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Study on the Risk Factors and Pharmacological Management of Atrial Fibrillation

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ABSTRACT

Background: Atrial Fibrillation is a leading cause of cardiac death, increasing with age worldwide and this study tries to find out its risk factors and pharmacological management.

Methodology: The study was a hospital based prospective, cross-sectional conducted at In-patient department of Manmohan Cardiothoracic Vascular and Transplant Center (MCVTC) for a period of three months from July 2019 to September 2019. It was so chosen for the study site because it is the referral center for heart disease and receives patients from all over the country

Results: The population in this study consisted of 100 patients, 51% were males and 49% were females.The mean age of AF patients in this study population was 61.84 ± 18.962 (range 60-69) . This study showed that people were suffered from AF due to their age (29%), Heart Diseases(23%), High Blood Pressure(17%), Alcohol(6%), Obesity(6%), COPD(8%), Diabetes Mellitus(7%), Hypothyroidism(1%), Smoking (2%) and Chronic Kidney Disease(1%).The 44% of the study population showed symptom of shortness of Breath, 25% had Chest pain while 9% of the study population had no symptoms. This study showed use of drugs like Beta Blockers (24%),Cardiacglycosides(20%),Anticoagulant(17%) ,Antiplatelet(18%),Calciumchannelblockers (18%), Anti-arrhythmic (3%) and NSAIDS (Aspirin).The estimated average cost of drugs used in AF, per day was found to be NRs. 27.39±66.69 ranges from NRs.1.13 to NRs.606.18.

Conclusion: This study showed majority of AF patient were males compared to females. The first line drugs for AF management was rate control drugs like betablockers and calcium channel blockers adding digoxin.

Key Words: Risk Factors, AF

I. Introduction

1.1 Background

Atrial fibrillation (AF) is the most common arrhythmia worldwide with increasing frequency noted with age. Despite good progress in the management of patients with AF, this arrhythmia remains one of the major causes of stroke, heart failure, sudden death, and cardiovascular morbidity in the world. 20–30% of all strokes are due to AF. A growing number of patients with stroke are diagnosed with ‘silent’, paroxysmal AF. 10–40% of AF patients are hospitalized every year. Quality of life is impaired in AF patients independent of other

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cardiovascular conditions(1). Hyperthyroidism is a well-known cause of atrial fibrillation with a 16%–60% prevalence of atrial fibrillation in patients with known hyperthyroidism Ross et al. (2016)(2).

AF is an irregular or abnormal heart rate. The resting heart rate of someone without AF is usually between 60-100 beats per minute but this number is usually over 100 beats per minute in AF. It is usually the result of an underlying condition such as hypertension (high blood pressure) or having an overactive thyroid but may develop for no known reason. In this circumstances , the person is said to have 'lone atrial fibrillation'. AF can affect people of any age but is rare in children and is more common in the elderly population. The adjusted incidence and prevalence of AF is roughly double for each advancing decade of life and at any given age, men have an approximately 50% higher incidence of AF than women. Several previous studies have reported the prevalence of AF ranging from 1.2% to 2.8% in persons aged 60 through 69 years to 7.3% to 13.7% in persons aged 80 years or older. Among the various causes of AF, hypertension, rheumatic valvular heart disease, and congenital heart disease are the most commonly related conditions. Other causes include congestive heart failure, coronary artery disease, dilated, hypertrophic and restrictive cardiomyopathies and pulmonary hypertension(3).

1.2 Symptoms

Some people with atrial fibrillation have no symptoms and are unaware of their condition until it's discovered during a physical examination. Those who do have atrial fibrillation symptoms may experience signs and symptoms such as:

1. Palpitations, which are sensations of a racing, uncomfortable, irregular heartbeat or a flip-flopping in your chest,
2. Dizziness,
3. Shortness of breath,
4. Chest pain,
5. Fatigue,
6. Syncope,
7. Dyspnea,
8. Orthopnea (4).

AF can be categorized into several types:

1. First-diagnosed AF: AF that has not been diagnosed before, regardless of how long it has been present for.
2. Paroxysmal AF: Occasional AF that stops ≤7 days
3. Persistent AF: Continuous AF that lasts longer than 7 days.
4. Early Persistent AF: Continuous AF that lasts 7 days to 3 months.
5. Long-standing Persistent AF: Continuous AF that lasts >12 months
6. Permanent AF: Represents a therapeutic attitude, where the presence of AF is accepted by the patient and physician, and no more attempts will be made to restore or maintain sinus rhythm(5).

1.3 Causes of Atrial fibrillation

Atrial fibrillation caused by valvular disease carries a higher risk of stroke than nonvalvular atrial fibrillation(4).Abnormalities or damage to the heart's structure are the most common cause of atrial fibrillation. uncontrolled high blood pressure enhances the risk of stroke and bleeding events and may lead to recurrent AF(1).Possible causes of atrial fibrillation include:

1. High blood pressure,
2. Heart Failure,
3. Valvular disease,
4. Dilated Cardiomyopathy,
5. Myocardial infraction,
6. Thyroid disease,
7. Coronary Obstructive Pulmonary Disease (COPD),
8. Previous heart surgery(4).

However, some people who have atrial fibrillation don't have any heart defects or damage, a condition called lone atrial fibrillation. In lone atrial fibrillation, the cause is often unclear, and serious complications are rare.

1.4 Prevalence and incidence

In the United state alone, 2.7 million to 6.7 million people have AF. In the European Union, AF prevalence in 2010 was estimated at 8.8 million among adults older than 55 years. In Asia it is estimated that by 2050, there will be 72 million patients with AF and 2.9 million AF-associated strokes. Beyond North America and Europe, epidemiological assessment is scarce, with estimated AF prevalence ranging widely from 0.1% in India and 3% in Israel to 4% in Australia. The global burden of AF in 2010 was estimated at about 33.5 million, with close to 5 million new cases diagnosed annually(6).

In 2010, the estimated numbers of men and women with AF worldwide were 20.9 million and 12.6 million, respectively, with higher incidence and prevalence rates in developed countries. One in four middle-aged adults in Europe and the US will develop AF. By 2030, 14-17 million AF patients are anticipated in the European Union, with 120000–

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215000 newly diagnosed patients per year. Estimates suggest an AF prevalence of approximately 3% in adults aged 20 years or older, with greater prevalence in older persons and in patients with conditions such as hypertension, heart failure, coronary artery disease (CAD), valvular heart disease, obesity, diabetes mellitus, or chronic kidney disease (CKD). The increase in AF prevalence can be attributed both to better detection of silent AF, alongside increasing age and conditions predisposing to AF(1).

Current AF prevalence in the general adult population of Europe ranges from 1.9% to 2.9% depending on the country (Zoni-Berisso et al., 2014) (7). AF prevalence varies with age and sex. In individuals younger than 50 years and older than 80 years, AF prevalence ranges from 0.1% to 10%–18%, respectively (Zoni-Berisso et al., 2014)(7). Globally, AF prevalence is higher in men than in women, with a 1.5: 1 ratio considering worldwide data (Chugh et al., 2014)(7).

In North American and European populations, the age-adjusted incidence of AF has been estimated to be 1.5 to 2 times higher in men than in women. The Framingham Heart Study and the Olmstead County, Minnesota study have reported the AF incidence (per 1000 person-years) in women to be 1.6 and 2.7, respectively, compared with 3.8 and 4.7 in men. The lower AF incidence among women seems to be consistently observed outside North America and Europe, although fewer studies are available. AF incidence has been shown to increase disproportionately with increasing age in both women and men, reaching as high as 30.4 per 1000 person-years in women and 32.9 per 1000 person-years in men by age 85–89 years.

Similarly to incidence, age-adjusted prevalence of AF has been reported to be lower in women than in men in North America and Europe. A large retrospective study of older adult (≥ 65 years) U.S. Medicare recipients reported the prevalence of AF to be 7.4% in women and 10.3% in men in 2007.The Framingham Heart Study showed similar results; the age-adjusted period prevalence (per 1000 person years) during 1998–2007 was 49.4 in women compared with 96.2 in men. In addition, a community-based, randomized, controlled trial in Sweden, in which individuals aged 75–76 years were enrolled for AF screening, showed a lower prevalence of this arrhythmia in women than in men (9.2% versus 15%). Because women typically live longer than men, the absolute number of women exceeds the number of men with AF in Medicare data.

The overall prevalence of AF varies by ancestry; prevalence studies of Asian populations have been less consistent than those of North American and European populations. Two large cross-sectional studies of Chinese cohorts reported that age-adjusted prevalence of AF was similar in women and men (0.76% versus 0.78% and 0.63% versus 0.66%), whereas data from Singapore indicated that prevalence was lower in women (0.6% versus 2.6%).Other East Asian studies also have reported lower prevalence of AF in women compared with men; however, the results are not directly comparable owing to a lack of age adjustment(8).

The direct costs of AF already amount to approximately 1% of total healthcare spending in the UK, and between 6.0–26.0 billion US dollars in the US for 2008 driven by AF-related complications (e.g. stroke) and treatment costs (e.g. hospitalizations). These costs will increase dramatically unless AF is prevented and treated in a timely and effective manner(1).

Systematically reviewed population-based studies of AF published 1980–2010, the estimated number of individuals with AF globally in 2010 was 33·5 million [(20·9 million males and 12·6 million females)]. A survey of 136 Ethiopian cardiac outpatients with AF in whom the mean age was 41 years, and the common etiological causes of AF were rheumatic heart disease (66%), hypertension (10%), cardiomyopathy (9%), and ischemic heart disease (7%). In contrast, in a review of 291 predominantly Chinese patients with AF who were treated at a regional hospital in Hong Kong, the mean age was 73 years, and the common etiological factors were hypertension (29%), vascular disease (25%), and rheumatic heart disease (18%). However, this trend has changed in Japanese patients with AF, since the predominant etiological factor according to recent Japanese studies has been hypertension, and not ischemic disease. The associated cardiovascular diagnoses were hypertension in 59.1% of the patients, coronary artery disease in 10.1%, cardiomyopathy in 8.3%, valvular heart disease in 13.7%.(9) 31% of patients with AF have some form of valvular heart disease(1).

Increased BMI, obesity, and smoking are associated with venous thromboembolism (VTE). In the Norwegian study, the mean age and BMI were 64 years and 26.9 kg/m2 for AF alone, 57 years and 26.7 kg/m2 for VTE alone, and 68 years and 29.2 kg/m2 for AF and VTE combined(3).

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1.5 Rationale of study

Atrial fibrillation is an increasing burden worldwide. According to ESC Guidelines 2016 10–40% of AF patients were hospitalized every year (1). Despite the increased awareness and enhanced detection of AF over the past few decades, one-third of the total AF population is asymptomatic, and a considerable proportion of patients with unknown AF can be detected by mass screening; therefore, AF burden worldwide should be considerably underestimated. AF is associated with an increased risk for morbidity, with 5-, 3-, and 2-fold increased risk for stroke, heart failure, and dementia, respectively, and 40% to 90% increased risk for mortality.

In the United States, AF-related Medicare expenses are approximately $16 billion annually. In Australia, the number of AF hospitalizations tripled between 1993 and 2007, with the rate of increase greatly surpassing those for heart failure or myocardial infraction. More recently, tremendous progress has been made in AF treatment and AF-related stroke prevention. Nevertheless, new technologies place even more remarkable economic demand on us. With increased life expectancy in both developing and developed countries, AF is expected to cause more harm and to be costlier. Dr.Eugene Braunwald pointed to AF as a new cardiovascular disease epidemic of the 21st century.(6) To reduce AF burden, it was essential to embrace prevention as a priority. So inorder to prevent the AF I felt the need of study on the risk factors of AF. It was estimated that at least 80% of coronary heart disease could be prevented if the major risk factors were eliminated. However, cardiology practice focused on AF treatment and AF-related stroke prevention rather than preventing AF itself, therefore I preffered to study on the pharmacological management of AF and since it's costlier due to new technologies and medicines I felt to estimate the cost of drugs used in AF management.

As per the study carried out at Sahid Gangalal National Heart Center from September 2014 to November 2014 on prevalence of AF in patients attending Emergency Department it was found that AF was a serious cardiovascular disease. Among the 1012 patients, 553 (54.6%) were male and 459(45.4%) were female. A total of 140 patients (13.8%) patients had AF. The mean age of patients with AF was 55 years. The prevalence of AF was higher in female than male (19.2% Vs 9.4%). Among the Rheumatic heart disease patients, seventy percentages of them had AF. Dyspnea was the commonest symptom of patients with AF followed by palpitation. Electrocardiogram, demographic features, diagnosis and clinical presentations were reviewed .The prevalence of AF in that study was higher than in western world mainly because of endemic rheumatic heart disease(10).If atrial fibrillation is not managed at its proper time then it may lead to stroke and heart failure. So, I found it's a very important topic of discussion on its risk factors and about its pharmacological management along with the estimation of cost of used drugs in AF.

II. Research objectives

2.1 General objective:

To study the risk factors and pharmacological management of Atrial Fibrillation (AF).

2.2 Specific Objectives:

1. To study the demographic profile of patients suffering from AF.
2. To enlist the potential risk factors for AF.
3. To study the drugs prescribed and management pattern in treatment of AF.
4. To estimate the cost of drugs used in AF per day.
5. To observe the symptoms associated to AF
6. To study the diagnostic pattern of AF.

III. Literature Review

AF is the most common cardiac arrhythmia and a major source of morbidity and mortality, its prevalence increases with age(4). AF is an irregular heart rhythm. The upper chamber (atria) of the heart quiver and don't empty into lower chambers (ventricles) completely. AF is an irregular or abnormal heart rate. The estimated prevalence of AF is 0.4–1% in the general population, increasing with age, and it is associated with an higher long-term risk of stroke, heart failure, and all-cause mortality, especially in women.

Management of patients with AF requires knowledge of its pattern of presentation (first diagnosed, paroxysmal, persistent, long-standing, and permanent AF, underlying conditions, and decisions about restoration and maintenance of sinus rhythm, control of the ventricular rate, and antithrombotic therapy.

3.1 Risk factors

Certain factors may increase your risk of developing atrial fibrillation.These include:

1. **Age:** Risk of AF increases along with age.

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2. **Heart disease:** Anyone with heart disease such as heart valve problems, congenital heart disease, congestive heart failure, coronary artery disease, or a history of heart attack or heart surgery has an increased risk of atrial fibrillation(4).
3. **High blood pressure:** Having high blood pressure, especially if it's not well-controlled with lifestyle changes or medications, can increase your risk of atrial fibrillation(9).
4. **Drinking alcohol:** For some people, drinking alcohol can trigger an episode of atrial fibrillation. Binge drinking may put you at an even higher risk(11).
5. **Obesity:** People who are obese are at higher risk of developing atrial fibrillation. In the Norwegian study, the mean age and BMI were 64 years and 26.9 kg/m2 for AF alone, 57 years and 26.7 kg/m2 for VTE alone, and 68 years and 29.2 kg/m2 for AF and VTE combined(3).
6. **Chronic Kidney Disease:** AF is present in 15–20% of patients with CKD (1).
7. **Smoking:** Smoking is associated with incident AF. The FHS showed that within the last 50 years, the frequency of smoking among participants with new-onset AF has decreased. Between 1998–2007, only 12.7% of AF-affected participants were smokers as compared to 15.6% in the prior decade(3).
8. **Diabetes Mellitus:** The FHS showed that men and women with diabetes had a 40% and 60% increased risk of AF, respectively. Level of blood glucose may be more predictive than actual diagnosis of diabetes in older adults. A meta-analysis of cohort and case-control studies found that patients with diabetes or impaired glucose homeostasis had a 34% greater risk of AF than individuals without diabetes. A causal association is supported by evidence that worse glycemic control and longer duration of diabetes are associated with increased AF risk. The estimated risk of AF increases by 3% per additional year of diabetes. The risk of AF in patients with diabetes for >10 years was 64% but only 7% in those with diabetes ≤5 years(3).
9. **COPD:** Among COPD patients, the prevalence of AF was very high (14.3%)(12).
10. **Thyroid Problems:** Both hypo-and hyperthyroidism are associated with atrial fibrillation, but the latter is more widely researched. Studies showed that the link between hypothyroidism and atrial fibrillation is less recognized. Hyperthyroidism is a well-known cause of AF with a 16%–60% prevalence in patients with known hyperthyroidism Ross et al. (2016)(2).The Canadian Registry of Atrial Fibrillation Investigators reported that 1.5% of 726 patients with atrial fibrillation had hypothyroidism over a period of 1.7 years(13)

3.2 Complications

Sometimes atrial fibrillation can lead to the following complications:

1. **Stroke:** 20–30% of all strokes are due to AF. A growing number of patients with stroke are diagnosed with ‘silent’, paroxysmal AF(1). In atrial fibrillation, the chaotic rhythm may cause blood to pool in your heart's upper chambers (atria) and form clots. If a blood clot forms, it could dislodge from your heart and travel to your brain. There it might block blood flow, causing a stroke.The risk of a stroke in atrial fibrillation depends on your age (you have a higher risk as you age) and on whether you have high blood pressure, diabetes, a history of heart failure or previous stroke, and other factors. Certain medications, such as blood thinners, can greatly lower your risk of a stroke or the damage to other organs caused by blood clots(14).
2. **Heart failure:** Atrial fibrillation, especially if not controlled, may weaken the heart and lead to heart failure (a condition in which the heart can't circulate enough blood to meet the body's needs).

3.3 Prevention

To prevent atrial fibrillation, it's important to live a heart-healthy lifestyle to reduce the risk of heart disease. A healthy lifestyle may include:

1. Eating a heart-healthy diet
2. Increasing the physical activity
3. Avoiding smoking
4. Maintaining a healthy weight
5. Limiting or avoiding caffeine and alcohol
6. Reducing stress, as intense stress and anger can cause heart rhythm problems
7. Using over-the-counter medications with caution, as some cold and cough medications contain stimulants that may trigger a rapid heartbeat(6).

3.4 Diagnosis

Patients with atrial fibrillation may present with mild or no symptoms, heart failure, myocardial infarction, stroke, or hemodynamic collapse. Pulse rate is sensitive, but not specific for diagnosis, and suspected atrial fibrillation should be confirmed with 12-lead electrocardiography. Key electrocardiographic findings are a loss of P waves and replacement by fibrillatory waves; erratic activation of the ventricles resulting in an irregular, rapid heart rate (usually 90 to 170bpm).

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The history and physical examination are focused on identifying risk factors, comorbidities, and physical findings of atrial fibrillation. Cardiac and noncardiac etiologies must be considered. Onset and duration of arrhythmia, aggravating and alleviating factors, and severity of associated symptoms should be elicited. Sleep apnea, thyroid disease, recent illnesses, and the use of any new medications or supplements must be considered. Physicians also should inquire about use of illicit drugs, alcohol, and diet pills. The physical examination should assess blood pressure, heart rate, presence of cardiac murmurs (such as aortic or mitral stenosis), and evidence of heart failure(4).

3.5 Pharmacological Management:

All AF patients needed rate versus rhythm control, and anticoagulation. Treatment was based on decisions made regarding when to convert to normal sinus rhythm vs. when to treat with rate control, and in either case, how to best reduce the risk of stroke.

For most patients, rate control was preferred to rhythm control by rate control drugs (beta blockers or non-dihydropyridine calcium channel blockers as first-line agents to achieve target heart rate (< 80 bpm resting or < 110 bpm in asymptomatic patients with normal left ventricular function), consider adding digoxin. Amiodarone may be used if firstline options do not work (4).

Drugs used in AF management:

1. Beta-Blockers: Metoprolol ,Bisoprolol, Atenolol, Sotalol
2. Calcium Channel Blockers: Verapamil, Diltiazem
3. Cardiac Glycoside: Digoxin(5)

Antiarrhythmic Drugs:

4. Potassium Channel Blockers: Amiodarone
5. Sodium channel blockers: Disopyramide, Flecainide, Procainamide, Propafenone, Quinidine(15)

Anticoagulation may be with warfarin, apixaban, dabigatran, etexilate, rivaroxaban, edoxaban, or a vitamin K antagonist(16). Anticoagulation is an essential part of AF management. It significantly reduces the risk of stroke, but increases the risk of bleeding. Firstly assessed risk of stroke with CHA2DS2-VASc score and risk of bleeding with HAS-BLED score then discussed anticoagulation risks and benefits with patient and recommendations were made. If CHA2DS2-VASc = 0: no; = 1: may consider; ≥ 2: yes

Warfarin lowers the risk of thromboembolic events, but it has a narrow therapeutic range, multiple drug and food interactions, and requires frequent blood monitoring of the international normalized ratio. Even with optimal compliance, patients using warfarin are within the therapeutic range (2 to 3 for nonvalvular atrial fibrillation) only 55% to 66% of the time. Aspirin alone or in combination with clopidogrel is an option for patients who decline or are unable to tolerate anticoagulants, or who are at low risk of stroke as indicated by a CHADS2 score of 0 or 1.1,2

CHA2DS2-VASc = congestive heart failure; hypertension; age 75 years or older [doubled]; diabetes mellitus; stroke, transient ischemic attack, thromboembolism [doubled]; vascular disease; age 65 to 74 years; sex category; DOACs = direct oral anticoagulants; HAS-BLED = hypertension, abnormal renal function and liver function, stroke, bleeding, labile international normalized ratio, elderly [older than 65 years] (4).

Diabetes and AF frequently coexist because of associations with other risk factors. Diabetes is a risk factor for stroke and other complications in AF. Treatment with metformin seems to be associated with a decreased long-term risk of AF in diabetic patients and may even be associated with a lower long-term stroke risk (1).

3.6 Cost:

Direct costs attributable to AF in the US, based on the findings from an insurance database, were $15,553 per year in 2002 with 75% of the cost related to in-patient care. Each AF related hospitalization in another group of Medicare insured patients cost an average of $11,085 US dollars (2004-07) with each AF recurrence adding $1,600 to the bill.(17)

IV. Methodology

4.1 Study Design:

The study was a hospital based prospective, cross-sectional conducted at Manmohan Cardiothoracic Vascular and Transplant Center (MCVTC) for a period of three months from July 2019 to September 2019. It was so chosen for the study site because it is the referral center for heart disease and receives patients from all over the country.

4.2 Study Population:

The study was done on the In-patient department of MCVTC. The data was collected from the inpatient of any age diagnosed with AF.

4.3 Sampling Method

Since my study was only about the risks and pharmacological management of AF it was purposive sampling. All the patients who were

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diagnosed with AF and were willing to give consent were included in the study.

4.4 Study Materials:

a) Patient data collection form:
Data was collected by using a semi- structured data collection form (pro-forma) which contained patient demographics, history, clinical features, Diagnosis, risk factors.

b) Patient consent form:
The consent was collected by using semi designed consent form which was prepared in two languages English and Nepali. Verbal and written consent of each patient was taken properly.

4.5 Study Variables:

Independent variables:

- Patient demographics
- Risk Factors of AF

Dependent variable:

- AF

4.6 Criteria for Sample Selection:

Inclusion criteria:

- Patient diagnosed as AF
- In-patients admitted in MCVTC

Exclusion criteria:

- Patients or caretaker who were not willing to give consent

4.7 Data Processing and analysis:

The data was collected through the help of a data collection sheet which included patient demographics, the diagnosis result and risk factors of Inpatients.

The data were analyzed with applying descriptive quantitative analytical statistics in Microsoft Excel 2007 and Statistical Package for Social Science (SPSS) version 18 and the results were represented in tables and figures.

4.8 Validity and reliability

To ensure the reliability and validity of the study, different measures were taken. Intensive review of relevant literature was done throughout the study. Data collection sheet was prepared with the consultation of supervisors and data was checked for errors and omissions daily.

4.9 Ethical Consideration

As the study deal with the sensitive issue of human subjects so all effort was taken to safeguard the rights of patients. The study was approved by Manmohan Cardiothoracic Vascular and Transplant Center (MCVTC) prior starting the study and Department of pharmacy NMCAL , NIST. The written or verbal consent whichever applicable was taken from the patient after clarifying the objectives and purpose of the study. The identity and sensible information of patients were kept confidential. The opportunity was given to ask any questions related at any time during the entire data collection period, pertaining to any information related to research topic. All the answers of respondents were kept confidential. All the research activities were carried out under close guidance of the supervisor.

V. Results

5.1 Demographic Study

A total of 100 in-patients prescription were studied. Demographic analysis was done for age, gender, address, religion and marital status.

5.1.1 Age

AGE GROUP

Range	Frequency	Percent
≤19	1	1
20-29	4	4
30-39	11	11
40-49	9	9
50-59	13	13
60-69	**22**	**22**
70-79	**20**	**20**
80-89	**16**	**16**
90-99	4	4

Table 1: Age wise distribution of Patients

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The data was divided into 9 age ranges (groups). Majority of patients were of age group 60-69, 70-79 & 80-89 which is 22%, 20% & 16% respectively. The mean age is 61.84 with standard deviation 18.962. This range feature is summarized in table 1.

5.1.2 Gender

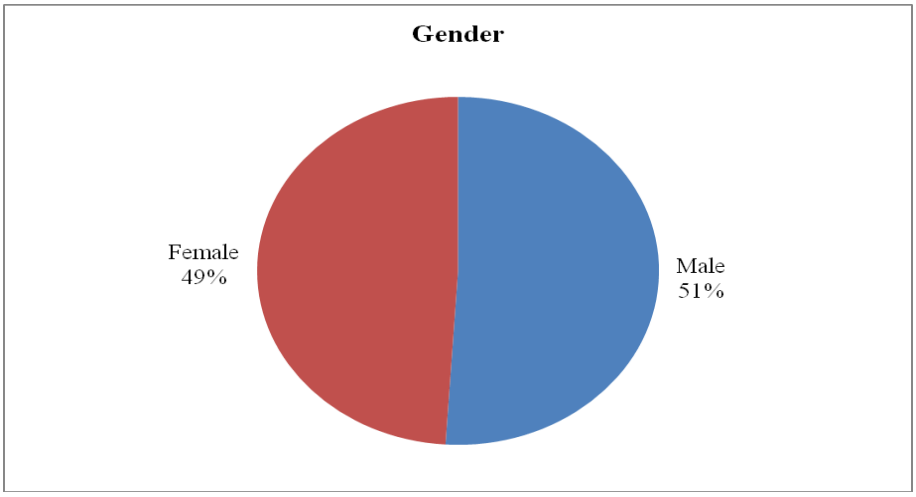

Figure 1: Distribution of Patients according to their gender

Among 100 patients 51(51%) were male and 49(49%) were female. Majority of the patients was found to be male.

5.1.3 Address

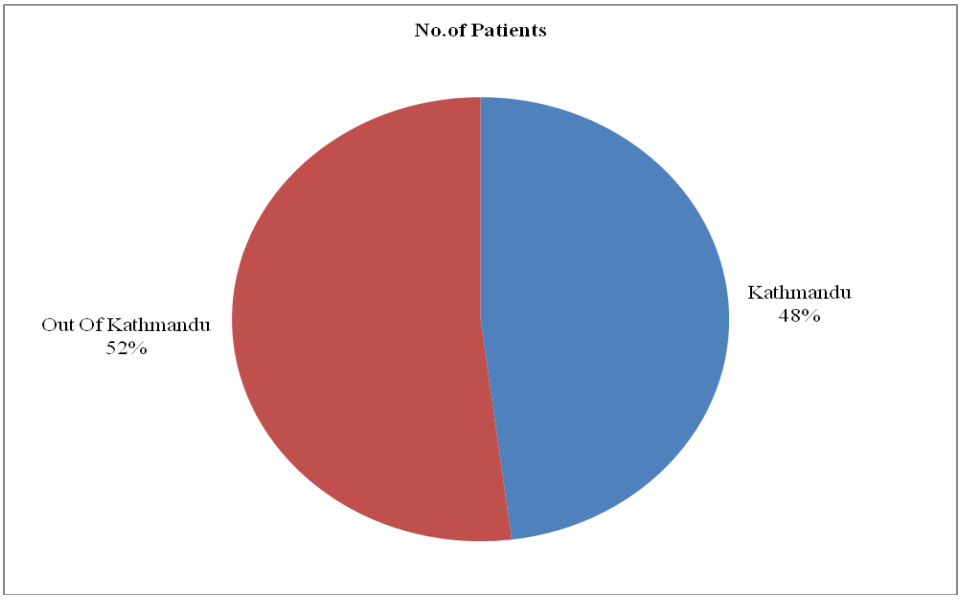

Figure 2: Distribution of patients according to their address

48% of the study population was from Kathmandu Valley while 52% of the study population was from outside of the Kathmandu valley.

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5.1.4 Religion

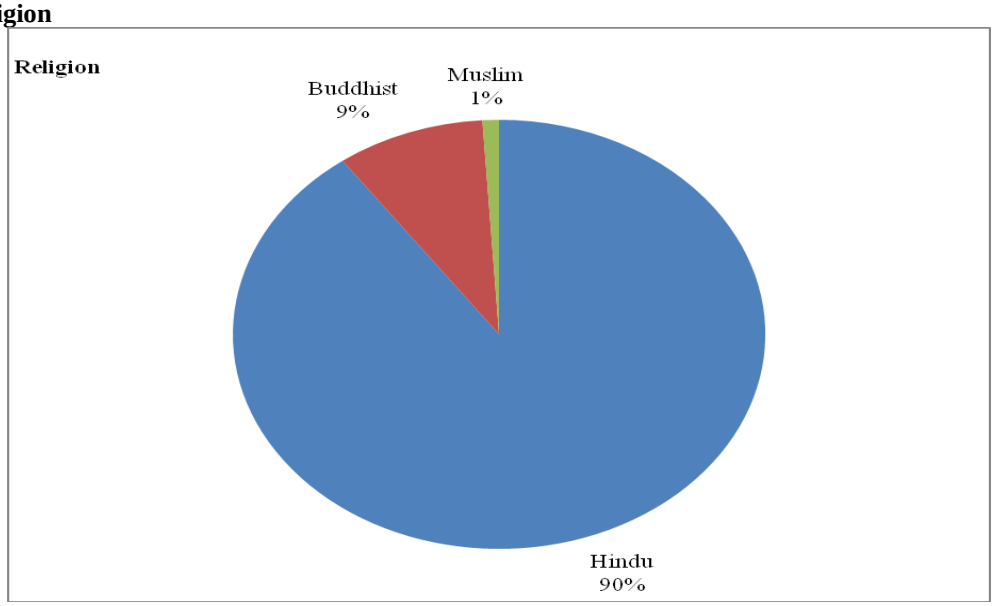

Figure 3: Distribution of patients according to their Religion

Majority of the patients were Hindu (90%) followed by Buddhist (9%) and then by Muslim(1%).

5.1.5 Marital Status

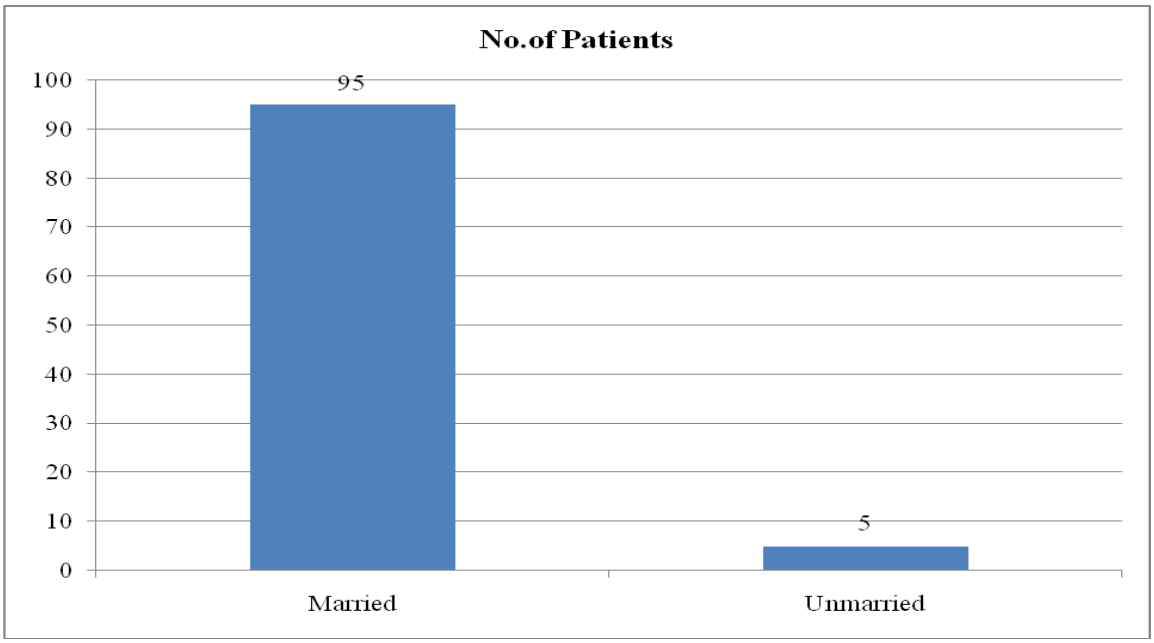

Figure 4: Distribution of Patients according to their marital status

95 patients of the study population were married while 5 patients were unmarried

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5.2 Risk Factors

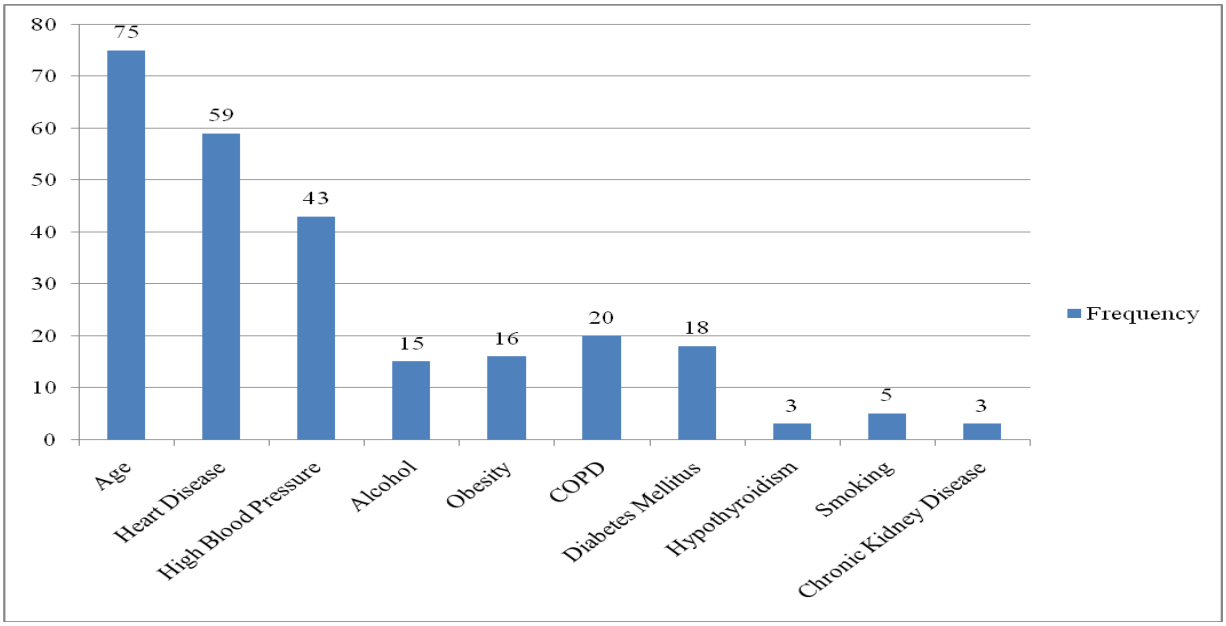

Figure 5: Distribution of the patients according to their risk factors

Majority of the patients of AF were due to age, heart disease and high blood pressure (75,59,43) respectively.

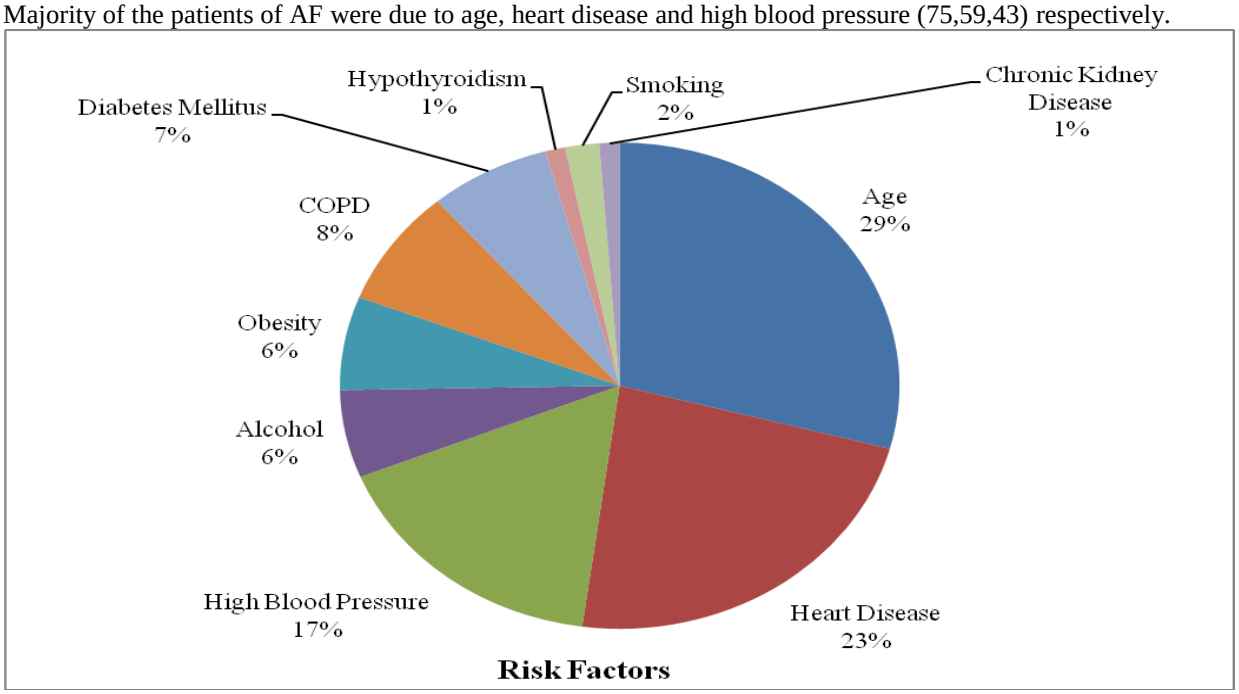

Figure 6: Distribution of the patients according to their risk factors

This study showed that people were suffered from AF due to their age (29%), Heart Diseases(23%), High Blood Pressure(17%), Alcohol(6%), Obesity(6%), COPD(8%), Diabetes Mellitus(7%), Hypothyroidism(1%), Smoking (2%) and Chronic Kidney Disease(1%).

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5.2.1 Age

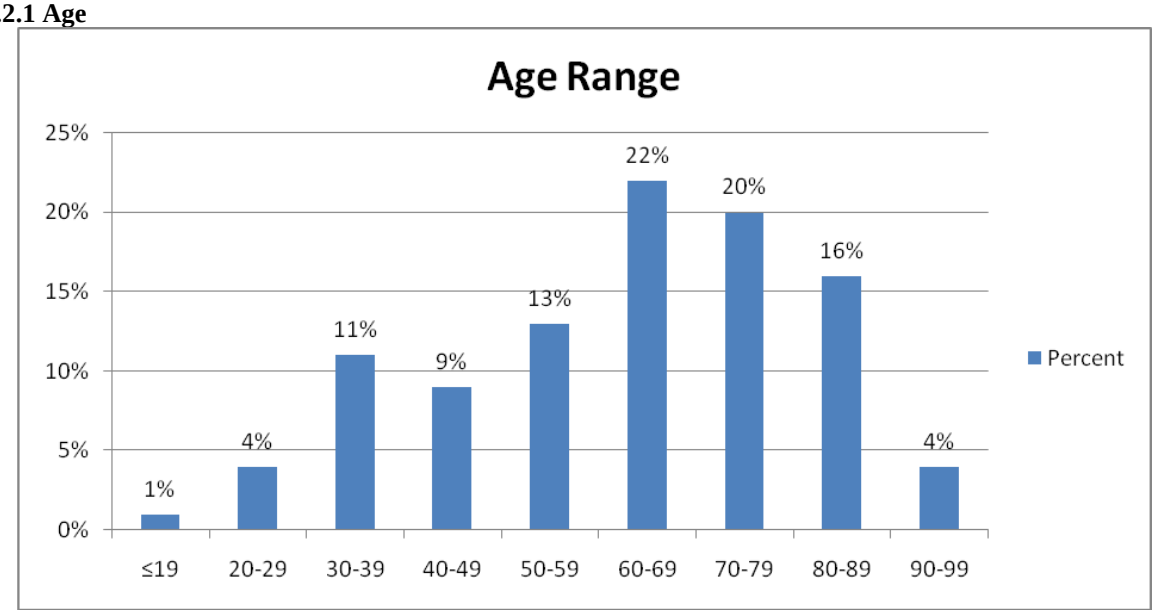

Figure 7: Age Range

This study showed that people were highly likely to suffer from AF by the age of 63 years to the age group (60-69). Higher percent of males (51%) suffered from AF than females (49%). Also, maximum male cases were observed at the age range 70-79 whereas for females they were observed at the age range 60-69. The youngest male patient was 21 years old while the oldest male was 96 years old. The youngest female patient was 19 years old while oldest female patient was 92 years old.

5.2.2 Heart Disease

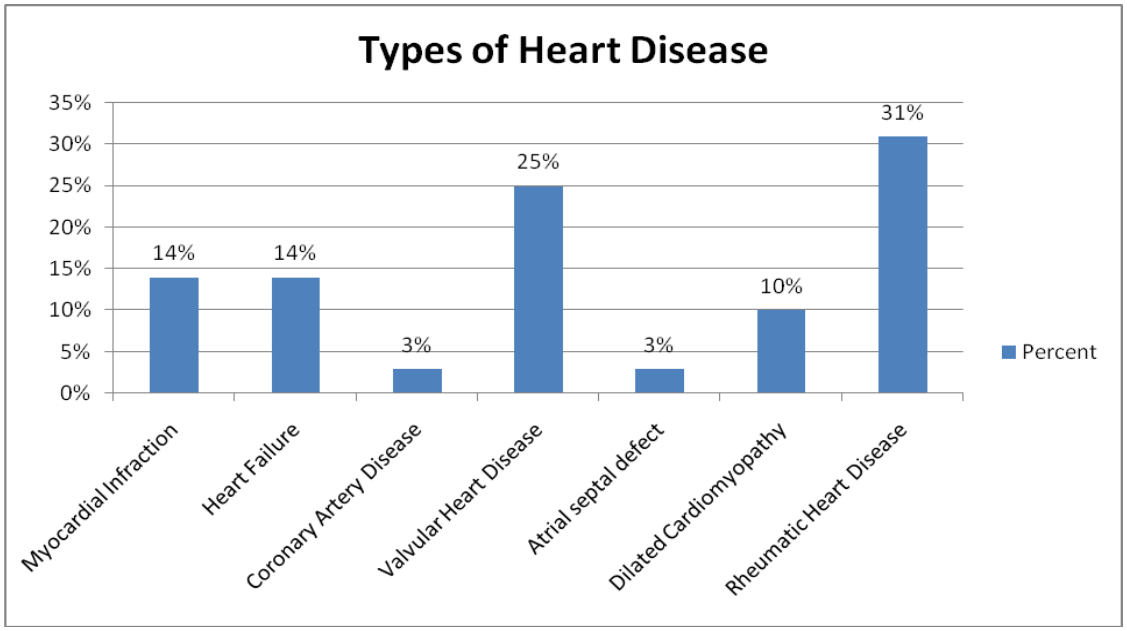

Figure 8: Types of Heart Disease

This study showed that the type of heart diseases were Myocardial Infraction(14%), Heart Failure(14%), Coronary Artery Disease(3%), Valvular Heart Disease(25%), Atrial Septal Defect(3%), Dilated Cardiomyopathy(10%), Rheumatic Heart Disease(31%).

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5.2.3 Hypertension

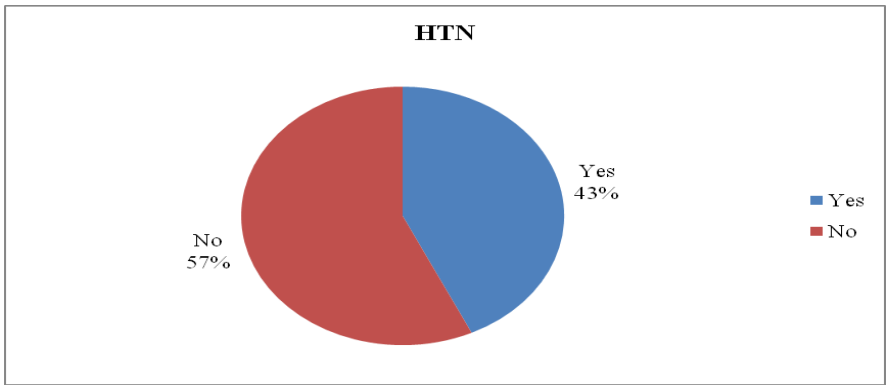

Figure 9: Hypertension

43% of the study population were hypertensive patients too while 57% patients were not hypertensive.

5.2.4 Alcohol

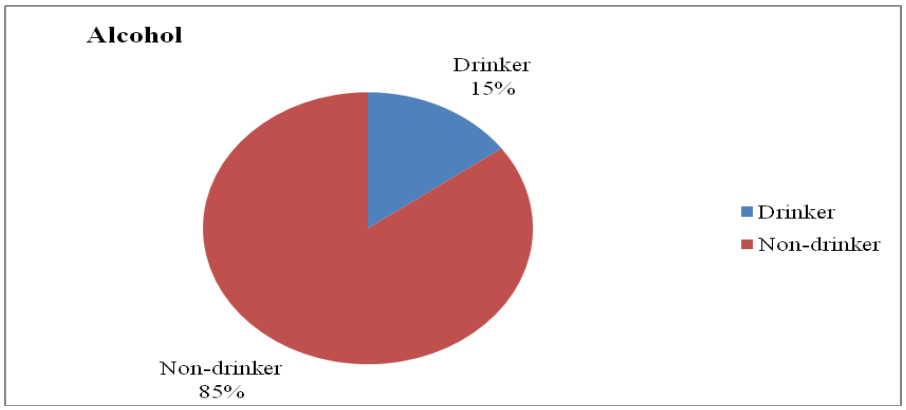

Figure 10: Alcohol Drinkers

15% of the study populations were alcohol drinkers while 85% were non-drinkers.

5.2.5 Obesity

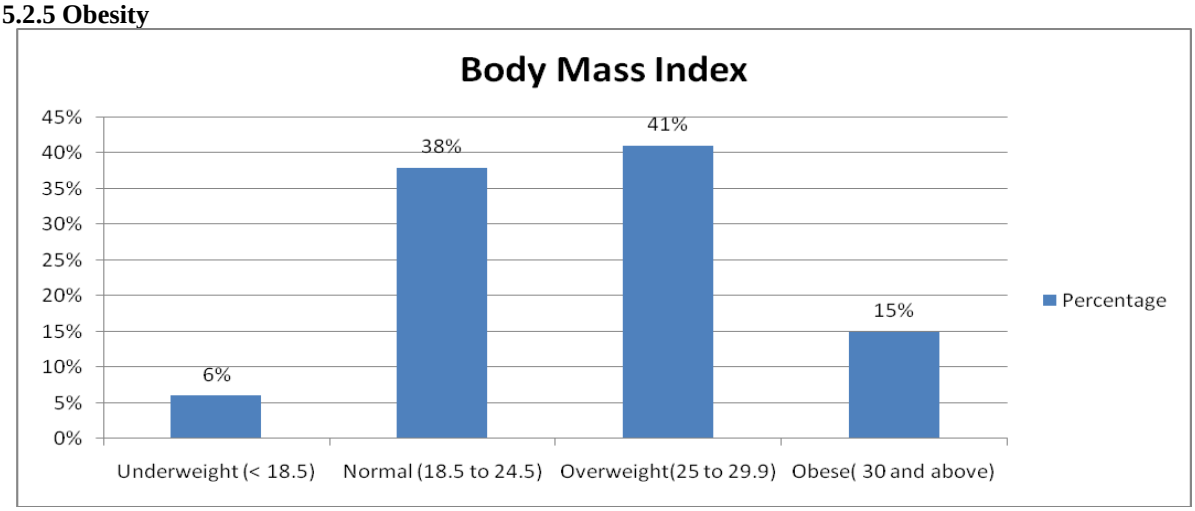

Figure 11: Distribution of patients according to their BMI

Body mass index was calculated according to the weight in kg and height in cm of the patient. The category of BMI shows underweight below 18.5, normal between (18.5-24.9), overweight between (25-29.9) and obese to

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30 and above. 15% of the study population were found to be obese, 41% of patients were over weighted, 38% of patients had Normal BMI while 6% were underweight.
It shows that increase in weight is associated with the increase in risk factors for the Atrial Fibrillation.

5.2.6 Chronic Obstructive Pulmonary Disease

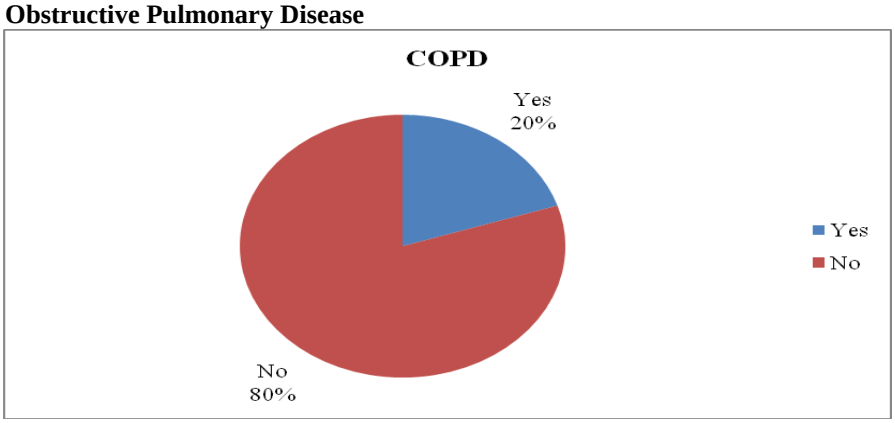

Figure 12: COPD

20% of the study population suffered from COPD.

5.2.7 Diabetes Mellitus

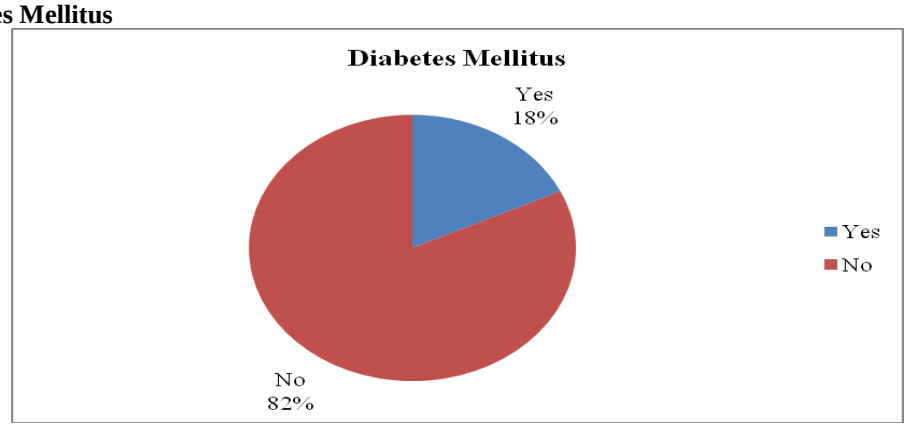

Figure 13: Diabetes Mellitus

18% of the study population suffered from Diabetes Mellitus.

5.2.8 Hypothyroidism

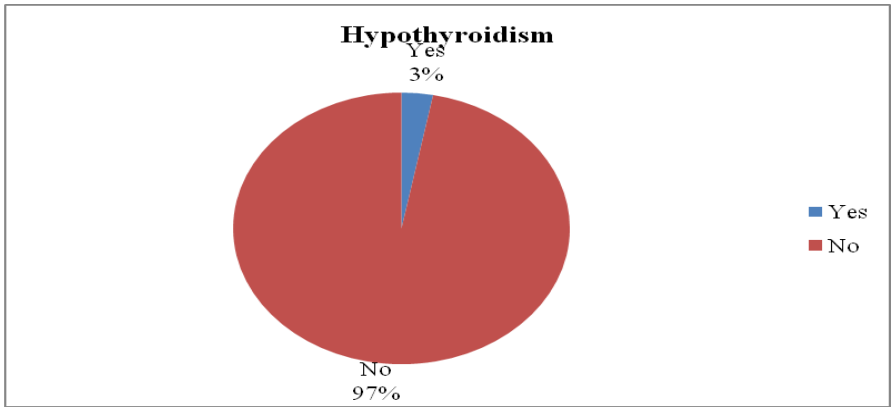

Figure 14: Hypothyroidism

3% of the study populations were suffered from Hypothyroidism.

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5.2.9 Smoking

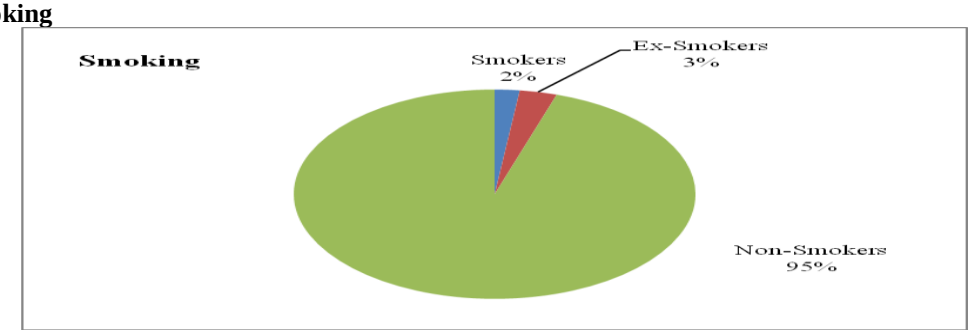

Figure 15: Smoking Habit

2% of the study population were smokers, while 3% were Ex-smokers and 95% were non-smokers.

5.2.10 Chronic Kidney Disease

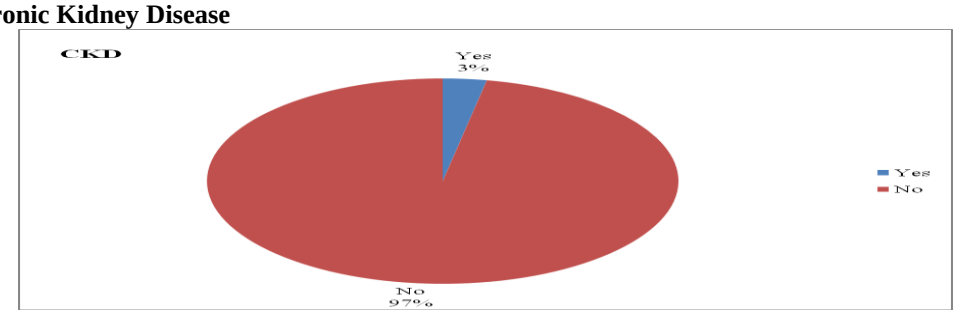

Figure 16: Chronic Kidney Disease

3% of the study populations were suffered from Chronic Kidney Disease (CKD).

5.3 Symptoms

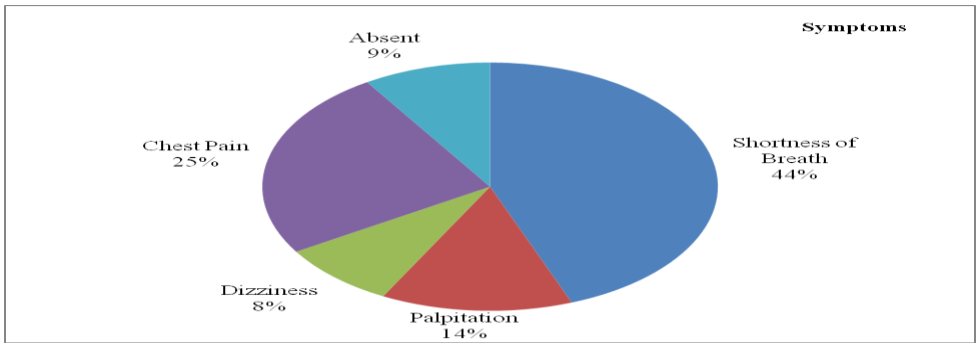

Figure 17: Distribution of patients on the basis of symptoms

44% of the study population had symptom of shortness of Breath, 14% had palpitation, 8% had Dizziness & 25% had Chest pain while 9% of the study population had no symptoms.

5.4 Diagnosis

Heart Rate(bpm)	No. of Patients
≤59	7
60-89	23
90-119	**31**
120-149	**22**
150-179	13
180-209	2
210+	2

Table 2. Heart Rate(bpm)

This result explains that majority of AF patients have heartbeat in the range of 90-119 bpm and 120-149bpm.

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5.5 Drugs used in AF Patients

Category	Drug	Dose Used in AF
Beta Blockers	Metoprolol	12.5mg 25mg 50mg 100mg
	Bisoprolol	2.5mg 5mg
	Nebivolol	5mg
Cardiac glycosides	Digoxin	0.125mg 0.25mg 0.5mg
Anti-coagulant	Warfarin	1mg, 2mg, 3mg, 4mg, 6mg 7mg, 10mg,
	Rivaroxaban	20mg
	Enoxaparin	60mg
	Heparin	25000IU (Injection)
Anti-platelet	Clopidogrel	75mg 225mg 300mg 350mg
	Tirofiban	25mcg\kg
Calcium channel blocker	Amlodipine Diltiazem	5mg 30mg 60mg 90mg 120mg
Anti-Arrhythmic	Amiodarone	150mg 200mg 300mg

Table3: Drugs used in AF

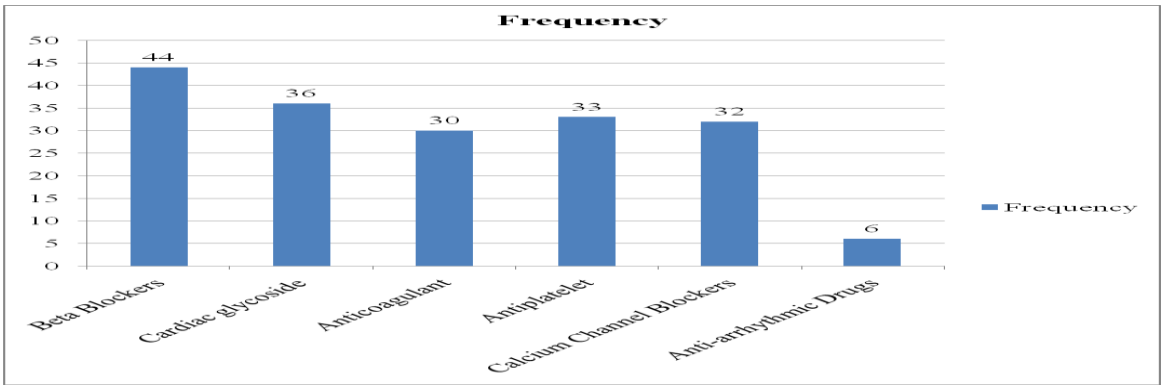

Figure 18: Class of Drugs used in AF patients

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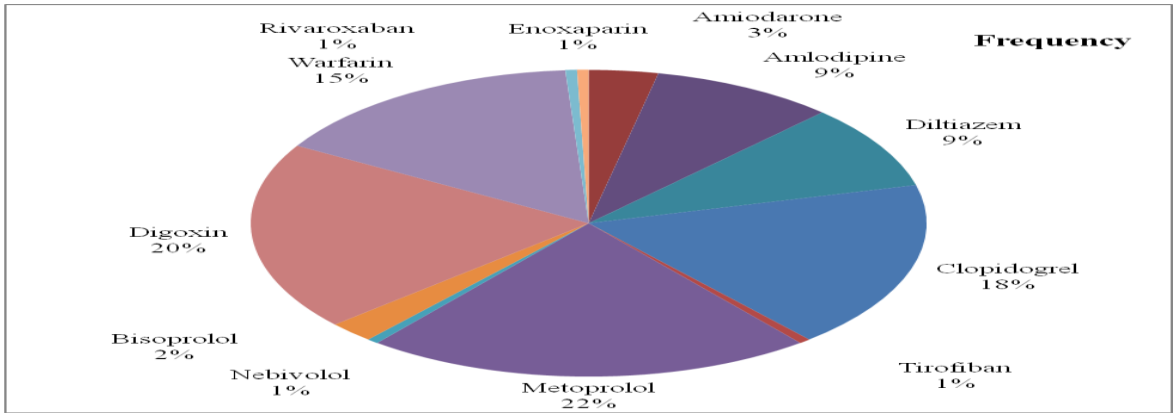

Figure 19: Drugs used in AF patients

Majority of AF patients were treated with Metoprolol,Digoxin,Clopidogrel,& Warfarin to 22%,20%,18%,&15% respectively.

5.6 Cost of Drugs in AF per Day:

The estimate average cost of drugs used in AF, per day was found to be NRs. 27.39±66.69 ranges from NRs.1.13 to NRs.606.18.

Table4: Cost of Drugs used in AF (per day)

	N	Minimum	Maximum	Median	Mean	Std. Deviation
Total cost NRs.	100	1.13	606.18	11.075	27.39	66.69

This study showed that Tab.Lanoxin(Digoxin)0.125mg had the minimum cost of NRs.1.125 while Inj.LMWX(Enoxaparin) 60mg had the maximum cost of NRs.600.83.

VI. Discussion

a) The population in this study consisted of 100 patients, 51% were males and 49% were females. This showed that the prevalence of AF in males was found to be higher than females which was similar to the study by (Kirchhof P et al.,2016), the estimated numbers of men and women with AF worldwide were 20.9 million and 12.6 million respectively, with higher incidence and prevalence rates in developed countries(1). Another study by (Nicole Jung-Eun Kim et al.,2017),reported the higher prevalence of AF in men (10.3%) compared to the female(7.4%)(8). In addition, a community-based, controlled trial in Sweden also showed a lower prevalence of this AF in women than in men (9.2% versus 15% (8).

b) This present study showed that people were suffered from AF due to their age by 29%. The mean age of AF patients in our study population was 61.84 ± 18.962 (range 60-69) which was similar to the Norwegian study which reported, the mean age 64 for AF(Staerk L et al., 2018) (3).

c) The study population showed that Diabetes Mellitus acted as a risk factor of AF by 7% which was found similar to the study of (Staerk L et al., 2018),reported diabetes≤5 years acted as a 7% risk factor of AF. This showed that the study population had diabetes of ≤ 5 years(3).

d) The study population showed that patients were suffered from AF due to Valvular Heart Disease by 25% which was almost similar to the study by (Kirchhof P et al.,2016), which showed that 31% of the AF is due to Valvular Heart Disease(5).

e) This present study reported,17% of the study population were hypertensive patients which was found to be dissimilar to the study done by (Avolio A , Butlin M et al.,2012) which showed that 90% of the HTN patients shows AF(18).

f) In this present study population, only 2 % smokers were studied while the study by (Staerk.Laila et al., 2017),showed 12.7% of AF-affected participants were smokers. It showed

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patient might have lied.

g) This present study population showed 6% were underweight (below 18.5), 38% of patients had normal BMI(18.5-24.9), 41% of patients were over weighted (25-29.9), while 15% of the study population were found to be obese(30 and above). The study by (Staerk L et al., 2018) showed BMI of 26.7kg\m2 for AF patients. It shows that increase in weight is associated with the increase in risk factors for the Atrial Fibrillation(3).

h) The 1% of study population was found to be suffered from CKD which was dissimiliar to the study by (Kirchhof P et al.,2016),reported AF was present in 15-20% of patients with CKD(1).

i) According to the study done by (Voskoboinik A. et al.,2016), AF precipitated by alcohol was 35% to 62% ,but in this present study population the AF precipitated by alcohol was only 6% which was dissimilar to the above study , this might be due to the lying nature of the patient(11).

j) The study done by (Goudis Christos A. 2016) showed that among the COPD patients the prevalence of AF was 14.3% (12) ,but in our present study population the 8% AF patients were suffered from COPD which was almost similar to the previous study.

k) This present study showed that the study population were suffered from AF due to their Hypothyroidism by 1% which was similar to the report of 1.5% by the study of the Canadian Registry of Atrial Fibrillation (Patel Dk.et al., 2009)(13).

l) 44% of the study population had symptom of shortness of Breath, 14% had palpitation, 8% had Dizziness & 25% had Chest pain while 9% of the study population had no symptoms. As per this study the majority of AF patient were reported with symptoms SOB and chest pain which was found to be similar to the study by (Kirchhof P et al.,2016),(1).

m) This present study reported the use of Beta Blockers (24%) which includes (Metoprolol,Bisoprolol,Nebivolol), Cardiac glycosides(20%) which includes (Digoxin), Anti-coagulant(17%)which includes (Warfarin,Rivaroxaban,Enoxaparin, Heparin), Anti-platelet (18%) which includes (Clopidogrel,Tirofiban), Calcium channel blockers(18%) which includes (Amlodipine,Diltiazem), Anti-arrhythmic(3%) which includes (Amiodarone), and NSAIDS(Aspirin) for the management of AF patients. A study on the management of atrial fibrillation developed in collaboration with EACTS by (Kirchhof P et al.,2016), mentioned the Rate control drugs (Beta blockers or calcium channel blockers as first line agents adding Digoxin and amiodarone if firstline options donot work (1). Anticoagulants (Warfarin)was used as per EAC Guideline2016(1), while Rivaroxaban was used as per NICE Guideline2014(16), and Antiplatelet (Clopidogrel, Aspirin) according to the clinical guideline National Institute for Health and Care Excellence (NICE),2014(16). The use of the drugs in AF management was found to be rational as compared to the EACGuideline2016 by (Kirchhof P et al.,2016)(1) and NICE guideline 2014(16).

n) Cost: The estimated average cost of drugs used in AF, per day was found to be NRs. 27.39±66.69 ranges from NRs.1.13 to NRs.606.18. Exact data for the cost of AF was not available. As per the study conducted by (Khaykin y et al.,2012) an average cost of $15,553 per year was estimated in 2002 with 75% of the cost related to in-patient care in AF management(17).

VII. Conclusion

AF was predominant at the age range 60-69 years and majority of patients were male (51%). Age, diabetes mellitus, valvular heart disease, HTN, overweight, obesity, hypothyroidism, rheumatic heart disease, myocardial infraction, heart failure, dilated cardiomyopathy were all major risk factors of AF. The most prescribed AF drug categories were Ca-channel blockers, β blockers, Antiarrhythmic drugs, Cardiac glycosides, Anticoagulants and use of other drugs depending upon the etiology and co-morbidities. Among these classes, the specific drugs like metoprolol, digoxin, warfarin, clopidogrel and aspirin were mostly used in the AF management.Various brand drugs were used which differ in their price. Average cost for AF drug per day was 27.39±66.69, which was normal for the current living standard of Nepal.

VIII. Limitations

a) The study was limited to only one hospital and information was taken only from the in-patient department of cardiology ward of MCVTC, so data obtained cannot be generalized.

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b) The time period of the study was only three months, hence number of patients enrolled in this study is less. Size of the study might not be sufficient to represent the whole AF patients of Nepal due to the purposive sampling.
c) The study was only carried in the developed area.

Recommendations
a) Similar type of study should be conducted throughout the country especially in AF.

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11. ANNEX
5.5.1 Prescribed Drug

	Category	Drugs	Count	Percent	

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Beta Blockers	Metoprolol Bisoprolol Nebivolol	39 4 1	39% 4% 1%
Cardiac glycosides	Digoxin	36	36%
Anti-coagulant	Warfarin Rivaroxaban Enoxaparin Heparin	28 1 1 1	28% 1% 1% 1%
Anti-platelet	Clopidogrel Tirofiban	32 1	32% 1%
Calcium-channel blocker	Amlodipine Diltiazem	16 16	16% 16%
Anti-Arrhythmic	Amiodarone	6	6%
Anti-Diabetic	Metformin Linagliptin Gliclazide	8 6 4	8% 6% 4%
α- Blockers	Prazosin Tamsulosin	3 1	3% 1%
βandα-adrenergic blockers	Carvedilol	1	1%
Angiotensin-ConvertingEnzyme (ACE) Inhibitors	Enalapril	14	14%
Angiotensin(AT1 receptor) Blockers	Telmisartan Losartan	1 28	1% 28%
Diuretics	Spironolactone Amiloride Furosemide Torsemide	9 6 19 3	9% 6% 19% 3%
Antibiotics	Amikacin Ceftriaxone Piperacillin Levofloxacin Cefadroxil Flucloxacillin Cefixime Azithromycin Quinolone Ciprofloxacin	1 2 1 1 3 2 7 1 1 2	1% 2% 1% 1% 3% 6% 7% 1% 1% 2%
NSAIDs	Aspirin	85	85%

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Statins	Rosuvastatin Atorvastatin	3 4	3% 4%
Bronchodilators (β2-adrenergic agonist)	Salbutamol Formoterol	3 1	3% 1%
Bronchodilator (Anti-cholinergic)	Tiotropium bromide Scopolamine	2 1	2% 1%
Bronchodilator (Methylxanthines)	Theophylline Acebrophylline	2 1	2% 1%
Corticosteroids	Fluticasone propionate Budesonide Prednisolone Beclomethasone	2 1 3 4	2% 1% 3% 4%
Glucocorticoids (Steroid Hormone)	Hydrocortisone	3	3%
Anaesthesia	Benzocaine Tricainemethanesulfonate Lidocaine	5 2 1	5% 2% 1%
Vasodilators	Nitrates Nicorandil Isosorbide mononitrate Trimetazidine	10 4 8 1	10% 4% 8% 1%
Thyroid Drugs	Levothyroxine sodium	3	3%
CNS Drugs	Clonazepam Lorazepam Codeine Fentanyl Escitalopram Fluoxetine Haloperidol	1 1 3 1 1 1 1	1% 1% 3% 1% 1% 1% 1%
H2-Blockers	Ranitidine	4	4%
Proton-Pump Inhibitors (PPI)	Pantoprazole Rabeprazole	80 2	80% 2%

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Others	Vitamin B1	5	5%
	Vitamin Bcomplex	3	3%
	Vitamin D3	1	1%
	Folic Acid	2	2%
	Methylcobalamine	1	1%
	Milk of magnesia	3	3%
	Potassium chloride	14	14%
	Ondansetron	1	1%
	Domperidone	1	1%
	Cyproheptadine	2	2%
	Febuxostat	1	1%

Table 5: Prescribed drugs