

A survey on prescription pattern and awareness of diabetic patients in selected area

A Research Report submitted to the Department of Pharmacy, East West University in partial fulfillment of the requirement for the Degree of Masters of Pharmacy.



Submitted by:-

Nasima Akhter Nipa

ID: 2013-3-79-025

East West University



DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation entitle “**A survey on prescription pattern and awareness of diabetic patients in selected area**” is an authentic and genuine research work carried out by me under the supervision of **Ms. Nazia Hoque**, Senior lecturer, Department of Pharmacy, East West University, Aftabnagar, Dhaka, Bangladesh.

Nasima Akhter Nipa

ID: 2013-3-79-025

Department of Pharmacy

East West University

Aftabnagar, Dhaka,

Bangladesh.



CERTIFICATE BY THE SUPERVISOR

This is to certify that the dissertation entitled “A survey on prescription pattern and awareness of diabetic patients in selected area .” is a bona-fide research work done by **Nasima Akhter Nipa, ID No: 2009-3-70-028**, in partial fulfillment of the requirement for the Degree of Masters of Pharmacy.

(Nazia Hoque)

Senior Lecturer

Department of Pharmacy

East West University

Aftabnagar, Dhaka.

Bangladesh.



ENDORSEMENT BY CHAIRPERSON

This is to certify that the dissertation entitled “A survey on prescription pattern and awareness of diabetic patients in selected area” is a bona-fide research work done by **Nasima Akhter Nipa. ID No: 2013-3-79-025**, under the guidance of **Ms. Nazia Hoque**, Senior Lecturer, Department of Pharmacy, East West University, Aftabnagar, Dhaka.

(Dr.Shamsun Nahar khan)
Chairperson and Associat.Professor
Department of Pharmacy
East West University
Aftabnagar, Dhaka.
Bangladesh.



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***THIS RESEARCH PAPER IS
DEDICATED TO***

***PROPHET MUHAMMAD (S.A.A.W.)
&***

MY SON NOBAIDUR RAHMAN MIHRAN

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List of Abbreviations

| Abbreviation | Explanation |
|---------------------|---|
| ACE..... | Angiotensin Converting Enzyme. |
| AMI..... | Acute Myocardial Infarction. |
| ARB..... | Angiotensin Receptor Blocker. |
| CHD..... | Coronary Heart Disease. |
| CMH..... | Combine Military Hospital. |
| CVD..... | Cardiovascular Disease. |
| CVDs..... | Cardiovascular Diseases. |
| EWU..... | East West University. |
| GTN..... | GlycerylTrinitrate. |
| HMG CoA..... | 3-hydroxy-3- methyl Glutaryl Coenzyme A. |
| HTN..... | Hypertension. |
| IHD..... | Ischemic Heart Disease. |
| LDL..... | Low Density Lipoprotein. |
| LVF..... | Left Ventricular Failure. |
| NDH..... | Narsingdi diabetes hospital. |
| NO..... | Nitric Oxide. |
| NSAID..... | Non-Steroidal Anti-Inflammatory Drugs. |
| NSTEMI..... | Non-ST-segment-Elevation Myocardial Infarction. |
| OMI..... | Old Myocardial Infarction. |
| RAAS..... | Renin-Angiotensin-Aldosterone System. |
| UA..... | Unstable angina. |

ABSTRACT

Diabetes is a major cause of disability and premature death in Bangladesh. Diabetes diseases are diseases of the blood. Patients may need lifestyle change, medications, surgery or other medical procedures as part of treatment. The objective of the present study is to find out the combination therapy pattern for the treatment of diabetes in Bangladesh. The survey of the study was conducted in Narsingdi diabetic hospital (NDH), situated in Narsingdi, the side city of Bangladesh. Study period was 4 months commencing from February 2015 to May 2015. 400 prescriptions of diabetic patients were collected from NDH. Among them number of male patients is 262 (65%) and number of female patients is 138 (35%). Most commonly prescribed drugs were Sitagliptin INN (45%), Linagliptin (32.5%), Metformin Hydrochloride (9%), Glyclajide (35%), Sitagliptin& metformin hydrochloride (40%), Drug International occupied 26% drug market , Beximco Pharma occupied 13% drug market , Acme Lab occupied 13% drug market (Daomin), Opsoninpharma occupied 10% drug market (met,) Aristropharma occupied (13%) Drug marketed (INN)& others Pharmaceutical Companies occupied 8% drug market. The result of this study focused on the prescription pattern and awareness of the patients. People those who are affected and unaffected from this diabetes disease should be more conscious about this because a little bit negligence may lead to this life threatening disease.

Chapter one

INTRODUCTION

Diabetes: an alarmingly growing disorder

Diabetes mellitus is an endocrinological disorder arising from insulin deficiency or due to ineffectiveness of the insulin produced by the body. This results in high blood glucose and with time, to neurological, cardiovascular, retinal and renal complications. Diabetes is the condition in which the body does not properly process carbohydrate for use as energy. Most of the food we eat is turned into glucose, or sugar, for our bodies to use for energy. The pancreas, an organ that lies near the stomach, makes a hormone called insulin to help glucose get into the cells of our bodies. When you have diabetes, your body either doesn't make enough insulin or can't use its own insulin as well as it should. This causes sugars to build up in your blood. This is why many people refer to diabetes as "sugar." (Ahern JA, et al, 2000)

1.2 Incidence of diabetes

1.2.1. Increasing trend of diabetes prevalence throughout the world

The recent World Health Organization (WHO) report on the prevalence of diabetes mellitus has presented an alarming picture of a global epidemic of type-2 diabetes (1997). It is posing a serious threat to entire population of the world irrespective of stages of industrialization and development. The increasing prevalence of diabetes mellitus for South East Asian Region (SEAR) was estimated from the observed prevalence in 1995 that projected to 2000 and 2025. This trend observed two folds increase in the developed and almost three folds in the developing nations. Global comparison estimated that highest increase would be observed in SEAR and in Eastern Mediterranean Region (East-Med). (Turner RC, et al 1998)

1.2.2. Increasing trend of diabetes prevalence in Bangladesh

Although there was no large-scale national survey in Bangladesh, several small-scale surveys at intervals have been done over several years. The prevalence of IGT has increase from-0.37% in 1983 to 12.5% in 1996 and that of diabetes from 0.7 in 1983 to 5.2% in 1996. As estimated on the basis of present prevalence rates of (Type 2 diabetes -5.2% and IGT - 12.5%), in the projected population, more than ten million Bangladeshis will suffer from the disease in the year 2005. This is a conservative estimate because the trend of increasing prevalence will make this figure much higher. Diabetes registry in BIRDEM, a referral center, also showed an increasing trend. Only 389 diabetic subjects were registered throughout the year 1960.(Turner RC,,1998, et al)

1.3 History of diabetes

For 2,000 years diabetes has been recognized as a devastating and deadly disease. In the first century A.D. a Greek, Aretaeus, described the destructive nature of the affliction which he named "diabetes" from the Greek word for "siphon." Eugene J. Leopold in his text *Aretaeus the Cappodaciand* describes Aretaeus' diagnosis: "...For fluids do not remain in the body, but use the body only as a channel through which they may flow out. Life lasts only for a time, but not very long. For they urinate with pain and painful is the emaciation. For no essential part of the drink is absorbed by the body while great masses of the flesh are liquefied into urine." symptoms of diabetes but were powerless to effectively treat it. Aretaeus recommended oil of roses, dates, raw quinces, and gruel. And as late as the 17th century, doctors prescribed "gelly of viper's flesh, broken red coral, sweet almonds, and fresh flowers of blind nettles."(Yang W, et all, 2010)

Physicians in ancient times, like Aretaeus, recognized theDespite physicians' valiant efforts to combat diabetes, their patients remained little more than human guinea pigs. In the early 20th century, diabetologists such as Dr. Frederick Allen prescribed low calorie diets-as little as 450 calories per day for his patients. His diet prolonged the life of people with diabetes but kept them weak and suffering from near starvation. In effect, the most a person afflicted with diabetes could do was blindly offer him to the medical establishment and pray for a cure. In his book, *The Discovery of Insulin*, Michael Bliss describes the painful wasting death of many people with diabetes before insulin: "Food and drink no longer mattered, often could not be taken. A restless drowsiness shaded into semi-consciousness. As the lungs heaved desperately to expel carbonic acid (as carbon dioxide), the dying diabetic took huge gasps of air to try to increase his capacity. 'Air hunger' the doctors called it, and the whole process was sometimes described as 'internal suffocation.' The gasping and sighing and sweet smell lingered on as the unconsciousness became a deep diabetic coma. At that point the family could make its arrangements with the undertaker, for within a few hours death would end the suffering.(Orasanu Get "all ,2008)

1.4 Types of diabetes

1.4.1. Type 1 diabetes

Type 1 diabetes, previously called insulin-dependent diabetes mellitus (IDDM) or juvenile-onset diabetes, may account for 5 percent to 10 percent of all diagnosed cases of diabetes. Risk factors are less well defined for Type 1 diabetes than for Type 2 diabetes, but

autoimmune, genetic, and environmental factors are involved in the development of this type of diabetes.(Yang W,et al, 2010)

1.4.2. Type 2 diabetes

Type 2 diabetes was previously called non-insulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes. Type 2 diabetes may account for about 90 percent to 95 percent of all diagnosed cases of diabetes. Risk factors for Type 2 diabetes include older age, obesity, and family history of diabetes, prior history of gestational diabetes, impaired glucose tolerance, physical inactivity, and race/ethnicity. African Americans, Hispanic/Latino Americans, American Indians, and some Asian Americans and Pacific Islanders are at particularly high risk for type 2 diabetes(Feldman CB:et all 1998)

1.5 Symptoms of diabetes

High blood levels of glucose can cause several problems, including:

- Blurry vision.
- Excessive thirst.
- Fatigue.
- Frequent urination.
- Hunger.
- Weight loss.

1.5.1. Symptoms of type 1 diabetes

- Fatigue.
- Increased thirst.
- Increased urination.
- Nausea.
- **Vomiting.**
- Weight loss in spite of increased appetite.

1.5.2. Symptoms of type 2 Diabetes

- Blurred vision
- Fatigue
- Increased appetite
- Increased thirst
- Increased urination

1.6 Risk Factors for diabetes

There are three major types of diabetes: type 1 diabetes, type 2 diabetes, and gestational diabetes. All three types of diabetes share the same basic characteristic -- the body's inability either to make or to use insulin. Your body needs insulin, a hormone, to be able to use glucose, which comes from the food you eat, for energy. Without enough insulin, glucose stays in the blood, creating high levels of blood sugar. Over time, this buildup causes damage to your kidneys, heart, nerves, eyes, and other organs.

One out of every three people with diabetes is unaware they have this chronic condition. According to the American Diabetes Association, that amounts to about 7 million Americans.

1.6.1. Risk factors for type 1 diabetes

With type 1 diabetes, which starts in childhood, the pancreas stops producing insulin. Insulin is a hormone your body needs to be able to use the energy -- glucose -- found in food. The primary risk factor for type 1 diabetes is a family history of this lifelong, chronic disease.

- Genetics and family history. Having family members with diabetes is a major risk factor. The American Diabetes Association recommends that anyone with a first-degree relative with type 1 diabetes -- a mother, father, sister, or brother -- should get screened for diabetes. A simple blood test can diagnose type 1 diabetes.
- Diseases of the pancreas. Injury or diseases of the pancreas can inhibit its ability to produce insulin and lead to type 1 diabetes.
- Infection or illness. A range of relatively rare infections and illnesses can damage the pancreas and cause type 1 diabetes.(Little RJA, et al.2002)

1.6.2. Risk Factors for Type 2 diabetes

There are many risk factors for type 2 diabetes, including:

- Age over 45 years.
- A parent, brother, or sister with diabetes.
- Gestational diabetes or delivering a baby weighing more than 9 pounds.
- Heart disease.
- High blood cholesterol level.

- Obesity.
- Not getting enough exercise.
- Polycystic ovary disease (in women).
- Previous impaired glucose tolerance.
- Some ethnic groups (particularly African Americans, Native Americans, Asians, Pacific Islanders, and Hispanic Americans).

1.7 Complications of diabetes

Heart disease and stroke- Approximately 75 percent of people with diabetes will die of heart disease or stroke, and they are likely to die at a younger age than people who do not have diabetes. Blindness due to diabetic retinopathy- Each year 12,000 to 24,000 people lose their sight because of diabetes. Diabetes is the leading cause of new blindness in people 20 to 74 years of age. Kidney disease due to diabetic nephropathy- Ten to 21 percent of all people with diabetes develop kidney disease. Diabetic nephropathy is the leading cause of end-stage renal disease (kidney failure), accounting for 43 percent of new cases. Nerve disease and amputations- About 60 to 70 percent of people with diabetes have mild to severe forms of diabetes-related nerve damage, which can lead to lower limb amputations. In fact, diabetes is the most frequent cause of non-traumatic lower limb amputations. Impotence due to diabetic neuropathy or blood vessel blockage- Impotence afflicts approximately 13 percent of men who have type 1 diabetes and eight percent of men who have type 2 diabetes. It has been reported that men with diabetes, over the age of 50 have impotence rates as high as 50 to 60 percent(Boyd AE III, et al.1990)

1.8 Treatment of diabetes

Medications to treat diabetes include insulin and glucose-lowering pills called oral hypoglycemic drugs. People with type 1 diabetes cannot make their own insulin. They need daily insulin injections. Insulin does not come in pill form. Injections are generally needed one to four times per day. Some people use an insulin pump. It is worn at all times and delivers a steady flow of insulin throughout the day. Other people may use inhaled insulin.

Type 1 diabetes-Unlike type 1 diabetes, type 2 diabetes may respond to treatment with exercise, diet, and medicines taken by mouth. There are several types of medicines used to lower blood glucose in type 2 diabetes.

Type 2 diabetes- Medications may be switched to insulin during pregnancy and while breastfeeding. Gestational diabetes may be treated with exercise and changes in diet.

Exercise- Regular exercise is especially important for people with diabetes. It helps with blood sugar control, weight loss, and high blood pressure. People with diabetes who exercise are less likely to experience a heart attack or stroke than those who do not exercise regularly.

Foot care- People with diabetes are more likely to have foot problems. Diabetes can damage blood vessels and nerves and decrease the body's ability to fight infection. You may not notice a foot injury until an infection develops. Death of skin and other tissue can occur. If left untreated, the affected foot may need to be amputated. Diabetes is the most common condition leading to amputations(Bassiony M.M et al,2009)

1.8.1. Sulfonylureas

Historically, increasing insulin output by the pancreas has been the major area targeted by medications used to treat type 2 diabetes. Medications that increase the output of insulin belong to a class of drugs called sulfonylurea's. Sulfonylurea primarily lower blood glucose levels by increasing the release of insulin from the pancreas. Older generations of these drugs include chlorpropamide and tolbutamide, while newer drugs include glyburide (DiaBeta), glipizide (Glucotrol), and glimepiride (Amaryl). These drugs are effective in rapidly lowering blood sugar but run the risk of causing hypoglycemia (abnormally low and dangerous levels of blood sugar). In addition, they are sulfa-containing drugs and should be avoided by patients who are allergic to sulfa.

Tolbutamide is a first generation potassium channel blocker, sulfonylurea oral hypoglycemic drug sold under the brand name Orinase. This drug may be used in the management of type II diabetes if diet alone is not effective. Tolbutamide stimulates the secretion of insulin by the pancreas, Since the pancreas must synthesize insulin in order for this drug to work, it is not effective in the management of type I diabetes. It is not routinely used due to a higher incidence of adverse effects compared to newer second generation sulfonylureas, such as glyburide. It generally has a short duration of action due to its rapid metabolism, and is therefore safe for use in elderly diabetics.¹Glimepiride is an oral blood sugar-lowering drug in a class of medicines for controlling diabetes called sulfonylureas. Glimepiride is related to other sulfonylureas including glyburide (Micronase; Diabeta), glipizide (Glucotrol), tolbutamide (Orinase) and tolazamide (Tolinase). Glimepiride is used in

type II diabetes, the most common type of diabetes that is found in 90% of patients with diabetes. In type II diabetes, insulin usually is not necessary to control the blood sugar.

1.8.2. Meglitinides

The class of drugs known as meglitinides is relatively new. Meglitinides also work on the pancreas to promote insulin secretion. Unlike sulfonylureas that bind to receptors on the insulin producing cells, meglitinides work through a separate potassium based channel on the cell surface. Unlike the sulfonylureas which last longer in the body, repaglinide and nateglinide are very short acting, with peak effects within one hour. For this reason, they are given up to three times a day just before meals. Since these drugs also increase circulating insulin levels, they may cause hypoglycemia, but the literature suggests this is less frequent than the hypoglycemia seen with sulfonylureas.

In a three month study, repaglinide dropped fasting blood glucose values by 61 mg/dL and post meal blood glucose values by 100 mg/dL. Because Prandin is short acting and given before meals, it is particularly beneficial in lowering blood glucose after meals and does not tend to lower fasting glucose levels to the same degree. Prandin has been used in combination with other medications, such as metforminee (Glucophage), with impressive results.

Nateglinide has essentially the same profile of side effects and interactions as Prandin. The major benefit of Starlix is that the starting dose of 120mg does not need to be adjusted upward, but rather remains constant. These medications are also relatively safe to use in people with impaired kidney function.(Feldman CB: etall1998)

1.8.3. Metformine

Metformine is an oral anti diabetic drug in the biguanide class. It is the first-line drug of choice for the treatment of type 2 diabetes, in particular, in overweight and obese people and those with normal kidney function. Its use in gestational diabetes has been limited by safety concerns. It is also used in the treatment of polycystic ovary syndrome, and has been investigated for other diseases where insulin resistance may be an important factor. Metformineee works by suppressing glucose production by the liver.(Eckel R.H,2008)

1.8.4. Non-Insulin diabetes treatment

There is a relatively new class of drugs called incretinmimetics, which mimic certain substances that can be found in the stomach and intestinal tract. These substances are normally released in response to food intake and signal the release of insulin from the

pancreas. Since this reaction is reduced in people with type 2 diabetes, incretinmimetics work to stimulate insulin release and help lower blood sugar. Your doctor may recommend incretinmimetics if you have not been able to adequately control your blood sugar with other types of treatment. These medications are taken by injection, either once or twice a day.

Chapter two

LITERATURE REVIEW

2. Literature Review:

It has expanded the direct care component, incorporating aspects of both nursing and medical care while maintaining the teaching and counseling roles. Both the clinical nurse specialist and nurse practitioner (NP) models, when applied to chronic disease management, create. When people are diagnosed with diabetes, they may be treated in several different ways. Controlling risk factors that can be managed—lowering weight and quitting smoking will be the first changes they will have to make.

Exercise will become part of their lives, if possible. Drug therapy may be the next course of action.

2.1 Case Study: a patient with uncontrolled type 2 diabetes and complex.

The specialized role of nursing in the care and education of people with diabetes has been in existence for more than 30 years. Diabetes education carried out by nurses has moved beyond the hospital bedside into a variety of health care settings. Among the disciplines involved in diabetes education, nursing has played a pivotal role in the diabetes team management concept. This was well illustrated in the Diabetes Control and Complications Trial (DCCT) by the effectiveness of nurse managers in coordinating and delivering diabetes self-management education. These nurse managers not only performed administrative tasks crucial to the outcomes of the DCCT, but also participated directly in patient care.¹

The emergence and subsequent growth of advanced practice in nursing during the past 20 years enhanced patient-provider relationships in which self-care education and counseling is provided within the context of disease state management. Clement² commented in a review of diabetes self-management education issues that unless ongoing management is part of an education program, knowledge may increase but most clinical outcomes only minimally improve. Advanced practice nurses by the very nature of their scope of practice effectively combine both education and management into their delivery of care.

Operating beyond the role of educator, advanced practice nurses holistically assess patients' needs with the understanding of patients' primary role in the improvement and maintenance of their own health and wellness. In conducting assessments, advanced practice nurses carefully explore patients' medical history and perform focused physical exams. At the completion of assessments, advanced practice nurses, in conjunction with patients, identify management goals and determine appropriate plans of care. A review of patients' self-care

management skills and application/adaptation to lifestyle is incorporated in initial histories, physical exams, and plans of care. (AlhyasL,et al,2011)

Many advanced practice nurses (NPs, CNSs, nurse midwives, and nurse anesthetists) may prescribe and adjust medication through prescriptive authority granted to them by their state nursing regulatory body. Currently, all 50 states have some form of prescriptive authority for advanced practice nurses.³ The ability to prescribe and adjust medication is a valuable asset in caring for individuals with diabetes. It is a crucial component in the care of people with type 1 diabetes, and it becomes increasingly important in the care of patients with type 2 diabetes who have a constellation of comorbidities, all of which must be managed for successful disease outcomes. (Boyd et al, 1990)

Many studies have documented the effectiveness of advanced practice nurses in managing common primary care issues.⁴ NP care has been associated with a high level of satisfaction among health services consumers. In diabetes, the role of advanced practice nurses has significantly contributed to improved outcomes in the management of type 2 diabetes,⁵ in specialized diabetes foot care programs,⁶ in the management of diabetes in pregnancy,⁷ and in the care of pediatric type 1 diabetic patients and their parents.^{8,9} Furthermore, NPs have also been effective providers of diabetes care among disadvantaged urban African-American patients.¹⁰ Primary management of these patients by NPs led to improved metabolic control regardless of whether weight loss was achieved.

The following case study illustrates the clinical role of advanced practice nurses in the management of a patient with type 2 diabetes. (Boyd et al, 1990)

2.2 Should we prescribe statin and aspirin for every diabetic patient?

There is clear evidence that diabetic patients constitute a group at high cardiovascular risk. Epidemiologic data show that with the aging of the European population, the percentage of diabetic patients will increase in the upcoming years, with important consequences for cardiovascular mortality. Therefore, the question arises, “How aggressive should prevention with statins and aspirin in diabetic patients be?”

As several studies have demonstrated, cardiovascular mortality of diabetic patients is as high as in nondiabetic patients with known coronary artery disease ; thus, the term “coronary artery disease risk equivalent” has been introduced.

A coronary artery disease risk equivalent implicates the need for stronger treatment goals of secondary prevention for cardiovascular risk factors. A further debate is whether medical treatment provided to patients with coronary heart disease should also be given to diabetic patients without known coronary heart disease.(Meier CR et al.1999)

2.3 Exercise prescription for patients with type 2 diabetes and pre-diabetes:

Type 2 diabetes mellitus (T2DM) and pre-diabetic conditions such as impaired fasting glucose (IFG) and/or impaired glucose tolerance (IGT) are rapidly increasing in prevalence. There is compelling evidence that T2DM is more likely to develop in individuals who are insufficiently active. Exercise training, often in combination with other lifestyle strategies, has beneficial effects on preventing the onset of T2DM and improving glycaemic control in those with pre-diabetes. In addition, exercise training improves cardiovascular risk profile, body composition and cardiorespiratory fitness, all strongly related to better health outcomes. Based on the evidence, it is recommended that patients with T2DM or pre-diabetes accumulate a minimum of 210 min per week of moderate-intensity exercise or 125 min per week of vigorous intensity exercise with no more than two consecutive days without training. Vigorous intensity exercise is more time efficient and may also result in greater benefits in appropriate individuals with consideration of complications and contraindications. It is further recommended that two or more resistance training sessions per week (2–4 sets of 8–10 repetitions) should be included in the total 210 or 125 min of moderate or vigorous exercise, respectively. It is also recommended that, due to the high prevalence and incidence of comorbid conditions in patients with T2DM, exercise training programs should be written and delivered by individuals with appropriate qualifications and experience to recognise and accommodate comorbidities and complications.(Simpson SH, et al 2006)

2.4 Risk of cardiovascular disease and all-cause mortality among diabetic patients.

The difference of cardiovascular effects between rosiglitazone and pioglitazone treatment for diabetic patients has not been thoroughly studied. We performed a meta-analysis to compare the risk of cardiovascular adverse effects in patients with type 2 diabetes treated with rosiglitazone compared to pioglitazone.

The Cochrane Library, PubMed, and Embase were searched to identify retrospective cohort studies assessing cardiovascular outcomes with rosiglitazone and pioglitazone. Meta-

analysis of retrospective cohort studies was conducted using RevMan 5.0 software to calculate risk ratios.

Of the 74 references identified, eight studies involving 945 286 patients fit the inclusion criteria for the analysis. The results of meta-analyses showed that, compared with pioglitazone, rosiglitazone therapy significantly increased the risk of myocardial infarction (risk ratios (RR) 1.17, 95% confidence interval (CI) 1.04 - 1.32; P = 0.01), the risk of heart failure (RR 1.18, 95%CI 1.02 - 1.36; P = 0.03), and total mortality (RR 1.13, 95%CI 1.08 - 1.20; P < 0.000 01).

2.5 Prescription practice for diabetes management among a female population in primary health care

Patterns and determinants of cardiovascular drug utilization in Prescription for diabetes care is an important practice in primary care. Methods. This is a descriptive study carried out on at primary care clinics over a five-month period at Al Imam Medical Complex, Riyadh, Saudi Arabia. It was cross-sectional study of 160 female diabetic patients, who visited the services between January and May, 2012. Data were collected from the medical records on the clinical characteristics and drugs prescribed for their diabetic management. Results. The majority of the sample population (82%) was older than 40 years old. Half of them had concomitant hypertension, hyperlipidemia, and obesity. There were 500 prescriptions for diabetes management. More than 57% of participants were on two or more drugs for hyperglycemia. Metformin was the most common drug prescribed. Metformin and sulphonylurea were the most common combined medications. Most of cases (70%) were on a combination of antihypertensive drugs. ACE or ARBs and diuretic was the most common combined prescriptions. (Al-Noza , et al 1999)

2.6 Risk of cardiovascular disease and all cause mortality among patients with type 2 diabetes prescribed oral antidiabetes drugs:

Incident myocardial infarction, congestive heart failure, and all cause mortality. Person time intervals for drug treatment were categorised by drug class, excluding non-drug intervals and intervals for insulin. 3588 incident cases of myocardial infarction, 6900 of congestive heart failure, and 18 548 deaths occurred. Compared with metformin, monotherapy with first or second generation sulphonylureas was associated with a significant 24% to 61% excess risk for all cause mortality (P<0.001) and second generation

sulphonylureas with an 18% to 30% excess risk for congestive heart failure ($P=0.01$ and $P<0.001$). The thiazolidinediones were not associated with risk of myocardial infarction; pioglitazone was associated with a significant 31% to 39% lower risk of all cause mortality ($P=0.02$ to $P<0.001$) compared with metformin. Among the thiazolidinediones, rosiglitazone was associated with a 34% to 41% higher risk of all cause mortality ($P=0.14$ to $P=0.01$) compared with pioglitazone. A large number of potential confounders were accounted for in the study; however, the possibility of residual confounding or confounding by indication (differences in prognostic factors between drug groups) cannot be excluded.(Johnsen SP, et al,2006.)

Chapter Three

METHODOLOGY

1 Type of the study

The present study was performed on a cross sectional observation which was attempted to find out the frequently prescribed drugs by the doctors in different diabetic patient.

3.2 Place of study

3.2.1 Narsingdi diabetic hospital (NDH)

NDH is a specialized hospital for diabetic patient. It is situated at in Norsigdi. . It is the apex centerfor diabetic patients in the country to provide modern and scientific management of patients. NDH is a 100-bedded hospital. It has ccu, pccu, wards, cabin and icu. Admission enter is open for 24 hours, A patient can take admission at any time of the day. The surgery department is very active in NDH. The surgery team has successfully done almost all the operations. NDH has many diagnostic and therapeutic equipments which are lifesaving. But a number of machines are now nonfunctioning. As the patients of this hospital are very critical in nature, so necessary lifesaving equipments should be in functioning position. Full automation system should be established for better service to the patient.

3.2.2 Dhaka bardem hospital(DB.H)

DBH is in Dhaka ,located in Shahbagh in the south part of Dhaka.

3.3 Study population

In the present study, all type of patients from both genders aging from 1 to 89, irrespective of their class and associated with types of diabetes diagnosed by the hospital physicians were included.

3.4 Study period

Study period was 4 months commencing from February 2015 to May 2015. To complete the study in time, a work schedule was prepared depending on different tasks of the study. Two months were spent for selection of topic, development of the protocol. Subsequent months were spent on official correspondence, data collection, data analysis, report writing and submission of report.

3.5 Sample size and sampling technique

In the present Study, Sample size consisted of 400 prescriptions which were sampled by using purposive sampling technique.

3.6 Data collection method

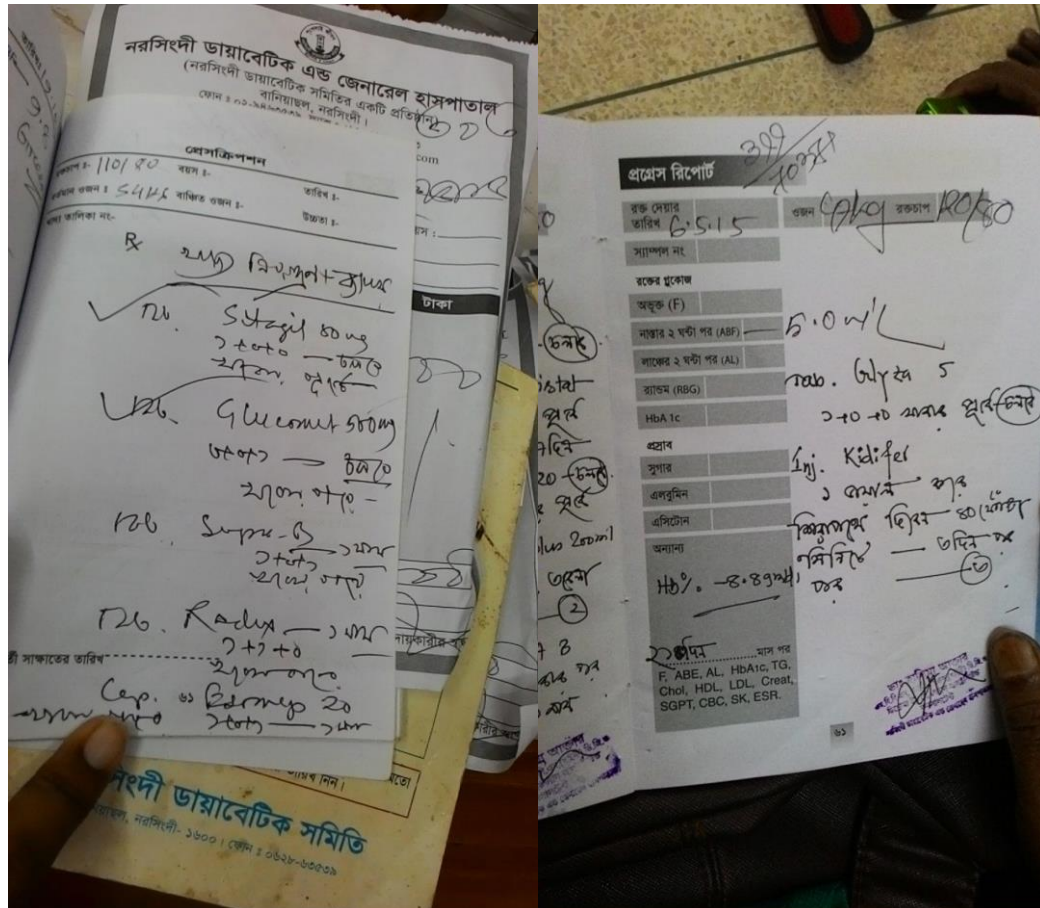
After explaining the purpose of the study to the respondents and obtaining their verbal consent, the researcher interviewed all the respondents by asking questions in Bangla and photocopied their prescriptions consisting of list of diseases and drugs prescribed with their dosing schedule and length. Sample photographs of 5 prescriptions are added below.

3.7 Data analysis

All the data were checked after collection. Then data were entered into computer and results were calculated with Microsoft® Excel 2010. The results were shown in Column, Line, Bar, Pie & Doughnut.

3.8 Sample prescriptions

Figure 1: Sample Prescription 1 Figure 2: Sample Prescription 2



Chapter four

RESULT

4. Result

4.1 Diabetes distribution profile on gender.

Table 1: Diabetes distribution profile on gender.

| Gender | Patient | Percentage |
|--------|---------|------------|
| Male | 262 | 65% |
| Female | 138 | 35% |
| Total | 400 | 100% |

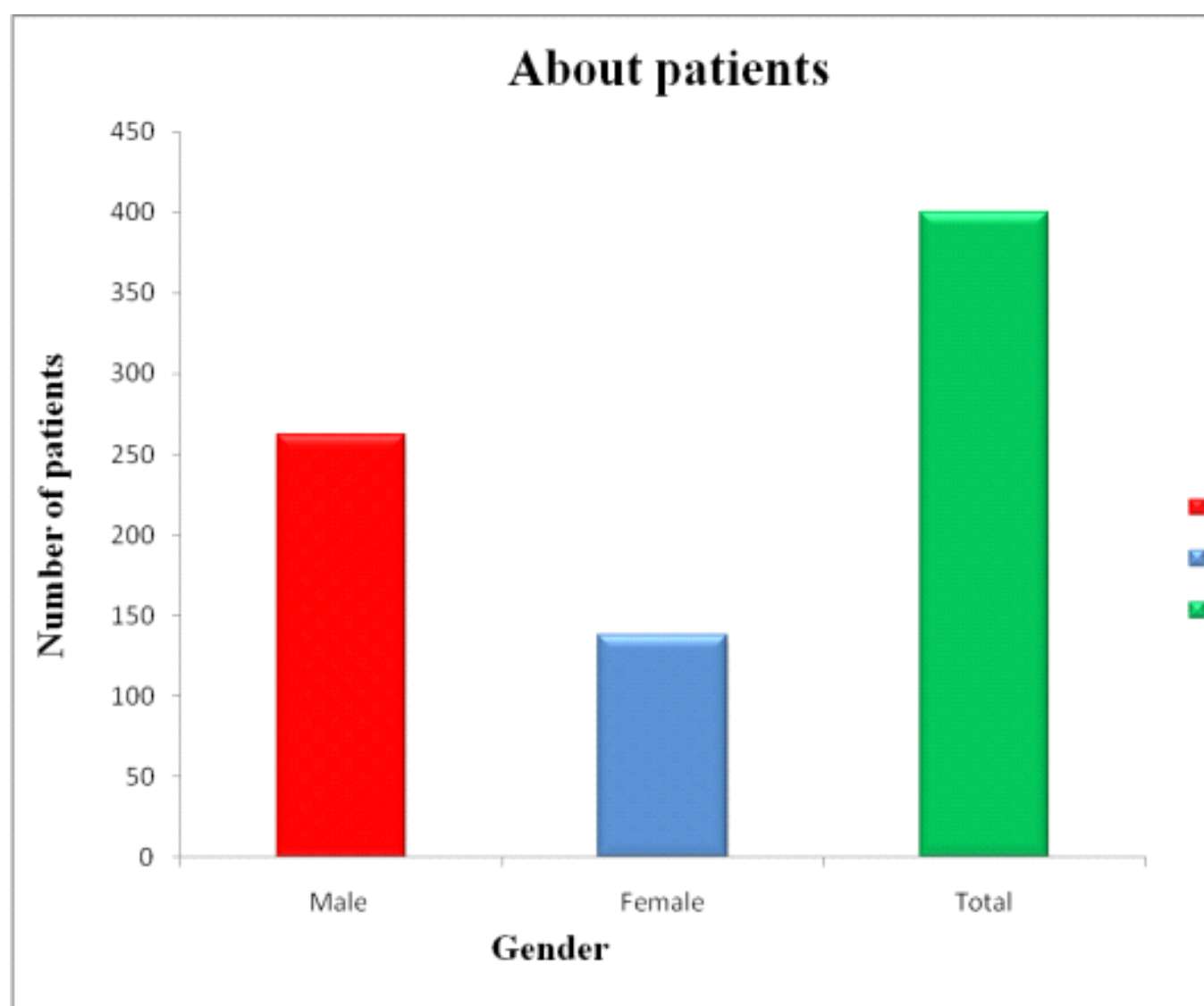


Figure5 :Diabetes distribution profile on gender.

4.2 diabetic patients' distribution profile on age.

Table 2:diabetic patients' distribution profile on age

| Age | Number of Patients | Percentage |
|-------|--------------------|------------|
| 0-14 | 0 | 0% |
| 15-29 | 7 | 1.7% |
| 30-44 | 75 | 18.75% |
| 45-59 | 154 | 38% |
| 60-74 | 109 | 29% |
| 75-89 | 55 | 14% |
| Total | 400 | 100% |

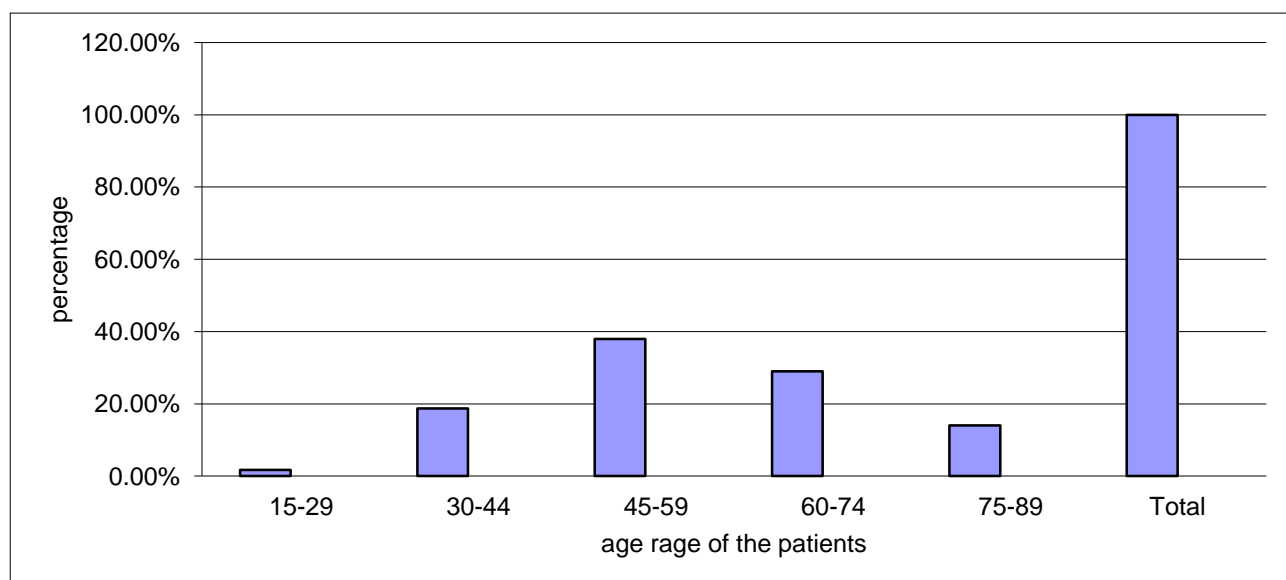


Figure 6:Diabetic patients distribution profile on age.

4.3. Distribution of the patients based on smoking habit

Table 3: Distribution of the patients based on smoking habit.

| Types | Percentage |
|------------|------------|
| smoker | 32% |
| Non smoker | 68% |

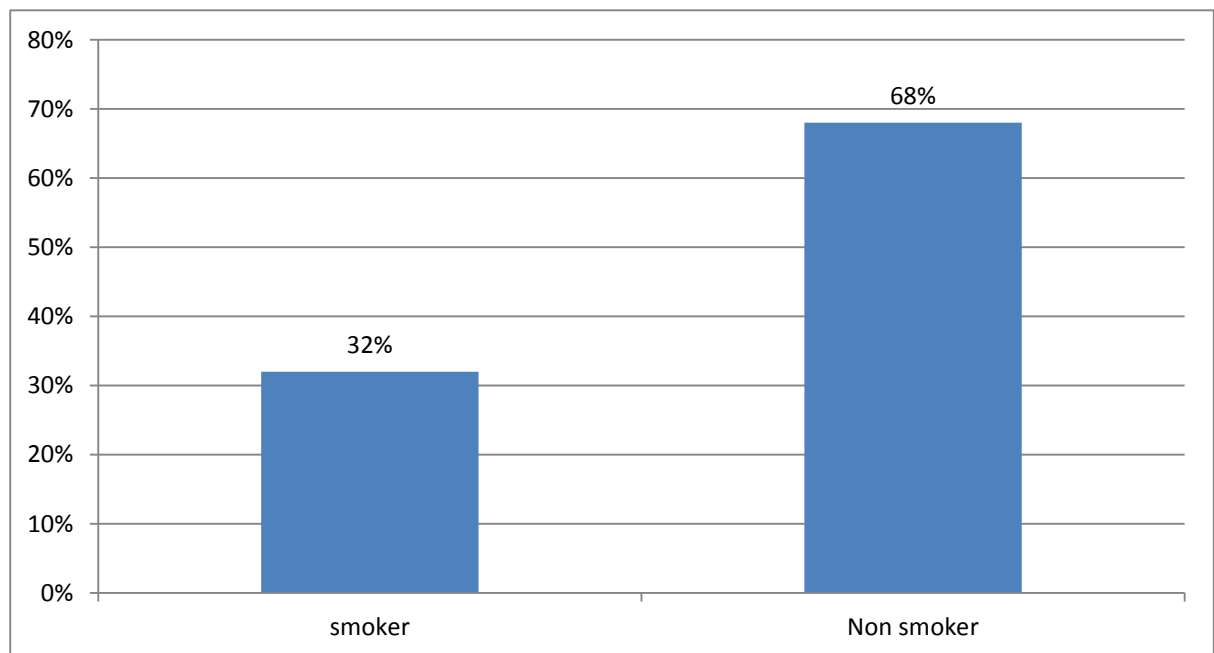


Figure 7: Distribution of patients based on smoking habit.

4.4 Distribution of diabetic patients based on types of diabetes.

Table 4: Distribution of diabetic patients based on types of diabetes.

| Types | Percentage |
|--------|------------|
| Type 1 | .5% |
| Type 2 | 99.5% |

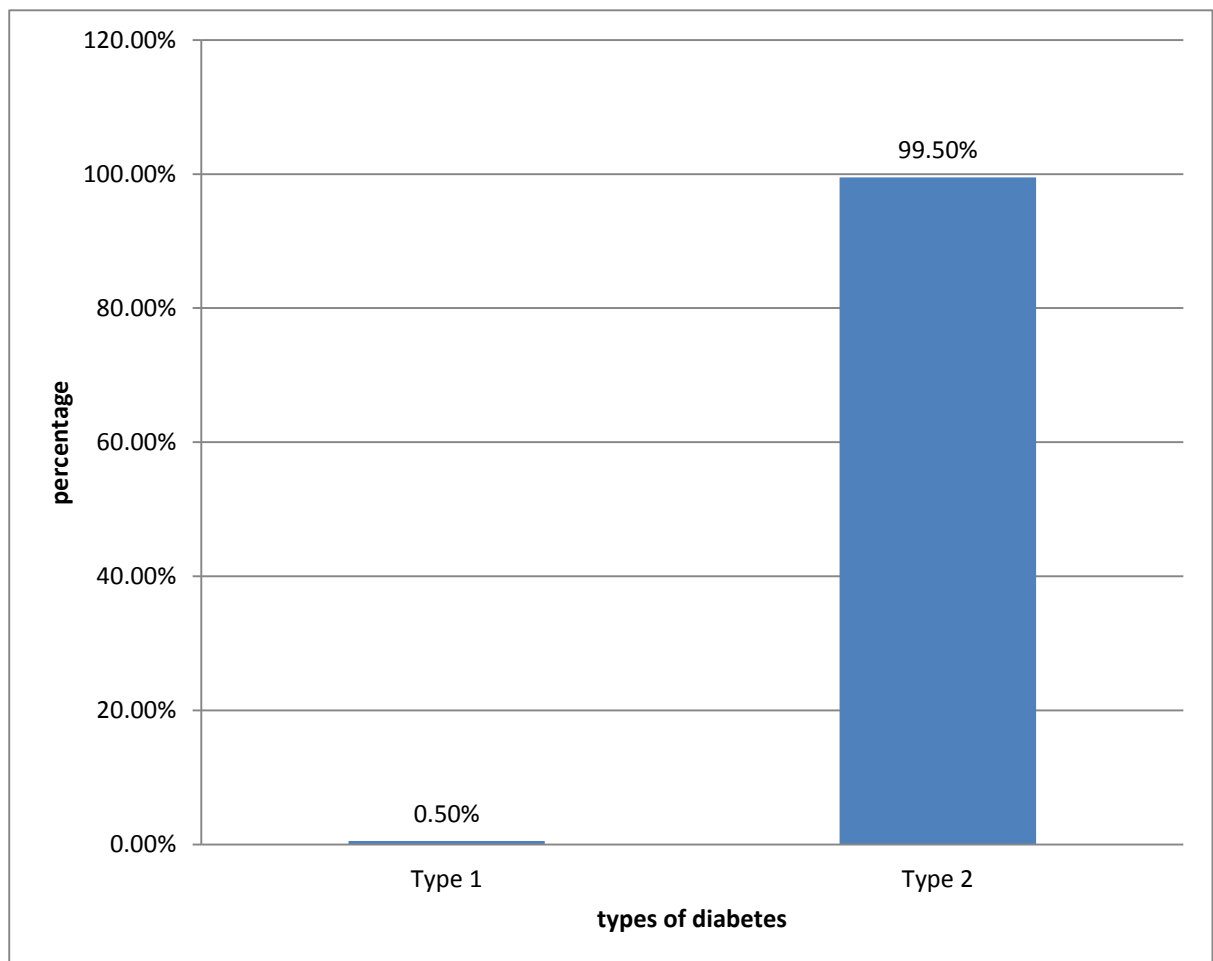


Figure 8: Distribution based on types of diabetes.

4.5 Distribution based on doing exercise

Table 5: Distribution based on doing exercise.

| Types of exercise | Percentage |
|--------------------|------------|
| Waking | 65% |
| Other exercise | 25% |
| Doing not exercise | 10% |

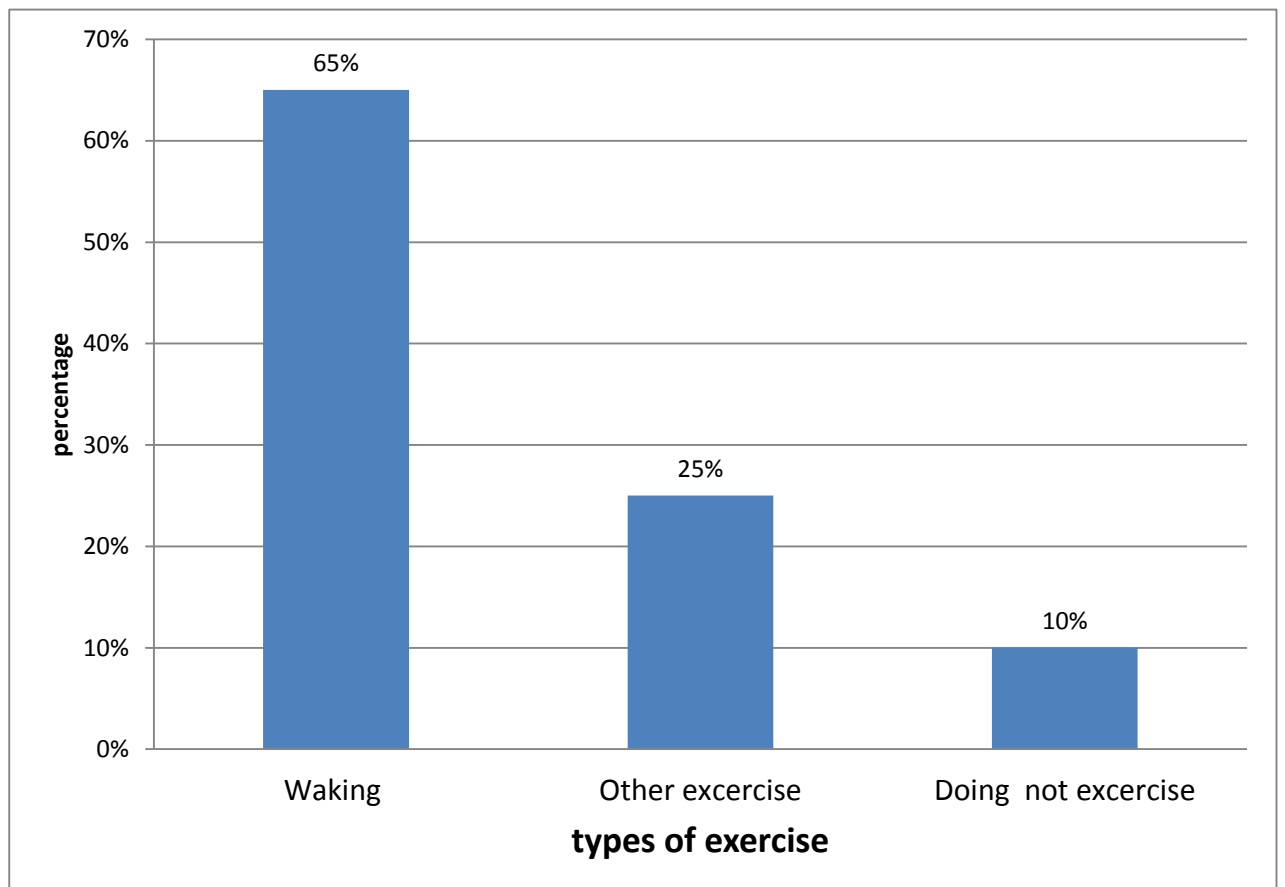


Figure 9: Distribution based on doing exercise.

4.6 Distribution based on maintaining the food habit according to the prescription.

Table 6: Distribution based on maintaining the food habit according to the prescription.

| Types | Percentage |
|-----------------|------------|
| Maintaining | 57% |
| Not maintaining | 23% |

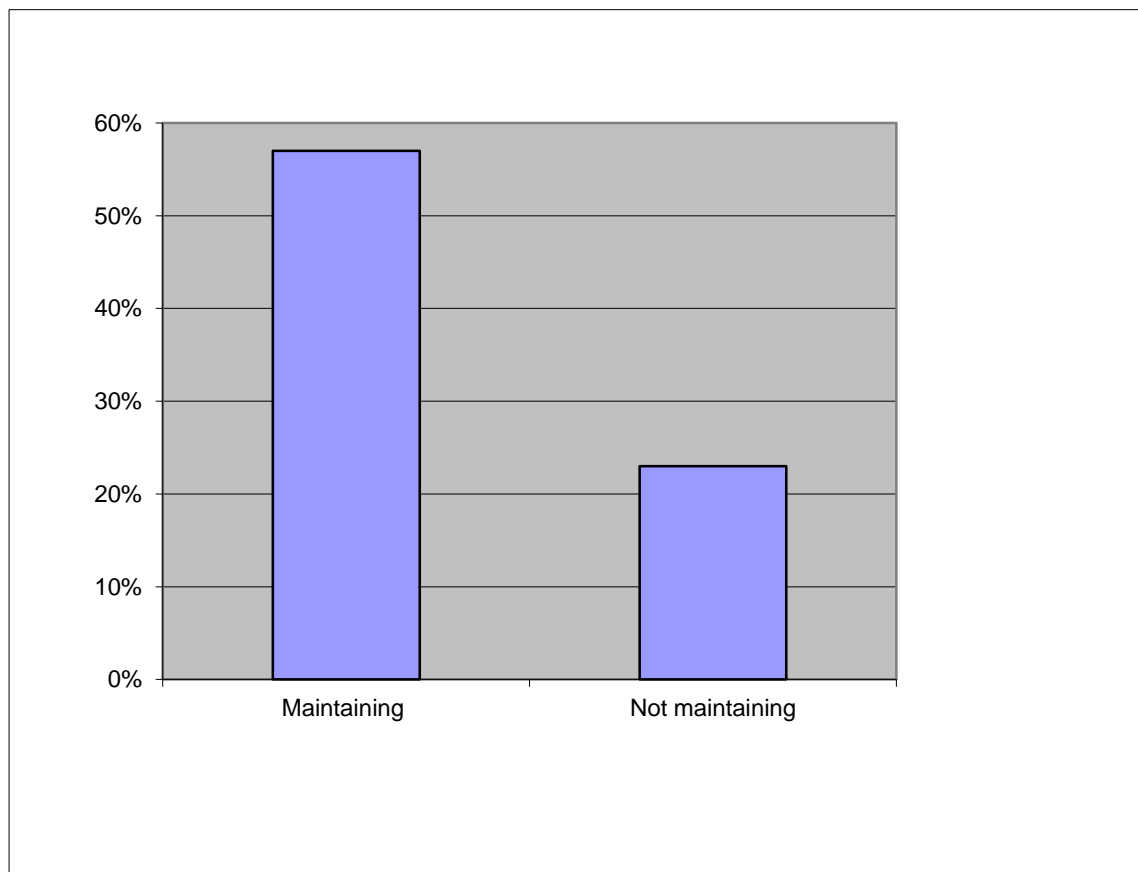


Figure:10Distribution based on maintaining the food habit according to the prescription

4.3 Drug market occupied by the different pharmaceutical companies.

Table 3: Drug market occupied by the different pharmaceutical companies.

| Companies | Brand name | Generic name | Drugs | Percentage % |
|--------------------|------------|--|-------|--------------|
| Drug International | sliptin | sitagliptin INN 50mg&metformin hydrochloride | 353 | 26 |
| NiproJMIpharma | lijenta5 | Linagliptin | 230 | 17 |
| Aristropharma | Linaglip | INN | 185 | 13 |
| Acme | Daomin | Metformin hydrochloride | 183 | 13 |
| Oponinpharma | met | metformin hydrochloride | 145 | 10 |
| popular | Flozit | Glyclajide | 110 | 8 |
| Total | | | 1380 | 100 |

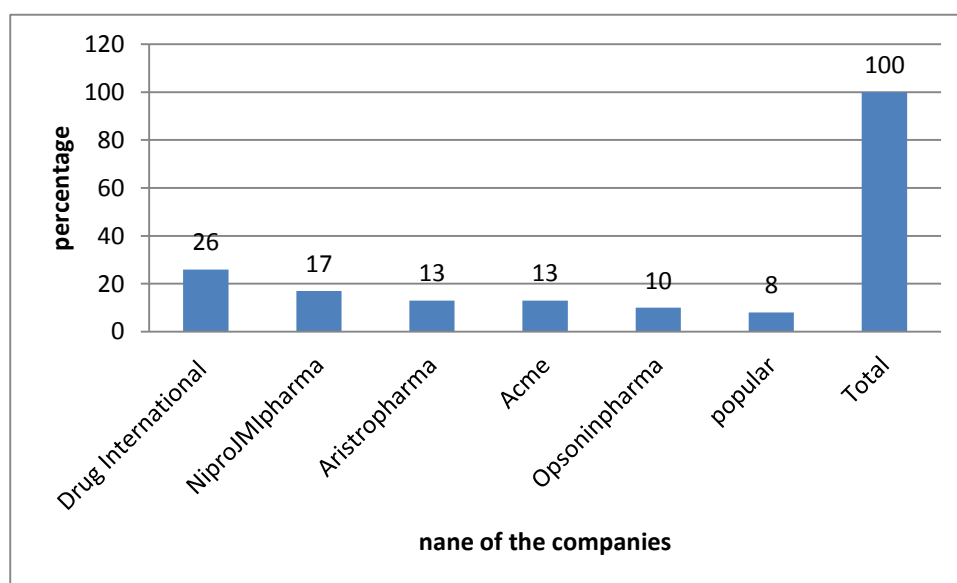


Figure 11: Drug market occupied by the different pharmaceutical companies.

Mostly prescribed drugs among diabetic patients.

Table 7: Mostly prescribed drugs among diabetic patients.

| Drugs | No. of patients | Percentage |
|-------------------------------------|-----------------|------------|
| Sitagliptin INN | 180 | 45% |
| Linagliptin | 130 | 32.5% |
| Metformin Hydrochloride | 108 | 9% |
| glyclajide | 140 | 35% |
| Sitagliptin&metformin Hydrochloride | 160 | 40% |

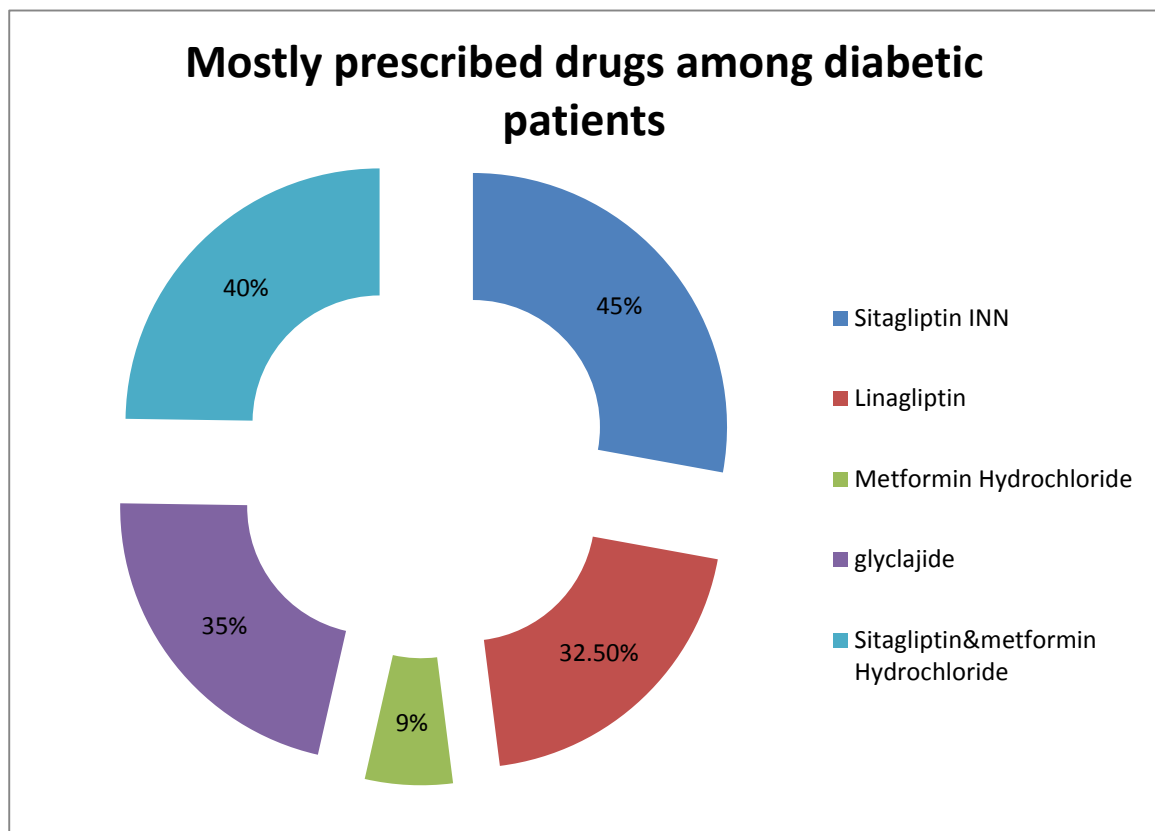


Figure 12: Mostly prescribed drugs among Diabetic patients.

4.9 Table 9:Uses of insuline for diabetic patients

| Types | Percentage |
|--------|------------|
| Type 1 | 47% |
| Type 2 | 53% |

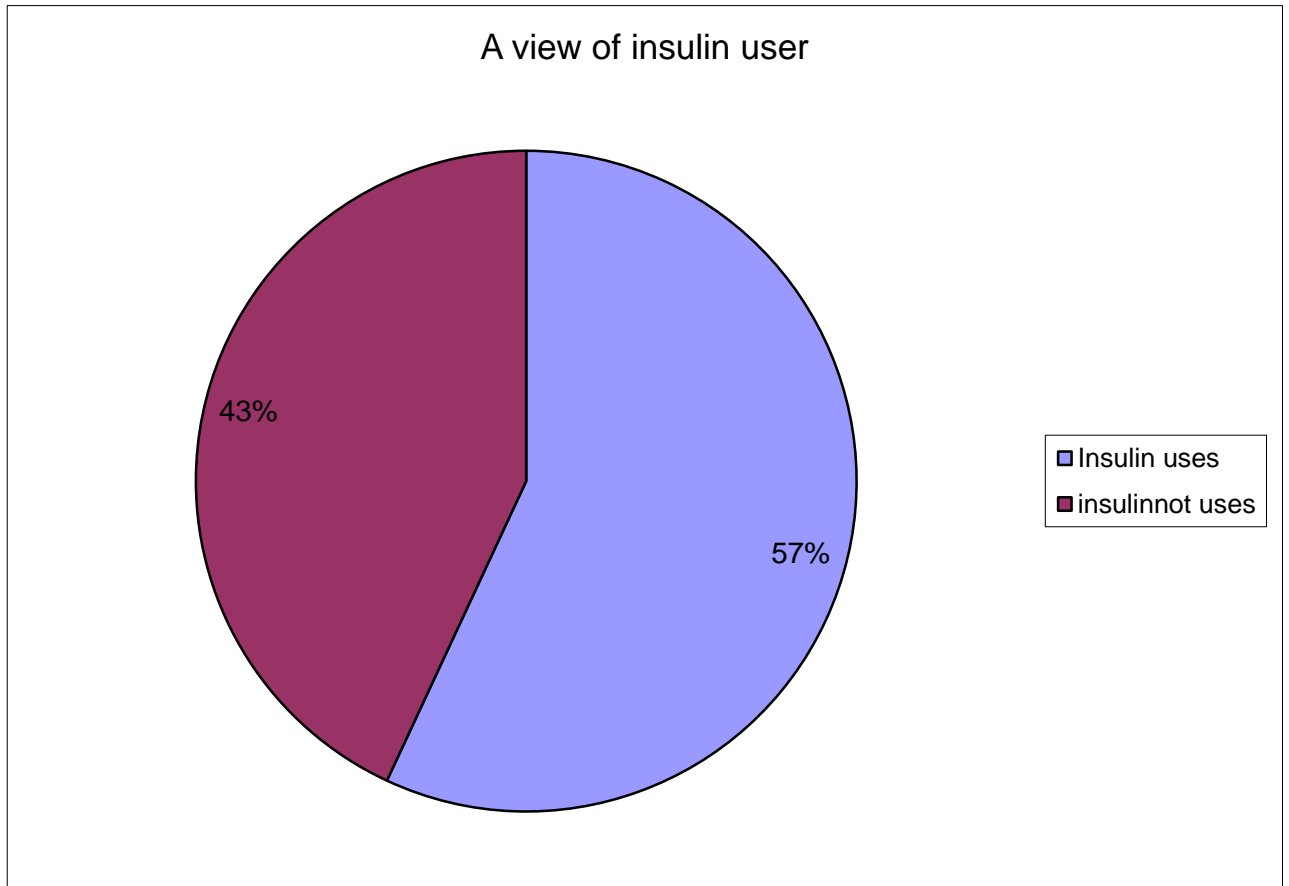


Figure 13:Aview of insulin user.

4.10 Table 10: Mostly prescribed insulin for diabetic patients.

| Name of insuline | No.of patients | Percentage |
|------------------|----------------|------------|
| Mixtured 70\80 | 80 | 20% |
| Novomix | 20 | 5% |
| Mix 30 | 50 | 12.5% |
| Kidifer | 30 | 7.5% |
| Diasuline 30\70 | 50 | 12.5% |

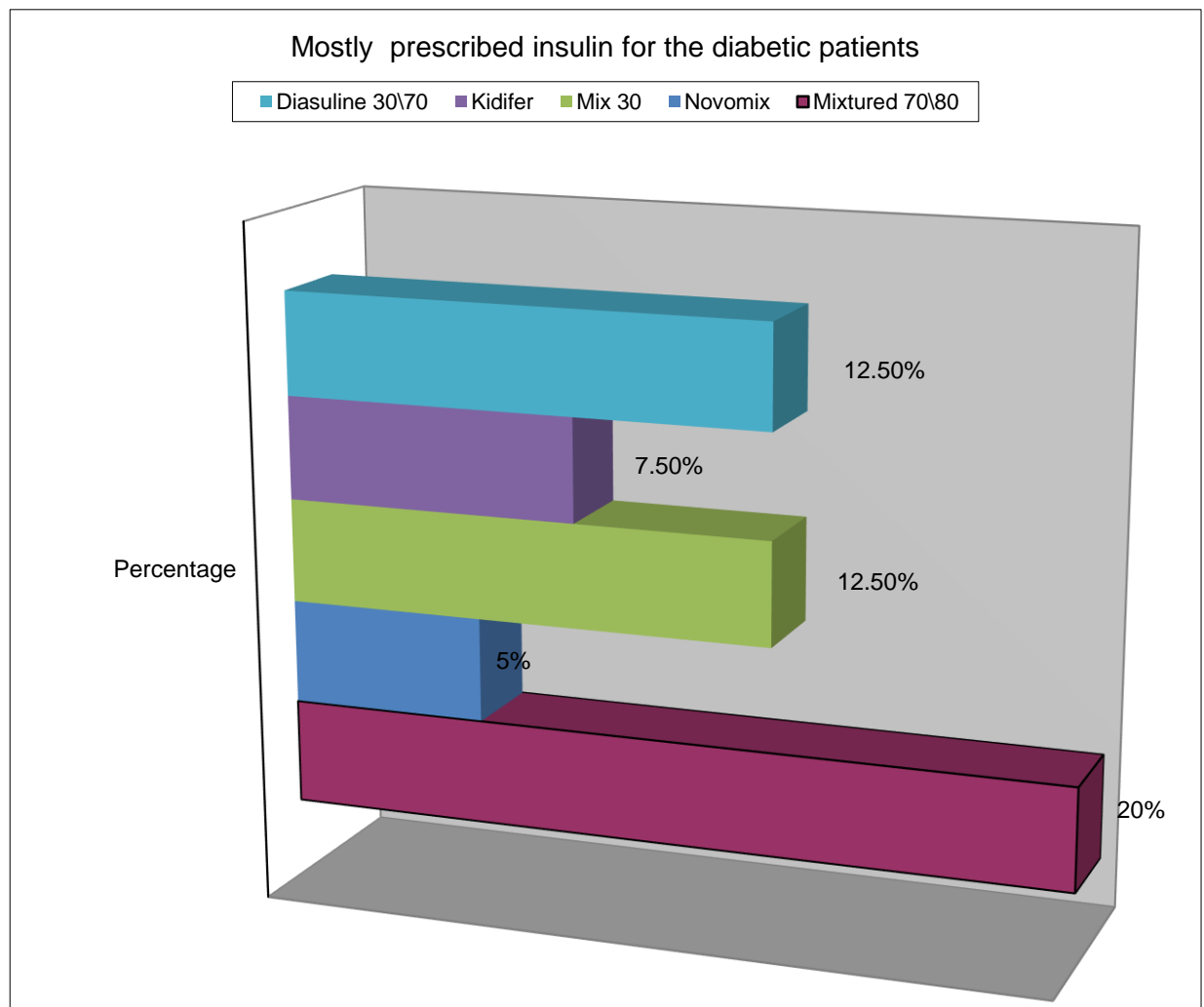


Figure 14: Mostly prescribed insulin for the diabetic patients

4.6 Different types of dosage form of drugs are used in diabetic patients.

Table 11: Different types of dosage form of drugs are used in diabetic patients.

| Dosage form | Percentage |
|-------------|------------|
| Tablet | 76% |
| Capsule | 12% |
| Injection | 86% |

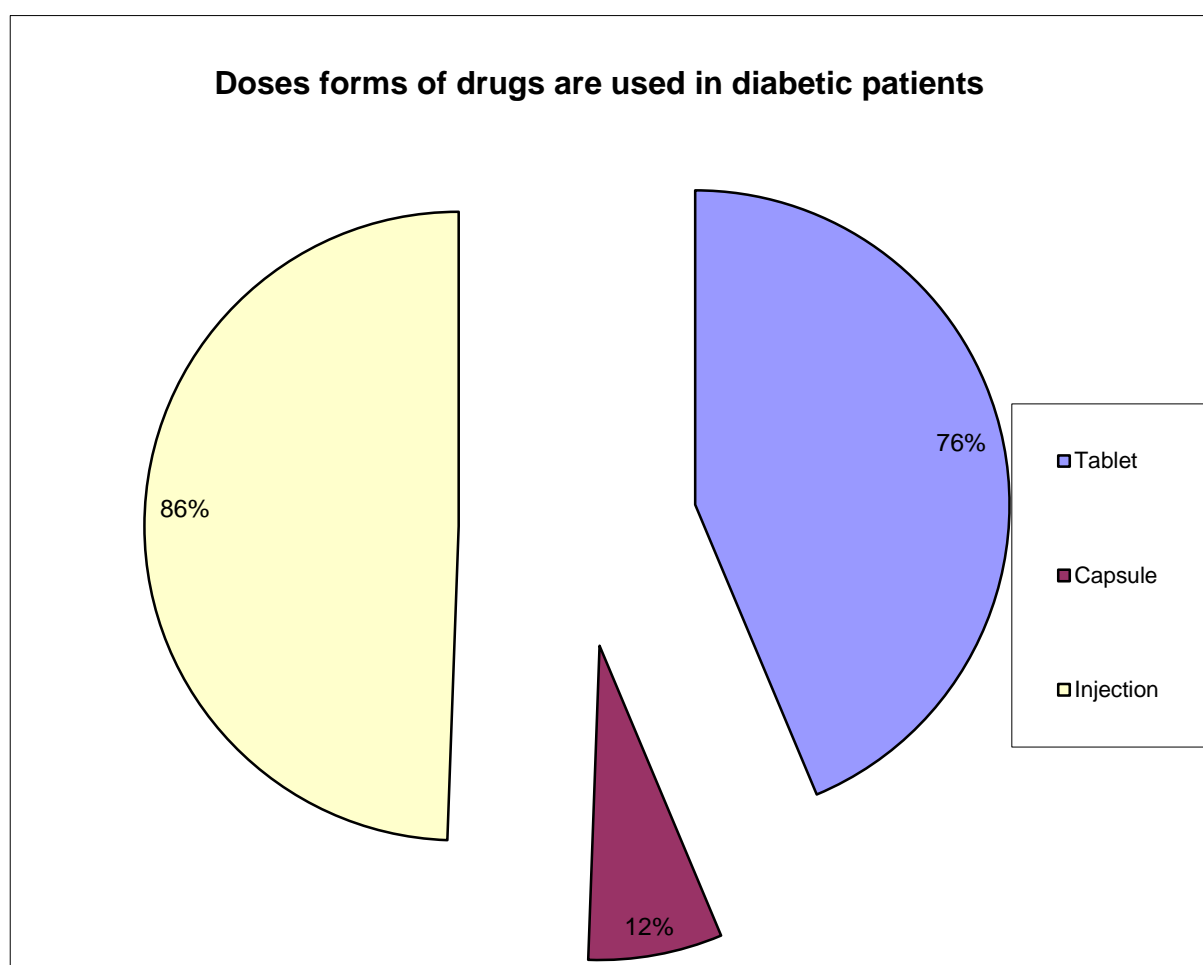


Fig 15: Dosage form of drugs are used in diabetic patients

4.12 Use of drugs in diabetic patients induced suffering from HTN.

Table 12: Use of drugs in diabetic patients suffering from HTN.

| Drugs | No. of patients | Percentage % |
|---------------------|-----------------|--------------|
| Clopidogrel | 106 | 26 |
| GlycerylTrinitrate | 78 | 20 |
| Ramipril | 64 | 16 |
| Metoprolol tartrate | 55 | 14 |
| Other drugs | 97 | 24 |

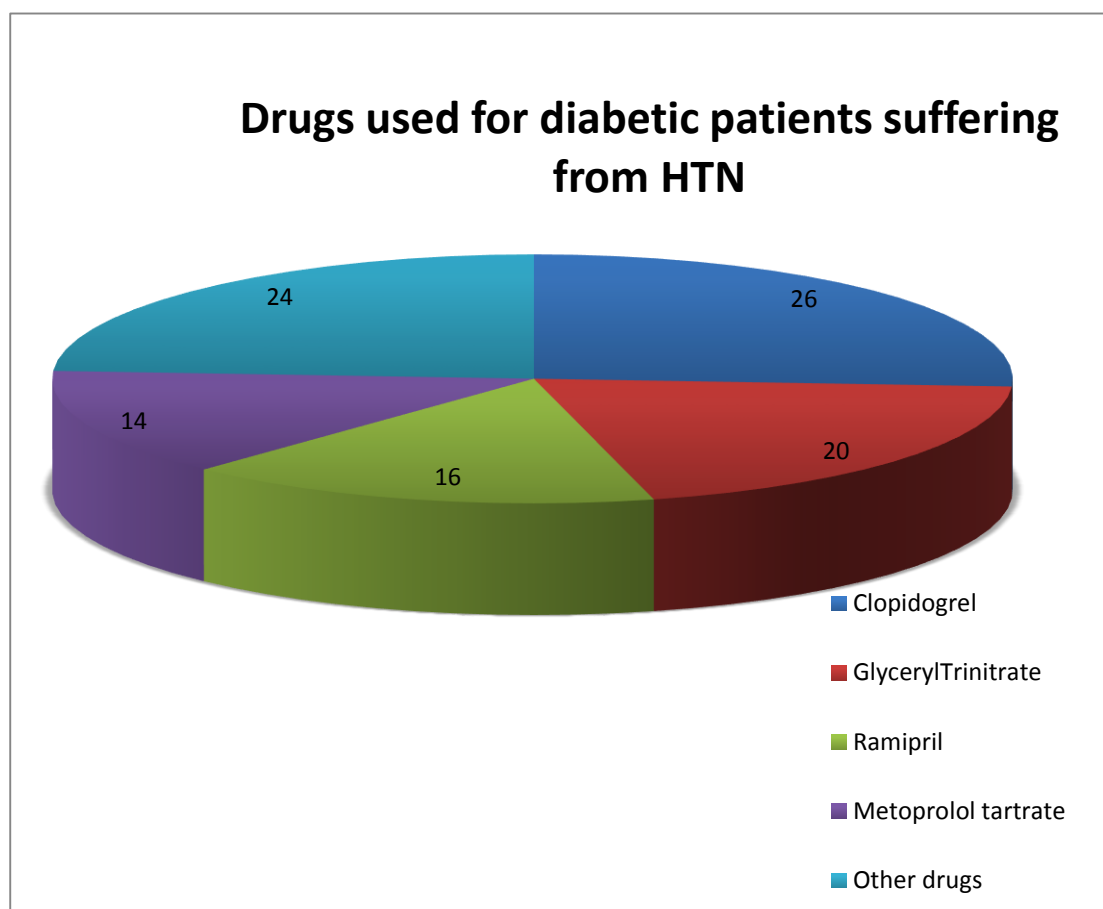


Figure 16: Uses of drugs in diabetic patients suffering from HTN

4.13 Use of drugs in diabetic patients suffering from cardiovascular disease.

Table 13: Use of drugs in diabetes suffering from cardiovascular disease.

| Drugs | No. of patients | Percentage % |
|--------------------|-----------------|--------------|
| Aspirin | 85 | 35 |
| GlycerylTrinitrate | 79 | 33 |
| Ramipril | 64 | 26 |
| Other drugs | 15 | 6 |

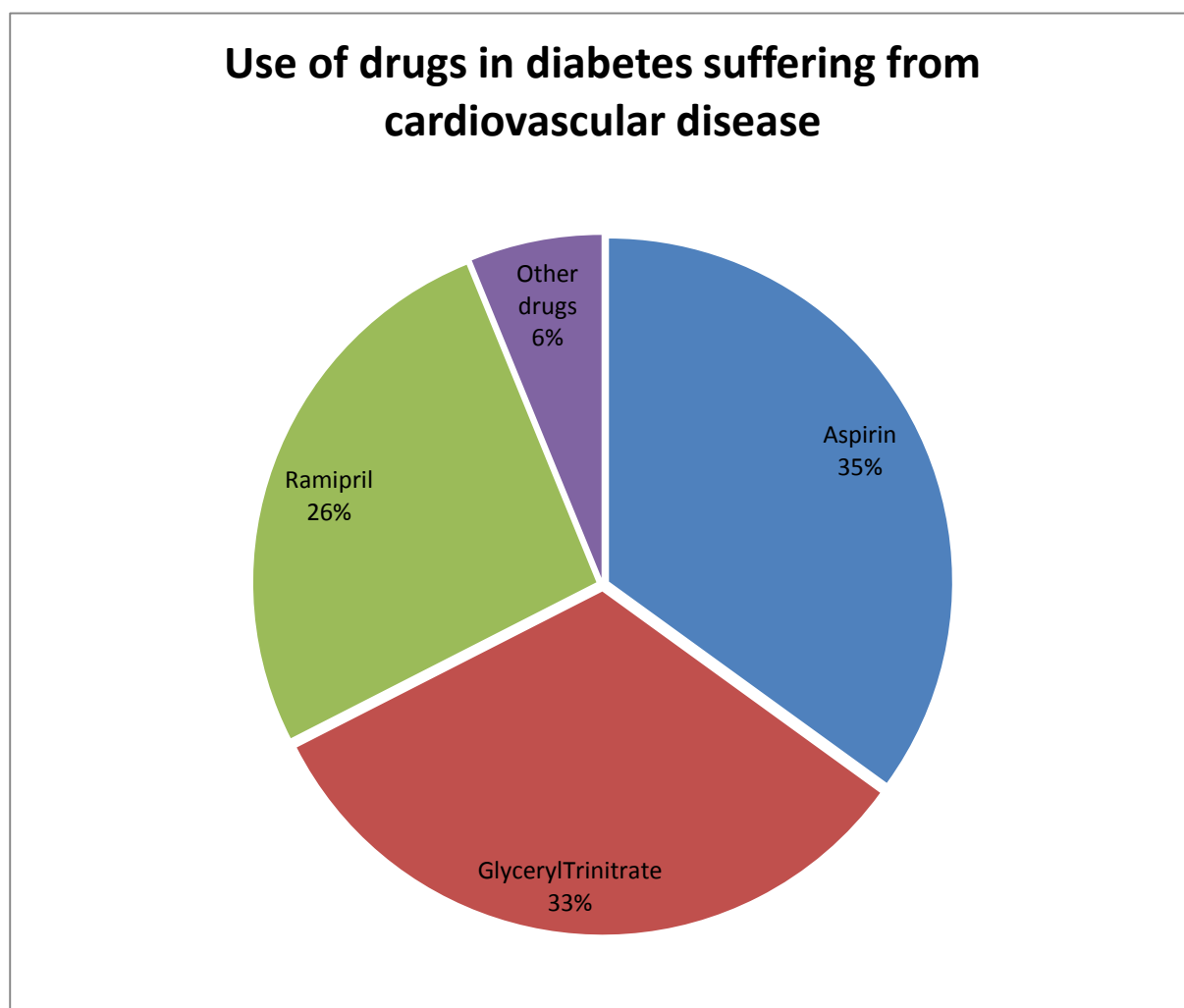


Figure 13: Use of drugs in diabetes suffering from cardiovascular disease.

Chapter 5

DISCUSSION

5.1 Diabetes distribution profile on gender.

Total number of patients is 400. Among them number of male patients is 262 (65%) and number of female patients is 138 (35%).

5.2 Diabetic patients' distribution profile on age.

In the present study 400 prescriptions related to diabetes were studied. 8 patients in 0-14 age group (0%), 2 patients in 15-29 age group (2%), 49 patients in 30-44 age group (12%), 154 patients in 45-59 age group (38%), 107 patients in 60-74 age group (27%), 55 patients in 75-89 age group (14%). The number of total patients is 400.

5.3 Drug market occupied by the different pharmaceutical companies.

Pharma market is very competitive in Bangladesh. There are about 265 pharmaceutical companies in Bangladesh. The quality of drugs produced by the top reputed companies is good. At present Bangladesh is exporting medicines in 87 countries of the world. anti-hyperglycemic drugs market is almost occupied by the top ranking companies. Among them Drug International occupied 26% , Nipro JMI Pharma 17% market , Acme Lab occupied 13% market ,Aritropharma 13% Opsoninpharma occupied 10%,popular 8%, market & others companies occupied 8% market. Total 1380 drugs were counted.

5.4 Mostly prescribed drugs among diabetic patients.

In 400 prescriptions Doctors prescribed Sitagliptin 45% among 239 patients, Linagliptin 32.5% among 221 patients, Metformin Hydrochloride 9% among 108 patients, Glyclajide 35% among 148 patients, Sitagliptin and Metformin Hydrochloride 40% among 162 patients, Ramipril 6% among 68 patients, Digoxin 8% among 98 patients.

5.5 Uses of insuline for diabetic patient.

Within 400 patient 230 patints are using insuline,so the percentage of insuline user is 57.5%.

5.6 Mostly prescribed insuline for the diabetic patients.

There are many types of insuline which prescribed for the diabetic patient.The use of mixtured 70\80 is 20%,novomix is 5%,mix 30 is 12.5%,kidiffer is 7.5%,diasuline 30\70 is 12.5%.

5.7 Different Types of dosage form are used in diabetic patient.

Different types of dosage form are used in diabetic patient that is tablets are used 76% diabetic patient. Capsule uses 12%, and 86% injections are used for the diabetic patients.

5.8 Metoprolol tartrate prescribed by doctors in different Diabetic and cardiovascular patients by doctors.

Metoprolol (Tablet 50 mg or 100mg; usually two times in a day) is the 5th most prescribed drug by doctors among cardiac patients. Metoprolol is cardio selective beta blocker & antihypertensive. From the study we observed that this drug is taken by 122 UA (Unstable angina) patients (26%), 105 AMI (Acute Myocardial Infarction) patients (23%), 102 LVF (Left Ventricular Failure) patients (22%), 63 HTN (Hypertension) induced patients (14%), 48 IHD (Ischemic Heart Disease) patients (10%), 21 others diseases patients (5%). Cardioselective beta-blockers, act mainly on the beta₁-receptors located in the heart, causing a reduction in heart rate and force of contraction, according to a study published by Churchouse, W., 2009.

5.9 Aspirin drug prescribed by doctors in diabetic and cardiovascular patients.

Aspirin (Tablet 75 mg or 300 mg; one or two times in a day) is the 4th most prescribed drug by doctors among cardiac patients. Aspirin is anticoagulant, antithrombotic & fibrinolytic. From the study we observed that this drug is taken by 173 UA (Unstable angina) patients (32%), 141 AMI (Acute Myocardial Infarction) patients (26%), 97 LVF (Left Ventricular Failure) patients (18%), 63 HTN (Hypertension) induced patients (11%), 49 IHD (Ischemic Heart Disease) patients (9%), 23 others diseases patients (4%).

5.10 Clopidogrel drug taken by the diabetic and cardiovascular patients.

Clopidogrel (Tablet 75 mg; one time in a day) is the top most prescribed drug among cardiac patients by doctors in Bangladesh. It is platelet aggregation inhibitor; anticoagulant. From the study we observed that this drug is taken by 148 AMI (Acute Myocardial Infarction) patients (29%), 123 UA (Unstable angina) patients (24%), 69 LVF (Left Ventricular Failure) patients (14%), 63 IHD (Ischemic Heart Disease) patients (12%), 34 OMI (Old Myocardial Infarction) patients (7%), 41 HTN (Hypertension) induced patients (8%) &

31 other diseases patients (6%). The benefits of Clopidogrel in cardiac patients stated in this study are similar with those published by Weisfeldt, M. L., et al, 2007.

5.11 Digoxin drug taken by the diabetic and cardiovascular patients.

Digoxin (Tablet 0.25 mg, Soft capsule 0.1 mg or 0.2 mg; one time in a day except Friday) is cardiac glycoside. From the study we observed that this drug is taken by 154 UA (Unstable angina) patients (30%), 123 AMI (Acute Myocardial Infarction) patients (24%), 79 LVF (Left Ventricular Failure) patients (16%), 66 HTN (Hypertension) induced patients (13%), 48 IHD (Ischemic Heart Disease) patients (9%), 39 other diseases patients (8%). Digoxin has been used to treat a variety of heart conditions for centuries, according to a study published by Bostock, B., 2011.

5.12 Use of drugs in diabetes suffering from hypertension (HTN).

From the study we observed that Clopidogrel is used by 106 hypertension induced diabetic patients (26%), GlycerylTrinitrate is used by 78 hypertension induced diabetic patients (20%), Ramipril is used by 64 hypertension induced diabetic patients (16%), Metoprolol tartrate is used by 55 hypertension induced diabetic patients (14%) & Other drugs are used by 97 hypertension induced diabetic patients (24%).

5.13 Use of drugs in diabetic patients suffering from cardiovascular disease.

From the survey we observed that Aspirin is used by 85 diabetes induced cardiovascular patients (35%), GlycerylTrinitrate is used by 79 diabetes induced cardiovascular patients (33%), Ramipril is used by 64 diabetes induced cardiovascular patients (26%), Other drugs are used by 15 diabetes induced cardiovascular patients (6%).

Chapter six

CONCLUSION

Conclusion

The leading cause of deaths in Bangladeshi people is diabetes. In Bangladesh deaths by coronary heart disease are 17.11% & deaths by stroke are 8.57%. Combination therapy pattern for the treatment of diabetic patients suffering from cardiovascular diseases is stated in this study. We can reduce the risk of diabetes and cardiovascular disease by avoiding tobacco use, reducing salt in the diet, doing regular physical exercise, avoiding harmful use of alcohol. We can also prevent heart disease & stroke through healthy diet, choosing a diet rich in fruits and vegetables, maintaining a healthy body weight, avoiding obesity and avoiding foods that are high in fat, sugar and salt. Preventing or treating hypertension and raised blood lipids are also helpful to reduce the diabetic risk. In coming days, pharmacogenomics capabilities will help to understand diseases in terms of specific genetic contributors. This plaque may be under control in near future by the development of effective new drugs based on pharmacogenomics capabilities.

Chapter seven

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