



ASSESSMENT OF DRUG UTILIZATION EVALUATION OF ANTIPLATELETS AND FIBRINOLYTIC AGENTS IN A TERTIARY CARE TEACHING HOSPITAL

Ramanath K. V.*¹ and Shanid A. S.²

¹Dept. of Pharmacy Practice, SAC College of Pharmacy, Adichunchangiri University BG Nagar Nagamangala (T), Karnataka Manyda (D), Karnataka.

²M. Pharm 2 Year Student, SAC College of Pharmacy, Adichunchangiri University BG Nagar Nagamangala (T), Karnataka Manyda (D), Karnataka.

Article Received on
31 Jan. 2019,

Revised on 21 Feb. 2019,
Accepted on 14 March 2019

DOI: 10.20959/wjpps20194-13359

*Corresponding Author

Dr. Ramanath K. V.

Dept. of Pharmacy Practice,
SAC College of Pharmacy,
Adichunchangiri University
BG Nagar Nagamangala
(T), Karnataka Manyda (D),
Karnataka.

ABSTRACT

Introduction: Drug utilization pattern study is a powerful exploratory tool to evaluate present trends of drug use and appropriateness of prescriptions. Cardiovascular diseases (CVD) are responsible for about 1/3 of deaths and likely to remain the prevalent eradicator globally. Antiplateletes are most commonly prescribed drugs for ischemic heart disease, cerebrovascular accident and other cardiovascular diseases. Hence the drug utilization of antiplateletes and thrombolytic agents are essential. **Methods:** A prospective and observational study was conducted in AH&RC for a period of nine months in general medicine department. The data was collected from Patient case sheets/Medication chart and prescriptions after the approval from Institutional Ethical Committee. **Results:** Among 110 patients, 68% were male and 32% were female, whose average age was 65 and 8.2%

was alcoholic, 20% was smokers. Among the antiplatelets aspirin (54.5%) was most commonly prescribed. Streptokinase was the common fibrinolytic drug. DDI interactions was observed in 92 patients, in which Mild drug interactions were observed only in 39 patients, 88 were moderate and 12 were major interaction. Total cost of the drugs were more in MI (2700±1817) patient, followed by CCF, COPD with HTN (2685.33±1833.54). **Conclusion:** Aspirin was the most commonly prescribed antiplatelet drug. Among the fibrinolytics streptokinase was most commonly used. This study conclude that antiplatelets are the most commonly used cardiovascular drugs in different cardiovascular diseases, utilization pattern

of these drugs will give knowledge about the rational use of drugs in different disease condition and the cost effective treatment.

KEYWORDS: DUE: drug utilization evaluation, CCF: Congestive cardiac failure, DDI: Drug-Drug interaction, MI: Myocardial infraction, CVD: cardio vascular diseases.

INTRODUCTION

Drug utilization pattern study tool helps to evaluate present trends of drug use and appropriateness of prescriptions. The World Health Organization (WHO) defines drug utilization research as the marketing, distribution, prescription and use of drugs in a society, with special emphasis on the resulting medical, social, and economic consequences.^[1] Hence drug utilization is necessary to recognize the variation among prescribing practice that could support health care professionals to improve clinical outcomes in the healthy society. These utilizations act as indicators to measure specific aspects of health providers and drug use in a hospital or health care center.^[2]

Cardiovascular diseases (CVD) mortality stands for about 1/3 of deaths and likely to remain the prevalent eradicator globally. The cardiovascular mortalities, projected were 20 million in 2015 and expecting more i.e. 24 million by the year 2030. Unstable angina (UA)/non-ST elevation myocardial infarction (NSTEMI) are referred to acute coronary syndrome (ACS) responsible for heart diseases.^[3]

Diabetes mellitus and hypertension are closely associated with ischemic heart disease and cerebrovascular accident. Antiplatelet drugs are used in the management of ischemic heart disease, myocardial infarction, stroke and other cardiovascular diseases.^[3,4]

Antiplatelets act by inhibit platelets aggregation. Hence this led to a revolution in cardiovascular medicine and it is the one of the major indications for these in cerebrovascular accident. The commonly used antiplatelet drugs are aspirin, clopidogrel and its combination. In older days aspirin was the most commonly used antiplatelet drug for ischemic heart disease and other cardiovascular disease.^[2,6,7]

Aspirin is effective mainly in the prevention of smaller and non-cardio embolic strokes. Different modalities in reducing embolic events covers therapy with aspirin, combination of aspirin and clopidogrel, and warfarin or one of the new oral anticoagulants targeting either thrombin or Factor Xa.^[9]

Clopidogrel has been extensively proved to be useful in both the non-ST elevation myocardial infarction (NSTEMI) and ST elevation myocardial infarction (STEMI) populations. Hence clopidogrel is now routinely used in patients with all forms of acute coronary syndrome (ACS) including those undergoing primary PCI.^[12,13]

Although the mechanisms responsible for the variability and low responsiveness to clopidogrel have not been fully elucidated, recent analyses suggest that genetic polymorphisms of the cytochrome P (CYP) 450 enzymes can significantly modulate individual response to clopidogrel are important determinants of prognosis.^[14]

Hence further studies from time to time are required in drug utilization pattern and standard treatment guidelines circulation among practicing physicians will help in minimizing the risks associated with the use of these drugs.^[15]

Clopidogrel to aspirin therapy useful more in high-risk patients, particularly if coronary intervention is not planned. It should be continued for at least 1 month. Longer periods of up to 1 year will also give benefit, however the economic impact of this is still not clear.^[18]

Fibrinolytic or thrombolytic drugs are used to dissolve (lyse) blood clots (thrombi). These drugs will help in dissolve blood clots by activating plasminogen; and forms a cleaved product called plasmin. Plasmin is a proteolytic enzyme that is capable of breaking cross-links between fibrin molecules helps in maintaining the normal viscosity and PH of blood to maintain normal vascular to the respective organ.^[17]

There are three major classes of fibrinolytic drugs used are tissue plasminogen activator, streptokinase and urokinase. Thrombolytic therapy has been proved to benefit patients in acute ischemic stroke and current guidelines also suggesting or recommending consideration of thrombolytic therapy in acute ischemic stroke.^[17]

The various studies showed that combination of anticoagulant and antiplatelet therapy is more effective than antiplatelet therapy alone for the initial and long-term management of acute coronary syndromes but increases the risk of bleeding.^[21]

The evidence-based guidelines also strongly suggest aspirin useful in the secondary prevention of cardiovascular events and also help in reducing of morbidity and mortality.^[4,5]

Anticoagulants are drugs used to prevent extension of thrombus and embolic complications by reducing the rate of fibrin formation.^[15]

In a hospital setting anticoagulants are mainly used in deep vein thrombosis (DVT), pulmonary embolism (PE), myocardial infarction (MI), unstable angina, rheumatic heart disease, vascular surgery, prosthetic heart valve, retinal vessel thrombosis, extra corporeal circulation, hemodialysis & defibrination syndrome management.^[20]

Prophylactic use of anticoagulants also shown to significantly reduce this risk. Individual patient response to a standard dose is not always predictable. Hence titrating anticoagulant dose within narrow therapeutic indices at times proves difficult, even for the most experienced practitioners.^[20]

Atrial fibrillation patients not treated with antithrombotic therapy show increased incidence of stroke.^[19]

The IHD patients, use the various first line drugs like inotropes, vasopressors, antihypertensive, antiplatelet agents, lipid lowering agents, and anticoagulants.^[5] IHD is one of the biggest killer diseases globally and therefore need of antiplatelet and thrombolytic therapy to reduce the risk of ischemic heart diseases. Hence drug utilization of antiplatelets and thrombolytic agents are essential.^[21]

Since antiplatelet drugs are most commonly prescribed in medicine department for ischemic heart disease, cerebrovascular accident and other cardiovascular diseases. There is a paucity of data in this area makes them to carry out this study in our hospital, with the following objectives 1. To find out the most commonly prescribing & usage of antiplatelets and fibrinolytics in different disease conditions specially in the medicine department 2. To evaluate & management of the drug interactions of antiplatelet and fibrinolytic drugs. 3. To find out the medicine cost of the disease management.

METHODOLOGY

This study is a prospective and observational study. The inclusion criteria includes only medicine unit inpatients & who are consented were considered in our study. The exclusion criterion includes pregnant and lactating patients. This study was conducted for a period of 9 months after obtaining of institutional [i.e; Adichunchanagiri Institute of Medical Science & Research center (AHRC)] ethical clearance (NO: AIMS/IEC/1380/2017-18). The study

procedure includes the patients who satisfy the inclusion criteria were enrolled in to the study after obtaining their written consent. The clinical pharmacist was reviewed the patient case notes, medication chart, laboratory data and other relevant documents and the relevant information was collected in a suitably designed data collection form consists of patient demographic details, patient medication history, and reason for admission, any allergic reaction, medication details and lab investigations and other relevant details . The obtained data was subjected for descriptive statistical method.

RESULTS

A total of 120 patients were approached in our study only 110 patients were consented. The various details of the enrolled patients were given below.

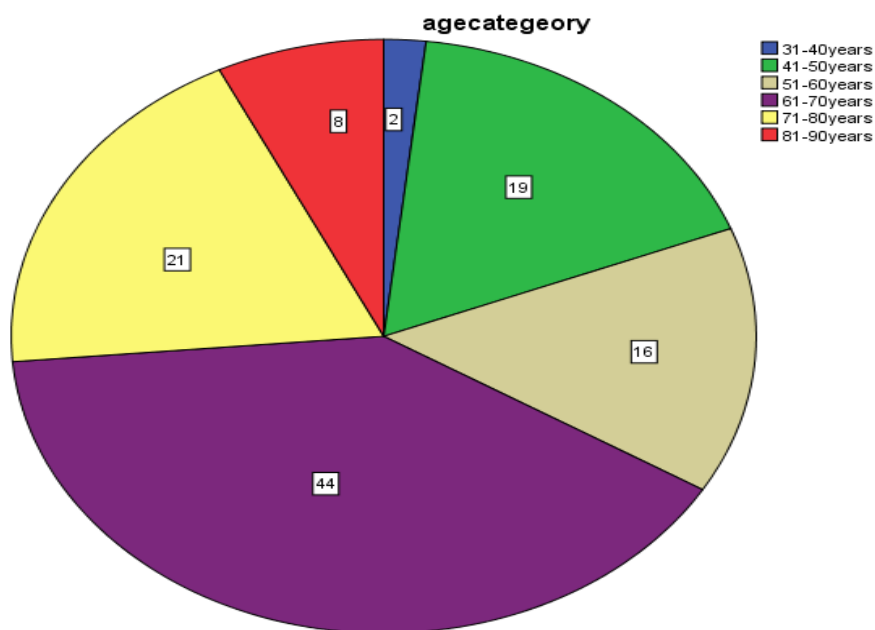


Figure 1: Distribution of the patient's age category

In our study majority of the fibrinolytic and antiplatelet users were at the age of 61-70 years followed by 71-80 and least were at the age 31-40 years. The mean age of the patients was 65.03 ± 11.90 . The Majority of the patients were male (75). Only 35 were observed as females. 64 patients BMI were found to be normal (64 patients). Only in one patient underweight was observed. 43 were overweight and two patients were obese. The Mean BMI of the patients was 24.31 ± 2.53 .

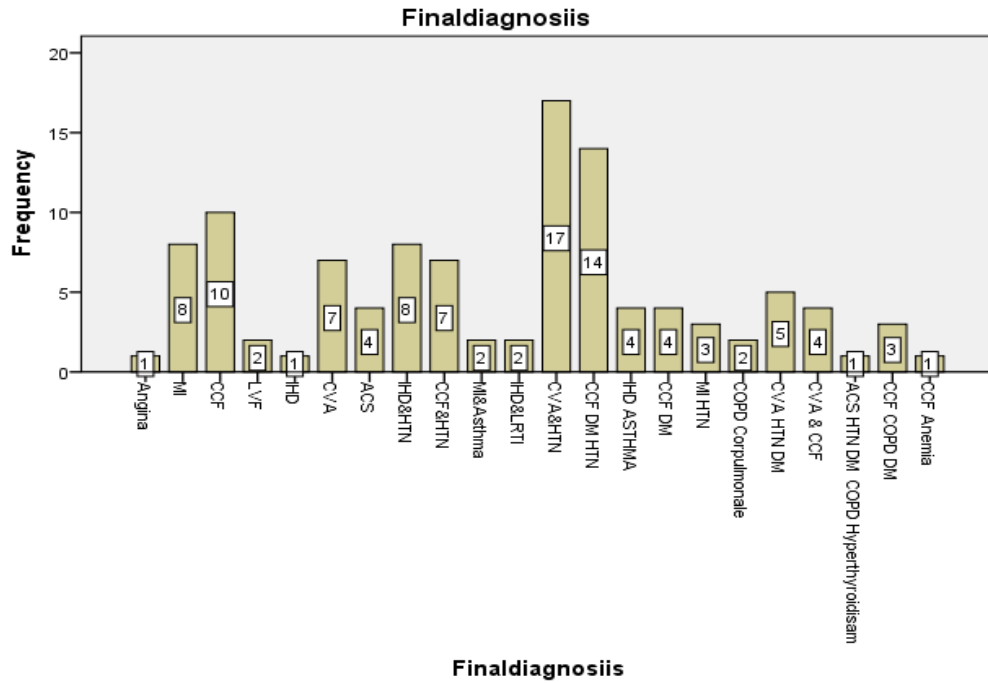


Figure 2: Distribution of the diseases

Interestingly our study shows 15.5 percentages were with CVA with HTN followed by CCF, DM & HTN combinations 12.7%. CCF alone was 10% and MI & IHD HTN were 7.3%.

Among 110 patients 91.8% were non alcoholic and only 8.2% were alcoholic. 80.9 percentage were non smokers and 9.1% were known smokers either may be chronic or from few years only.

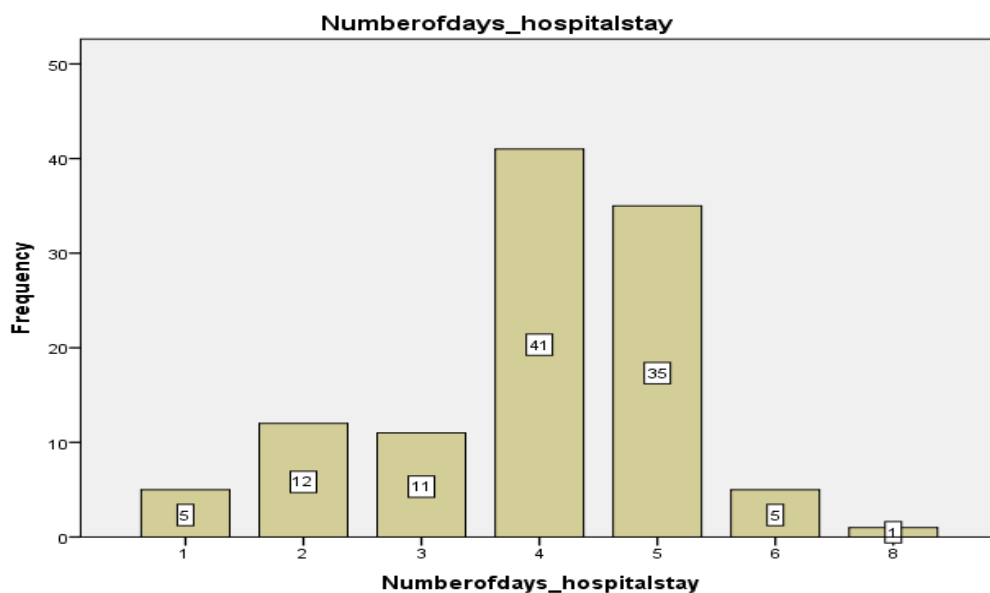


Figure 3: Distribution of number of hospital stay.

The mean stay of the patients in the hospital was 3.99 ± 1.27 .

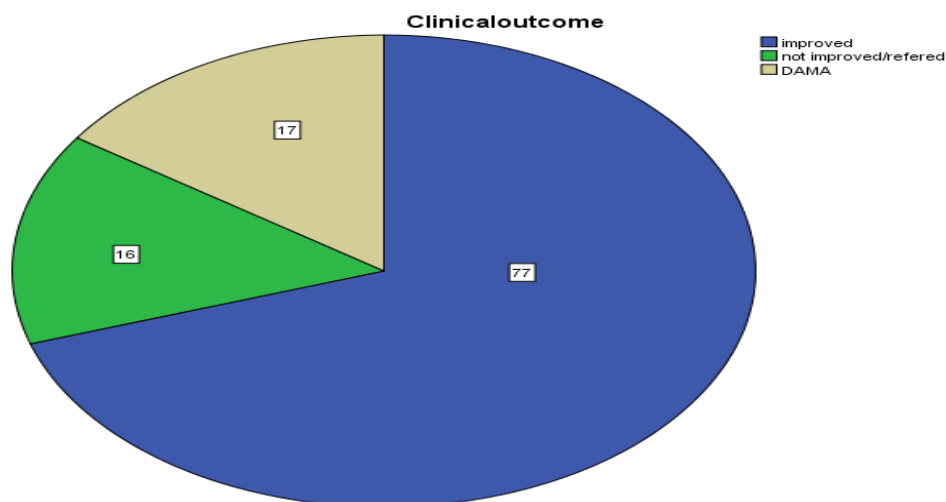


Figure 4: Distribution of clinical outcome of the patients.

This study showed that 70 % were improved and rests were referred to the higher center (14.5%) and Discharge against medical advice (15.5%).

Table 1: Distribution of various drugs utilization in the patients.

S. no	Class of drugs	Specific drug	N (%)
1	Anti platelet drugs	Clopidogrel 300,75,375	44(40)
		Aspirin 350,150,75	60(54.5)
		Aspirin 75+ clopidogrel 150	1(0.9)
		Aspirin 75/150+ Atorvastatin 10/20	59(53.63)
2	Fibrinolytics	Streptokinase 5000IU	9(8.2)
3	Anticoagulants	HMW heparin 5000u	2(1.8)
		Enaxaparin40/60	18(16.4)
4	Anti emetics	Ondacitrone 4mg	67(60.9)
		Domperidone 20mg	2(1.8)
5	antiulcer drugs		88(80)
		Pantoprazole 40 mg	82(74.5)
		Ranitidine 150mg	6(5.5)
6	Antihypertensive		78(70.9)
		Calcium channel blockers	23(20.9)
		Amlodipine5/10mg	17(15.4)
		Cilnidipine 10mg	5(4.5)
		Diltiazem 15mg	1(0.9)
		Beta-blocker	20(18.2)
		Metaprolol 12.5/20/25/50mg	16(14.5)
		Propranolol 40mg	1(0.9)
		Nebivolol 2.5mg	1(0.9)
		Alpha & Beta-blocker	12(10.9)
	Labetalol 100mg	1(0.9)	

		Carvedilol 3.125/10/35mg	11(10)
		ACE inhibitor	21(19.1)
		Ramipril 1.25/2.5/5mg	19(17.27)
		Enalapril 5mg	2(1.8)
		ARB's	15(13.6)
		Losartan 50mg	2(1.8)
		Telmisartan 20/40 mg	9(8.2)
		Olmisartan 4mg	1(0.9)
7	Combination of antihypertensives	Atenalol+amlodipine 50/5mg	1(0.9)
8	Diuretics		58(52.7)
		Furosemide 20/40mg	43(39.1)
		Spiranolactone 25/50mg	5(4.5)
		Mannitol 100mg	7(6.3)
		Telmisartan40+hydrochlorthazide12.5mg	5(4.5)
		Torseamide+spiranolactone 10/5mg	2(1.8)
		Furosemide+Spiranolactone 20/10mg	3(2.7)
9	anticholenergics		35(31.8)
		Ipratropiumbromide 40mcg	8(7.3)
		corticosteroids	35(31.8)
		Hydrocortisone100/200	3(2.7)
		Budesonide 100/200mcg	37(33.6)
		Dexamethasone 8mg	1(0.9)
10	Beta-sympathomimetics		33(30)
		Salbutamol100+ipratropium40mg	34(30.9)
11	Methyl xanthenes	Etiophyline+theophyline	1(0.9)
12	Expectorants	Bromohexine+terbutaline	2(1.8)
13	Anti anginal drugs		25(22.7)
		Isosorbide mononitrate 30mg	1(0.9)
		Isosorbide dinitrate 5/10mg	17(15.4)
		Nitroglycerines0.3 mg	2(1.8)
		Ivabradine 5mg	1(0.9)
		Trimethazidine 35mg	1(0.9)
14	Miscellaneous agents	Noradrnealine 50ml	8(7.3)
		multivitamins	8(7.3)
		Digoxin0.25 mg	11(10)
15	NSAIDS		11(10)
		Paracetamol 650mg	9(8.2)
		Diclofenac 400mg	1(0.9)
		Acetaminophen+tramadaol 500mg	1(0.9)
		Acetaminophen+aceclofenacsodium500	1(0.9)
		Acetaminophen+thicolchiside 500mg	1(0.9)
16	antivertigo	Betahistine 8 mg	2(1.8)
17	psychostimulent	Citicholine 200mg	11(10)
18	anticonvulsants		10(9.1)
		Diazepam 5mg	3(2.7)
		Phenytoin 100mg	4(3.6)
		Carbamazapine 200mg	1(0.9)
		Levetiracetam 500mg	5(4.6)

		Locasamide 50mg	1(0.9)
		Amytryptlin25mg	3(2.7)
		Lorazepam 4mg	1(0.9)
19	antidiabetics		27(24.5)
		Humanactrapid 20/20u	20(18.2)
		Humanmixtard 10/20u	2(1.8)
		Insulin regular 10u	1(0.9)
20	Oral hypoglycemic		4(3.6)
		Glimepiride 1mg	1(0.9)
		Glimepiride+metformin 2mg	1(0.9)
		Glipizide+metformin 500mg	2(1.8)
21	Antihistamine	Chlorphenaramine 4mg	1(0.9)
22	Others	Acetylcystine 200mg	1(0.9)
		Allopurinol 100mg	1(0.9)
		Taurine+acetylcystine 200mg	1(0.9)
		Nicoumalone 2mg	1(0.9)
		Glycerol 50mg	1(0.9)
		Olanzapine 5mg	1(0.9)
		FeSo4	1(0.9)
		Disodium hydrogen citrate 100ml	2(1.8)
		IV fluids	2(1.8)
23	Antibiotics		53(48.2)
		Cefotaxime 1gm	35(31.8)
		Ofloxacin 500mg	1(0.9)
		Azithromycin 500mg	1(0.9)
		Nitrofurantoin 100mg	1(0.9)
		Metronidazole 500mg	2(1.8)
		Pencillanamine 150mg	1(0.9)
		Piperacillin+tazobactam 4.5gm	6(5.45)
		Amoxycillin+clavalunicacid 1.2gm	2(1.8)
24	Anti hyperlipidemic	Atorvastatin20/40/80mg	54(49.1)

In this study, all 110 patients were prescribed with antiplatelet drugs, in which 60 were aspirin, 59 were Aspirin+Atorvastatin combination and 44 were clopidogrel. Nine patients were prescribed with fibrinolytic drugs (streptokinase). Enoxaparin is the most commonly prescribed anticoagulant drug (90%) and the rest were heparin (10%). 69 patients were prescribed with antiemetic drugs, in which 67 were Ondancitrate. Out of 110 patients 78 were prescribed with antihypertensive drugs, in which commonly prescribed antihypertensive drugs was calcium channel blockers (29.4%) followed by ACE inhibitors (26.9%), beta blockers (25.6%) and ARB's(19.2%). 58 patients were prescribed with diuretics in which Furosemide were 74.1%. Isosorbide dinitrate were the most commonly prescribed antianginal drug (68%). Antibiotics were prescribed in 53 patients, in which 35 were Cefotaxime. Atorvastatin was the most commonly prescribed antihyperlipidemic drug (49.1%).

Table 2: Distribution of the anti platelet drugs.

Final diagnosis	No. of cases	Clopidogrel	Aspirin	Aspirin + clopidogrel	Aspirin + Atorvastatin
ANGINA	1	1(100%)	1(100%)	0	1(100%)
MI	8	8(100%)	7(87.5%)	0	3(37.5%)
CCF	10	2(20%)	3(30%)	0	8(80%)
LVF	2	1(50%)	0	0	2(100%)
IHD	1	1(100%)	1(100%)	0	0
CVA	7	0	2(28.5%)	0	5(71.5%)
ACS	4	4(100%)	4(100%)	0	2(50%)
IHD&HTN	8	4(50%)	5(62.5%)	0	5(62.5%)
CCF&HTN	7	3(42.8%)	4(57.1%)	0	4(57.1%)
MI&ASTHMA	2	1(50%)	0	0	2(100%)
IHD&LRTI	2	0	0	0	2(100%)
CVA&HTN	17	1(5.8%)	13(76.4%)	0	4(23.5%)
CCF, DM & HTN	14	9(64.2%)	10(71.4%)	0	6(42.8%)
IHD & ASTHMA	4	1(25%)	1(25%)	0	3(75%)
CCF DM	4	1(25%)	1(25%)	1(25%)	2(50%)
MI HTN	3	3(100%)	3(100%)	0	1(33.3%)
COPD WITH CORPULMONALE	2	1(50%)	1(50%)	0	2(100%)
CVA, HTN & DM	5	0	2(40%)	0	2(40%)
CVA & CCF	4	4(100%)	1(25%)	0	3(75%)
ACS, HTN, DM COPD & HYPERTHYROIDISM	1	1(100%)	1(100%)	0	0
CCF, COPD & DM	3	2(66.6%)	1(33.3%)	0	1(33.3%)
CCF& ANEMIA	1	0	0	0	1(100%)

In all the different cardiovascular diseases showed the anti platelet drugs, in which aspirin is the most commonly prescribed drugs in all the cardiovascular diseases, aspirin were prescribed for 13 cases of CVA with HTN, 10 cases of CCF with DM&HTN. Aspirin+Atorvastatin were prescribed in 53.6% of the total population, in which 8 were prescribed for CCF, followed by CCF with DM&HTN (6) and 5 for CVA and IHD with HTN. Clopidogrel were prescribed in 44 cases, in which 9 were prescribed for CCF with DM&HTN, All MI and ACS patients were prescribed with clopidogrel.

Table 3: Distribution of fibrinolytics.

Final diagnosis	No. of cases	Streptokinase	Urokinase
ANGINA	1	0	0
MI	8	6(75%)	0
CCF	10	0	0
LVF	2	0	0
IHD	1	0	0
CVA	7	0	0
ACS	4	0	0
IHD&HTN	8	0	0
CCF&HTN	7	0	0
MI & ASTHMA	2	0	0
IHD & LRTI	2	0	0
CVA & HTN	17	0	0
CCF, DM,&HTN	14	1(7.1%)	0
IHD& ASTHMA	4	0	0
CCF& DM	4	0	0
MI& HTN	3	1(33.3%)	0
COPD WITH CORPULMONALE	2	0	0
CVA, HTN& DM	5	0	0
CVA & CCF	4	0	0
ACS, HTN, DM, COPD & HYPERTHYROIDISM	1	0	0
CCF, COPD& DM	3	1(33.3%)	0
CCF& ANEMIA	1	0	0

Among 110 patients, only 9 patients were prescribed with fibrinolytic drugs, and the prescribed fibrinolytic drug was streptokinase. Out of 8 patients diagnosed with myocardial infarction 6 were prescribed with streptokinase, one were prescribed for CCF with DM&HTN and one for MI with HTN.

Table 4: Distribution of anticoagulants.

Final diagnosis	No. of cases	Heparin HMW(5000u)	Heparin LMW	Warfarin	Enoxaparin
ANGINA	1	0	0	0	0
MI	8	1(12.5%)	0	0	4(50%)
CCF	10	0	0	0	0
LVF	2	0	0	0	0
IHD	1	0	0	0	0
CVA	7	0	0	0	1(100%)
ACS	4	0	0	0	3(100%)
IHD&HTN	8	0	0	0	3(100%)
CCF&HTN	7	0	0	0	1(100%)
MI & ASTHMA	2	0	0	0	0
IHD & LRTI	2	0	0	0	0
CVA & HTN	17	1(5.8%)	0	0	0
CCF, DM,&HTN	14	0	0	0	3(21.4%)

IHD& ASTHMA	4	0	0	0	0
CCF& DM	4	0	0	0	0
MI& HTN	3	0	0	0	2(66.6%)
COPD&CORPULMONALE	2	0	0	0	0
CVA, HTN& DM	5	0	0	0	0
CVA & CCF	4	0	0	0	0
ACS, HTN, DM, COPD & HYPERTHYROIDISM	1	0	0	0	0
CCF, COPD& DM	3	0	0	0	1(33.3%)
CCF& ANEMIA	1	0	0	0	0

Out of 110 patients, 20 were prescribed with anticoagulants; most commonly prescribed anticoagulant drug was enoxaparin (90%). in which 4 were prescribed for myocardial infarction, 3 were acute coronary syndrome and IHD with HTN and 2 were MI with HTN. Another anticoagulant prescribed in this study was heparin (10%).

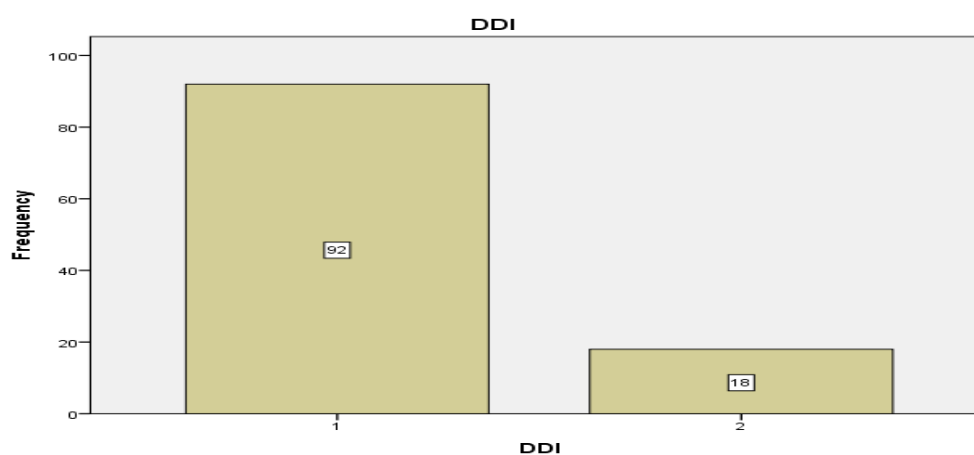


Figure 5: Distribution of the DDI.

Total number of DDI interactions was observed in 92 patients.

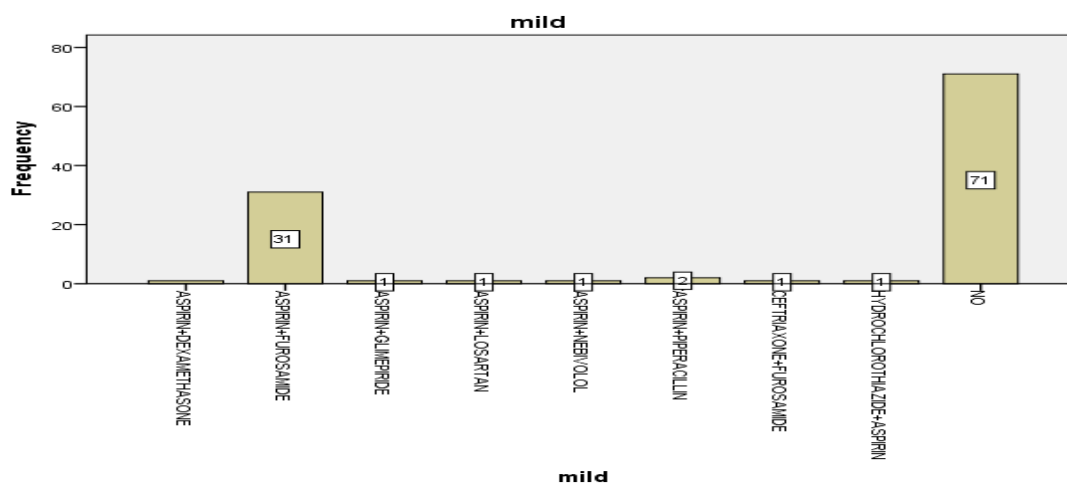


Figure 6: Distribution of mild DDI.

Mild drug interactions were observed only in 39 patients. Aspirin+furosemide were the most commonly found mild drug-drug interaction. Aspirin decreases the effect of Furosemide by pharmacodynamic antagonism.

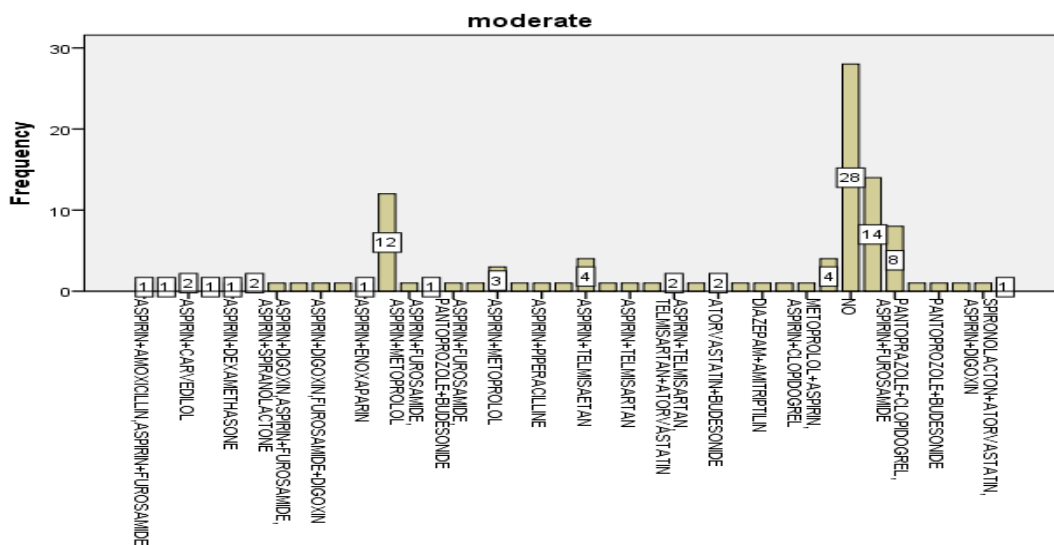


Figure 7: Distribution of moderate DDI.

82 patients had moderate drug interactions. In which aspirin +Furosemide were the most commonly found moderate drug-drug interactions (14); aspirin increases and Furosemide decreases serum potassium level, followed by aspirin+ metoprolol (12); aspirin decreases the effect of metoprolol by pharmacodynamic antagonism. Clopidogrel+pantoprazole (8); Pantoprazole decreases the effect of clopidogrel by affecting hepatic enzyme CYP2C19 metabolism.

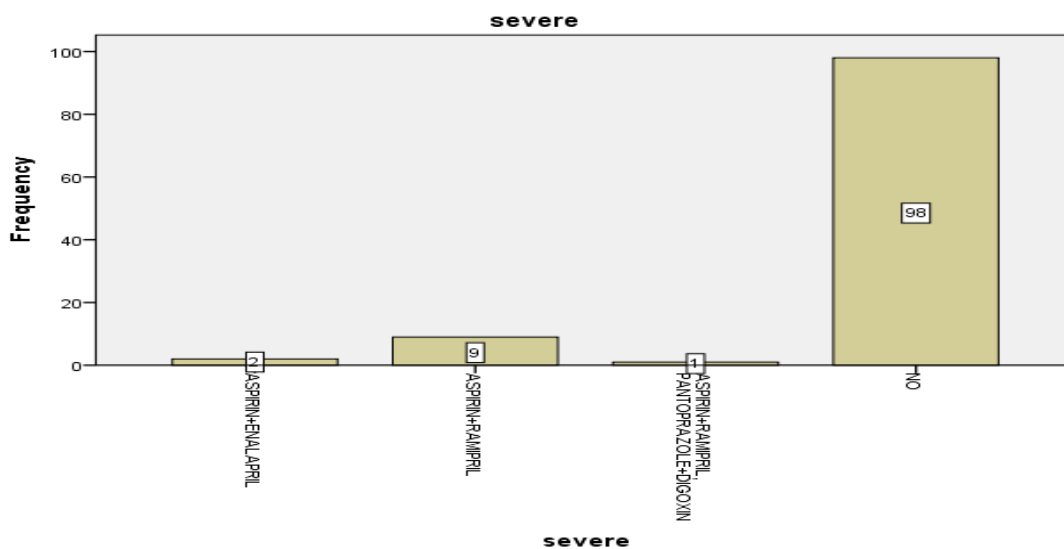


Figure 8: Distribution of severe DDI.

Only 12 patients had severe drug interactions. In which Aspirin+Ramipril were 75%, co-administration of aspirin and Ramipril may result in significant decrease in renal function. Aspirin+Enalapril were found 17%.

Table 5: Distribution of the Medication cost of the Patients.

Final diagnosis	Total cost (Mean± SD)	Cost of the antiplatelet (Mean± SD)	Cost of the fibrinolytic (Mean± SD)	Cost of the antibiotics (Mean± SD)
Angina	196	12	0	0
MI	2700±1817	22.87±11.53	1940.62±1439.55	0
CCF	653.20±524.52	17.7±11.4	0	162.45±215.29
LVF	526±603.86	22.5±6.36	0	12±16.97
IHD	826	40	0	490
CVA	1119.43±1852.26	11.42±5.86	0	204.71±300.87
ACS	1073.75±456.69	35.76±3.86	0	49±98
IHD&HTN	924.13±744.08	20.50±12.19	0	85.25±169.19
CCF&HTN	729±820.45	18.14±12.21	0	0
MI&Asthma	784±107.48	20.50±7.7	0	226±234.75
IHD&LRTI	2059	12	0	1700
CVA&HTN	902.76±826.92	7.47±9.22	0	212.59±539.53
CCF DM HTN	1721.21±1317.22	22.28±13.38	123.21±461.02	345±447.07
IHD ASTHMA	1505.25±779.24	15.75±6.18	0	496±685.86
CCF DM	2265.2±853.48	20±9.79	0	510±651.05
MI HTN	1994.67±1896.72	23.33±12.70	575.0±995.92	32.66±56.58
COPD Corpulmonale	1284.50±647.	23.5±16.26	0	147±207.8
CVA HTN DM	1631.8±1179.37	9±4.63	0	752.8±845.29
CVA & CCF	669.5±152.83	10.75±5.5	0	183.5±220.7
ACS HTN DM COPD Hyperthyroidisam	2079	32	0	1360
CCF COPD DM	2685.33±1833.54	18±12.76	575±995.92	586.6±964
CCF Anemia	741	12	0	0

Total cost of the drugs were more in MI (2700±1817) patient, followed by CCF, COPD with HTN (2685.33±1833.54), MI with HTN (1994.67±647) and CCF, DM&HTN (1721.21±1317.22). Antiplatelete costs were more in ACS patients (35.76±3.86). Fibrinolytic costs were more in MI patients (1940.62±11.53) and cost of antibiotics were high in IHD with LRTI patients (1700).

DISCUSSION

This study provides data on prescribing pattern of antiplatelets and fibrinolytics in the medicine department of AH&RC. A total number of 110 patients who were prescribed with antiplatelets and fibrinolytics were identified and included in this study.

Age distribution of patients

In this study the average age of study population were 65.03 ± 11.90 , which is close to a study conducted by **Mukesh Kumar et al**, that showed that majority of the age population was 61-90. Majority of our patients were belonging to the age group 61-70.^[1]

Gender distribution of patients

In our study 68% of the study populations were male patients, which is close to a study conducted by **Shazia Alam et al**, they showed a male population of 64%.^[3]

BMI distribution of patients

In this study the mean BMI of the patients were 24.3 ± 2.53 , which is similar to a study conducted by **Sandip Jadav et al**, they showed that in their study the mean BMI of the patients was 22.4 ± 1.8 . In our study majority of the patients was normal weight.^[8]

Distribution of various diseases

In this study 15.5% of the study population were diagnosed with CVA & HTN, which is similar to a study conducted by **Erin A Woods et al**, showed that 16% of their study population was diagnosed with CVA & HTN.^[10]

Among the 110 patients 14 were prescribed with CCF, HTN&DM and 10 were CCF alone, which is similar to a study conducted by **K Jyothi et al**, they showed that in their study 15.5% were diagnosed with CCF&HTN.^[23]

Habit distribution of the patients

In our study 91% of the study populations were non alcoholic and 80.9% were non smokers, which is close to a study conducted by **Jose Lopez Sendon et al**, showed that in their study 70% of the study population was non smokers.^[13]

Clinical outcome of the patients

In this study 70% of the study population were improved their clinical status, which is close to a study conducted by **Hamid Ghanbari et al**, showed that 65% of their study population was improved with antiplatelete therapy.^[14]

Distribution of various drugs utilization in the patients

In this study all the 110 patients were received antiplatelete therapy (100%), in which aspirin were prescribed to 60 patients clopidogrel were given to 44 patients and combination of

aspirin and atorvastatin were prescribed to 59 patients, which is similar to a study conducted by **Praveen Choudhary et al**, showed that in their study 71 patients was received both aspirin and clopidogrel.^[11]

Streptokinase were the commonly prescribed fibrinolytic drug in this study (8.2%), which is similar to a study conducted by **C H Jyothi et al**, showed that streptokinase was prescribed to 61% among the fibrinolytic drugs and the rest was urokinase.^[16]

In this study anticoagulant were prescribed in 20 patients in which enoxaparin were the most commonly prescribed anticoagulant (n=18) and the rest were heparin, which is close to a study conducted by **Getnet Mengistu et al**, showed that enoxaparin was prescribed 66.5% among the anticoagulants.^[15]

Among the 110 patients, 70.9% were prescribed with antihypertensive drugs, in which 20.9% were calcium channel blockers, 26.9% were ACE inhibitors and 25.6% were beta-blockers, which is similar to a study conducted by **Shazia Alam et al**, showed that 88% of their study population was prescribed with antihypertensive drugs and calcium channel blockers were 27.1%.^[3]

In our study 22.7% of the study populations were prescribed with antianginal drugs in which Isosorbide dinitrate (68%) were the most commonly used, which is similar to a study conducted by **H Nagabushan et al**, showed that 49% of their study population was prescribed with antianginal drugs and Isosorbide dinitrate were most commonly prescribed.^[22]

Among the 110 patients, NSAID were prescribed to 10% and antibiotics were given to 48.2% of the study populations, which is close to a study conducted by **Prasanna Kumar et al**, showed that 8% of the study populations was prescribed with NSAID and 98% were prescribed with antibiotics.^[7]

Distribution of antiplatelets

In this study aspirin is the most commonly prescribed drugs in all the cardiovascular diseases, aspirin were prescribed for 13 cases of CVA with HTN, 10 cases of CCF with DM&HTN. Aspirin+Atorvastatin were prescribed in 53.6% of the total population, in which 8 were prescribed for CCF, followed by CCF with DM&HTN (6) and 5 for CVA and IHD with HTN. Clopidogrel were prescribed in 44 cases, in which 9 were prescribed for CCF with

DM&HTN, All MI and ACS patients were prescribed with clopidogrel. These results were similar in a study conducted by **K. Jyothi et al**, showed that antiplatelets used in 93% of CVA cases and 96% of IHD cases.^[23]

Distribution of fibrinolytics

Among 110 patients, only 9 patients were prescribed with fibrinolytic drugs, and the prescribed fibrinolytic drug was streptokinase. Out of 8 patients diagnosed with myocardial infarction 6 were prescribed with streptokinase, one were prescribed for CCF with DM&HTN and one for MI with HTN. These findings are similar to a study conducted by **Praveen Choudhary et al**, they showed that among 71 patients 28(39.43%) was underwent thrombolysis, in which 20 were diagnosed as MI.^[11]

Distribution of anticoagulants

Out of 110 patients, 20 were prescribed with anticoagulants; most commonly prescribed anticoagulant drug was enoxaparin (90%).in which 4 were prescribed for myocardial infarction, 3 were acute coronary syndrome and IHD with HTN and 2 were MI with HTN. These findings are close to a study conducted by **Shazia Alam et al**, they showed that 86% was enoxaparin among the anticoagulants prescribed in their study.^[3]

Distribution of DDI

In our study drug-drug interaction were observed in 92 patients among the 110 study population, in which mild interaction observed in 39 patients (Aspirin+furosamide were the most commonly found mild drug-drug interaction), moderate were observed in 82 patients (commonly found moderate interactions are, Aspirin+furosamide, aspirin+metoprolol, and clopidogrel +Pantoprazole) and severe were observed only in 12 patients(most commonly observed severe DDI was Aspirin+Ramipril).

Distribution of cost of the drugs

In our study total cost of the drugs were more in MI (2700±1817) patient, followed by CCF, COPD with HTN (2685.33±1833.54), MI with HTN (1994.67±647) and CCF,DM&HTN (1721.21±1317.22). Antiplatelete costs were more in ACS patients (35.76±3.86). Fibrinolytic costs were more in MI patients (1940.62±11.53) and cost of antibiotics were high in IHD with LRTI patients (1700).

CONCLUSION

This study provides the data on the nature and extent of use of antiplatelets and fibrinolytics in the medicine department of AH&RC. A total number of 110 patients who were prescribed with antiplatelets and fibrinolytics were identified and included in this study.

This study showed that aspirin was the most commonly prescribed antiplatelete drug followed by the combination of aspirin and atorvastatin and then clopidogrel. Among the fibrinolytics streptokinase was most commonly used. In this study 92 patients had drug-drug interactions, in which 39 were mild interactions, 82 were moderate and the rest was severe interactions. Most commonly observed moderate interaction was aspirin with Furosemide and aspirin with Ramipril was the most commonly observed major interaction. The cost of antiplatelets were less and acceptable to patients when compared to fibrinolytics and other cardiovascular drugs.

Hence this study conclude that antiplatelets are the most commonly used cardiovascular drugs in different cardiovascular diseases, utilization pattern of these drugs will give knowledge about the rational use of drugs in different disease condition and the cost effective treatment. This study also shows that pharmacological service on drug interaction management is required.

LIMITATIONS

- The study could review only a small percentage of patients admitted in medicine department
- Usage pattern of antiplatelets and fibrinolytic agents in pediatric populations could not be assessed.
- This study was conducted in only for in-patients not included in an out-patient due to lack of information in out-patients.

FUTURE DIRECTIONS

- Extension of similar kind of studies to surgery and pediatrics department where antiplatelets and fibrinolytics usage is seen.
- This kind of study can improve the rational use of drugs.

CONFLICT OF INTEREST: None

SOURCE OF FUNDING: Nil

ACKNOWLEDGEMENT

The authors are thankful to Adichunchangiri shikshnika trust for providing this opportunity to carry out this research work. The authors also thankful to department of general medicine HOD, the entire team and SAC College of pharmacy for cooperating for carry out this study.

REFERENCES

1. Mukesh Kumar, Vicky Dahiya, Shruti Mishra. Cardiovascular disease prevalence and drug utilization patterns at a tertiary care hospital in north eastern India. *International Journal of Pharmacy and Pharmaceutical Sciences*, 2016; 8(6): 116-119.
2. Tasneem Sandozi & Fouzia Nausheen. Drug utilization study in ischemic heart diseases associated with diabetes and hypertension. *International Journal of Pharma and Bio Sciences*, 2010; 1(3): 1-4
3. Shazia Alam, Prof. Baqir S Naqvi, Sidra Alam. A study of drug utilization in unstable angina/NSTEMI patients admitted in Karachi, Pakistan. *World Journal of Pharmaceutical Research*, 2015; 4(5): 13-22.
4. Jeffrey S Berger, David L Brown, Gregory L Burke. Aspirin Use, Dose, and Clinical Outcomes in Postmenopausal Women with Stable Cardiovascular Disease: The Women's Health Initiative Observational Study, 2009; 2(2): 78-87.
5. Marc Cohen. Oral Antiplatelet Therapy for Acute and Chronic Management of NSTEMI ACS: Residual Ischemic Risk and Opportunities for Improvement, 2009; 23: 489-499.
6. Hormoz Ayromlou, Hassan Soleimanpour, Mehdi Farhoudi. Eligibility Assessment for Intravenous Thrombolytic Therapy in Acute Ischemic Stroke Patients; Evaluating Barriers for Implementation, 2014; 16(5): 1-4
7. Prasanna Kumar, B Jewargi, Ravi D Mala. Drug Utilization Study in Congestive Heart Failure at a Tertiary Care Hospital. *Scholars Journal of Applied Medical Sciences*, 2015; 3(2): 857-862.
8. Sandip Jadav, Chandresh Dumatar. Utilization Pattern of Antiplatelet and Anticoagulant Medicines among the Patients Suffering From Atrial Fibrillation. *International Journal of Medicine and Public Health*, 2016; 6(2): 103-108.
9. Ming-Ju Hsieh¹, Sung-Chun Tang, Wen-Chu Chiang, Kuang-Yu Huang. Utilization of Emergency Medical Service Increases Chance of Thrombolytic Therapy in Patients with Acute Ischemic Stroke. *NIH Public Access*, 2014; 113(11): 813-819.
10. Erin A Woods, Margaret L Ackman, Michelle M Graham, Sheri L Koshman, Rosaleen M Boswell, Arden R Barry. Anticoagulant and Antiplatelet Prescribing Patterns for Patients

- with Atrial Fibrillation after Percutaneous Coronary Intervention. *Can J Hosp Pharm*, 2016; 69(4): 280-285.
11. Praveen Choudhary, Jitendra M Agrawal, Supriya D Malhotra, Varsha J Patel. Drug utilization pattern in acute coronary syndrome at tertiary care hospital: a prospective cross-sectional observational study. *International Journal of Basic & Clinical Pharmacology*, 2016; 5(2): 513-516.
 12. M W H Behan, R F Storey. Antiplatelet therapy in cardiovascular disease. *Postgrad Med J.*, 2004; 80(1): 155–164.
 13. Jose Lopez-Sendon, Omar H. Dabbous, Esteban Lopez de Sa, Martin Stiles, Joel M Gore, David Briegerm et al., In-Hospital Outcomes Associated With Fibrinolytic and Thienopyridine Use in Patients With ST-Segment Elevation Acute Myocardial Infarction. The Global Registry of Acute Coronary Events. *Rev Esp Cardiol*, 2009; 62(5): 501-509.
 14. Hamid Ghanbari, Brahmajee K Nallamothu, Yongfei Wang, Jephtha P Curtis. Antithrombotic Therapy and Outcomes After ICD Implantation in Patients With Atrial Fibrillation and Coronary Artery Disease: An Analysis From the National Cardiovascular Data Registry. *Journal of the American Heart Association*, 2015; 4(1): 1-12.
 15. Getnet Mengistu, Bayisa Lemma, Mulugeta Molla. Utilization Patterns of Anticoagulants at Medical Ward of Hiwot Fana Specialized University Hospital, Harar, Ethiopia. *Journal of Basic and Clinical Pharmacy*, 2017; 8(4): 235-238.
 16. C H Jyothi, H K Vidya, K R Dinakar, G H Shashikala. Drug Utilization Study in Intensive Cardiac Care Unit of a Tertiary Care Hospital. *International Journal of Pharma Research and Health Sciences*, 2015; 3(5): 824-830.
 17. S Halvorsen, K. Huber. Fibrinolytic treatment of ST-elevation myocardial infarction. *Hamostaseologie*, 2014; 1(1): 47-52.
 18. Pedro Beraldo de Andrade, Leonardo Silva Roever Borges. Antiplatelet Agents in Acute Coronary Syndromes. *International Journal of Cardiovascular Sciences*, 2017; 30(5): 442-451.
 19. Shengyuan Luo, Mei Zhuang, Wutao Zeng, Jun Tao. Intravenous Thrombolysis for Acute Ischemic Stroke in Patients Receiving Antiplatelet Therapy. *Journal of the American Heart Association*, 2016; 5(1): 1-15.
 20. Bruno Ramos Nascimento, Marcos Robertode Sousa, Fabio Nogueira Demarqui, Antonio Luiz Pinho Ribeiro. Risks and Benefits of Thrombolytic, Antiplatelet, and Anticoagulant Therapies for ST Segment Elevation Myocardial Infarction. *ISRN Cardiology*, 2014; 4(1): 1-7.

21. J W Eikelboom, J Hirsh. Combined antiplatelet and anticoagulant therapy: clinical benefits and risks. *Journal of Thrombosis and Haemostasis*, 2007; 5(1): 255–263.
22. H Nagabushan, H S Roopadevi, G M Prakash, R Pankaja. A prospective study of drug utilization pattern in cardiac intensive care unit at a tertiary care teaching hospital. *International Journal of Basic & Clinical Pharmacology*, 2015; 4(3): 579-583.
23. Sharonjeet Kaur, Sujit Rajagopalan, Navjot Kaur, Nusrat Shafiq, Ashish Bhalla, Promila Pandhi et al., Drug Utilization Study in Medical Emergency Unit of a Tertiary Care Hospital in North India. *Emergency Medicine International*, 2004; 1(1): 1-6.