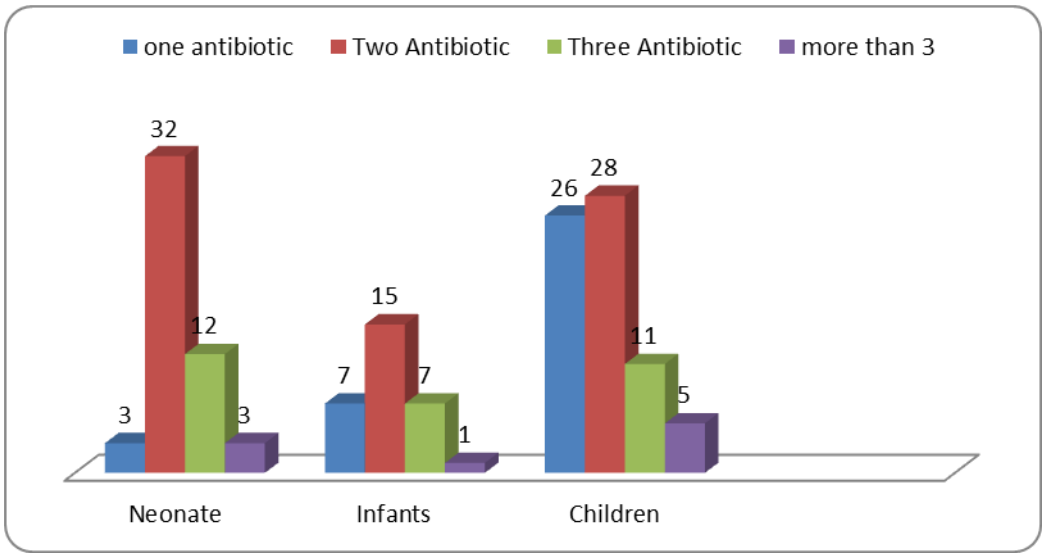


Figure 9: Number of Antibiotic Prescribed Per Prescription.

CLASS OF ANTIBIOTIC PRESCRIBED IN PAEDIATRIC PATIENTS

Class of antibiotic prescribed in paediatric patient enrolled in the study. The result shows as follows.

Table 11: Class of antibiotic prescribed in pediatric patient.

Class of antibiotics	Antibiotics prescribed	Percentage
Aminoglycoside	Amikacin Gentamycin Streptomycin	53%
cephalosporins	Ceftriaxone Cefotaxime	29%
Amino pencillin	Ampicillin	22%
Amino pencillin+ beta lactamase	Amoxicillin+clavunate	12%
Anti protozoal(imidazole derivative)	Metronidazole	12%
Beta lctamase	Piperacillin +tazobactum	3.3%
Oxazolidone derivative	Linezolide	8.6%
carbapenem	Meropenem	7.3%
tetracycline	Doxycycline	2.6%
Glycopeptide antibiotic	Vancomycin	2.6%
Macrolide	Erythromycin	1.3%
monobactum	Azenam	1.3%

DOSAGE REGIMEN

Dosage regimen enrolled in the study the result shows as follows

Antibiotic	OD	BD	TID
Amikacin	2	48	2
Gentamycin	28	6	2
Ampicillin	-	-	4
Ceftraixone	4	17	-
Amoxyclav	-	2	2
Metronidazole	-	2	30
Cefotaxime	-	20	11
Linezolid	-	2	13
Meropenem	-	4	11
Netromycin	4	2	-
Pipperacillin+tazobactum	-	-	4
Vancomycin	-	-	6
Doxycycline	8	-	-
Streptomycin	2	-	-
Erythromycin	2	-	-
Azenam	-	-	2

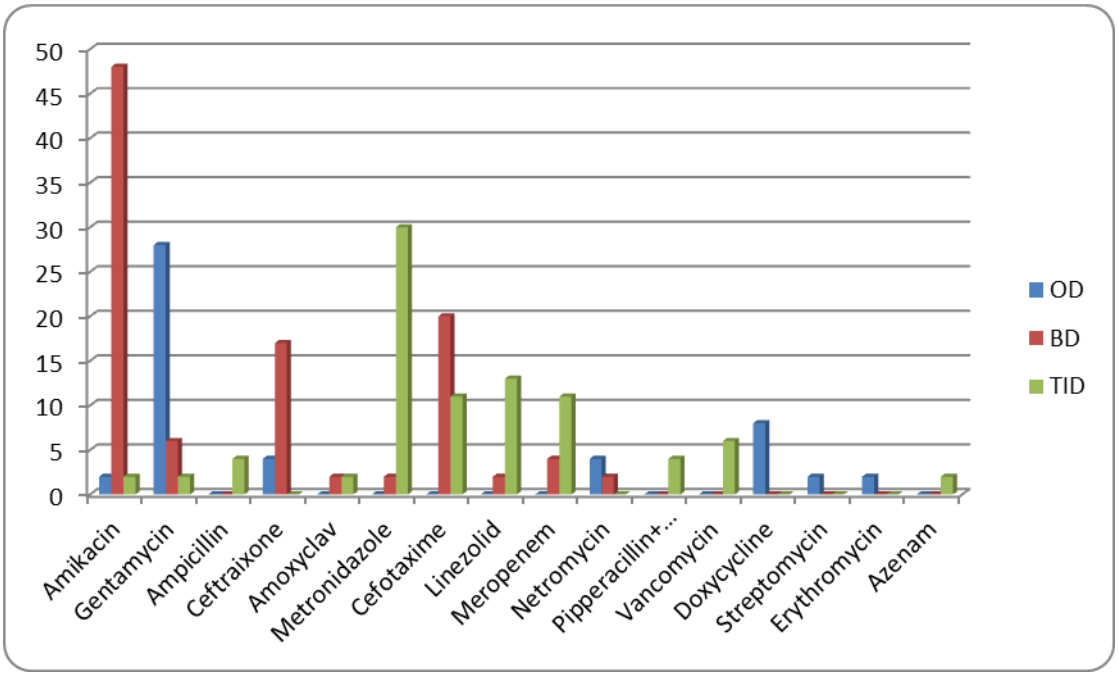


Figure -10: Dosage regimen.

FREQUENCY OF INDIVIDUAL ANTIBIOTIC PRESCRIBED FOR SPECIFIC DIAGNOSED DISEASE

Frequency of antibiotic prescribe for specific diagnosis of antibiotic enrolled in the study. The results show as follows.

Table 12: Frequency of individual antibiotic prescribed for specific diagnosis.

Diagnosis	Amikacin	Gentamycin	Ampicillin	Ceftriaxonee	Amoxicillin+clav	Metronidazole	Linezolid	Meropenem	Netromycin	Pipperacillin+ tazabactum	Vancomycin	Cefotaxime	Streptomycin	Erythromycin	Azenam	Doxycycline
Ge	15		3			10						2				
Pneumonia	12	8	-	5	19		4		4	4		8				
Meningitis	8	4	6	18			4	6				2	1	3	1	4
Sepsis	4	8	4		6	4	10	4			3					
Rti	2	2	3	4			2	5	3		2					
Uti	6	-	4	9								4				
Ba with rd	1	10	14	3				2	2							
Viral hepatitis	-	-	3	5		2										
Intestinal obstruction	1	1		1		2	1	2	1	1						
Nephrotic syndrome	-	-			**1**						**1**					
Cerebral lesion	-	-		**1**		**1**				**1**						**1**

ANTIBIOTICS DRUG USAGE PATTERN IN PAEDIATRIC PATIENTS

Antibiotics drug usage pattern in pediatric patients enrolled in the study. The results showed that Amikacin was prescribed in 43 patients (28%) followed by gentamycin 37patients (24%), Ampicillin 33 patients (22%), ceftriaxone 28 patient (18%), amox +clav 18 patient (12%), Metronidazole 12 patient (12%), cefotaxime 16patient (10.6%), Linezolide 13paients (8.6%), meropenem 11patients (7.3%), Netromycin 5 patient(3.3%), piperacillin+tazobactum 5 patients (3.3%), Vancomycin 4 patients (2.6%), Doxycycline 4 patirnt (2.6%), Streptomycin 2 patients (1.3%), Erythromycin 2patinet (1.6%), Azenam 2patient (1.6%).

Table 13: Antibiotics drug usage pattern in paediatric patients.

Antibiotic	No of patients	Percentage%
Amikacin	43	28%
Gentamycin	37	24%
Ampicillin	33	22%
Ceftriaxone	28	18%
Amoxicillin+clavunate	18	12%
Metronidazole	18	12%
Cefotaxime	16	10.6%
Linezolid	13	8.6%
Meropenem	11	7.3%
Netromycin	5	3.3%
Piperacillin+tazobactum	5	3.3%
Vancomycin	4	2.6%
Doxycycline	4	2.6%
Streptomycin	2	1.3%
Erythromycin	2	1.3%
Azenam	2	1.3%

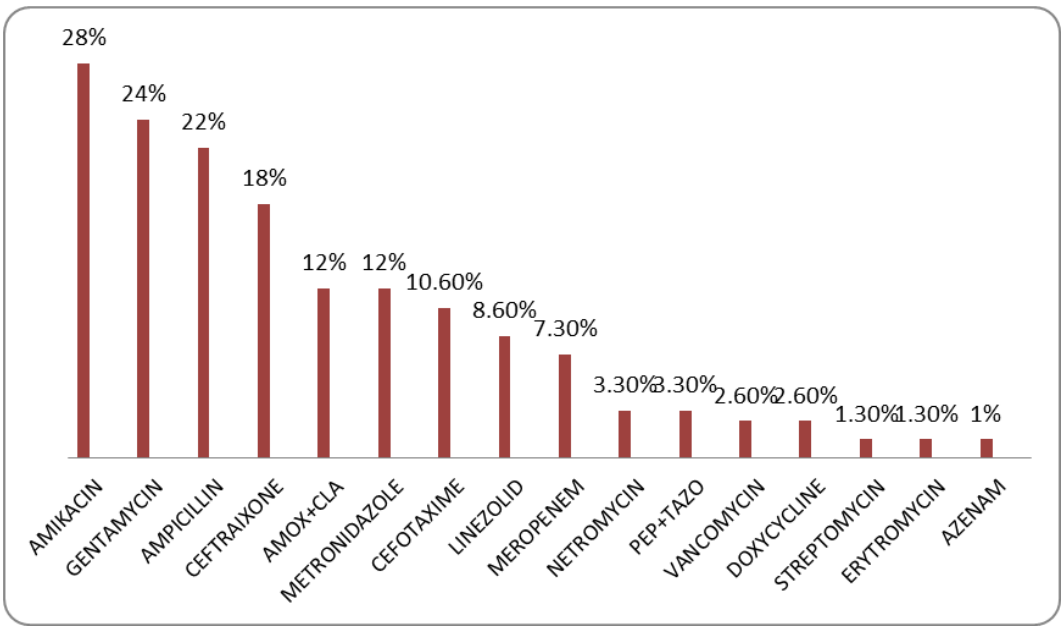


Figure -11: Antibiotic Drug Usage Pattern in Pediatric patients.

MOST COMMONLY PRESCRIBED ANTIBIOTICS AMONG PEDIATRIC PATIENTS

Most commonly prescribed antibiotic among pediatric patient enrolled in the study. The results shows as follows.

Table 14: Most commonly prescribed antibiotic among pediatrics.

Commonlyprescribed antibiotic	Indication	No of patients
Amikacin	Gastroenteritis	43
Gentamycin	BA with RD, SEPSIS,RTI	37
Ampicillin	BA with RD, RTI, Meningitis	33
Ceftraixone	Meningitis, UTI	28
Aamoxclave	Pneumonia, UTI	18

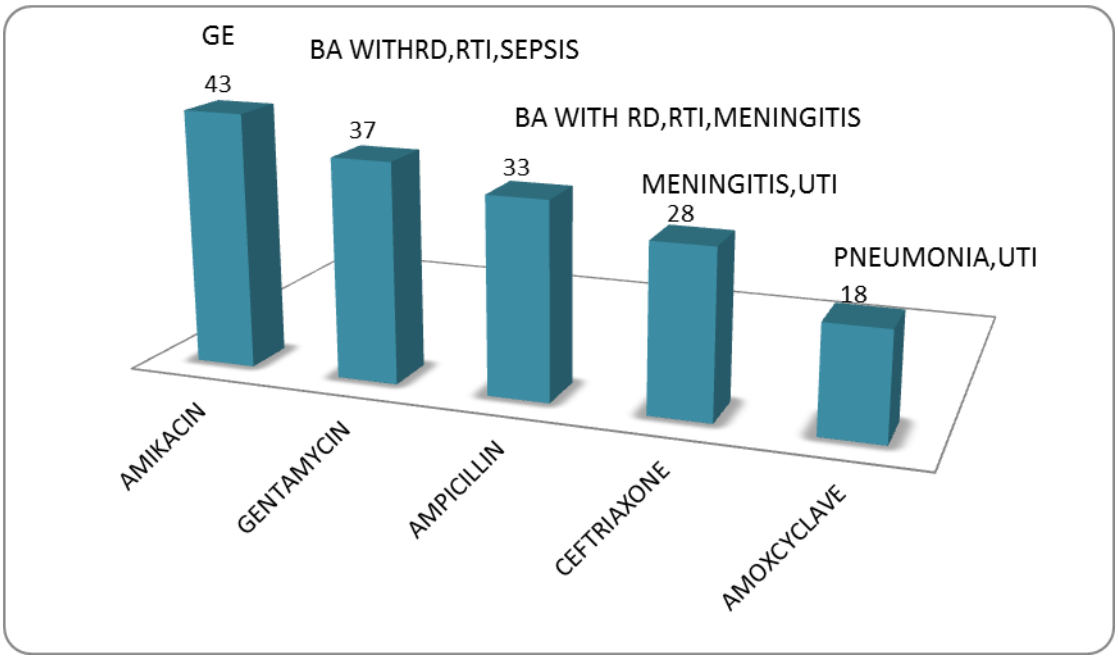


Figure-12: Most commonly prescribed antibiotics among pediatric patients.

DETAILS OF CO-MORBID CONDITIONS AMONG PAEDIATRIC PATIENTS

Among 150 patients enrolled in the study, the associated co morbid conditions of pediatric patients were acute gastroenteritis with dehydration 33 patients (47%), followed by(BA) Birth Asphyxia with (RD) Respiratory Distress with Hypoxic Ischemic Encephalopathy (HIE) 7patients (10%), sepsis with septicemia 6 patients (8.5%), meningitis with encephalopathy 6 patients (8.5%), (IUGR) Intrauterine growth retardation with sepsis 6 patients (8.5%), Nephrotic syndrome with glomerulonephritis 2patients(2.85%) bacillary dysentry with rti 2 patients (2.85%), pleural effusion with bronchopneumonia 2 patients (2.85%), osteopetrosis with bronchopneumonia 1 patient (1.4%), meningoencephalitis with

viral hepatitis 1 patient (1.45%), left congenital hernia with hydrocele 1patient (1.45%), neuromyelitisoptica with transverse myelitis 1 patient (1.45%), thalesemia with grade-2 Protein energy malnutrition with sepsis 1 patient (1.45%).

Table 15: Co-Morbid Conditions Among paediatric patients.

Diagnosis	Co-Morbid conditions	Number of patients	Percentage (%)
Acute gastroenteritis	with dehydration	33	47%
BA with RD	with HIE	07	10%
Sepsis	with septicaemia	06	8.5%
Meningitis	with Encephalopathy	06	8.5%
IUGR	with Sepsis	06	8.5%
Nephrotic syndrome	with Glomerulo nephritis	02	2.85%
Bacillary dysentery	with RTI	02	2.85%
Pleural effusion	withBronchopneumonia	02	2.85%
Osteopetrosis	with bronchopneumonia	01	1.4%
MeningioEncephilitis	withViral hepatitis	01	1.4%
Left congenital hernia	with hydrocele	01	1.4%
NeuromyelitisOptica	with Tranverse Myelitis	01	1.4%
Thalasemia	with grade 2 PEM with sepsis	01	1.4%
Guillanbarre syndrome	with right middle lobe pneumonia	01	1.4%
	Total	**70**	

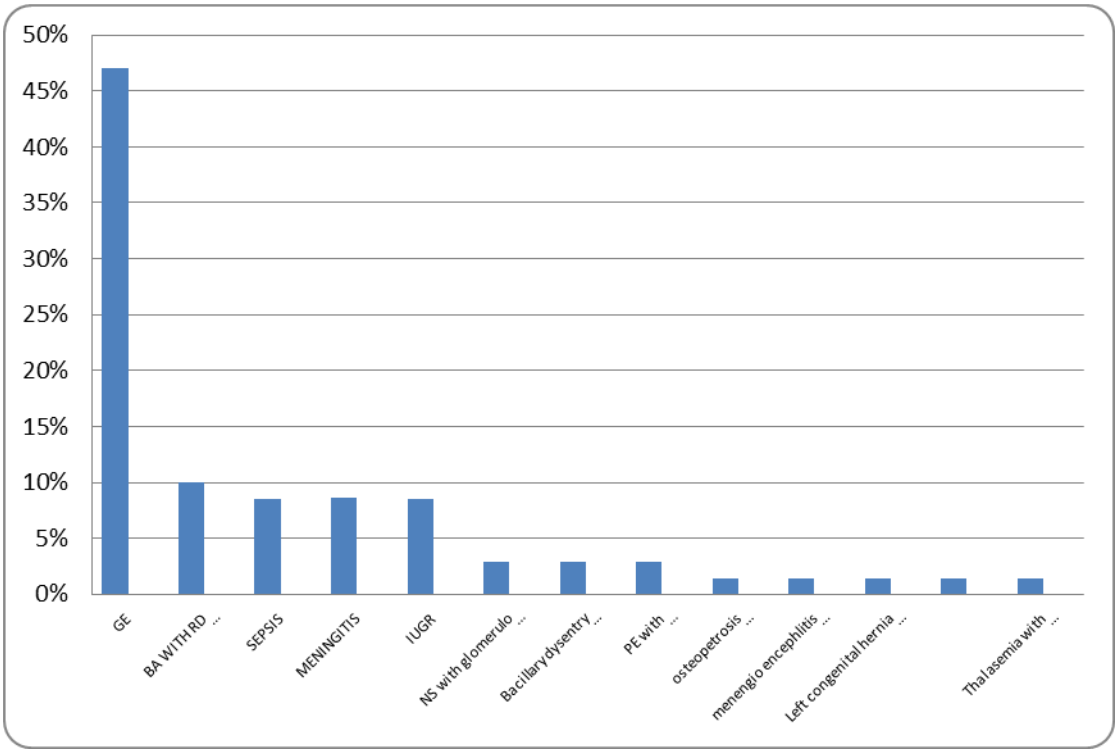


Figure -13: Co-morbid condition among paediatric patient.

CONDITION OF PEDIATRIC PATIENTS AT THE TIME OF DISCHARGE

Condition of Patients of the pediatric patients enrolled in the study. The results showed that, 112(74.00%) were Improved followed by 24(16%) were Discharged on request, 08(5.3%) were referred and 6(4%) were reported death.

Table 16: Condition of Pediatric patients at the time of discharge.

Condition	Number of patients	Percentage (%)
Improved	112	74.00%
Discharge under request	24	16.00%
Referred	08	5.3%
Death	06	4%
TOTAL	**150**	

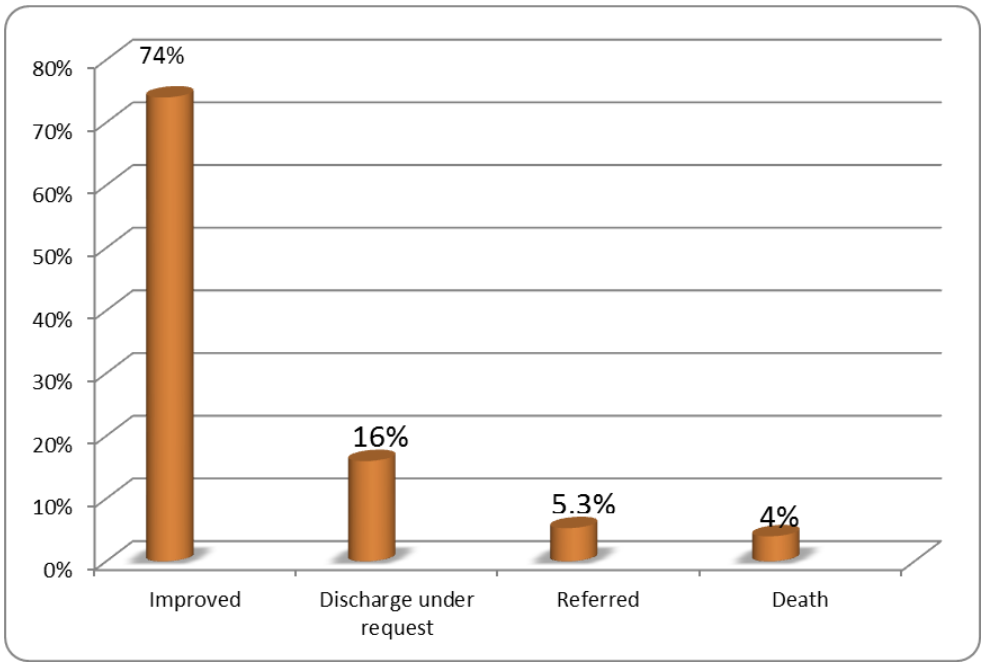


Figure 14: Condition of Pediatric patients at the time of discharge.

DISCUSSION

During study period total 150 patients were evaluated, 80 patients were male & 70 were female.

The percentage of male was 53% and 46% female. And the results also showed that among 150 patients 50 were, Neonates followed by 30 Infants & 70children.

The most common diagnosis was GE 33Patients (22%), followed by Pneumonia 25 Patients (16%), Meningitis 19 Patients (12%), BA with RD 14Patients (9%) Septicemia 12 Patients

(8%,) RTI 10 Patients (6%) UTI 8Patients(5.3%) IOB 6Patients (4%) VH 3 Patients (2%) NS 3Patients (2%) & OTHERS (8%).

The study shows that out of 150 patient enrolled in the study, Amikacin was the major antibiotic prescribed among 43 patients (28%), followed by Gentamycin 37 patients (24%), Ampicillin 33 patients (22%), Ceftriaxone 28 patients (18%) & Amoxicillin+Clav18 patients (12%)

In our study, more number of patients received single antibiotics in children of age group varying from 5-14 yrs.

In our study most of the pediatric patients received antibiotics through parental route which was similar to the study conducted by Sriram in Warangal.[5]

In our study, among the combination of antibiotics, Amoxiciliin+clav & Pipperacillin+Tazobactum were found to be commonly prescribed antibiotics to paediatric patients have found similar with the study carried out by Ashraf et.al, Guwahati.

Out of 150 cases reviewed, Analysis of disease pattern reveals that most of the children suffered from Gastroenteritis (GE), Pneumonia, Meningitis, RTI, UTI & Other diseases. Were as in Infants most of the patients suffered from (GE), Pneumonia, & Rare cases of Meningitis. Were as in Neonates most of the patients suffered from (BA), Sepsis, Meningitis, Pneumonia & Other diseases like Pseudomonal Sepsis, & Iugr.

In our study, the average length of stay in our study was 7-8 days which was more than the study done at Kathmandu[3]. In our study we have observed that paediatric patients having age group5-12 years had received more number of antibiotics as compare to infants

The organisms isolated in our study were P.aeurogenosa, E.coli, S.pyogenes, Klebsella, S.aureus, Enterococus, Corynebacterium, S.pneumonia from sputum,urine and blood respectively. specimens for culture test were not obtained in most cases or patients were not asked for the culture test in this study. Before the intiation of antimicrobials it is necessary to isolate from the specimen and identify the causative organism for appropriate antimicrobial therapy.

In our study, among various groups of antibiotics, Aminoglycosides (28%) were the most frequently prescribed antibiotics followed by Aminopencillins (22%), Cephalosporins (18%), Aminopencillins+Salbactum (12%), Imidazole (12%.

The study on the usage of antibiotics for various disorders revealed that Amikacin was the antibiotic commonly used to treat Gastroenteritis (22%), Amoxicillin+clavunate potassium for pneumonia (16%), Ceftriaxone for Meningitis (12%), Linezolid for septicemia (8%) respectively.

Intervention donein our study

In our study period we found that, In case of Drug Induced Hepatic Injury (INH-INDUCED). For which the physician prescribed Gentamycin, which is Contraindicated in patients with hepatic impairment. The Gentamycin has the tendency of causing hepato-toxcity. After Intervention done the physician withdraw the drug.

CONCLUSION

In our study we found that majority of prescription contained Broad-spectrum antibiotics.

Greater attention and caution is highly needed and recommended when antibiotics prescribed for children. Physicians must keep a clear understanding of need for microbial diagnosis, use of antibiotics and make good judgment in clinical situations.

Proper education program on rational usage of drug and an antimicrobial order form should be implemented in the hospitals to reduce the inappropriate therapy.

Antibiotics are the most commonly prescribed drugs in paediatric population. Thus special measures are imperative for their rational usage to prevent emergence of resistance.

Empirical therapy and antimicrobial usage for viral infection can be reduced by the availability of rapid diagnostic method to differentiate between viral and bacterial infection.

From this study it can be concluded that it is mandatory to prepare guidelines for antibiotic prescription and use Appropriate drugs for the disease rather than prescribing multiple drugs.

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