Pattern of Pharmacotherapy of Patients Having Ischemic Heart Disease at a Specialized Hospital in Dhaka, Bangladesh: A Survey Based Study on Patients Discharged from Hospital

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ABSTRACT

Aims: Study on pharmacotherapeutic pattern on cardiovascular patients is rarely done. Patient’s demography, drug usage and its clinical outcome are the basis for the assessment of cardiac treatment. The aim of this study to analyze the demography of patients of ischemic heart disease along with drug usage and current trends of practice in Bangladesh.

Methods: This study was carried out over a period of two months at different units of NICVD, situated at Dhaka, Bangladesh. A structured questionnaire was prepared to collect necessary data from patients. Descriptive statistics was used to represent the data.

Results: A total 363 discharged patients were interviewed followed by the verification of their discharge report and other medical documents to obtain necessary information. Out of 363 patients, frequency of male patients were high (74.66%, N= 271) than female patients (25.34%,

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N=92). There is a trend of ischemic heart disease development after 40 years of age and found significant in this study ($P<0.05$). In this study, 83.19% of total patients were above 40 years of age. We found a significant number of patients also had diabetes, asthma and chronic kidney disease. Treatment approach of ischemic heart disease includes pharmacotherapy, revascularization and percutaneous coronary intervention. 48 patients (13.22%) out of 363 went for revascularization and percutaneous coronary intervention was done to 25 patients (6.89%). The goal of Pharmacotherapy is to reduce blood cholesterol level, prevention of further platelet aggregation, reduction of angina and control of heart rate. In our study, we found that, statins, anti platelet and anti angina/anti ischemic drugs are core in the treatment of ischemic heart disease. Beta blocker, ACE inhibitor or ARB, CCB is commonly added to standard therapy to reduce mortality and for better therapeutic outcome. Among statins, the frequency of use of atorvastatin (87.93%), combination of clopidogrel and aspirin (73.90%) among anti platelet agents, combination of trimetazidine and nitroglycerine (61.56%) among anti angina/anti ischemic agents were highest. In our study, we found that bisoprolol was most commonly prescribed by the physicians among other beta blockers.

**Conclusion:** The outcome of this study will be helpful for young professionals, general physicians and other professionals involved in the health care setting for the rational use of drugs and to formulate effective strategy for the management of ischemic heart disease.

**Keywords:** Ischemic heart disease; statins; anti platelet; NICVD; beta blocker; anti-anginal/anti ischemic.

**ABBREVIATIONS**

ACE : Angiotensin Converting Enzyme  
ARB : Angiotensin Receptor Blocker  
CABG : Coronary Artery Bypass Graft  
CCB : Calcium Channel Blocker  
CKD : Chronic Kidney Disease  
DM : Diabetes Mellitus  
IsHD : Ischemic Heart Disease  
NICVD : National Institute of Cardiovascular Disease  
PCI : Percutaneous Coronary Intervention

1. INTRODUCTION

Cardiovascular diseases (CVD) may be defined as a group of disorders of heart and blood vessels categorized as coronary heart disease or ischemic heart disease (heart attack), cerebrovascular disease (stroke), disease of aorta and arteries including hypertension and peripheral arterial disease, congenital heart disease, rheumatic heart disease, cardiomyopathies and cardiac arrhythmias of varying patho-physiologic causes [1,2]. Stroke and heart attack are the acute events of cardiovascular disease featured by the blockage of blood flow to brain and heart. Strokes can be caused by bleeding from a blood vessel in the brain or by blood clots [1]. Cardiovascular disease is a global health burden and ranked one in terms of death worldwide. It is estimated that CVD’s cause for more than 17 millions death globally each year (30% of all deaths), 80% of which occur in low and middle income countries, which is expected that to rise more 38.9% by 2030 [3]. Recently, there is a significant decrease in mortality due to CVD’s in UK, but CVD’s treatment costs a lot and holds second position in terms of mortality [4]. There is also a significant decrease of mortality due to cardiovascular diseases in recent years in USA and this remarkable decline has been fueled by rapid progress in both prevention and treatment, including precipitous declines in cigarette smoking, improvements in hypertension treatment and control, widespread use of statins to lower circulating cholesterol levels, and the development and timely use of thrombolysis and stents in acute coronary syndrome to limit or prevent infarction [5].

Bangladesh is lower middle income country having lots of challenges in its health sector. Now a day's Bangladesh has been experiencing a epidemiological transition from communicable disease to non communicable disease and among all non communicable disease CVD’s ranked one in terms of death and disability [6,7]. Cardiovascular diseases associated with diabetes significantly increase the rate of complications and more difficult to manage. Bangladesh is a densely populated country and number of people suffering from cardiovascular disease is increasing day by day. If early prevention and long term rehabilitation program is not taken, will place a major burden in the health care system in Bangladesh and will leads
to disability of its people. The present study was undertaken to investigate the pharmacotherapy of ischemic heart disease patients along with the demography and associated co morbidity of discharged patients from a govt. based specialized cardiac hospital.

2. METHODS

This study was carried out over a period of two months among the patients discharged from different units of National Institute of Cardiovascular Diseases (NICVD), Dhaka, Bangladesh. Prior study, approval was taken from the authority to conduct this survey. This center serves as a referral center for patients requiring specialized cardio care and patients of all economic grades from all over the country come here to get proper treatment. A structured questionnaire was developed through different stages of cross check and analysis to collect data from the patients. Informed consent was taken from the patients that the information may be disseminated both nationally and internationally. A total 363 were enquired and their discharge prescriptions were verified to obtain other necessary information and pharmacotherapy. Patients who denied facing questionnaire and non cooperative were excluded from this study.

3. RESULTS

3.1 Demographic Characteristics of Patients

Out of 363 patients discharged from different units of NICVD (Table 1), frequency of male (N=271, 74.66%) was higher than female (N=92, 25.34%). In our study, we divide patients in different age group and our concern was to find out the highest prevalence of ischemia developed in any specific age group.

The risk of development of ischemic heart disease increase with age and in this study we found that 83.19% percent of patients suffered from ischemic heart disease were above 40 years of age and was statistically significant ($P<0.05$). According to this study, a total of 253 patients out of 363 patients were from Dhaka division (69.7%), ranked one in terms of patients divisional distribution followed by Chittagong division (N=63, 17.36%). Distribution of patients from different division of Bangladesh is shown in Fig. 1.

**Table 1. Demographic characteristics of ischemic heart disease patients discharged from NICVD**

| Sex       | No of patients (N) | Percentage (%) |
|-----------|--------------------|----------------|
| Male      | 271                | 74.66          |
| Female    | 92                 | 25.34          |
| Religion  |                    |                |
| Islam     | 343                | 94.49          |
| Hinduism  | 20                 | 5.51           |
| Age       |                    |                |
| <20       | 16                 | 4.41           |
| 20-30     | 12                 | 3.31           |
| 31-40     | 33                 | 9.09           |
| 41-50     | 106                | 29.2           |
| 51-60     | 81                 | 22.31          |
| >60       | 84                 | 23.14          |
| >70       | 31                 | 8.54           |
| Distribution of patients of different division |        |                |
| Dhaka     | 253                | 69.7           |
| Mymensingh | 5               | 1.38           |
| Rajshahi  | 8                  | 2.2            |
| Rangpur   | 5                  | 1.38           |
| Khulna    | 15                 | 4.13           |
| Barisal   | 9                  | 2.48           |
| Sylhet    | 5                  | 1.38           |
| Chittagong| 63                 | 17.36          |
| Comorbidity |                  |                |
| Only IsHD | 232                | 63.91          |
| IsHD+DM   | 70                 | 19.28          |
| IsHD+CKD  | 14                 | 3.86           |
| IsHD+DM   | 11                 | 3.03           |
| + CKD     |                    |                |
| IsHD+ Asthma | 31          | 8.54           |
| IsHD+CKD  | 3                  | 0.83           |
| + Asthma  | 2                  | 0.55           |
| IsHD+DM+  |                    |                |
| Cardiac intervention and surgery frequency |        |                |
| Only      | 290                | 79.89          |
| pharmacotherapy |                |                |
| CABG      | 48                 | 13.22          |
| PCI       | 25                 | 6.89           |

**Table 1.** Frequency of patients suffering from ischemic heart disease above 40 years of age were found significant statistically compared to the frequency of patients of ischemic heart disease below 40 years of age ($P<0.05$). t-test of two unequal variance was done to find out the P value.
Our effort was also to find out associated complications with ischemic heart disease patients. Different diagnostic approaches were involved to find out the associated complications of patients when they were admitted in the hospital. After verifying all the reports physician confirmed their severity of disease and associated complications. According to this study, patients suffering from both ischemic heart disease and diabetes was highest (N=70, 19.28%) (Table 1). Patients suffered from both ischemic heart disease with asthma holds the second position (N=31, 8.54%). In this study, we found that, 48 patients (13.22%) out of 363 went for coronary artery bypass grafting and 25 patients (6.89%) out of 363 went for percutaneous coronary intervention (Table 1 and Fig. 2)
3.2 Pattern of Pharmacotherapy

Pharmacotherapy was given to patients according to severity of disease and associated complications. Aim of this study was to investigate the pattern of pharmacotherapy and find the frequency of specific class of drug prescribed in the treatment of ischemic heart disease. During this study, we found that, all the prescription contained multiple medications. In this study, we found that, the use of anti platelet was highest in the treatment (No of prescription: 341, Prescription rate: 93.94%) followed by lipid lowering agent (No of prescription: 323, Prescription rate: 88.98%) and anti ischemic/anti anginal drug (No of prescription: 320, prescription frequency: 88.15%), (Table 2).

Most of the prescriptions contained combination drug product of a single therapeutic category and was observed in case of anti platelet, anti ischemic/anti angina and anti hypertensive agents (Table 3). In terms of use of anti platelet agents, frequency and prescription rate of combination of clopidogrel and aspirin was highest (No of prescription: 252, prescription rate: 73.90%). In terms of use of single anti platelet agent in a prescription, frequency of use of clopidogrel was most compared to single low dose of aspirin (No of prescription: 73 Vs 16, Prescription rate: 21.41 Vs 4.69). Patients suffering from ischemic heart disease required anti ischemic/anti anginal drug therapy. Combination use of nitroglycerine and trimetazidine was highest (No of prescription: 197, prescription rate: 61.56) compared to single use of either nitroglycerine (26.25%) or trimetazidine (12.19%). In our study, we found no combination use of lipid lowering agents. Use of atovastating was highest (No of prescription: 284, Prescription rate: 87.83%) compared to other lipid lowering agents (Table 3). We found 143 discharge order containing diuretic and among different diuretic combination use of frusemide and spironolactone was highest (86.71%) compared to single use of any other diuretic.

4. DISCUSSION

Investigation of clinical studies and pharmacotherapeutic pattern on cardiovascular patients is rarely done in our country and such type of study will allow in depth exploration of health problem associated with cardiovascular disease and better understanding of pharmacotherapy to young professionals to serve the patients. This study was carried out in a govt. based specialized cardiac center for obvious reason.

Number of male patients was higher compared to the female patients discharged from hospital. Generally, cardiovascular disease develops 7-10 years later to men and is still the major cause of death in women. The risk of cardiovascular disease in women is often underestimated as there is a misperception that females are protected from heart disease. Level of self awareness regarding cardiovascular disease in women may be another factor and needs further investigation [8]. Cardiovascular disease usually develop in the late stage of life. In a review of global burden of cardiovascular disease, proportion of death was highest after 50 years of age and ranked one in terms of death compared to other chronic diseases [9]. In this study, we found the highest frequency of patients after 40 years of age. Significant number of patients out from the Dhaka comes to this cardiac center to get their treatment. In our study, we found the patients load form Dhaka division was highest compared to other division. As, in every division of this country, medical college based hospital having all kinds of facility for the intensive treatment of cardiovascular disease is a reason for highest patient frequency from Dhaka division for treatment. Patients with diabetes are at increased risk of a wide range of complications and comorbidities, which adversely affect quality of life and mortality. Cardiovascular diseases, most commonly ischemic heart disease is the primary causes of morbidity and mortality among patients with diabetes. Uncontrolled glucose level leads micro and macrovascular complications which strongly related to development of ischemic heart disease and in long run affects major physiological system significantly increase the rate of suffering from, hyperlipidemia, stroke, retinopathy, nephropathy which will ultimately leads to multiple organ failure if there is no proper control over blood glucose level [10]. In this study, majority of our patients were suffering from ischemic heart disease only, but in terms of co-morbidity, patients of suffering from diabetes and ischemic heart disease was highest, 19.28% of total patients (Table 1).

Treatment of ischemic heart disease involves pharmacotherapy, percutaneous coronary intervention or surgical revascularization, may be combination of them depending on patients
Table 2. Prescription frequency and prescription rate of different therapeutic class

| Therapeutic class            | No of prescription | Percent of (%) different groups of medicines |
|------------------------------|--------------------|---------------------------------------------|
| Positive inotropic agent     | 49                 | 13.50                                       |
| Diuretic                     | 143                | 39.39                                       |
| ACE inhibitor                | 191                | 52.62                                       |
| B blocker                    | 280                | 77.13                                       |
| ARBs                         | 45                 | 12.40                                       |
| CCB                          | 4                  | 1.10                                        |
| Anti platelet                | 341                | 93.94                                       |
| Anti ischemic/Anti anginal   | 320                | 88.15                                       |
| Lipid lowering agent         | 323                | 88.98                                       |

Table 3. Prescription frequency and prescription rate of drugs from different therapeutic class

| Drugs                        | No of prescription | Percent of prescription (%) |
|------------------------------|--------------------|-----------------------------|
| Positive inotropic agent     | 49                 | 100                         |
| Digoxin                      | 49                 | 100                         |
| Diuretic                     | 143                | 86.71                       |
| Frusemide and spironolactone | 124                | 11.89                       |
| Indapamid                    | 2                  | 1.40                        |
| ACE inhibitor                | 191                | 98.43                       |
| Ramipril                     | 188                | 1.05                        |
| Lisinopril                   | 2                  | 1.05                        |
| Perindopril                  | 2                  | 1.05                        |
| β blocker                    | 280                | 55.56                       |
| Bisoprolol                   | 77                 | 27.5                        |
| Carvediolol                  | 129                | 46.07                       |
| Metoprolol                   | 74                 | 26.43                       |
| ARBs                         | 45                 | 44.44                       |
| Olmesartan                   | 20                 | 55.56                       |
| Losartan                     | 25                 | 55.56                       |
| CCB                          | 4                  | 50                          |
| Amlodipine                   | 2                  | 50                          |
| Diltiazem                    | 2                  | 50                          |
| CCB with β blocker           | 7                  | 100                         |
| Amlodipin & Atenolol         | 7                  | 100                         |
| CCB with ARBs                | 3                  | 100                         |
| Anti platelet                | 341                | 73.90                       |
| Clopidogrel & Aspirin        | 252                | 21.41                       |
| Clopidogrel                  | 73                 | 4.69                        |
| Low dose aspirin             | 16                 | 4.69                        |
| Anti ischemic/Anti anginal   | 320                | 61.56                       |
| Nitroglycerin & trimetazidine| 197                | 26.25                       |
| Nitroglycerin                | 84                 | 12.19                       |
| Trimetazidine                | 39                 | 87.93                       |
| Lipid lowering agent         | 323                | 7.74                        |
| Atorvastatin                 | 284                | 3.10                        |
| Rosuvastatin                 | 25                 | 0.93                        |
| Pitavastatin                 | 10                 | 0.31                        |
| Fluvastatin                  | 3                  | 0.31                        |

condition and intensity of disease [11]. In this study, we found that most our patients were treated by drug therapy only and asked them for follow up visit at specific time interval to monitor the pharmacotherapy for better health outcome. Only 13.22% (N=48) of total patient undergone
for revascularization successfully and discharged from hospital. Pharmacotherapy of ischemic heart disease involves drugs from different categories like, lipid lowering agent, anti platelet agent, anti angina/anti ischemic agent, \( \beta \) blockers, ACE inhibitor, angiotensin receptor blocker, calcium channel blocker, diuretic, positive ionotropin na agent [11]. Platelet plays an essential role in the pathogenesis of ischemia in coronary circulation, platelet aggregates together to form thrombus leads blockage in coronary circulation. Anti platelet drug therapy therefore is obvious in the management of ischemic heart disease as a primary and secondary preventive measure to reduce mortality [12]. Low dose aspirin and clopidogrel are most widely used anti platelet agent in Bangladesh and in many cases, depending on the intensity of disease; combination of low dose aspirin and clopidogrel is used in the management of ischemia. Blood cholesterol level is an important risk factor for the development of ischemic heart disease. High level of blood cholesterol leads to development of atherosclerosis results restricted blood flow leads to less supply of oxygen to heart muscle resulting chest pain. High blood cholesterol level is also associated with the patients of diabetes and is one of the vital reasons that of high risk factor for the diabetes patients to develop ischemic heart disease. Other risk factor for high blood cholesterol includes life style and food habit [13,14]. Among of many lipid lowering agents, statins are commonly used to reduce of cardiovascular events and also in the treatment of dyslipidemia. There are many reports have demonstrated the efficacy of statins in patients with ischemic heart disease. The West of Scotland Coronary Prevention Study (WOSCOPS) demonstrated statin induced reduces of cardiovascular events and cardiovascular mortality in patients with high cholesterol level but without ischemic heart disease. In the Cholesterol and Recurrent Events (CARE) trial, the cardioprotective effects of statins were also demonstrated in patients with myocardial infarction and average cholesterol levels [15]. Among many statins employed, Atorvastatin in its various dose ranging from 10-40mg had highest frequency of use. Beta blockers, ACE inhibitors, Angiotensin receptor blockers (ARBs), Calcium channel blockers are commonly employed as an antihypertensive agent, but in current practice have multiple functions in the management of cardiovascular patients. Depending on intensity of ischemic heart disease, combination these drugs are used for proper management except there is any contraindication for patients. The selective beta blockers like bisoprol, atenolol administration to patients with coronary artery disease resulted in increased survival and improved quality of life patients and therefore they are a key group of drugs for their management. In a clinical trial of newly diagnosed coronary heart disease patients, treatment with beta blockers was associated with lower risk of cardiac events. The Meta analysis of several randomized clinical trials demonstrated that ACE inhibitors or ARBs added to standard pharmacotherapy in patients with ischemic heart disease and normal systolic function significantly reduces total mortality [16,17,18,19]. In our study, we found similarities towards the usage pattern of beta blocker and ACE inhibitors in the treatment of ischemic heart disease patients. In terms of usage frequency, the use of ARB and Calcium channel blocker are less than beta blocker and ACE inhibitor. Patients suffering from ischemic heart disease may be hypertensive and for proper management of hypertension, single and combination use of such agents are also required. In our study we found the combination use of Frusemide and spironolactone compared to single use of either agent or any other single diuretic. As such combination of diuretic does not cause electrolyte imbalance compared to single use of diuretic, preferred by most physicians. Diuretic treatment in combination with standard therapy of ischemic heart disease might brings positive outcome as diuretics reduces peripheral resistance ultimately reduces cardiac work load and prescribed to patients upon consideration of overall pathological condition [20].

5. CONCLUSION

This survey based study suggests that, statins, anti platelet and anti anginal/ischemic drugs are major cardiovascular drugs used in the treatment of ischemic heart disease. Addition of beta blockers, ACE inhibitors, ARBs, diuretics to standard therapy bring better therapeutic outcome and reduce ischemic mortality rate. Depending on the intensity of pathology, revascularization and PCI is done to patients. As the goal of ischemic therapy is to lower the blood cholesterol level, prevention of further platelet aggregation, control of hypertension in hypertensive ischemic patients, a combination of drugs from different pharmacological category is required. Along with pharmacotherapy and surgical intervention, cardiac rehabilitation and change in life style is essential for better therapeutic outcome. High blood cholesterol,
diabetes, hypertension associated with lifestyle is major risk factors for the development of ischemic heart disease. Findings of this study are a current scenario of demography of patients of ischemic heart disease and trends of pharmacotherapy by the physicians at a specialized cardiac hospital. As this study was done a specialized cardiac center, variation of treatment pattern may be found with other generalized hospital.

CONSENT AND ETHICAL APPROVAL

Written informed consents were obtained from the patients that the information may be disseminated nationally and internationally. No violation of ethics was done during this study and this study was conduct according to the rules of hospital. All authors read and provide final approval of this manuscript to publish.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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