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Assessment Of Potential Drug-Drug Interaction And Its Risk Factors Among Cardiac Patients In A Tertiary Care Hospital, Erode, Tamil Nadu, India.

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ABSTRACT

The aims of this research were to assess the prevalence and types of Potential Drug Drug Interactions (pDDIs) and its risk factors among cardiac patients admitted in a Tertiary care hospital, Erode. Totally 263 patients of any age group diagnosed with cardiovascular diseases and co-morbid conditions were randomly selected. Patients of either sex and at least one day of hospital stay with more than two prescribed medications were included in the study. After interviewing the patient, potential drug-drug interactions (pDDIs) were assessed from medication profile and through which the prevalence and types of pDDIs were assessed. Also, the most common pDDIs and its risk factors in the hospitalized cardiac patients were determined. Among 263 patient's prevalence of cardiovascular disease is more in males (59.31%) than females (40.68%). Out of 263 patients total of 552 interactions were found and out of that 228 were major interaction and 324 were moderate type. Most of the drug-drug interactions were found in the patients with age group of ≥60 (142). Also, in the patients with polypharmacy (≥7 medications) shows more drug interaction than the prescription with <7 Medications. In order to ensure the safety of patients taking cardiovascular medications, each patient should be educated about the possible drug interactions and the risk of potentially serious complications that could arise as a result of the interactions. The overall incidence of pDDIs was very high in the cardiac patients and it was associated with old age, polypharmacy and increased lengths of hospital stay.

Keywords: Cardiovascular diseases, pDDIs, Polypharmacy, Drug drug interactions.

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INTRODUCTION

Drug–drug interactions (DDIs) are an emerging threat to public health.[1]A drug interaction is a change in a drugs effect on the body when the drug is taken together with a second substance. A drug interaction can delay, decrease, or enhance absorption of either substance. This can decrease or increase the action of either or both substance or cause adverse effects.[2]. Most health care professionals are not fully aware of all major and clinically important drug interactions or underestimate the risk of the co-administration of multiple drugs. Prescribers commonly rely on pharmacists as a key source of drug-interaction information.. Patient population at high risk include the elderly and patients with co morbidities as they are usually prescribed with a greater number of drugs(polypharmacy).[3]

Clinical pharmacist plays an important role in healthcare settings as it gets an opportunity to work in a team and utilize the professional skills, knowledge and expertise for better patient care. Physician awareness, patient education, and patient-physician communication are necessary for the timely detection of such interactions and prevention of the associated morbidity.[4] Systematic reviews have shown that electronic alerts and prompts can improve prescribing pattern or reduce rate of error.[5] Therefore intense monitoring programme needs to be initiated in every hospital for early detection and prevention of PDDI.[6] Our study objectives are to find the prevalence and types of pDDIs, to list out the most common pDDIs in the hospitalized cardiac patients and to determine the risk factors associated with pDDIs in cardiac patients.

MATERIALS AND METHODS

A prospective observational study was conducted in a tertiary care hospital, Erode, Tamil Nadu for a six month period from November 2018 to April 2019. Ethical approval was obtained from the institutional review board and a written informed consent was taken from all the participants. After interviewing the patient, potential drug-drug interactions (pDDIs) were assessed from medication profile and through which the prevalence and types of pDDIs were assessed. Potential drug interactions were checked by using MICROMEDEX. Also the most common pDDIs and its risk factors in the hospitalized cardiac patients were determined.

Study population

Totally 263 patients of any age group diagnosed with cardiovascular diseases and co-morbid conditions were randomly selected. Patients of either sex and at least one day of hospital stay with more than two prescribed medications were included in the study. Patients who had incomplete data such as gender, age, diagnosis, duration of hospital stay, date of admission and discharge are excluded from the study.

RESULTS AND DISCUSSION

Table No 1: Basic characteristics of study population

Characteristics	Frequency		Percentage (%)
Sex			
Male	156		59.31
Female	107		40.68
Age(Years)	**Males**	**Females**	**Percentage (%)**
≤14	0	0	0
15-30	16	4	7.05
31-45	34	24	22.0
46-59	43	35	29.65
≥60	58	49	40.68
Length of hospital stay			
≤3	48		18.3

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4-6	123	46.8
≥7	91	34.7
No of prescribed medications		
≤4	51	19.4
5-6	83	30.4
≥7	129	50.1
Diagnosis		
Myocardial infraction(MI)	87	33.3
Coronary artery disease(CAD)	67	25.4
Acute coronary syndrome(ACS)	38	14.4
Angina	54	20.5
Others	17	6.3
Severity of pDDIs (n=552)		
Major	228	41.0
Moderate	324	58.9

Table No 2: Number of pDDIs per patient

Sl No.	Number of pDDIs	Number of patients (n=263)	Percentage (%)
1	None	24	9.1
2	1-2	128	48.6
3	3-5	72	27.3
4	≥6	39	14.8

Figure No 1: Number of pDDIs per patient

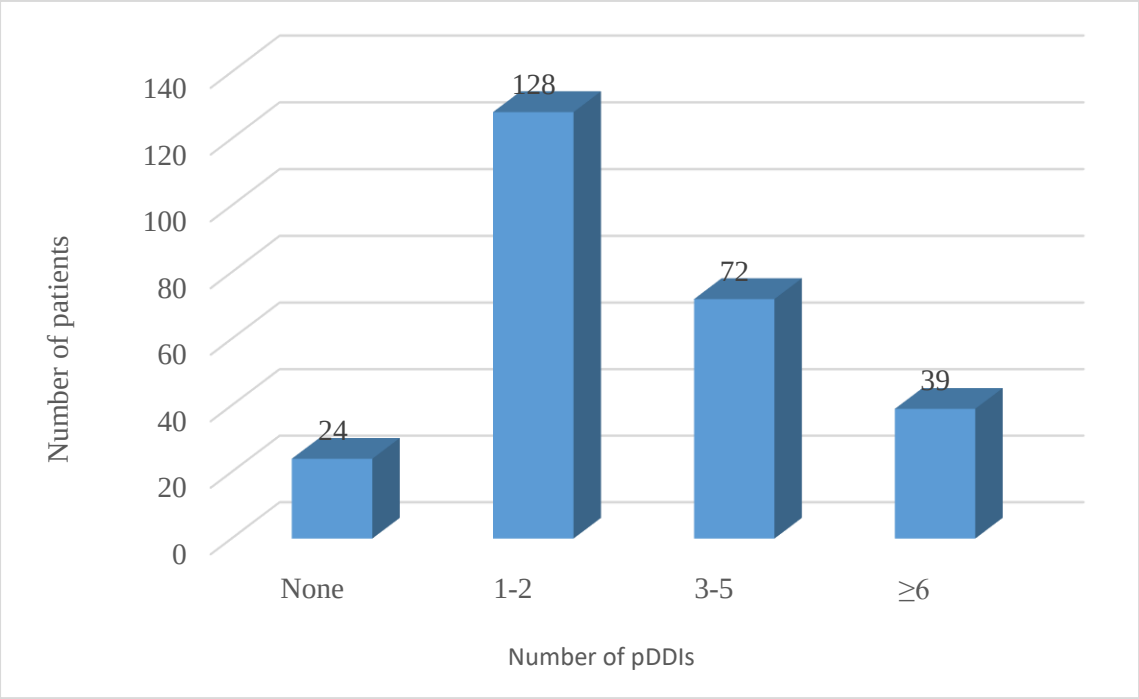

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Table No 3: Factors associated with drug-drug interactions

Patient age (years)	Number of patients with interaction(n=239)
<60	97
≥60	142
Gender	**Number of patients with interaction(n=239)**
Male	115
Female	124
Hospital stay (days)	**Number of patients with interaction(n=239)**
<7	137
≥7	102
Number of drugs prescribed	**Number of patients with interaction(n=239)**
<7	98
≥7	141

Table No 4: Most common pDDIs combinations

pDDIs Combination	Severity	Documentation	Frequency
Aspirin + Clopidogrel	Major	Probable	63
Aspirin + Enalapril	Major	Probable	51
Atorvastatin + Clopidogrel	Moderate	Established	106
Aspirin + Furosemide	Moderate	Probable	42
Aspirin + Propranolol	Moderate	Established	24

More than three thousand patients were admitted in the Department of general medicine during the study period. Among them 263 patients were studied. Table.1 shows that out of 263 patients 156 were males (59.31%) and 107 were females (40.68%). Among total population prevalence of cardiovascular disease is more in males than females.[7] Also it shows the distribution of patients based on age group. It was 16 males and 4 female among 15 to 30 years age group, 34 males and 24 females among 31 to 45 years age group, 43 males and 35 females among 46 to 59 years age group and 58 males and 49 females among ≥60 years age group.

Table 1also shows the distribution of patients based on the length of hospital stay in days. Among 263 patients 48 were admitted in hospital for ≤3 days,123 were admitted in hospital for 4-6 days and 91 were admitted in hospital for ≥ 7 days.The distribution of patients based on prescribed medications is also described in table 1. Among 263 patients 51 patients were prescribed with ≤4 medications, 83 patients were prescribed with 5-6 medications and 129 patients were prescribed with ≥7 medications**.**

Among 263 patients 87 patients were diagnosed with myocardial infraction, 67 were diagnosed with coronary artery disease, 54 were diagnosed with angina and 38 were with acute coronary syndrome. Most common diagnosis was myocardial infarction followed by acute coronary syndrome and coronary artery disease. Few other studies also suggest that cardiac patients are at higher risk of pDDIs as a number of cardiac drugs are associated with pDDIs as these patients are more vulnerable to pDDIs due to complexity of disease and multiple drug therapy.[8]

Among 263 patients total of 552 interactions were found and out of that 228 were major interaction and 324 were moderate type. A study in the south Indian hospital showed that prevalence rate for pDDIs was 30.67% among the studied cardiac patients.[73] According to a study carried out in the cardiac ward of a hospital in Nepal 32 out of the 150 studied cardiac patients had at least one pDDI with prevalence rate of 21.3%.[9]

Out of 263 patients 128 were coming under the category of 1-2 pDDIs per patient group. In most of the cases 1-2 potential drug-drug interactions per patient were identified. Among 263 patients 24 patients do not have any interaction in their medication chart.

Table 2 shows that most of the drug-drug interactions were found in the patients with age group of ≥60 (142). Also in the patients with polypharmacy (≥7 medications) shows more drug interaction than the prescription with <7 Medications. Our findings regarding association of pDDIs with elder patients are supported by other studies as well.[10] It was reported in our study that old age is a risk factor for pDDIs ($p< 0.001$). A study performed at Switzerland in cardiovascular patients also showed that patients with old age were at higher risk for pDDIs.[11] Another study carried out in patients taking antihypertensive drugs in Medicaid population also found significant association of pDDIs with increase in age.[12] Some other studies found similar median for pDDIs in cardiac patients. It was revealed in our study that 55% of pDDIs in cardiac patients were of moderate severity and 45% with major severity.[13](Table 3)

Table 4 shows that out of 552 interaction the most commonly occurred potential drug-drug interactions combination in 263 patients. Study conducted by Bista D et al.,[14] also found aspirin was the most common drug causing DDIs. It is expected from aspirin because aspirin increases serum potassium level and serum potassium level is altered by almost all antihypertensive drugs including ACE inhibitors, ARBs, BB and diuretics.[1]

Limitations

The study was conducted in a short time period and collected sample size was less.

CONCLUSION

In order to ensure the safety of patients taking cardiovascular medications, each patient should be educated about the possible drug interactions and the risk of potentially serious complications that could arise as a result of the interactions. Our study concluded that the overall incidence of pDDIs was very high in the cardiac patients. It was found that incidence of pDDIs was associated with old age, polypharmacy and increased lengths of hospital stay.

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