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Research Article

**ASSESSMENT OF PRESCRIPTION PATTERN OF  
ANTIBIOTICS IN PAEDIATRICS WITH RESPIRATORY  
TRACT INFECTIONS AND GASTRO INTESTINAL TRACT  
INFECTIONS****Sridhar. STK\*, Suvarchala Reddy. S, Yogitha. K**

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**Abstract:**

*Antibiotics are the main drugs used for treatment of infections and are most commonly prescribed in Paediatric department. Their overuse has prompted the risk of Bacterial Drug Resistance and need for the use of Antibiotics judiciously in Paediatric Practice. It has been reported that there are about 20-50% of usage of antibiotics is questionable or inappropriate. The study was conducted to assess (i) Drug use pattern of Antibiotics in Paediatrics with Respiratory tract infections and Gastro intestinal tract infections. (ii) To measure the drug use pattern in pediatrics according to WHO Prescribing patterns. A Prospective observational study was conducted in inpatient and outpatient department of pediatrics. Patient Demographics and drugs prescribed were collected and analyzed. National List of Essential Medicines (NLEM) or Essential Drug List (EDL) is taken for the assessment of rational drug use. In this study of age group 1 day to 18 years, most of the infections are present below 1 year age group. To conclude, In Respiratory tract infections, Cephalosporin's are most commonly prescribed of 40% followed by Pencillins 29%, where as in Gastro intestinal tract infections, Floroquinolones are commonly prescribed of 48% followed by cephalosporin's 28%. The Prescribing patterns according to WHO Prescribing indicators are less likely followed.*

**Keywords:** *National List of Essential Medicines (NLEM), Essential Drug List (EDL), Respiratory tract infections (RTIs), Gastro intestinal tract infections, World Health Organisation (WHO).*

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**INTRODUCTION:**

Antibiotics are prescribed unnecessarily for viral infections like common cold which is misuse in paediatrics (Alakhali and Asif Ansari, 2014). It has been reported that there are 20-50% usage of antimicrobials is questionable or inappropriate (Arulmoli et al., 2009). Accurate judgement of origin of infection may help the prescriber to prescribe the drugs rationally. This may reduce adverse drug events and Patient noncompliance in the healthcare process to prevent medication-related problems (Tiwari et al., 2014).

Evaluation of prescription patterns helps us to reduce the adverse drug events as they are most common in children (Gupta, 2014). Worldwide it is estimated that over 50% of drugs are prescribed, dispensed and sold inappropriately. In developing countries only 70% of pneumonia cases receive appropriate antibiotic about half of the upper respiratory viral infections and viral diarrhoea receive antibiotics inappropriately (Achalal et al., 2015) Upper respiratory infection is most common cause for morbidity in pediatric age group (Torvi and Dambal, 2011). Infants and children are more exposed for this disastrous consequences of the misuse inappropriate use of antibiotics due to frequent illness (Alemnew and Atnafie, 2015).

Following strategy developed by WHO in a collaborative work with international network for rational use of drug, we can detect the problems in prescribing like poly pharmacy and over use of antibiotic (Narayan and Mangesh, 2016). Emergence of multiple antibiotic resistance is due to the overuse of antibiotics (Shivaleela et al., 2014). In the pediatric populations for rational prescription there should be proper therapeutic indication and the correct dosage in appropriate formulation, easily available and of reasonable cost (Babu et al., 2015). Lower respiratory tract infections are leading cause of death below 5 years of age in some developing countries (Thapaliya et al., 2015). Children below 1 year of age are at high risk of receiving multiple doses of antibiotics than others (Palikhe, 2008).

Antibiotic guidelines are the standard set of guidelines for the treatment of infectious diseases based on local culture sensitivity data. These guidelines help the physician to prescribe rational antibiotics to the paediatric population when definitely indicated (WHO model formulary for children, 2010). So detailed rational knowledge of prescription pattern of antibiotics should be implemented in clinical practice. Infants <1 year received more antibiotics than 1-5 years and 5-12

years, 75% are administered parentally (Prabahar, 2017).

The Global antibiotic resistance partnership (GARP) India research estimates 19,0000 neonatal deaths each year due to the infections of which over 30% are attributable over antibiotic resistance (Gopal et al., 2014). In developing countries 30% of adults and 25% of pediatric inpatients are diagnosed with acute respiratory tract infections (Hemamalini et al., 2016). From the wrong drug prescription to wrong dose and administration the impact of medication is tremendously costly problem. The combination of global immunisation programmes, housing, sanitation, nutrition and use of such antimicrobial agents led to significant fall in mortality in paediatric populations from infectious diseases 20<sup>th</sup> century (Mezgebe et al., 2015).

Antibiotics are most commonly prescribed drugs all over the globe, they account for about 24% (Choudhury, 2014). Several studies reported that about 50-85% of children receive antibiotics prescribed by physician (Suryawanshi, 2015). A common problem encountered in children is failure to comply with therapeutic regimen is either due to inconvenient dosing schedule or multiple medications recommended (Surendra Reddy et al., 2015). Appropriate use of drugs is the essential element for the health (Fatima Mohammed and Osman Ahmed, 2015). Number of antibiotics prescribed, appropriateness of dose and drug interactions are considered very essential for rational clinical practice in pediatric populations (Malpani, 2016). Management of URTIs include non-pharmacological therapy which may ameliorate the rhinorrhoea and cough like: Good hydration, Elevated bed, Saline nasal drops, Educational handouts, Bulb syringe and Water vaporiser. Optimal and judicious selections of anti-microbial agents for the therapy of infectious diseases require clinical judgement and complete knowledge about pharmacological and microbiological agents (Resmi, 2016).

Medically inappropriate, ineffective, non-economical use of pharmaceutical product is commonly observed in health care system throughout the world especially in developing countries (Ajapuje et al., 2012). Respiratory infections are increasing globally with parallel increase in population, urbanisation, overcrowding, global warming and poverty (Gupta and Chatterjee, 2017).

NICE guidelines provide three poles of antibiotic management strategies with RTIs like following: No antibiotic prescribing, deferred antibiotic prescribing

and instantaneous antibiotic prescribing (Gairola et al., 2016). The use of injectibles increases the cost of treatment and puts economic load and use of non-

sterile injections may cause transmission of blood borne diseases. WHO standard prescribing indicators with optimum values are given as follows.

| Indicator   | Optimal/reference value |
|---|-------------------------|
| Average number of drugs per encounter -                   | 1.6-1.8                 |
| Percentage of drugs prescribed by generic name -          | 100%                    |
| Percentage of encounters with an antibiotic -             | 20-26.8%                |
| Percentage of encounters with injectibles -               | <10%                    |
| Percentage of drugs prescribed by EDL/Hospital formulary- | 100%                    |

These prescribing indicators are used for the measure of rational drug use (Demeke et al., 2015). This concept was introduced to accelerate the positive impact on health care and status especially in developing countries (Desalegn, 2013). International network of rational use of drugs (INURD) along with WHO set some Prescribing indicator for the rationality of prescribing in primary care (Mahalli, 2012). The simplified five rules for rational usage of drugs are appropriate drug at appropriate dose at appropriate route at the appropriate time for appropriate patient (Bello et al., 2016). Furthermore determinants of irrational prescribing include patient demands or expectations, lack of appropriate role

model, lack of objective drug information and vigorous drug promotions by companies (Cole et al., 2015).

#### **METHODOLOGY:**

A prospective study was conducted in pediatrics department at tertiary care hospital for a period of 6 months (January 2017 to June 2017).

Prescriptions, symptoms and relevant data regarding respiratory tract infections and gastrointestinal infections in pediatrics with different age groups was entered in the preformed proforma and analyzed.

#### **Methods:**

|                           |  |
|---------------------------|--|
| <b>Study site</b>         | : Varma hospitals, Bhimavaram.<br>Vijaya Lakshmi nursing home                                  |
| <b>Inclusion Criteria</b> | : Pediatrics with respiratory tract infections<br>Pediatrics with gastro intestinal infections |
| <b>Exclusion Criteria</b> | : Subjects with other serious diseases<br>Subjects not willing to participate in study         |
| <b>Study Design</b>       | : Prospective – Observational  |

Visit the patients in hospital in both inpatient and outpatient department, Get information, Proper diagnosis found for RTIs and GI infection, Observe antibiotics in therapy Assess the antibiotic usage in pediatrics using WHO prescribing indicators with the

help of National essential medication list (NEML) or essential drug list

**Data Collection:** Permission from hospital authorities was obtained to collect data from subjects after describing the trail objectives to the participants.

Patient data such as Name, age, weight, gender, symptoms, vital, temperature, background information about previous allergies and diagnosis etc; are collected by using data collection forms.

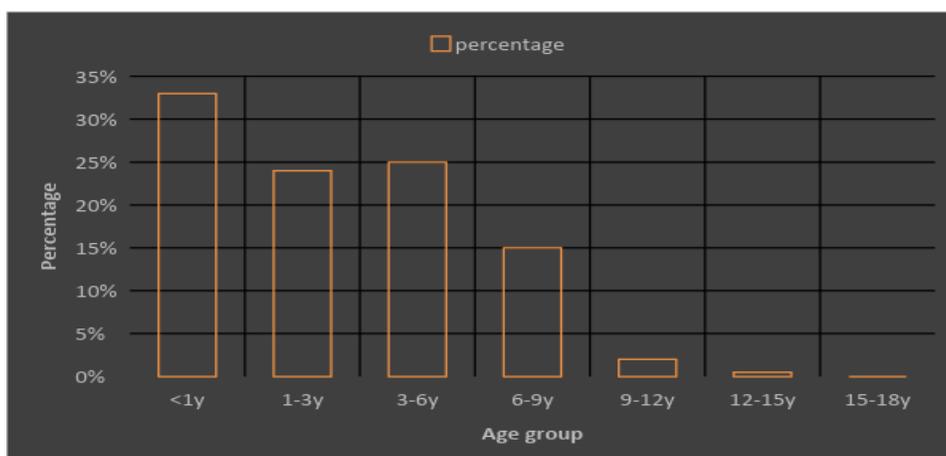
**Data Analysis:** Drug use pattern in paediatrics according to WHO prescribing indicators was assessed using essential drug list or hospital formulary for average no. of drugs per prescription, percentage of drugs prescribed by generic and essential drug list. Paediatrics with respiratory tract infections and gastrointestinal infections with

antibiotic usage are taken in prior for the study to assess the drug use pattern of antibiotics.

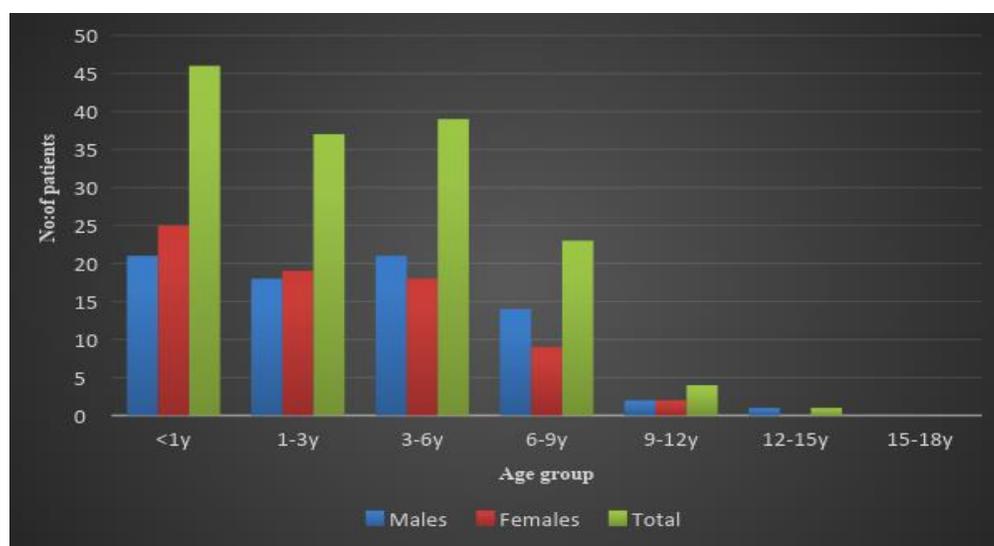
**Statistical Techniques Used:** A descriptive statistical analysis has been carried out in this present study where Mean and percentages are calculated

**Ethical consideration:** The study was carried out from January 2017 to June 2017 after due permission from the Institutional Ethics Committee and after getting consent (in written form) from all the participating subjects.

## RESULTS



**Fig.1: Percentage of antibiotic administration in paediatrics with respiratory tract infections and gastrointestinal infections**



**Fig.2: Age wise distribution of paediatrics with respiratory tract infections and gastrointestinal tract infections according to gender**

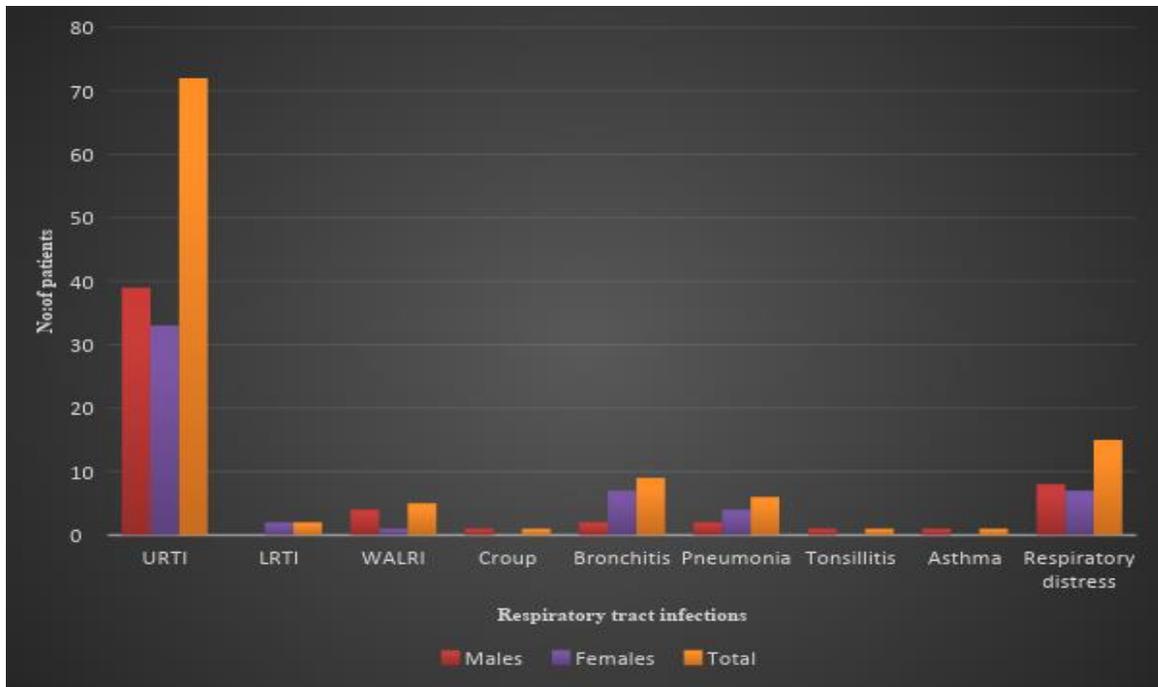


Fig. 3: Gender wise distribution of paediatrics with respiratory tract infections

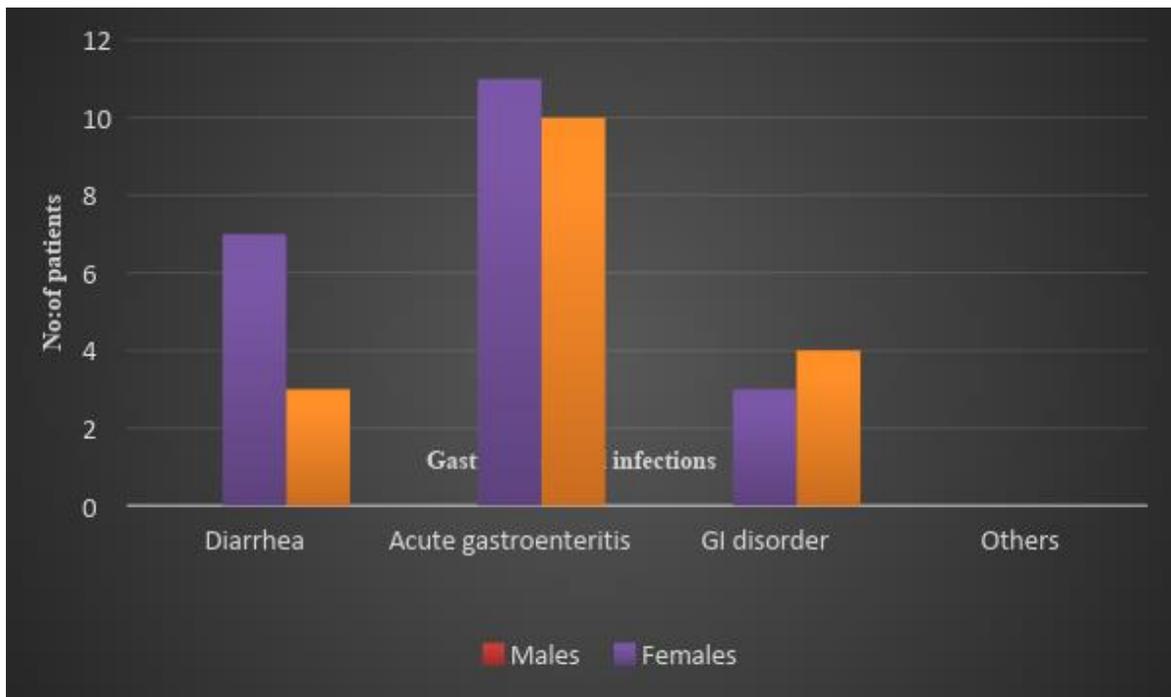
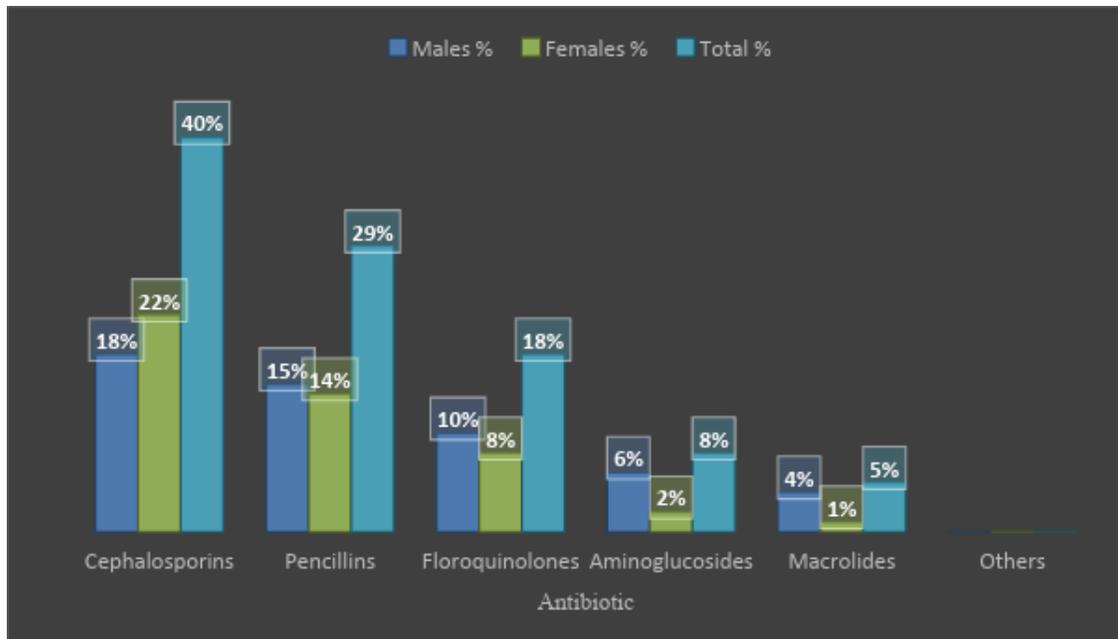
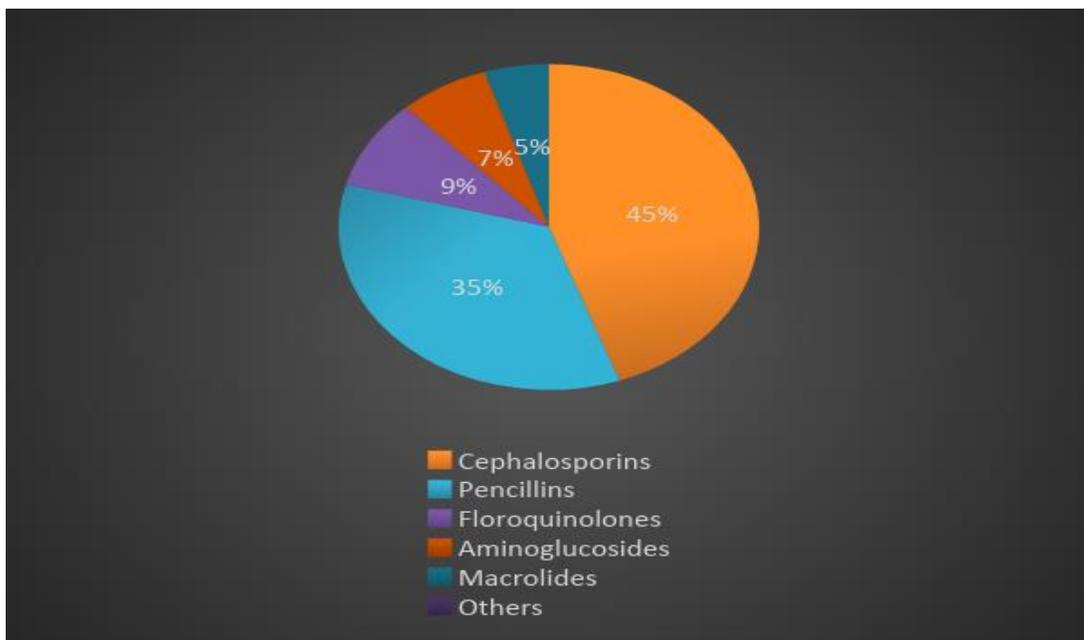


Fig.4: Gender wise distribution of paediatrics with gastro intestinal tract infections



**Fig.5: Percentage of antibiotic administration in paediatrics with respiratory tract infections and gastro intestinal tract infections according to gender**



**Fig.6: Percentage of antibiotic administration in paediatrics with respiratory tract infections**

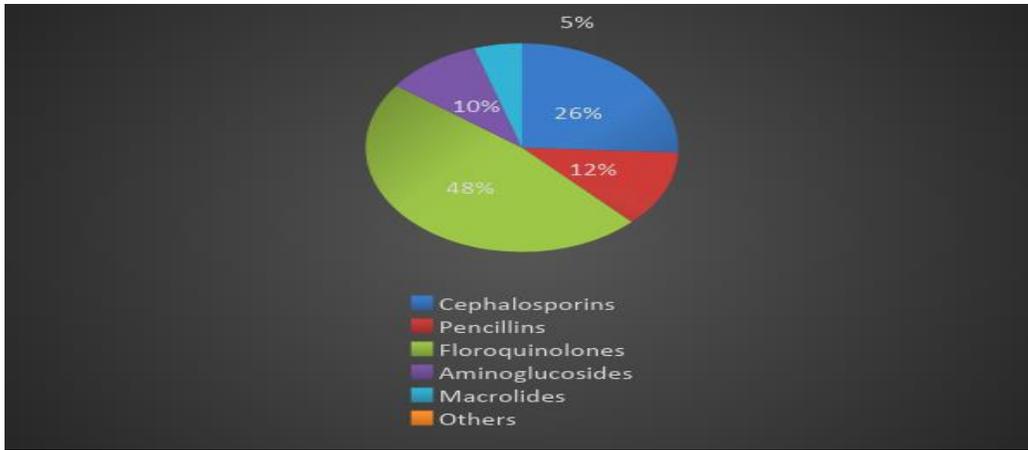


Fig.7: percentage of antibiotic administration in paediatrics with gastro intestinal tract infections

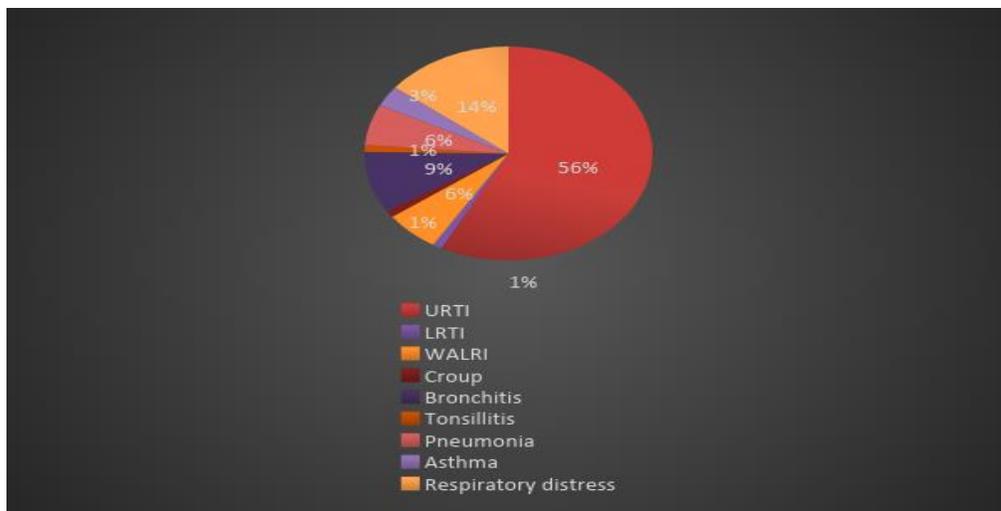


Fig.8 : Categorization of percentage of antibiotic administration according to respiratory tract infections

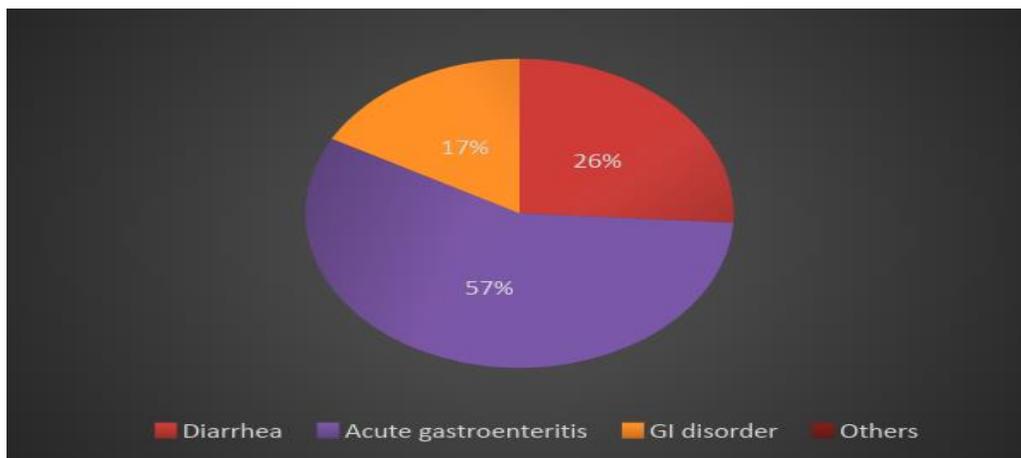
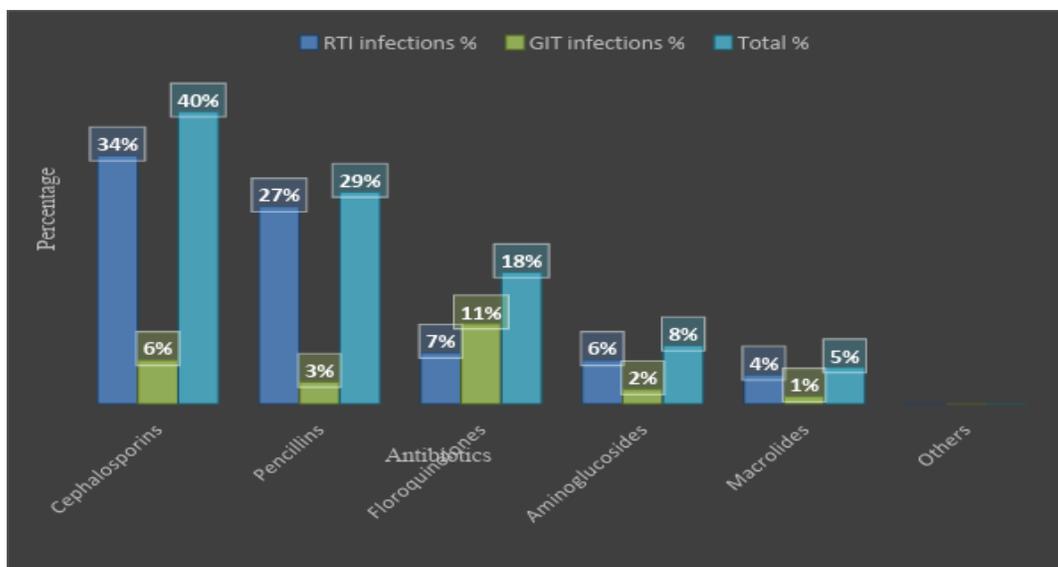


Fig.9 : categorization of percentage of antibiotic administration according to gastro intestinal tract infections



**Fig. 10: percentage of antibiotic administration in paediatrics according to respiratory tract infections and gastro intestinal infections**

**Table 1: WHO prescribing indicators to measure the drug use pattern in paediatrics with respiratory tract infections and gastro intestinal tract infections**

| WHO prescribing indicator  | Average /percentage | WHO optimal / reference value |
|--|---------------------|-------------------------------|
| Average no: of drugs per counter (mean)                                | 3.36                | 1.6 - 1.8                     |
| Percentage of drugs prescribed in generic (%)                          | 7.9%                | 100%                          |
| Percentage of encounters with antibiotic (%)                           | 100%                | 20-26.8%                      |
| Percentage of encounters with injectibles (%)                          | 49%                 | <10%                          |
| Percentage of drugs prescribed according to EDL/Hospital formulary (%) | 45.1%               | 100%                          |

### DISCUSSION:

A prospective observational study was conducted in outpatients and inpatients in pediatrics department admitted in Varma hospitals and Vijaya nursing home to assess the prescription pattern of antibiotics in pediatrics and assess the drug use pattern in pediatrics according to WHO prescribing indicators. Total number of pediatrics enrolled with respiratory tract infections and gastro intestinal tract infections are 150 (n=150), where the distribution according to gender are males=77 (52%) and females=73

(48%). Most of the the percentage of antibiotic administration was below 1 year of age 59 (33%). Total no: of pediatrics enrolled with respiratory tract infection are 112 where males =58 (52%) and females =54 (48%); pediatrics enrolled with gastro intestinal tract infections are 38 where males = 21 (55%) and females =17 (45%).

**Prescription pattern for Respiratory Tract Infections:** In this study Percentage of antibiotic administration in pediatrics with respiratory tract

infections are as follows Cephalosporins (45%); Pencilins (35%); Floroquinolones (9%); Aminoglycosides (7%); Macrolides (5%), where total no: of antibiotics prescribed were 139 (77%). For each respiratory tract infection the percentage of antibiotic administration are as follows URTI (56%); LRTI (1%); WALRI (6%); croup (1%); Bronchitis (9%); Pneumonia (6%); Tonsillitis (1%); Asthma (3%); Respiratory distress (14%).

#### **Prescription pattern for Gastro Intestinal Tract Infections:**

In this study percentage of antibiotic administration in paediatrics with gastro intestinal tract infections are as follows Cephalosporins (26%); Pencilins (12%); Floroquinolones (48%); Aminoglycosides (10%); Macrolides (5%), where total no: of antibiotics prescribed were 42 (23%). For each gastro intestinal tract infection the percentage of antibiotic administration are as follows Diarrhoea (26%); Acute gastroenteritis (57%); GI disorder (17%).

Where the WHO prescribing indicators has the optimal values of following as average no: of drugs per encounter - 1.6-1.8; Percentage of drugs prescribed by generic name - 100%; Percentage of encounters with an antibiotic - 20-26.8%; Percentage of encounters with injectables - <10%; Percentage of drugs prescribed by EDL/Hospital formulary - 100%. These prescribing indicators are used to assess the drug use pattern in paediatrics with respiratory tract infections and gastro intestinal tract infections.

#### **CONCLUSION:**

This study revealed that antibiotics are more prescribed under 1 year of age and most of the cases are with respiratory tract infections than gastrointestinal tract infections especially upper respiratory tract infections. Cephalosporins are most commonly used percentage of antibiotics in respiratory tract infections of 40%, followed by pencilins 29% and floroquinolones 18% where as in gastro intestinal tract infections floroquinolones are commonly prescribed 48% followed by cephalosporins 26% and pencilins 12%, where acute gastroenteritis is commonly seen disease in paediatrics and antibiotic administration was about (57%), followed by diarrhea (26%).

Therefore the drug use pattern is assessed according to WHO prescribing indicators where average no:of drugs per counter is high indicating polypharmacy , percentage of drugs by generic is not done where the prescriptions are with different brand names, percentage if encounters with antibiotic is very high

indicating in appropriate use, percentage of encounters with injectables is also high and drugs are not completely prescribed according to Hospital formulary or EDL is observed in this study.

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