Assessment of diabetes drug prescription pattern in Bangladesh: A narrative study

A research report submitted to the Department of Pharmacy, Facultyof Allied Health Sciences, Daffodil International University in partial fulfillment of the requirements for the degree of Bachelorof Pharmacy (B.Pharm. Hons.)

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APPROVAL

This Project, "**Assessment of diabetes drug prescription pattern in Bangladesh: A narrative study**", Submitted to the Department of Pharmacy, Daffodil International University, has been accepted as satisfactory in partial fulfillment of the requirements for the degree of Bachelor of Pharmacy and approved as to its style and contents.

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DECLARATION

I hereby declare that,this project report is done by me under the supervision of **Prof. Dr. Md. Ekramul Haque,** Professor, Department of Pharmacy, Faculty of Allied Health Sciences, Daffodil International University, in partial fulfillment of the requirement for the degree of Bachelor of Pharmacy. I am declaring that this project is my authentic and genuine work. I am also declaring that neither this project nor any part thereof has been submitted elsewhere for the award of a Bachelor or anydegree.

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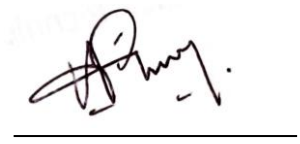

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At the beginning, I would to praise the name of almighty Allah who has given me power, patience and ability to complete my B.Pharm project report in very blessed manner.

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Author

Dedicatated

To

My Family

Abstract

Diabetes is a common metabolic disorder in which blood glucose level too high. Generally diabetes patients control blood glucose level by the help of medication, exercise and diet. Patients may need to change their lifestyle and properly taking medication. The prevalence of diabetes is constantly increasing worldwide. People with diabetes have an increased risk of developing various serious health problems resulting in higher medical care costs, reduced quality of life and increased mortality. The main objective of my study was to see the recent consequences of practice, and treatment pattern of diabetes. It was a survey based study and performed at Birdem General Hospital, BIHS General Hospital, Ibrahim General Hospital, Bangladesh Diabetic Samity (Nazimuddin road –Dhaka) The study was carried out on 1200 patients where their prescription was collected from indoor and outdoor department and analyzed in different method including gender, causes, symptoms, etiology, medication pattern, doctor visiting frequency. Here, found that male patients were more affected by diabetes than female patients.Among the mnumber of male patient is762 (63%) and number of female patientsis438(37%).The study also assessed that 66.67% patients were taking insulin. From the collected 1200 prescriptions, DPP-4 inhibitors were more prescribed in prescription. Doctor prescribed DPP-4inhibitors 21.92%, Sulphonylurea 19.76%,Biguanides +DPP-4inhibitors 14.17%,Biguanides +Thiazolidinedione 11.59%, Thiazolidinediones 10.42%, Biguanides 8.59%,DPP-4inhibitors +Biguanides 8%,Sulphonylurea +Biguanides 4.3%,Alpha-glucosidase inhibitors 1.25%.

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CHAPTER ONE: INTODUCTION

1.1 General Introduction

Survey is a process that is used for collection of data or information by individual persons. The questionnaireandtheinterview are two types of survey that are available. Questionnaire survey means ask the question of individual persons that the questions are already created to the paper and complete the answer to the response of the individual persons.Interviewis the another type of survey that arecompletedby responseto interviewer.The various ways of survey that are telephonesurvey to collect information or data by telephone,face-to-facesurvey that are present face-to face to collect information and paper survey that are collect information by asking question to interviewer. At the current times these way of surveys are increasingly replaced byinternet survey. Internet survey is the modern technology based survey to collect information by the use of internet. It is time consuming and rapidly gather information of many individuals.

Developing of diabetes increasingly day by day in Bangladesh

Diabetes is ametabolic disorder in whicha common condition that is hyperglycemia due to insulin deficiency. As a resultincrease the normal blood glucose level or highbloodglucoselevel. It is the condition in which the body does not properly produce enough insulin. The pancreasproduceinsulin to help glucose get into the cells of our bodies. When any patients have diabetes, thebody doesn't produce enough insulin.Diabetes patients have an increased risk of developing many serious health problems. High blood glucose levels can lead to serious diseases that affect the heart and blood vessels**,** eyes**,** kidneys**,** nerves and teeth**.**

Figure 1.1: Glucose in Blood

Pancreas

The part of the pancreas with endocrine function is made up of a million cell clusters called islets of Langerhans.

- Alpha or A cells secrete glucagon which increased blood glucose level.
- Beta or B cells secrete insulin which decreased blood glucose level.
- Delta or D cells secretesomatostatin, it is an inhibitor of growth hormone secretion.
- F or PP cells secrete pancreatic polypeptide. Function and origin of pancreatic polypeptide are still uncertain.

1.2 History of Diabetes

For 2,000 years polygenic disorder} has been recognized as a devastating and deadly disease. Polygenic disorder was one among the primary diseases delineate with Associate in Nursing Egyptian manuscript from c. 1500 BCE mentioning "too niceevacuation of the urine"[1].

The first represented cases area unit believed to be of sort I polygenic disease. Indian physicians round the same time known the unwellness and classified it as madhumeha or "honey urine", noting the excreta would attract ants.

The term "diabetes" or "topassthrough" was first used in 230 BCE by the Greek Appollonius of Memphis The disease was considered rare during the time of the Roman empire, with Galencomment in ghehad only seen two cases during his career[2]. This is possibly due the diet and life-style of the ancient people or because the clinical symptoms were observed during the advanced stage of the disease. Galen named the disease "diarrhea of the urine"(diarrheaurinosa).

The earliest extant work with an in depth relation to polygenic disorder is that of Aretaeus of Cappadocia (2nd or early thirdcentury CE). He represented the symptoms and also the course of the sickness, that he attributed to the wet and coldness,reflective the beliefs of the "Pneumatic School". He hypothesized a correlation of polygenic disorders with alternative diseases and mentioned medical from the bite that additionallyprovokes excessive thirst. His work remained unknown within theWest till the center of the sixteenth century.

Type I and II polygenic disease were known as separate conditions for the primary time by the Indian physicians Sushruta and Charaka in 400-500 metal with type Irelated to youth and sort II with being overweight. The term "mellitus" or "from honey" was additional by the Briton John Rolle within the late 1700s to separate the condition from diabetes, that is additionally related to frequent maturation. Effective treatment wasn't developed till the first part of the twentieth century, once Canadians town Banting and Charles Victor Herbert Best isolated and sublimate hypoglycemic agent in 1921 and 1922. This was followed by the event of the long hypoglycemic agent NPH within the Nineteen Forties[3].

1.3 Incidenceof diabetes

1.3.1Increasingtrend of diabetesprevalence throughout theworld

The recent World Health Organization (WHO) report on the prevalence of DM has given a dread image of a worldwideepidemic of type-2 polygenic disease (1997). It's motion a heavy threat to entire population of the globe regardless of stages of manufacture and development. The increasing prevalence of DM for South East Asian Region (SEAR) was calculable from the ascertained prevalence in 1995 that projected to 2000 and 2025. This trend ascertained 2 folds increase within thedeveloped and virtually 3 folds within the developing nations. International comparison calculable that highest increase would be ascertained in SEAR and in Japanese Mediterranean Region (East-Med)[4].

1.3.2Increasing trend of diabetes prevalence in Bangladesh

Although there was no large-scale national survey in Bangladesh but several small-scale survey intervals have been done over several years. The prevalence of IGT has increase from O.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. Thesis a conservative estimate because the trend of increasing prevalence will make this figure much higher. Diabetes registry in BIRDEM, are ferral center, also showed an increasing trend. Only 389 diabetic subjects were registered throughout the year 1960

1.4 Alignment of Diabetes

1.4.1 Type I Diabetes

Dependent polygenic disorder during this case, lack of endocrine production is answerable for metabolism of aldohexose within the cell of duct gland is destroyed by the autoimmuno. It's additionally referred to as juvenile onset polygenic disorder. Over ninety fifth of persons with an equal incidence in each lingams of 100 percent of all polygenic disorder patients.

People with sort I polygenic disorder to create endocrine solely only a few or perhaps none in any respect. As a result, rising blood sugar (hyperglycemia) and therefore the body's cells don't get adequate energy uptake.Theseconditions can cause:[6] [7] [8]

Dehydration

High levels of sugar within the blood can increase the frequency of excreting in response to lowering blood glucose. once blood glucose is out with excreta, the body can lose tons of waterinflicting dehydration.

Losingweight

Blood sugar (glucose) is that the energy supply for the body. Aldohexose is wasted with excretion conjointly contains several nutrients and calories required frame. Therefore, folks with type I diabetes also will slenderize drastically.

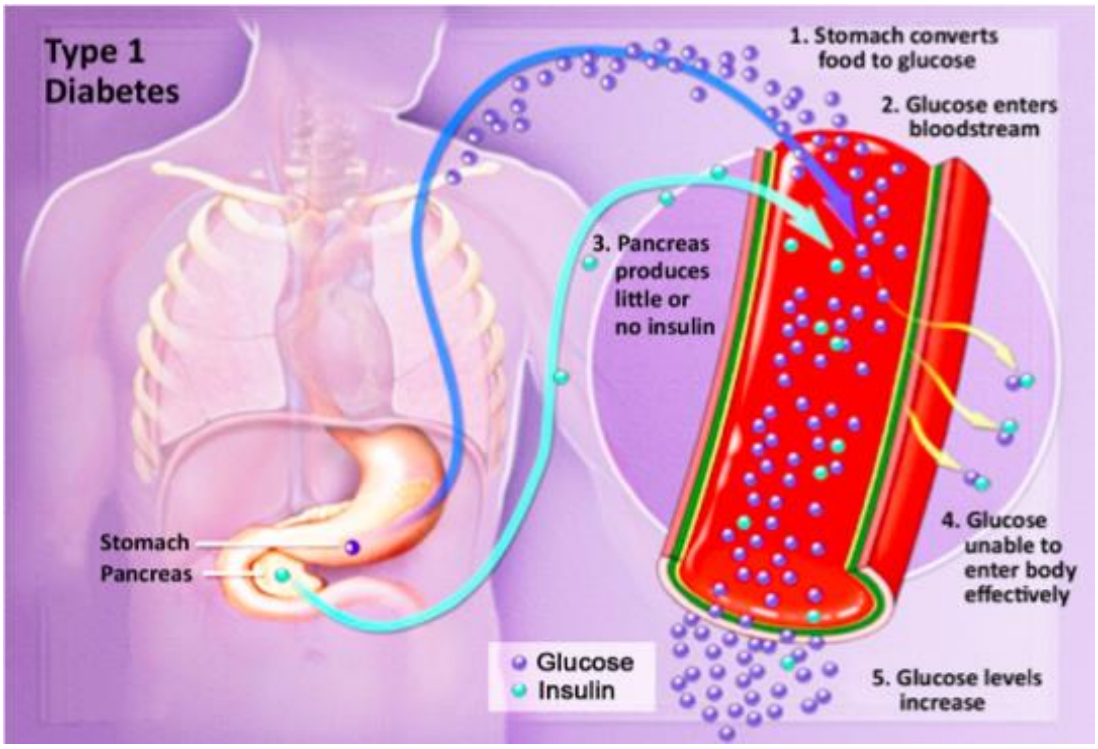

Figure 1.3: Formation of type I Diabetes

1.4.1.2 Etiology of Type I Diabetes

- Creation of antibodies causing destruction of β-cell.
- Disclosure to food toxins.
- Drug induced damage of β-cell.
- Disclosureof young infants to cow's milk.
- Infection with bacteria or virus causing wreck of β-cell.

1.4.1.3 Symptoms of Type I Diabetes

- Polydipsia
- Polyuria
- Polyphagia
- Weight loss
- Dry skin
- Blurred vision

1.4.1.5 Complications ofTypeI Diabetes

Type I diabetes can affect major organs in the body including heart, blood vessels, nerves, eyes and kidneys. Keeping the blood sugar level familiar to normal most of the time can reduce the risk of many complications.

Develop over a period of decades. Good blood sugar management. Eventually, diabetes complications may be disabling [9].

Diabetic Cardiomyopathy

Diabetes increases the risk of various cardiovascular problems, including coronary artery disease with chest pain (angina), heart attack, stroke, narrowing of the arteries (atherosclerosis) and high blood pressure[10].

❖ Diabetic Neuropathy

Excess sugar can injure the wall soft he tiny blood vessels (capillaries)that nourish our nerves, especially in the legs. This can cause tingling, numbness, burning or pain that usually begins at the tips of the toes or fingers and graduallyspreadsupward.Poorlycontrolledbloodsugarcouldcauseiteventuallyloseallsense of feeling in the affected limbs [11].

Damagetothenervesthataffectthegastrointestinaltractcancauseproblemswithnausea, vomiting, diarrhea or constipation. For men, erectile dysfunction maybe an issue.

❖ Diabetic Nephropathy

The kidneys contain millions of tiny blood vessel clusters thatfilterwastefromourblood.Diabetescandamagethisdelicatefiltering system .Severe damage can lead to kidney failure or irreversible end-stage kidney disease, which requires dialysis or a kidney transplant.

❖ Diabetic Retinopathy

Diabetes can damage the blood vessels of the retina, potentially leadingtoblindness.Diabetesalsoincreasestheriskofotherseriousvision conditions, such as cataracts and glaucoma.

❖ Diabetic ketoacidosis

Diabetic ketoacidosis (DKA) is an acute and dangerous complication that is always a medical emergency and requires prompt medical attention. Low insulin levels cause the liver to turn fatty acid to ketone for fuel ;ketone bodies are intermediate substrates in that metabolic sequence .This is normal when periodic ,but can become a serious problem if sustained .Elevated levels of ketone bodies in the blood decrease the pH of blood. The level of consciousness is typically normal until ate in the process, when lethargy may progress to coma. Ketoacidosis can easily become severe enough to cause hypotension, shock, and death.

❖ Foot damage

Nerve damage in the feet or poor blood flow to the feet increases the risk of various foot complications .Left untreated, cuts and blisters can become serious infections, which often heal poorly and may ultimately require toe, foot or leg amputation.

❖ Skin and mouth conditions

Diabetes may causes kin problems ,including bacterial and fungal infections. Gum infections also affect diabetic patients and especially have a history of poor dental hygiene.

❖ Osteoporosis

Diabetes may lead to lower than normal bone mineral density, increasing risk of osteoporosis.

❖ Hearing problems

Hearing impairments occur more often in people with diabetes.

❖ Urinary tract infection

Diabetes people is increased rate of urinary tract infection. The reason Is bladder dysfunction that Is more common in diabetics than in non-diabetics due to diabetic nephropathy. Nephropathy can cause reduce in bladder sensation, which in turn can cause reduced residual urine that is a risk factor for urinary tract infections[12].

❖ Sexual dysfunction

Sexual dysfunction in diabetics is often are to physical factors such as nerve damage or poor circulation and psychological factors such as stress and depression caused by the demands of the disease.

❖ Males

The mostcommonsexualissuesindiabetic malesare facing problemswith erectionsandejaculation: "Withdiabetes,bloodvesselssupplying the penis erectiletissuecangethardandnarrow, preventingtheadequatebloodsupply neededforafirmerection.Thenervedamagecausedby poor bloodglucosecontrolcan alsocauseejaculate togointo the bladderinstead of through the penisduringejaculation,calledretrogradeejaculation.Whenthishappens,semenleavesthe bodyintheurine.Another causeforerectiledysfunctionare thereactiveoxygenspeciescreated as a resultof thedisease.

❖ Females

Diabetes will have an effect on feminine sex or feminine sexualpathology and there need to be a major prevalence of sexual issues in diabetic girls. Common issues embrace reduced sensation within the crotch, dryness, issue or inability to climax, pain throughout sex, andbelittled concupiscence. In some cases polygenic disorder has been belittled sex hormone levels in females, which may have an effect on duct lubrication. Oral contraceptives are taken by diabetics. Sometimes, contraceptive pills will cause a blood glucose imbalance[13].

1.4.1.6 Risk factors for typeI diabetes

Type1diabetes,whichstartsinchildhood,thepancreasstopsproducing insulin.Insulin isahormone that thebody needstobeabletousetheenergythat foundinfood.The primaryrisk factor for typeIdiabetes is a familyhistoryof this lifelong then it is chronicdisease.

- **Family history**

Anyone with a parent or sibling with typeIdiabetes has a slightly increased risk of developing the condition.

- **Genetics**

The presence of certain genes indicates an increased risk of developing typeIdiabetes.In some cases, usually througha clinical trial genetic testing can bedone to determine, someone who has a family history of type 1 diabetes is at increased risk ofdeveloping the condition.

- **Geography**

The incidence of typeIdiabetes tends to increase as travel away from the equator. People living in Bangladesh the highest incidence of type Idiabetes about townies area more affected than rural area.

- **Viral exposure**

Exposureto Epstein-Barrvirus,coxsackievirus,mumpsvirus orcytomegalovirusmaytrigger the autoimmunedestruction of the islet cells that may directly affect the islet cells.

- **Early vitamin D**

VitaminD play the vital role of protectiveagainsttype Idiabetes.However,early drinking of cow'smilk -a commonsource of vitamin D. It has been linked to an increased risk of type I diabetes.

❖ **Dietary factors**

Omega-3fattyacidsmayoffersomeprotectionagainsttype1 diabetes.Drinking water that containsnitratesmay increasetherisk of typeIdiabetes.

Consumingdairyproducts, particularly cow'smilk,may increase infants' riskofthedisease.Additionally,thetimingof theintroductionof cerealintoa baby'sdietmayaffectrisk.Oneclinical trialfoundthatbetweenages threeand sevenmonthsappears to be the optimal time for introducing cereal [14].

1.4.2Type II Diabetes

It is also called non-insulin dependent diabetes.Usually,itconsistsof85%ofallpatients.Inthiscase,insulinconcentrationinbloodissometimesnormal or more than normal or less than normal. Insulin is produced in β-cell but not secreted sufficiently or not workingduetotissueresistancetoinsulin. So, Glucoseisnot utilized properly. This is also called maturity onset diabetes or old age diabetes [15].

A person with Type IIDiabetes either:

- ❖ Does not produceenough insulin Or
- ❖ Suffers frominsulin resistance

Themajority ofpeoplewithTypeIIhavedevelopedtheconditionbecausethey areoverweight. TypeIIisthemostcommonformof diabetes.Inthecaseofinsulinresistance,thebodyisproducingtheinsulin,butinsulinsensitivity isreducedanditdoesnotdothejobaswellasit shoulddo.Theglucoseisnotentering thebody's cells properly, causingtwo problems**:**

- ❖ A build-up ofglucose inthe blood.
- ❖ The cells arenotgettingtheglucose theyneed forenergyandgrowth.

IntheearlystagesofTypeIIinsulinsensitivityisthemainabnormalityalsothereareelevated levelsofinsulinintheblood.Therearemedicationswhichcanimproveinsulinsensitivityandreduce glucoseproductionby theliver.Asthediseaseprogressestheproductionofinsulinis undermined and the patient will often need to begiven replacement insulin [16].

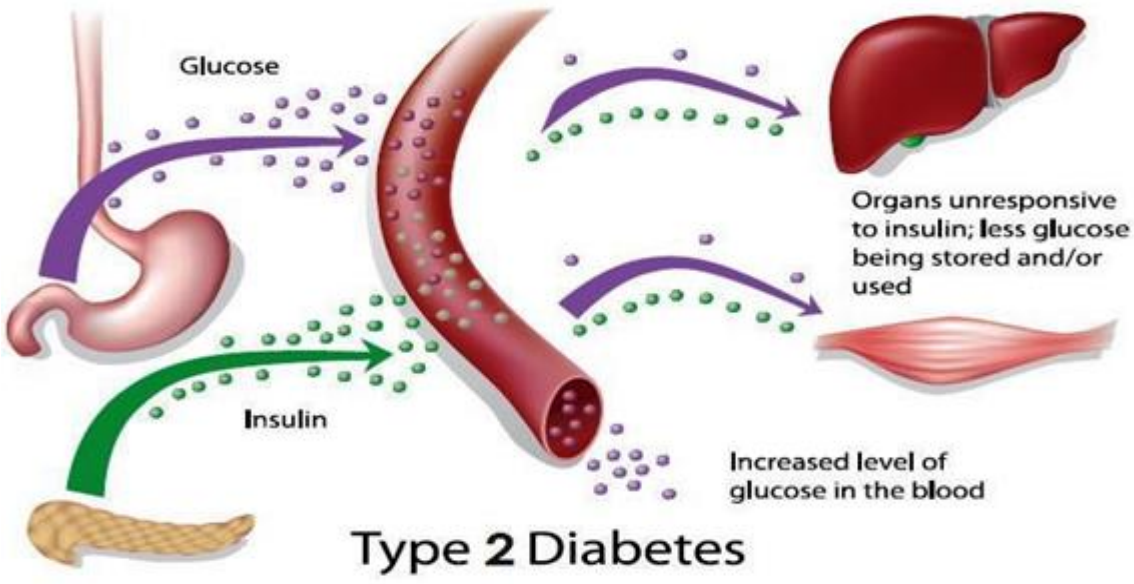

Figure 1.4: Formation of type II Diabetes

1.4.2.1 Etiology of Type II Diabetes

- Physical inactivity
- Obesity
- Heredity
- Insulin receptor defects
- Reduction of sensitivity of peripheral tissue.

1.4.2.2Symptoms of TypeII Diabetes

- Fatigue
- Increased appetite
- Increased thirst
- Obesity
- Glucosuria
- Proteinuria
- Itching

1.4.2.3 Complication ofTypeII diabetes

Type IIdiabetes is typically a chronic disease associated with a ten-year-shorter life expectancy.This is partly due to a number of complications which it is including:

- **Respiratory infections**

Theimmuneresponseisimpairedinindividualswithdiabetes.Cellularstudieshave shownthathyperglycemia bothreducesthefunctionof immune cellsandincreasesinflammation. The effectsofdiabetesalsotendtoalter lungfunction,all of whichleadstoanincrease in susceptibility torespiratoryinfectionssuchaspneumoniaandinfluenzaamongindividualswith diabetes.

- **Alzheimer'sdisease**

TypeIIdiabetesmayincreasetheriskofAlzheimer'sdiseaseand vasculardementia.Thepoorerbloodsugarcontrol,thegreatertheriskappearsto be. Cardiovascularproblems caused by diabetes could contribute to dementia by blocking blood flow to the brain or causingstrokes.

Otherpossibilitiesarethat too much insulininthebloodleadstobrain- damaging inflammation, or lack of insulin in the brain deprivesbrain cells of glucose.

- **Diabetic encephalopathy**

It is increased cognitive decline and risk of dementia- including (butnotlimitedto)theAlzheimer's type-observedindiabetes.Various mechanismsare proposed,includingalterationstothevascularsupply ofthebrainandthe interaction ofinsulin with the brain itself.

- **Periodontal Disease**

Diabetes is associated with periodontal disease (gum disease) and may make diabetes more difficulttotreat.Gum diseaseisfrequently relatedtobacterialinfectionby

organismssuchasPorphyromonasgingivalisandActinobacillusactinomycetemcomitans.An umber of trialshave foundimproved blood sugar levels in type2 diabetics who haveundergoneperidontal treatment.

- Ischemic heartdiseaseand stroke
- Increase in lower limb amputation[17].

1.4.2.4 Complications linkedto badly controlled Type IIdiabetes

1.4.2.4.1 Hyperglycemia

Hyperglycemiameanswhenthe bloodglucoseis too high; it is the oppositeof hypoglycemia. Hyperglycemianeeds tobetreated immediatelyas itis a major cause ofcomplications among people with diabetes. Hyperglycemiahappens when thereis no insulin in the blood, not enough insulin in the blood, ortheinsulin in the blood is not workingproperly[18][19].

1.4.2.4.1.2 Etiology of Hyperglycemia

- Insufficient food intake due to skipping meals, vomiting or diarrhea
- Inaccurate measurement of insulin
- Concomitant intake of hypoglycemic drugs (sulfonyl urea)
- Termination of diabetogenic conditions
- Strict glycemic control
- Liver diseases
- Adrenocortical insufficiency

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1.4.2.4.1.3 Symptoms ofHyperglycemia

Normal symptoms include:

- Nausea
- Weakness
- Palpitation
- Sweating
- Nervousness
- Parasympathetic response (intense hunger or flatulence)

If blood sugar falls below 45 mg/dl, then acute symptoms are shown and this is called hypoglycemic episode.

In that case nervous system is affected and symptoms include:

- Diminished cerebral function (confusion, agitation, lethargy or personality changes)
- Drowsiness
- Unconsciousness
- Convulsion
- Coma
- Speaking problem

1.4.2.4.2 Hypoglycemia

Hypoglycemiais acondition characterized byabnormallylow bloodglucose (blood sugar)levels, usuallyless than 70 mg/dl.

1.4.2.4.2.1Hypoglycemia symptoms

- Trembling, shakiness
- Headache
- Pallid skin
- Irritability and moodiness
- Seizure
- Absent mindedness
- Confusion
- Strongdesireto eat[20].

1.4.2.4.2.2 Hypoglycemiaunawareness

Somepeoplemaylose theability tosensethat theirbloodsugar levelsare gettinglow,becausethey'vedevelopedacondition knownashypoglycemia unawareness.Withhypoglycemiaunawareness, thebodyno longer reacts toa lowbloodsugar withsymptomssuchasheadaches.

1.4.2.4.2.3DiabeticComa

Diabeticcomaisa conditioninwhichapersonwithdiabetesiscomatose(unconscious)becauseofoneof theacute complications of diabetes:

- Severediabetichypoglycemia.
- Diabetic ketoacidosis advancedenoughtoresultinunconsciousnessfromacombinationof severehyperglycemia, dehydration andexhaustionwhichextremehyperglycemiaanddehydrationalonearesufficient to causeunconsciousness.
- Hyperosmolarnonketoticcomainwhichextremehyperglycemiaanddehydrationalonearesufficient to causeunconsciousness.

15percentofdiabeticswillsufferfromatleastoneepisodeofdiabeticcomaintheirlifetimesasa resultof severehypoglycemia.

1.4.2.5RiskFactorsfor Type II diabetes

There aremanyrisk factors for typeIIdiabetes, including:

- **Bodyweight(andinactivitycombinedwithbodyweight)**

Four-fifths ofpeople who haveTypeIIbecamebecause ofthey wereoverweight.The highest risk of the person of type diabetes who is overweight and physically inactive.

- **Age**

TheriskoftypeIIdiabetesincreasesasgetolder,especiallyafterage45. This happen probably because people tend to exercise less, lose muscle mass and gain weight as they age.But typeIIdiabetes isalso increasingdramaticallyamong children, adolescents and younger adults.

- **Fatdistribution**

Ifbodystoresfat elsewhere, such as hips and thighsthan the greater riskoftypeIIdiabetes.

❖ Inactivity

Thelessactive person are thegreaterriskoftypeIIdiabetes.Physical activityhelps tocontrolbody weight,usesupglucoseas energyand makescells more sensitive to insulin.

❖ Diabetesinthefamily

Ifanyonehasarelativewhohas or haddiabetestheriskmightbegreater. The riskincreasesiftherelativeisa closeone, iffather or mother has or haddiabetesthentherisk might be greater for the children.

❖ Cardiovascularproblemsandstroke

Apersonwhohas orhadastrokerunshigherrisk developing of typeII diabetes .Thisisalsothecaseforpeoplewhosuffer fromhypertension(highblood pressure) and have or had heartattack of developing typeII diabetes.

❖ Prediabetes

Prediabetesisaconditioninwhichbloodsugarlevelishigherthan normal,butnothighenoughtobeclassifiedasdiabetes.Left untreated,prediabetesoften progresses to type IIdiabetes.

❖ Gestationaldiabetes

During pregnancy developing of gestationaldiabetes, at the riskof laterdevelopingtypeIIdiabetesincreases.Ifbirth toababy weighing more than nine pounds (4 kilograms) then also at riskof type II diabetes [21].

1.4.3Type III Diabetes

ItiscalledsecondaryDiabetesmellitus.Itisanon-pancreaticDiabetesmellituscharacterizedbyelevation of blood glucose level by taking of some drugs.

1.4.3.1 Etiology of Type II Diabetes

- Intake of drugs causing hyperglycemia
- Some endocrine disorder

1.4.4Type IV Diabetes (Gestational Diabetes)

It is also called gestational diabetes. It is usually found in pregnant woman. In case of insulin resistance. Gestational diabetes is a condition of pregnancy (during the third trimester).Gestational diabetes is caused when insulin does not function properly. Susceptible to insulin receptors. Inappropriately elevated blood sugar levels may cause developing of gestational diabetes. Diagnosis of gestational diabetes does not mean that anyone affected by birth but the baby is still healthy

1.4.4.1Risk factors of Type IV Gestational Diabetes)

Any womancandevelopgestationaldiabetes,butsomewomenareatgreaterrisk.Riskfactorsfor gestational diabetes include:

- **Agegreaterthan25**

Womenolderthanage25aremorelikelytodevelopgestational diabetes.

- **Familyorpersonalhealthhistory**

Theriskofdevelopinggestationaldiabetesincreases ifanyonehavePrediabetes,slightlyelevatedbloodsugarthatmaybeaprecursortodiabetesorifaclos efamilymember,suchasaparentorsibling,hastypeIIdiabetes.

Apersonalsomorelikely todevelopgestationaldiabetesifshehaditduringaprevious pregnancy, if thedeliveredbabyweighed more than nine pounds (4.1 kilograms)[23].

- **Excess bodyweight**

Apersonmaymorelikelytodevelopgestationaldiabetesifanyonehas significantlyoverweightwith a bodymass index(BMI) of 30 or higher[24].

1.4.4.2Complications ofGestational diabetes

Who has gestational diabetes deliver healthy babies. Gestational diabetes is not a good cause and need C-section to deliver.

1.4.4.2.1 Complications that mayaffect baby

Ifanyone havegestational diabetes, then the babymaybe at increasedrisk of:

- **Excessivebirthweight**

Extraglucoseinthebloodstreamcrossestheplacenta,which triggersthebaby'spancreastomakeextrainsulin.Thiscancauseababy togrowtoolarge. Largebabies those weight ninepounds or morelikely to become narrow in thebirth canal, sustain birthinjuries or requireaC-section birth.

- **Earlybirthandrespiratorydistresssyndrome**

Amother'shighbloodsugar mayincreaseherriskofearly laboranddeliveringherbabybeforeitsduedate because ofthebabyis large.Babiesbornearly may cause respiratory distresssyndrome.

It is aconditionthat difficulty of breathing. Babieswiththissyndromemay needhelpbreathinguntillungs matureandbecomestronger.Babiesofmotherswithgestationaldiabetesmay cause respiratorydistress syndrome.

- **Lowbloodsugar(hypoglycemia)**

Sometimesbabiesofmotherswithgestationaldiabetes developlowbloodsugar(hypoglycemia)shortly afterbirthbecausetheirinsulin productionishigh.Severeepisodesofhypoglycemiamay provokeseizuresinthebaby. Prompt

feedings andsometimes an intravenousglucosesolution canreturnthe baby's blood sugar level to normal.

❖ Type IIdiabeteslaterinlife

Babies of mothers who have gestational diabetes or untreated gestational diabetes can result in birth.

1.4.4.2.2 Complications that mayaffect themother

Gestationaldiabetes may alsoincrease the mother's of risk

❖ Highbloodpressureandpreeclampsia

Gestationaldiabetesraisestheriskofhighblood pressure,aswellas,preeclampsiaaseriouscomplicationofpregnancy thatcauseshigh blood pressure and othersymptoms that can threaten the lives ofboth mother and baby.

❖ Futurediabetes

If a mother has gestational diabetes, she was more likely to get it during her future pregnancy. She is getting older to develop type II diabetes.However, making of healthy lifestyle such as eating healthy foods and exercising can help to reduce the risk of future type II diabetes.

1.5 Otherspecific typesofdiabetes

❖ Genetic defects of the B-cell

Severalformsofdiabetesareassociatedwith Monogenetic defects in beta-cell function. These formsofdiabetesare frequentlycharacterizedbyonset ofhyperglycemiaatanearlyage (generally before age 25 years).

These forms are often referred to as: Insulin secretion with minimal or no defects in insulin action. They are inherited in the autosomal dominant pattern.

❖ Genetic defects in insulin action

Thereareunusualcausesofdiabetesthatresultfrom geneticallydeterminedabnormalitiesof insulinaction. Hyperinsulinemia and modest hyperglycemia to severe diabetes.

❖ Diseases of the exocrine pancreas

Any process that causes diabetes. Acquired processes include pancreatitis, trauma, infection, pancreatectomy, and pancreatic carcinoma. With the exception of diabetes; adrenocarcinomas have only been associated with diabetes.

❖ Endocrinopathics

Several hormones (e.g., growth hormone, cortisol, glucagon, and epinephrine) antagonize insulin action. Cushing's syndrome, glucagonoma, pheochromocytoma, respectively cause diabetes. Defects in insulin secretion, and hyperglycemia.

❖ Drug or chemical-induced diabetes

Many drugs can transport insulin secretion. These drugs can be used to insulin resistance. In such cases, it is not known and such drugs are rare of insulin action. Examples include nicotinic acid and glucocorticoids. Antibodies and, in some cases, severe insulin deficiency.

❖ Infectios

Certain viruses have been associated with beta-cell destruction occurs in patients with diabetes. In addition, coxsackievirus B, cytomegalovirus, adenovirus, and mumps have been implicated in certain cases

❖ Other genetic syndromes sometimes associated with diabetes

Many genetic syndromes such as Turner's syndrome, Klinefelter's syndrome, and Down's syndrome .Wolfram's syndrome is an autosomal recessive disorder characterized by insulin deficient diabetes[25].

1.6 Management of Diabetes

Education

Diabetic patients should be monitored under the guideline of a doctor. Patients should be continually educated and participate with other patients with diabetes.

Exercise

Exercise produces insulin sensitivity which will be effective for glucose utilization. It helps in uptake of glucose by muscle. It also increases blood circulation which will increase glucose utilization.

Diet

- Diabetic patients should follow dietary requirement.
- Prolong fasting should be avoided.
- Quick acting sugar should be avoided.
- Animal fat should be avoided.
- Alcohol and smoking should be prohibited.

Medications

The medications that are used for the treatment of diabetes can be catergorized into two broad areas.

- Oral antidiabetic drgs
- Insulin

1.6.1 Oralantidiabeticdrugs

These drugs are suitableformost adultpatients.

Insulin secretagogues (agents that increase insulin secretion from pancreas)

- Sulphonylurea - Gliclazide (Second generation)
- Meglitinides - Repaglinide
- D-Phenylalanine derivatives - Nateglinide

Biguanides - Metformin

Alpha-glucosidase inhibitors - Acarbose

Thiazolidinediones - Pioglitazone, Rosiglitazone

DPP-4inhibitors - Linagliptin ,Saxagliptin,Sitagliptin , Vildagliptin[26].

1.6.1.1.Sulphonylureas

Sulphonylureas were the primary anti- diabetic medications. They are hypoglycemic agent secretagogues, triggeringhypoglycemic agent unharnessed by inhibiting the cell"second-generation" medication area unit currently a lot ofnormally used. They're more practical.They bind robust to plasma proteins. They are associate in Nursing endogenous unharnessed of hypoglycemic agent. They need polygenic disease for below 10 years. The first side-effect is symptom. Typical reductions in glycated Hb (A1C) values for second-generation sulfonylureas area unit0–2.0%

1.6.1.1.1Mechanism of action of sulphonylureas

- Sulfonylureas bind to sulfonylurea receptors of β-cells of pancreas.
- As a result, the efflux/expulsion of $K^+$from inside to outside the cell is reduced.

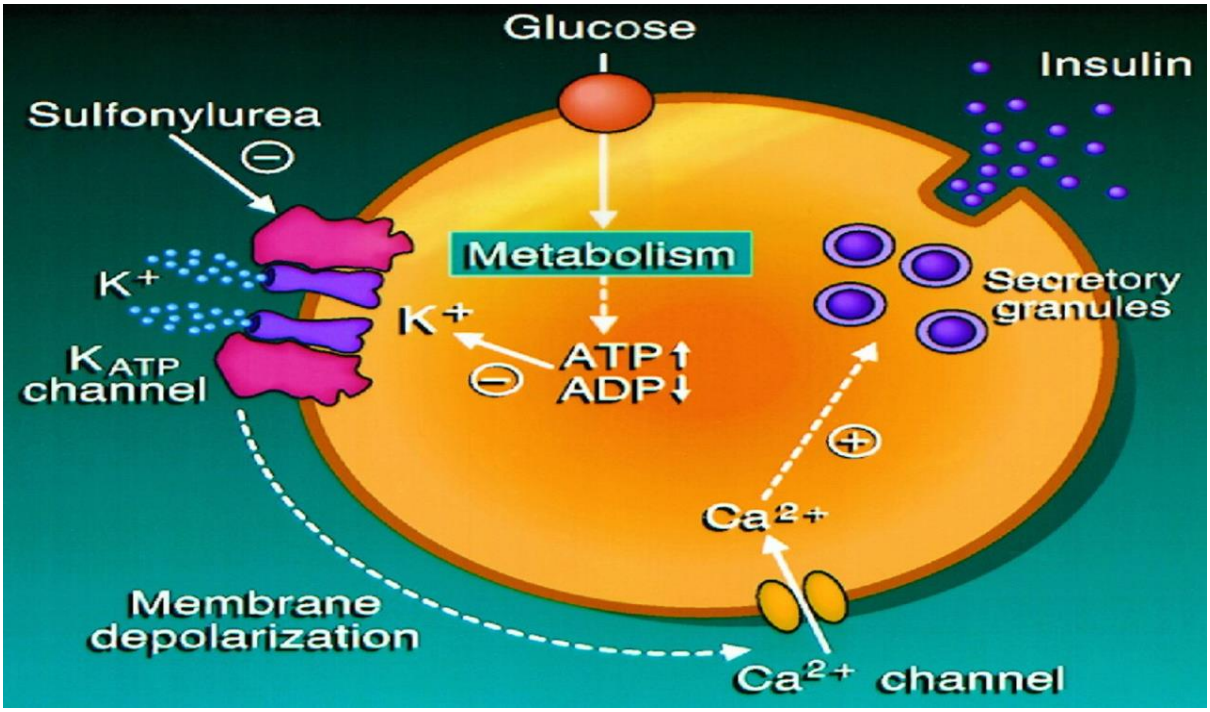

Figure 1.7: Sulfonylurea M/A

- So, there will be depolarization and Ca^{2+}-channel will be opened.
- This will cause degranulation and release of insulin from β-cells of pancreas.
- So, insulin secretion is increased.

1.6.1.2 Meglitinides

Meglitinide facilitate the duct gland turn out hypoglycemic agentand ar usually known as "short-acting secretagogues." They act on identical metallic element channels as sulfonylureas, however at a unique binding web site [27].By closing the metallic elementchannels of the duct gland beta cells, they open the atomic number 20 channels, thereby enhancing hypoglycemic agentsecretion [28].

Typical reductions inglycated hemoglobin(A1C)values are0.5-1.0%.

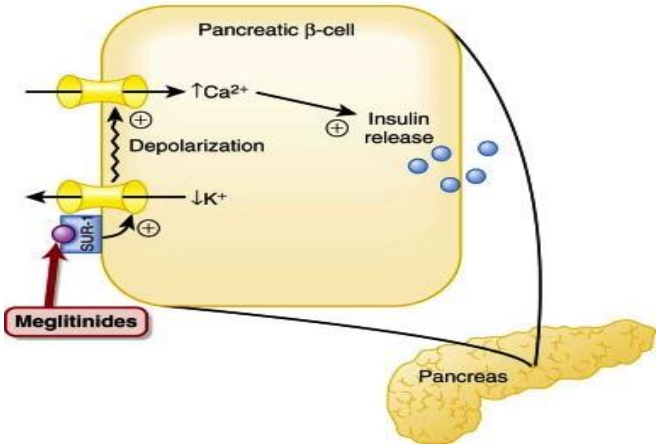

Figure 1.8: Meglitinides M/A

1.6.1.3 Biguanides

Biguanides reducehepatic glucoseoutputandincreaseuptakeofglucosebytheperiphery, includingskeletalmuscle.Althoughitmustbeusedwithcautioninpatientswithimpairedliver orkidneyfunction.

Metformin is a group of biguanide hasbecomethemostcommonly usedagentfortype diabetesinchildrenandteenagers and it istheonly widelyused oral drugthat does not cause weightgain[29] butitshouldbetemporarilydiscontinuedbeforeanyradiographicprocedure involving intravenousiodinatedcontrast,aspatientsareatanincreasedriskoflactic acidosis. It is also availablein combination with otheroral diabeticmedications.

Typical reduction inglycated hemoglobin(A1C) values formetformin is 1.5–2.0%.

1.6.1.3.1Mechanism of action of Metformin

- It's mechanism of action isdifferent.Ithasnoeffectonβ-cellsofpancreas.Itenhancestheutilizationofglucose.Noaction on receptors. It acts in the following ways:
- It suppresses the hepatic gluconeogenesis and glucose output from liver.
- It enhances disposal of glucose in muscle and fat.

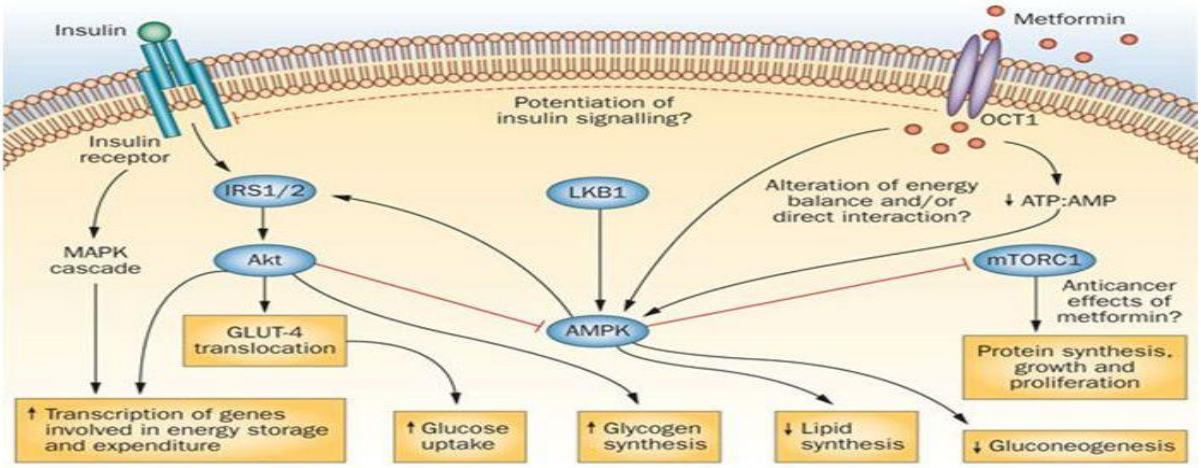

Figure 1.9: Metformin M/A

- Usually, it enhances GLUT-4 concentration from intracellular region to plasma membrane.
- It reduces the absorption of glucose from intestine and decreases the blood sugar level.
- It increases the utilization of glucose in peripheral tissue by anaerobic glycolysis.

1.6.1.4Alpha-glucosidaseinhibitors

Alpha-glucosidase inhibitors are "diabetes pills" but not technically hypoglycemic agents becausethey donothaveadirecteffectoninsulinsecretionorsensitivity.Theseagentsslowthe digestionofstarchinthesmallintestine,sothatglucosefromthestarchofamealentersthe bloodstreammoreslowly,andcanbematchedmoreeffectively by animpairedinsulinresponse orsensitivity.Theseagentsareeffectiveby themselvesonly intheearlieststagesofimpairedglucosetolerance, but can behelpful in combination with other agents intype2 diabetes.

Typical reductions inglycated hemoglobin (A1C)values are0.5–1.0%.

1.6.1.5.Thiazolidinediones

Thiazolidinediones (TZDs),also known as "glitazones," bind to PPARγ,a type of nuclear regulatoryproteininvolvedintranscriptionofgenesregulatingglucoseandfatmetabolism[30].ThePPREs influence insulin-sensitive genes,whichenhance productionof mRNAsof insulin-dependent enzymes. Thefinal resultis better useofglucosebythecells.

Typical reductions inglycated hemoglobin(A1C) values are1.5–2.0%.

1.6.1.5.1 Mechanism of action of thiazolidinediones

- This drug is an agonist of nuclear peroxisome proliferator activated receptor-γ.
- When agonist binds with the receptor, It stimulates various insulin responsive genes.
- Reverses insulin resistance by increasing GLUT-4 transcription/expression and translocation(intacellular to plasma membrane).
- As a result, insulin response will be increased.

1.6.1.6 Dipeptidyl Peptidase 4 Inhibitors

GLP-1 analogs resulted in weight loss and had more gastrointestinal side-effects, while in generalDPP-4inhibitorswere weight-neutralandincreasedriskfor infectionandheadache,but bothclassesappear topresentanalternative toother antidiabetic drugs.However, weightgain and/or hypoglycaemiahavebeenobservedwhenDPP-4inhibitorswere usedwithsulfonylureas; effect on long-term health and morbidityrates arestillunknown.

1.6.1.6.1 Mechanism of action of Dipeptidyl Peptidase 4 Inhibitors

- Dipeptidyl peptidase (DPP) -4 inhibitor slows the breakdown of insulinotropic hormone glucagon-like peptide (GLP) 1 for better glycemic control in diabetes patients.
- And GLP and glucose-dependent insulinotropic polypeptide (GIP) are incretin hormones that increase the amount of cellulose.
- This results in a glucose-dependent manner.

1.6.2 Insulin

Insulin is a peptide hormone, produced by the body. Insulinstopstheuseof fatasanenergysourcebyinhibitingthereleaseofglucagon. Exceptinthepresenceof the metabolicdisorderdiabetesandmetabolicsyndrome,insulinisprovidedwithinthebodyinaconstant proportiontoremoveexcess glucosefromthebloodwhichotherwisewouldbetoxic.Whenbloodglucoselevelsfall belowacertainlevel,thebodybeginsto usestoredsugarasanenergysourcethrough glycogenolysiswhichbreaksdowntheglycogenstoredintheliverand musclesinto glucose,whichcanbeutilizedasanenergysource.Asacentralmetaboliccontrol mechanism,itsstatusis alsousedasacontrolsignaltootherbodysystems(suchas aminoaciduptakebybodycells).Inaddition,it hasseveralotheranaboliceffects throughoutthebody.

The human insulin is the first of all. Chain A consists of 21 amino acids whereas chain B consists of 30 amino acids.

1.6.2.1 Biosynthesis of Insulin

Amate acids (C peptide). Proinsulin is further subjected to proteolytic cleavage to give insulin.Contain insulin and C peptide stored in granules within β-cells. Insulin and C peptide are secreted in equimolar in response to insulin secretion.

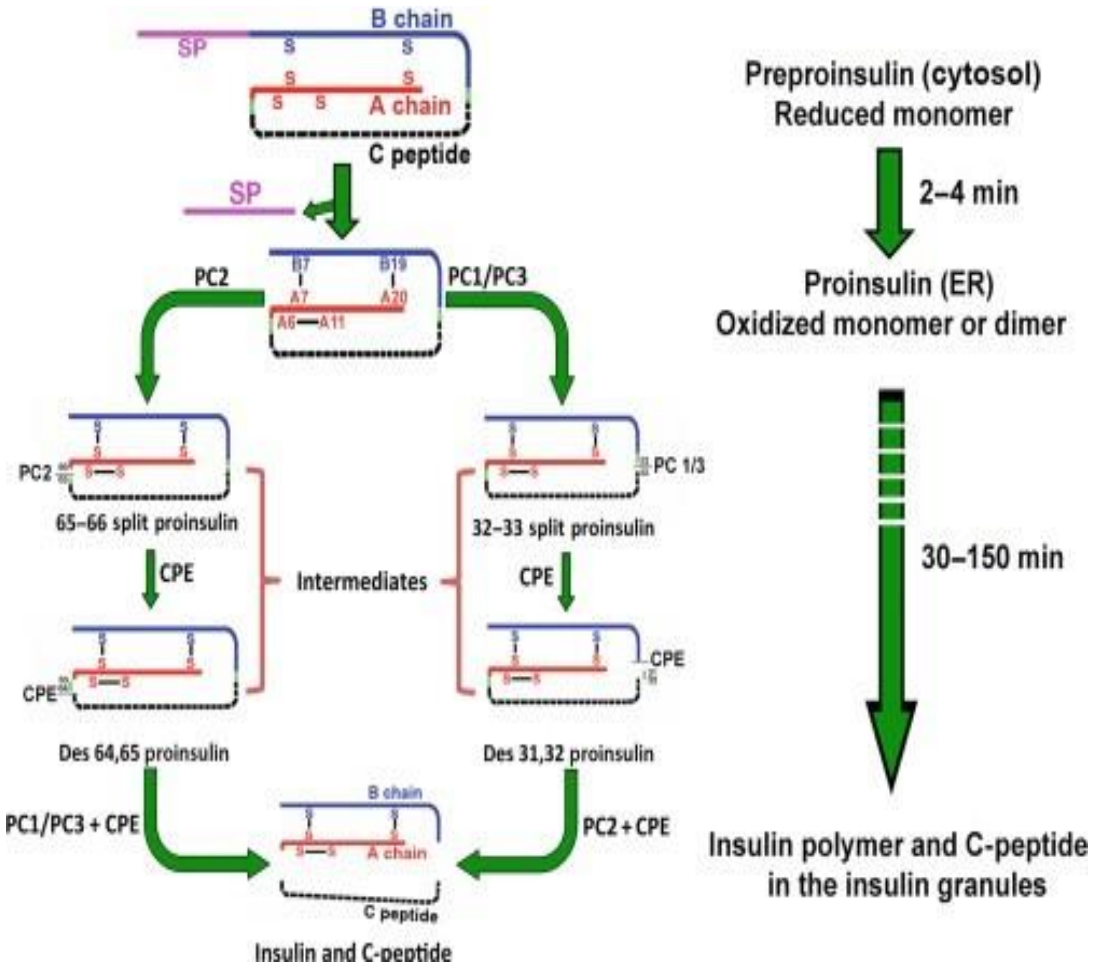

Figure 1.13: Insulin Biosynthesis

1.6.2.2 Mechanism of Insulin

- Insulin stimulates glucose transport across cell membrane by ATP dependent translocation of glucose transporter GLUT4 to the plasms membrane.
- The second messenger PPI and certain tyrosin phosphorylated guanine nucleotide exchange proteins play crucial roles in the insulin sensitive translocation of GLUT4.
- Over a period of time insulin also promotes expression of the genes directing synthesis of GLUT4.
- Genes for a large number of enzymes and carries are regulated by insulin through Rass/Raf and MAP- Kinase as well as through the phosphorylation cascade.

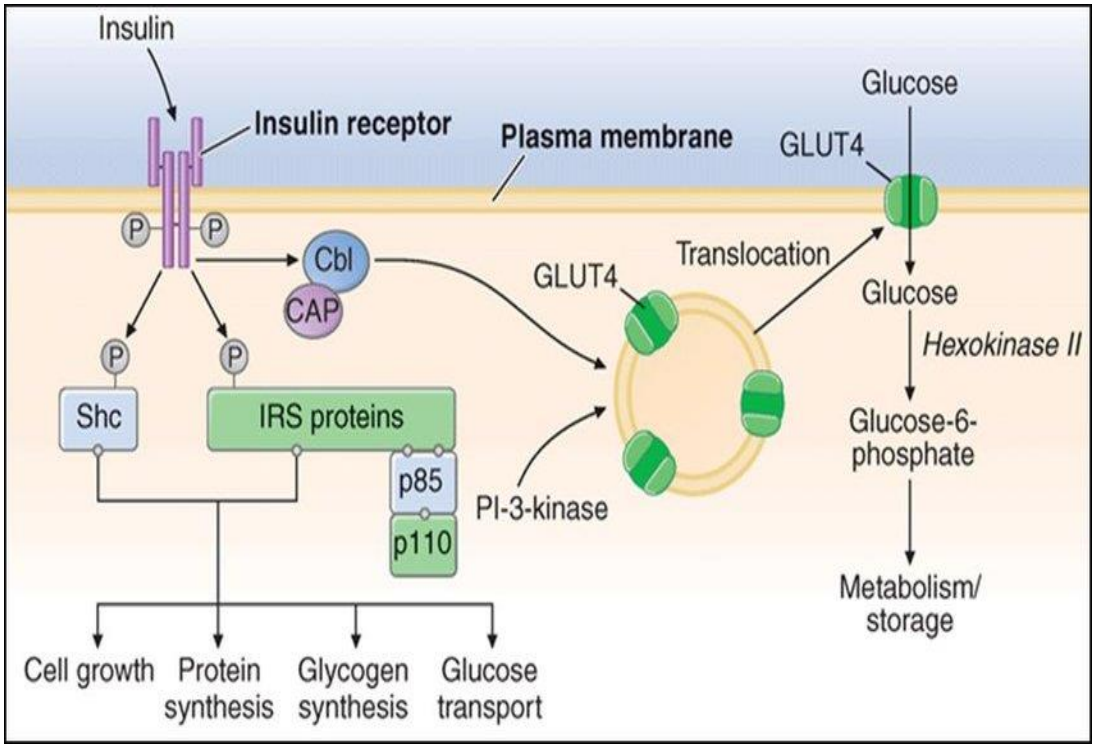

Figure 1.14: Insulin M/A

1.6.2.3 Secretion of Insulin

Aftersynthesized,insulinisstoredinthegranulesoftheβcellsoftheisletsofLangerhans.Insulinis secreted from the β-cells of pancreas.

There are stimulators that stimulate insulin secretion in high amount, such as,-

- Glucose concentration in the blood: High glucose conc. in the blood stimulates insulin secretion.
- Other stimulants such as other sugars. E.g. Mannose.
- Some amino acids: leucine, arginine.
- Some hormones: glucagon, gastrin.

Glucose is transported with the help of GLUT-2 and firstly metabolized by glucokinase producing ATP. Leads to the opening of Ca2 + channel and Ca2 + ions enter the cell [31].

1.6.2.4 Function of Insulin

On Carbohydrate Metabolism

- It reduces glycogenolysis and gluconeogenesis.
- It stimulates glycogen synthesis in both liver and muscle.
- In adipose tissue, it also rises utilization of glucose by the following ways:

On Fat Metabolism

- Usually, it rises uptake of fatty acid.
- It reduces lipolysis because it causes inhibition of lipase.
- In case of insulin deficiency, triglycerides are broken down into free fatty acids which are finaly converted into ketone bodies (β-hydroxy butyric acid, acetoacetic acid) causing ketoacidosis.

On Protein Metabolism

- It increases uptake of amino acids.
- It also inhibits protein catabolism.
- It influences structural protein synthesis.

1.6.2.5 Degredation of Insulin

Insulin cannot be given orally because it is a peptide. If it is given orally, it will be hydrolyzed by peptide digesting enzyme in stomach.

Insulinisgivensubcutaneously.Afteradministration,about50%ofinsulinismetabolized in the liver and it isthemain siteofmetabolism.Insomeothersitee.g.,inmusclecell,metabolismofinsulinalsotakesplace[32].

1.6.3 Alignment of Insulin

Insulin can be divided into four types depending on their duration of action, such as:

- **Rapid acting insulin**

Usually, onset of action is 5-15 minutes and duration of action is 2-5 hours. It is usually used for hyperglycemia, because it can reduce blood sugar level rapidly. It can be taken before and after meal.

❖ Short acting insulin

Usually, onset of action is 30 minutes and duration of action is 5-8 hours. It is produced by recombinant DNA technology and it is totally identical to natural insulin. It remains as hexamers. It is injected subcutaneously.

❖ Intermediate acting insulin

NeutralprotamineHagedorn(NPH)isintermediateactinginsulinwheretheratioofprotaminetoinsulinis10:1. Onset of action is 2-3 hours and duration of action is action is 4-12 hours.

❖ Long acting insulin

Thistypeof insulinisoftencombined,whenneededwithrapid-or short-actinginsulin.It lowersbloodglucoselevelswhenrapid-actinginsulinstop working.Itistakenonceortwiceaday.Onset of action is 5 hours and duration of action is 11-24 hours.

❖ Premixed insulin

Premixedinsulinisacombinationof specificproportions of intermediate-actingandshort-actinginsulin[33].

1.6.4Using of insulin can be administered

- **A fine needleand syringe**

By the using of needle or syringe, insulin is administered into the body.

- **An insulin pen**

It is a device that like an ink pen, except the cartridge is filled with insulin.

- **Aninsulinpump**

It is adevice that like a sizeofacell phone and set upontheoutsideof the body.Atubeconnectsareservoirof insulintoa catheter that is insertedunderthe abdomen. There is also a wireless pump option that is available inmost areas. Setting upareservoirof insulinon the bodythathasatinycatheter that is insertedunder skin.Theinsulinpodcanbe setonabdomen,lowerback, oron alegoran arm. The programming is done with a wireless device that communicates with the pod.Pumps are programmed to dispense specific amounts of rapid-acting insulin automatically[34].

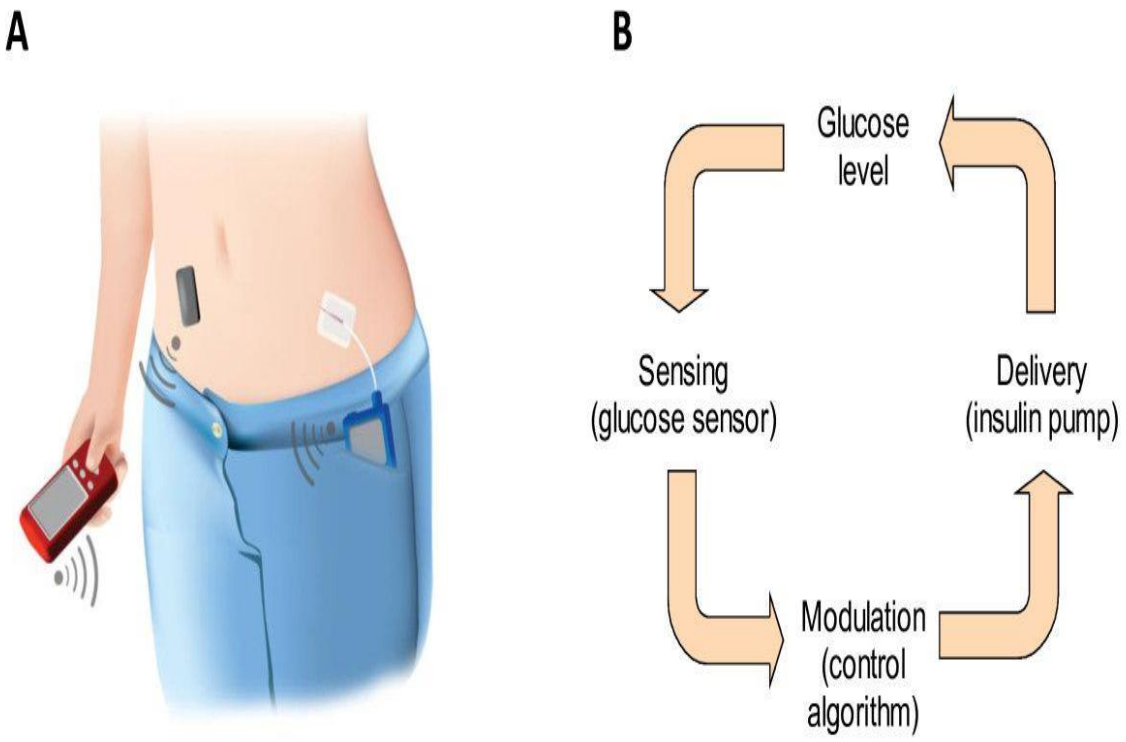

Figure 1.16:Insulin delivery process

1.7 Prevention

Choosing of healthy lifestyle canhelp to prevent diabetes. Evenhaving of diabetesinfamily,dietandexercisecanhelp to preventthedisease.If already havebeendiagnosedwith diabetes, the same healthy lifestyle choices can help to prevent potentially serious complications.

- **Eathealthyfoods**

Choosing of foods that lowinfatandcalories. Mainly focusing onfruits,vegetablesandwhole grains.

- **Physical activity**

Aimfor30minutesofmoderatephysicalactivityaday.Takeabriskdaily walk. Ride a bike. Swim laps. Fitin a long workout, spread 10-minute or longer sessions throughout the day.

- **Loseexcess weight**

Any overweighting person loses 5to10percentofbodyweight can reducethe risk of diabetes. To keep weight in a healthyrange focus on permanentchangestoeatingandexercisehabits.

CHAPTER TOW:LITERATURE REVIEW

2.1 Ahern JA,RamchandaniN,Cooper J,HimmelA,SilverD,TamborlaneWV:2000Using a primary nursemanagertoimplementDCCTrecommendationsinalargepediatric program. Diabetes Educ26:990–994.

The specialized role of nursing within the care and education of individuals with polygenic disease has been breathing for overthirty years. Polygenic disease education administered by nurses has affected on the far side the hospital side into a range of health care settings. Among the disciplines concerned inpolygenic disease education, nursing has vie a crucial role within the polygenic disease team management thought. This was well illustrated within the polygenic disease management and Complications Trial (DCCT) by the effectiveness of nurse managers in coordinating and delivering polygenic disease self-management education. These nurse managers not solelyperformed body tasks crucial to the outcomes of the DCCT,however additionally participated directly in patient care. The emergence and resulting growth of advanced follow in nursingthroughout the past twenty years increased patient-provider relationships in that self-care education and direction is provided the context of sickness state management. Clement2 commented associate degree exceedingly in a very review ofpolygenic disease self-management education problems that unless current management is an element of an education program, data might increase however most clinical outcomessolely minimally improve. Advanced follow nurses by the terriblynature of their scope of follow effectively mix each education and management into their delivery of care management skills and application/adaptation to life-style is incorporated in initial histories, physical exams, and plans of care.

2.2 BoydAEIII, Aguilar-BryanL,NelsonDA.1990.Molecular mechanismsofactionof glyburideon the beta cell.AmJ Med;89:S3-10.

Many advancedpracticenurses(NPs,CNSs,nursemidwives,andnurse anesthetists) mayprescribeandadjustmedicationthroughprescriptiveauthoritygrantedtothem by their state nursing regulatory body. Currently, all 50 states have some form of prescriptive authorityforadvancedpracticenurses. Theability toprescribeandadjustmedicationisa valuableassetincaring forindividualswithdiabetes.Itisacrucialcomponentinthecare of people with type1 diabetes, and itbecomes increasinglyimportant in the careof patients with type2diabeteswhohave aconstellationofcomorbidities,allofwhichmustbe managedfor successful diseaseoutcomes.Many studieshavedocumentedtheeffectivenessofadvancedpracticenursesin managingcommonprimary careissues.4NPcarehasbeenassociatedwithahighlevelof satisfactionamonghealthservicesconsumers.Indiabetes,theroleofadvancedpractice nurseshassignificantly contributedtoimprovedoutcomesinthemanagementoftype2 diabetes,5 inspecializeddiabetes foot careprograms,6inthe management of diabetes in pregnancy,7 and in the care of pediatric type 1 diabetic patients and their parents.8.9 Furthermore,NPshavealsobeeneffectiveprovidersofdiabetescareamong disadvantaged urbanAfrican-Americanpatients.10Primary managementofthesepatientsby NPsledto improved metabolic control regardless of whetherweight loss wasachieved. Thefollowing casestudy illustratestheclinicalroleofadvancedpracticenursesinthe management ofapatientwith type2 diabetes.

2.3 Simpson SH,Majumdar SR,TsuyukiRT,EurichDT,JohnsonJA.2006,Dose-response relationbetweensulphonylureadrugsandmortality intype2diabetesmellitus:a population-based cohortstudy.CMAJ;174:169-74.

Type 2 diabetes mellitus (T2DM) and pre-diabetic conditions such as impaired fasting glucose(IFG)and/orimpairedglucosetolerance(IGT)arerapidly increasinginprevalence. ThereiscompellingevidencethatT2DMismorelikely todevelopinindividualswhoare insufficientlyactive.Exercisetraining,oftenincombinationwithother lifestyle strategies,has beneficialeffectsonpreventing theonsetofT2DMandimprovingglycogeniccontrolinthose withpre-diabetes.Inaddition,exercisetraining improvescardiovascularriskprofile,body compositionand cardio respiratoryfitness, all stronglyrelated to better health outcomes. Based

on the evidence, itisrecommended that patientswithT2DMor pre-diabetesaccumulatea minimumof210minperweekofmoderate-intensity exerciseor125minperweekof vigorous intensity exercisewith no more than two consecutive days withouttraining. Vigorousintensityexerciseismoretimeefficientandmay alsoresultingreaterbenefitsin appropriate individuals with consideration of complications and contraindications.It is furtherrecommendedthattwoormoreresistancetraining sessionsperweek(2–4setsof8–10 repetitions)shouldbeincludedinthetotal210or125minof moderateorvigorousexercise, respectively. It is also recommended that, due to thehigh prevalence and incidence of conditionsinpatientswithT2DM,exercisetraining programsshouldbewrittenand delivered by individualswithappropriatequalificationsandexperiencetorecognizeandaccommodate comorbidities and complications.

2.4 Al-NozhaM.M, Al-MaatouqM.A, Al-MazrouY.Yetal.2004,"DiabetesmellitusinSaudi Arabia,"SaudiMedical Journal, vol. 25, no. 11, pp. 1603–1610.

Patterns and determinants of cardiovascular drug utilization in Prescription for diabetescareisanimportantpracticeinprimary caremethods.Thisisadescriptivestudy carriedoutonatprimary careclinicsoverafive-monthperiodatAlImamMedicalComplex, Riyadh,SaudiArabia.Itwascross-sectionalstudyof160femalediabeticpatients,who visitedtheservicesbetweenJanuary andMay,2012.Datawerecollectedfromthemedical recordsontheclinical characteristicsanddrugsprescribedfortheir diabetic management.Themajority ofthesamplepopulation(82%)wasolderthan40 yearsold.Halfof themhadconcomitanthypertension,hyperlipidemia andobesity.There were500 prescriptionsfor diabetesmanagement.Morethan57% of participantswereontwoor more drugsforhyperglycemia.Metformin wasthemostcommondrug prescribed.Metforminand sulphonylurea werethemostcommoncombinedmedications.Mostofcases (70%) wereona combinationofantihypertensivedrugs.ACEorARBsanddiuretic wasthemostcommon combined prescriptions.

2.5 Simpson SH,Majumdar SR,TsuyukiRT,EurichDT,JohnsonJA.2006,Dose response relationbetweensulphonylureadrugsandmortality intype2diabetesmellitus:a population-based cohortstudy CMAJ;174:169-74.

Incident of myocardial infarction, congestive heart failure, and all cause mortality. Persontimeintervalsfordrugtreatmentwerecategorized by drugclass,excludingnon-drug intervals and intervals forinsulin.3588 incident cases of myocardial infarction, 6900 of congestive heart failure, and 18 548 deaths occurred. Compared with metformin, immunotherapy withfirstorsecondgenerationsulphonylureaswasassociatedwithasignificant24% to 61% excess risk for all cause mortality (P<0.001) and second generationsulphonylureaswithan18%to30%excessriskforcongestiveheartfailure (P=0.01and P<0.001).The thiazolidinedioneswere notassociatedwithriskofmyocardialinfarction; pioglitazone wasassociated witha significant31% to39% lower riskofallcause mortality (P=0.02toP<0.001)comparedwithmetformin.Among thethiazolidinediones,rosiglitazone wasassociatedwitha 34%to41%higherriskofallcausemortality (P=0.14toP=0.01) comparedwithpioglitazone.

CHAPTER THREE: MOTIVE OF PRACTICE

3.1 Enunciation of survey practice

This is the innovative technique that determines the opinions of the targeted people by the collecting of information from targeted population by asking various kind of question. It is the co relational way to combine or gather opinion or attitude by the people. Such as questionnaire construction and system for civilizing the number and exactness of responses to surveys.

3.2 Research design

There are several different designs, or overall structures, that be able to worn in assessment examine. Important designs are cross-sectional, consecutive independent samples, and longitudinal studies.

Here I use cross sectional practice in my survey study.

3.3 Cross-sectional studies

In these study a quantity of population is gathered together to describe the practice. A cross-sectional learns describes uniqueness of those inhabitants at one time, but cannot give any approaching as to the causes of inhabitants' individuality because it is a prognostic.

3.4 Instance of this practice

- Determine the Diabetes patients in Bangladesh.
- Analysis the main etiology and symptoms of this disorder.
- Identify the medication pattern of this disorder.
- Findoutthemostpopulardrugsthatareprescribedbydoctorfordiabetes patients inBangladesh.
- Identifymale and femaleratio of overallprescription.
- Inpatient, outpatient patients, emergency department utilization rates specificto diabetes patients.
- Identify diabetes incident rate.
- Identifythe guidelines for the prevention and management of diabetes.
- Making people awareness.

CHAPTER FOUR: METHODOLOGY

4.1Method of survey study

Thepresentstudywasperformedonacrosssectionalobservationwhichwasattemptedto find out thefrequentlyprescribed drugs bythedoctors in different diabeticpatient.

4.1.1Study location

Birdem General Hospital, BIHS General Hospital, Ibrahim General Hospital, Bangladesh Diabetic Samity (Nazimuddin road –Dhaka).

4.1.2 Studypopulation

Inthepresentstudy,alltypeofpatientsfrombothgendersagingfrom25to75 irrespectiveoftheirclassandassociatedwith typesof diabetesdiagnosedby thehospital physicians wereincluded.

4.1.3Sample selection

In this study, about 1200 patients were elected from Birdem General Hospital, BIHS General Hospital, Ibrahim General Hospital, Bangladesh Diabetic Samity (Nazimuddin road –Dhaka).

4.1.4 Sampling technique

In this practice indiscriminately sampling was mimicked.

4.1.5 Period of study

Iwas collected allthe datafrom 10 November 2018 to 10 March 2018.

4.2 Stepwise Procedure

4.2.3 Data analysis

After collecting, all the data were confined and analyzed with the help of Microsoft Excel 2010 by pie and column chart and calculated the percentage of the practice.

4.3 SPSS

It is a windows based program that can be used to perform data entry, analysis and create tables and graphs. SPSS is capable of handling large amounts of data and canperform all of the analysis covered in the text. So, finally justify by SPSS

CHAPTER FIVE: RESULT AND DISCUSSION

5.1 Demographic Analysis

Gender	Number of prescription	Ratio(%)
Male	762	63
Female	438	37
Total	1200	100

Table 5.1: Male and Female Ratio

5.1.1 Graph of Gender

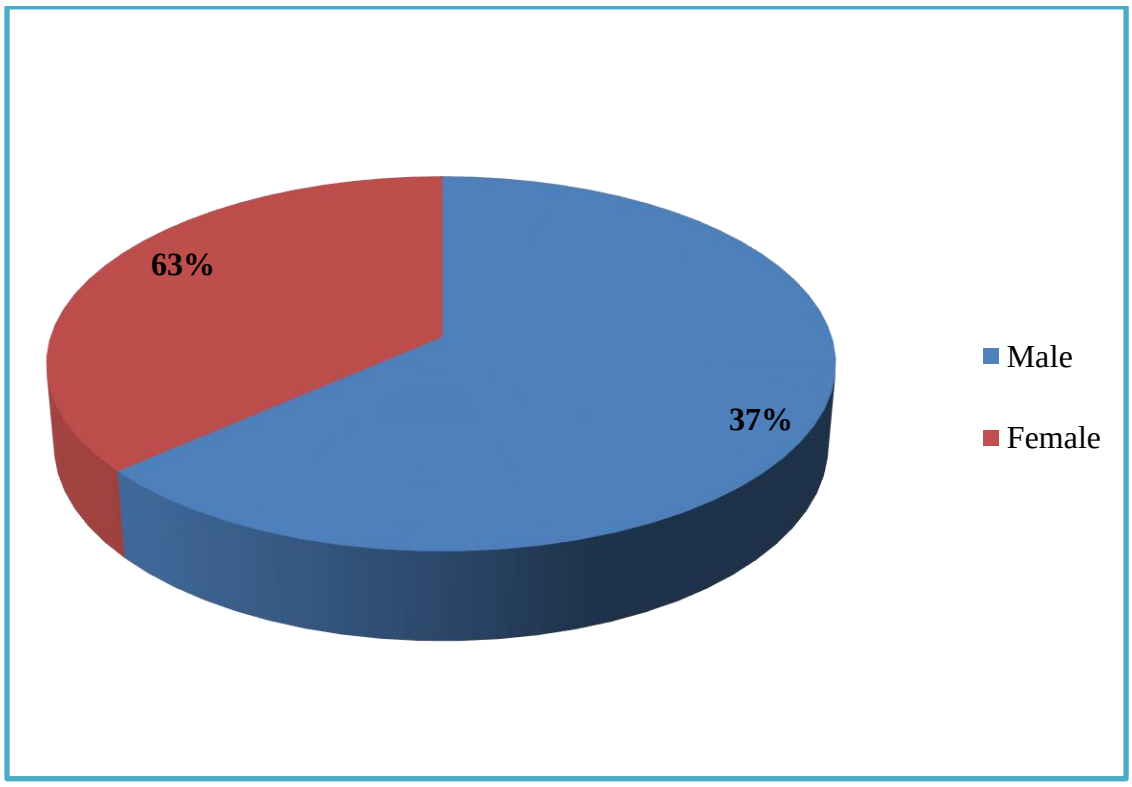

Fig 5.1.1: Graph of gender

Among 1200prescriptions,762prescriptionspatientweremalewhereas438prescriptions werefemale.Evaluationof table andfigure showedthat63% male and37% female.Male patients aremoreaffected by diabetes than female patient

5.2Departmental Analysis

Type of patient	No of patient	Male	Female
Indoor	350	357	188
Outdoor	850	405	250
Total	1200	762	438

Table 5.2: Ratio of male and female in both outdoor and indoor department

5.2.1 Graph of indoor and outdoor patient comparison

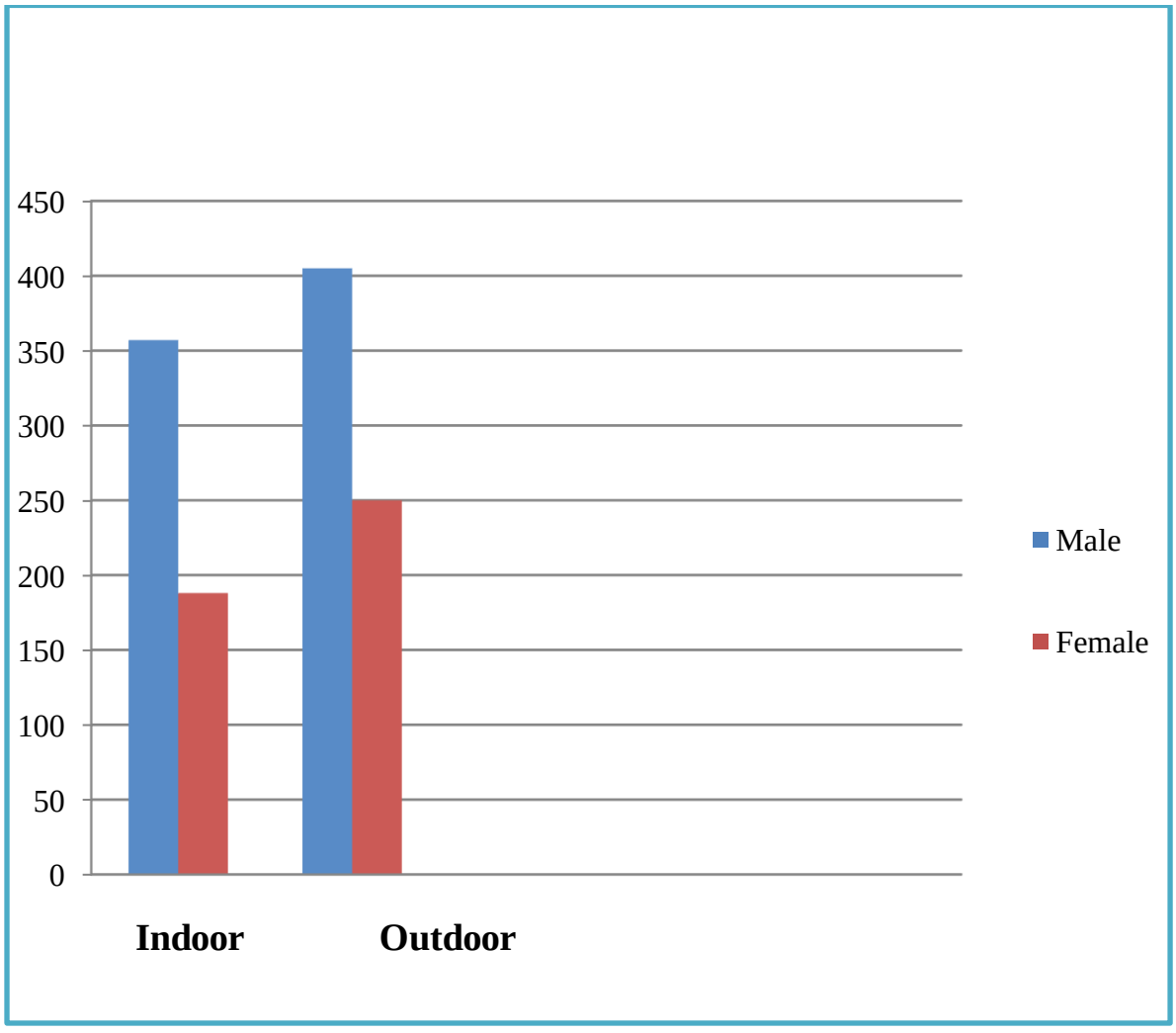

Fig 5.2.1: Inpatient vs. outpatient comparison

That graphevaluatedthecomparison betweenmale and female inbothindoorandoutdoor patient. Indoor patientwere 29.16% and outdoor patient were 70.84%.

Here indoor patient were less thanoutdoorpatient.Buttheratio ofbothindoorandoutdoormalepatientwere much higher thanthose of femalepatient.

5.3 Age of patient

Age of patients	Number of patients	Ratio (%)
0-23	0	0
23-30	113	9.41
30-38	375	31.25
38-45	317	26.42
45-55	235	19.58
55-60	75	6.25
60-70	52	4.33
70-75	33	2.76
Total	1200	100

Table 5.3: Age of patients

5.3.1 Graph of Age

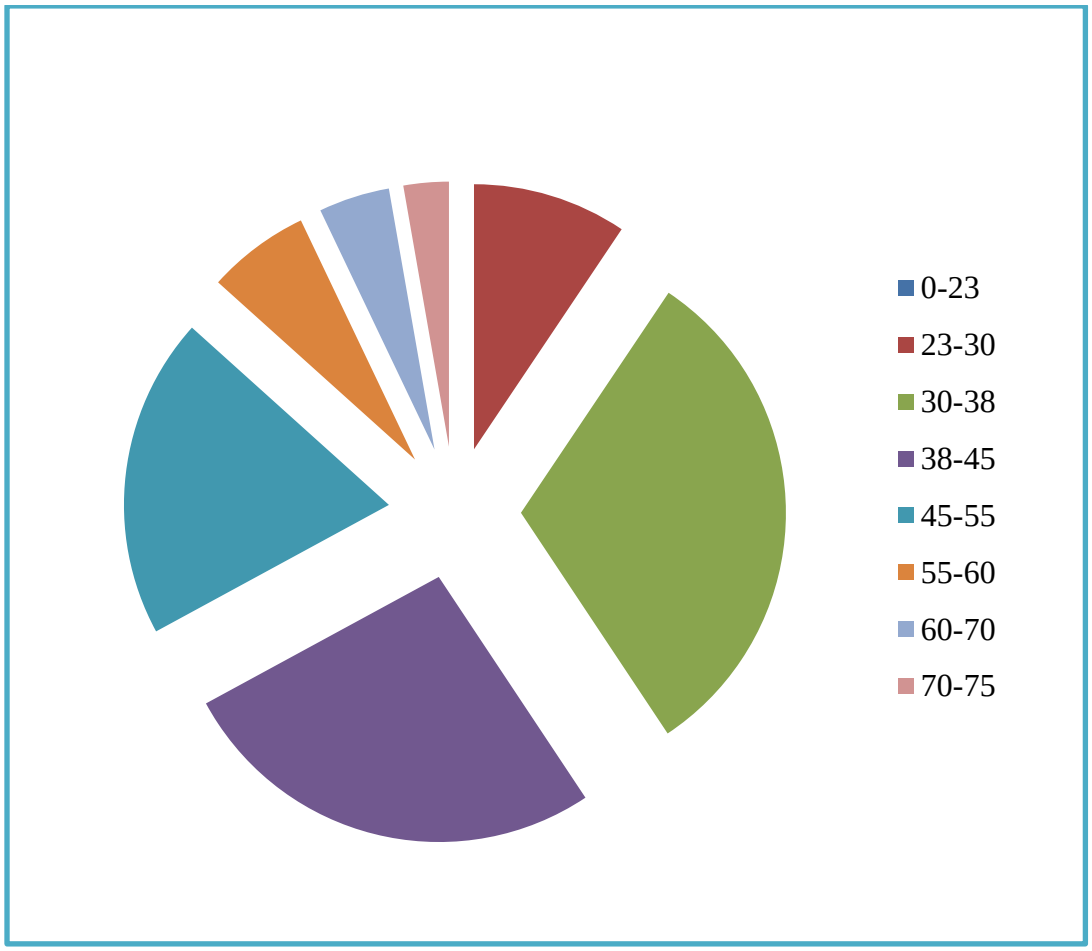

Figure 5.3.1: Age of patient

Thisgrapeshowedthattheratioof diabetesindifferentages patient.Among 1200 prescriptions the age of 30-38(31.25%),38-45 (26.42%) and 45-55 (19.58%)age'spatientwere morethanotherage's patientand 0-23 age's are not found.

5.4 Area found in prescription

Name of Area	Number of Patients	Ratio (%)
Dhaka	305	25.41
Chitagong	176	14.67
Rangpur	162	13.5
Pabna	158	13.16
Shylet	150	12.5
Khulna	144	12
Barisal	105	8.75
Total	1200	100

Table 5.4: Area found in prescription

5.4.1 Graph of area

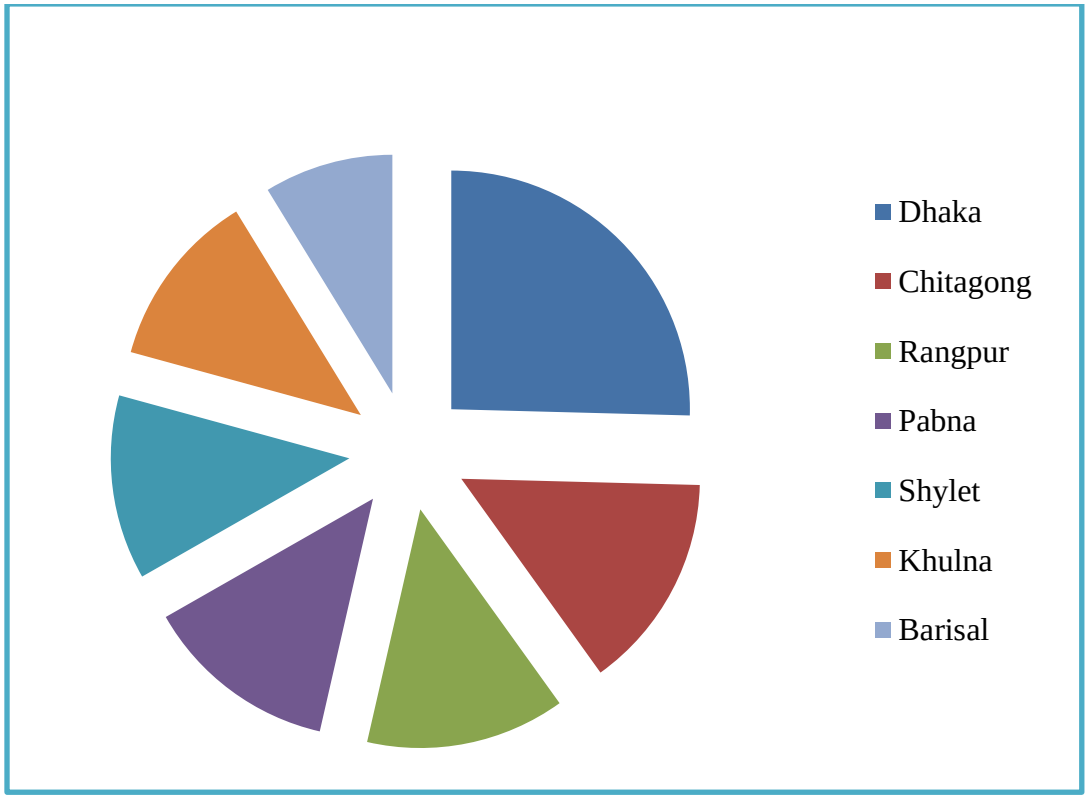

Figure 5.4.1: Area

This graph showed thatDhaka is highly affected in this diseases also available inChitagong,Rangpur,Pabna, Shylet, Khulna, Barisal etc.

5.5 Causes of Diabetes

Causes of Diabetes	Number of patients	Ratio%
Generally	855	71.25
Genetically	345	28.75
Total	1200	100

Table 5.5: Causes of Diabetes

5.5.1 Graph of causes of Diabetes

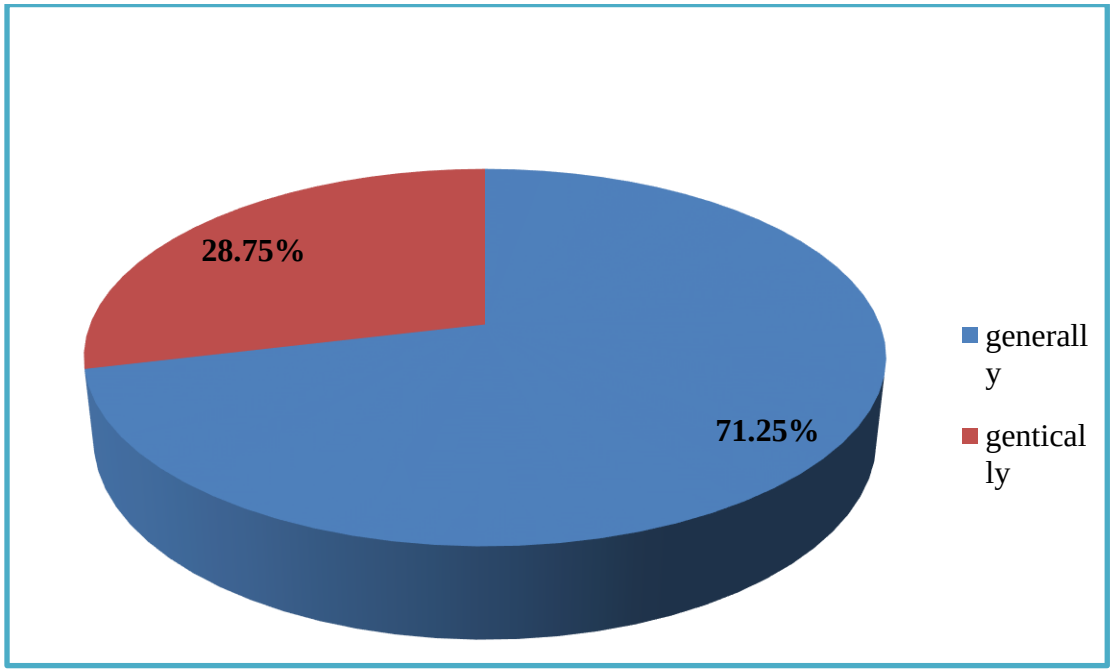

Figure 5.5.1: Causes of Diabetes

This graph showed that diabetes occurred by both generally and genetically but generally was more than genetically.

5.6 Types of Diabetes

Types	Ratio%
Type I	66.67
Type II	33.33

Table 5.6: Types of Diabetes

5.6.1 Graph of types of diabetes

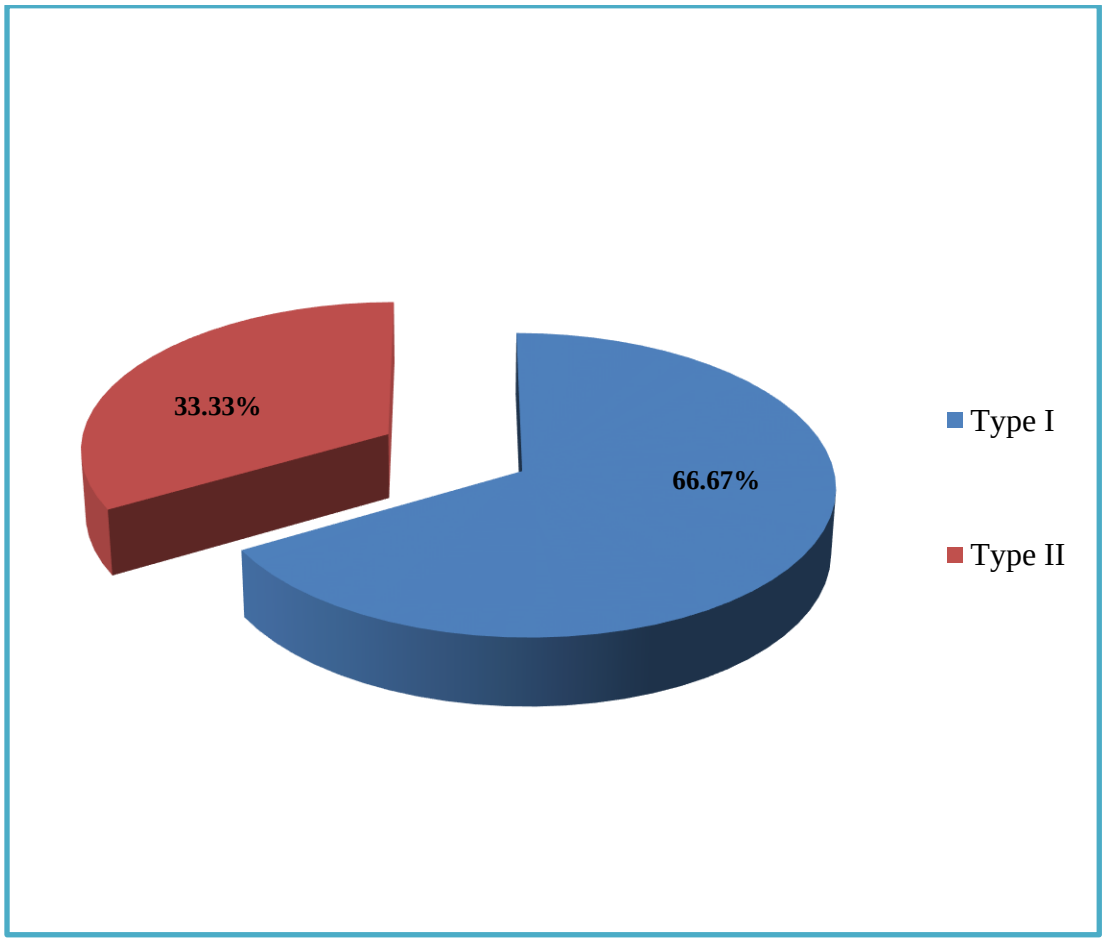

Figure 5.6.1: Types of diabetes

This graph showed that type I diabetes patient was more than typeII diabetes.

5.7 Doctor check up frequency

Doctor check up frequency	Number of patients	Ratio
3 month	676	56.33
2.5 month	357	29.75
2 month	93	7.75
7days	74	6.16
Total	1200	100

Table 5.7.1: Doctorcheck up frequency

5.7.1 Graph of doctor check up frequency

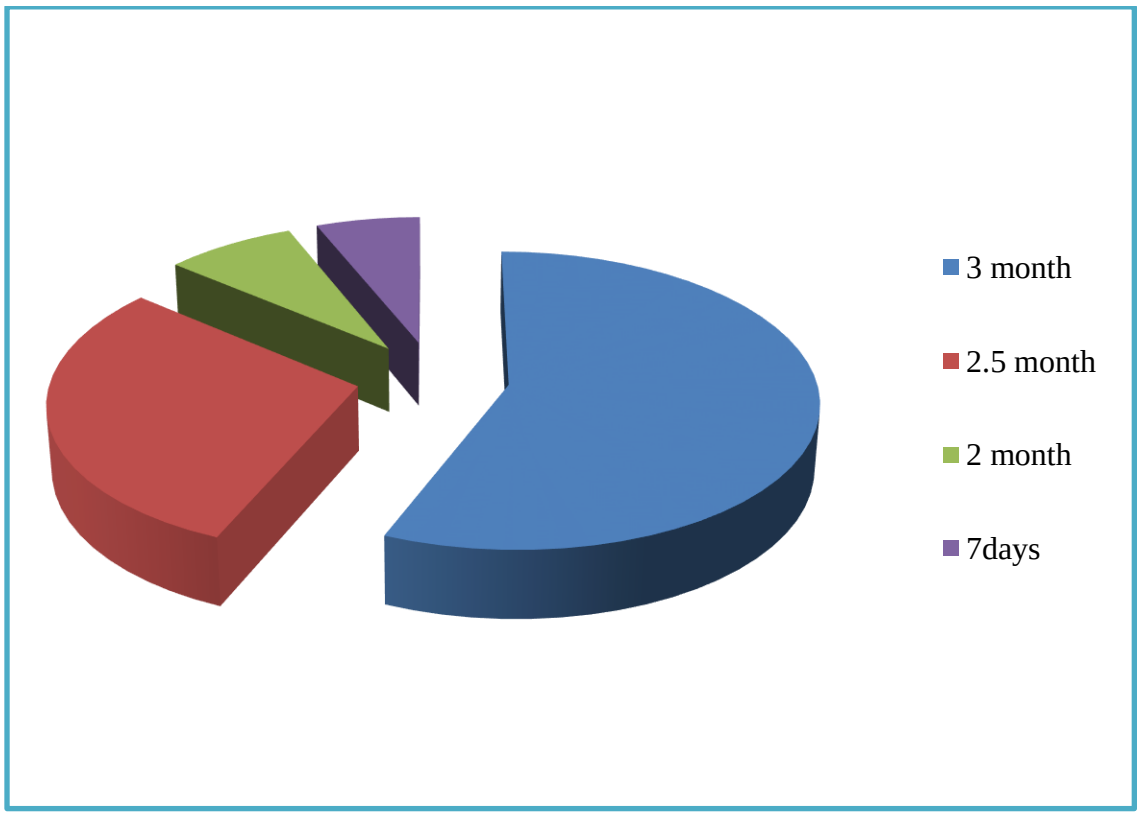

Figure 5.7.1: Check up frequency

The graph showed that frequency of patients were check up doctor in 7days,2 month,2.5 month and 3 month.

5.8 People awareness

Name	Number	Ratio
Knowledge	861	71.75
No knowledge	339	28.25
Total Number	1200	100

Table 5.8: People awareness

5.8.1 Graph of people awareness

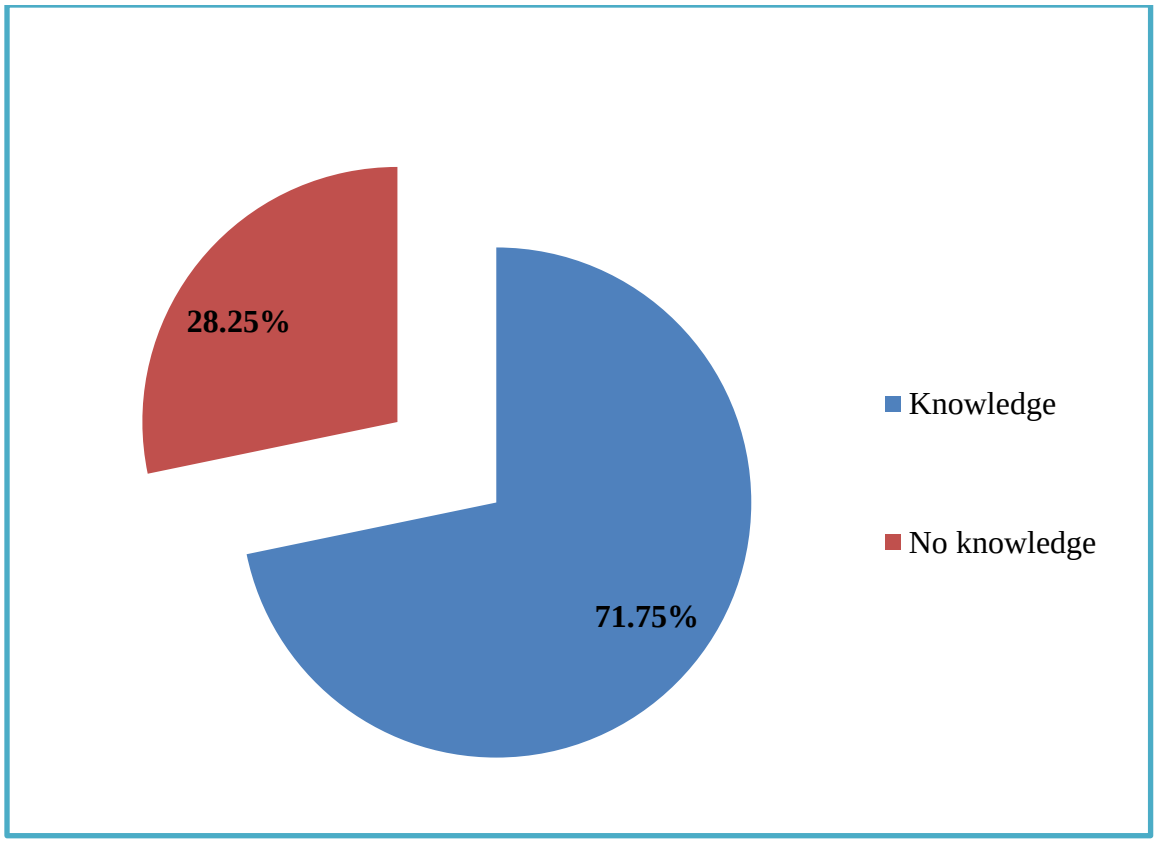

Figure 5.8.1: Awareness

This graph showed that people were known or awareness of diabetes but least of people awareness were low.

5.9 Prescription pattern

5.9.1 Anti diabetic (Oral) Prescription Pattern

Drugs	Total Number
Sitagliptin	205
Metformin hydrochloride+Sitagliptin	170
Glimepiride	133
Pioglitazone	125
Metformin hydrochloride	103
Linagliptin + Metformin hydrochloride	96
Gliclazide	81
Metformin hydrochloride + Pioglitazone	73
Metformin hydrochloride+Rosiglitazone	66
Linagliptin	58
Glipizide + Metformin hydrochloride	52
Glipizide	23
Acarbose	15
Total	1200

Table 5.9.1: Oral medication

5.9.2 Graph of Oral medication

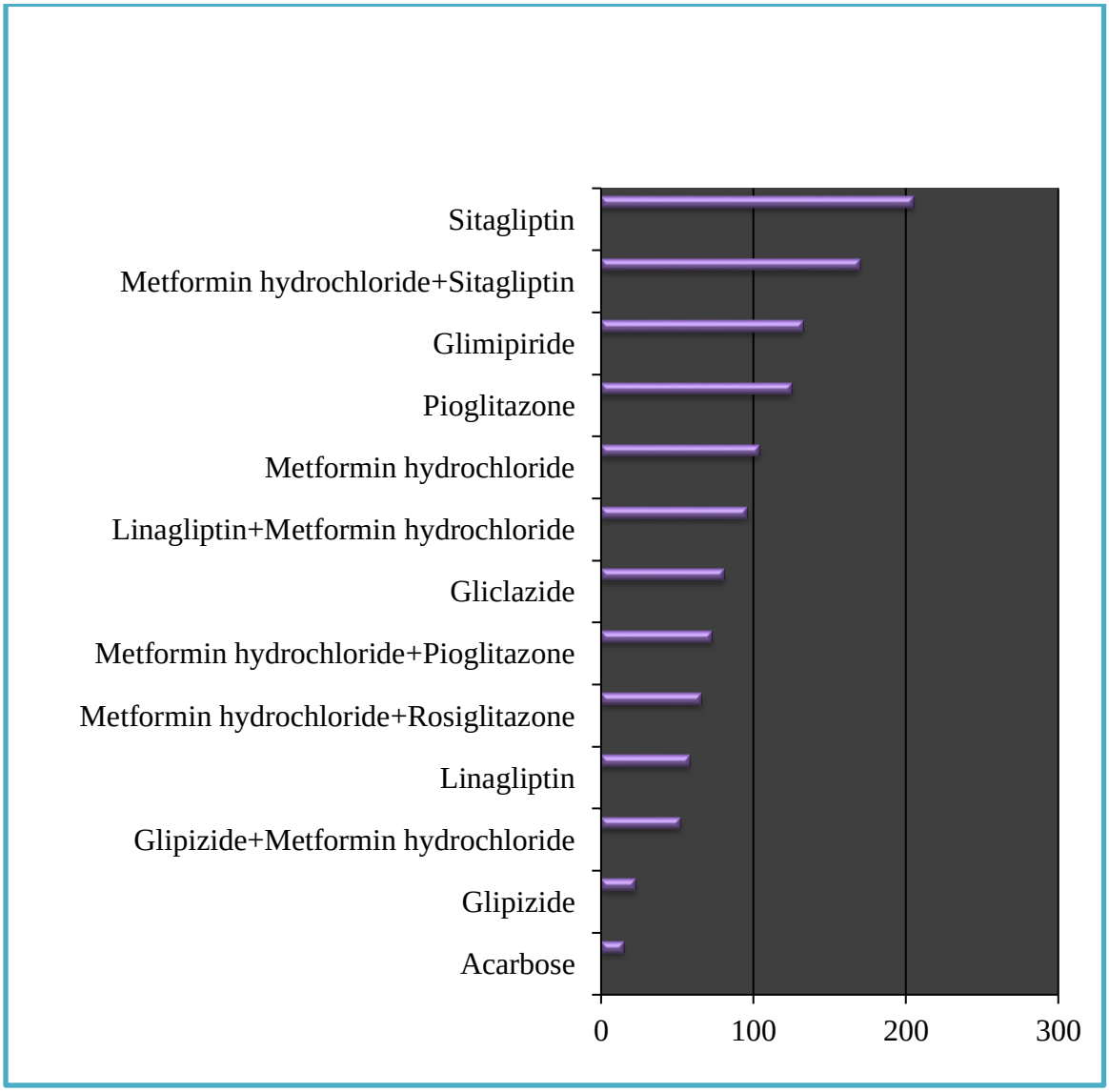

Figure 5.9.1.1: Anti-diabetic (oral) prescription pattern

This graph showed that in1200prescriptionsdoctorsprescribedSitagliptin 17.08% among 205 patients,Metformin hydrochloride+Sitagliptin 14.16% among 170 patients,Glimepiride 11.08% among 133 patients,Pioglitazone 10.41% among 125 patients,,Metformin hydrochloride 8.59%,Metformin hydrochloride 8% among 96 patientsamong 103 patients,Gliclazide 6.76% among 81 patients,Metformin hydrochloride + Pioglitazone 6.08% among 73 patients,Metformin hydrochloride+Rosiglitazone 5.5% among 66

patients,Linagliptin 4.83% among 58 patients,Metformin hydrochloride 4.3% among 52 patients,Glipizide 1.92% among 23 patients,Acarbose 1.25% among 15 patients,

Here,Sitagliptin and Metformin hydrochloride+Sitagliptinwas more prescribed than other anti- diabetic drugs.

This graph showed that DPP-4 inhibitors were more prescribed in prescription. Doctor prescribed DPP-4inhibitors 21.92%, Sulphonylurea 19.76%,Biguanides + DPP-4inhibitors 14.17%,Biguanides +Thiazolidinedione 11.59%,Thiazolidinediones 10.42%,Biguanides 8.59%,DPP-4inhibitors +Biguanides 8%,Sulphonylurea +Biguanides 4.3%,Alpha-glucosidase inhibitors 1.25%.

5.9.3 Insulin prescription pattern

Insulin	No.of prescription	Ratio %
Mixtured70\80	350	43.75
Humulin 70/30	288	36
Maxsulin 30/70	109	13.63
Novomix	53	6.62
Total	800(up to 1200)	100

Table 5.9.3: Insulin prescription pattern

Within 1200 patients 800 patients were using insulin out of 1200 patients. So, the ratio of insulin user was 66.67%.

This graph showed that Mixtured70\80 was more prescribed in the prescription .Doctor prescribed Mixtured70\80 43.75%, Humulin 70/30 36%, Maxsulin 30/70 13.62%, Novomix 6.62%.

5.9.4. Prescription pattern of Hypertension

Drugs	No.of prescription	Ratio%
Ramipril	175	42.68
GlycerylTrinitrate	90	21.96
Clopidogrel	57	13.90
Metoprololtartrate	50	12.19
Otherdrugs	38	9.27
Total	410 (out of 1200)	100

Table 5.9.4: Prescription pattern of HTN

5.9.5 Prescription pattern of Cardiovascular disease

Drugs	No.of prescription	Ratio%
Aspirin	149	41.74
Lisinipril	96	26.89
GlycerylTrinitrate	70	19.60
Others	42	11.77
Total	357 (out of 1200)	100

Table 5.9.5: Prescription pattern of Cardiovascular disease

5.9.5.1 Graph of Cardiovascular disease prescription pattern

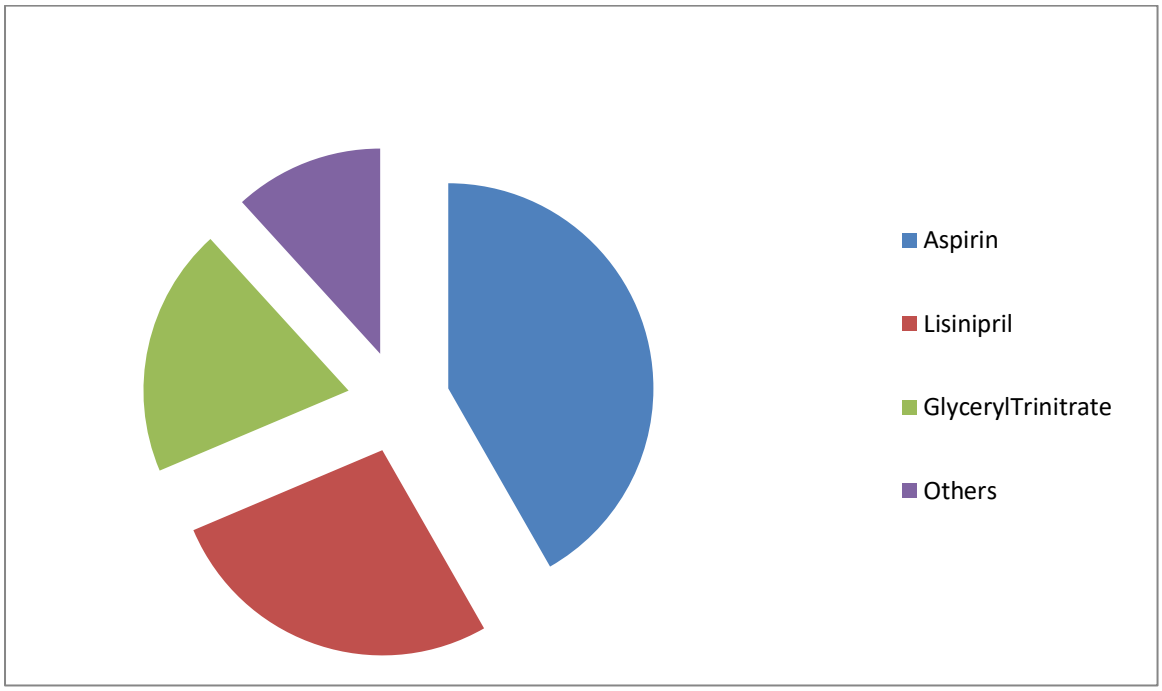

Figure 5.9.5.1: Graph of Cardiovascular disease prescription pattern

This graph showed that aspirin was mare prescribed in the prescription. Doctor prescribed Aspirin 41.747%, Lisinopril 26.89%, 42.68 %, GlycerylTrinitrate 19.60%, Clopidogrel 13.90% and others 11.77%.

CHAPTER SIX: CONCLUSION

Conclusion

Statisticalanalysisreveals the ratio of indoor patient were 29.16% and outdoor patient were 70.84%.On the other hand the the ratio of maleand femaledifferent,maleishigherthanfemaleamong allofthedepartment.Inthisevaluation, differentage's diabetic patient prescriptionpattern,it shownthat DPP-4 inhibitors were more prescribed in prescription. Doctor prescribed DPP-4inhibitors 21.92%, Sulphonylurea 19.76%, Biguanides + DPP-4inhibitors 14.17%, Biguanides +Thiazolidinedione 11.59%, Thiazolidinediones 10.42%, Biguanides 8.59%, DPP-4inhibitors +Biguanides 8%, Sulphonylurea +Biguanides 4.3%, Alpha-glucosidase inhibitors 1.25%.Here analysis only one of the largest hospitalthatisBirdem General Hospital and under the supervision of Birdem samity that is BIHS General Hospital, Ibrahim General Hospital, Bangladesh Diabetic Samity (Nazimuddin road –Dhaka) whereIcollected1200prescriptions within 4 monthsandfinally evaluatedthe prescriptionpattern for diabetic patientindifferent agedbut furthermore,thisstudy protocolwillalsoascertainthefurtherevaluationindifferenthospital where more data and prescription will becollectedand I will able to find out different prescription pattern in more different hospital.

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