

# Drug-Related Problems in South Indian Tertiary Care Hospital

Dr.R.Siddarama<sup>\*1</sup>, P. Anjali<sup>2</sup>, K. Leelavathi<sup>3</sup>

<sup>\*1</sup> Pharm.D, Assistant Professor, CESCOP, Kurnool, 518218 - AP, India.

<sup>2)</sup> Pharm.D, Department of Pharmacy Practice, CESCOP.

<sup>3)</sup> Pharm.D, Department of Pharmacy Practice, CESCOP.

DOI: 10.29322/IJSRP.8.10.2018.p8287

<http://dx.doi.org/10.29322/IJSRP.8.10.2018.p8287>

**Abstract- INTRODUCTION:** DRPs was defined as events or circumstances that involves a patient's drug treatment that actually or potentially interferes with the achievement of an optimal outcome. With respect to older patients with comorbidities and using multiple drugs, DRPs are associated with an increased risk of hospital readmissions, morbidity, and mortality. In Australia, an incidence of between 2.4% and 3.6% was found and in the US. DRPs include adverse drug reactions (ADRs), unnecessary drug therapy, untreated conditions, Wrong drug, and drug interactions and inappropriate choice of drugs.

**OBJECTIVE:** To identify various DRPs in a tertiary care hospital admitted to various departments, to make suitable drug therapy recommendations by clinical pharmacist interventions.

**METHODS:** The prospective interventional study was conducted in inpatients of various departments in a tertiary care hospital in 198 patients by considering the inclusion and exclusion criteria for a period of 6 months. The clinical pharmacist visited the patients and filled out the designed pharmacotherapy sheet for each patient. Then, the general pharmacist checked the patients' files and pharmacotherapy sheets and categorized DRPs using the modified method of "The Pharmaceutical Care Network Europe classification,

**RESULTS:** Out of 198 patients, a total of 922 DRPs were identified by the clinical pharmacist in the study patients. The amount of each DRP was as follows: Unnecessary drug therapy 51 (6%), Low dose 8 (1%), High dose 13(1%), Wrong drug (0%), inappropriate adherence 17(2%), adverse drug reactions (1%), needs for additional therapy (4%), and Drug Interactions (84%). Out of 922, 535 DRPs are noticed in the age group of 51-75 years. 664 DRPs (72%) are observed in males and 258 DRPs (28%) observed in females. By considering all the departments for DRPs, most of the DRPs are noticed in the cardiology department 489 (53%). Out of 198 patients, the intervention done by the clinical pharmacist to only 193 patients. Out of this, 93 (48.3%) cases are solved, 48 (24.8%) cases are partially solved and 52 (26.9%) cases are not solved.

**CONCLUSION:** DRPs occurred in the majority of the patients in all departments. The type of DRP differed markedly between the patient groups. Knowledge of these differences is clinically valuable by enabling us to guide efforts toward prevention of DRPs. The large number of interventions reported in several studies, as well as this study, revealed that clinical pharmacy

services could contribute to a rationalization of drug therapy and may eventually lead to more medication safety.

**Index Terms-** Adverse drug reactions, Drug interactions, Drug-related problems, Medication errors.

## I. INTRODUCTION

As we know drug usage are increasing day by day due to the growing a number of diseases and comorbidities. Usage of drugs enhances health-related quality of life but inappropriate use of drugs may be harmful and lead to DRPs [1]. DRPs are defined as events or circumstances that involving a patient's drug therapy that actually or potentially interfere with the desired health outcome [1]. DRPs can occur at all stages of the medication usage process starting from prescribing to dispensing stage. Lack of follow-ups and reassessment of therapeutic outcomes may also contribute to DRPs. Most DRPs are avoidable and community Pharmacies are assuming an active role in preventing and solving DRPs [1]. In our study DRPs are classified into

**Unnecessary drug therapy:** This could occur when the patient has been placed on too many medications for their condition and the drug is simply not needed.

**Low dose:** This could occur when a patient is given medication that is not strong enough to get beneficial or therapeutic effects.

**High dose:** This could occur when a patient is given medication that is too strong and is causing detrimental effects or is simply not necessary.

**Wrong drug:** This could occur when a patient is given medication that does not treat the patient's condition.

E.g. A heart medication to treat an infection.

**Inappropriate adherence:** This could occur when a patient chooses not to or forgets to take a medication.

**Adverse drug reaction:** This could occur when a patient has an allergic response to a medication.

**Need for additional drug therapy:** This could occur when a patient needs more medication to treat their condition

**Drug interactions:** A drug interaction is a situation in which a substance (usually another drug) affects the activity of a drug when both are administered together. This action can be synergistic (when the drug's effect is increased) or antagonistic (when the drug's effect is decreased) or a new effect can be produced that neither produces on its own. DRPs

are associated with an increased risk of hospital readmission, morbidity, mortality, and increased health care cost<sup>[2]</sup>.

In Australia, an incidence of between 2.4% and 3.6% was found and in the US an incidence of between 3.1% and 6.2% was found. A study in India carried out in a tertiary referral center in South India showed that admissions due to ADRs accounted for 0.7% of total admissions and deaths due to ADRs accounted for 1.8% of total ADRs<sup>[3]</sup>.

DRPs include both actual and potential problems. An actual problem has resulted in clinical manifestations (e.g. a drug-related rash, an adverse drug reaction), or therapy failure due to incorrect dosage. A potential problem is not manifest, but if left unresolved, it may lead to drug-related harm to the patient. The identification and suggestions for interventions by clinical pharmacists on clinically significant DRPs, and further, the acceptance of the interventions by the prescribers, are evidence of the major contribution of clinical pharmacists in reducing the frequency of DRPs, thus implying better pharmacotherapy for the patient.

## II. NEED OF THE STUDY

In order to develop effective interventions to identify and address these DRPs, it is very important to get more insight into the specific nature of DRPs in this specific patient group and determinants of their occurrence. Probably due to differences in setting, patient characteristics, and measures addressing possible DRPs, the results of these studies are also inconsistent<sup>[4]</sup>. Policies and services should be developed to reduce and prevent drug-related morbidity and mortality. Purpose of the study was to investigate type, nature, and incidence of drug-related admissions in a tertiary care hospital in south India<sup>[5]</sup>.

It is useful to investigate which part of potential DRPs can be avoided by the intervention of the community pharmacist in collaboration with the prescriber and the patient. Hospital-based medication review by a clinical pharmacologist was not associated with reduced rates of re-hospitalization and/or death. The clinical relevance of DRPs might be overestimated as a risk for re-hospitalization or death. It is of great importance to clarify if and how DRPs can be prevented. In designing such studies, one should consider choosing inclusion criteria that accumulate risk<sup>[6]</sup>.

### AIM:

To assess, monitor and report any of the drug-related problems (DRPs) in a tertiary care hospital

### OBJECTIVES:

To assess toxic or overdose, sub-therapeutic dose, adverse drug reactions, medication errors or noncompliance, drug use without an indication, improper drug selection, drug interactions (DI), untreated indication and to improve the rational use of medicines

## III. METHODOLOGY

This is a prospective study conducted for 6 months in the 250-bedded Viswabharathi super specialty Hospital. The study was carried out on 200 patients.

### Data collection:

Patient data collected using a standardized data collection form (SDCF). SDCF of each patient consisting with regard to patients age, gender, past medical and surgical history, confirmatory diagnosis, duration of treatment, lifestyle modifications, questions about adherence of drugs, scales of ADRs were included<sup>[7]</sup>.

Patients included based on criteria like all age groups, all diseases except cancer, all classes of drugs are included patients who are coming for regular follow-ups and either gender is considered. Excluded patients who are under the therapy with chemotherapy drugs, radiation therapy and surgical therapy, pregnancy and breastfeeding patients, who are under dialysis, uncooperative patients, palliative patients, patients with incomplete data, patients under influence of alcohol and drugs, compromised patients with dementia and those who stayed less hours of stay in hospital.

### IDENTIFICATION OF DRPs:

The assessment of DRPs was based on each research's clinical judgment with the support of established literature and standard guidelines of diseases. Information on drugs such as recommended dosages frequency and side effects was based on Drug Information Handbook whereas Naranjo, WHO scale were used to access causality of the ADRs<sup>[1,11]</sup>. Based on the score type of ADR can be accessed. With exception of drug interactions data which was later identified using Micromedix outline software.<sup>[1,9]</sup>

## IV. DATA ANALYSIS:

All extracted data were pooled and analyzed. Results expressed in frequency percentage and with maximum and minimum value.

### Ethical consideration:

Before data collection to conduct this study, ethical clearance was obtained from CESCOP of ethical committee. A letter was submitted to CESCOP referral hospital of managing director<sup>[9]</sup>. From beginning to interventions of DRPs ethical conduct was maintained.

## V. RESULTS:

Based on inclusion and exclusion criteria totally 200 cases were collected among these 198 cases were included.

**Demographic characteristics:** Among 198 subjects 127 were male and 71 were female subjects. Patient characteristics and DRPs were summarized in the Table No 1.

**Clinical characteristics:** Totally 922 DRPs were identified by the clinical pharmacist under the study patients. Total 1667 medicines were prescribed for the patients. Average of 8 drugs were prescribed per admitted patient. The percentages of each DRP were as follows: Unnecessary drug therapy 51

(6%), Low dose 8 (1%), High dose 13(1%), Wrong drug (0%), inappropriate adherence 17(2%), adverse drug reactions (1%), needs for additional therapy (4%), and Drug Interactions (84%). Types freq and percentage of DRPs were shown in table no 2. And fig no 1.

The department that was most likely to cause DRPs was Cardiology (53%), followed By General Medicine (15%), Neurology (12%), Gastroenterology (7%), Nephrology (7%), Endocrinology (5%), Psychiatry (1%).

Among these majorly prescribed were anti Hypertensive drugs i.e. 570 (16%) and least were NSAIDS i.e. 245 (7%). A total of 922 DRPs were identified in 198 patients. A total of 2.02% of patients (n=0) has no DRPs, 61.11% of patients (n=121) only had one type of DRP, 27.77% of patients (n=55) had two DRPs, 9.09% of patients (n=18) had 3 DRPs.

**Drug interactions:** Among 992 DRPs 776 were DI. Among these DI, major were 324(41.7%), moderate was 349

(45%), minor were 103 (13.3%). DIs were further classified into drug–drug interactions (DDI), drug–food interaction (DFI), drug-ethanol interaction (DEI). Distribution of DI was shown in Table No 3.

**Adverse drug reactions:** Among 992 DRPs 16 were ADRs. In our study ADRs were Antibiotics caused Steven Johnsons syndrome and erythematous patches, Diuretics cause electrolyte imbalance, Anticoagulants caused bleeding of gums, antipsychotics caused sedation slurred speech, decreased weight, antidiabetic drugs caused dilated cardiomyopathy and neurotropics caused constipation. The outcome of ADR evaluation and pharmacist intervention were shown in Table No .5

**Table No. 1 Patient characteristics and DRPs**

Patient demographics	Freq (%)
<b>Age</b>	
0-25	35(4)
26-50	301(33)
51-75	535(58)
>75	51(5)
<b>Sex</b>	
Male	664(72)
Female	258(28)
<b>Alcoholism</b>	
Alcoholic	332(36)
Non alcoholic	590(64)
<b>Smoking</b>	
Smokers	353(38)
Nonsmokers	569(62)
<b>Departments</b>	
Cardiology	489(53)
Endocrinology	44(5)
Gastroenterology	61(7)
General medicine	140(15)
Nephrology	61(7)
Neurology	115(12)
Psychiatry	10(1)

**Table No. 2 Types freq and % of DRPs**

Drug-related problems	Freq (%)
<b>Unnecessary Drug therapy</b>	51(6)
Duplicate therapy	7(13.7)
No medical indication	41(80.3)
Nondrug therapy indicated	2(3.9)
Treating available ADR	19(19)
<b>Low Dose</b>	8(1)
Wrong Dose	5(6.52)
Duration inappropriate	1(12.5)
Frequency inappropriate	2(5)
Drug interaction	0(0)

<b>High Dose</b>	13(0)
Wrong Dose	6(46.1)
Duration inappropriate	3(23)
Frequency inappropriate	3(23)
Drug interaction	17(79.)
<b>Wrong drug</b>	0(0)
Prescribed drug not available	0(0)
Dispensing error	0(0)
Prescribing error	0(0)
<b>Inappropriate adherence</b>	17(2)
Cannot administer	2(11.7)
Patient forgets to take	6(35.2)
Patient prefers not to take	9(52.9)
<b>Needs for additional drug therapy</b>	40(4)
Untreated indication	36(90)
Additional therapy	1(2.5)
Preventive	3(7.5)
<b>Drug Interactions</b>	776(84)
Drug-drug interactions	519(66.8)
Drug-food interactions	220(28.3)
Drug-ethanol interactions	37(4.7)
<b>Adverse drug reactions</b>	16(1)

**Table No: 3 Distribution of Drug Interactions**

Characteristics	No of prescriptions of DI	DDI	DFI	DEI	Total	% of interactions
<b>Age</b>						
0-25	23	18	9	0	27	3.479
26-50	61	167	67	17	251	32.345
51-75	103	303	132	20	455	58.63
>75	11	31	12	0	43	5.54
<b>Sex</b>						
Male	127	388	152	37	577	74.35
Female	71	131	68	0	199	25.65
<b>Deparments</b>						
Cardiology	61	59	32	0	91	11.74
Endocrinology	4	8	2	2	12	1.54
Gastroenterology	54	310	123	30	463	59.66
General medicine	24	70	24	2	96	12.37
Nephrology	17	26	13	2	41	5.29
Neurology	24	24	16	0	40	5.15
Psychiatry	14	22	10	1	33	4.25

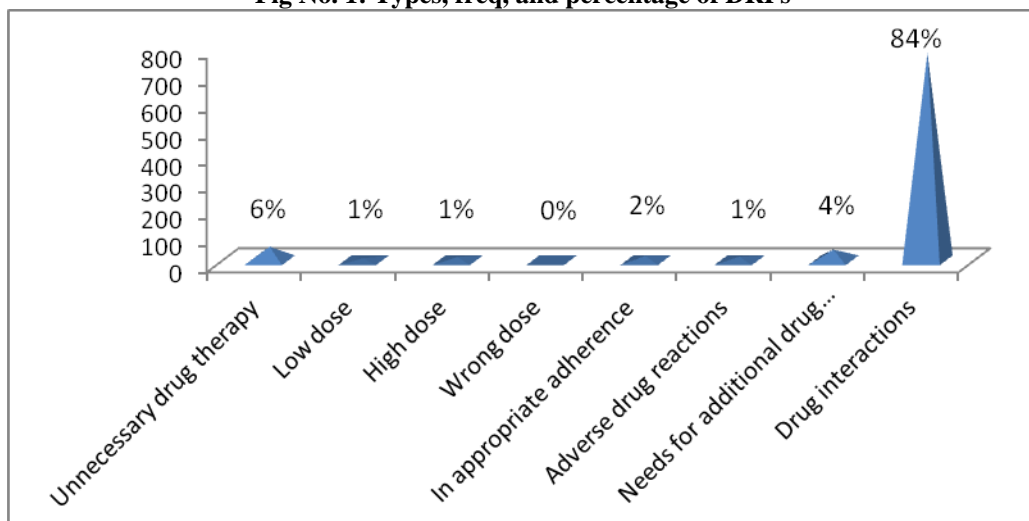
**Table no 4: Assessment of ADRs**

ADR	No of ADRs	% of ADRs
<b>CASUALTY</b>		
<b>Naranjo</b>		
Definite	2	12.5
Probable	12	75
possible	2	12.5
<b>WHO Scale</b>		
Certain	1	6.2
Possible	2	12.5
Probable	13	81.25

**Table No 5: Outcome of ADR evaluation and pharmacist intervention**

Outcome	Yes (%)	No (%)
Dechallenge	13(81%)	3(19%)
Rechallenge	1(6%)	15(94%)
Pharmacist intervention	193(97.47)	5(2.53)

**Fig No. 1: Types, freq, and percentage of DRPs**



**VI. DISCUSSION**

DRPs are very frequent in patients who are admitted to hospitals. These problems may lead to patient’s morbidity, mortality, increase in their hospitalization stay and cost. It has been shown that clinical pharmacist’s intervention can reduce the DRPs and total drug cost during hospitalization.<sup>[6]</sup>

According to the findings, the average number of errors per patient was 4.6. The most common form of error in our study was DIs (776) 84.16 % of the total problems in which out of 198 cases 127 were male and 71 were female. Among these drug interactions 61 cases are from General medicine department, 4 cases from Psychiatry, 64 cases from Cardiology, 24 from Neurology, 17 from Nephrology, 24 from Gastroenterology and 14 from Endocrinology.

The percentages of each DRP were as follows: Unnecessary drug therapy (6%), Low dose (1%), High dose (1%), Wrong drug (0%), inappropriate adherence (2%), adverse drug reactions (1%), needs for additional therapy (4%), and Drug Interactions (84%).

In this present study, 922 DRPs were found, a previous study by Rijo Mary George et.al. Showed 598 DRPs, Another study by Mohammednur Hussein et al 452 DRPs identified.

In the detail classification of Drug-related problems, In the Unnecessary drug therapy (6%) in which no medical indication is high (80.3%) and treating available ADR is low (1.9%). In low dose (1%) in which the wrong dose is high (62.5%) and Duration inappropriate is low (12.5%). In high dose (1%) in which the wrong dose is high (46.1%) and Drug interaction is low (7.69%). In Inappropriate adherence (2%) in which patient the prefers not to take is high (52.9) and cannot administer is low (11.7%). In needs for additional therapy (4%) in which untreated indication is high (90%) and additional therapy is low (2.5%). Drug interactions (84%) in which DDIs were more (66.8%) and DEIs are less (4.7%).<sup>[7]</sup>

ADRs were occurring in 1% (16) of the total samples in this study. The result is not in line with research done in East Ethiopia and India 42.7% and 10% respectively. In this study, electrolyte imbalance was the main ADR identified followed by Erythematous patches. While the research was done in East Ethiopia, the gastrointestinal disturbance is the main ADR.<sup>[8]</sup>

The most common DRPs in this study are “drug Interactions (776) and unnecessary drug therapy (51) whereas “Potential interactions” and “drug not taken or administered at all” are the common DRPs in the study of DRPs in type 2 DM patients with dyslipidemia.<sup>[9]</sup>

In the cardiology department, more DRPs were identified i.e. 53% and in Psychiatry low DRPs were found (1%). Based on the Class of drugs, Less number (245) of DRPs were found with the NSAIDs (7%) and more number of DRPs were found with the antihypertensives.

In our study drug interactions under moderate (45%) category were leading when compared to major (41.75%), while in other studies drug interactions under major category were leading when compared to moderate.

One of the main duties of a clinical pharmacist is to restrict the drug-related problems in medical wards. For 198 patients surveyed in this study 193 interventions were done by the clinical pharmacist with the mean of 0.97 interventions per patient.

More than 193(97%) interventions done by clinical pharmacists. Over that 93 (48.3%) are completely solved, 48 (24.8%) are partially solved and 52 (26.9%) are not solved

Previous studies showed that a pharmacist in collaboration team in hospitals reduces the adverse events by 30-86%.

The result is not constant with the results of research done in other tertiary care hospitals. These may be due to the difference in health worker accessibility and absence of drug interaction checker.<sup>[10]</sup>

## VII. CONCLUSION

DRPs occurred in the patients of all departments. The type of DRP differed markedly between the patient groups. Knowledge of these differences is clinically valuable by enabling us to guide efforts toward prevention of DRPs. The large number of interventions reported in several studies, as well as this study, revealed that clinical pharmacy services could contribute to a rationalization of drug therapy and may eventually lead to more medication safety.

Potential drug interactions, poor medication adherence and the lack of health consciousness were the three most common factors found in this study.

DRPs increases with an increase in the number of comorbidities. This may be because as comorbidity increase number of drugs patients using increases. This increase drug intersection which is the main DTP identified in our case, Drug therapy problem increases with age.

Since clinical pharmacist interventions are not known well to most of the physicians and medical students in our country, a better introduction of clinical pharmacy services and their achievements can improve patient care and reduce clinical risks. Regarding the current study outcomes, the health sector policymakers should consider to include clinical pharmacists in the hospital. The role of clinical pharmacists should also be geared to identify, solve, and prevent DRPs rather than overlapping on the already existing dispensing pharmacists

## VIII. LIMITATIONS:

There are limitations were present for our study they were, because of the lack of awareness, patient is unable to identify the ADRs due to medications, limited no of patients, the study period was very less, we were unable to determine what would happen

to the patients if errors were left uncorrected, the study is conducted in the inpatient department of Viswabharathi super specialty hospital at the district level and this can't be used to represent the Indian population, so the robust prevalence studies have to be conducted in India by door to door survey which will give the overall prevalence of India and lack of national drug-related forms designed at national level was also the other limitation of the study.

## IX. ACKNOWLEDGEMENTS

This thesis arose in part out of research that has been done from past days. It is a proud Privileged honor for me to express my heartfelt thanks and gratefulness to all the persons who backed me directly or indirectly throughout the materialization of this project work at this magnitude. We would like to avail this opportunity to express my deep sense of gratitude and heartfelt thanks to my revered guide Dr.R.Siddarama, Pharm.D, Associate Professor and Head of the department of pharmacy practice, for his support and valuable suggestions and for sharing his extensive experience with me during the entire course of the work.

## REFERENCES

- [1] Mohammed Biset Ayalew,1 Teshome Nedi Megersa et,al Drug-related problems in medical wards of Tikur Anbessa specialized hospital, Ethiopia, J Res Pharm Practice, Published :OCT 2015
- [2] M.Sonal Sekhar C.Adheena Mary P.G.Anju Nishana AmeerHamsa, Study on drug related hospital admissions in a tertiary care hospital in South India, *Saudi Pharmaceutical Journal*, Volume 19, Issue 4, October 2011, Pages 273-278
- [3] Thijs H. A. M. Vinks, Fred H. P. de Koning, Ton M. de Lange, Toine C.G. Egberts, Identification of Potential Drug-related Problems in the Elderly: The Role of the Community Pharmacist, *Pharmacy World and Science*, February 2006, Volume 28, Issue 1, pp 33-38
- [4] [Cruts G, Buster M, Vicente J, Deerenberg I, Van Laar M](#), Estimating the total mortality among problem drug users. *Subst Use Misuse*. 2008;43(5):733-47
- [5] [Mannheimer B, Ulfvarson J, Eklöf S, Bergqvist M, Andersén-Karlsson E, Pettersson H, von Bahr C](#). Eur J Clin Pharmacol. Drug -related problems and pharmacotherapeutic advisory intervention at a medicine clinic. 2006 Dec;62(12):1075-81. Epub 2006 Oct 26.
- [6] Farzaneh Foroughinia, Seyyed Ramtin Tazarehie, and Peyman Petramfar, Detecting and managing drug-related problems in the neurology ward of a tertiary care teaching hospital in Iran: A clinical pharmacist's intervention, *J Res Pharm Pract*. 2016 Oct-Dec; 5(4): 285-289.
- [7] [Bereket Molla Tigabu, Daniel Daba, and Belete Habte](#), Drug-related problems among medical ward patients in Jimma university specialized hospital, Southwest Ethiopia, *J Res Pharm Pract*. 2014 Jan-Mar; 3(1): 1-5
- [8] Mohammednur Hussein, Jimma Likisa Lenjisa, Minyahil Alebachew Woldu, Gobeze Temesgen Tegegne et al. Assessment of Drug Related Problems Among Hypertensive Patients on Follow up in Adama Hospital Medical College, East Ethiopia, *Clin Pharmacol Biopharm* 2014, 3:2
- [9] Hasniza Zaman Huri and Lee Chai Ling, Drug-related problems in type 2 diabetes mellitus patients with dyslipidemia, *BMC Public Health* 2013, 13:1192
- [10] Franklin Acheampong, Florence Amah Nkansah and Berko Panyin Anto, Drug-related problems and their clinical interventions in a Ghanaian teaching hospital, *Safety in health* 2016;2:15, <https://doi.org/10.1186/s40886-016-0050-5>
- [11] Rijo mary george, emmanuel james, vijayalakshmi s clinical pharmacist's interventions on drug related problems in a tertiary care hospital Department of Pharmacy Practice, Amrita School of Pharmacy, AIMS Health sciences Campus, published on 12 Mar 2015

AUTHORS

**First Author** – P. Anjali, Pharm.D, Department of Pharmacy Practice, CESCOP, India,  
Email: reddyanjali682@gmail.com .

**Correspondence Author** – Dr.R.siddarama, Pharm.D, Assistant Professor, CESCOP, Kurnool, 518218 - AP, India, Email: siddaramapharmad22@gmail.com, Contact no. 8501806237.