



## **Analysis of Prescribing Pattern among Cardiovascular Patients at National Institute of Cardiovascular Disease, Dhaka, Bangladesh**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Author MSI designed and supervised the study. Authors IAHS and LR performed the laboratory tests and prepared the manuscript. Author AAH revised the final manuscript. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Objective:** The aim of this study was to comprehend the prescribing pattern among cardiovascular patients at the national institute of Cardiovascular Disease (NICVD), Dhaka, Bangladesh.

**Methodology:** The current study was carried out in a national institute of Cardiovascular Disease (NICVD), Dhaka, Bangladesh from 13<sup>th</sup> February, 2017 to 2<sup>nd</sup> December, 2017. Cross-sectional types of descriptive research were performed in the cardiac outpatient department through the period of study. A total of 1,000 patients meeting the inclusion and exclusion criteria, were interviewed with the structured questionnaire. The questionnaire includes the demographic details of the patients, prescribing trend and the written permission was also taken from administrative offices as well as patients in this hospital.

**Results:** The findings of this study suggest that out of 1,000 patients, only 13.1% of patients were

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used monotherapy, whereas 86.9% of patients were taken combination therapy for the treatment of CVD. Among the combination therapy, penta therapy was the most popular.

**Conclusions:** Drug prescription pattern in our study observed that combination therapy was more commonly prescribed than monotherapy.

*Keywords: Prescribing pattern; cardiovascular patients; CVD; national institute of cardiovascular disease.*

## 1. INTRODUCTION

CVD continues to be the most common cause of mortality all over the world, in the 2013 Global Burden of Disease (GBD) study claimed that 17.3 million deaths were caused by CVD. It is responsible for 31.5% of all deaths and 45% of all non-infectious disease mortality worldwide, and two times higher than that caused by cancer, furthermore greater than totally communicable, maternal, neonatal and nutritional disorders combined. The 2013 GBD also observed that CVD caused a higher figure of deaths and was accountable for a greater number of all deaths than in 1990 when 12.3 million deaths were attributed to CVD, corresponding to 25.9% of to overall deaths [1]. The economic influence of various types of CVD is huge. Conventionally, Bangladesh is experienced with infectious diseases. Similar to many other low-income countries in the global, she has been suffering from epidemiological transition; the predominating disease pattern is converting from infectious diseases to non-infectious diseases. [2-3].

CVD is accounted for 75% of the deaths happening in developing countries like Bangladesh [4]. Studying the present situation, it has been expected that at least 25 million individuals will face death because of CVDs by 2030 [5-6]. Whereas the prevalence and death because of CHD is decreasing in the developed countries but it is not happening in lower-income countries.

There has been a horrific rise in the past twenty years in the prevalence of CHD and cardiovascular mortality in India and other south Asian nations [7]. The incidence of cardiovascular diseases has been rising in the new decade [8].

In the majority of nations, the absolute number of mortalities from CVD is rising due to rising life expectancy and related population longevity and deaths of individuals over than 70 years of age [9]. If the account is taken of population

longevity, cardiovascular mortality rates have decreased worldwide by 16% between 2000 and 2012 [10]. A trend is driven by decreasing in smoking cigarette, population-level blood pressure improvements and best treatment for CVD. Declines are more in higher –income countries than in low- and middle – income countries [11-12].

Recently, important medicines to treat CVD are accessible, e.g. pharmacological treatment of high low-density lipoprotein (LDL) cholesterol levels increased blood pressure and inhibiting platelet function with statins, anti-hypertensive agents (thiazides, beta blockers, calcium channel blockers, angiotensin-converting enzyme (ACE) inhibitors, or angiotensin II receptor blockers (ARBs), etc. and antiplatelet agents e.g. Low dose aspirin, respectively [13-14].

The objective of this study was to understand the prevalence of cardiovascular disease and the different prescribing patterns of the cardiovascular drug in tertiary care hospital in Bangladesh.

## 2. METHODS

### 2.1 Participants and Study Site

The current study was carried out in a National Institute of Cardiovascular Disease (NICVD), Dhaka, Bangladesh from 13<sup>th</sup> February, 2017 to 2<sup>nd</sup> December, 2017. Types of the descriptive study were performed in the cardiac outpatient department through the period of study a total of 1,000 patients who meets the criteria (inclusion and exclusion criteria) were interviewed with the structured questionnaire. The main target of the study was to find out the prevalence of CVD and several patterns among 1,000 patients with CVD diseases. The questionnaire includes the demographic details of the patients. The written consent was approved by administrative offices in the hospital.

## 2.2 Statistical Analysis

The statistical calculation was carried out on collected and compiled data with the help of Microsoft Excel 2010 (Roselle, IL, USA).

## 3. RESULTS

Prescribing status of cardiovascular drugs among 1,000 patients with CVD is given in Table 1. From the 1,000 patients, 26.3% of patients were taken penta therapy whereas 13.1% of patients were used monotherapy for the treatment of CVD. The outcomes of the cardiovascular drug prescribed with monotherapy are shown in Table 2. The proportion of patients who took bisoprolol as a monotherapy was the highest while the lowest was azilsartan medoxomil, ramipril, prazosin and carvedilol used as a monotherapy. The figures were 29.77% and 0.77% respectively. 28.20% of patients were administered bisoprolol + atorvastatin as a dual therapy and 11.11% of patients were taken clopidogrel + atorvastatin as a dual therapy for the treatment of CVD. The consequences of the cardiovascular drug prescribed with dual therapy are presented in Table 3.

The percentage of patients who used clopidogrel + atorvastatin + glyceryl trinitrate (nitroglycerine) as a triple therapy was the maximum but the minimum was Clopidogrel+Atorvastatine+Azilsartan Medoxomil used as a triple therapy. The percentages were 17.77 and 0.4 successively. The results of the cardiovascular drug prescribed with triple therapy are displayed in Table 4. The percentage of patients who were administered atorvastatin + bisoprolol + ramipril + glyceryl trinitrate (nitroglycerine) as a quadruple therapy and used glyceryl trinitrate (nitroglycerine) + propranolol hydrochloride + frusemide + spironolactone was the same. The percentages were 1.93. The outcomes of the cardiovascular drug prescribed with quadruple therapy are demonstrated in Table 5. 52.47% of patients used clopidogrel + bisoprolol + atorvastatin + glyceryl trinitrate(nitroglycerine) + trimetazidine dihydrochloride as a penta therapy whereas 2.28% of patients administered clopidogrel + rosuvastatin + bisoprolol + glyceryl trinitrate (nitroglycerine) + azilsartanmedoxomil as a penta therapy for the management of CVD. The results of the cardiovascular drug prescribed with penta therapy are demonstrated in Table 6.

**Table 1. Prescribing status of the cardiovascular drugs**

Status	Frequency	Percent
Monotherapy	131	13.1%
Dual Therapy	117	11.7%
Triple Therapy	135	13.5%
Quadruple Therapy	155	15.5%
Penta Therapy	263	26.3%
Hexa Therapy	117	11.7%
Hepta Therapy	67	6.7%
Octa Therapy	15	1.5%

**Table 2. Cardiovascular drug prescribed with monotherapy**

Prescribed Medicines	Frequency	Percent
Bisoprolol	39	29.77%
Losartan Potassium	3	2.29%
Propranolol Hydrochloride	36	27.49%
Metoprolol Tartrate	5	3.82%
Atorvastatine	26	19.84%
Azilsartan Medoxomil	1	0.77%
Rosuvastatin	7	5.34%
Trimetazidine Dihydrochloride	2	1.52%
Ramopril	1	0.77%
Prazosin	1	0.77%
Atenolol	2	1.52%
Carvedilol	1	0.77%
Glyceryl Trinitrate (nitroglycerine)	4	3.05%
OlmesartanMedoxomil	3	2.29%

**Table 3. Cardiovascular drug prescribed with dual therapy**

<b>Prescribed Medicines</b>	<b>Frequency</b>	<b>Percent</b>
Bisoprolol+Atorvastatine	33	28.20%
Amlodipine+Olmesartan Medoxomil	3	2.57%
Clopidogrel+Atorvastatine	13	11.11%
Atorvastatine+Losartan Potassium	6	5.12%
TrimetazidineDihydrochloride+Losartan Potassium	1	0.85%
Clopidogrel+Bisoprolol	5	4.28%
Frusemide+Spironolactone	6	5.12%
Bisoprolol+Losartan Potassium	7	5.98%
Clopidogrel+Rosuvastatin	9	7.69%
Ramopril+Carvedilol	1	0.85%
Propranolol Hydrochloride +Atorvastatine	1	0.85%
Bisoprolol+OlmesartanMedoxomil	5	4.28%
Rosuvastatin+Bisoprolol	9	7.69%
Bisoprolol+AzilsartanMedoxomil	1	0.85%
Atorvastatine+GlycerylTrinitrate (nitroglycerine)	1	0.85%
Rosuvastatin+Losartan Potassium	2	1.70%
Bisoprolol +Hydrochlorothiazide	1	0.85%
Hydrochlorothiazide+OlmesartanMedoxomil	2	1.70%
Rosuvastatin+Metoprolol	1	0.85%
OlmesartanMedoxomil+Diltiazem Hydrochloride	1	0.85%
Rosuvastatin+AzilsartanMedoxomil	1	0.85%
Glyceryl Trinitrate (nitroglycerine+Propranolol Hydrochloride	1	0.85%
Amlodipine+Metoprolol	1	0.85%
Bisoprolol+Ramopril	1	0.85%
Atorvastatine +OlmesartanMedoxomil	1	0.85%
TrimetazidineDihydrochloride+Ramopril	2	1.70%
Glyceryl Trinitrate (nitroglycerine+Clopidogrel	2	1.70%

**Table 4. Cardiovascular drug prescribed with triple therapy**

<b>Prescribed Medicines</b>	<b>Frequency</b>	<b>Percent</b>
Clopidogrel+ Atorvastatine+ Diltiazem Hydrochloride	4	2.96%
Atorvastatine+Bisoprolol+GlycerylTrinitrate (nitroglycerine)	9	6.67%
Atorvastatine+ TrimetazidineDihydrochloride+Ramipril	1	0.74%
Clopidogrel+Bisoprolol+GlycerylTrinitrate (nitroglycerine)	3	2.22%
Clopidogrel+Trinitrate (nitroglycerine)+TrimetazidineDihydrochloride	1	0.74%
Clopidogrel+Atorvastatine+GlycerylTrinitrate (nitroglycerine)	24	17.77%
Clopidogrel+Atorvastatine+Cilnidipine	1	0.74%
Bisoprolol+ Atorvastatine+OlmesartanMedoxomil	5	3.70%
Atorvastatine+Amlodipine+Atenolol	1	0.74%
Atorvastatine+Bisoprolol+Losartan Potassium	5	3.70%
TrimetazidineDihydrochloride+Ramipril+Carvedilol	1	0.74%
Atorvastatine+Clopidogrel+Bisoprolol	19	14.08%
Clopidogrel+Bisoprolol+Rosuvastatin	9	6.67%
Clopidogrel+Rosuvastatin+Glyceryl Trinitrate (nitroglycerine)	3	2.22%
Bisoprolol+LosartanPotassium+GlycerylTrinitrate (nitroglycerine)	1	0.74%
Bisoprolol+Atorvastatine+TrimetazidineDihydrochloride	5	3.70%
Rosuvastatin+Bisoprolol+AzilsartanMedoxomil	1	0.74%
Rosuvastatin+LosartanPotassium+Carvedilol	2	1.48%
Clopidogrel+Atorvastatine+OlmesartanMedoxomil	1	0.74%
Clopidogrel+Atorvastatine+TrimetazidineDihydrochloride	2	1.48%
TrimetazidineDihydrochloride+Frusemide+Spironolactone	1	0.74%
Bisoprolol+OlmesartanMedoxomil+Rosuvastatin	2	1.48%

Prescribed Medicines	Frequency	Percent
Clopidogrel+Atorvastatine+AzilsartanMedoxomil	4	0.4%
Clopidogrel+Atorvastatine+Verapamil Hydrochloride	1	0.74%
Bisoprolol+Atorvastatine+AzilsartanMedoxomil	3	2.22%
Ramopril+GlycerylTrinitrate (nitroglycerine)+Propranolol Hydrochloride	4	2.97%
Atorvastatine+PropranololHydrochloride+Losartan Potassium	1	0.74%
Carvedilol+Frusemide+Spironolactone	1	0.74%
Clopidogrel+GlycerylTrinitrate (nitroglycerine)+OlmesartanMedoxomil	1	0.74%
Clopidogrel+Bisoprolol+OlmesartanMedoxomil	1	0.74%
Bisoprolol+Frusemide+Spironolactone	2	1.48%
Clopidogrel+Atorvastatine+Metoprolol Tartrate	1	0.74%
Glyceryl Trinitrate (nitroglycerine)+Rosuvastatine+Metoprolol Tartrate	3	2.22%
Bisoprolol+GlycerylTrinitrate (nitroglycerine)+OlmesartanMedoxomil	1	0.74%
Bisoprolol+Amlodipine + OlmesartanMedoxomil	1	0.74%
Bisoprolol+Atorvastatine+Losartan Potassium	2	1.48%
Clopidogrel+Rosuvastatin+Losartan Potassium	1	0.74%
Propranolol Hydrochloride+Frusemide+Spironolactone	1	0.74%
TrimetazidineDihydrochloride+GlycerylTrinitrate (nitroglycerine)+Atorvastatine	1	0.74%
Diltiazem Hydrochloride+Amlodipine+ OlmesartanMedoxomil	1	0.74%
Clopidogrel+Atorvastatine+Propranolol Hydrochloride	2	1.48%
Glyceryl Trinitrate (nitroglycerine)+Atorvastatine+Losartan Potassium	1	0.74%
Atorvastatine+Frusemide+Spironolactone	1	0.74%

26.49% of patients were used clopidogrel + atorvastatin + glyceryl trinitrate (nitroglycerine) + trimetazidinedihydrochloride + bisoprolol+losartan potassium as a hexa therapy while 7.69% of patients were administered clopidogrel + rosuvastatin + glyceryl trinitrate (nitroglycerine) + trimetazidinedihydrochloride + frusemide + spironolactone for the management of CVD. The results of the cardiovascular drug prescribed with hexa therapy are presented in Table 7. 34.32% of patients were taken clopidogrel + atorvastatin + bisoprolol + glyceryl trinitrate (nitroglycerine) + trimetazidinedihydrochloride + frusemide+ spironolactone as a hepta therapy whereas 7.46% of patients were used Clopidogrel + Atorvastatin + Glyceryl Trinitrate (nitroglycerine) + Trimetazidine Dihydrochloride + Frusemide + Spironolactone + Ramipril as a hepta therapy for the mitigation of CVD. The outcomes of the cardiovascular drug prescribed with hepta therapy are shown in Table 8. 40% of patients were used Clopidogrel + atorvastatin + bisoprolol + glyceryl trinitrate (nitroglycerine) + trimetazidinedihydrochloride + frusemide + spironolactone + ramipril as an octa therapy for the treatment of CVD. The findings of the cardiovascular drug prescribed with octa therapy are shown in Table 9.

#### 4. DISCUSSION

By 2020, cardiovascular disease burden is predicted to be 85% of the worldwide in the

developing countries, and the increase in CAD mortality in developing nations between 1990 and 2020 is projected to be 120% in female and 137% in male [15-16]. Full study has been done on the epidemiology of CVDs and the related risk factors have been well published which several factors like include age, high blood pressure (hypertension), smoking, high blood cholesterol, diabetes, overweight or obesity, lack of exercise and family history of heart disease [17-18]. In our study, we found that the presence of hypertension was higher in males compared to females, which has the similarity to the results of Gupta R et al, [19] and Guang Hui Dong et al. [20]. The percentage of patients on combination therapy was 86.9% in this study. This observation is higher than finding reported in Ibadan, Nigeria (73%) [21] and also higher than the finding (56%) reported by Ezuo and Njoku [22]. The great number of prescriptions of combination therapy might point out the great prevalence of patients suffering from severe and moderate hypertension, and the presence of comorbid diseases.

In our study among patients who were on monotherapy, the majority of them (58.78) were treated with the beta blocker. However, this result corresponding with the study done in India that found frequently medication for the hypertensive a patient on monotherapy was beta blocker [23]. Beta-blockers have become the first recommended treatment for hypertension, affirmed currently by the guidelines of JNC VI

[24]. Bisoprolol is probably the most beta1 selective agent mostly available [25]. There is some proof that it may be more efficient than atenolol in the control and management of hypertension [25-28]. Whereas diuretics were found to be the fundamentally prescribed class of antihypertensive drugs in the United Kingdom and Sub-Saharan countries [29-30].

This is in correspondence with the published international guidelines for antihypertensive treatment. JNC-VII guidelines provide diuretics should be prescribed as initial therapy for the majority of patients with either alone or in combination with drugs from other classes. As the diuretic is familiar to boost the antihypertensive efficacy of multidrug regimen, they can be helpful in attaining BP control and are less costly than other antihypertensive agents [31]. In spite of these recommendations, diuretics were reported to be prescribed less often to patients as monotherapy treatment in our study. Over the last two decades, there has been an abundant increase of new antihypertensive like ACE inhibitors, ARBs and, CCBs [32].

Where statins were the highest drugs prescribed for hypolipidaemic. The prescription of a single hypolipidaemic drug was popular. The preference of the statin as monotherapy depends on the disease process and atorvastatin was prescribed as a major hypolipidaemic drug. Also, it was found that atorvastatin was choice as a single hypolipidaemic agent. Many findings have shown first line lipid-lowering drugs used for primary preventions of coronary artery diseases (CAD) [33].

According to our study, the prescribing status was based on different therapies i.e 13.1% were on monotherapy and 86.9% were on combinations therapies i.e. dual, triple, quadruple, penta, hexa, hepta and octa therapies. And among the combination therapy penta therapy was the most common combination therapy prescribed by doctor with 26.3% followed by quadruple therapy with 15.5% and then triple therapy was the third most common combination therapy with 13.5% and dual therapy with 11.7% while hexa therapy was slightly lower than dual therapy and percentage was 11.7%, finally hepta therapy and octa therapy were 6.7% 1.4% respectively.

But Iqbal Arain et a., reported that dual therapy dominated the highest percentage of combination therapy with 42.64%, while triple therapy was the second highest with 14.40% and lowest number was quadruple therapy with 6.84%. Whereas the number of patients who prescribed monotherapy was 36.11% [34]. While Krunal [35] reported that 49.50% of patients were on dual therapy, 33.16% of the patients were on monotherapy and 15.5% of patients were on triple therapy.

In our study we observed that in most prescribing monotherapy was Bisoprolol with 29.77% followed by Propranolol Hydrochloride with 27.49% and dual therapy was Bisoprolol+Atorvastatin with 28.20% followed by Clopidogrel+Atorvastatin with 11.11%. In triple therapy was Clopidogrel+Atorvastatin+Glycerol Trinitrate (nitroglycerine) with 17.77% followed by Atorvastatin+Clopidogrel+Bisoprolol with 14.08% and quadruple therapy was Clopidogrel+Atorvastatin+Bisoprolol+Glycerol Trinitrate (nitroglycerine) with 23.22% followed by Clopidogrel+Atorvastatin+Glycerol Trinitrate (nitroglycerine)+Trimetazidine Dihydrochloride with 9.03% and penta therapy was Clopidogrel+Bisoprolol+Atorvastatin+Glycerol Trinitrate+Trimetazidine Dihydrochloride with 52.47% and followed by Clopidogrel+Bisoprolol+Trimetazidine Dihydrochloride+Rosuvastatin+Glycerol Trinitrate with 14.82% and Hexa therapy was Clopidogrel+Atorvastatin+Glycerol Trinitrate (nitroglycerine)+Trimetazidine Dihydrochloride+Bisoprolol+Losartan Potassium with 26.49% followed by Clopidogrel+Glycerol Trinitrate (nitroglycerine)+Trimetazidine Dihydrochloride+Atorvastatin+Bisoprolol+Olmesartan Medoxomil 10.25% and 7 therapy was Clopidogrel+Atorvastatin+Bisoprolol+Glycerol Trinitrate (nitroglycerine)+Trimetazidine Dihydrochloride+Frusemide+Spironolactone with 34.32% followed by Clopidogrel+Rosuvastatin+Bisoprolol+Glycerol Trinitrate (nitroglycerine)+Trimetazidine Dihydrochloride+ Frusemide+ Spironolactone with 13.43% and 8 therapy was Clopidogrel+Atorvastatin+ Bisoprolol+Glycerol Trinitrate (nitroglycerine)+ Trimetazidine Dihydrochloride+Frusemide+ Spironolactone+ Ramipril with 40% followed by Clopidogrel+ Rosuvastatin+Bisoprolol+Trimetazidine Dihydrochloride+Amlodipine+Olmesartan Medoxomil+ Frusemide+Spironolactone With 13.33%.

**Table 5. Cardiovascular drug prescribed with quadruple therapy**

<b>Prescribed Medicines</b>	<b>Frequency</b>	<b>Percent</b>
Atorvastatine+ Bisoprolol+Ramipril+GlycerylTrinitrate (nitroglycerine)	3	1.93%
Clopidogrel+Atorvastatine+ Bisoprolol +TrimetazidineDihydrochloride	12	7.74%
Clopidogrel+Bisoprolol+GlycerylTrinitrate (nitroglycerine)+TrimetazidineDihydrochloride	8	5.16%
Clopidogrel+Atorvastatine+GlycerylTrinitrate (nitroglycerine)+TrimetazidineDihydrochloride	14	9.03%
Clopidogrel+Atorvastatine+Bisoprolol+GlycerylTrinitrate (nitroglycerine)+	36	23.22%
Clopidogrel+Bisoprolol+LosartanPotassium+Atorvastatine	11	0.09%
Losartan Potassium+Atorvastatine+TrimetazidineDihydrochloride+	1	0.64%
Glyceryl Trinitrate (nitroglycerine)		
Bisoprolol+LosartanPotassium+TrimetazidineDihydrochloride+	1	0.64%
Glyceryl Trinitrate (nitroglycerine)		
Clopidogrel+Bisoprolol+Rosuvastatin+GlycerylTrinitrate (nitroglycerine)	9	5.80%
Atorvastatine+Rosuvastatin+Bisoprolol+AzisartanMedoxomil	2	1.29%
Clopidogrel+Bisoprolol+Rosuvastatin+TrimetazidineDihydrochloride	1	0.64%
Clopidogrel+Bisoprolol+Atorvastatine+ TrimetazidineDihydrochloride	1	0.64%
Bisoprolol+Atorvastatine+ TrimetazidineDihydrochloride+AzilsartanMedoxomil	4	2.58%
Clopidogrel+Atorvastatine+GlycerylTrinitrate (nitroglycerine)+Carvedilol	8	5.16%
Clopidogrel+Atorvastatine+Amlodipine+Atenolol	1	0.64%
Clopidogrel+Atorvastatine+GlycerylTrinitrate (nitroglycerine)+OlmesartanMedoxomil	2	1.29%
Clopidogrel+Atorvastatine+Amlodipine+OlmesartanMedoxomil	7	4.51%
Rosuvastatin+Bisoprolol+ TrimetazidineDihydrochloride+GlycerylTrinitrate (nitroglycerine)	2	1.29%
Clopidogrel+Atorvastatine+Frusemide+Spironolactone	1	0.64%
Glyceryl Trinitrate (nitroglycerine)+Losartan Potassium+Atorvastatine+	1	0.64%
Verapamil Hydrochloride		
Clopidogrel+Rosuvastatin+TrimetazidineDihydrochloride+GlycerylTrinitrate (nitroglycerine)	2	1.29%
Clopidogrel+Atorvastatine+TrimetazidineDihydrochloride+Losartan Potassium	1	0.64%
Atorvastatine+Bisoprolol+GlycerylTrinitrate (nitroglycerine)+Losartan Potassium	3	1.93%
Atorvastatine+Bisoprolol+GlycerylTrinitrate (nitroglycerine)+Losartan Potassium	1	0.64%
Atorvastatine+Bisoprolol+GlycerylTrinitrate (nitroglycerine)+Losartan Potassium	2	1.29%
Atorvastatine+Bisoprolol+GlycerylTrinitrate (nitroglycerine)+Losartan Potassium	1	0.64%
Atorvastatine+Bisoprolol+TrimetazidineDihydrochloride+GlycerylTrinitrate (nitroglycerine)	1	0.64%
Clopidogrel+Bisoprolol+Atorvastatine+Ramopril	5	3.22%
Clopidogrel+Rosuvastatin+Bisoprolol+Losartan Potassium	4	2.58%

Prescribed Medicines	Frequency	Percent
Clopidogrel+TrimetazidineDihydrochloride+Atorvastatine+Carvedilol	1	0.64%
Clopidogrel+GlycerylTrinitrate (nitroglycerine)+Atorvastatine+Metoprolol Tartrate	1	0.64%
Clopidogrel+GlycerylTrinitrate (nitroglycerine)+Atorvastatine+Propranolol Hydrochloride	4	2.58%
Atorvastatine+Amlodipine+Atenolol+TrimetazidineDihydrochloride	1	0.64%
Glyceryl Trinitrate (nitroglycerine)+Propranolol Hydrochloride+Frusemide+Spironolactone	3	1.93%

Table 6. Cardiovascular drug prescribed with penta therapy

Penta	Frequency	Percent
Clopidogrel+Bisoprolol+Atorvastatine+GlycerylTrinitrate(nitroglycerine)+Trimetazidine Dihydrochloride	138	52.47%
Clopidogrel+Bisoprolol+TrimetazidineDihydrochloride+Rosuvastatin+GlycerylTrinitrate(nitroglycerine)	39	14.82%
Clopidogrel+Atorvastatine+GlycerylTrinitrate(nitroglycerine)+Trimetazidine Dihydrochloride+Carvedilol	9	3.42%
Clopidogrel+Atorvastatine+Bisoprolol+GlycerylTrinitrate(nitroglycerine)+Losartan Potassium	1	0.38%
Clopidogrel+Rosuvastatin+Bisoprolol+GlycerylTrinitrate (nitroglycerine)+AzisartanMedoxomil	6	2.28%
Clopidogrel+Atorvastatine+Carvedilol+Frusemide+Spironolactone	5	1.90%
Clopidogrel+GlycerylTrinitrate(nitroglycerine)+Atorvastatine+Carvedilol+Ramopril	3	1.14%
Clopidogrel+Atorvastatine+Bisoprolol+Ticagrelor+Ramopril	2	0.76%
Bisoprolol+GlycerylTrinitrate(nitroglycerine)+Losartan Potassium+Trimetazidine Dihydrochloride+Rosuvastatin	3	1.14%
Losartan Potassium+Clopidogrel+Bisoprolol+Atorvastatine+TrimetazidineDihydrochloride	2	0.76%
Clopidogrel+GlycerylTrinitrate(nitroglycerine)+Carvedilol+Atorvastatine+Losartan Potassium	1	0.38%
Clopidogrel+Atorvastatine+GlycerylTrinitrate(nitroglycerine)+TrimetazidineDihydrochloride+Metoprolol Tartrate	2	0.76%
Atorvastatine+GlycerylTrinitrate(nitroglycerine)+Metoprolol Tartrate+Trimetazidine Dihydrochloride+Ramipril	1	0.38%
Rosuvastatin+Bisoprolol+LosartanPotassium+Ticagrelor+OlmesartanMedoxomil	1	0.38%
Clopidogrel+Atorvastatine+TrimetazidineDihydrochloride+Carvedilol+Ramipril	2	0.76%
Clopidogrel+Bisoprolol+GlycerylTrinitrate(nitroglycerine)+Atorvastatine+Ramopril	11	4.18%
Clopidogrel+Atorvastatine+GlycerylTrinitrate(nitroglycerine)+Carvedilol+Ramopril	1	0.38%
Clopidogrel+Atorvastatine+GlycerylTrinitrate +TrimetazidineDihydrochloride+Carvedilol	16	6.08%
Clopidogrel+Rosuvastatin+Atorvastatine+GlycerylTrinitrate(nitroglycerine) +Trimetazidine Dihydrochloride	2	0.76%
Clopidogrel+Rosuvastatin+Bisoprolol+ TrimetazidineDihydrochloride+OlmesartanMedoxomil	3	1.14%
Clopidogrel+Bisoprolol+GlycerylTrinitrate(nitroglycerine)+TrimetazidineDihydrochloride+Metoprolol Tartrate	1	0.38%
Clopidogrel+Atorvastatine+Ranolazine+Bisoprolol+GlycerylTrinitrate(nitroglycerine)	4	1.52%
Clopidogrel+Atorvastatine+Amlodipine+GlycerylTrinitrate(nitroglycerine)+Losartan Potassium	1	0.38%
Clopidogrel+Atorvastatine+TrimetazidineDihydrochloride+GlycerylTrinitrate(nitroglycerine) +Ramopril	3	1.14%
Clopidogrel+Bisoprolol+Atorvastatine+LosartanPotassium+GlycerylTrinitrate(nitroglycerine)	2	0.76%



<b>Penta</b>	<b>Frequency</b>	<b>Percent</b>
Clopidogrel+Bisoprolol+Rosuvastatin+LosartanPotassium+GlycerylTrinitrate(nitroglycerine)	1	0.38%
Trimetazidine+Dihydrochloride+Carvedilol+Ramopril+Frusemide+Spironolactone	1	0.38%
Atorvastatine+TrimetazidineDihydrochloride+Frusemide+Spironolactone+Carvedilol	2	0.76%
Bisoprolol+TrimetazidineDihydrochlori+Ramopril+Frusemide+Spironolactone	1	0.38%
Clopidogrel+Bisoprolol+Atorvastatine+Ramopril+Cilnidipine	1	0.38%
Clopidogrel+Bisoprolol+Rosuvastatine+Frusemide+Spironolactone	1	0.38%
Atorvastatine+Carvedilol+Frusemide+Spironolactone+Losartan Potassium	1	0.38%
Clopidogrel+Atorvastatine+Bisoprolol+GlycerylTrinitrate (nitroglycerine)+Trimetazidine Dihydrochloride	1	0.38%
Clopidogrel+Atorvastatine+Bisoprolol+Amlodipine+GlycerylTrinitrate(nitroglycerine)	1	0.38%
Clopidogrel+GlycerylTrinitrate (nitroglycerine)+Atorvastatine+Carvedilol+Losartan Potassium	5	1.90%

**Table 7. Cardiovascular drug prescribed with hexa therapy**

<b>Prescribed medicines</b>	<b>Frequency</b>	<b>Percent</b>
Clopidogrel+Atorvastatine+GlycerylTrinitrate (nitroglycerine)+TrimetazidineDihydrochloride+Bisoprolol+Losartan Potassium	31	26.49%
Clopidogrel+Glyceryl Trinitrate (nitroglycerine)+Trimetazidine Dihydrochloride+Atorvastatine+Bisoprolol+OlmesartanMedoxomil	12	10.25%
Clopidogrel+Atorvastatine+GlycerylTrinitrate (nitroglycerine)+TrimetazidineDihydrochloride+Carvedilol+Ramipril	3	2.56%
Clopidogrel+Bisoprolol+Atorvastatine+Trimetazidine Dihydrochloride+Amlodipine +OlmesartanMedoxomil	5	4.27%
Clopidogrel+Atorvastatine+TrimetazidineDihydrochloride+Bisoprolol+Glyceryl Trinitrate (nitroglycerine)+Amlodipine	2	1.70%
Atorvastatine+Losartan Potassium+Glyceryl Trinitrate (nitroglycerine)+Trimetazidine Dihydrochloride+Amlodipine +OlmesartanMedoxomil	1	0.85%
AzisartanMedoxomil+Clopidogrel+Bisoprolol+RosuvastatinGlyceryl Trinitrate (nitroglycerine)+TrimetazidineDihydrochloride	3	2.56%
Clopidogrel+Atorvastatine+Frusemide+Spironolactone+Ramipril+Carvedilol	2	1.70%
Clopidogrel+Atorvastatine+GlycerylTrinitrate (nitroglycerine)+TrimetazidineDihydrochloride+Carvedilol+Losartan Potassium	1	0.85%
Atorvastatin+TrimetazidineDihydrochloride+Carvedilol+LosartanPotassium+Frusemide+Spironolactone	1	0.85%
Clopidogrel+Atorvastatine+Rosuvastatin+TrimetazidineDihydrochloride+Losartan Potassium+Carvedilol	2	1.70%
Clopidogrel+Bisoprolol+Atorvastatine+TrimetazidineDihydrochloride+Glyceryl Trinitrate (nitroglycerine)+Valsartan	2	1.70%
Clopidogrel+Atorvastatine+Bisoprolol+TrimetazidineDihydrochloride+Frusemide+Spironolactone	2	1.70%
Clopidogrel+Atorvastatine+Bisoprolol+TrimetazidineDihydrochloride+Frusemide+Spironolactone	4	3.41%
Clopidogrel+Rosuvastatin+GlycerylTrinitrate (nitroglycerine)+TrimetazidineDihydrochloride+Frusemide+Spironolactone	9	7.69%
Clopidogrel+Rosuvastatin+Bisoprolol+Amlodipine+OlmesartanMedoxomil+Losartan Potassium	1	0.85%
Clopidogrel+Rosuvastatin+Bisoprolol+Atorvastatine+TrimetazidineDihydrochloride+GlycerylTrinitrate (nitroglycerine)	1	0.85%
Frusemide+Spironolactone+Bisoprolol+Clopidogrel+TrimetazidineDihydrochloride+Ramopril	1	0.85%
Clopidogrel+Atorvastatine+Rosuvastatin+TrimetazidineDihydrochlorideGlyceryl Trinitrate (nitroglycerine)+Indapamide	4	3.41%

<b>Prescribed medicines</b>	<b>Frequency</b>	<b>Percent</b>
Clopidogrel+Rosuvastatin+Bisoprolol+TrimetazidineDihydrochloride+Amlodipine+Telmisartan	5	4.27%
Clopidogrel+Atorvastatine+Bisoprolol+TrimetazidineDihydrochloride+Glyceryl Trinitrate (nitroglycerine)+Carvedilol	1	0.85%
Clopidogrel+Atorvastatine+TrimetazidineDihydrochloride+GlycerylTrinitrate (nitroglycerine)+Carvedilol+Ramopril	9	7.69%
Clopidogrel+GlycerylTrinitrate (nitroglycerine)+Atorvastatine+Carvedilol+Frusemide+Spironolactone	5	4.27%
Clopidogrel+GlycerylTrinitrate (nitroglycerine)+Atorvastatine+PropranololHydrochloride+Hydrochlorothiazide+Losartan Potassium	1	0.85%
Clopidogrel+TrimetazidineDihydrochloride+GlycerylTrinitrate (nitroglycerine)+ Ramopril+Propranolol Hydrochloride	2	1.70%
Clopidogrel+Atorvastatine+Hydrochlorothiazide+Losartan Potassium+Frusemide+Spironolactone	1	0.85%
Clopidogrel+Atorvastatine+PropranololHydrochloride+Frusemide+Spironolactone+TrimetazidineDihydrochloride	1	0.85%
Clopidogrel+Bisoprolol+TrimetazidineDihydrochloride+GlycerylTrinitrate (nitroglycerine)+Atorvastatine+Perindopril Erbumibe	1	0.85%

**Table 8. Cardiovascular drug prescribed with hepta therapy**

<b>Prescribed medicines</b>	<b>Frequency</b>	<b>Percent</b>
Clopidogrel+Atorvastatine+Glyceryl Trinitrate (nitroglycerine)+TrimetazidineDihydrochloride+Frusemide+Spironolactone+Ramipril	5	7.46%
Clopidogrel+Rosuvastatin+Bisoprolol+GlycerylTrinitrate (nitroglycerine)+TrimetazidineDihydrochloride+Frusemide+Spironolactone	9	13.43%
Clopidogrel+Atorvastatine+GlycerylTrinitrate (nitroglycerine)+TrimetazidineDihydrochloride+Carvedilol+Amlodipine+OlmesartanMedoxomil	3	4.48%
Amlodipine+Atenolol+OlmesartanMedoxomil+GlycerylTrinitrate (nitroglycerine)+TrimetazidineDihydrochloride+Frusemide+Spironolactone	1	0.49%
Clopidogrel+Atorvastatine+GlycerylTrinitrate (nitroglycerine)+TrimetazidineDihydrochloride+Carvedilol+Frusemide+Spironolactone	2	2.95%
Aspirin+Clopidogrel+Atorvastatine+GlycerylTrinitrate (nitroglycerine)+TrimetazidineDihydrochloride+Carvedilol+Amlodipine + Valsartan	4	5.97%
Clopidogrel+Atorvastatine+Bisoprolol+GlycerylTrinitrate (nitroglycerine)+TrimetazidineDihydrochloride+Frusemide+Spironolactone	23	34.32%
Clopidogrel+Atorvastatine+TrimetazidineDihydrochloride+GlycerylTrinitrate (nitroglycerine)+Losartan Potassium+Frusemide+Spironolactone	1	0.49%
Clopidogrel+Bisoprolol+TrimetazidineDihydrochloride+Frusemide+Spironolactone+Rosuvastatin+Ramipril	2	2.95%
Clopidogrel+Bisoprolol+TrimetazidineDihydrochloride+Glyceryl Trinitrate (nitroglycerine)+AzilsartanMedoxomil+Frusemide+Spironolactone	1	0.49%
Clopidogrel+Atorvastatine+Bisoprolol+TrimetazidineDihydrochloride+Glyceryl Trinitrate (nitroglycerine)+Amlodipine+OlmesartanMedoxomil	6	8.95%
Aspirin+Clopidogrel+Atorvastatine+Bisoprolol+TrimetazidineDihydrochloride+GlycerylTrinitrate (nitroglycerine)+Hydrochlorothiazide+Losartan Potassium	4	5.97%
Clopidogrel+Atorvastatine+GlycerylTrinitrate (nitroglycerine)+Losartan Potassium+Carvedilol+Frusemide+Spironolactone	1	0.49%
Ticagrelor+Rosuvastatin+Bisoprolol+TrimetazidineDihydrochloride+Glyceryl Trinitrate (nitroglycerine)+Carvedilol+Ramipril	1	0.49%
Clopidogrel+GlycerylTrinitrate (nitroglycerine)+Atorvastatine+TrimetazidineDihydrochloride+Frusemide+Spironolactone+Metoprolol Tartrate	2	2.95%
Clopidogrel+GlycerylTrinitrate (nitroglycerine)+Atorvastatine+TrimetazidineDihydrochloride+Hydrochlorothiazide+OlmesartanMedoxomil+Bisoprolol	2	2.95%

**Table 9. Cardiovascular drug prescribed with octa therapy**

<b>Prescribed medicines</b>	<b>Frequency</b>	<b>Percent</b>
Clopidogrel+Rosuvastatin+Bisoprolol+TrimetazidineDihydrochloride+Amlodipine+Olmesartan Medoxomil+Frusemide+Spironolactone	2	13.33%
Clopidogrel+Atorvastatine+Bisoprolol+GlycerylTrinitrate (nitroglycerine)+TrimetazidineDihydrochloride+ Frusemide+Spironolactone+Ramipril	6	40%
Clopidogrel+Atorvastatine+GlycerylTrinitrate (nitroglycerine)+TrimetazidineDihydrochloride+Frusemide+Spironolactone+Ramipril+Carvedilol	1	6.67%
Clopidogrel+Bisoprolol+Atorvastatine+TrimetazidineDihydrochloride+Losartan Potassium+Frusemide+Spironolactone+Cilnidipine	2	13.33%
Clopidogrel+Rosuvastatin+Carvedilol+TrimetazidineDihydrochloride+Glyceryl Trinitrate (nitroglycerine)+Frusemide+Spironolactone+Losartan Potassium	1	6.67%
Clopidogrel+Carvedilol+Ramipril+Trimetazidine Dihydrochloride+Glyceryl Trinitrate (nitroglycerine)+AzilsartanMedoxomilFrusemide+Spironolactone	1	6.67%

Clopidogrel+Atorvastatine+Trimetazidine Dihydrochloride+Glyceryl Trinitrate (nitroglycerine)+Carvedilol+Ramopril+Frusemide+Spironolactone	1	6.67%
Clopidogrel+Rosuvastatin+Bisoprolol+TrimetazidineDihydrochloride +Frusemide+Spironolactone+Amlodipine+OlmesartanMedoxomil	1	6.67%

But Iqbal Arain et al. reported the most monotherapy was Telmisartan with 11.11% whereas most common dual therapy was Telmisartan+Hydrochlorothiazide with 14.76% moreover among triple therapy most prescribing combination was Atenolol +Chlorthalidone+Telmisartan with 15.30% and finally, Atenolol+Chlorthalidone+Telmisartan+αMD was most frequently drug prescribed for quadruple therapy with 26.44%. While Krunal reported the greatest percentage of combination dual therapy was enalapril+atenolol with 22% followed by enalapril+amlodipine with 10.83% and greatest percentage of triple therapy were enalapril+atenolol+amlodipine with 8% followed by enalapril+atenolol+frusemide with 4.16% and enalapril+atenolol, amlodipine +furosemide were described the most frequent therapy prescribed for quadruple therapy with 1.66%.

And another study by V Pavani et al. observed that the majority of patients were prescribed with dual therapy with (48.3%), followed by monotherapy with (30.2%), and triple therapy with (13%) and the lowest percentage of patients were with (8.3%) who prescribed with more than 3 drugs [36]. In our study where the maximum number of patients was found in the age group of 40-50 years. While in India the average group for hypertension is greatest in the age group of 50-59 years in men and 60-64 in women in the city whilst in the village an age increase in both gender in the age group 50-64 [37].

Drug prescription pattern in our study observed that combination therapy was more commonly prescribed than monotherapy this result match with previous studied conducted by Kumar et.al [38] and also higher than those recorded in similar studies conducted in southwestern and northern regions of Nigeria [39,40].

## 5. CONCLUSION

CVDs are the most common and affected diseases in the present time. CVDs are not only affected alone but also caused due to the complications of other diseases. To treat these complex and well-known diseases doctors prescribed various types of drugs either alone or

in combination therapy. Our study results suggested that doctors are prescribing combination therapy most frequently than monotherapy which completely matched with the results published regarding this issues.

## CONSENT

The written consent was approved by administrative offices in the hospital.

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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