IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Human Journals
Research Article
July 2022 Vol.:24, Issue:4

Evaluation of Drug Therapy Review and Dose Division Services in the Paediatric Department

IJPPR
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals
ISSN 2349-7203
HUMAN

Md. Sofiqul Mollik[1*], Ann Madhu[1], Marsoom M[1], B J Mahendra Kumar[1], Baharul Islam H[2]

[1]Department of Clinical Pharmacy, CSI Holdsworth Memorial Hospital, Mysore, India.

[1]Farooqia College of Pharmacy, Mysore, India.

Submitted: 21 June 2022
Accepted: 26 June 2022
Published: 30 July 2022

Keywords: Clinical pharmacist, Paediatric, Doctors, Neonate, Adolescent, Drug therapy review

ABSTRACT

Background: The drug therapy review is a systematic process of collecting patients' specific information, assessing medication therapies to identify drug-related problems, developing a prioritized list of medication-related problems, and creating a plan to resolve them. The dose division services were a quantity of drug to be administered at one time as a specified amount of drug. Its means the dose of medication is split up (divided) into smaller doses throughout the day and provided to the patients. **Objectives:** To evaluate drug therapy review and dose division in the pediatric department. **Methodology:** This Prospective study was carried out for a period of 6 months from January 2021 to June 2021. In the inpatient departments of pediatrics, in the CSI Holdsworth Memorial (Mission) Hospital Mysore, Karnataka. With aim of evaluating drug therapy review and dose division in the pediatric department. The data are collected on patients' demographic details, patient case sheets, patient prescriptions, and Personal interviews with doctors, nurses, patients, and patient caretakers. Current medications along with their drug-related problems. Were drug-drug interactions, adverse drug reaction, overdosage, improper drug selection, sub-therapeutic dose, untreated indication, failure to receive the drug, and drug use without indication which was reported to the doctors. **Results:** 65 patients' treatment charts were reviewed in the study period. Among them, age group 1 month to 2 years maximum patients 32 (49.23%), 41 (63.07%) were males, and 24 (36.92%) patients female. Out of 65 patients, 296 prescribed medications were the maximum number administered by intravenous (IV) route. In this study various drug-related problems have been categorized out of which 10 (15.38%) Patients were found with Adverse drug reactions, 19 (29.23%) patients were found with Drug-drug interactions, and 36 (55.38%) were found with no drug-related problem. A total of 8 dose division services were provided during the study period which was approached by doctors of the pediatric department. A total of eight dose division services were provided which is approached by doctors. Were albendazole1, doxycycline6, and mefenamic acid1. Most of the time doctors were busy and they don't aware of the dose division services which was provided by the clinical pharmacist and most of the requests from the age group between 6 to 12 years. **Conclusion:** The purpose of this study was to identify drug-related problems in the pediatric population. This is a potential challenge for ensuring drug safety along with effective treatment by systematic monitoring of drug-related problems such as drug-drug interaction, overdose, contraindication, polypharmacy, sub-therapeutic dose, untreated indication, and drug used without indication. During the study period, a total of 65 patients were a treatment chart review done by the pediatric Department.

INTRODUCTION

The drug therapy review is a systematic process of collecting patients' specific information, assessing medication therapies to identify medication-related problems, developing a prioritized list of medication-related problems, and creating a plan to resolve them.

The list of drugs used for various cardiac diseases in children is long and ever-increasing. Most of the data for the efficacy of these drugs has been generated in adult cardiac patients through randomized trials and observational studies. Conducting such trials in children is difficult, if not impossible, due to logistic problems and ethical issues. Therefore, in most cases, the basis of using a drug in pediatric practice is extrapolated from the experience of adult patients. With this background, the Working Group on Management of Congenital Heart Diseases met on 13th September 2008, at the All India Institute of Medical Sciences. New Delhi, to reach a consensus for an evidence-based review of drugs used in heart disease in children and formulation of recommendations.[7]

Realizing ideal drug therapy in the pediatric population is a global concern for clinicians and regulatory agencies largely owing to the scarcity and low quality of evidence in safety and efficacy in the pediatric population (Dunne 2007). Use of medicines outside the specifications described in the license in terms of formulation, indications, and contraindications constitutes off-label and off-licensed use.[8]

While the adage that children are not small adults has existed for some time, most pediatric doses are still extrapolated from adult studies. Children experience large amounts of growth and development during early childhood which can dramatically affect the pharmacokinetics of different drugs. The lack of pediatric clinical trials and dosing information has been highlighted by the US Food and Drug Administration (FDA) and the European Medicines Agency as areas of clinical need, and there is now a requirement for more pediatric data in the evaluation of new drugs.[9]

When DRPs and/or medication errors were identified by the researchers, the same was discussed with the clinical pharmacist, postgraduate students, resident doctors, and the unit chief of the pediatric department. The suitable suggestions were made regarding the identified DRPs and/or medication errors at the earliest possible time and were documented in the data collection form. To check the quality of the documentation and also to minimize

transcription errors, clinical pharmacists and pediatricians reviewed the data collection forms for ensuring the consistency of information transferred from patients' medical records.[19]

There is enough evidence to demonstrate that the prescribing of the drugs has shifted from generics to brands and prescribing out of the National List of Essential Medicines (NLEM). Rational prescribing can be assessed with the help of conducting prescription audits and the results of such studies help in developing the quality of rational drug use in a health facility. World Health Organization (WHO) has formulated a set of core drug use indicators, which measure the performance of prescribers, patients' experience at health facilities, and whether the health personnel can function effectively.[20]

Promoting safe and judicious use of drugs in children is fundamental. Regular audits by trained pharmacists with rational and judicious prescribing practices will help toward standardizing pediatric therapeutic interventions and promote better and safe futures for children. This study was aimed at assessing drug prescription patterns in a tertiary care hospital with the following objectives: to evaluate adherence to prescription format; to determine commonly prescribed FDCs for children and analyze whether they are rational and to assess drug prescription patterns in children using the WHO prescribing indicators.[21]

Classification of pediatrics population is as follows:

- Neonates (birth to 1 month)
- Infants (1 month to 1 year)
- Children (2 years to 5 years)
- Young children (6 to 12 years)
- Adolescents (13 to 18 years)

The dose division services are defined as the quantity of drug to be administered at one time as a specified amount of drug. Its means the dose of medication is split up (divided) into smaller doses throughout the day.

Children differ from adults in many aspects of pharmacotherapy, including capabilities for drug administration, medicine-related toxicity, and taste preferences. Pediatric medicines must be formulated to best suit a child's age, size, physiologic condition, and treatment

requirements. To ensure adequate treatment of all children, different routes of administration, dosage forms, and strengths may be required.2

Many drugs are prescribed off-label, which means outside the terms of the summary of product characteristics (SPC) i.e. indication, dosage, and contraindication in children. Among the numerous studies about off-label use, no data have focused on drug use despite contraindication in children.[4]

Globally nearly nine million children under five years of age die every year, with pneumonia, diarrhea, and neonatal causes being the major killers. Many of these conditions could be treated with safe, effective medicines. On the other hand, irrational use of the available drugs has led to adverse drug reactions and drug resistance to the usual pathogens and infections by unusual organisms. The promotion of appropriate and safe drugs in children is the need of the hour globally.[5]

The pediatric population constitutes a significant portion of the total population. Unlike the overall perception, a pediatric population is a diverse group comprising different subgroups, categorized differently by agencies across the world. The American Academy of Paediatrics (AAP) considers the pediatric group from fetus up to the age of 21 (AAP, 1988). Globally nearly nine million children under five years of age die every year, with pneumonia, diarrhea, and neonatal causes being the major killers. Many of these conditions could be treated with safe, effective medicines. On the other hand, irrational use of the available drugs has led to adverse drug reactions and drug resistance to the usual pathogens and infections by unusual organisms. The promotion of appropriate and safe drugs in children is the need of the hour globally.[6]

In the case of dose division, most drugs in children are dosed according to body weight or body surface area. Doses are often expressed as mg/kg/d, which is confusing; requires further clarification from the prescriber.

Dosing also varies by indication; therefore diagnostic information is helpful when calculating doses.

The approach to pediatric drug dosing needs to be based on the physiological characteristics of the child and the pharmacokinetic parameters of the drug. In addition, dosage adjustments based on practical problems, such as child-friendly formulations and feeding regimens, disease state, genetic makeup, and environmental influences are presented. Modification of

dosage based on absorption depends on the route of absorption, the physic-chemical properties of the drug, and the age of the child.

Objective (s):

- To evaluate drug therapy Review and provide dose division services in the pediatric department.

METHODOLOGY:

The study was a prospective observational and Interventional study, conducted in a pediatric department of CSI Holdsworth Memorial (Mission) Hospital, Mysore for 6 months.

Data Collection:

All the relevant and necessary data of the patient were collected from the Patients case sheet, Patient prescription, Medication/ Treatment Chart, and dose division request form. A suitable data collection form was designed to store data for computation.

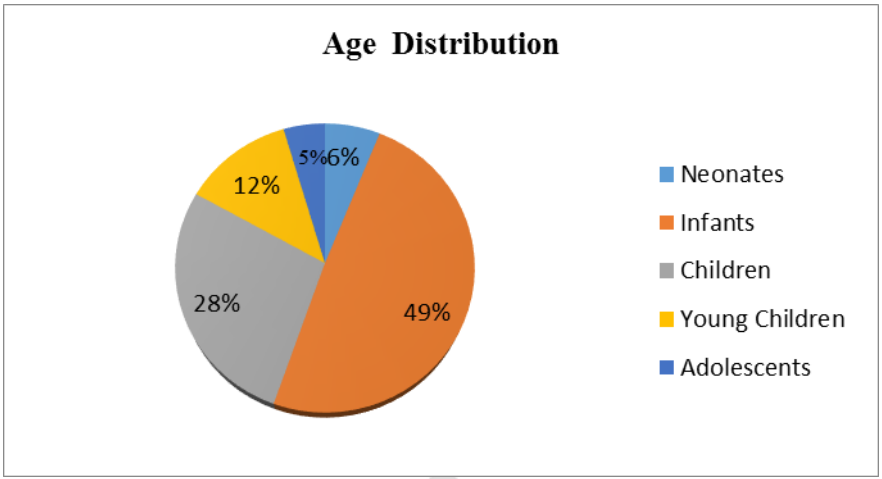
A total of 65 patients' treatment charts were reviewed during the study period. The drug therapy was reviewed mainly by assessing medication to identify medication-related problems, developing prioritized lists of medication-related problems, and resolving them.

RESULTS:

AGE:

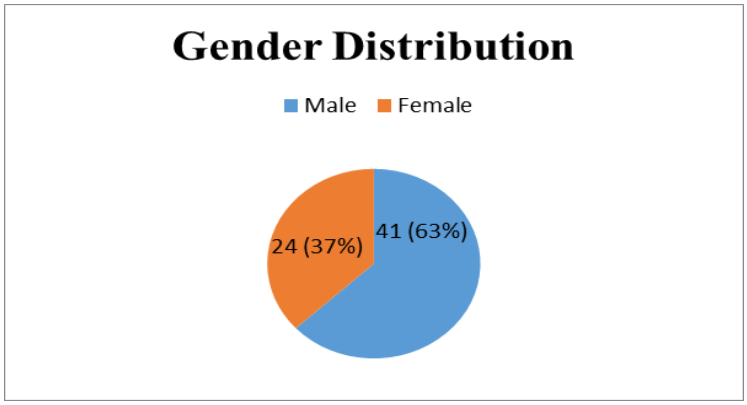
The patients were grouped into different categories based on their age of the patients. Among them 4(6.16%) patients were in the age group between birth to 1 Month, 32 (49.23%) were in the age group between 1 Month to 2 years,18 (27.23%) were in the age group between 2 to 5 years, 08 (12.30%) were in the age group between 6 to 12years, 03 (4.61%) were in the age group between 13 to 18 years.

Age Groups	No. of Patients	% of Patients
Neonates (Birth to 1 Month)	04	06.15
Infants (1 Month to 2 Years)	32	49.23
Children (2 Years to 5 Years)	18	27.69
Young Children (6 Years to 12 Years)	08	12.30
Adolescents (13 Years to 18 Years)	03	04.61



GENDER:

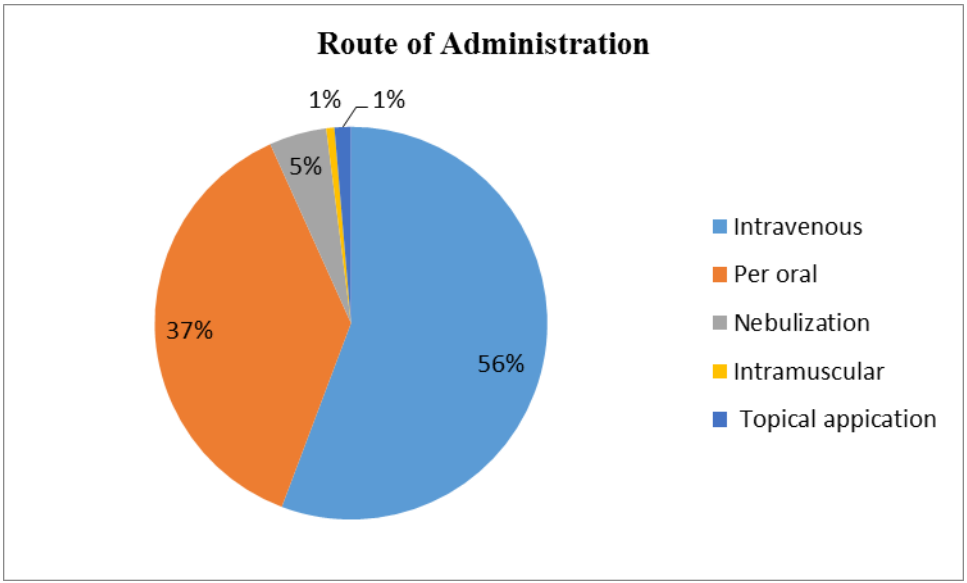
Among 65 patients, 41 (63.07%) were males and 24 (36.92%) patients were females**.**



ROUTE OF ADMINISTRATION:

Among 296 prescribed medications 165 (56%) were administered by intravenous (IV) route, 111 (37%) by oral route (PO), 14 (5%) were administered by Nebulization, 2 (1%) were administered by Intramuscular route (IM) and 4 (1%) was administered by Topical application**.**

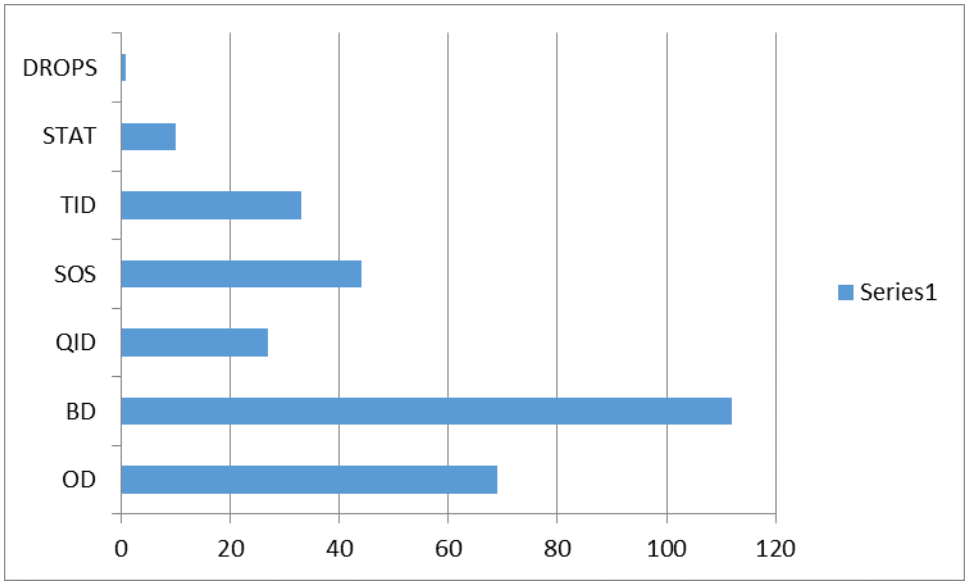
Sl No	Name of Administration	No drug Administered	% of drugs Administered
1	Intravenous (IV)	165	56
2	Oral (PO)	111	37
3	Intramuscular (IM)	014	05
4	Nebulization	002	01
5	Topical Application	004	01



FREQUENCY OF MEDICATION

All the medications were administered using various regimens such as 112 (37.31%) twice daily (BD), 69 (23.31%) once daily (OD), 33 (11.14%) thrice daily (TID), 27 (09.12%) four times a day (QID), 3 (03.37%) STAT, 44 (14.86%) SOS and 01 (0.33%) drops.

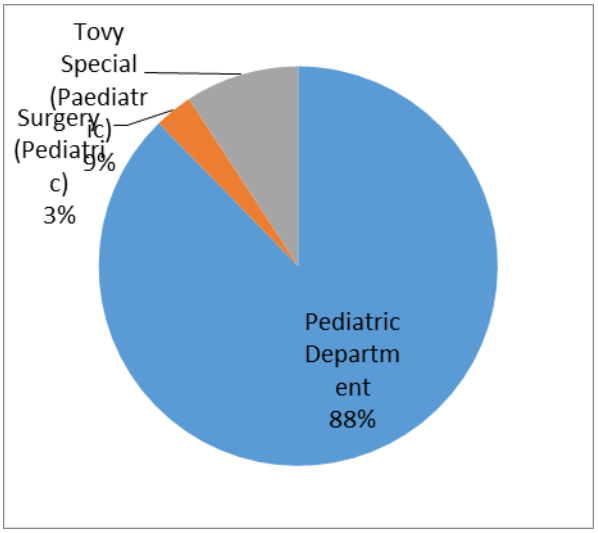
Sl No.	Frequency	No. of Medications	% of Medications
1	Once daily (OD)	069	23.31
2	Twice daily (BD)	112	37.83
3	Four times a day (QID)	027	09.12
4	SOS	044	14.86
5	Thrice daily (TID)	033	11.14
6	STAT	010	03.37
7	DROPS	001	00.33



PEDIATRIC DEPARTMENT:

The study population was conducted in pediatric departments and a total of 65 patients were pediatric department 57 (88%), surgery 2 (3%), and special 6 (9%).

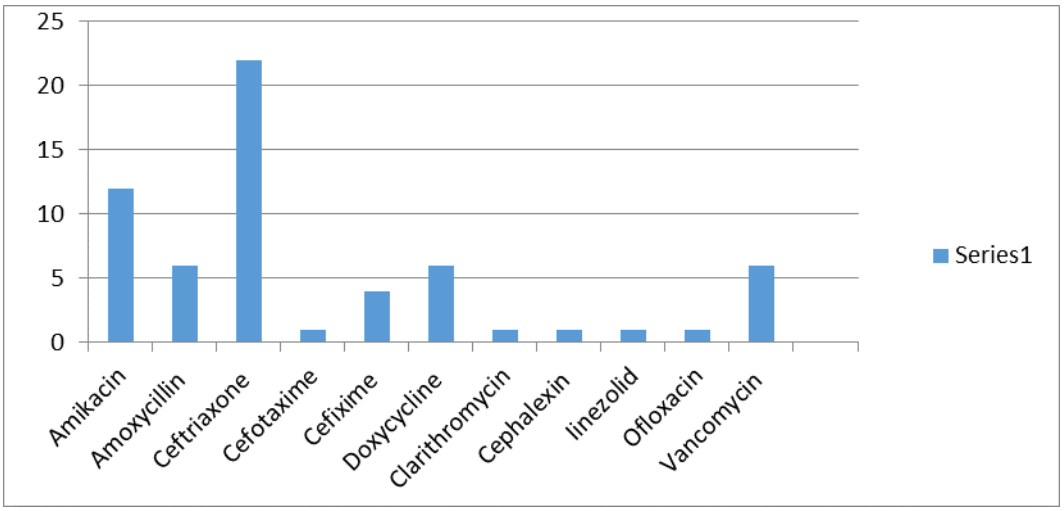
Unit	No. of Patients	% of Patients
Paediatric Department	57	88
Surgery (Paediatric)	2	3
Tovy Special (Paediatric)	6	9



PHARMACOLOGICAL CLASSIFICATION:

During the study period, various pharmacological classes of antibiotics were used for pediatric patients in which 12 (19.61%) of Amikacin, 6 (9.83%) of Amoxicillin, 22 (36.06%) of Ceftriaxone, 1(1.63%) of Cefotaxime, 4 (6.55%) of Cefixime, 6 (9.83%) of Doxycycline, 1 (1.63%) of Clarithromycin, 1 (1.63%) of Cephalexin, 1(1.63%) of Linezolid, 1(1.63%) of Ofloxacin and 6 (9.83%) of Vancomycin.

Sl. No.	Pharmacological classification	Name of Antibiotic	No. of Antibiotic	% of Antibiotic
1	Aminoglycoside	Amikacin	12	19.61
2	Beta-lactamase inhibitors	Amoxicillin	06	09.83
3	Cephalosporin	Ceftriaxone	22	36.06
4	Cephalosporin	Cefotaxime	01	01.63
5	Cephalosporin	Cefixime	04	06.55
6	Tetracycline	Doxycycline	06	09.83
7	Macrolide	Clarithromycin	01	01.63
8	Cephalosporin	Cephalexin	01	01.63
9	Oxazolidinones	Linezolid	01	01.63
10	Fluoroquinolones	Ofloxacin	01	01.63
11	Glycopeptide	Vancomycin	06	09.83



MEDICATIONS:

During the study period, the maximum of acetaminophen used was 52 (%), ondansetron 26 (%), ceftriaxone 22 (%), ranitidine 20 (%), followed by other medications.

Sl No.	Name of Medication	No. of Medication	% of Medication
1	Acetaminophen	**52**	**17.56**
2	Amikacin	12	04.05
3	Amoxycillin	06	02.70
4	Acyclovir	01	00.33
5	Ceftriaxone	**22**	**07.43**
6	Calcium phosphate	02	00.67
7	Cefotaxime	01	00.33
8	Clobazam	03	01.01
9	Cefixime	04	01.35
10	Doxycycline	06	02.02
11	Hydrocortisone	03	01.01
12	Clarithromycin	01	00.33
13	Dicyclovir	01	00.33
14	Mefenamic acid	09	03.04
15	IVF DNS+KCL	**20**	**06.75**
16	Mannitol	05	01.68
17	Hydroxyzine hydrochloride	01	00.33
18	Multivitamin	05	01.68
19	Nasoclear	05	01.68
20	Otrivin	01	00.33
21	Ondansetron	**26**	**08.78**
22	Oseltamavir	01	00.33
23	Regular insulin	01	00.33
24	Ranitidine	20	06.75
25	Silodium ointment	01	00.33
26	Salbactum	02	00.67
27	Vancomycin	06	02.02
28	Vitamin D3	15	05.06

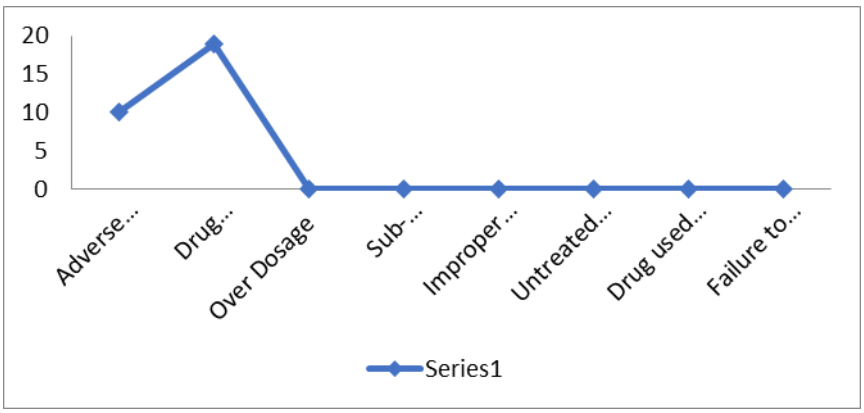
29	Zinc and sulphate	03	01.01
30	Fosphenytoin	01	00.33
31	Furosemide	01	00.33
32	Human mixtard	01	00.33
33	Linezolid	01	00.33
34	IVF 10% Dextrose	02	00.67
35	IVF RL	04	01.35
36	Ofloxacin	01	00.33
37	Meropenem	01	00.33
38	Pantoprazole	01	00.33
39	Prednisone	01	00.33
40	Cephalexin	01	00.33
41	Enalapril	01	00.33
42	IVF NS	01	00.33
43	Hydrocortisone	02	00.67
44	Lactic acid	04	01.35
45	Lorazepam	02	00.67
46	Mucolytic	01	00.33
47	Salbutamol	01	00.33
48	Sodium valproate	01	00.33
49	Spironolactone	02	00.67
50	Vitamin K	03	01.01
51	Dicyclomine	01	00.33
52	Domperidone	01	00.33
53	Dexamethason	05	01.68
54	Albendazole	02	00.67
55	Becosules	01	00.33
56	Adrenaline	03	01.01
57	Asthalin	04	01.35
58	Soft skin cream	01	00.33
59	Vitamin B12	01	00.33
60	Pramoxine hydrochloride	01	00.33

61	Antacid	01	00.33
62	Metronidazole	01	00.33
63	Folic acid	01	00.33
64	ORS	04	01.35
65	Ambroxol hydrochloride and salbutamol	01	00.33

DRUG-RELATED PROBLEMS:

In this study, various drug-related problems have been categorized out of which 10 (15.38%) Patients were found with Adverse drug reactions, 19 (29.23%) patients were found with Drug-drug interactions, and 36 (55.38%) were found with no drug-related problem.

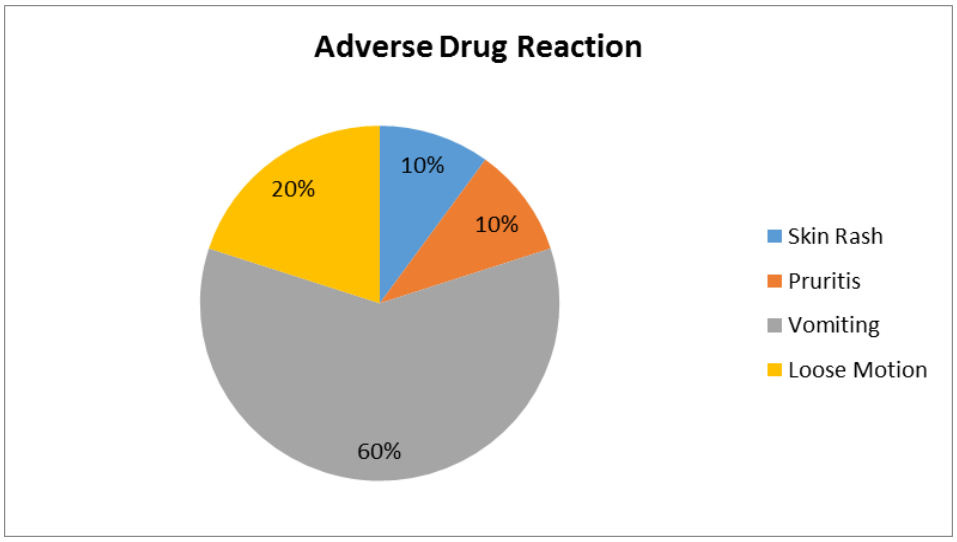
Sl No.	DRPs	Number of Patients	% DRPs
1	Adverse Drug Reaction	**10**	**15.38**
2	Drug Interaction	**19**	**29.23**
3	Over Dosage	**00**	**00.00**
4	Sub-Therapeutic Dose	**00**	**00.00**
5	Improper drug selection	**00**	**00.00**
6	Untreated Indication	**00**	**00.00**
7	A drug used without Indication	**00**	**00.00**
8	Failure to receive drug	**00**	**00.00**



ADVERSE DRUG REACTION:

During the study period, a total number of 10 adverse drug reactions were found and reported. Namely skin rash 1 (10%) by amoxicillin, pruritus 1 (10%) by cefotaxime, vomiting 6 (60%) by cefixime & loose motion 2 (20%) by ceftriaxone**.**

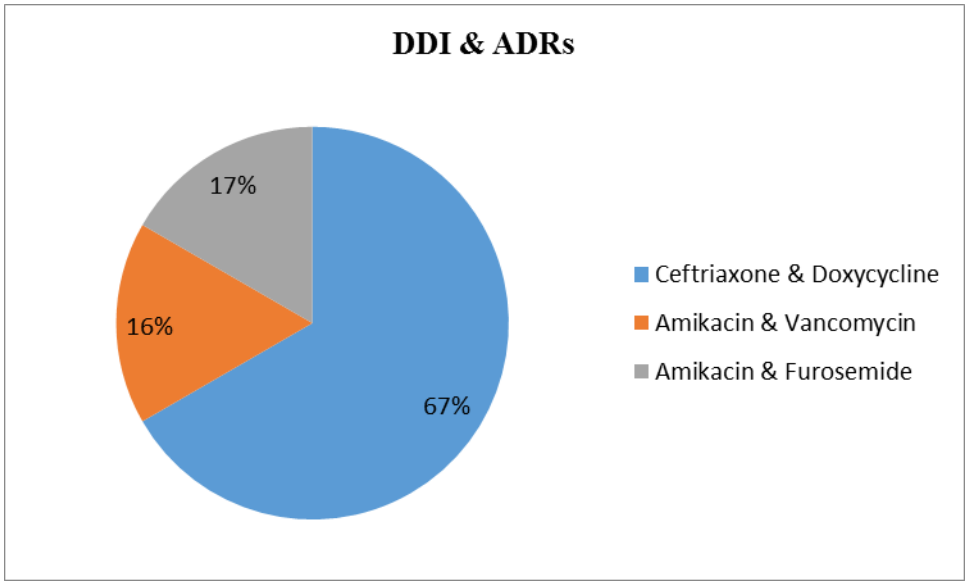
Sl. No.	Name of Drugs	Adverse Drug Reaction	No. of Adverse Drug Reaction	% of Adverse Drug Reaction
1	Amoxicillin	Skin Rash	1	10
2	Cefotaxime	Pruritus	1	10
3	Cefixime	Vomiting	6	60
4	Ceftriaxone	Loose Motion	2	20



DRUG-DRUG INTERACTION AND ADVERSE DRUG REACTION:

A total of 6 patients were founded with drug-drug interaction with adverse drug reactions and were 4 (66.67%) of (ceftriaxone and doxycycline), 1 (16.66%) of (amikacin and vancomycin) and 1 (16.66%) of (amikacin and furosemide).

Sl No.	**DDI and ADRs**	**No. of DDI and ADRs**	**% of DDI and ADRs**
1	Ceftriaxone & Doxycycline	4	66.67
2	Amikacin & Vancomycin	1	16.66
3	Amikacin & Furosemide	1	16.66



DRUG-DRUG INTERACTIONS:

The total drug-drug interactions found in our study was 19 (29.23%) where all the drug drug-drug interaction was minor founded. The below table contains interacting drugs with minor interactions.

Sl No	Interacting Drugs	Effect	Total Number of DDI Identified
1	Furosemide and Enalapril	Both Enalapril and Furosemide Pharmacodynamics synergism	1
2	Ceftriaxone and Doxycycline	Doxycycline decreases the effect of Ceftriaxone by pharmacodynamics antagonism	4
3	Hydrocortisone and Prednisone	Hydrocortisone will increase the level or effect of Prednisolone by affecting hepatic enzymes CYP3A4	1
4	Fosphenytoin and Valproate	Fosphenytoin will decrease the level or effect of Valproate by affecting	1

		hepatic enzymes CYP3A4	
5	Amikacin and Vancomycin	Both increase nephrotoxicity or ototoxicity	1
6	Acyclovir and vancomycin	Both increase nephrotoxicity or ototoxicity	2
7	Lorazepam and Acetminophen	Lorazepam decreases the level of Acetaminophen by increasing metabolism	1
8	Dexamethason and Hydrocortisone	Dexamethasone will decrease the level or effect of Hydrocortisone by affecting the hepatic metabolism enzyme CYP3A4	1
9	Dexamethason and Ondesedrom	Dexamethasone will decrease the level or effect of Ondansetron by affecting the hepatic metabolism enzyme CYP3A4	1
10	Lorazepam and Clobazam	Concomitant administration can increase the potential for CNS effects	1
11	Fosphenytoin and Ondansetron	Fosphenytoin will increase the level or effect of Ondansetron by affecting hepatic enzymes CYP3A4	1
12	Furosemide and Amikacin	Either increase the toxicity of the other by mechanism pharmacodynamics synergism	1
13	Ofloxacin and Ondesedrom,	Ofloxacin and Ondansetron both increase QTc interval and Avoid or used	1

		alternative drug	
14	Ofloxacin and Thiamine	Ofloxacin will decrease the level or effect of Thiamine by altering intestinal flora	1
15	Furosemide and Enalapril	Both Enalapril and Furosemide Pharmacodynamics synergism	1

SEVERITY CLASSIFICATION OF DRUG-DRUG INTERACTIONS:

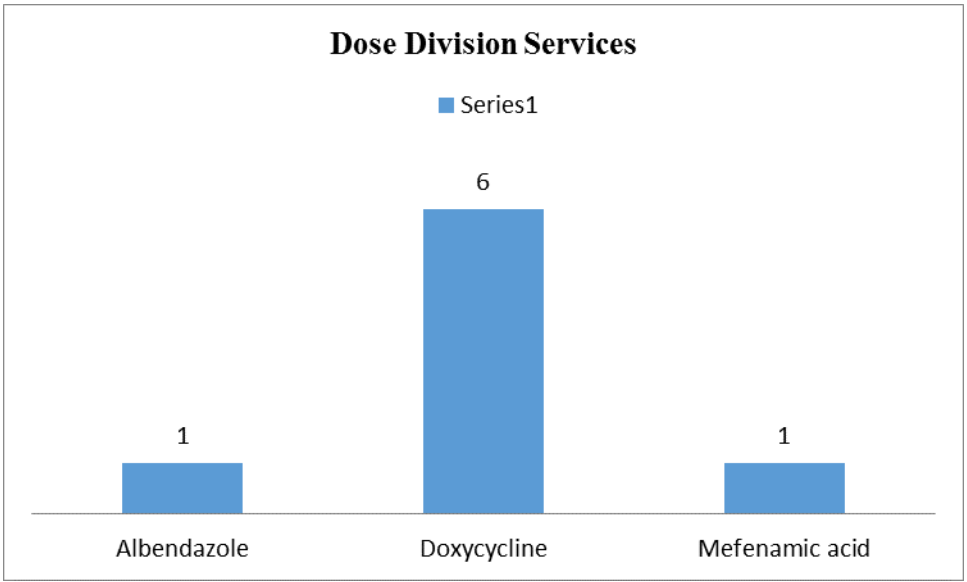
The total drug-drug interactions categories in different groups were 19 (100%) minor drug problems, potential, and severe zero drug-related problems were not found.

Sl No	**Name of DDI**	**No. of DDI**	**% of DDI**
1	Potential DDI	00	000.00
2	Severe DDI	00	000.00
3	Minor DDI	19	100.00

DOSE DIVISION SERVICES:

A total of eight dose division services were provided which is approached by doctors. Were albendazole 1 (12.50%), doxycycline 6 (75%) and mefenamic acid 1 (12.50%).

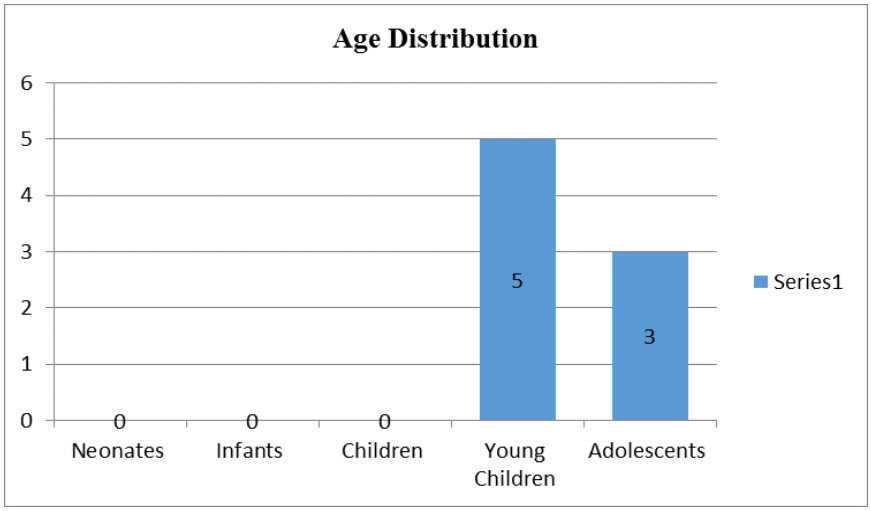
Sl No.	Name of Drugs	Actual Dose	Required Dose	No. of Patients	% of Patients
01	Albendazole	400 mg	200 mg	1	12.50
02	Doxycycline	100 mg	50 mg	6	75.00
03	Mefenamic acid	100 mg	50 mg	1	12.50



AGE:

The patients were grouped into different categories based on their age of the patients. Among them 0(0%) patients were in the age group between birth to 1 Month, 0 (0%) were in the age group between 1 Month to 2 years,0 (0%) were in the age group between 2 to 5 years, 05 (62.50%) were in the age group between 6 to 12years, 03 (37.50%) were in the age group between 13 to 18 years.

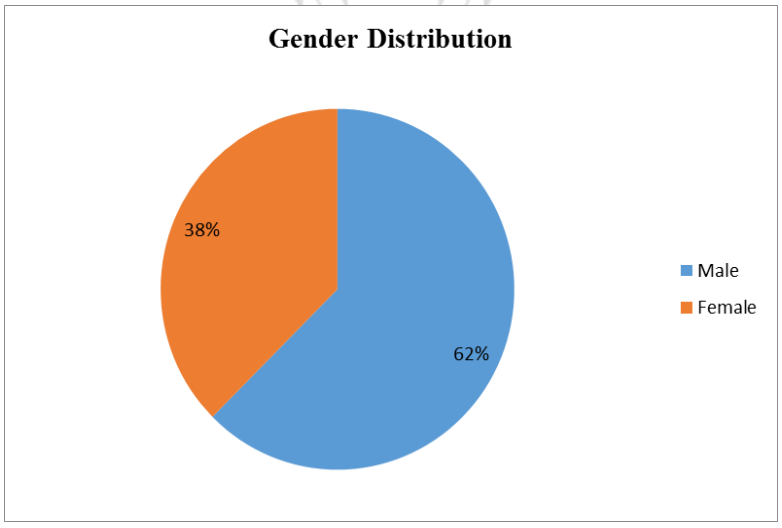
Age Groups	No. of Patients	% of Patients
Neonates (Birth to 1 Month)	00	00.00
Infants (1 Month to 2 Years)	00	00.00
Children (2 Years to 5 Years)	00	00.00
Young Children (6 Years to 12 Years)	05	62.50
Adolescents (13 Years to 18 Years)	03	37.50



GENDER:

Among the 8 patients, 5 (62.50%) were male and 3 (37.50%) were female.

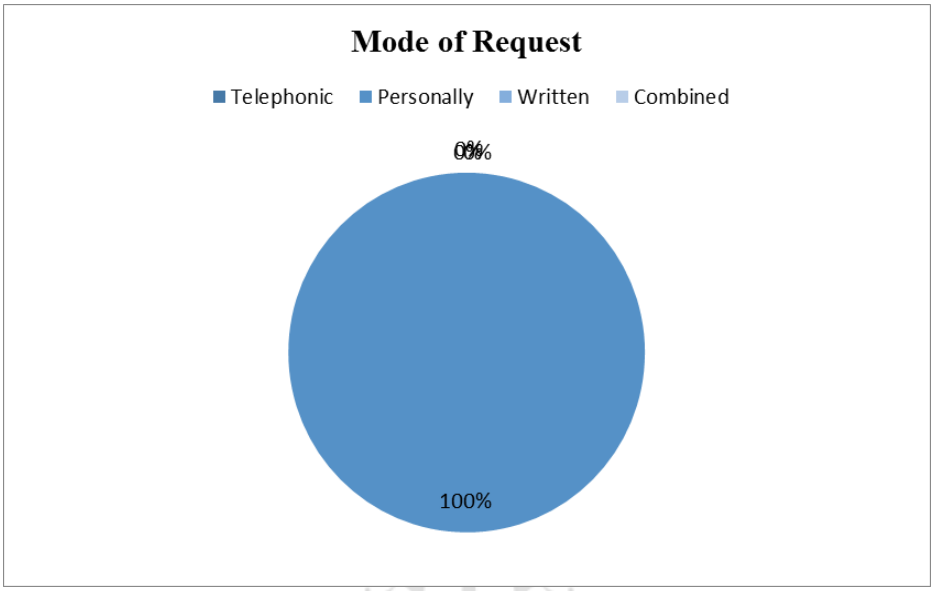
Sl No.	Gender	No. of Patients	% of Patients
1	Male	5	62.50
2	Female	3	37.50



MODE OF REQUEST FOR DOSE DIVISION SERVICES:

During the study, the period received dose division services most of the personal request was 8 (100%), telephonic request 0 (0%), Written request 0 (0%), and combination request 0(0%).

Sl No.	Mode of Request	No. of Request	% of Request
1	Telephonic	0	000.00
2	Personally	8	100.00
3	Written	0	000.00
4	Combined	0	000.00



TIME REQUIRED FOR SERVICES:

During the dose division services period, the total time consumption for the services was differentiated**.**

Sl No.	Name of drugs	Request time	Dose division starting time	Dose division end time	Total time consuming
1	Doxycycline	10:30AM	10:45AM	11:00AM	15min
2	Doxycycline	11:00AM	11:20AM	11:40AM	20min
3	Mefenamic acid	10:45AM	11:10AM	11:25AM	15min
4	Doxycycline	12:00AM	12:25AM	12:40AM	15min
5	Doxycycline	10:00AM	10:20AM	10:45AM	20min
6	Doxycycline	11:00AM	11:20AM	11:35AM	15min
7	Albendazole	11:20AM	11:45AM	12:05AM	20min
8	Doxycycline	11:40AM	11:55AM	12:15AM	20min
Average time					**17.50min**

DISCUSSION:

During the study period, a total of 65 patients were drug therapy reviewed in the pediatric Department, Tovy Special (Paediatric), and Surgery (Paediatric). Because of lockdown could not able to perform more number of patients.

AGE DISTRIBUTIONS:

The patients were grouped into different categories based on their age of the patients. Among the age group between birth to 1 Month, the age group between 1 Month to 2 years, the age group between 2 to 5 years, the age group between 6 to 12 years, and the age group between 13 to 18 years. Among them, the age group was 1 month to 2 years maximum patients and were adolescents patients compared to the other age groups.

ALLERGIC STATUS

Among 65 patients, 63 (97%) patients were found No Known Allergies and 02 (03%) were allergic to the drug.

GENDER DISTRIBUTION

Among 65 patients, 41 (63.07%) were males, and 24 (36.92%) patients were female. Male patients are more compared to females, and maybe a fewer population of females in the hospital area. The studies have shown similar finding[6].

ROUTE OF ADMINISTRATION

Among 296 prescribed medications were the maximum number administered by intravenous (IV) route and by oral route (PO) and followed by other routes like Nebulization, Intramuscular route (IM), and Topical application**.** Most of the patients under the age group 1 month to 2 years were not possible to give oral formulation. so that most of the medications they prescribed the intravenous route.

FREQUENCY OF MEDICATION

All the medications were administered using various regimens such as twice daily (BD), once daily (OD), thrice daily (TID), Four times a day (QID), STAT, SOS, and also by giving Drops as required.

UNIT DISTRIBUTION

The study population was conducted pediatric department, Tovy Special (Paediatric), and Surgery (Paediatric) a total number of 65 patients were enrolled for this study. Here most of the patients admitted to the pediatric department, Tovy special and surgery fewer patients because of all the patients admitted main department pediatrics.

DRUG-RELATED PROBLEMS:

In this study various drug-related problems have been categorized out of which 10 (15.38%) Patients were found with Adverse drug reactions, 19 (29.23%) patients were found with Drug-drug interactions, and 36 (55.38%) were found with no drug-related problem. A very less number of drug-related problems were identified if more patients were admitted than drug-related problems.

ADVERSE DRUG REACTION:

During the study period, a total of 10 adverse drug reactions were found and reported. Namely skin rash by amoxicillin, pruritus by cefotaxime, vomiting by cefixime, and loose motion by ceftriaxone. A very less number of adverse drug reactions were identified if more patients were admitted than drug-related problems.

DRUG-DRUG INTERACTIONS:

The total drug-drug interactions were found in 19 patients during the study period where most of the drug-drug interaction was minor.

DRUG-DRUG INTERACTION AND ADVERSE DRUG REACTION:

A total of 6 patients were founded with drug-drug interaction with adverse drug reactions and were four (ceftriaxone and doxycycline), one (amikacin and vancomycin), and one (amikacin and furosemide). Very less number of combination antibiotics are prescribed for pediatric patients.

DOSE DIVISION SERVICES:

A total of 8 dose division services were provided during the study period which was approached by doctors of the pediatric department. A total of eight dose division services were provided which is approached by doctors. Were albendazole 1, doxycycline 6, and

mefenamic acid 1. Most of the time doctors were busy and they don't aware of the dose division services which was provided by the clinical pharmacist.

AGE:

The patients were grouped into different categories based on their age of the patients. Among them are patient's neonates in the age group between birth to 1 Month, infants in the age group between 1 Month to 2 years, children in the age group between 2 to 5 years, 05 young children in the age group between 6 to 12 years, 03 adolescent in the age group between 13 to 18 years. Mostly received young children and adolescent patients for dose division services. Here the highest number of requests comes from the ages above 10 years because dose division services were provided only in the oral dosage form.

GENDER:

A total of 8 patients 5 male and 3 female. A maximum number of requests received from the male patients was received. Because admitted patients were the highest male compared to the female patients.

MODE OF REQUEST FOR DOSE DIVISION SERVICES:

During the study period, we provided dose division services to patients. When interacting with the doctors explain the benefit of services which was a help to patients. Were we provided the various modes for the dose division services like personal, telephonic, written, and combination but were all requests received personally and approached by the doctors.

TIME REQUIRED FOR SERVICES:

Time required dividing the dose, calculating the dose, and packaging to give to patients. The total time consuming for the services was helpful for the patients. Where average time taken for the dose division services was 17:50 min.

CONCLUSION:

The purpose of this study was to identify drug-related problems in the pediatric population. This is a potential challenge for ensuring drug safety along with effective treatment by systematic monitoring of drug-related problems such as drug-drug interaction, overdose, contraindication, polypharmacy, sub-therapeutic dose, untreated indication, and drug used without indication. During the study period, a total of 65 patients were a treatment chart

review done the in podiatric Department, Tovy Special Surgery. In this study various drug-related problems have been categorized out of which 10 (15.38%) Patients were found with Adverse drug reactions, 19 (29.23%) patients were found with Drug-drug interactions, and 36 (55.38%) were found with no drug-related problem.

Observed that drug-related problems are common in pediatric patients, predominating potential problems of drug therapy effectiveness, mainly due to inappropriate dose selection with an important proportion of drug-related problems of significant or high clinical relevance. Pharmaceutical interventions near the healthcare team.

Clinical pharmacist as a part of a multidisciplinary team is associated with a substantially lowering rate of adverse drug event caused by medication errors, drug interactions, and drug incompatibilities, underdosing and overdosing and improve patient safety and outcome, reduce costs, and provide quality of care in the pediatric population.

We have also provided the dose division for pediatric patients, where dose division was approached by the pediatrician a total of 08 dose division services have been provided during the study period. Most of the pediatric doctors were not aware of the dose division services which was provided by the clinical pharmacist and also business doctors got very less number of dose division requests.

ACKNOWLEDGEMENT:

I thank the Almighty for his choicest blessings showered upon us for the success of this dissertation work.

The completion of this dissertation is not only the fulfillment of our y dreams but also the dreams of our Parents & Family who have taken lots of pain for me in the completion of higher studies.

With great pleasure and a sense of gratitude, we express our most cordial and humble thanks to our eminent respected teacher and guide **Dr. Mahendra Kumar Betur Jayappa,** Professor & Head, Department of Pharmacy Practice, Farooqia College of Pharmacy, Mysore for guidance, keen interest, inspiration, unflinching encouragement and moral support throughout our dissertation work. This project would be impossible without their support and guidance.

I am immensely thankful to **Dr. M.P Bhagat** Principal, Farooqia College of Pharmacy, Mysore, for providing the necessary facilities and help in carrying out this work and also thank Ex- Principal **Dr. Md Salahuddin for** inspiration, unflinching encouragement, and moral support throughout our dissertation work.

I would like to express our thanks to **Dr. Ravish S R, Dr. M S Panchaksharaiah, Dr. Ashwin AM, Dr. Suraj Upadya, and Dr. Kanya**, Department of Pediatric, Mission Hospital, for excellent timely advice effort which enabled us to complete our work successfully.

REFERENCES:

1. Amol DattatreyaGalande, Naveen Ahuja Khurana, Srinivas Mutalik. Pediatric dosage forms—challenges and recent developments: Acritical review. Journal of Applied Pharmaceutical Science 2020; 10(07): 155-166.
2. Anita Saxena. Drug Therapy of Cardiac Diseases in Children. Indian Pediatrics journal 2009; 46: 210-238.
3. Yonas G Tefera, BegashawMelakuGebresillassie, TamratBefekadu, et al. Off-Label Drug Use in Hospitalized Children: A Prospective Observational Study at Gondar University Referral Hospital, Northwestern Ethiopia. British Pharmacological Society 2017; 5(2): 1-6.
4. Tirin Babu, George Mathew Panachiyil, Juny Sebastian, et al. Prescribing patterns and drug-related problems (DRPs) in transfusion-dependent pediatric thalassemia patients: A prospective interventional study from a tertiary care hospital in India. International Journal of Pediatrics and Adolescent Medicine 2021; 8: 35-38.
5. Nimbagiri Swamy Thiruthopu, Uday Venkat Mateti, Raju Bairi, et al. Drug utilization pattern in South Indian pediatric population: A prospective study. Perspectives in Clinical Research 2014; 5(4): 178-183.
6. Ajitha Sharma, Oommen Shweta. Assessment of drug prescription pattern in children: A descriptive study. National Journal of Physiology Pharmacy and Pharmacology 2015; 6(1): 74-84.
7. Verica Ivanovska, Liset Van Dijk, Mantel-Teeuwisse et al. Pediatric Drug Formulations: A Review of Challenges and Progress. America Academic Pediatrics 2014; 134(2): 361-371.
8. Lamiae Bensouda-Grimaldi, Nathalie Sarraf, Françoise Doisy et al. Prescription Of Drugs Contraindicated In Children: A National Community Survey. European Journal of Clinical Pharmacology 2007; 63: 99–101.
9. K Cheung, M Teichert, H A Moll, et al. Filled Prescriptions of Age-Related Contraindicated Drugs in Children: A One-Year Nationwide Cohort Study In The Netherlands. International Journal of Clinical Pharmacy 2018; 40: 1137–1143.
10. Vijay N Yewale, DhanyaDharmapalan. Promoting Appropriate Use of Drugs in Children. International Journal of Pediatrics 2012: 1-5.
11. OffiePoratSoldin, Steven J Soldin. Review: Therapeutic Drug Monitoring in Pediatrics. Ther Drug Monit 2013; 24(1): 1-8.
12. Iswar Hazarika. Therapeutic Drug Monitoring: An Aspect of Clinical Pharmacology and Pharmacy Practice. Research & Reviews: A Journals of Pharmacology 2018; 5(3): 27-34.
13. Kate O'Hara. Paediatric Pharmacokinetics and Drug Doses. Australia Prescriber Journal 2016; 39(6): 208-210.
14. Ju-Seop Kang, Min-Ho Lee. Overview of Therapeutic Drug Monitoring. The Korean Journal of Internal Medicine 2009, 24(1): 2-10.
15. N Nwobodo Ndubuisi, A Obu Herbert. Therapeutic Drug Monitoring in Pediatric Practice: A Critical Appraisal. Biomedical & Pharmacology Journal 2014; 7(1): 235-240.
16. Ji Yeon Lee, Tsz-Yin So, Jennifer Thackray. A Review on Vitamin D Deficiency Treatment in Pediatric Patients. Journal of Pediatric Pharmacology and Therapeutics 2013; 18(4): 277–291.

17. P Pearl O'Rourke, Robert K Crone Joseph P et al. Extracorporeal Membrane Oxygenation Conventional Medical Therapy in neonates with persistent pulmonary hypertension of the newborn. Pediatric Journal 1989, 84(6): 957-963.
18. Ramon Duarte Leopoldino, Marco Tavares Santos, Tatiana Xavier Costa, et al. Drug-related problems in the neonatal intensive care unit: incidence, characterization and clinical relevance. BMC Pediatrics Journal 2019; 134: 2-7.
19. Lidhu Daniel, LiyaRarichan, Merlin Jose et al. An Investigation on Drug Related Problems in Pediatrics of a Tertiary Care, Private, Teaching Hospital at Coimbatore. Journal of Clinical Case Reports and Trials 2018; 1(2): 1-7.
20. Gillian Porter, Nathan Grills. Medication misuse in India: a major public health issue in India. Journal of Public Health 2015; 38(2): 150–157.
21. Zakir Khan, Khayal Muhammad, Yusuf Karatas, et al. Pharmacovigilance and incidence of adverse drug reactions in hospitalized pediatric patients: a mini systematic review. Egyptian Pediatric Association Gazette 2020; 68(24): 1-7.
22. Inderjeet Kaur, Mahesh Hiranandani, Pratibha Singhi. Sedation in Pediatric Practice. Indian Pediatrics Journal 1994; 31: 1146-1153.