A PROSPECTIVE OBSERVATIONAL STUDY ON HOSPITALIZATION DUE TO DRUG RELATED PROBLEMS IN A SOUTH INDIAN POPULATION

Mohd. Haseebur Rahman Khan[1]*, Dr. Roshan S[2]

Abstract

Drug related problems (DRP) are any unenviable experiences of the patient which intervene the drug therapy and involves in the desired patient outcome. To curb the drug related problems, few vigilant steps can be taken which can preclude at least 50% of the total DRP related admissions (8.36%). In the present investigation, total 240 cases, where a correlation between past medication history and current complaints that resulted in hospitalization was established, were included in the 6 months prospective study done in departments of general medicine, dermatology, paediatrics and gastroenterology in tertiary care teaching hospital. Patient with no correlation between past medication history and current complaints, social habits causing hospitalization, herbal medication use history were excluded. The results revealed that non-adherence (51.07%) and ADR (38.21%) are predominant among the identified drug-related problems. Moreover, both paediatrics and geriatric patients showed the higher incidence of non-adherence to the prescribed therapy. Interestingly, majority of the adults showed adverse drug reactions (ADRs) as the DRP with higher incidence, followed by non-adherence to the prescribed therapy. Lack of knowledge about the disease, its complications and possible adverse reactions with self-medication was identified to be the high incidence risk factor. Higher incidence of drug-related problems was observed in patients having past medical history of CVS and CNS diseases which require long-term management.

[1]*Research Scholar, Mewar University, Chittorgarh, Rajasthan, India.
[2]Research Supervisor, Mewar University, Chittorgarh, Rajasthan, India.

*Corresponding Author: - Mohd. Haseebur Rahman Khan
[1]*Research Scholar, Mewar University, Chittorgarh, Rajasthan, India, Mobile No: +91 6301671072,
E-mail: haseeburrahmankhan2016@gmail.com

INTRODUCTION:

Drug related problems (DRP) can be defined as conditions related to the usage of the medicine by the patient that directly or indirectly makes the patient not to acquire the medicinal benefits. Identifying and dealing the drug related problems are considered as the important undertakings within the health care system (Kjeldsen et al, 2017). There exist different DRP categorization systems but most of these systems target on the issues which can be identified by review the patient case sheets. Therefore most commonly observed drug related problems are adverse drug reaction, drug–drug interactions, sub–therapeutic dose, non–adherence to the prescribed therapy, over use of the medications, over dosage of the drug, wrong administration of the medication, drug use without an indication and therapeutic duplication (Adusumilli and Adepu, 2014). Drug related problems may lead to reduced quality of life, hospital admission and overall increase in health cost and even increases the risk of morbidity and mortality (Alghamdy et al., 2015).

In order achieve better health outcomes, various modifications has been done to improve the medical therapy. DRPs depict the major reasons for hospitalization. This significantly explains the need for assessment of majorly involved risk factors, disease conditions, drug classes and severity (Al Hamid et al., 2013). Most of the patients having chronic diseases are treated as outpatients and their management is challenging (there is a chance of improper medication use) as less time is available for outpatient evaluation (HSu et al., 2016). Drug related problems are common among individuals after hospital discharge and relevant since they threaten patient safety. Most efficient interventions to avoid hospitalization due to drug related problems may be by focussing on post discharge measures, care modulation and monitoring of their effectiveness along with regular follow up strategies (Nicholls et al., 2017). The world alliance for patient safety is initiated by WHO in 2004 is very helpful tool to achieve medication accuracy through reconciliation of medicine. It is an important scheme to minimize the drug related problems and the patients are gaining better relief from the DRPs (Garcio-Caballos et al., 2010). Most of the studies were retrospective, multicentre studies done internationally. Limited research has been conducted in India to exemplify the impact of DRP that results in hospital admission (Nivya et al., 2013).

The fact is that most of these DRP are avoidable with little vigilant effort (Singh H et al., 2011). As per various researches carried out, drug related problems are having a great importance in the health care system since 8.36% of DRPs are contributing to the total drug related issues, out of which half of them can be avertable (Beijer et al., 2002).

This study is to explain the importance of patient education about disease, drug and highly possible drug related problems that may result in severe complications and deterioration of patient's quality of life. To explain the importance of care needed in prescribing drug in high risk patients like elderly with multiple chronic condition, low immune individuals etc. To highlight the importance of resolving the risk factors causing DRPs (Phansalkar et al., 2011). Main aimed is to study the drug related problems resulting in Hospitalization. Objectives of the study include identification of group of people (age, sex, area) at higher risk, risk factors involved, commonly associated risk disease conditions and type of drugs involved in the drug related problems, assess the severity and identify the person responsible for DRPs.

METHODOLOGY:

A Prospective observational study was conducted in a tertiary care teaching hospital which is a 1200 bed hospital providing specialized healthcare services to people through various departments like general medicine, pediatrics, gastroentero-logy, dermatology departments etc. The study was approved by the ethical committee of the hospital. The case sheets of the patients having past medical history admitted in various departments during two years duration were collected and analyzed. Data of the patients with drug related admissions to hospital during the study period helps in determining the prevalence of the drug related problems. Cases in which an association between the admission and a DRP was observed were included in the study. Cases where patient or patient care taker was able to communicate adequately and patients hospitalized in general medicine, pediatrics, gastroenterology, dermatology departments were included in the study. Hospital admissions attributed to herbal medicine use, poisoning and substance abuse or outpatients consulting for drug related problem are excluded from the study. The various sources of data include patient demographic details (age, gender, area of residence), past medical history, past medication history, case sheets of the patient,

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laboratory investigations, provisional and conformational diagnosis, treatment, interviewing patient and patient care takers and any other relevant sources. The cases from the departments included in the study are reviewed. Case sheets of patients with past medical history are considered and assessed for the impact of the medication used in the past on the current complaints and if the DRP is observed, the case is considered for further study by documenting necessary information in documentation forms, including data collection form and DRP assessment form which were developed and found applicable to the departments considered for the study. Necessary information from each patient such as age, sex, area of residence, admitting department, reasons for hospitalization, past medical history, past medication history and certain laboratory investigations are recorded from the available sources. Based on the information available from the case sheets regarding the past medical history and the past medication history, the type of DRP involved was identified. After categorizing the DRP, by questioning the patient or the patient care taker (in case of pediatrics, unconscious patients, patients unable to communicate) about medication taking behavior, risk factors like age, polypharmacy, infectious and parasitic diseases, self- medication with non- prescribed medications, lack of knowledge, inappropriate medication use, social habits of the patient, economic status of the patient etc. were assessed. Severity was classified as mild-drug related problem requiring only change in the treatment of existing medical condition, moderate-drug related problem requiring additional treatment with a change /no change in treatment of existing medical condition and resulting in no permanent disability and severe drug related problem that was life-threatening, organ damage or resulted in permanent disability or fatal.

RESULTS:

Among the 240 cases, 280 drugs related problems were identified, which shows the probability of multiple drug related problems in a single patient. Among age groups adults 129(53.75%) were predominant over children 69(28.75%) and geriatric 42(17.50%) in terms of prevalence (Figure 1), while males have higher risk to develop drug related problems among children and adults and in geriatrics both the genders have high risk in developing drug related problems. Among the 240 cases documented 146(60.83%) were male and 94(39.17%) were female, showing 1.55 times higher risk for males to develop drug

related problems (Figure 2). Among the 240 cases documented predominance of drug related problems was observed in patients belonging to urban area 126(52.50%), showing 1.105 times higher risk for drug related problems in individuals of urban area compared to rural area (Figure 3). Among all the individuals regardless of sex the distribution of drug related problems is significant over rural areas details were given in Table 1. The DRPs with higher incidence among the 240 documented cases were non-adherence to the prescribed therapy 143(51.07%) followed by ADR 107(38.21%), overuse of the drug 21 (07.50%), therapeutic duplication 05(01.79%) and wrong administration 04 (01.43%) details were given in Table 2 (Figure 4). 396 risk factors responsible for 280 drug related problems are lack of knowledge 157(39.65%) followed by inappropriate medication use 67 (16.92%), hypersensitivity & pharmacology of drugs 58 (14.65%), self-medication with non-prescribed medications 40(10.10%), age 24(06.06%), drug with narrow therapeutic index 21(05.30%), infectious and parasitic diseases 14(03.53%), social habits of the patient 11(02.78%), economic status of the patient 4(01.01%) details were given in Table 3 (Figure 5). Various persons were involved in causing of DRPs, patients 132(47.14%) themselves was one of major cause in developing DRPs followed by patient care taker 47 (16.79%), patient and patient care taker 10 (03.57%) and in 79 (28.29%) DRPs person involvement absent details was given in Table 4 (Figure 6). Among the 280 documented drug related problems non adherence 62(22.14%) was the major drug related problem in children followed by adverse drug reaction 12(04.29%). In adults adverse drug reaction 74(26.43%) was the major drug related problem followed by non-adherence 56(20%) and overuse of the drugs. In geriatrics, non adherence 25(08.93%) was the major drug related problem followed by adverse drug reaction 21(07.5%) details were given in Table 5 (Figure 7).

Distribution of the 240 cases documented according to the past medical history is depicted in the following table. Among 240 cases the higher prevalence of drug related problems was observed in patients having past medical history of CVS diseases 57(23.75%) followed by CNS disease 50(20.84%), skin disease 32(13.34%), metabolic disease 28(11.66%), renal disease 19 (07.92%), immune disease 16(06.67%), GI disease 10(04.16%), respiratory disease 05 (02.08%) and others 23(09.58%). Non-adherence

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is the most common drug related problem in patients with past medical history CVS disease 32(11.42%), CNS disease 37(13.21%), skin disease 18(06.42%), metabolic disease 21 (07.50%), renal disease 21(07.50%), respiratory disease 03(01.07%) and adverse drug reaction is the most identified drug related problem in patients with immune disease 14(5%) and other conditions 21(07.50%) (having complaints like joint pains, cold, fever, body pains) details were given in Table 6 (Figure 8).

Adverse drug reactions are predominant in OTC drugs 30 (10.71%), while non-adherence is the drug related problem which is predominant in prescribed drugs 143(51.07%) Table 7 (Figure 9). 280 drug related problems were distributed based on their severity as assessed. Among the 280 cases, 199(71.07%) were assessed as moderate followed by 67(23.93%) as mild and 14(5%) as severe Table 8 (Figure 10).

DISCUSSION:
A total of 752 cases with past medical history were reviewed out of which 240 cases were enrolled into the study based on inclusion criteria and the remaining 512 cases were excluded based on exclusion criteria. Among the excluded cases 229 patients had no relation between past medical history and current reasons for admission, 131 cases were hospitalized due to herbal medicine intake, 87 cases were due to patient's social habits that aggravated their medical condition, 65 cases were due to trigger factors. Among the 240 enrolled cases, 280 drug related problems were identified. We have evaluated various parameters in relation with the drug related problems as follows. From our study it was observed that drug related problems were predominant with adult's patients. It was observed from our study that males have high risk of drug related problems when compared with the females. From our study it was evident that both the urban and rural individuals have approximately equal risk for drug related problems.

In our study non-adherence (50.94%) and adverse drug reactions (38.36%) are predominant among the identified drug related problems. To prevent the avoidable ADRs patient should be informed about the suspected and highly frequent ADRs, so that they can easily report and obtain immediate management. According to our study children and geriatrics have higher incidence of non-adherence to the prescribed therapy ultimately leading to further complications. ADRs have higher incidence among adults followed by non-adherence to the prescribed therapy.

It is also observed in the study that risk factors like lack of knowledge, inappropriate medication use, hypersensitivity towards drug and pharmacology of certain drugs showed more predominance among the drug related problems. Lack of knowledge about the disease and its complications; pharmacological management is found to be the main risk factor for development of non-adherence, whereas hypersensitivity to drug and pharmacology of drug are found to be main risk factors for developing ADR which are unavoidable. Patient and patient care taker need to be provided with necessary information about drug use and patient's medical condition in order to improve compliance to therapy and frequency of hospitalization.

In our observational study, it is found that the patients with CVS and CNS related diseases have shown higher incidence of drug related problems. Since, these diseases need long term medical management and regular follow up is needed to avoid the constrains in the therapy and improved therapeutic benefits as per their physician assessment towards the patient need, which subsequently reduce the risk of drug related problems.

In our study antimicrobial, immune and inflammatory modulators majorly used for infectious conditions and pain management found to have high incidence of ADR as the drug related problem whereas cardiovascular and CNS drugs used for treatment of chronic condition have higher incidence of non-adherence as the drug related problem.

It is also observed in the current study that the individuals with past medical history are mostly admitted with moderate drug related problems and the risk is high due to the inadequate awareness about the consequences of improper medication use.

CONCLUSION:
In this study in non-adherence to prescribed therapy is found to be the DRP causing hospitalization at higher incidence followed by ADR. The most commonly involved risk factors are lack of knowledge about disease, need of adherence to the therapy as prescribed and outcomes of treatment provided. The class of drugs commonly involved is antimicrobials,

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immune and inflammatory mediators, cardiovascular and CNS drugs in the order of incidence respectively. Severity of DRPs was majorly, assessed to be moderate.

Lack of information was predominant risk factor for adverse drug reaction. Statistically lack of information is 2.16 times higher in risk, for drug use without indication, than knowledge deficit and lack monitoring also significantly risk factors for drug use without indication. Statistically knowledge deficit and lack monitoring have twice the risk for overuse of the drug, than knowledge deficit and poly-physician also significantly risk factors for drug use without indication. Appropriate patient counselling about regular follow up and use of prescribed medication is significant on clinical pharmacist's part in association with other health care professionals.

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TABLES:

Table 1: Distribution according to age, sex and area of residence

Demographic details		Male	Female	Total (%)	Ratio (M:F)
Age group	Children	41	28	69 (28.75)	1.46
	Adults	84	45	129 (53.75)	1.86
	Geriatrics	21	21	42(17.50)	1
	Total	146 (60.83)	94 (39.17)	240	1.55
Area	Urban	70 (47.94)	57(60.64)	126 (52.50)	P value
	Rural	76(52.06)	37 (39.36)	114(47.50)	0.04

Table 2: Types of Drug related problems

Drug related problem	Frequency	Percentage (%)
Non-adherence to prescribed therapy	143	51.07
Adverse drug reaction	107	38.21
Overuse of the drug	21	07.50
Therapeutic duplication	05	01.78
Wrong administration	04	01.42
Total	280	99.98

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Table 3: Risk factors involved in Drug related problems

Risk factors	Frequency	Percentage (%)
Lack of knowledge	157	39.65
Inappropriate medication use	67	16.92
Hypersensitivity & Pharmacology of drugs	58	14.65
Self-medication with non-prescribed medications	40	10.10
Age	24	06.06
Drug with narrow therapeutic index	21	05.30
Infectious and parasitic diseases	14	03.53
Social habits of the patient	11	02.78
Economic status of the patient	04	01.01
Total	396	99.96

Table 4: Person responsible for Drug related Problems

Person responsible	No. of DRPs	Percentage (%)
Patient	132	47.14
Patient care taker	47	16.79
Patient and patient care taker	10	03.57
Patient and pharmacist	12	04.29
None	79	28.21
Total	280	99.97

Table 5: Distribution of Drug related problems according to Age group

Age group	Drug related problems	Frequency	Percentage (%)
Children	Non adherence	62	22.14
	Adverse drug reaction	12	04.29
Adults	Adverse drug reaction	74	26.43
	Non adherence	56	20.00
	Overuse of drug	16	05.71
	Therapeutic duplication	05	01.79
	Wrong administration	04	01.42
Geriatrics	Non adherence	25	08.93
	Adverse drug reaction	21	7.50
	Overuse of drug	05	1.79
	Total	159	99.94

Table 6: Distribution of Drug related problems based on Past medical history

Past Medical History Frequency (%)	Type of Drug related problems	Frequency	Percentage (%)
CVS disease 57(23.75)	Non-adherence	32	11.42
	Adverse drug reaction	26	09.28
	Overuse of drug	07	02.50
	Therapeutic duplication	02	00.71
CNS disease 50(20.84)	Non-adherence	37	13.21
	Adverse drug reaction	16	05.71
	Therapeutic duplication	02	00.71
Skin disease 32 (13.34)	Non-adherence	18	06.42
	Adverse drug reaction	18	06.42

	Overuse of drug	02	00.71
Metabolic disease 28 (11.66)	Non-adherence	21	07.50
	Adverse drug reaction	07	02.50
	Wrong administration	04	01.42
Renal disease 19 (07.92)	Non-adherence	21	07.50
Immune disease 16(06.67)	Adverse drug reaction	14	05.00
	Non-adherence	03	01.07
GI disease 10 (04.16)	Non-adherence	08	02.86
	Adverse drug reaction	04	01.42
	Overuse of drug	02	00.71
Respiratory disease 05 (02.08)	Non-adherence	03	01.07
	Adverse drug reaction	01	00.35
Others 23 (09.58)	Adverse drug reaction	21	07.50
	Overuse of drug	10	03.57
	Therapeutic duplication	01	00.35
Total		280	99.94

Table 7: Distribution between Type of Drugs and Drug related problems

Type of drugs	Type of DRP	Frequency	Percentage (%)
OTC drugs	Adverse drug reaction	30	10.71
	Over use of drugs	21	07.50
	Therapeutic duplication	03	01.07
Prescribed drugs	Non adherence to prescribed therapy	143	51.07
	Adverse drug reaction	77	27.50
	Therapeutic duplication	02	00.71
	Wrong administration	04	01.42

Table 8: Severity assessment of Drug related problems

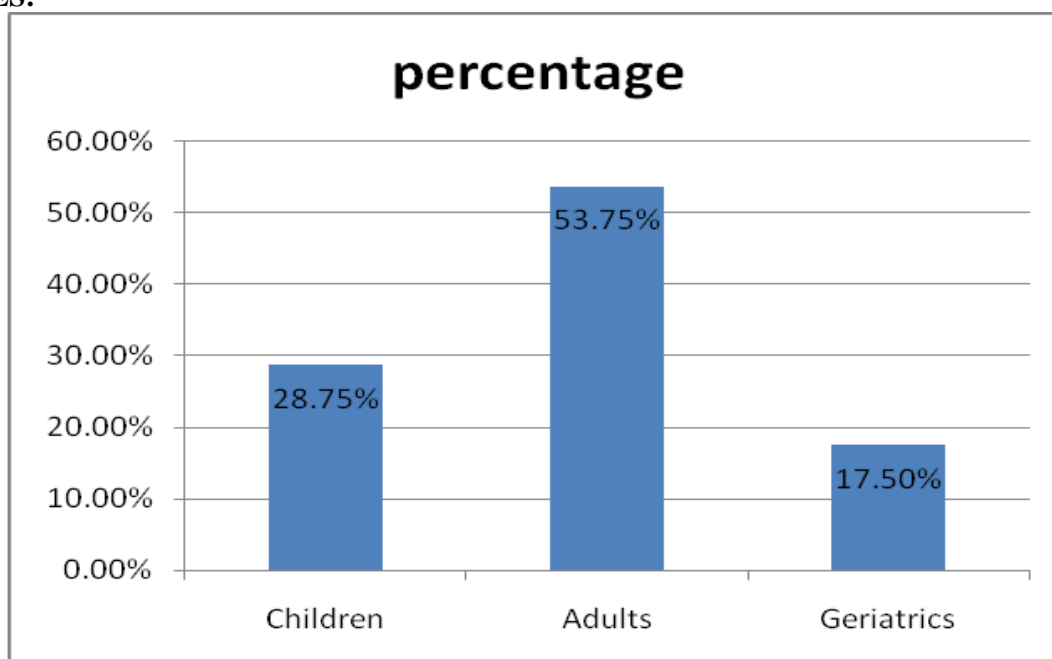| Severity	Frequency	Percentage (%)
Moderate	199	71.07
Mild	67	23.93
Severe	14	5.00
Total	280	100

FIGURES:

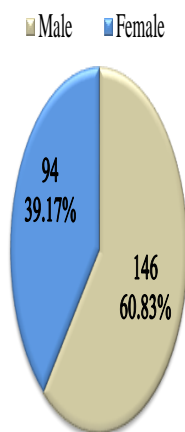
Figure 1: Distribution according to Age group
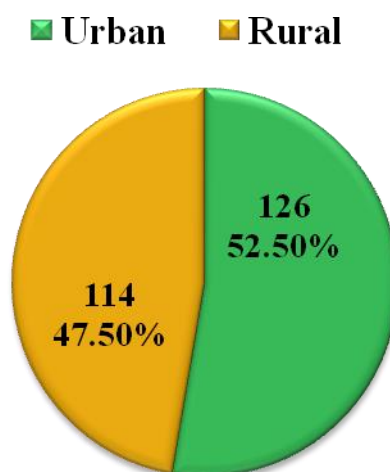
Figure 2: Sex wise distribution

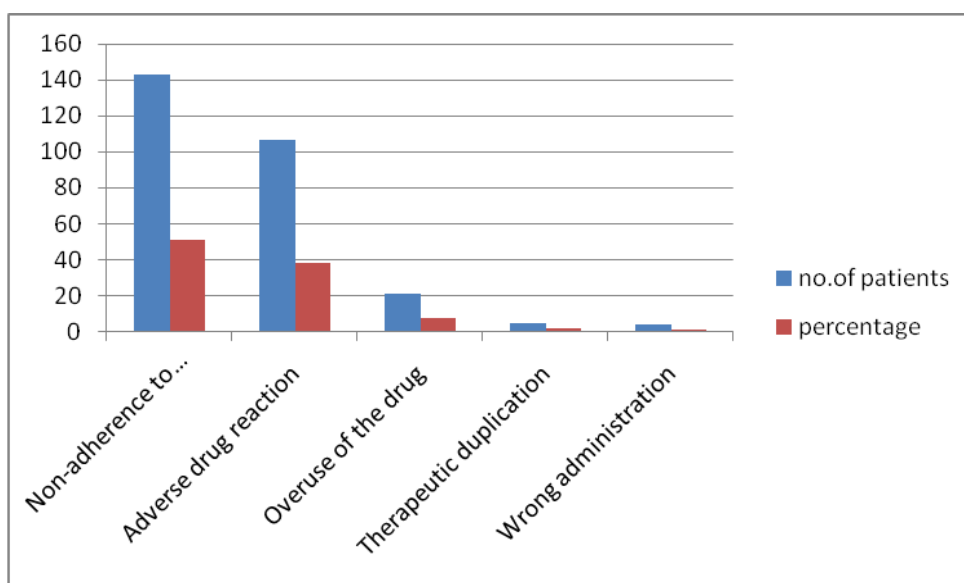
Figure 3: Area wise Distribution

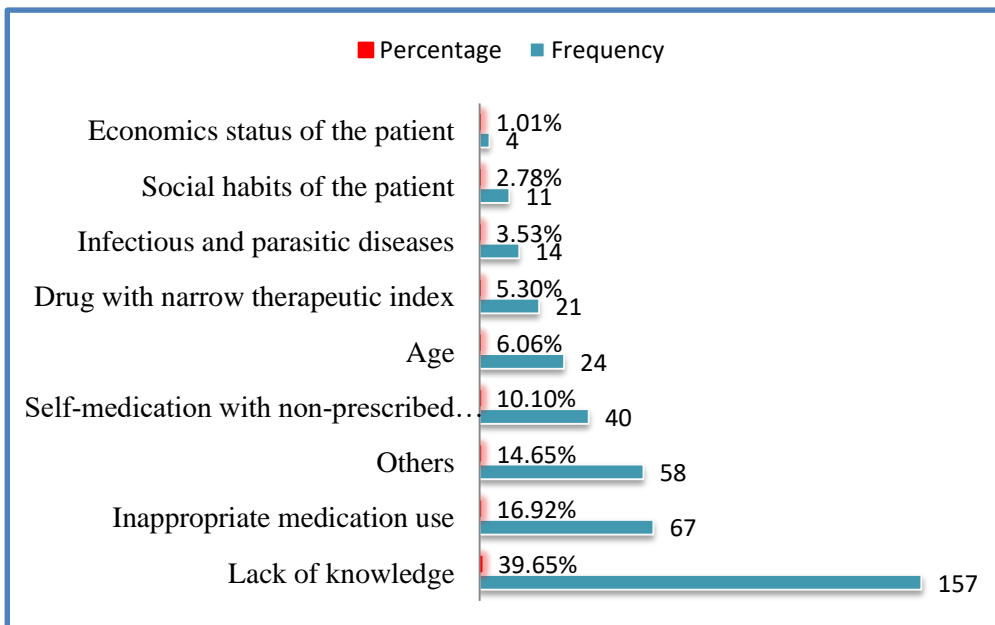**Figure 4:** Types of drug related problems

Figure 5: Risk factors involved in DRPs
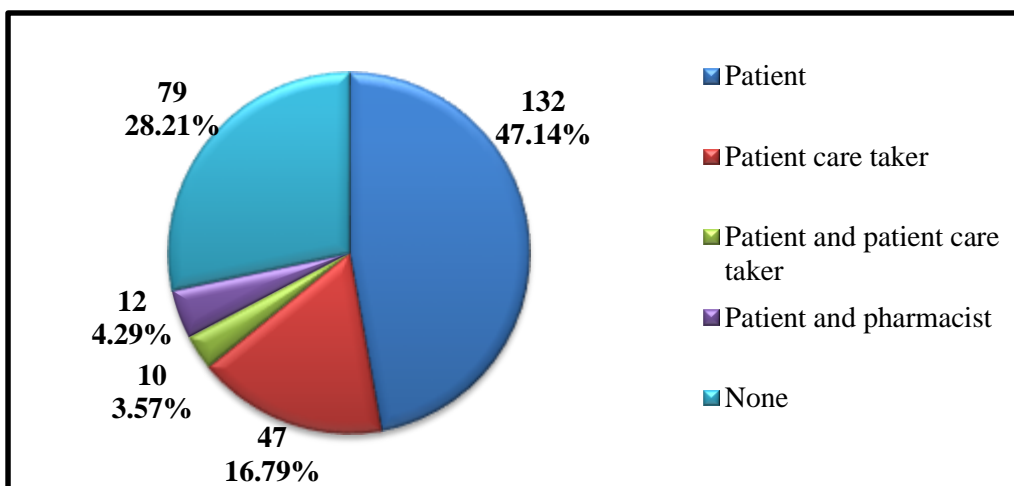
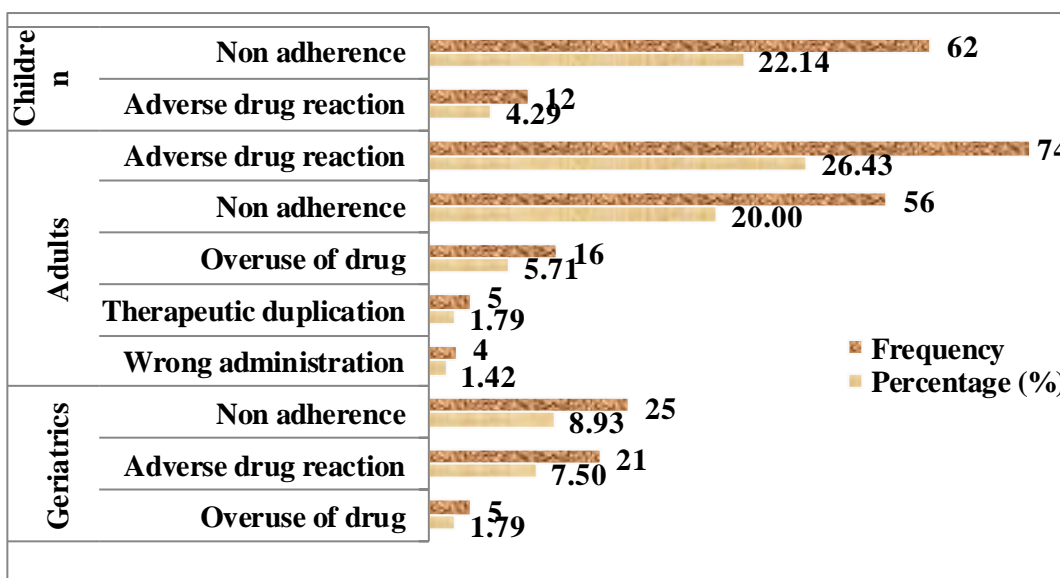**Figure 6:** Person responsible for DRPs

Figure 7: Distribution of DRPs according to age group

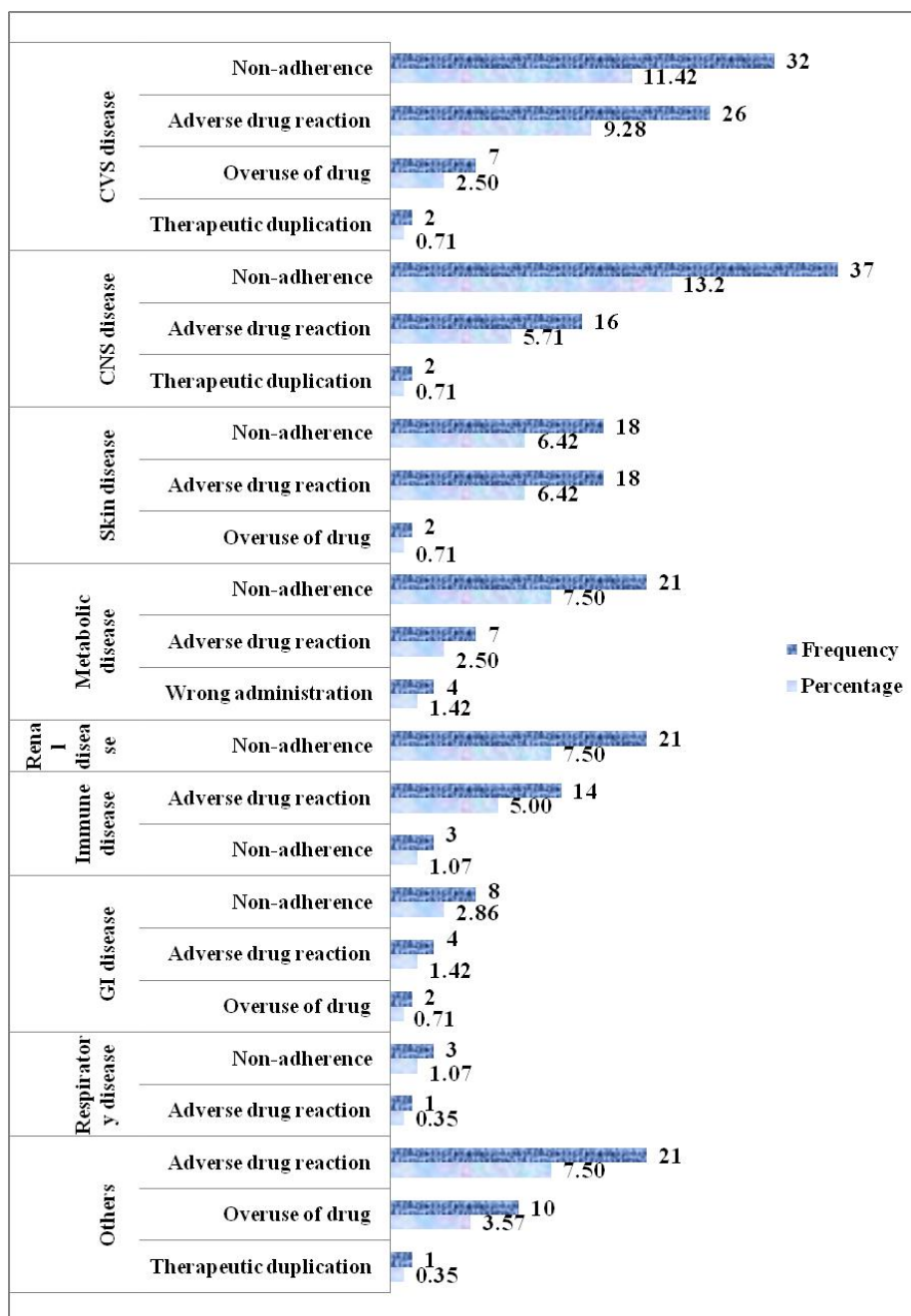*Eur. Chem. Bull.* **2023**, *12(Special Issue 5), 3073 – 3083*

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Figure 8: Distribution of DRPs based on past medical history
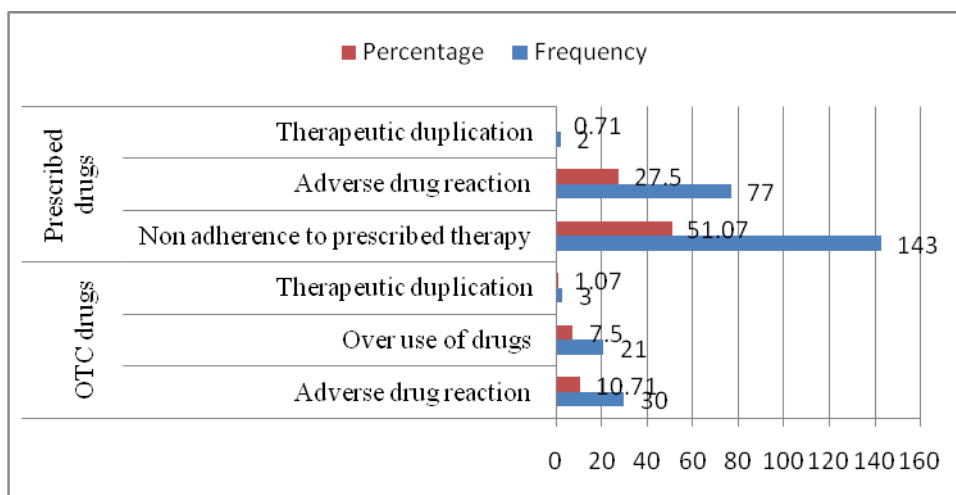

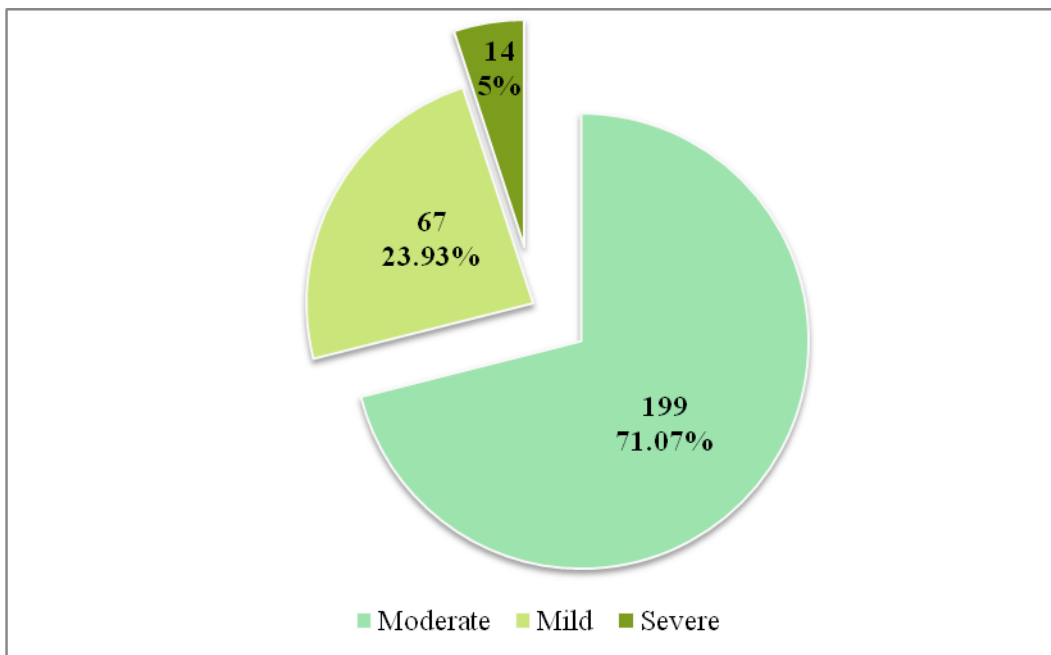**Figure 9:** Distribution between type of drugs and drug related problems

Figure 10: Severity assessment of drug related problems

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