

Report of the mini-project work done in the related subject w.r.t the habitation/village.

A mini-project work in the related subject w.r.t the habitation/village. (For ex., a Student of Botany may do a project on Organic Farming or Horticulture or usage of Biofertilizers or biopesticides or effect of the inorganic pesticides, etc. A student of Zoology may do a project on Aquaculture practices or animal husbandry or poultry or Health and hygiene or Blood group analysis or survey on the Hypertension or survey On the prevalence of diabetes, etc.

The Report shall be limited to 6 pages.

INTRODUCTION

Diabetes is a condition in which body can't produce enough insulin to process the glucose in the blood or group of metabolic diseases in which a person has high blood sugar. The normal process of how the body turns food into energy and the changes that occur when diabetes is present, is explained below.

- **Food is changed in to glucose :** The stomach changes the food we eat into a fuel called glucose, a form of sugar. Glucose goes into the blood stream and is carried to the millions of cells in the body.
- **Glucose gets into the cells :** An organ called the pancreas makes a chemical called insulin. Insulin also goes into the bloodstream and travels to the cells. It meets glucose and enables it to enter the cells.
- **Cells turn glucose into energy :** The cells metabolize (burn) the glucose to give the body energy.

when diabetes is present, the changes that happen are

- Diabetes makes it harder for the body to get energy from food.
- Food is changed into glucose : The stomach still changes the food we eat into glucose. Glucose goes into the bloodstream. But most of the glucose may not be able to enter the cells because:
 - There may not be enough insulin.
 - There may be plenty of insulin, but it can't unlock the receptors.
 - There may be too few receptors for all the glucose to get through.
- Cells can't make energy : Most of the glucose stays in the bloodstream. This is called Hyperglycaemia (also known as high blood glucose or high blood sugar). Without enough glucose in the cells, the cells can't make the energy needed to keep the body Running smoothly.

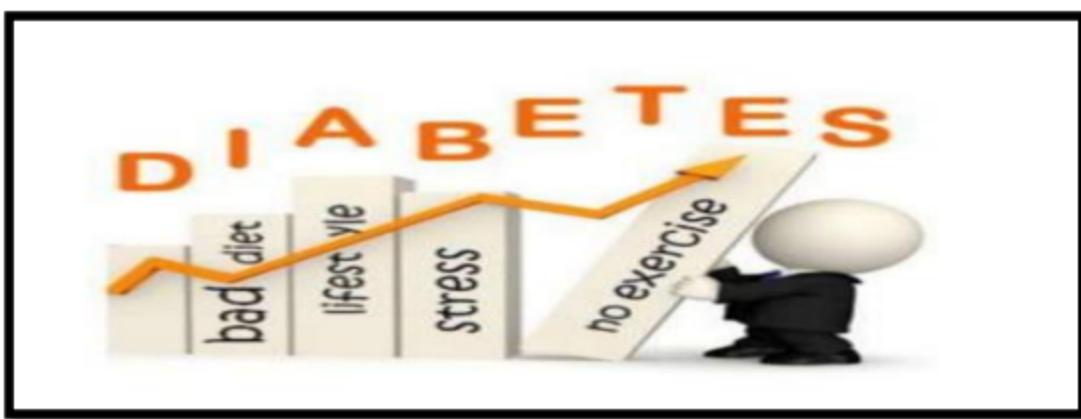


Fig 1: Incidence of Diabetes

TYPES OF DIABETES

There are three main types of diabetes:

Type 1 diabetes used to be called juvenile-onset diabetes. It is usually caused by an autoimmune reaction where the body's defence system attacks the cells that produce insulin. The reason this occurs is not fully understood. People with type 1 diabetes produce very little or no insulin. The disease may affect people of any age, but usually develops in children or young adults. People with this form of diabetes need injections of insulin every day in order to control the levels of glucose in their blood. If people with type 1 diabetes do not have access to insulin, they will die.

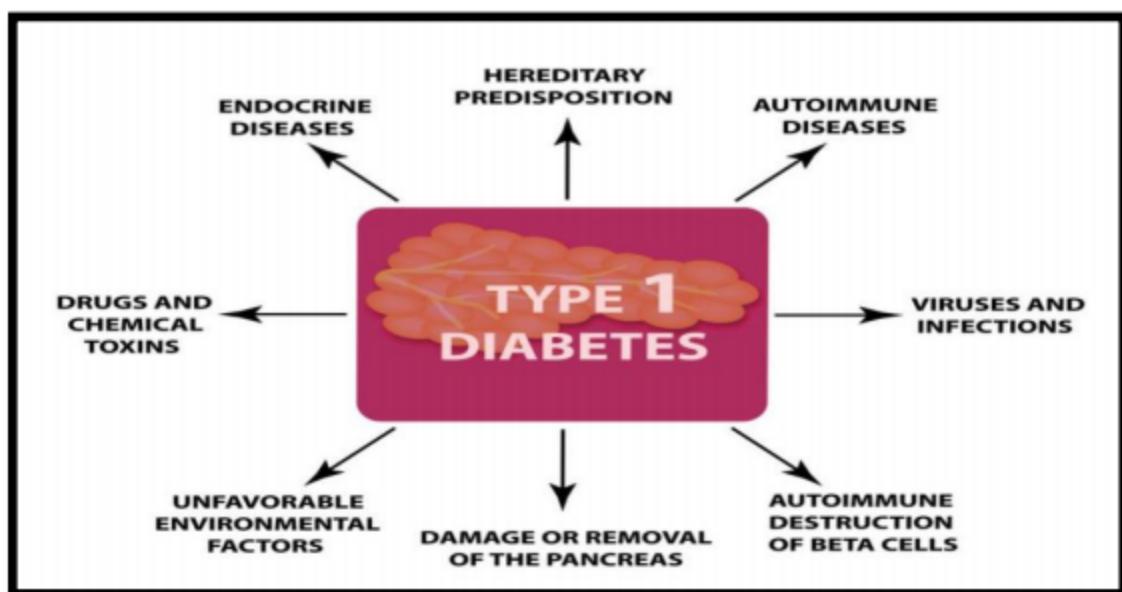


Fig 2: Type 1 Diabetes

Type 2 diabetes used to be called non-insulin dependent diabetes or adult-onset diabetes, and accounts for at least 90% of all cases of diabetes. It is characterised by insulin resistance and relative insulin deficiency, either or both of which may be present at the time diabetes is diagnosed. The diagnosis of type 2 diabetes can occur at any age. Type 2 diabetes may remain undetected for many years and the diagnosis is often made when a complication appears or a routine blood or urine glucose test is done. It is often, but not always, associated with overweight or obesity, which itself can cause insulin resistance and lead to high blood glucose levels. People with type 2 diabetes can often initially manage their condition through exercise and diet. However, over time most people will require oral drugs and/or insulin.

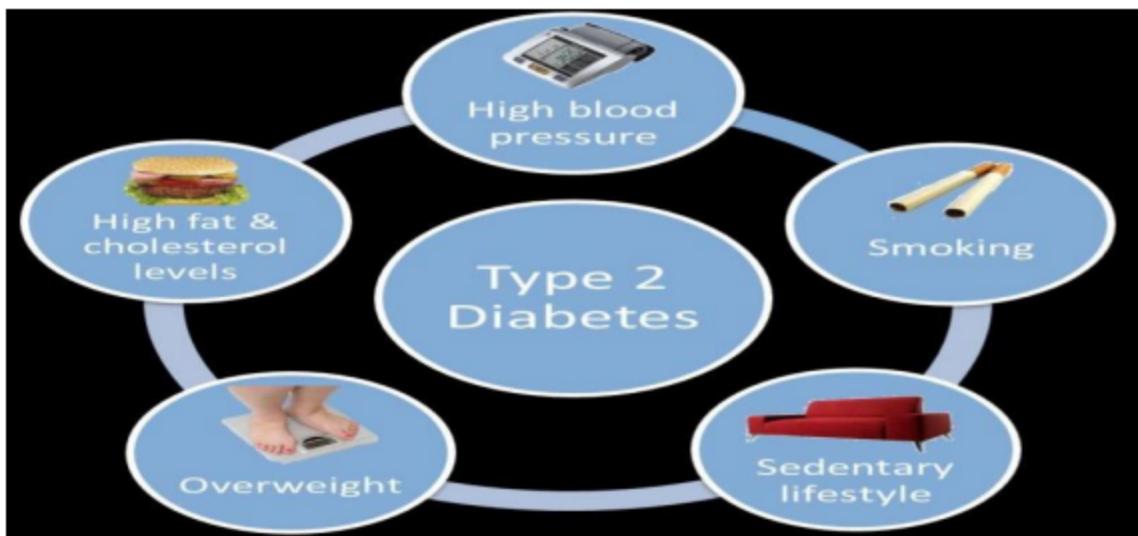


Fig 3: Type 2 Diabetes

Both type 1 and type 2 diabetes are serious. There is no such thing as mild diabetes.

Gestational diabetes (GDM) is a form of diabetes consisting of high blood glucose levels during pregnancy. It develops in one in 25 pregnancies worldwide and is associated with complications to both mother and baby. GDM usually disappears after pregnancy but women with GDM and their children are at an increased risk of developing type 2 diabetes later in life. Approximately half of women with a history of GDM go on to develop type 2 diabetes within five to ten years after delivery.

Other specific types of diabetes also exist.

COMPLICATIONS OF DIABETES

People with diabetes have an increased risk of developing a number of serious health problems. Consistently high blood glucose levels can lead to serious diseases affecting the heart and blood vessels, eyes, kidneys, nerves and teeth. In addition, people with diabetes also have a higher risk of developing infections. In almost all high-income countries, diabetes is a leading cause of **cardiovascular disease, blindness, kidney failure, and lower limb amputation.**

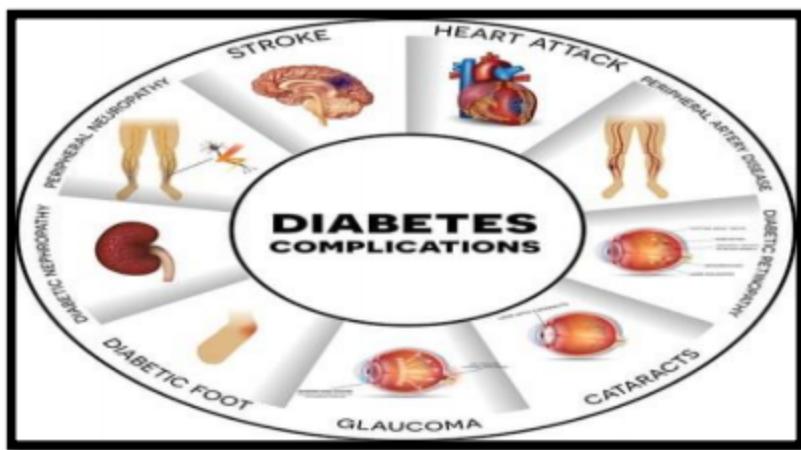


Fig 4: Complications

Maintaining blood glucose levels, blood pressure, and cholesterol at or close to normal can help delay or prevent diabetes complications. Therefore people with diabetes need regular monitoring.

Cardiovascular disease: affects the heart and blood vessels and may cause fatal complications such as coronary artery disease (leading to heart attack) and stroke. Cardiovascular disease is the most common cause of death in people with diabetes. High blood pressure, high cholesterol, high blood glucose and other risk factors contribute to increasing the risk of cardiovascular complications.

Kidney disease (diabetic nephropathy): caused by damage to small blood vessels in the kidneys leading to the kidneys becoming less efficient or to fail altogether. Kidney disease is much more common in people with diabetes than in those without diabetes. Maintaining near normal levels of blood glucose and blood pressure can greatly reduce the risk of kidney disease.

Nerve disease (diabetic neuropathy): diabetes can cause damage to the nerves throughout the body when blood glucose and blood pressure are too high. This can lead to problems with digestion, erectile dysfunction, and many other functions. Among the most commonly affected areas are the extremities, in particular the feet. Nerve damage in these areas is called peripheral neuropathy, and can lead to pain, tingling, and loss of feeling. Loss of feeling is particularly important because it can allow injuries to go unnoticed, leading to serious infections and possible amputations. People with diabetes carry a risk of amputation that may be more than 25 times greater than that of people without diabetes. However, with comprehensive management, a large proportion of amputations related to diabetes can be prevented. Even when amputation takes place, the remaining leg and the person's life can be saved by good follow-up care from a multidisciplinary foot team. People with diabetes should regularly examine their feet.

Eye disease (diabetic retinopathy): most people with diabetes will develop some form of eye disease (retinopathy) causing reduced vision or blindness. Consistently high levels of blood glucose, together with high blood pressure and high cholesterol, are the main causes of retinopathy. It can be managed through regular eye checks and keeping glucose and lipid levels at or close to normal.

Pregnancy complications: Women with any type of diabetes during pregnancy risk a number of complications if they do not carefully monitor and manage their condition. To prevent possible organ damage to the fetus, women with type 1 diabetes or type 2 diabetes should achieve target glucose levels before conception. All women with diabetes during pregnancy, type 1, type 2 or gestational should strive for target blood glucose levels throughout to minimize complications. High blood glucose during pregnancy can lead to the foetus putting on excess weight. This can lead to problems in delivery, trauma to the child and mother, and a sudden drop in blood glucose for the child after birth. Children who are exposed for a long time to high blood glucose in the womb are at higher risk of developing diabetes in the future.

RISKS FACTORS

The risk factors for **type 1 diabetes** are still being researched. However, having a family member with type 1 diabetes slightly increases the risk of developing the disease. Environmental factors and exposure to some viral infections have also been linked to the risk of developing type 1 diabetes.

Several risk factors have been associated with **type 2 diabetes** and include:

- Family history of diabetes
- Overweight
- Unhealthy diet
- Physical inactivity
- Increasing age
- High blood pressure
- Ethnicity
- Impaired Glucose Tolerance (IGT)*
- History of gestational diabetes
- Poor nutrition during pregnancy



Fig 5: Risk Factors

Impaired Glucose Tolerance (IGT) is a category of higher than normal blood glucose, but below the threshold for diagnosing diabetes.

Changes in diet and physical activity related to rapid development and urbanisation have led to sharp increases in the numbers of people developing diabetes.

Pregnant women who are overweight, have been diagnosed with Impaired Glucose Tolerance (IGT), or have a family history of diabetes are all at increased risk of developing **Gestational diabetes (GDM)**. In addition, having been previously diagnosed with gestational diabetes or being of certain ethnic groups puts women at increased risk of developing GDM.

The etiology of diabetes is believed to be multifactorial. Many individual-level non modifiable risk factors like genetic, age, ethnicity, and family history have been prospectively associated with type 2 diabetes, but the increases in prevalence in most populations have probably been driven by a modifiable risk factors including sedentary lifestyle and/or lack of exercise, increasing prevalence of overweight/obesity, unhealthy diets (increased intake of refined grains, fat, sugar, and sweetened beverages and decreased intake of fruits and vegetables) and habits (smoking and alcohol abuse), exposure to environmental pollutants, altered intrauterine environment and mental health (stress/depression), short sleep duration, and the built environment.

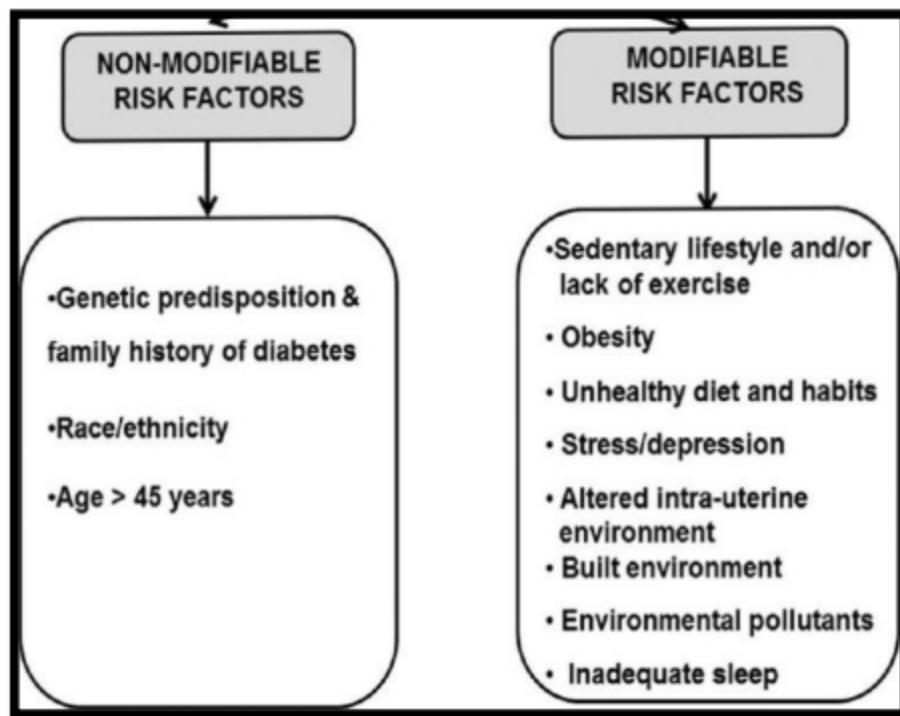


Fig 6: Modifiable & Non-Modifiable

SIGNS AND SYMPTOMS OF DIABETES

Individuals can experience different signs and symptoms of diabetes, and sometimes there may be no signs.



Fig 7: Signs & Symptoms of Diabetes

Some of the signs commonly experienced include:

- Frequent urination
- Excessive thirst
- Increased hunger
- Weight loss
- Tiredness
- Lack of interest and concentration
- A tingling sensation or numbness in the hands or feet
- Blurred vision
- Frequent infections
- Slow-healing wounds
- Vomiting and stomach pain (often mistaken as the fever related)

The development of type 1 diabetes is usually sudden and dramatic while the symptoms can often be mild or absent in people with type 2 diabetes, making this type of diabetes hard to detect. Blood tests Levels for Diagnosis of Diabetes and Prediabetes.

Condition	HbA1C(%)	Fasting Plasma Glucose	Oral Glucose Tolerance Test (mg/dL)
Diabetes	6.5 or above	126 or above	200 or above
Predabetes	5.7 to 6.4	100 to 125	140 to 199
Normal	About 5	99 or Below	139 or below

Mg=milligram, dL=decilitre. For all three tests, within the prediabetic range, the higher the test result, the greater the risk of diabetes.

How Are Diabetes and Pre-Diabetes Treated

Although diabetes can be a very serious disease, it can be treated. It is important to manage diabetes by checking your blood glucose regularly and keeping it under control. Many people control their glucose levels by maintaining a healthy weight, changing their diet, and increasing exercise.

A healthy diet for people with diabetes involves reducing sugar and starchy foods (carbohydrates), such as candy, pastries, chips, sugary drinks, bread, potatoes, rice, and corn. If possible, see a registered dietitian to help you plan your meals. Many AIDS service organizations have registered dietitians on staff who will see you free of charge.

Sometimes, despite eating well and being physically active, blood sugar levels cannot be controlled without the help of medications and/or insulin. There are a number of medications available that lower blood glucose levels. Because these medications act in different ways, they may often be used together.

Some of the diabetes medications may interact with HIV drugs. To reduce the chance of drug interactions, make sure your health care provider knows about all medications you take.

DIET AND DIABETES

To live a long and healthy life with Diabetes, following diet and exercise are very important along with medication. Diabetic diet is not different from normal diet; however some modifications need to be done for the normal diet

Dietary Guidelines

Eat more Vegetables: Eat more locally available and seasonal vegetables. Take them as curry, retia, and in raw form. Include green leafy vegetables regularly in the diet. Vegetables; contain fibre and many vitamins and minerals which are helpful in control of diabetes and to maintain good health.

Eat variety of foods: for better control of blood sugar instead of using only rice include other grains like wheat, jowar, ragi or unpolished; rice in the diet, eating only white rice is not going to help to control Blood sugar.

More of whole Grains: Include whole dals like moong dal and channa dal in everyday diet.

Use less oil: Diabetic person is at higher risk of hear disease, it is advisable to reduce the consumption of oil for cooking. Restricted amount of oil for cooking and not preparing the vegetables in fried forms will help to consume less amount of oil. Traditionally used oils like groundnut and gingelly oil are good for health. Ghee, butter, coconut oil contain different type of fats, (which may increase cholesterol) and should be taken in small quantities.

Use less salt: usually Indian diet is rich in salt, especially when using pickles, papad and adding more salt to food is quite common. Normally people with diabetes may also get Hypertension (B.P) and it is better to restrict the intake of pickles, papad and adding less salt while cooking food.

Use of Eggs/ Non veg: Fish contains special type of oil which helps in blood sugar management, so consumption of fish is encouraged 3-4 times a week. Chicken also contain less fat than meat.

Simple sugars: Certain food increase blood sugar and sometime can cause health problems if taken in excess and without proper medical care, especially items like sweets, coffee / tea with more sugar or honey. Some fruits also contain simple sugars in excess, like banana, mango, sapota, seethaphal, jack fruit and it is preferable to take less quantity of these fruits or avoid them. Take fruits but not fruit juices.

Dietary Fibre: Dietary fibre is that part of food which is not digested by the body. Fibre present in vegetables, fruits, legumes and fenugreek seeds are effective in controlling blood sugar and also helps in reducing cholesterol

Alcohol: Diabetic patients should avoid alcohol completely. Alcohol may lower the blood sugar. Remember Alcohol should never be taken with some anti diabetic drugs as it may make the diabetic very ill.

Wrong beliefs

There is a common belief that diabetics cannot eat rice and they can eat only wheat. This is not true. Both wheat and rice have almost same calories and same effect on blood sugar. But the advantage with wheat or roti is that it is quite convenient to count as well as to reduce the number of chapatti's they eat, than to measure rice and eat.

Total Fasting is not good for those who are diabetic especially when on treatment it may lead to drop in blood sugar and health problems.

Diet Schedule

Meal	Typical Diet	Modified for diabetics
Breakfast 8.00 A.M	1 cup of coffee with buffalo milk 4 idlis or 1 plate upma with coconut chutney	1 cup of coffee with cows/ Toned milk 3 idlis or 1 cup upma with more vegetables, 2 table spoons chutney(tomato or dhal chutney)
Lunch 12.30 P.M	3 cups of white rice, 1 cup dal, 1 cup rasam, ½ cup brinjal fry, 1 cup curd, pickle, papad.	Lunch 12.30 P.M 2 cups of brown rice, 1 cup rasam, 1 cup of brinjal; pulusu, fresh chutney prepared with vegetables and less oil.
Afternoon 3.30 P.M	2murukkus/Bhajji/pakoda 1 cup coffee.	1 cup murmura / chudwa / boiled moong 1 cup.
Dinner 8P.M	3 cups of rice, 1 serving of fish/chicken, 1 cup of; dal, fried veg	2 cups of brown rice/ 3 rotis/1 serving of fish.

Advice on Cooking

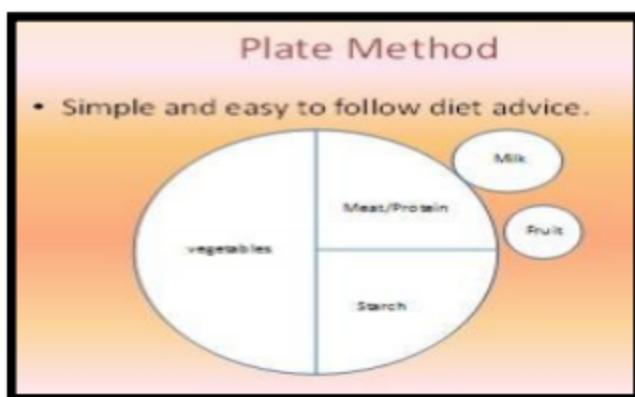
- Use less oil for cooking, do not prepare fried vegetables like aloo fry, brinjal fry: instead prepare brinjal curry/ pulusu etc.,
- Instead of using pickles, use vegetable chutney with less oil and salt.
- Instead of using buffalo milk for the preparation of curd and coffee, use cows / toned milk. If they are not available remove the cream to set the curds.
- Use less of fried papad.

Home remedies

We know there is no permanent cure for Diabetes, it can only be managed. Using home remedies is helpful in controlling blood sugar. With regular medicines, these home remedies are included in the diet.

Food item	How to take
Amla (usiri)	Fresh ones or dried powder with water
Fenugreek seeds (menthulu)	Leaves and seeds, in case of seeds soak them in overnight.
Bitter gourd (kakarakaya)	$\frac{1}{4}$ cup of juice or cooked vegetables
Onion (ulligadda)	Take them in raw form or as raita regularly
Garlic (vellulli)	Fresh(crushed) , use them in food preparations
Black jamun (neredu)	Fruit or seed powder

Simple and easy way to control blood sugar levels is following plate method.



DIABETES PREVENTION

At present, type 1 diabetes cannot be prevented. The environmental triggers that are thought to generate the process that results in the destruction of the body's insulin-producing cells are still under investigation.

Lifestyle changes

- There is a lot of evidence that lifestyle changes (achieving a healthy body weight and moderate physical activity) can help prevent the development of type 2 diabetes.
- Obesity, particularly abdominal obesity, is linked to the development of type 2 diabetes. **Weight loss** improves insulin resistance and reduces hypertension. People who are overweight or obese should therefore be encouraged to achieve and maintain a healthy body weight.
- **Physical activity** is one of the main pillars in the prevention of diabetes. Increased physical activity is important in maintaining weight loss and is linked to reduced blood pressure, reduced resting heart rate, increased insulin sensitivity, improved body composition and psychological well-being.
- **A balanced and nutritious diet** is essential for health. A healthy diet reduces risk factors for cardiovascular diseases.
- **Smoking:** a well-established risk factor for many chronic diseases, including diabetes and its complications. As well as other harmful effects, smoking increases abdominal fat accumulation and insulin resistance. All smokers should be encouraged to quit smoking. However, weight gain is common when quitting smoking and therefore dietary advice on avoiding weight gain should also be given (e.g. managing cravings and withdrawal symptoms by using short bouts of physical activity as a stress-relief activity, rather than eating snacks).
- **Stress and depression:** There is evidence of a link between depression and both diabetes and cardiovascular disease.
- **Sleeping patterns:** Both short (<6h) and long (>9h) sleep durations may be associated with a higher risk of developing type 2 diabetes. Sleep deprivation may impair the balance of hormones regulating food intake and energy balance. Long sleep durations may be a sign of sleep-disordered breathing or depression and should be treated appropriately. There is also a close association between obesity and obstructive sleep apnoea syndrome (OSA), the most common form of sleep disordered breathing.

Healthy eating

1. Individuals can reduce their risk of type 2 diabetes by:
2. Choosing water or unsweetened coffee or tea instead of fruit juice, soda, and other sugar sweetened beverages.
3. Eating at least three servings of vegetables every day, including green leafy vegetables such as palak, greens, etc.
4. Eating up to three servings of fresh fruit every day.
5. Choosing nuts, a piece of fresh fruit or sugar-free yoghurt for a snack.
6. Limiting your alcohol intake to a maximum of two standard drinks per day.
7. Choosing lean cuts of white meat, poultry and seafood instead of processed meat or red meat.
8. Choosing peanut butter instead of chocolate spread or jam to spread on bread.
9. Choosing whole-grain bread instead of white bread, brown rice instead of white rice, whole grain pasta instead of refined pasta.
10. Choosing unsaturated fats (olive oil or sunflower oil) instead of saturated fats (butter, ghee, animal fat, coconut oil or palm oil).
11. Eating a healthy breakfast decreases the risk of developing type 2 diabetes as it helps to control appetite and blood glucose concentrations in both adults and children. Skipping breakfast is also associated with weight gain.



Fig 9: Prevention of Diabetes

5 tips for taking control diabetes

1. Lose extra weight

Losing weight reduces the risk of diabetes. People in one large study reduced their risk of developing diabetes by almost 60% after losing approximately 7% of their body weight with changes in exercise and diet.

The American Diabetes Association recommends that people with prediabetes lose at least 7% to 10% of their body weight to prevent disease progression. More weight loss will translate into even greater benefits. Set a weight-loss goal based on your current body weight. Talk to your doctor about reasonable short-term goals and expectations, such as a losing 1 to 2 pounds a week.

2. Be more physically active

There are many benefits to regular physical activity. Exercise can help you:

- Lose weight
- Lower your blood sugar
- Boost your sensitivity to insulin — which helps keep your blood sugar within a normal range

Goals for most adults to promote weight loss and maintain a healthy weight include:

- **Aerobic exercise.** Aim for 30 minutes or more of moderate to vigorous aerobic exercise — such as brisk walking, swimming, biking or running — on most days for a total of at least 150 minutes a week.
- **Resistance exercise.** Resistance exercise — at least 2 to 3 times a week — increases your strength, balance and ability to maintain an active life. Resistance training includes weightlifting, yoga and calisthenics.
- **Limited inactivity.** Breaking up long bouts of inactivity, such as sitting at the computer, can help control blood sugar levels. Take a few minutes to stand, walk around or do some light activity every 30 minutes.

3. Eat healthy plant foods

Plants provide vitamins, minerals and carbohydrates in your diet. Carbohydrates include sugars and starches — the energy sources for your body — and fibre. Dietary fiber, also known as roughage or bulk, is the part of plant foods your body can't digest or absorb.

Fibre-rich foods promote weight loss and lower the risk of diabetes. Eat a variety of

- Fruits, such as tomatoes, peppers and fruit from trees
- Non starchy vegetables, such as leafy greens, broccoli and cauliflower
- Legumes, such as beans, chickpeas and lentils
- Whole grains, such as whole-wheat pasta and bread, whole-grain rice, whole oats, and quinoa

The benefits of fiber include:

- Slowing the absorption of sugars and lowering blood sugar levels
- Interfering with the absorption of dietary fat and cholesterol
- Managing other risk factors that affect heart health, such as blood pressure and inflammation
- Helping you eat less because fiber-rich foods are more filling and energy rich.

Avoid foods that are “bad carbohydrates” — high in sugar with little fiber or nutrients: white bread and pastries, pasta from white flour, fruit juices, and processed foods with sugar or high-fructose corn syrup.

4. Eat healthy fats

Fatty foods are high in calories and should be eaten in moderation. To help lose and manage weight, your diet should include a variety of foods with unsaturated fats, sometimes called “good fats.”

Unsaturated fats — both monounsaturated and polyunsaturated fats — promote healthy blood cholesterol levels and good heart and vascular health. Sources of good fats include:

- Olive, sunflower, safflower, cottonseed and canola oils
- Nuts and seeds, such as almonds, peanuts, flaxseed and pumpkin seeds
- Fatty fish, such as salmon, mackerel, sardines, tuna and cod

Saturated fats, the “bad fats,” are found in dairy products and meats. These should be a small part of your diet. You can limit saturated fats by eating low-fat dairy products and lean chicken and pork.

5. Skip fad diets and make healthier choices

Many fad diets — such as the glycemic index, paleo or keto diets — may help you lose weight. There is little research, however, about the long-term benefits of these diets or their benefit in preventing diabetes.

Your dietary goal should be to lose weight and then maintain a healthier weight moving forward. Healthy dietary decisions, therefore, need to include a strategy that you can maintain as a lifelong habit. Making healthy decisions that reflect some of your own preferences for food and traditions may be beneficial for you over time.

One simple strategy to help you make good food choices and eat appropriate portions sizes is to divide up your plate. These three divisions on your plate promote healthy eating:

- One-half: fruit and nonstarchy vegetables
- One-quarter: whole grains
- One-quarter: protein-rich foods, such as legumes, fish or lean meats

See your doctor regularly.

Schedule an appointment with your primary care provider at least once a year so you can track your health together. “A regular check-up and lab work can help identify what your blood sugars are doing so you and your doctor can develop a good plan for delaying the onset of diabetes,” Compston says.

MEDICINES FOR DIABETES

Diabetes is a serious condition that is brought on by decreased insulin secretion from the pancreas and diminished insulin sensitivity in the muscle cells. It is characterized by excessive urination, extreme thirst, high blood sugar, and increased appetite.

There are a number of medications on the market to help manage this condition, but the following are the top 10 in terms of showing efficacy in lowering A1C and blood sugar levels.

1. Insulin (long- and rapid-acting)
2. Metformin (biguanide class)
3. Glipizide (sulfonylurea class)
4. Glimepiride (sulfonylurea class)
5. Invokana (sodium glucose cotransporter 2 inhibitor class)
6. Jardiance (SGLT2 class)
7. Januvia (dipeptidyl peptidase 4 inhibitor)
8. Pioglitazone (thiazolidinedione)
9. Victoza (glucagon-like peptide 1 agonist)
10. Trulicity (glucagon-like peptide 1 agonist)



Fig 10: Medicine for diabetes

The above medicine is used by most of the diabetic patients in India.

CHAPTER 6: RECOMMENDATIONS AND CONCLUSIONS OF THE MINI PROJECT

CONCLUSION

Diabetes is a slow killer with no known curable treatments. However, its complications can be reduced through proper awareness and timely treatment. Three major complications are related to blindness, kidney damage and heart attack. It is important to keep the blood glucose levels of patients under strict control for avoiding the complications. One of the difficulties with tight control of glucose levels in the blood is that such attempts may lead to hypoglycemia that creates much severe complications than an increased level of blood glucose.

Exercise reduces the severity of the disease and the long term complications of diabetes. In effect, a well-planned and-regular exercise regimen can be very beneficial if made a part and parcel of everyday life, more so if one has diabetes. Exercise has the advantages of controlling the blood sugar levels without taking additional medications.

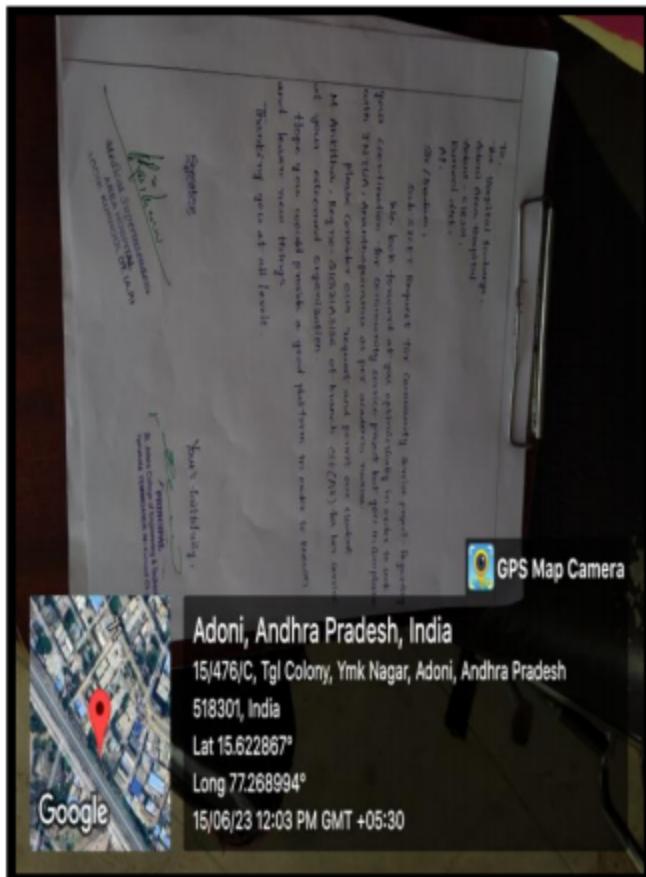
Overall regular exercise cannot only help in better control of blood sugar but also helps with control of weight and blood pressure as it lowers the bad cholesterol and raises the level of good cholesterol in the blood. Exercise can reduces the risk of heart disease and nerve damage, the risks of which are higher with diabetes.

Diabetes is a serious life-threatening disease and must be constantly monitored and effectively subdued with proper medication and by adapting to a healthy lifestyle. By following a healthy lifestyle, regular checkups, and proper medication we can observe a healthy and long life.

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Incidence of Diabetes Photos and links



Incidence of Diabetes

