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Original Research Article

A study on drug utilization pattern of antiplatelet and anticoagulant drugs in the medicine department of a tertiary care teaching hospital

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ABSTRACT

Background: Antiplatelet and anticoagulant therapies are essential in the prevention and management of thromboembolic disorders, particularly cardiovascular and cerebrovascular diseases. Evaluation of prescribing patterns is necessary to ensure rational drug use and minimize adverse events. This study assessed the utilization patterns, prescribing appropriateness, drug interactions, adverse drug reactions and treatment outcomes of antiplatelet and anticoagulant therapy.
Methods: A six-month prospective observational study (November 2024 to April 2025) was conducted in the medicine ward, Coronary care unit, and Medicine intensive care unit of a tertiary care teaching hospital in Tamil Nadu. Data from 100 patients receiving antiplatelet and anticoagulant therapy were collected using a structured proforma and analyzed using JASP software.
Results: Most patients were aged 51-70 years and were predominantly male. Hypertension (61%) and diabetes mellitus (47%) were the most common comorbidities, while coronary artery disease was the leading indication for therapy. Aspirin (93%), clopidogrel (74%) and heparin (47%) were the most frequently prescribed drugs. Dual antiplatelet therapy was commonly utilized and 41% of patients received combination therapy. Seventeen potential drug interactions and five adverse drug reactions were identified. Significant differences in treatment outcomes were observed among drug groups ($p<0.05$). Ninety percent of prescribed drugs were in accordance with standard treatment guidelines.
Conclusions: Antiplatelet and anticoagulant therapies were widely used for thromboembolic disorders, with prescribing practices largely consistent with treatment guidelines and favorable treatment outcomes. However, polypharmacy, potential drug interactions and adverse drug reactions highlight the need for continuous prescription monitoring and individualized patient care.

Keywords: Antiplatelet drugs, Anticoagulants, Drug utilization review, Cardiovascular diseases, Prescribing patterns, Adverse drug reactions

INTRODUCTION

The rational use of medicines is a vital part of high-quality healthcare services, specifically when dealing with cardiovascular and thromboembolic diseases.[1,2] DUR is an indispensable tool for analyzing prescriptions, drug distribution, and their supervision in healthcare facilities, which helps examine prescribing practices, the appropriateness of therapy, and the adherence to standard treatment protocols concerning important drugs.[1] CVD has

turned into the most common reason for death in India, comprising one-quarter of all fatalities, with ischemic heart disease and strokes becoming the most prevalent factors, causing more than 80% of CVD-induced deaths.[5,6] Medications that inhibit platelets and anticoagulants are highly recommended in preventing and treating thrombosis, especially in patients suffering from cardiovascular and cerebrovascular illnesses.[12-14] Medicines of such type are frequently prescribed for people with ischemic heart disease, including coronary artery disease (CAD) and acute coronary syndrome (ACS), as it involves the obstruction of blood supply in arteries, triggering myocardial ischemia.[3,4] When dealing with a condition such as AF, the presence of an abnormal rhythm causes the blood to stagnate within the atria, thereby increasing the chance of developing an embolic stroke.[18-20] In the same way, ischemic strokes resulting from occlusion of the cerebral arteries and venous thromboembolism (VTE), which includes both deep vein thrombosis and pulmonary embolism, necessitate proper anticoagulant treatment to avoid further problems. When treating a patient with one of these disorders, the antiplatelet medications aspirin and clopidogrel will play a crucial role in the inhibition of platelets and subsequent arterial thrombosis in CAD and ACS.[11-13] On the other hand, anticoagulants, such as unfractionated heparin, low molecular weight heparin (e.g. enoxaparin), warfarin, as well as new oral anticoagulants (e.g. rivaroxaban), achieve their goal through blocking different steps within the process of coagulation and thus prevent clot formation or development.[15,16,18] The above-mentioned drugs are essential in the treatment of VTE, ACS, and AF, but they require careful consideration because of possible risks associated with their administration. In addition, it will be prospectively evaluated through the study the antiplatelet and anticoagulant medications prescribing patterns and guidelines adherence in actual settings of hospitals where many patients with different diseases attend, especially in medicine wards due to the complexity of the patients' condition.[17] From the research, the conclusion was made that antiplatelets and anticoagulants are widely used both for treatment and prophylactic purposes.[19,20] CAD is one of the most prevalent non-infectious diseases in the context of high morbidity and mortality cases throughout the world. Many people die from CAD more than any other disease.[5]

METHODS

Study site

The study was conducted in the inpatient medicine ward, CCU and MICU of the Department of Medicine at Cuddalore Government Medical College and Hospital, Chidambaram, Tamil Nadu. The hospital is 1200 bedded multi-specialty rural tertiary care teaching hospital.

Study design

A prospective observational study was conducted.

Study period

The study was conducted over a period of 6 months (November 2024-April 2025).

Study tools

A proforma was used as the data collection form.

Sources of data

The required data were extracted from case sheets and face to face interview with patients.

Sample size

As it is preliminary research, there is no sample size calculation. Based on patient's accessibility, the sample size is selected according to inclusion and exclusion criteria.

Study recruitment

Target population

Patients who were prescribed with antiplatelet and anticoagulant drugs in the Department of Medicine at Government of Cuddalore Medical College and Hospital, Chidambaram.

Study population

Patients were enrolled based on specified inclusion and exclusion criteria.

Eligibility criteria

Adult and elderly patients admitted to the inpatient medicine ward, CCU and MICU who were prescribed antiplatelet and/or anticoagulant drugs were included in the study. Pregnant and lactating women, pediatric patients, psychiatric patients and patients or their relatives who refused to provide informed consent were excluded from the study.

Data analysis

The collected data were recorded in Microsoft Excel and statistical analysis was done using JASP software to generate significant results.

RESULTS

Age-gender distribution of patients

Out of 100 patients, 6 were in the 31-40 years age group, with 5 males and 1 female. In the 41-50 years group, 6 were male and 2 were female, totaling 8 patients. The 51-60 years group included 17 males and 15 females, making

up 32 patients. In the 61-70 years group, there were 20 males and 18 females, totaling 38 patients. The 71-80 years group had 7 males and 6 females, contributing 13 patients. Finally, in the 81-90 years group, there were 3 males and no females, with a total of 3 patients. The age- and gender-wise distribution of patients is illustrated in Figure 1.

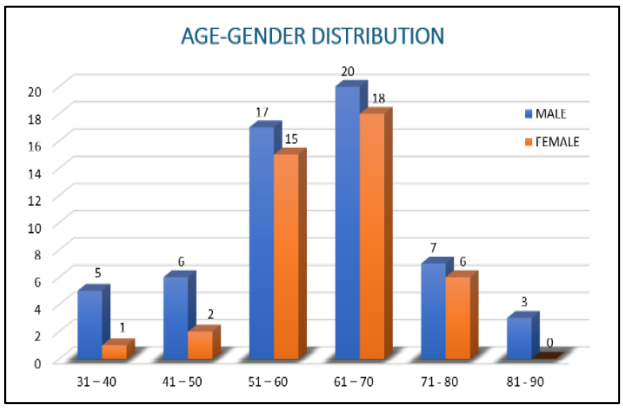

Figure 1: Graphical representation of age-gender distribution of patients.

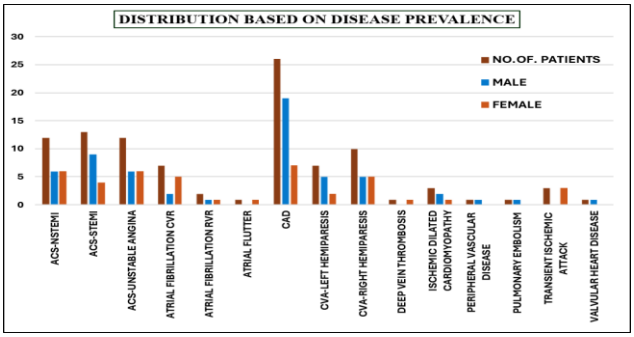

Figure 2: Graphical representation of gender-wise distribution of disease prevalence among patients.

Distribution of disease prevalence among patients

Among 100 patients, coronary artery disease (CAD) was most common (26 cases:19 males, 7 females). ACS included STEMI (13), NSTEMI (12), and unstable angina (12). Atrial fibrillation was seen in 8 cases and atrial flutter in 1. CVA occurred in 17 patients, with 3 TIAs. Other conditions included cardiomyopathy (3) and one case each of DVT, PVD, PE, and VHD. The gender-wise distribution of disease prevalence among patients is illustrated in Figure 2.

Utilization of antiplatelet and anticoagulant drugs

For antiplatelet drugs, aspirin was the most frequently prescribed, with a total of 93 prescriptions, accounting for 93% of the utilization. This was followed by clopidogrel, with 74 prescriptions making up 74%, and cilostazol being the least used, with only 2 prescriptions corresponding to 2% of the total. Regarding anticoagulant drugs, heparin was the most utilized, prescribed 47 times and making up 47% of the total anticoagulant usage. Warfarin followed with 9 prescriptions (9%), while enoxaparin and rivaroxaban were prescribed 4 (4%) and 2 (2%) times respectively. Details regarding the utilization of antiplatelet and anticoagulant drugs are summarized in Table 1.

Table 1: Distribution of antiplatelet and anticoagulant drugs prescribed.

Drugs	Frequency of drugs prescribed (N)	Percentage (%)
Antiplatelet drugs		
Aspirin	93	93
Clopidogrel	74	74
Cilostazol	2	2
Anticoagulant drugs		
Heparin	47	47
Warfarin	9	9
Enoxaparin	4	4
Rivaroxaban	2	2

Type of therapy

Dual antiplatelet therapy (aspirin+clopidogrel) was most common (27%). Aspirin alone (18%) and clopidogrel alone (2%) followed. Anticoagulant use was limited: warfarin (4%), enoxaparin (1%) and dual anticoagulant therapy (1%).

The largest group (41%) received dual antiplatelet plus single anticoagulant, while 5% received single antiplatelet with anticoagulant. The patterns of therapy administered among the study population is presented in Table 2.

Table 2: Distribution of patients according to the type of therapy (n=100).

Type of therapy	Drugs	No. of patients	Percentage (%)
Single antiplatelet therapy	Aspirin	18	18
	Clopidogrel	2	2
Dual antiplatelet therapy	Aspirin+ clopidogrel	27	27
	Aspirin+ cilostazol	1	1
Single anticoagulant	Warfarin	4	4
	Enoxaparin	1	1
Two anticoagulants	Heparin+ rivaroxaban	1	1

Continued.

Type of therapy	Drugs	No. of patients	Percentage (%)
Patients with antiplatelet and anticoagulant	Single antiplatelet with single anticoagulant	5	5
	Dual antiplatelet with single anticoagulant	41	41

Distribution based on the categories of drugs prescribed

Antiplatelet drugs were the most frequently prescribed category, accounting for 16.60% of all medications. This was followed by hyperlipidemic agents (9.23%), anti-hypertensives (8.74%), H2 blockers (8.35%) and antibiotics (8.25%). Other notable categories included anti-emetics (7.32%), vitamin supplements (6.88%) and anticoagulants (6.09%). Less frequently used drug classes included antiepileptics (0.29%), PPIs (0.69%) and iron replacement products (0.98%), the distribution of which is presented in Table 3.

Table 3: Distribution based on the categories of drugs prescribed.

Drugs category	No. of drugs (N)	Percentage (%)
Antiplatelet	169	16.60
Hyperlipidemic	94	9.23
Anti-hypertensive	89	8.74
H2 blocker	85	8.35
Antibiotic	84	8.25
Anti-emetic	75	7.37
Vitamin supplements	70	6.88
Anti-diabetic	65	6.38
Anticoagulant	62	6.09
Diuretic	54	5.30
Corticosteroids	33	3.83
Bronchodilator	33	3.24
Positive inotropic	23	2.26
Anti-histamine	18	1.77
Antacid	17	1.67
Anti-fibrinolytic	13	1.28
Nitrates	8	0.7
Iron replacement products	6	0.98
Pain relievers	10	0.59
PPI	7	0.69
Antiepileptic	3	0.29

Distribution of patients with treatment outcome

Out of the total patients, 70 (70%) showed improvement, 26 (26%) remained Unchanged, 1 (1%) worsened and 3 (3%) patients died during the course of treatment. The treatment outcomes of patients are graphically represented in Figure 3.

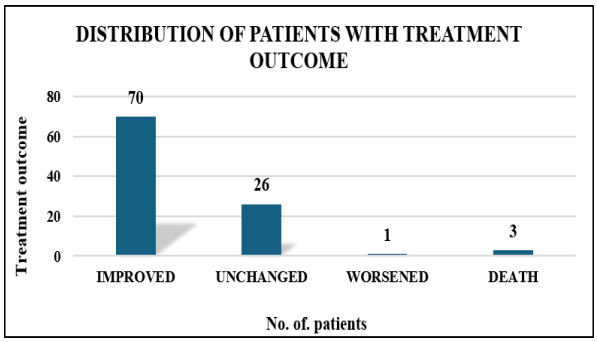

Figure 3: Representation of treatment outcome of patients.

Drug-drug interaction

A total of 17 distinct drug interaction combinations were observed. Most interactions (16) were synergistic and 1 was antagonistic. Moderate severity was noted in 13 cases, and 4 were severe. Drug therapy was discontinued in 14 cases, while 3 cases continued. The most frequent interaction was Aspirin+Clopidogrel (68 prescriptions). The detailed distribution of drug-drug interactions is shown in Table 4.

Adverse drug reactions in patients

A total of 5 patients experienced ADRs. Aspirin caused dyspepsia and heartburn in 2 patients, while heparin caused thrombocytopenia and hematuria in 3 patients. Most reactions were probable and required stopping the drug. The distribution of adverse drug reactions is shown in Table 5.

Evaluation of prescribing practices based on WHO indicators

Out of the total 1018 drugs prescribed, the average number of drugs per prescription was 10.18, 60% were prescribed by generic name, 41% involved injections, 90% were from standard treatment guidelines, 94% of patients received antiplatelet drugs, and 54% received anticoagulant drugs. The who prescribing indicators are shown in Table 6.

Inferential statistics

The results were tabulated accordingly and data was analyzed using Jeffery's Amazing Statistics Program (JASP). A p value of <0.05 is considered as statistically significant. The results of all inferential statistics are summarized in Table 7.

Evaluation of association between therapy regimens and treatment outcome

The Chi-square test demonstrated a statistically significant association between drug groups and treatment outcome ($p<0.05$). This suggests that the type of drug regimen may influence patient outcomes. Following the finding, a one-way ANOVA was performed to assess whether the mean outcome differed significantly across the four drug groups. This complementary analysis provided a quantitative measure of treatment effect, allowing for a more nuanced comparison of clinical efficacy between, single antiplatelet, dual antiplatelet, anticoagulant and combination (antiplatelet with anticoagulant) therapy groups.

The ANOVA results indicated a significant difference in treatment outcomes among the therapy groups ($p=0.011$). Similarly, the Kruskal-Wallis test demonstrated a significant difference in treatment outcomes across drug groups ($p<0.001$). Dunn's post hoc pairwise comparisons revealed that dual antiplatelet therapy and the combination of antiplatelet with anticoagulant were associated with significantly different outcomes compared to single antiplatelet therapy. This indicates that more intensive antithrombotic strategies may influence patient recovery.

Table 4: Observation of drug-drug interactions in patients.

Drugs	Type of interaction	Severity	No. of prescriptions (n)
Aspirin+clopidogrel	Synergism	Moderate	68
Heparin+aspirin	Synergism	Moderate	41
Heparin+clopidogrel	Synergism	Moderate	39
Heparin+enalapril	Synergism	Moderate	11
Hydrocortisone+clopidogrel	Synergism	Moderate	3
Aspirin+hydrocortisone	Synergism	Moderate	3
Aspirin+spironolactone	Antagonism	Moderate	2
Heparin+warfarin	Synergism	Severe	1
Aspirin+enoxaparin	Synergism	Moderate	1
Clopidogrel+enoxaparin	Synergism	Moderate	1
Pantoprazole+cilostazol	Synergism	Moderate	1
Azithromycin+heparin	Synergism	Severe	1
Metronidazole+cilostazole	Synergism	Moderate	1
Piperacillin+heparin	Synergism	Severe	1
Erythromycin+heparin	Synergism	Severe	1
Heparin+hydrocortisone	Synergism	Moderate	1
Rivaroxaban+heparin	Synergism	Moderate	1

Table 5: Adverse drug reactions in patients.

Drug	ADR type	Causality assessment	Management	No. of patients with ADR	Score (Naranjo scale)
Aspirin	Dyspepsia	Possible	Symptomatic treatment, drug continued	1	4
Aspirin	Heartburn	Probable	Symptomatic treatment, drug stopped	1	7
Heparin	Thrombocytopenia	Probable	Symptomatic treatment, drug stopped	2	5
Heparin	Hematuria	Probable	Symptomatic treatment, drug stopped	1	8

Table 6: Evaluation of prescribing practices based on WHO indicators.

WHO-prescribing indicator	Value	WHO-STD
Total no. of prescription	100	NA
Total no. of drugs prescribed	1018	NA
Average number of drugs per prescription	10.18	1.6-1.8
Percentage of drugs prescribed by generic name	60%	100%
Percentage of encounter with antiplatelet drug	94%	NA
Percentage of encounter with anticoagulant drug	54%	NA
Percentage of encounters with an injection prescribed	41%	13.4-24.1%
Percentage of drugs prescribed from standard treatment guidelines	90%	100%

Table 7: Summary of inferential statistical analysis and post HOC comparisons.

Analysis objective	Statistical test	Test statistic	DF	P value	Interpretation
Association between treatment outcome and drug groups	Chi-square test	X^2=36.964	9	<0.001*	Significant association exists between treatment outcome and drug groups
Comparison of treatment outcomes across drug groups	One-way ANOVA	F=3.952	3,96	0.011*	Mean treatment outcomes differed significantly among drug groups
Comparison of treatment outcomes across drug groups	Kruskal-Wallis test	H=22.536	3	<0.001*	Significant difference in treatment outcomes among drug groups
Post-HOC comparison: single antiplatelet vs dual antiplatelet	Dunn's test	Z=3.300	—	0.006*	Significant difference
Post-HOC comparison: single antiplatelet vs anticoagulant	Dunn's test	Z=1.852	—	0.384	Not significant
Post-HOC comparison: single antiplatelet vs antiplatelet+anticoagulant	Dunn's test	Z=4.732	—	<0.001*	Significant difference
Post-HOC comparison: dual antiplatelet vs anticoagulant	Dunn's test	Z=-0.231	—	1.000	Not significant
Post-HOC comparison: dual antiplatelet vs antiplatelet+anticoagulant	Dunn's test	Z=1.257	—	1.000	Not significant
Post-HOC comparison: anticoagulant vs antiplatelet+anticoagulant	Dunn's test	Z=0.934	—	1.000	Not significant
Association between diagnosis and drug group usage	Chi-square test	X^2=207.049	42	<0.001*	Drug group selection significantly varied with diagnosis
Association between age and drug group usage	Chi-square test	X^2=120.372	90	0.018*	Age significantly influenced drug group selection

Continued.

*p<0.05 considered statistically significant. X^2=chi-square statistic; f=ANOVA statistic; h=Kruskal-Wallis statistic; z=Dunn's test statistic; DF=degrees of freedom. Dunn's test p values were Bonferroni-adjusted.

Relationship between clinical diagnosis and drug groups

The Chi-square test revealed a highly significant association between the type of disease diagnosis and the drug groups used. This indicates that drug therapy choices vary significantly depending on the underlying condition, suggesting that clinical decisions regarding anticoagulant or antiplatelet use are influenced by the specific diagnosis.

Influence of patient age on drug group

The Chi-square test demonstrated a significant association between patient age and drug group. This result suggests that the distribution of drug therapy varies significantly across different age groups, indicating that age may influence the choice of antiplatelet or anticoagulant therapy in clinical practice.

DISCUSSION

The present prospective study evaluated the utilization patterns of antiplatelet and anticoagulant drugs, associated drug-drug interactions, adverse drug reactions and prescribing trends in patients with cardiovascular and thromboembolic disorders.

Demographic profile

In total, 100 patients were selected, out of which males constituted 58%, while females were only 42%. It was noted that 38% of the subjects were between 61-70 years, whereas 32% were aged between 51-60 years. This is supported by Vyas et al, where male preponderance was 56.2% and the age range was from 50-80 years.[20] Common comorbid conditions were hypertension (61%) and diabetes mellitus (47%), followed by LRTI (13%) and COPD + CKD (11%). These findings are consistent with the study by Vyas et al, which also identified hypertension and diabetes as prevalent comorbidities. Symptoms such as breathlessness, chest pain, palpitation and limb weakness were common among subjects. The presence of high incidence of ischemic heart diseases at the age range of 51-70 years was possibly because of lack of physical activities, comorbidity and cholesterol accumulation resulting in

reduced coronary circulation. High lipid levels still play an important role as a risk factor.

As far as social habits were concerned, 35% were alcoholics, 22% were smokers, 14% had both habits and 43% had no such habits. This data is parallel to the data presented by Reddy PR et al, although with minor differences as smoking prevalence was slightly more in their study.[19]

Utilization of antiplatelet drugs

In this study, the utilization of antiplatelet drugs was observed in patients with ACS, CVD, stroke, TIA, PAD, DVT and atrial fibrillation. The same indications were documented by Reddy PR et al.[19] Patients were administered monotherapy (either aspirin or clopidogrel) or DAPT (aspirin+clopidogrel). The utilization rate was 93% aspirin, 74% clopidogrel and 2% cilostazol, similar to the results of Reddy PR et al.[19]

Only one PAD patient was receiving DAPT comprising of aspirin+cilostazol. DAPT is standard practice in the treatment of ACS, usually consisting of loading dose followed by maintenance treatment. Aspirin monotherapy was frequently prescribed in stroke and TIA. Although DAPT reduces the occurrence of ischemic events, usage in the elderly with multiple comorbidities was uncommon owing to the risks associated with bleeding.

Utilization of anticoagulants

The main indications for anticoagulants in the hospital include DVT, PE, MI, unstable angina, atrial fibrillation, and valvular heart disease. Likewise, Meera et al utilized them for different cardiovascular and thromboembolic diseases like IHD, CVA, PAD and post angioplasty patients.[22]

Heparin is the drug most frequently used in our study, accounting for 47% of anticoagulant prescriptions, followed by warfarin (9%), enoxaparin (4%) and rivaroxaban (2%). Acenocoumarol (38%) and enoxaparin (31%) were the two drugs that occurred most often according to Meera et al whereas, according to Raouf S et al, heparin accounted for 49%, enoxaparin (29%), and fondaparinux (13%).[21,22]

Heparin was the most widely used anticoagulant drug together with DAPT in ACS due to its prompt effect; however, it was only prescribed for a brief period owing to hemorrhage risks. The use of warfarin and enoxaparin was seen in atrial fibrillation, while PE patients received enoxaparin. Combination therapy (heparin then warfarin) was also detected. The choice between injectable (heparin, enoxaparin) and oral anticoagulant drugs (warfarin, rivaroxaban) depended on the acute versus chronic nature of the disease.

Trends in prescribing patterns

Among the participants in our study, 20% had prescribed single antiplatelet drugs, 28% had been prescribed DAPT, 5% single anticoagulants, 1% dual anticoagulants, and 46% combination therapy. Our results can be compared with those of Vyas et al, except that they found a larger proportion of DAPT (52.3%).[20] The increased usage of combination therapy is because of the necessity of having aggressive treatment approaches for cardiovascular diseases.

Trends in drug interactions

A total of 17 drug interactions were detected among the medications prescribed. They mainly consisted of antiplatelet and anticoagulant medications. The highest frequency of interaction was aspirin-clopidogrel interaction, followed by the interaction between heparin and either aspirin or clopidogrel. Despite increasing bleeding complications, their interaction can be clinically justified.

The moderate interactions include hydrocortisone with aspirin/clopidogrel, aspirin with spironolactone and enoxaparin with antiplatelet drugs. Severe interactions, like those seen with warfarin-heparin interaction or certain antibiotics (azithromycin and erythromycin), were treated with medication modification or discontinuation, similar to the Reddy PR et al.[19]

Adverse drug reactions (ADRs)

Five ADRs were observed. Aspirin led to dyspepsia and heartburn, with the latter requiring discontinuation. According to Reddy PR et al, aspirin resulted in most of the adverse events such as dyspepsia, diarrhea and GI ulcers.[19] Heparin caused thrombocytopenia and hematuria, which were the reason for discontinuing heparin therapy, a similar observation made by Meera et al.[22] Causality was assessed using the Naranjo algorithm, with most reactions classified as probable. These findings are consistent with known adverse effects of these drugs and emphasize the importance of early detection and management.

WHO prescribing indicators

Average number of medications per prescription (10.18) was significantly high, indicating polypharmacy. Generic naming of drugs was 60%, indicating that branded medicines are used commonly. The high utilization of antiplatelet drugs (94%) and anticoagulant drugs (54%) is because of the nature of the study. The injection drug prescription rate (41%) was higher than the standard value, indicating excessive prescription of injections. However, it can be noted that 90% of prescriptions were in accordance with the standard guidelines.

Inferential statistics

Inferential statistics indicated that there was a significant relationship between drug regimen and the outcome of the treatment ($p<0.001$). The post-hoc test revealed the fact that dual therapy and combination therapy had better treatment outcome than monotherapy. There was a significant association between diagnosis and choice of drugs. There was no influence of gender on the drug selection. However, the patient age influenced drug selection.

Limitations

This study was conducted in a single tertiary care hospital with a limited sample size, which may restrict generalizability. Multicentric studies with larger populations are recommended for broader applicability.

CONCLUSION

The study evaluated the prescription practices of antiplatelet and anticoagulant medications that are commonly prescribed for the treatment and prophylaxis of thromboembolic disorders, such as IHD, stroke, atrial fibrillation, and VTE. Most patients' ages ranged between 50-70 years with males being more prevalent. Comorbidities such as hypertension and diabetes were prevalent too. Aspirin and clopidogrel were the most popular antiplatelet agents and they could be prescribed alongside each other (DAPT). Heparin, enoxaparin, and warfarin were the common anticoagulants and both antiplatelet and anticoagulant combination have been effective in managing the thrombotic disease. Higher prescription of these medicines has shown good compliance to the clinical guideline and resulted in positive outcomes. Management of complications such as bleeding was well carried out. However, there were some difficulties such as polypharmacy, drug interactions and some exceptions were noted, particularly among older patients with several comorbid conditions. This study highlights the significance of proper monitoring and individualized treatment plan for improving patient outcomes.

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