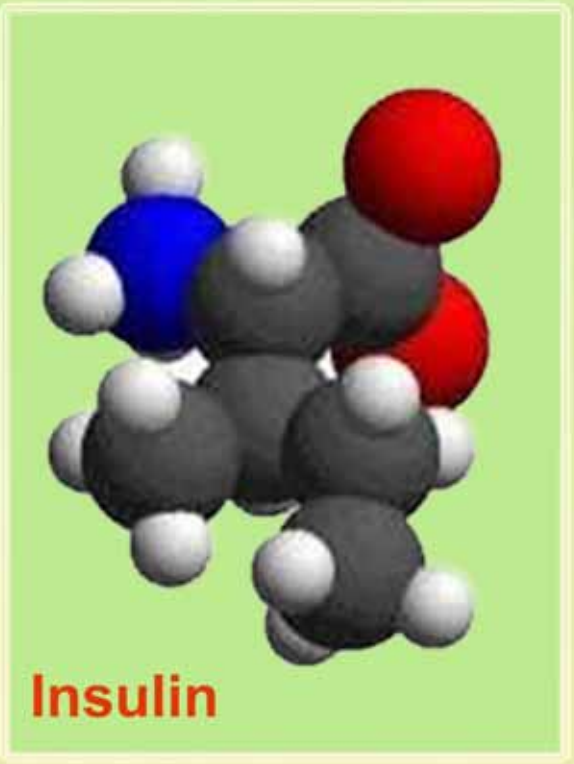
DIABETES



Insulin

Dr. Mrs. Anjali Kulkarni

INDEX

INTRODUCTION

Mankind knows **Diabetes Mellitus** since ages. Indian medical history mentions **madhumeha** in **Charak Samhita** (500-700 BC) and has given description of this disorder in detail. The following shlok describes symptoms of diabetes. Charak mentions a madhumehi person passes large amount of sweet urine.

मधुमेही के लक्षण
कषायमधुरं पाण्डुं रूक्षं मेहंति यो नरः ।
वातकोपादसाध्यं तं प्रतीयान्मधुमेहिनं ।।

In spite of knowing the disease for so long the reaction of the patient at the time of diagnosis remains almost the same. The moment of diagnosis brings a lot of unnecessary despair. It is frightening to the patient. But most of the times this reaction is due to misconception about the disease. India is going to be a country with largest diabetes population by year 2025. This would be apparent from following figure.

Rising prevalence of diabetes in India

Year	Prevalence %	Place
1971	1.2	Cuttak
1972	2.3	New Delhi
1979	3.0	Multicentric
1984	4.7	Tenali
1988	5.0	Kudremath
1992	8.5	Madras
1999	10 to 12	Multicentric

WHAT IS DIABETES?

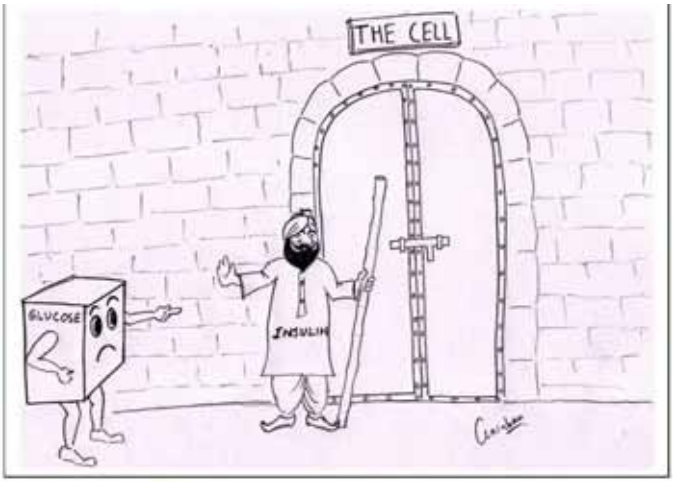
Millions of people have diabetes. Even children suffer from this disease. That is why I feel that you are fortunate that your disease has been diagnosed at right time. This is one of the most widely studied, researched and advance areas in the medical field. At present there is no cure in any of the PATHIES for this disease. But with modern medical advancement you can definitely live near normal healthy life. We are here to add life to your life. We care for you and for your diabetes. Your cooperation is mandatory because A DIABETIC WHO KNOWS THE MOST ABOUT HIS DISEASE FACES LEAST PROBLEMS. In any disease it is said that half the battle is won by confidence and I intend to give you confidence in this booklet, confidence to live with the disease gracefully and confidence to tackle your problems intelligently.

Let us start with the basic question i.e. WHAT IS DIABETES?

Glucose is essential for providing energy for normal body functions. In diabetes the blood glucose levels are increased due to relative or absolute deficiency of insulin. Insulin is a hormone. A Hormone is a chemical secreted by one of the glands in our body. This gland is situated in abdomen and is known as pancreas. Insulin acts as a gatekeeper that allows entry of glucose into the cell.

If the amount of insulin is abnormal or the function of insulin is at fault excess of glucose accumulates in the body with harmful effects on the cells of various organs. Diabetes is a metabolic disorder in which body is unable to handle glucose for its energy requirements. As we have already discussed, insulin is essential for entry of glucose in to the cell that is why

1) Cells can not adequately utilise glucose, so
2) Body tries to produce more glucose (gluconeogenisis).



This is how blood glucose keeps on rising even if there is no food intake. There are two major types of diabetes. The first type i.e. insulin dependent diabetes. It can be treated only with insulin as the main drug. This is common in younger age group of patients. The second type is non-insulin dependent diabetes (Type II). This is more common in India. This usually affects people above 40 years of age. This group can be managed with diet, exercises and oral medications. Some patients in this group may require insulin sometime later in life.

The comparison of two types of diabetes is shown in following table.

FEATURE	TYPE I (IDDM)	TYPE II (NIDDM)
Age of Onset	Younger age group	Above 30-35 years
Insulin level in blood	Negligible	Decreased or High
Bodyweight	Underweight or Normal	Overweight or Normal
Usual Treatment	Insulin	Oral and Insulin
Inheritance	Less Significant	More Significant

Uncontrolled diabetes can lead to deleterious effects on every part of the body if not looked after well at the right time. Even if one may not, in actual sense suffer the consequences of the disease today, it needs to be adequately treated. Complacency and neglect is always dangerous.

Remember that the disease has to be well controlled as it is critical in leading a normal life.

Poorly controlled diabetes can be a major aggravating factor for later diabetes complications. Following chart shows some of these complication risks. This is only to make you aware how important it is to control diabetes and not to scare you about this disease.

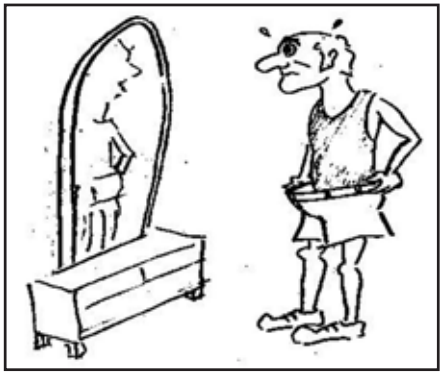
Complication	**Frequency, in comparison to non-diabetics**
Retinopathy leading to blindness	25 times higher
Kidney disease	15-20 times higher
Foot problems	20-30 times higher
Paralysis	2 times higher
Heart disease	2-4 times higher

Let us understand how this disease starts making its impression on your life. Usually, disease creeps in silently. One comes to know of it generally during routine blood sugar test for getting licenses, insurance etc. Sometimes it is detected only during treatment of other concomitant illness or before surgery.

Following are the common manifestations of diabetes.

REPORT AS A SURPRISE

INCREASED APPETITE AND THIRST



SIGNIFICANT WEIGHTLOSS

INFECTIONS IN FOLDS

INCREASED URINATION

EXHAUSTION

Who should test themselves for diabetes?

1. **Everybody with above mentioned symptoms.**
2. **Close relatives of Diabetes Patients.**
   For Type 1 diabetes hereditary factor is less prominent.
   If a father is diabetic then the risk to the child is 5-10%. If a mother is diabetic then the risk is 5%.
   Type 2 or NIDDM has significant genetic predisposition. If one parent has diabetes the risk is 40%. If both parents are diabetic the risk is 90%.
3. **Pregnant women** Diabetes is not uncommon due to various hormonal and metabolic changes during pregnancy.
4. **Those having high blood pressure, obesity, heart disease and paralysis etc.**
5. **A lady who delivered a baby weighing more than 4.5 kg**
6. **All above 45 years of age should check their sugar level once in a year.**

How is diabetes detected?

Estimation and interpretation of blood glucose is the only test for diagnosis of diabetes. World Health Organization (WHO) has laid down guidelines for diagnosis.

Criteria for diagnosis of diabetes
Fasting Venous plasma glucose > 140 mg/100ml
and
Two hours after 75 gm ingestion of glucose > 200 mg /100ml

Recently, American Diabetes Association has accepted the fasting plasma glucose values as >126mg/100ml for diagnosis of diabetes.

How to prepare for blood test?

How one should prepare for the blood test is also very important. The person should have normal diet 3-4 days prior to the test.

Please do not try to reduce sugar intake purposely just to show less blood sugar values. By this, one is not only fooling the doctor but oneself also. Actually you are delaying the diagnosis which may prove very costly later. We want to diagnose the disease so as to take correct measures to control it at the earliest time. You should remember that by checking sugar levels doctors are not making you a patient but trying to avoid serious complications related to high sugars.

A) At the time of blood test the person should be fasting overnight. He can have water.
B) The next morning fasting blood glucose sample is collected.
C) Two hours after 75g of glucose load or lunch second blood glucose sample is collected.

Another way is ,to give post lunch plasma sample on one day and to give fasting glucose sample next morning.

A known diabetic patient is supposed to follow the normal daily routine on the day of blood test also. That means the timings of breakfast, medicines and the lunch should be followed on this day as usual. The doctor can do any modification in the drug and the doses if the patient follows a regular schedule on the blood test day.

Diabetes management for each person is different. Do not compare your doses and drugs with other patients. Management of Diabetes is not only sugar control but much more beyond that. Your doctor knows your system very well. He will decide what is best for you. Feel free to ask all your queries to your doctor.

CONTROLLING DIABETES

What is the idea of control in Diabetes?

Basic idea of control is that the person should get relief from the symptoms also, blood biochemistry must be in an acceptable range so as to avoid acute and long-term complications due to **UNCONTROLLED DISEASE**. It is important to know the fact that though the blood biochemistry prescribes normal range of values, they may be little more or less without causing any alarm signals. Hence one should be aware of the concept of **ACCEPTABLE CONTROLS.**

Parameter	Good control	Acceptable control
Fasting plasma glucose	80-120 mg/dl	£ 140 mg/dl
Post prandial plasma glucose	140-160 mg/dl	£ 180 mg/dl
Glycated haemoglobin	<7 %	7 to 8 %
Total cholesterol	£ 180 mg/dl	£ 200 mg/dl
HDL cholesterol	³ 40 mg/dl	³ 35 mg/dl
Triglycerides	£ 150 mg/dl	< 180 mg/dl

All these values have to be correlated with other factors like associated disease, patient's age etc. The management will depend upon overall health of the patient and certainly not on blood reports! Regular medical examination includes

- Monthly weight record
- Blood pressure check up
- Blood glucose testing
- Complete lipid profile
- Urine and blood tests for assessing kidney functions
- Tests for evaluation of heart disease
- Examination of eyes
- Evaluation of diabetic foot changes
- Any sexual problems

Other specialized tests can be suggested depending upon results of tests mentioned above and the clinical examination by the specialist.

DIABETES CARE SCHEDULE

Every 3-6 Months :

Regular visits to your doctor, it includes

- Test for plasma glucose levels
- Glycated hemoglobin test (such as HbA1c)
- Examination of injection site.
- Feet: examined without shoes and socks

Every Year :

- Cholesterol: fasting profile including HDL & LDL cholesterol and triglycerides.
- Kidneys: microalbumin measured
- Eyes: examined through dilated pupils

Every 2-3 Years :

- HDL/cholesterol: if the last reading was normal
- Number of visits to the doctor depend on the control of blood sugar.

MYTHS ABOUT DIABETES

To help separate fact from fiction, here are some of the myths and the actual truth about diabetes.

1. **All diabetes is inherited**.
   Not everyone who gets diabetes inherits it. People tend to inherit the risk of NIDDM diabetes more than IDDM. You are considered at risk for developing NIDDM if any first-degree relatives have diabetes.

2. **People with diabetes should never eat sugar and sweets**.
   Sugar and sweets do raise your blood glucose, but people with diabetes can safely eat sugar as part of their meal plan in their recommended quota of calories occasionally. And just to clear up another myth, you can't get diabetes from eating too much sugar if you don't carry any other risk factor for its development.

3. **You can have borderline diabetes for many years**.
   There is no such thing as borderline diabetes. You either have it, or you don't. You have diabetes if,
   a) your fasting blood glucose levels are greater than 126 mg/dl, or
   b) The random blood glucose is above 200 mg/dl on at least two occasions.

4. **Once you start taking pills or insulin, you can eat anything that you want.**
   The pills or insulin that you take for diabetes are more effective when they don't have to work as hard to lower your blood glucose. Combining your medicines with a healthy meal plan and physical activity is the best method of control of diabetes.

5. **Insulin causes impotence**.
   Some men who have diabetes may become impotent, but not because they take insulin. Impotence or erectile dysfunction is

caused by damage to nerves caused by **longstanding high blood glucose. Diabetes is one of the many reasons for getting impotence.**

6. **The best way to judge your blood sugar level is by the way that you feel**.

   Some people have symptoms when their blood glucose is too high or low, others do not. Because some of the symptoms of high and low blood glucose are similar, it can be hard to know what your symptoms mean. The only way to be sure is to check your blood glucose.

7. **If my blood sugar is usually over 180 mg/dl that must be normal for me.**

   No. Your usual blood glucose isn't the same as normal blood glucose. Just because your blood glucose is usually high, does not mean that this is an acceptable blood glucose level. High blood glucose levels that are above those recommended goals do damage to many organs and systems in your body.

8. **"The doctor has prescribed me insulin. However I do not feel sick at all. So I would better postpone taking insulin at a later date"**

   For some people with type 2 diabetes, especially those who are obese, moderate weight loss and increased physical activity can lower blood glucose levels so significantly, that insulin injections are not necessary. But bargaining like this is bad for your health! When you put off insulin even for a few months, high blood glucose levels can be doing a lot of damage. Instead, start insulin as soon as it is recommended so that you can keep your blood glucose in control. At the same time you can focus on losing weight and exercising more, with the hope that this will help to reduce your body's need for insulin injections in the future.

9. **"My diabetes is much more serious than some people because I have to take insulin injection while others do not take it"**
Many people avoid insulin because they believe it is a good way to keep their diabetes from becoming too "serious." When you really think about it, that seems silly, doesn't it? If your blood glucose levels are high, whether you are taking insulin or not, the problem is serious and needs to be addressed. If you avoid insulin it doesn't make the high blood glucose less serious, it just makes it easier for you to ignore the problem. Certainly when you begin taking insulin, your diabetes does not suddenly become more serious. Rather, you are now using a new and powerful tool to address a problem that has been serious all along. It would be a beginning towards a better life.

10. **Type 2 or NIDDM diabetes is not serious.**
This is never true. All types of diabetes are serious, and need to be taken seriously by people who have it and their families.

11. **"The first prescription of insulin is the prescription for rest of your life".**
It is true that most people who take insulin continue to do so for the rest of their lives. But does it really matter? Taking insulin injection is certainly not like an addiction to drugs or narcotics. You are always in control of what you are doing and it is for running your body system correctly. Some people do manage to make the necessary lifestyle changes so that insulin can be safely discontinued without a rise in blood glucose levels. **There is definitely no point in avoiding one or two pricks of injection at the cost of your life!**

DIABETES CARE

NOW YOU HAVE SOME IDEA ABOUT YOUR DISEASE.

The golden rule of diabetes care is that " You are the most important person even more that the doctor in management of diabetes". Management of diabetes can best be described under following steps.

- Diet
- Exercise
- Oral Medication
- Insulin Injection

Let us get more familiarized with these steps as they are going to play an important role in your goal i.e. " living a healthy life with the disease".

DIET IN DIABETES

आहार प्रभवं वस्तु रोगाश्चाहार संभवाः ।
हितहितं विशेषाश्व विशेषं सुख दुःखयो ।।

विनापि भैषजे व्याधिः पथ्यादेव निवर्तते ।
न तु पथ्यविहीनस्य भेषजानां शतैरपि ।।

This means that many diseases and symptoms are managed by proper diet. Even hundreds of medicines may not work or show effect unless certain rules regarding diet are adhered to.

This is the most important area in the management of the disease. You have lots of people other than the doctor in your periphery to prescribe your diet. But remember that you are going to decide your diet in consultation with your **doctor and the dietician.** You may be bothered with lots of "Don'ts". But you will realize that you can eat practically everything provided you know what you are eating and how much you are eating. **Traditional Indian diet with little modification is "IDEAL DIABETIC DIET".** Diabetic diet does not deprive you of many foodstuffs. You do not have to make major changes in your food habits in particular and life style in general other than avoid sugars (mainly SWEETS) and quantity of FAT in your daily diet. **You need to be just little more disciplined in limiting your food intakes.** You can eat everything in your allotted quota of calories in consultation with your doctor and dietician. You can eat rice, potatoes, fruits etc. as other people. One fruit per day can be eaten without any problems. You just need to get carbohydrates, proteins, fats and vitamins in right proportion**. Remember that strict but unsupervised diet control can also be more harmful.**

Depending on your ideal body weight and calorie requirement diet can be tailor-made for you. The design of the plan can easily be made by keeping in mind your likes and dislikes. You can have variety of food in "Exchange Food Plan". Your doctor and dietician can be consulted for this innovation. Diet control does not mean weight reduction. Some diabetics need to gain weight. This can be done under your doctor's guidance.

Remember

Do not add too much oil as cooking medium.

Do not add sugar or jaggery in vegetable preparations.

Have in AMPLE AMOUNT whenever you feel hungry.

- ✓ Salads: cucumber, cabbage, lettuce, onion, tomato, capsicum, and radish.
- ✓ Plain lemon juice with water.
- ✓ Clear soups (without additives like starch or bread pieces).
- ✓ Thin buttermilk without cream or sugar.
- ✓ Sprouted cereals.

WHAT YOU SHOULD AVOID?

- X Jams, jellies, soft drinks.
- X Sugar, jaggery, honey
- X Oily foodstuff
- X Fried food
- X Alcohol and other beverages
- X Concentrated sweets
- X Fasting for any reason
- X Yellow part of egg
- X Liver, kidney and brain parts in non-vegetarian food
- X Prawns

WHAT YOU SHOULD RESTRICT?

- Oil consumption
- Salt

WHY SALT SHOULD BE RESTRICTED?

Diabetics are more prone to get high blood pressure and heart diseases. Since these disorders are also related to the dietary conditions, you will have to strike a correct balance of different components of food. You can make food palatable with reduced salt by adding tamarind, garlic, fresh lime, onion, dry mango powder (aamchur) etc.

FOOD EXCHANGE

This means you can choose what you can eat from a group so that diet does not become monotonous and you can enjoy all varieties of food listed below.

CEREAL EXCHANGE

(70 calories at each serving)

- Rice - 1 vati*
- Bread - 1-2 pieces
- Khichadi - 3/4 vati (Rice + mung dal)
- Idli - 2 (medium size)
- Chapati - 2 (small size or fulka)
- Bhakri - one (small size) from bajra or jowar
- Thalipeeth from any atta (2 table spoon flat)
- Dal preparation (cooked) - 3/4 vati
- Chana preparation (cooked) - 3/4 vati

(* - Vati is a common unit in Indian kitchen equal to 125 ml volume)

VEGETABLE EXCHANGE

(40 calories)

A) Cabbage, cucumber, cauliflower, brinjol, tomato, lady's finger, beans, padwal, drumsticks, pumpkin, methi, radish

B) (1/2 - 3/4 vati cooked) Carrot, beet root, green peas, suran, potato

NON VEGETERIAN FOOD

(70 calories of 30 gms of each of the followings)

- Beef
- Lamb
- Pork
- Fish
- Chicken

(Avoid yellow part of egg, liver, kidney and brain parts, and prawns).

DAIRY PRODUCTS (40 cal)

- Milk (from cow) - 50ml
- Skimmed milk - 1 cup
- Curd - 1/2 vati
- Cheese - one cube small sized
- Paneer - 1 piece

FRUITS (50 cal)

Banana (medium)	1/2	Anjir (Fig)	2	Papaya	1/2 vati
Peru (Guava)	1	Orange	1	Pineapple	1/2 vati
Custard apple (sitafal)	1/2	Dates (Khajur)	2-3	Grapes	1 0 - 1 2
Apple	1/2	Peach	1	Coconut water	1/2 cup
Mango pieces (small)	2	Water melon	3/2cup		

It is obvious from these lists that you can enjoy wide variety of foods. Your diet should not be monotonous. You are also entitled to delicious and varied food as other Healthy individuals.

ARTIFICIAL SWEETNER

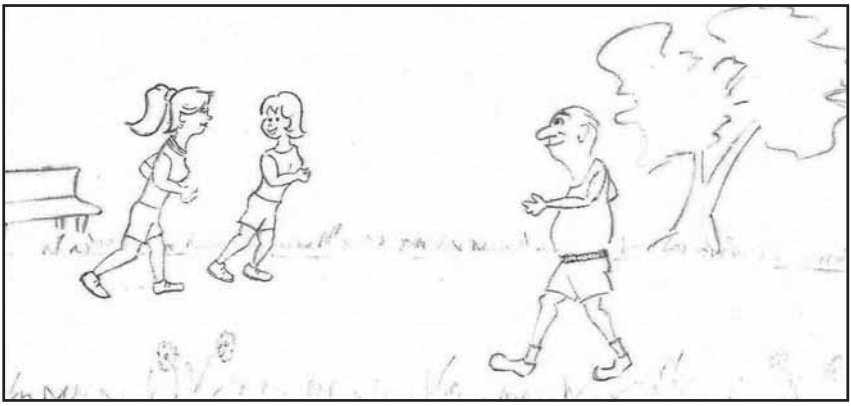
These are synthetically prepared agents. They are 200 to 300 times sweeter than sugar. These can be safely used in tea, coffee and even in preparing sweets.

Following table would help you in choosing the various items as per their nutritional value.

COMMON FOOD ITEMS IN INDIAN KITCHEN AND THEIR NUTRITIONAL VALUE

ITEM	WEIGHT (gm)	CALORIES
POHA	100	180
DHOKLA	100	120
IDLI	100	130
UPMA	100	200
PIZZA	60	140
UTTAPA	100	350
SAMOSA	100	250
CHIVDA	100	420

EXERCISE IS A MEDICINE AND FUN TOO!



Importance of EXERCISE in the management of diabetes is given prominence in CHARAK SAMHITA in following shlok.

मन्दोत्साहमतिस्थूलमतिस्निग्धं महाशनम
मृत्युः प्रमेहरूपेण क्षिप्रमादाय गच्छति

This means that a lazy, obese person and a person who eats lots of fat is attacked by death very easily.

Exercise is an important aspect of diabetes management. How exactly does exercise help in diabetes control?

- It improves glucose control by peripheral utilization of glucose by tissues
- It improves blood circulation
- Tones up your heart, lungs and other muscles
- It helps you to keep healthy
- It is fun and enjoyable
- It helps to reduce weight
- It increases physical stamina

1. A diabetic person without any associated complication can do any type of exercise.
2. Start the exercise programme with minimum time and intensity. Then try to achieve the maximum within your limits.
3. Exercise should be done regularly for at least for 30-35 minutes per day & atleast 5 days a week.
4. Try to do the same exercise every day. No frequent EXCHANGE programme should be tried here.
5. The exercise should not be changed in its intensity either as that will create problems.

Keep some sugar handy, to take care of hypoglycemia if it occurs. Wear loose cotton clothes. Do not exercise bare-footed.

Brisk walk, jogging, cycling are good exercises. Before starting the exercise programme discuss with your doctor for any special instructions. For many diabetics who have associated problems of foot or osteoarthritis walking may be difficult. They can consult the doctor for upper limb exercises or exercises in lying down position where weight bearing can be avoided.

Yogic exercises are also helpful.

Table showing calories burnt by exercises per hour

Sleeping and lying down	**65-70**
Standing quietly	100-120
Typing or deskwork	100-120
Level walking	120-240
Washing utensils and clothes	150-200
Sweeping and swabbing	150-200
Cycling 6km/hour	250-300
Brisk walk	300-500
Swimming	500-600

MEDICATION

In some patients diet control and exercises are not adequate for achieving acceptable blood glucose levels. These patients require medication either in the form of oral drugs or insulin injections.

Diet and exercise need to be continued as a part of treatment of diabetes. Basically, oral medication is of following major types: sulfonylurea (available commercially as daonil, Glynase, euglucon and dimicron) and biguinides (marketed as Glyciphase, Walaphase). These have different modes of action. The doctor will decide the suitable type and dose of medicine. You may need one or more tablets if the control of your blood glucose is not possible by following a healthy eating plan or by being active. These tablets lower blood glucose, in different ways. For example, sulfonylurea lowers blood glucose by helping the pancreas make more insulin. Sulfonylureas have to be taken half an hour before food. Whereas, biguanides reduce blood glucose by decreasing the liver's production of glucose. It also causes the muscle to use glucose more efficiently. The two other new types of medicines like Acarbose and insulin sensitizers work in other ways. Acarbose reduces absorption of glucose from intestine. It has to be taken just before first bite of lunch and dinner. These medicines have specific indications. It is again important to remind you at this stage that **no two patients are similar. Hence do not compare your doses or type of tablet with other patients.** Do not take tablets prescribed to some other patient when you run out of stock or while away from home. Always carry sufficient quantity of your medicine with you.

These tablets should be avoided in pregnancy, diabetes associated with severe heart diseases, kidney and liver diseases or young diabetics. After years of use sometimes oral medicine may not show required effects on blood sugar. This is called primary or secondary drug

failure. The patient may not respond to tablets then. This is because the oral drugs can work if the pancreas make enough to let the pills work. The pills do not stop working, the pancreas does. If the pancreas no longer make insulin then one must take insulin injection. **Remember what is most important is to control of blood sugar levels.** Eating healthy and staying active is still a must even if you are taking medicine.

Consider your oral drugs as "extra help" to control your blood glucose. More than likely you need to shed a few kilograms, improve your blood fats and blood pressure. Healthy eating and exercise helps you achieve these goals as well. And if you lose enough weight you maybe able to take less tablets or no tablets at all. **Remember that it may only take a few kilos off your body to get rid of diabetes!**

INSULIN-INJECTION

INSULIN THERAPY

There are misconceptions and phobia in minds of patients and sometimes even doctors about insulin. **Prescription of insulin does not mean that your disease is severe**. Any type of Diabetes Mellitus is a major illness. It needs to be treated with whatever possible means. The fear of insulin is due to its mode of delivery which is through injection. But with newer types of injection syringes and with right technique one can have minimum pain while taking the injection.

Insulin is needed by

1. Young diabetics
2. Very high blood sugar levels
3. Pregnant diabetic women
4. Diabetics who have to undergo operative procedures and/or other serious illness.
5. Diabetics with associated complications like heart or kidney disease may require insulin in addition to oral tablets.
6. Infections like tuberculosis or hepatitis in presence of diabetes.

Never refuse to take insulin if your doctor advises. There are definitely more advantages of being on insulin therapy in certain situations. You have to take insulin in the form of an injection not because of the seriousness of the problem, but because it is the only mode by which insulin can be administered at the moment.

TYPES OF INSULIN

Two main types of insulin are available. The first type is fast acting. The action starts within 1/2 to 1 hour after taking it. Hence itis taken 1/2 to 1 hour before consuming food. The second type is cloudy type of insulin. It is an intermediate acting insulin. The action starts 3-4 hours after injection and lasts for 18-20 hours. Peak effect is

seenafter 10-12 hours. Both these insulins are available in premixed forms as well in different ratios to make it most convenient for the patient.

Types and Duration of Action of Insulins

Type of Insulin	Appearance	Begins	Peak Activity	All Gone
Analogue insulin	Clear	10-15 minutes	30-60 minutes	4 hours
Regular	Clear	30 minutes	2 - 4 hours	4 - 8 hours
NPH	Cloudy	2 - 4 hours	6 - 8 hours	12 - 15 hours
NPH/Regular 70/30 or 50/50 are common mixes	Cloudy	30 minutes	Varies	18 - 24 hours

INSULIN PRESERVATION

Storage of insulin is very important for its optimum action. Insulin should be stored preferably in fridge (on the door at the bottom level). It should not be frozen. It should not be exposed to extreme temperatures like shelf near the cooking stove in the kitchen or geyser in the bathroom. Constant sunlight at the windows can cause problem if the bottle of insulin has been left there. Insulin can be kept safety for 15 - 30 days at room temperature in relatively cooler place also.

INJECTION

How to prepare insulin shot ?

Wash your hands thoroughly. Roll the insulin vial in both hands. Do not shake it.

Take cloudy insulin or intermediate acting insulin vial. Clean the top with a spirit swab.

Insert the needle in the vial and push air inside the vial, in an amount equal to units of insulin you are required to take. Take out EMPTY syringe without any insulin in it. Now take vial of clear or rapid acting insulin. Push air inside the vial, amount equal to units of your insulin dose. Make vial-syringe unit upside down. Just pull back the plunger to withdraw clear insulin. Take out the needle.

Now insert needle in cloudy insulin vial. Pull the piston back so that insulin flows inside the syringe without getting mixed inside the vial. Remove air bubbles by firmly flicking the syringe.

You are now ready with insulin shot.

Clean the area where you want to inject. Pinch the skin fold. Hold syringe like a pen with thumb and middle finger. Press the plunger with index finger, straight in the skinfold. You have now injected successfully.

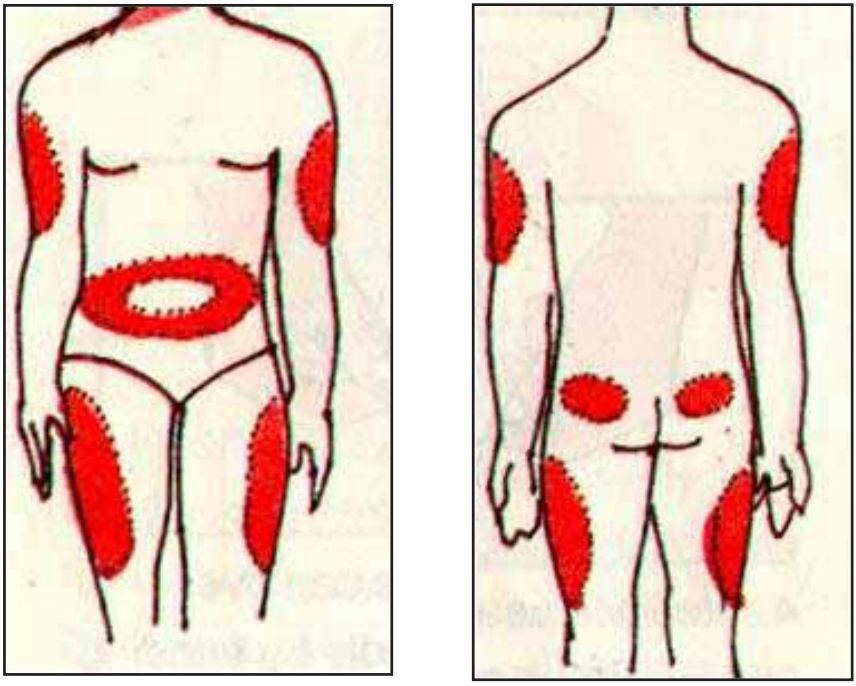
INJECTION DEVICE

Insulin syringes are available in markets that are disposable and capable of offering near "painfree" injections. Insulin portable pens, insulin jets and portable insulin pumps are also available. The pen like instruments are available now in the market which allow you to dial

the dose and inject. These pens have following advantages:

- They assure a freedom from syringes.
- They are very accurate.
- They increase the self confidence of the patients and assure them a near normal social life.

Sites for insulin injection Insulin injection is easy to take. Following picture depicts various sites where injection can be taken.



The areas marked red can be used for insulin injection

HYPOGLYCEMIA

Hypoglycemia means sudden lowering of blood sugar. When you are on medication for diabetes, lowering of the blood sugar level is the normal expected response of the drug. This is not a side effect of the medicine but sometimes, for the reasons given below, this level of blood glucose is lowered significantly.

How to recognise hypoglycemia?

Following symptoms can be correlated with hypoglycemia.

- Sudden feeling of hunger and cramps in stomach
- Unexplained uneasiness
- Sweating
- Headache
- Blurring of vision
- Tremulousness
- Palpitation
- Abnormal behaviour
- Sudden mood changes

If it is not treated at proper time it may progress to deterioration in consciousness, convulsions, paralysis and coma. All these symptoms of hypoglycemia are avoidable if it is treated immediately.

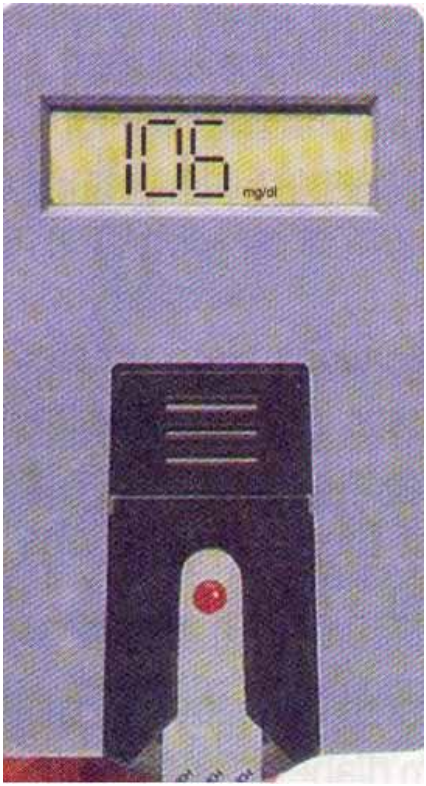
CAUSES OF HYPOGLYCEMIA

- Missed food
- Excess of diabetes medicine dose
- Sudden unaccustomed exercise
- Alcohol consumption

TREATMENT OF HYPOGLYCEMIA

As soon as you get warning symptoms take sugar, fruit juice, chocolates or some sweets immediately. If it is left untreated patient may require injection of glucose or glucagon. Report this event to the doctor so as to adjust doses of medicine.

A glucometer is very handy to keep a record of glucose levels. It would help to monitor the hypoglycemic conditions as well.



SICK DAY PLAN

Simple illnesses like viral fever, diarrhea, flu etc are as common in diabetics as in non-diabetic persons. When you are sick body releases hormones that help to fight against disease. But these hormones may raise blood glucose levels. If you are not having enough insulin to take care of this situation, body will release lot of ketone bodies. This can be very harmful.

- Check your blood glucose and urine ketose more often when you are sick
- Do not skip total insulin dose or medicine even if you are not eating properly
- Do not exercise on a sick day
- If the urine sugars are absent and ketone bodies are present, it indicates starvation ketoses. You need to eat more and take more fluids in this situation.

Sick-Day Food & Fluids With About 15 Grams of Carbohydrate

1 Fruit Juice glass	1/2 Cup Ice Cream
1 Slice Toast or Bread	1/2 Cup Cooked Cereal
1 Cup Soup	1/2 Cup Mashed Potatoes
1 Cup Sports Drink	1/3 Can Regular Soft Drink
1/2 Cup Fruit Juice	1/3 Cup Rice
1/4 Cup Sherbet	1/3 Cup curds
1/4 Cup Pudding	1/4 Cup Applesauce

PREGNANCY AND DIABETES

All those related to the field of diabetology, as patient or as a health care professional should thank Best and Banting (1921) for their discovery of insulin. It was next to impossible for a pregnant diabetic woman to survive before availability of insulin. But now the scenario has totally changed. With medical advancement a diabetic lady can have a normal pregnancy and expect a normal child. Its also possible for a nondiabetic pregnant woman to get diabetes during the course of her pregnancy. This entity is called as **gestational diabetes** and is not an uncommon occurrence.

What is gestational diabetes mellitus (GDM)?

Appearance of diabetes during the course of pregnancy is called as GDM. This condition is generally asymptotic. But it is a very serious condition if left untreated. Uncontrolled diabetes is a major health hazard for both the mother and the baby in the womb. The good news is that if it is well managed, than the course of pregnancy and outcome is almost same as non-diabetic pregnancies.

CURRENT RECOMMENDATIONS ARE THAT ALL PREGNANT WOMEN MUST BE SCREENED FOR GESTATIONAL DIABETES BETWEEN THE 24th and 28th WEEKS OF PREGNANCY.

Some important tips:

- If your diabetes is detected during pregnancy report to a diabetologist or an obstetrician immediately.
- Diet control and exercises are initial steps in the management like other diabetic patients, but oral hypoglycemic tablets are not recommended during pregnancy.
- The oral drugs should be immediately stopped as soon as pregnancy is confirmed and patient should be switched over to insulin.

temperatures like shelf near the cooking stove in the kitchen or geyser in the bathroom. Constant sunlight at the windows can cause problem if the bottle of insulin has been left there. Insulin can be kept safety for 15 - 30 days at room temperature in relatively cooler place also.

- If you are a known diabetic and planning to conceive keep your blood glucose as tightly controlled as possible.
- The diabetic woman in child bearing age group must plan family with doctor's consultation with excellent blood glucose control throughout.

Some problems in the foetus and mothers are more common in diabetic pregnancies but if the sugar control is well, a normal pregnancy and delivery is possible.

- Diabetes per se does not pose contraindication for child bearing.

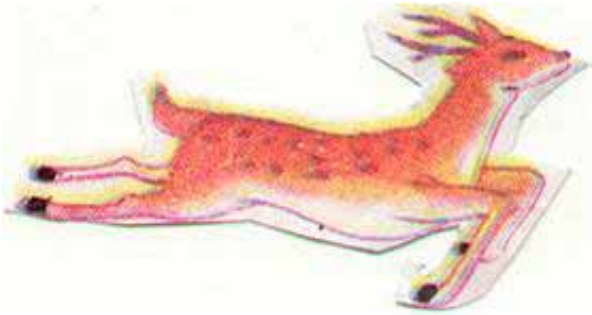
- Insulin and only insulin remains as a major treatment till delivery. The best insulin is human insulin.

- Try to maintain fasting blood glucose levels between 70 to 90 mg/dl and post prandial 100-135 mg/dl. through out preconception period and during pregnancy.

- You may have to do some special blood tests and frequent sonographic examinations during pregnancy for evaluation of normal foetal growth.

- Diabetic ladies should avoid oral contraceptive tablets and use other barrier methods for contraception.

DIABETES AND YOUTH



No age is barred from getting attacked by diabetes, but diabetes at young age is a special condition. There are many physical, endocrinal and psychological changes taking place in young diabetic patients. Their activities and food requirements are higher than adult patients. This type of diabetes needs only insulin for managemnet. The adolescent changes in the minds need to be understood by the parents and other family members. The managemnet becomes easier if the parents and the child have good rapport. Counseling and psychiatric help is sometimes essential at this stage for better compliance. Children should be given enough freedom regarding diet and activities but still be supervised. Occupation, job, marriage and post-marriage events do not pose any problem in a well-controlled young diabetic patient. Horizon is as open for these young people as it is for non-diabetic ones.

SELF MONITORING

Self-monitoring means that the patient can monitor and maintain test results of urine and blood sugar examinations at home. It's a novel concept so that you have maximum information about your health situation. Urine can be examined for presence of sugars, proteins and ketones. Sugar in urine does not carry much significance and blood sugar examination is the only confirmatory test. But it is better than doing nothing. Commercially available urine strips are quite reliable and give useful information to the doctor. Ketone body testing is most important in urine test. They are present in urine when DM control is very poor and body is under severe metabolic stress. It is an emergency situation.

Home blood glucose monitoring is an important examination that can be carried out by patient himself. Small pocket size glucometers are available commercially. They give instant blood glucose results. A Person can check blood glucose at different times in a day and as and when required in the case of hypoglycemia. Your visits to pathology laboratory are reduced. You know your blood glucose levels over a long period that helps in maintaining normoglycemia. Blood test done in laboratory by venous route have slightly different values than those checked by glucometer. **Having glucometer for insulin requiring patient is the top priority in the purchase list of your household gadgets.**

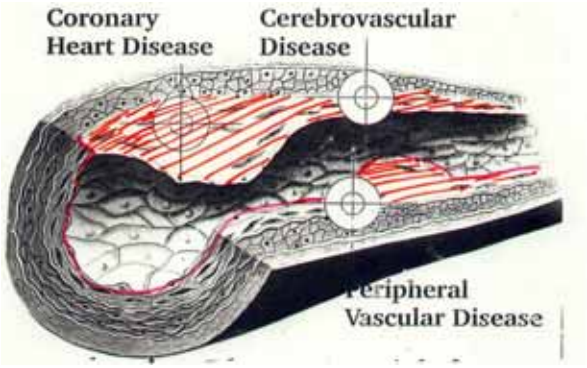
You can make a practice to enter your glucometer readings in following format of the table. This would definitely help your physician in assessing your condition.

Date	Pre breakfast	Post breakfast	Pre lunch	Post lunch	Pre dinner	Post dinner	3 a.m.	SOS

LONG TERM COMPLICATIONS OF DIABETES AND MANAGEMENT

Diabetic complications are medical problems that occur more often in people with diabetes than those without diabetes.

Uncontrolled diabetes over a long period of time causes changes in practically every organ in the body. If proper precaution is taken at the right time, most of these complications are avoidable or can at least be postponed. High blood sugar levels for long period cause changes in the blood vessels and nerves. This leads to involvement of target organs. The lining of blood vessels gets thicker and the lumen is reduced. As a result blood flow to the affected organ is reduced.



Thus the heart, brain, kidney etc. can get affected if the related vessels are involved. Regular follow-up with the doctor, meticulous sugar control and following the advice does help in the management of these complications. The major organs affected by diabetes are

- Eyes
- Heart
- Kidney
- Foot

Eyes: Early Cataractus changes and changes in blood vessels of eyes are very common. It is a usual cause of blindness in diabetes and it is avoidable to some extent. Visit the specialist once a year for eye examination even if you do not have any eye problem (it your diabetes is more than five years old). Remember that correction for spectacle number by an optician is not enough.

Heart and brain: If the disease is not controlled heart and brain blood vessels of diabetics are affected at earlier stage than non-diabetic people. Diabetics may not experience typical "filmy type chest" pain of heart attack. Most of the times they may only feel some discomfort. Silent infarct or painless heart attacks do occur in diabetic patients due to involvement of nerves and blood vessels.

Unexplained sweating, discomfort in left arm and neck can be an indication of heart attack. Some important tips are

- Strictly follow the advice of the doctor.
- Do not postpone the specialized tests like the treadmill test, recommended by the doctor just because you may not suffer at that moment.

Most of the heart attacks and paralysis can be averted or atleast postponed if medication is started in time. Be particular about your diet, fat intake and exercises. These have definitive roles in prevention of heart diseases.

Kidney: Kidney failures and problems are very commonly seen in uncontrolled diabetes. High blood pressure is a common occurrence in diabetic patients. Regular examination of blood pressure and urine should be done to avoid this complication.

Examination of urinary proteins and microalbumin is essential

to initiate early treatment and retard kidney damage. Do not wait for warning symptoms of high blood pressure to occur.

FOOT

Foot in diabetes is at risk. There are three major problems.

- Poor blood circulation
- Reduced sensation due to involvement of nerves
- Susceptibility to infections

The pain, which is a protective reflex, may be absent in some patients due to involvement of nerves. In such cases the injury may go unnoticed. This can lead to foot ulcer and infections.

Due to poor blood circulation the healing process is very slow.

Each year more than 50,000 people with diabetes lose a limb or a part of a limb due to diabetic complication. This can be upsetting news to the patient but most of these problems are because of unawareness and negligence of both the patient and the doctor.

Some foot care tips

- Wear proper sized footware.
- Inspect your feet daily for blister, injury
- Discoloration on foot
- Wash and scrub the foot gently. Moisten with cream after proper drying.
- In-toe space for infection
- Pressure points due to footwear
- Cracks over heels
- Never walk barefooted indoor or outdoor.
- Wear cotton socks. Cut nails straight across.

Remember

Footwear shopping should be done preferably late in the afternoon when foot is slightly bigger in size than in the morning hours. Inspect your shoes from inside before wearing and remove any foreign materials like small stones or sand.

Do not buy footwear unless they are 100% comfortable.

Report to the doctor about foot injury if it does not heal in 2-3 days.

NERVES

Long years of uncontrolled diabetes in some patients can lead to involvement of nerves. Burning in feet and cramps in legs are very common. They can have tingling sensation over feet, sole and fingers. This is described as glove and stocking type of neuropathy.

This is very important as sensations at these points may be decreased and injury may go unnoticed. These painless injuries may lead to diabetic foot complications.

Sexual dysfunction

Long standing uncontrolled DM is one of the reasons for impotence. Complete physical and psychological evaluation is necessary. Advanced medical care offers good results in the management of sexual dysfunction.

PSYCHOLOGICAL FACTORS AND DIABETES

Diagnosis of diabetes in the very first stage can cause lot of stress to the patient. Some patients feel victimized. They may have "why me " feeling. There is no cure to this disease. Person has to live with it. But most of these above-mentioned negative reactions are due to misconceptions about diabetes. There is a lot of unawareness about it. Counseling to the patient at this stage helps to alter his attitude towards the disease. This in turn results in better acceptance and compliance. Involvement of family members in diabetes care is very important. Person may feel deprived of food due to many restrictions on diet. Tailor-made diet that will take into account person's likes and dislikes can be offered with the help of a dietician. Sexual dysfunction can be a major factor of worry. Help of andrologists, gynaecologists and psychologists can reorient life in a proper direction.

Other psychological stress factors like office work, household problems, financial difficulties can ultimately lead to a rise in the blood glucose level. The health care personnel should extend his support to cope up such situations. Regular aerobics, Yogic exercises and meditation plays an important role in stress management. Short vacation from routine life can be of great help as a stress reliever

CAN DIABETES BE PREVENTED?

It is a million-dollar question. It is theoretically possible but practically very difficult. This is because it does not have one specific reason which one can take care of Preventive steps can be taken at different stages.

Primary prevention:

This means the prevention of Diabetes Mellitus to occur at first step. Genetic counseling can help at this step. Marriage between two diabetic persons is not advisable as stronger family history makes offspring more prone to get diabetes. Ideally, marriage between two genetic prediabetic should be avoided. Gene therapy and specific protection against the disease are the challenges of new millenium. Person having strong family history of diabetes can definitely take some precautions. Healthy food habits and a physically active life can keep the disease away. Risk factors like obesity, smoking and tobacco chewing are definitely modifiable. What you need is more of self-control and self-confidence. You should always be telling yourself "It is not difficult, I can do it".

Secondary prevention:

Earliest diagnosis of the disease and proper management is required to avoid the long-term complications. This can be achieved by maintaining blood glucose levels as normal as possible. Various tests for screening of target organs are easily available. Complete medical check up and tests like microalbumin excretion, treadmill test, and fundoscopy are helpful in detecting the earliest involvement of organs. Medical intervention at right time and initiation of medication definitely can postpone or retard the development of complications.

Tertiary prevention:

At tertiary level of prevention, measures can be taken to retard the progress of complications, which have already occurred. Target organ

involvement like heart disease, kidney problem is managed successfully. Newer techniques in cardiology, advances in the field of dialysis and renal replacement therapy have brightened the life of diabetics. Modern medical practice has really offered not only longevity but also better quality of life to diabetic people.

HEIGHT - WEIGHT TABLE OF AVERAGE VALUES

	Height (Meter)								
Weight	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95
50-55	22	20	19	19	17	16	16	14	13
55-60	24	22	21	20	19	18	17	16	15
60-65	**26**	24	23	22	20	19	18	17	16
65-70	**28**	**26**	25	23	22	21	20	19	18
70-75	**30**	**28**	**27**	25	24	22	21	20	19
75-80	**32**	**30**	**28**	**27**	25	24	23	21	20
80-85	**34**	**32**	**30**	**29**	**27**	25	24	23	22
85-90	**34**	**32**	**30**	**29**	**27**	25	24	23	22
90-95	**38**	**36**	**34**	**32**	**30**	**28**	**27**	**26**	24
95-100	**40**	**38**	**36**	**34**	**32**	**30**	**28**	**27**	**26**
100-105	**43**	**40**	**38**	**35**	**33**	**32**	**30**	**28**	**27**

EPILOGUE

Now you should be convinced that diabetes is not the dreaded disease as it was thought to be decades before. Your positive attitude towards the disease is very important. What we require is little modification in your life style to make it more organized and disciplined! Availability of artificial sweeteners allows you to enjoy delicious food preparations. Newer injection devices and purer forms of insulin have made life of diabetics more comfortable. Advancement in pancreatic transplants, gene therapy definitely offers brighter future to the diabetic population. Better understanding about the disease and its management will help you to lead healthy, complication free life.

IDENTITY CARD FOR A DIABETES PATIENT

This card can give valuable information in case of emergency.

Identity Card	
Name :	Photo
Adress:	
Tel. No. (R) :	
Tel. No. (O) :	
Close relative's Phone & Adress :	
Current Medicines :	
Appeal I am a diabetic patient. If I am found in unconscious or semiconscious state please given me sugar/sweet and please take me to a nearest doctor.