Learnovate-International
An International Open-Access Journal Published By Lapain Press Publications [LPP]
Content Available at www.lapinjournals.com E-ISSN: 3049-1592
Research Article Open Access

A STUDY ON EVALUATION OF DRUG-DRUG INTERACTIONS IN CARDIOVASCULAR DISEASE PATIENTS IN A TERTIARY CARE HOSPITAL

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Article History: Received: 22 May 2025, Revised: 11 June 2025, Accepted: 06 July 2025

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DOI: https://doi.org/10.70604/learnint.v2i1.58

Abstract
Cardiovascular disease remains a major cause of premature mortality and rising health care costs. Cardio metabolic, behavioral, environmental, and social risk factors are major drivers of cardiovascular disease. The present study aimed to assess drug-drug interactions in cardiovascular disease patients in a tertiary care hospital. 36-46 years age patients were more 59 (34.70%) as compared to 47-56 years age patients were 44 (25.88%), 57-67 years age patients were 42 (24.70%). Moderate drug-drug interaction patients were more 81 (47.64%) as compared to other drug interactions. Aspirin + Clopidogrel drugs drug interactions were more 74 (43.52%) as compared to other drug interactions. The study found that incidence of drug interactions was associated with old age, polypharmacy and increased lengths of hospital stay. The development of such data base in hospitals may help for the surveillance of drug interactions in hospitalized cardiac patients. Patients with cardiovascular disorders are subjected to high risk of potential drug-drug interactions and the number of drugs prescribed and educational level of the prescribers has a high significantly associated with the occurrence of potential drug-drug interactions.

Keywords: Cardiovascular disease, Polypharmacy, Hospitalized cardiac patients, Drug interactions, Hospital stay.

INTRODUCTION

Cardiovascular disease (CVD) remains a major cause of premature mortality and rising health care costs. Cardio metabolic, behavioral, environmental, and social risk factors are major drivers of CVD. Consistent, comparable, and systematic analysis of long-term trends and patterns in global CVD are essential to guide public policy and provide benchmarks for decision makers. Beginning with ischemic heart disease (IHD) and stroke, this article provides information on the burden of CVD, including 13 underlying causes of cardiovascular death and 9 related risk factors at the global, regional, and national levels[1-3]. These trends show us where in the world CVD mortality and burden are increasing or declining and where progress has stalled. For each of the contributing causes of cardiovascular deth and risk factors examined, we identify which regions and countries have the highest and lowest estimates of prevalent cases and number of deaths, as well as summary measures including number of years of life lost (YLLs), number of years lived with disability (YLDs), and the magnitude and temporal trends in disability-adjusted life years. For each section, the article also addresses how the summary measures of health and disease discussed inform investments in cardiovascular research, their implications for clinical and public health practice, and implications for health system development and national and regional policy. Each CVD cause and related health states were identified with standard case definitions. IHD represented acute myocardial infarction, chronic stable angina, chronic IHD, and heart failure due to IHD. Myocardial infarction was defined according to the Fourth Universal Definition of Myocardial Infarction and was adjusted to include out-of-hospital sudden cardiac death. Stable angina was defined according to the Rose Angina Questionnaire. Stroke was defined according to the World Health Organization definition and was estimated separately for 3 subcategories: 1) ischemic stroke (IS); 2) intracerebral hemorrhage; and 3) subarachnoid hemorrhage. Lower extremity peripheral artery disease (PAD) was defined by an ankle brachial index of <0.9. Symptomatic PAD was defined as self-report of symptoms of claudication among those with an ankle brachial index of <0.9. Atrial fibrillation (AF) and atrial flutter (AFL) were defined by electrocardiogram. Hypertensive heart disease (HHD) was defined as symptomatic heart failure due to the direct and long-term effects of hypertension.

Cardiomyopathy was defined as symptomatic heart failure due to primary myocardial disease or toxin exposure to the myocardium, such as alcohol[4-9]. Acute myocarditis was defined as an acute and time-limited condition due to myocardial inflammation using health system administrative data. Endocarditis and rheumatic heart disease (RHD) were defined by their clinical diagnosis. Estimates of RHD include cases identified by clinical history and physical examination, including auscultation or standard echocardiographic criteria for definite disease. Mortality was estimated by using vital registration data coded to the International Classification of Disease (ICD) system or household mortality surveys known as verbal autopsy. Statistical methods were used to increase the comparability of mortality data sources, including the reclassification of codes that are nonspecific or unspecified, noise reduction algorithms, and Bayesian geospatial regression software (CODem, the cause of death ensemble model, Institute for Health Metrics and Evaluation, Seattle, Washington) that used location-specific covariates to create smoothed time trends for 204 countries and territories by borrowing strength over age, space, and time. GBD 2019 allowed for the production of estimates with uncertainty intervals (UIs) for all locations in every year, even when data were sparse or missing. Disease incidence and prevalence were produced by using a broad range of population-representative data sources identified by literature review and via study collaborations, including scientific reports of cohorts and registries, population surveys, microdata from registry and cohort studies, and health system administrative data[10-18]. Consistent disease estimates were produced by using epidemiologic state-transition disease modeling software, DisMod-MR (Institute for Health Metrics and Evaluation), and Bayesian meta-regression software, MR-BRT (Institute for Health Metrics and Evaluation), that adjusted for study-level differences in measurement methods and case definitions. Risk factor exposures were estimated by using population-representative survey and surveillance data and geospatial Gaussian process regression models that borrowed strength across time and geography.

METHODOLOGY

Study Design: It was Prospective observational study.

Study Period: The Present study was conducted for a period of six months.

Study Site: The Present study was conducted in a cardiology department in a tertiary care hospital.

Sample Size: It was 170 Patients.

Inclusion criteria

- Patients who are willing to give consent.
- Patients withcardiac disease symptoms.
- Patients of either sex, diagnosed with cardiac disease.
- Patients with clinical profile of cardiac disease.
- Patients receiving treatment for cardiac disease.

Exclusion criteria

- Patients below 18 years.
- Patients who were not willing to join in the study.
- Patients who are not diagnosed with respiratory abnormalities.
- Special population including pregnant women and lactating women.
- Psychiatric abnormalities.

Institutional ethics committee (IEC) consideration

The research protocol was submitted to ethical committee and ethical Committee was permitted to perform the research work in cardiologydepartment.

Patient data collection and management

The data collection form contains information regarding age, sex, diagnosis, past medical history, laboratory data, and diagnostic results. The information aboutrisk factors, clinical laboratory reports, treatment was collected from the patients treatment chart.

Statistical analysis

The data was represented as percentages. The $P<0.05$ was considered to indicate a statistically significant difference.

AIM

The present study aimed to assess drug-drug interactions in cardiovascular disease patients in a tertiary care hospital.

OBJECTIVES

- To study the demographic profile of cardiac disease patients.
- To study the risk factors of cardiac disease patients.
- To investigate the laboratory profile of cardiac disease cases.
- To study the treatment pattern cardiac disease.

RESULTS

25-35 years age patients were 25 (14.70%), 36-46 years age patients were 59 (34.70%), 47-56 years age patients were 44 (25.88%), 57-67 years age patients were 42 (24.70%).

Table 01: Age wise distribution

S.No	Age	Total (N=170)	Percentage (%)
1.	25-35	25	14.70
2.	36-46	59	34.70
3.	47-56	44	25.88
4.	57-67	42	24.70
	Total	170	

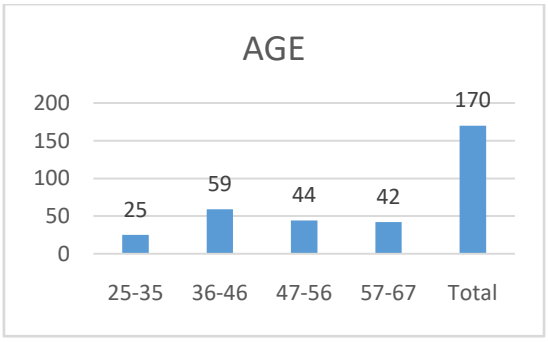

Fig 01: Age wise distribution

In our study male patients were 122 (71.76%), female patients were 48 (28.23 %).

Table 02: Gender

S.No	Gender	Total (N=170)	Percentage (%)
1	Male	122	71.76
2	Female	48	28.23
	Total	170	

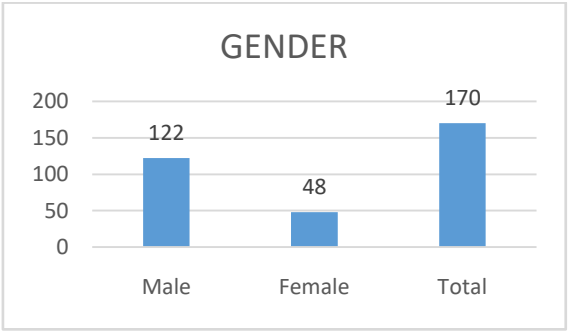

Figure 02: Gender

In our study Literate patients were 72 (42.35 %), Illiterate patients were 98 (57.64 %).

Table 03: Education

S.No	Education	Total (N=170)	Percentage (%)
1	Literate	72	42.35
2	Illiterate	98	57.64
	Total	**170**	

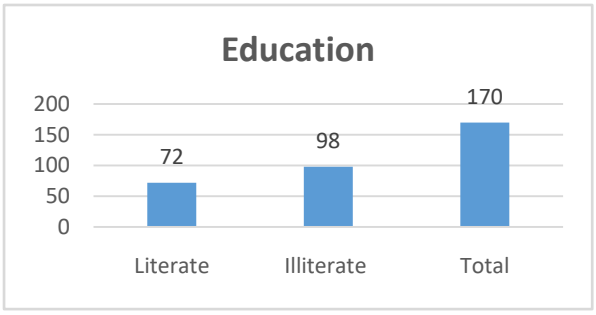

Figure 03: Education

1-3 days hospital admitted patients were 40 (23.52%), 4-6 days hospital admitted patients were 73 (42.94%), 7-10 days hospital admitted patients were 57 (33.52 %).

Table 04: Hospital stay (days)

S.No	Hospital stay (days)	Total (N=170)	Percentage (%)
1	1-3 days	40	23.52
2	4-6 days	73	42.94
3	7-10 days	57	33.52
	Total	170	

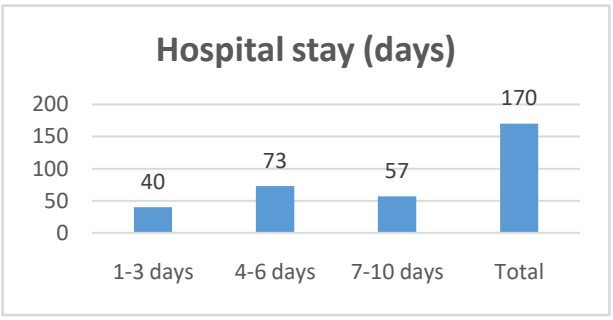

Figure 04: Hospital stays (days)

6–9Prescribed medications patients' were57 (33.52%), 10-13 prescribed medications patients were 65 (38.23%), > 13 drugs prescribed medications patients were 48 (28.23%).

Table 5: Number of prescribed medications

S.No	Number of prescribed medications	Total (N=170)	Percentage (%)
1	6–9	57	33.52
2	10-13	65	38.23
3	> 13 drugs	48	28.23
	Total	170	

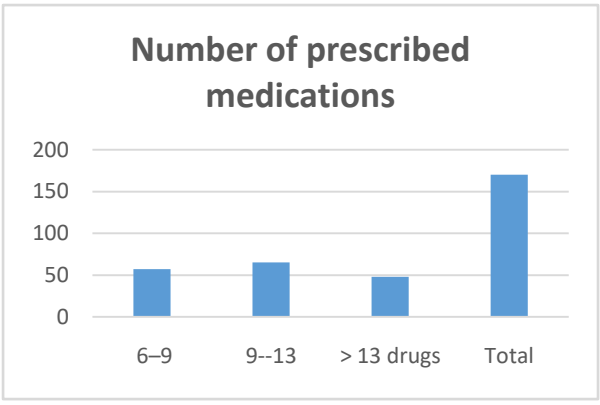

Figure 05: Number of prescribed medications

Treadmill test patients were 78 (45.88%), Blood test patients were 50 (29.41%), ECG patients were 42 (24.70%).

Table 06: Lab test for cardiac diseases

S.No	Lab test	Total (N=170)	Percentage (%)
1	Treadmill test	78	45.88
2	Blood test	50	29.41
3	ECG	42	24.70
	Total	170	

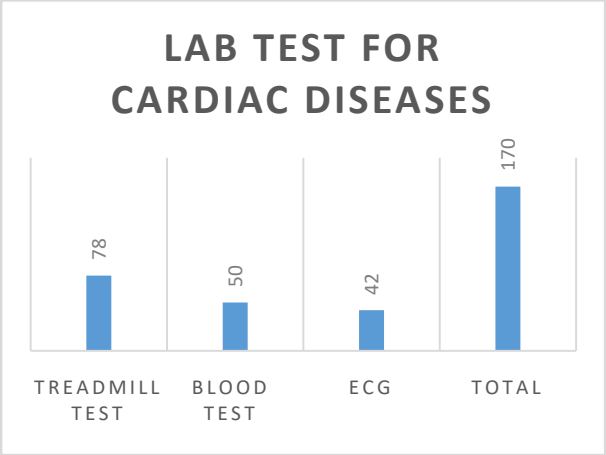

Figure 06: Lab test for cardiac diseases

Major drug-drug interaction patients were 33 (19.41%), Minor drug-drug interaction patients were 56 (32.94%), and Moderate drug-drug interaction patients were 81 (47.64%).

Table 07: Severity of DDIs

S.No	Severity of DDIs	Total (N=170)	Percentage (%)
1	Major	33	19.41
2	Minor	56	32.94
3	Moderate	81	47.64
	Total	170	

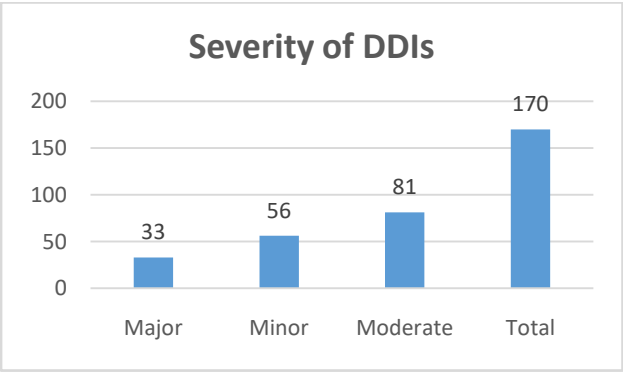

Figure 07: Prescribed drugs during the seizure treatment

Established prescribed drugs were 28 (16.47%), Theoretical Prescribed drugs were 47 (27.64%), and Probable Prescribed drugs were 95 (55.88%).

Table 08: Documentation of DDIs

S.No	Prescribed drugs	Total (N=170)	Percentage (%)
1	Established	28	16.47
2	Theoretical	47	27.64
3	Probable	95	55.88
	Total	170	

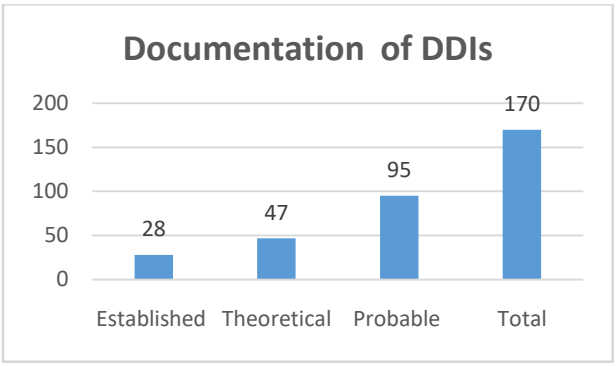

Fig 08: Documentation of DDIs

Aspirin + Clopidogrel drugs patients were 74 (43.52%), Aspirin + Bisoprolol drugs patients were 31 (18.23%), Aspirin + Nitroglycerin drugs patients were 65 (38.23%), Aspirin + Furosemide drugs patients were 74 (43.52%).

Table 09: Prescribed drugs with DDIs

S.No	Prescribed drugs	Total (N=170)	Percentage (%)
1	Aspirin + Clopidogrel	74	43.52
2	Aspirin + Bisoprolol	31	18.23
3	Aspirin + Nitroglycerin	65	38.23
4	Aspirin + Furosemide	74	43.52
	Total	170	

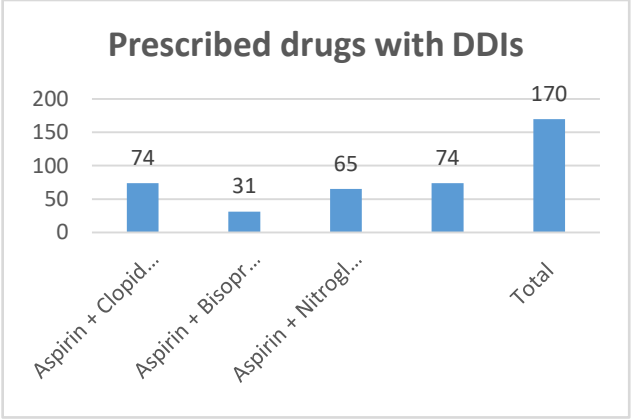

Fig 09: Prescribed drugs with DDIs

Cardiovascular drugs interaction patients were 22 (12.94%), Antimicrobials drugs interaction patients were 74 (43.52%), Anti diabetics drugs interaction patients were 52 (30.58%), Anti epileptics drugs interaction patients were 22 (12.94%).

Table 10: Classification of category of drug associated with a high risk of potential DDIs

S.No	High risk of potential DDIs	Total (N=170)	Percentage (%)
1	Cardiovascular drugs	22	12.94
2	Antimicrobials	74	43.52
3	Anti diabetics	52	30.58
4	Anti epileptics	22	12.94
	Total	**170**	

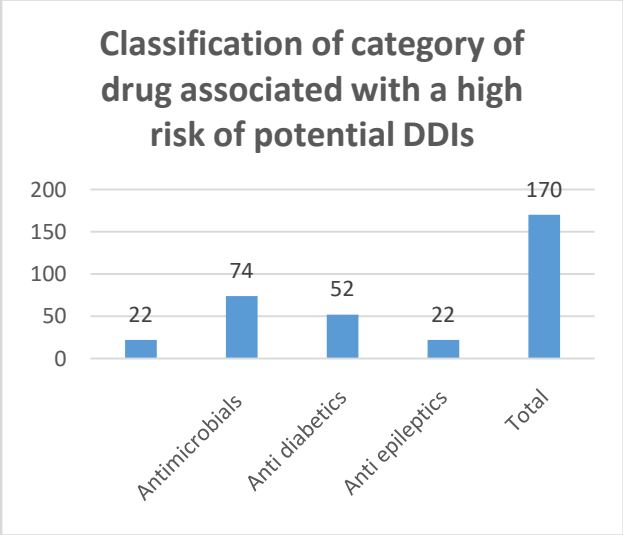

Fig 10: Classification of category of drug associated with a high risk of potential DDIs

DISCUSSION

- 36-46 years age patients were more 59 (34.70%) as compared to 47-56 years age patients were 44 (25.88%), 57-67 years age patients were 42 (24.70%).
- In our study male patients were more 122 (71.76%), as compared to female patients were 48 (28.23 %).
- In our study Literate patients were more 72 (42.35 %), as compared to Illiterate patients were 98 (57.64 %).
- 7-10 days hospital admitted patients were more 57 (33.52 %) as compared to other hospital admitted patients[19-25].
- 10-13 Prescribed medications patients were more 65 (38.23%), as compared to other > 13 drugs Prescribed medications patients were 48 (28.23%).
- Treadmill test patients were more 78 (45.88%), as compared to Blood test patients were 50 (29.41%), ECG patients were 42 (24.70%).
- Moderate drug-drug interaction patients were more 81 (47.64%) as compared to other drug interactions.
- Probable Prescribed drugs were more 95 (55.88%) as compared to other category of drug interactions.
- Aspirin + Clopidogrel drugs drug interactions were more 74 (43.52%) as compared to other drug interactions[26-29].
- Antimicrobials drugs interaction patients were more 74 (43.52%) as compared to Anti diabetics drugs interaction patients were 52 (30.58%).

CONCLUSION

The study found that incidence of drug interactions was associated with old age, polypharmacy and increased lengths of hospital stay. The development of such data base in hospitals may help for the surveillance of drug interactions in hospitalized cardiac patients. Patients with cardiovascular disorders are subjected to high risk of potential drug-drug interactions and the number of drugs prescribed and educational level of the prescribers has a high significantly associated with the occurrence of potential drug-drug interactions. Therefore, it is imperative that further studies need to be conducted to identify reasons for and tackle the problem and provide appropriate mechanisms for management[30]. It can be concluded from the present study that the risk of drug interactions increases with the increase in number of drugs in the prescription and there is increase in number of drugs in the prescription with the increase in number of co morbidities. Most of these drug interactions could be avoided with slight modification in the dosage regimen based on the pharmacokinetics and pharmacodynamics of the drug.

FUNDING

Nil

CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

AUTHOR CONTRIBUTION

All authors are contributed equally.

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