Diabetes Mellitus

National Clinical Practice Guidelines

EDITOR
A. Samad Shera

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National Coordinator for Diabetes Control, Honorary President, International Diabetes Federation (IDF), Head of the WHO Collaborating Centre for Treatment, Education and Research in Diabetes and Diabetic Pregnancies, Member WHO Expert Advisory Panel on Diabetes, Secretary General Diabetic Association of Pakistan, Karachi.

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Contents

Foreword	2
Preface	3
Introduction	4
Definition	5
The new classification	6
Diagnosis	6
Targets for control of diabetes	9
Primary objectives of the treatment and treatment plan	9
Diet and nutritional recommendations	10
Exercise	12
Education	13
Type 2 diabetes	15
Oral hypoglycaemic agents (OHA)	15
The obese person with Type 2 diabetes	18
The non-obese person with Type 2 diabetes	19
Insulin therapy	20
Sites for insulin injection	22
Self-monitoring and self-management	26
Diabetes & Pregnancy	28
Long-term complications	34
Retinopathy	34
Nephropathy	35
Neuropathy	36
Foot care	37
Cardiovascular diseases	38
Diabetes and Ramadan	42
Diabetes - Ten Commandments	46
Hints for losing weight	48
References	49
Participants	52

Contents

Foreword 2
Preface 3
Introduction 4
Definition 5
The new classification 6
Diagnosis 6
Targets for control of diabetes 9
Priority objectives of the treatment and treatment plan 9
Diet and nutritional recommendations 10
Exercise 12
Education 13
Type 2 diabetes 15
Oral hypoglycaemic agents (OHA) 15
The obese person with Type 2 diabetes 18
The non-obese person with Type 2 diabetes 19
Insulin therapy 20
Sites for insulin injection 22
Self-monitoring and self management 24
Diabetes & Pregnancy 28
Long-term complications 34
Retinopathy 34
Nephropathy 43
Neuropathy 50
Foot care 57
Cardiovascular disease 58
Diabetes and Ramadan 61
Diabetes - Jan Communautaire 63
Hints for losing weight 68
References 69
Participants 72

FOREWORD

Diabetes is an important chronic disorder, both in terms of numbers of persons affected and the considerable associated morbidity and mortality. The managment of Diabetes has completely revolutionised in the last two decades. Education holds a key position in the Diabetes Management Protocol, which is valid both for the health care professionals and the people with diabetes.

The World health Organization's Expert Committee has declared education as the cornerstone of diabetes therapy. This applies not only to the people with diabetes but equally to health providers. A clinician with good knowledge of all aspects of diabetes will provide better care and support to his patients. Good metabolic control and prevention of both acute and chronic complications of diabetes is an integral part of Diabetes Management.

I am sure that the busy medical practitioners will find Dr Samad Shera's book "Diabetes Mellitus Clinical Practice Guidelines" extremely helpful in managing diabetic patients. I am pleased to acknowledge that Dr Shera has packaged a lot of useful information in this very well written book. I highly commend him for his devotion and the efforts put into the preparation of this manuscript.

October, 1999 Islamabad

Hasan Raza Pasha
Secretary Health
Government of Pakistan

PREFACE

Like the rest of the world, diabetes continues to be a major health problem in Pakistan. Diabetes is a life-long disorder, and the better it is managed, the better the outlook for a long and healthy life, but no one should be expected to follow a lot of restrictions and advice unless their purpose is fully understood. This book has been written as a practical guide to the management of diabetes for the benefit of clinicians. I hope this handbook will be helpful to those with charge of people with diabetes and also that it will be valuable, in general practice and in hospital. The reader will find the chapter on Diabetes and Ramadan useful as not much is written on this subject in general medical text books. This Handbook addresses in a straightforward manner what the clinician needs to know.

I would like to thank all the participants of the "Consensus Workshop for Developing Clinical Practice Guidelines for the Management of Diabetes" for the quality of their contribution. The workshop was held in Karachi on 12 - 14 March 1999.

A committee was formed to formulate the guidelines for 'Diabetes and Pregnancy'. Prof Noorjahan Samad was the coordinator. Prof Khalida Akhtar, Prof Zahida Baqai, Dr Felix Burden, Prof Jak Jervell, Dr A. Ramachandran and Prof Aftab Munir were the members. I am indebted to them for their input.

I would also like to thank the Ministry of Health and World Health Organisation, Islamabad for their financial support for convening the workshop and for the printing of this book.

October, 1999 Karachi

A. Samad Shera
Editor

Introduction

In the last decade, diabetes has emerged as a major health problem in Pakistan. The national diabetes prevalence survey conducted by the Diabetic Association of Pakistan and WHO collaborating centre Karachi in collaboration with WHO has shown that over 10% of the people in the age group of 25 years and above are diabetic and an equal number are suffering from impaired glucose tolerance (IGT) .

The incidence of childhood diabetes (Type 1) continues to be very low in Pakistan and there has been no apparent increase during the last 30 years. The manifestations of diabetes cause considerable human suffering and enormous economic costs.

Despite the high prevalence of diabetes and its complications and the availability of successful prevention strategies, essential health care requirements and facilities for self-care are often inadequate in Pakistan. Action is needed at all levels of health care and the various aspects of diabetes care, to bridge the gap and to improve health care delivery to people with diabetes.

The primary resource in diabetes care is now recognised to be the people with diabetes themselves, supported by well trained and enthusiastic health care professionals.

The recommendations contained in this hand book have been developed to serve as general guidelines for better management of diabetes and improved patient care. They are based on up-to-date scientific knowledge and clinical practice.

Needless to say that these guidelines have to be modified and adapted to local needs and circumstances. They must be acceptable both to the professionals who shall be using them and to the people with diabetes.

Definition

Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both. The severity of its symptoms is largely determined by the degree to which the insulin action is deficient. Characteristically, the diabetic has a long term risk of developing progressive disease of the retina and kidney, damage to the peripheral nerves, and aggravated atherosclerotic disease of the heart, legs, and brain.

THE NEW CLASSIFICATION

Types of Diabetes Mellitus

Type 1
(a) Autoimmune
(b) Idiopathic

Type 2
(a) Predominantly insulin resistance
(b) Predominantly insulin secretory defects
Other specific Types
Gestational

It should be explained that the terms IDDM and NIDDM have been dropped. They have caused confusion and often meant people with diabetes were classified by treatment rather than aetiology. MRDM has been removed following difficulties in proving its existence. IGT has also been removed from the list of Clinical Classes of Diabetes. It is, of course, not a type of diabetes at all, but is an important risk factor and remains as such.

Diagnosis
When symptoms of thirst, excessive urination and weight loss are present, a single measurement of blood glucose is usually all that is required to establish the diagnosis and more formal tests are unnecessary. This may also be the case when symptoms and signs are few. A clearly raised fasting glucose concentration (venous plasma) in excess of 125 mg/100 ml or a 2 hours post meal blood glucose in excess of 199 mg/100 ml unequivocally establishes the diagnosis. However, a standard oral glucose tolerance test (OGTT) should be performed when random blood glucose values are equivocal or when there are special indications.

ORAL GLUCOSE TOLERANCE TEST (OGTT):

OGTT is the only form of glucose tolerance test recommended for the

diagnosis of diabetes, and is the only test for IGT.
OGTT must be among the most over-used procedures in every day diagnostic practice. When it is necessary to carry out this test, it should be performed as follows:

The subject should be consuming a normal diet, containing more than 150 gm carbohydrate for at least 3 days before the test. Going on diabetic diet before the test is not advisable. After 8 - 14 hours overnight fast, fasting blood sample is taken and the subject then drinks the glucose load dissolved in 250 to 300 ml of water over the course of 5 minutes. The recommended glucose load is 75 gm. A further blood sample should be taken 2 hours after the glucose drink. The subject should sit comfortably and not smoke during the test. Any medications, medical disorders, adverse reactions to testing or other special features should be noted as they may affect the validity or interpretation of the test. The values of diagnostic glucose concentrations for diabetes mellitus are given in Table 1.

Table 1: Value of diagnosis of diabetes mellitus

	Glucose concentration, mmol/l (mg/dl)		
	Whole blood		Plasma
	Venous	Capillary	Venous
Fasting	≥ 6.1 (≥110)	≥ 6.1 (≥110)	≥ 7.0 (≥126)
or			
2-h post glucose load	≥ 10.0 (≥180)	≥ 11.1 (≥200)	≥ 11.1 (≥200)

In the absence of diabetic symptoms, at least two abnormal values are required to establish the diagnosis of diabetes mellitus.

The old OGTT, requiring half hourly blood glucose estimation for two and-a half hours or more, has been replaced by the above modified OGTT.

IMPAIRED GLUCOSE TOLERANCE (IGT):

The diagnosis of IGT is made at 2 hours after the glucose load, therefore the fasting blood sugar measurements are unnecessary. Table-2.

Table 2: Values for diagnosis of Impaired Glucose Tolerance (IGT)

	Glucose concentration, mmol/l (mg/dl)		
	Whole blood		Plasma
	Venous	Capillary	Venous
Fasting cncentration (if measured) and 2-h post glucose load	< 6.1 (< 110)	< 6.1 (< 110)	< 7.0 (< 126)
	6.7-9.9 (120-179)	7.8-11.0 (140-199)	7.8-11.0 (140-199)

IGT recognizes the existence of a zone of diagnostic uncertainty and includes individuals who used to be classed as chemical, borderline, subclinical or early diabetics. The justification for distinguishing IGT from normal, is based on long-term follow-up results which show that IGT subjects are at a high risk of developing diabetes and macrovascular disease. In pregnancy, IGT must be taken very seriously and should be treated as diabetes. It is important that people with IGT should maintain or achieve normal weight and regular exercise to reduce insulin resistance and slow down progression to diabetes.

Table 3: Targets for Control of diabetes in men and non pregnant women (Venous plasma glucose)

Time	Ideal	Acceptable
Fasting / preprandial	70-105 mg/dl 3.9-5.8 mmol/l	80-120 mg/dl 4.4-6.7 mmol/l
Postprandial (2 h)	80-140 mg/dl 4.4-7.8 mmol/l	80-160 mg/dl 4.4-8.8 mmol/l
Bedtime	100-140 mg/dl 5.5-7.8 mmol/l	100-160 mg/dl 5.5-8.9 mmol/l
HbA1c	< 6.5	< 7.5

Table 4: Targets for Control of diabetes in pregnant women (Venous plasma glucose)

Time	Glucose
Fasting / Preprandial	80-100 mg/dl 4.4-5.5 mmol/l
Postprandial (2 h)	90-126 mg/dl 5.0-7.0 mmol/l

TREATMENT

The primary objectives of the treatment of all types of diabetes are:

- To alleviate symptoms of hyperglycaemia
- To achieve optimum control and thus improve the quality of life
- To prevent acute complications and to reduce long term complications
- To reduce mortality
- To treat associated disorders

The treatment plan for all types of diabetes includes

Diet and Nutritional Recommendations

- Exercise
- Education
- Oral Hypoglycaemic Drugs
- Insulin
- Management of associated conditions and complications

DIET AND NUTRITIONAL RECOMMENDATIONS
The first line of treatment is diet combined with exercise

A. Goal of Diet Therapy
- To provide adequate amounts of all nutrients
- To achieve and maintain ideal body weight
- To normalize blood sugar and blood lipids
- To prevent or delay the complications of diabetes

B. Recommendations
Calories should be prescribed according to the individual requirements, taking into account the age, activity and body weight. The following table gives the recommendations for calories, proteins, carbohydrates and fats.

Recommendations	1000 Cal/day (Obese)	1500 Cal/day (Medium built)	2000 Cal/day (Thin built)
15% of the total calories as Proteins	38 g/day	56 g/day	75 g/day
55 - 60% of total calories as CHO	138 - 150 g/day	206 - 225 g/day	275 - 300 g/day
25 - 30% of total Calories as Fat	28 - 33 g/day	42 - 50 g/day	56 - 67 g/day

Carbohydrate Intake
Carbohydrates should provide 55-60% of the total calorie intake. At

least 80% of the total carbohydrates should come from complex starches like cereals (rice, wheat, bread, oats) legumes (beans. lentils) and vegetables and root tubers (potato)

Protein Intake

Proteins should provide 15% of the total calorie intake. The recommended dietary allowance is 0.8 g/kg body weight except in elderly subjects, pregnant women and children who may require more. In case of diabetic nephropathy protein intake has to be reduced to 0.5 g/kg body weight. White meat like fish, chicken, low fat milk, cottage cheese and legumes should form part of the protein.

Fat and Cholesterol Intake

Total fat consumption has to be restricted to 25 - 30 % of the total calories. Cholesterol consumption has to be limited to less than 300 mg per day. Replacement of saturated fats with unsaturated fats may slow the progression of atherosclerosis. Three types of dietary fats are:

1. Saturated fats; butter, ghee, cream, desi ghee. Fats in this group should not be taken.
2. Polyunsaturated fats; soya oil and corn oil. These fats can be taken in moderation.
3. Monunsaturated fats; olive oil and canola oil. These are safest fats. Fats in all three gorups contain same amount of calories (1g = 9 calories).

Salt Intake

Normal salt intake of 3g daily (1 tea spoonful contains 5g of salt) is allowed except in hypertensive persons and in those with cardiac failure when salt intake is reduced.

Alcohol

Restriction of alcohol intake is particularly important to those who are obese, hypertensive and those with uncontrolled diabetes and hyperlipidaemia.

Vitamins and Minerals

If the individual is eating a normal well-balanced diet, there is no need

for supplements of vitamins and minerals except in elderly patients who may need them.

Artificial sweeteners

The use of artificial sweeteners is not strongly advised as it is better, in the long term, for the person with diabetes to get away from the taste of sugar. Noncaloric sweeteners like aspartame and saccharine can be used in limited amounts. Use of diabetic food items, should be discouraged. These items are expensive and contain calories.

The food intake should be distributed as evenly as possible throughout the day.

EXERCISE

Exercise is extremely important in the management of diabetes because of its effect on the blood glucose and free fatty acids. Exercise burns calories and helps to control weight, ease stress and tension, and maintain a feeling of well-being. Regular exercise improves the body's response to insulin and makes oral hypoglycaemic drugs and insulin more effective. It also promotes circulation, lowers cholesterol and triglyceride levels, thus reducing the risk of cardiovascular disease.

Persons with diabetes should be encouraged to lead a normal life and to participate in sports and exercise programmes that other people are doing. Generally they should not be excluded from physical activities or games, unless there are complications. Parents, teachers and coaches of children with diabetes, should be sufficiently informed about diabetes and physical activities. The main risk when exercising is hypoglycaemia, therefore advice is needed about either reducing treatment (insulin or OHAs) before exercise, or if more appropriate to the individual taking extra carbohydrate.

Before starting any exercise programme, the health provider should do a thorough physical examination to find out whether or not it is safe to exercise.

The person with diabetes should be advised to:

- Start activities slowly and then work up to a goal over a 6-8 weeks

period

- Wear proper foot wear
- Avoid exercise in extreme hot conditions and immediately after heavy meals
- Avoid exercise during period of severe hyperglycaemia.
- Reduce insulin prior to exercise when necessary
- Consume carbohydrates 30-40 minutes before exercise especially if blood sugar is below 100mg.
- Additional precautions should be taken for those with complications e.g. those with sensory neuropathy or ischaemic heart disease.
- For those who are not physically fit or who have not been active for sometime, low intensity activities like walking should be started for at least four to six weeks initially for 10 to 15 minutes, gradually building up to 30 - 40 minutes.
- For people with Type 2 diabetes, daily brisk walk for 30 - 40 minutes on empty stomach i.e. about 120 steps per minute is very useful. Daily walk is beneficial for general health and to reduce insulin resistance. If it is not possible to undertake daily walk, do it at least four days in a week.

EDUCATION

Education is a vital aspect of the care of persons with diabetes. The aim of education is to encourage self care and give enough information so that the person with diabetes understands when and how to access further help. There are three components to education - acquisition of knowledge, teaching skills and changing attitudes and behaviour. Diabetes education is the transmission of information through:

Knowledge:

a) What is diabetes? An explanation that is appropriate to the level of understanding to patient and the family.
b) Dietary advice. Ensure adequate nutrition by taking a dietary

history. Encourage beneficial behaviour change by exploring individual motivation.

c) Exercise. Explain benefits of exercise on general health and treatment of diabetes. Knowledge about what action to take to prevent hypoglycaemia when exercising.

d) Hypoglycaemia. Ensure there is understanding of what causes hypoglycaemia, what preventive actions are and how to treat. Always carry sugar or easily absorbed CHO in case of delayed meals.

e) Of identification. Persons with diabetes should be advised to always carry their diabetes care booklet, or card so that in case of an emergency, the medication or the type of insulin and the dose are known and appropriate treatment provided without delay.

f) Of good hygiene. All persons with diabetes must receive adequate instruction on personal hygiene, especially with regard to care of the feet, skin and teeth.

Practical Skills

a. Insulin Injection Technique. Self injection should be encouraged so that the people with diabetes can manage their condition without being too dependent on health professionals. This will give them more freedom and boost their morale. In the case of children, parents/family members should be taught. Self injection should be encouraged as soon as possible. The elderly and people with physical disabilities will also need support to inject.

b. Self monitoring of diabetes. Many people with diabetes find it useful to monitor their diabetes at home. This can be done by testing urine or blood sugar. Patient preference and cost should be explored. The aim for urine test is to keep the urine negative throughout the day for most of the time. For blood glucose measurement the aim is to keep the pre-meal and post-meal tests in the normal range. Patient should be advised what to do if these targets are not met.

TREATMENT OF TYPE 2 DIABETES

Oral Hypoglycaemic Agents (O H A)

The three groups of oral hypoglycaemic agents available in Pakistan are:

1. Sulphonylureas
2. Biguanides
3. ∝ Glucosidase inhibitors

Oral hypoglycaemic agents should be used only when diet and exercise have failed to achieve individual treatment goal. OHA are used only in the treatment of hyperglycaemia in person with type 2 diabetes. They have no role in the treatment of type 1 diabetes.

SULPHONYLUREAS

Sulphonylureas are the first line drug treatment in type 2 diabetics who are not very obese. The following sulphonylureas are available in Pakistan

Glibenclamide	(Daonil, Euglucon, Glicon)
Glipizide	(Glibenese, Minidiab)
Gliclazide	(Diamicron, Diclazide, Nidonil, Nodibet)
Glimepiride	(Amaryl)
Chlorpropamide	(Diabenese)

	Initial daily dose	Maximum daily dose
Glibenclamide	2.5 - 5 mg	5 - 15 mg
Glipizide	2.5 - 10 mg	10 - 30 mg
Gliclazide	40 - 160 mg	160 - 320 mg
Glimepiride	0.5 - 1 mg	4 - 6 mg
Chlorpropamide	250 - 375 mg	375 - 750 mg

All Sulphonylureas can cause hypoglycaemia. Longer-acting sulphonylureas (chlorpropamide) are particularly hazardous in the elderly. Renal insufficiency may require dose reduction or use of short

acting sulphonylurea i.e Glipizide.

Before using Sulphonylureas, the patient must be advised that: (1) they do not replace the need for continued strict dieting: (2) their use does not imply that the diabetes is 'mild' and therefore not liable to complications in the years ahead: (3) they may not be effective for an indefinite period. On average about 6-10% of type 2 diabetics fail to respond to sulphonylureas every year. Thus on an average about 90% patients with type 2 diabetes will not be controlled on O H A after 10 years of onset of diabetes. In fact, it has been observed that the oral agents may assist in the control of diabetes for an average of 8 years and after that use of insulin becomes necessary for blood sugar control.

Two sulphonylureas must not be combined while treating diabetes.

BIGUANIDES

The commonest use of biguanides has been in combination with sulphonylureas. If therapy with sulphonylureas alone is not sufficient then additional administration of biguanides can produce further blood glucose lowering effect. Biguanides are useful as first line drug treatment in the overweight. Biguanides lower LDL Cholestrol Biguanides available in Pakistan are: Metformin, Glucophage Biguanil, Tabrophage and Neodipar. Biguanides must not be used in patients with impaired renal function, septic shock, acute myocardial infarction, severe cardiac failure or during surgery, because of the risk of lactic acidosis. If creatinine rises, stop the drug. Gastro intestinal intolerance can also occur (upto 20% of patients), but can be minimised by starting therapy at a low dose (500 mg or 850 mg daily) and increasing slowly as tolerance develops. Recognised problems include dyspepsia, anorexia, diarrhoea and occasionally unpleasant metallic taste. Patients may also complain of general malaise. These side effects often limit the dose which a patient can tolerate. The incidence of gastrointestinal intolerance increases if the dose of Biguanide exceeds (500 mg per day). Biguanides should always b

taken immediately after meals or during meals.

∝ - GLUCOSIDASE INHIBITORS (ACARBOSE)

Competitive, reversible inhibition of ∝ - glucosidases and pancreatic ∝ - amylase by acarbose delays carbohydrate digestion, prolongs digestion time, and reduces the rate of glucose absorption. As a result, the postprandial rise in blood glucose is decreased and insulin secretion is attenuated. They are therefore useful particularly in those with normal fasting glucose levels and raised postprandial glucose. It is advisable to start with small dose and build up the dose gradually.

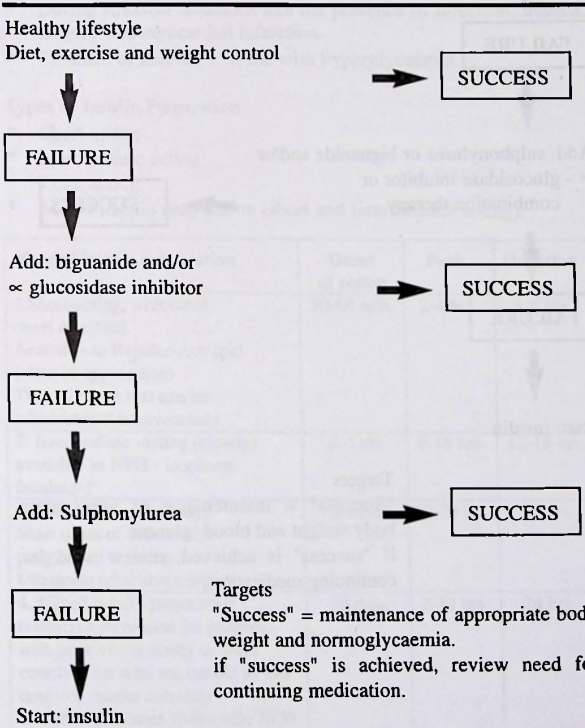
This group has been introduced in Pakistan as Glucobay and is available in 50 mg and 100 mg tablets. The dose is 50 - 100 mg three times a day to be taken at the beginning of breakfast, lunch and dinner. Common side effect is gaseous distention.

COMBINATION THERAPY

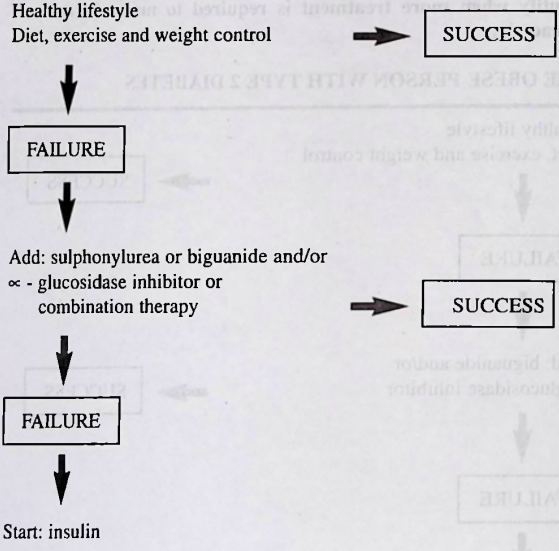
Biguanides and Sulphonylureas may by used in combination when treatment goals are not achieved with either agent alone. Combinations in small doses may also be used to avoid side effects of either agent. ∝ - glucosidase inhibitors (Glucobay) may also be used in conjunction with other oral hypoglycaemic drugs.

Type 2 diabetes is a progressive disease with insulin resistance and beta cell failure. Regular monitoring of glycaemic control will identify when more treatment is required to maintain normal glycaemia.

THE OBESE PERSON WITH TYPE 2 DIABETES



THE NON-OBESE PERSON WITH TYPE 2 DIABETES



Targets

"Success" = maintenance of appropriate body weight and blood glucose.

if "success" is achieved, review need for continuing medication.

INSULIN THERAPY

Indications for insulin therapy:

- When hyperglycaemia has not been controlled by diet and oral hypoglycaemic drugs
- When the diet has failed during pregnancy
- During stressful situations like the presence of infection, trauma, surgery and myocardial infarction.
- Presence of ketones in urine with hyperglycaemia.

Types of Insulin Preparation

- Short acting
- Intermediate acting
- Long acting
- Mixed insulin preparation (short and intermediate acting).

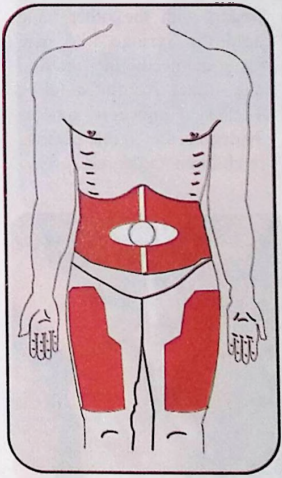
Type of insulin preparation	Onset of action	Peak	Duration
1.Short-acting, with rapid onset of action. Available as Regular-Actrapid (clear in appearance) The only type that can be administered intravenously	30-60 min.	2-4 hrs	4-6 hrs
2. Intermediate -acting (cloudy) available as NPH - Isophane-Insulatard	2-4 hrs	6-16 hrs	12-18 hrs
3. Long-acting - (cloudy) Slow onset of action with proglonged duration Ultralente (zinc suspension)	3-8 hrs	10-30 hrs	36 hrs
4. Mixed Insulin preparation (cloudy) Convenient for patients with poor visual acuity or hand coordination who are unable to mix doses of insulin correctly Available as Mixtard 30 Humulin 70/30 (70% NPH + 30% Regular)	30 min.	2-12 hrs	24 hrs

Insulin dose

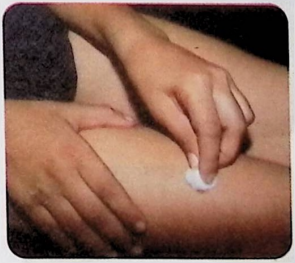
- There are no fixed rules of insulin dosages, but average requirements often are 0.5 - 1.0 U/kg/day.
- The majority of patients will require more than one daily injection if good glycaemic control is to be achieved.
- Twice-daily injections of mixed short and intermediate-acting insulins is a commonly used regimen
- In some cases, short acting insulin is given in the morning, before lunch and evening meal and intermediate-acting insulin at bedtime. This regime usually gives better control than twice daily injections.

The dose of the insulin preparations is adjusted according to the blood glucose levels. Blood glucose monitoring should be intensified during intercurrent illness and other stressful conditions and the insulin dose may have to be increased.

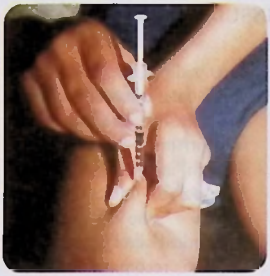
INJECTING INSULIN



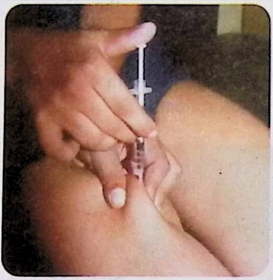
1. Choose an injection site where there is adequate subcutaneous tissue. This type of tissue is located between the fat layer just under the skin and the muscle layer which is below that. Body areas where adequate subcutaneous tissue is found include: the abdomen, (except the area around the umblicus and midline shown in white); the front and outer side of the thighs; the upper outer areas of the arms and buttocks. The abdominal wall or thighs are ideal sites for self injection of insulin. Moving of injection sites within the preferred anatomical site i.e. abdomen, thighs, is recommended. This reduces the chances of lipoatrophy and lipohypertrophy which can interfere with insulin absorption.

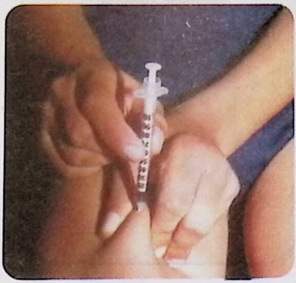


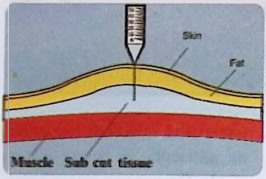
2. Clean the injection site with an antiseptic or warm water swab. Do not use methylated spirit as it will harden the skin. Move the swab in a circular motion. Start from the centre and move outward.



3. Gently pinch two inch fold of skin of the area to be injected between thumb and index finger, with the other hand hold the syringe like pen, insert the needle into the fold and inject insulin quickly. The usual injection angle is 90 degree, and in thin persons or children 45 degree.







4. When finished with the injection, pull the needle out of the skin and release the skin fold. Gently press the site with the swab. DO NOT MASSAGE the area.

5. Replace the needle cap and do not wash the syringe. Wrap the syringe with a clean cloth and place the syringe in an area free of dust or in the refrigerator but not in the freezer.

6. Injection sites and skills should be checked regularly and more often where blood glucose control is suboptimal.

Insulin Storage

- Insulin should be refrigerated but never frozen or exposed to sun light or heat. If refrigeration is not available, insulin can be safely kept in water cooler (without ice) or in water in a clay pitcher which should be kept in a cool area.

Special circumstances

- Insulin should never be omitted during intercurrent illness. Extra insulin is often required and if possible self-monitoring should be intensified.
- Less insulin may be taken before predicted exercise.

Appropriate adjustments (including changes to cope with time zones) may be necessary when travelling.

Complications of insulin therapy

- Hypoglycaemia

Hypoglycemia occurs when blood sugar becomes very low (less than 50 mg/dl) as a result of poor intake of food, more than the usual physical activity or over dose of insulin. Early warning signals of low blood sugar include lightheadedness, dizziness, sweating, tremors and hunger. Later on, patients may present with behavioural and sensorial changes and subsequently coma and even convulsions if uncorrected. Unfortunately, some patients especially those with neuropathy, do not experience the early warning signs. These patients are said to have "hypoglycemia unawareness."

It is important that early warning signals be picked up so that treatment may be given immediately. If the patient is still conscious with the above symptoms, he may be given candy or any sugar containing beverage such as coca cola or juice, so that blood sugar can be raised as soon as possible, after which the patient must be fed. However, if the patient is already unconscious, put some honey or syrup under tongue or between the lips and teeth but do not force any food or drink because this may cause the patient to choke resulting in serious complications. Unconscious patients are best treated with

intravenous glucose or glucagon if available. It is advisable to send the patient to the nearest hospital as soon as possible.

Insulin allergy / hypersensitivity
Occasionally local or sometimes generalized urticaria occurs due to beef insulin, particularly with those containing protamine. Anti-histamines and desensitization may be helpful, but it is better to switch to human insulin.

Immune insulin resistance
Insulin treated patients develop a titre of circulating anti-insulin antibodies (IgG). This results in high insulin requirements. Shifting to human insulin which is less antigenic may lead to reduction in the insulin requirements.

SELF-MONITORING AND SELF-MANAGEMENT

Self-monitoring fulfills a number of important roles in diabetes self care. It is recommended for all IDDM patients. It helps to document the glycaemic control, provides reassurance and information required for appropriate changes in therapy, warns against metabolic disturbances and provides a powerful tool to understand the effects of behavioural changes.
Frequency of blood glucose testing should be determined by the person with diabetes in consultation with the physician and nurse. Intensified testing is needed during pregnancy and in special cases when strict glycaemic control is to be ensured.

The following tables give simplified methods for adjusting the amount of insulin when monitoring blood glucose at home for patients receiving twice daily injection of short and intermediate-acting insulin.

If blood glucose result are too high for two days or more:

Before breakfast	Before lunch	Before dinner	At bed time
Increase next evening's intermediate acting insulin	Increase next morning's short-acting insulin	Increase next morning's intermediate-acting insulin	Increase next evening's short-acting insulin

If blood glucose results are low for two days or more:

Before breakfast	Before lunch	Before dinner	At bed time
Reduce evening's Intermediate acting insulin	Reduce morning's short-acting insulin	Reduce morning's intermediate-acting insulin	Reduce evening's short-acting insulin

NOTE:

- Increase or decrease insulin by 10% at a time.
- Ask the patient to consult his/her doctor if frequent (more than two) changes are needed.

Diabetes Mellitus and pregnancy

If diabetes mellitus (Type 1 or Type 2) is known before conception, following measures should be taken

- pregnancy must be planned.
- preconception control of diabetes mellitus must be done with Insulin at least for two months
- control levels (venous plasma):

Time	Ideal	Acceptable
Fasting / preprandial	70-105 mg/dl (3.9-5.8 mmol/l)	80-120 mg/dl (4.4-6.7 mmol/l)
Postprandial (2 h)	80-140 mg/dl (4.4-7.8 mmol/l)	80-160 mg/dl (4.4-8.8 mmol/l)
Bedtime	100-140 mg/dl (5.5-7.8 mmol/l)	100-160 mg/dl (5.5-8.9 mmol/l)
HbA1c	< 6.5	< 7.5

- folic acid supplements to be given.
- good preconception glycaemic control and folic acid supplements are known to reduce congenital malformations in the babies and this must be explained to the mothers.

Gestational diabetes mellitus - GDM

Definition

Carbohydrate intolerance resulting in hyperglycaemia of variable severity with onset or first recognition during pregnancy. The definition applies irrespective of whether or not insulin is used for treatment or the condition persists after pregnancy. It does not exclude the possibility that the glucose intolerance may antedate pregnancy

but has been previously unrecognized.

Screening

In order to prevent maternal and perinatal complications of diabetes, early detection of glucose tolerance abnormalities during pregnancy is important. Another advantage in screening for GDM is the fact that women who develop glucose intolerance during pregnancy will run a higher risk of developing diabetes in the future, thus detection of this abnormality provides the possibility of preventive intervention.

It may not be possible to screen all pregnant women for diabetes mellitus, then at least women with following risk factors should be screened:

- adverse obstetric history
  - repeated abortions
  - stilbirths
  - neonatal deaths
- previous history of GDM
- family history of diabetes in first degree relatives
- hypertension
- obesity BMI > 30
- history of giving birth to big baby $\geq$ 3.5kg
- history of congenital malformation affecting the newborn in a previous pregnancy
- polyhydramnios
- mother's age more than 35 years

In a large study of antenatal screening conducted at Karachi, Pakistan, out of 1792 women with risk factors 211(12%) were found to be diabetic, whereas out of 2325 women with no risk factors only 13(0.6%) were diabetic[1].

Time and method of screening

- screening in the first trimester will reveal diabetes that may have antedated pregnancy but was not recognized.
  Following tests should be performed. GDM is diagnosed if one or both of the following tests are positive

- fasting venous plasma level ≥ 110 mg/dl (≥ 6.1 mmol/l)
- post prandial venous plasma level ≥ 140 mg/dl (≥ 7.8 mmol/l)

- if screening in the first trimester does not reveal glucose intolerance then repeat screening at 24 - 28 weeks of gestation, after 75g glucose load, may detect pregnancy induced diabetes. Test: 75g glucose load is given at any time of the day irrespective of food intake*, if venous plasma level after 1 hour is > 140 mg/dl (> 7.8 mmol/l), repeat blood sugar after next one hour. If this level is also > 140 mg/dl (> 7.8 mmol/l) then GDM is considered to be positive.

*75g glucose load in a non-fasting state is recommended for following reasons:

- pregnant women in developing countries, because of poverty and illiteracy, find it difficult to travel to a hospital in fasting state and also do not tolerate glucose load well in fasting state
- this test can be performed both for screening (blood sugar after one hour) and diagnosis of DM (blood sugar level after 2 hours)

- In the event of non-availability of facilities for conducting blood sugar, urine (second fasting void) test may by done for detecting sugar. If urine is positive for sugar, confirm DM by performing blood sugar.

- Role of OGTT: In the event of borderline raised blood sugar, confirmation of DM is done by a standard Oral Glucose Tolerance test. After overnight fasting (8-14 hours); 75g anhydrous glucose in 250-300 ml of water given. Plasma glucose is measured fasting and after 2 hours. **Pregnant women who meet WHO criteria for diabetes mellitus or IGT are diagnosed as having GDM.**

WHO Criteria for the diagnosis of diabetes mellitus (venous plasma glucose).

Normoglycaemia	IGT	DM
FPG < 110 mg/dl (< 6.1 mmol/l)	FPG ≥ 110 mg/dl and < 126 mg/dl (≥ 6.1 mmol/l and < 7.0 mmol/l)	FPG ≥ 126 mg/dl (> 7.0 mmol/l)
2-h PG < 140 mg/dl (< 7.8 mmol/l)	2-h PG ≥ 140 mg/dl and < 200 mg/dl (≥ 7.8 mmol/l and < 11.1 mmol/l)	2-h PG ≥ 200 mg/dl (≥ 11.1 mmol/l)

FPG, fasting plasma glucose; 2-h PG, 2 hour post glucose load

Obstetric and Perinatal considerations

The presence of maternal hyperglycaemia may be associated with an increase in the risk of intrauterine foetal death during the last 4-8 weeks of gestation. GDM increases the risk of foetal macrosomia and other neonatal morbidities including hypoglycaemia, hypocalcaemia, polycythemia and jaundice. GDM is associated with an increased frequency of maternal hypertensive disorders and the need for caesarean delivery.

Long-term considerations

Women with GDM are at increased risk for the development of diabetes, usually type 2, after pregnancy. Obesity and other factors that promote insulin resistance appear to enhance the risk of type 2 diabetes after GDM. Offspring of women with GDM are at increased risk of obesity, glucose intolerance, and diabetes of late adolescence and young adulthood.

Management of diabetes during pregnancy

- those well controlled on diet alone may continue on such therapy as long as they are carefully monitored to assess the need for

insulin

- dietary strategy
  - provide sufficient calories and nutrients to nurture the pregnancy
  - in pregnancy caloric intake is usually increased by 500 K cals.
  - diet content: 50-60% carbohydrate
    20-30% protein
    20% fat
  - in order to avoid postprandial hyperglycaemia 3 meals and 2-3 snacks should be taken
  - prevent starvation ketosis

- oral hypoglycaemic agents are not given during pregnancy
- insulin is given in two daily injections of a mixture of short and intermediate-acting. Only short acting insulin may be given three to four times per day. It is better if first three doses of the day are short acting and fourth intermediate to cover the night
- good control levels of glucose are:
  fasting venous plasma : 80-100 mg/dl (4.4-5.5 mmol/1)
  post prandial venous plasma : 90-126 mg/dl (5.0-7.0 mmol/1)
- "four-point" glucose levels may by done every 1 to 4 weeks to ascertain the dose of insulin. In pregnancy postprandial monitoring is superior to preprandial.
- during pregnancy, frequent follow-up is needed to ensure that therapy targets are met. Insulin requirement in pregnancy rises by 60% more than that of prepregnancy requirement. Review every two to four weeks is generally recommended but should be more frequent if required.
- self monitoring of blood glucose (SMBG) can be allowed for educated mothers.
- full clinical assessment is needed, blood pressure, renal & retinal complications should be looked for, ophthalmoscopy & testing for urinary albumin should be repeated during pregnancy.
- urine for ketone monitoring may be useful in detecting insufficient caloric or carbohydrate intake.

- ACE inhibitors should not be given for hypertension during pregnancy.
- foetal well being is monitored by ultrasonography at 18-20 weeks to exclude abnormality and then repeated, if necessary; to monitor growth i.e. macrosomia or retarded growth in case of long standing DM. Foetal kick-charting is useful from 32 weeks of gestation.
- delivery should be monitored & planned. It can take place at term without surgical intervention but earlier induction or caesarean section may be needed for obstetric reasons.
- insulin dosage should be adjusted following delivery to avoid hypoglycaemia because insulin requirement diminishes immediately after delivery.
- OGTT (WHO) should be performed one to six weeks after delivery and the women should be reclassified as having
  - diabetes
  - impaired glucose tolerance
  - GDM that reverted
- mothers should be encouraged to breastfeed.
- contraception
  - low dose oral contraceptive pills can be given to young women
  - IUCD for older women
- postpartum follow up and counselling will be needed in all cases. Women with GDM have evidence of beta cell dysfunction and insulin resistance both during and after pregnancy. Advice regarding weight loss, increased physical activity, low fat and high carbohydrate diet will improve insulin sensitivity and lessen the risk of diabetes mellitus (Type 2) in future years.

LONG-TERM COMPLICATIONS

Retinopathy

Diabetic retinopathy is a leading cause of visual disability. Significant retinopathy is rarely encountered in the first five years of insulin dependent diabetes mellitus, nor before puberty. However, over the subsequent two decades, the vast majority of people with diabetes develop retinal changes. In those suffering from Type 2 diabetes, up to 20% may be found to have retinopathy at the time of first diagnosis of diabetes and most develop some degree of retinopathy over subsequent decades. Hypertension is an established risk factor for macular oedema and is associated with the presence of proliferative retinopathy.

Good control of diabetes results in reduction in the occurrence of retinopathy. Timely laser photocoagulation has been demonstrated to prevent severe visual loss associated with proliferative retinopathy. It has also been shown to be of considerable benefit to patients with macular oedema.

Since retinopathy is not the only manifestation of diabetic eye disease, attention should also be given to glaucoma, cataract and other abnormalities likely to occur in diabetes.

In every case, eye assessment should include the following;

— History of visual symptoms, glaucoma and cataract:

— physical examination, visual acuity testing unaided and, if necessary, with glasses and/or pinhole-lens examination for cataract, ocular pressure; and

— pupil dilation with 2.5% - 10% phenylephrine and/or 1% tropicamide, and/or cyclopentolate eye drops, followed by fundus examination by direct ophthalmoscopy.

Further assessment should be performed every one-to-two years. If retinopathy is detected, follow-up should be arranged in one year or more frequently, if required.

To prevent retinopathy and visual loss, the following are recommended:

- promoting good glycaemic control in all diabetic individuals
- controlling blood pressure i.e. less than 140 / 80
- detecting and treating glaucoma at an early stage
- detecting and treating cataract
- detecting and providing timely treatment of potentially serious retinal changes

Nephropathy

Diabetic nephropathy is a major cause of death among people with diabetes and an important cause of morbidity and increased health care costs due to diabetes. It leads to end-stage renal disease requiring dialysis or renal transplantation.

This complication may be prevented and progression can be slowed by:

- Maintenance of blood sugar and HbA1c in normal range.
- Vigorous treatment of hypertension
- Avoidance of nephrotoxic drugs and early and effective treatment of infection.

Detection & Evaluation

The onset of clinical nephropathy is manifested by urinary albumin excretion of > 300mg in 24 hours. However, an earlier marker of the onset of nephropathy is the presence of microalbuminuria, defined as an overnight excretion of 20-200 microgram of albumin per minute or excretion of 30-300 mg of albumin in 24 hours on more than one occasion.

- People with diabetes should have their urine tested for albumin at initial assessment and at regular intervals.
- In the absence of proteinuria, a test for microalbuminuria is recommended where resources permit.
- In the presence of microalbuminuria or clinical proteinuria:

— Full assessment of renal function should be performed periodically

— Treatment of hypertension should be instituted as early as possible and good control should be achieved. Emphasis should be given to avoidance of nephrotoxic drugs and early and effective treatment of infection

— Optimal diabetes control should be ensured

— Dietary modifications in the form of reduced protein intake and salt restriction should be considered if the need arises.

Neuropathy

Neuropathy is a common complication of diabetes. It causes clinical manifestations and disabilities of diverse spectrum and considerable severity. Both peripheral nerves (sensory and motor) and the autonomic nervous system can be affected. Patients present with distal symmetrical polyneuropathy, focal neuropathy or manifestations of autonomic involvement such as gastroparesis, constipation, diabetic diarrhoea, bladder dysfunction, impotence and orthostatic hypotension.

During the initial assessment, the person with diabetes should be questioned about symptoms of neuropathies. Screening for autonomic neuropathic involvement is particularly important prior to general anaesthesia.

Peripheral nerve affection together with peripheral vascular disease

predispose to foot ulcers and infection. If not detected early, these lesions may progress to gangrene and result in amputation.

Neuropathic involvement can be prevented or delayed by good glycaemic control. Foot complications can be avoided by good foot care and detection of early lesions.

Pain due to neuropathy can be severe and distressing and requires attention. If it persists in spite of good blood glucose control, drug treatment may be indicated. Analgesics may be given but opiates should be avoided. Tricyclic antidepressants such as amitriptyline or nortriptyline may also be used for this purpose, the latter in a useful combination with fluphenazine (Motival). Carbamazepine (Tegretol) may help in cases not responding to Tricyclic antidepressants. Reassurance that pain will eventually decrease with time is needed.

Diabetic gastropathy, caused by autonomic involvement, is often manifested by troublesome gestrointestinal symptoms such as heartburn, nausea and vomiting. Symptoms may be relieved by agents promoting gastric emptying such as metoclopramide.

Foot care

Severe foot lesions requiring amputation are one of the major complications of diabetes.

The two main approaches to prevention are: (1) identification of high-risk individuals, and (2) early detection of foot lesions: for example, trauma, infection or ulcers.

Intensified foot care should be ensured for patients at high risk, such as those with:

- symptoms and/or signs of neuropathic involvement
- evidence of peripheral vascular disease
- nephropathy or significant retinopathy

- Visual impairment, foot deformities and poor mobility.
- poor hygiene

Instructions on foot care should be an integral part of any educational activity on diabetes. They should focus on:

- Stop smoking
- Self-examination
- avoidance of trauma, and
- wearing properly fitting shoes.

Efforts should be intensified in respect of high-risk people. Health-care professionals, other than doctors, at the primary health care level should be trained to identify such individuals and recognise early lesions. Patients with suspected or confirmed abnormalities should be sent for medical consultation.

Cardiovascular diseases

Cardiovascular diseases (coronary heart disease and strokes) are the leading causes of death in the diabetic population. Risk factors for the development of macrovascular disease are frequently found in people with diabetes.

The initial assessment of the newly diagnosed type 2 individual should always include:

- clinical screening for risk factors of cardiovascular diseases (CVD); for example, hypertension, smoking, obesity, and hyperlipidaemia
- screening for early signs of cardiovascular abnormalities
- a baseline electrocardiogram
- serum lipid measurement, whenever possible.

Activities to reduce CVD risk factors should be an integral part of the management plan.

The management plan should include:

- cessation of smoking
- correction of other CVD risk factors, good control of hypertension and effective treatment of hyperlipidaemia
- nutritional advice to reduce weight, consume less saturated fat, avoid excess salt in the diet and to discourage the use of alcohol, particularly in individuals with hypertriglyceridaemia.
- promotion of physical activities and exercise.

Hypertension

Hypertension is commonly associated with diabetes and may complicate it. Both conditions are important independent risk factors for cardiovascular, renal, cerebral and peripheral vascular disease. Hypertension should be detected early and treated aggressively if its contribution to increased morbidity and mortality in diabetes is to be avoided.

Guidelines for the management of hypertension in diabetes

- Unless the blood pressure is very high, diagnosis should usually be based on high blood pressure (BP) measurement made under standard condition on at least three occasions.

- Blood pressure is elevated when the BP is persistently $\geq$140 mmHg systolic and /or $\geq$90 mmHg diastolic.

- BP should always be measured in the lying and standing positions if symptoms of hypotension are present.
- The presence of target-organ damage (e.g. retinal, renal or cardiovascular) should be evaluated.

- Other modifiable cardiovascular risk factors should be checked.

- In general, the goal of blood pressure treatment should be to maintain BP at <140 mmHg systolic and <85 mmHg diastolic.

- Treatment should initially be based on nonpharmacological therapy, namely weight reduction, dietary modification, increased physical activity and smoking cessation.

- Dietary advice should focus on low salt intake and low saturated fat to reduce the risk of CVD. For overweight individuals, calorie reduction to achieve gradual weight loss should be planned together with regular physical exercise. Alcohol increases plasma triglyceride levels; excessive consumption can also lead to further rise in blood pressure.

- Drug treatment should be considered only if the therapy targets are not reached with nonpharmacological measures. An exception to this recommendation is severe hypertension (systolic >180) or (diastolic >110) when drug treatment should be considered on presentation.

Drugs used to lower blood pressure in diabetes
There are several classes of antihypertensive drugs. Each class has potential advantages and possible drawbacks.

Thiazide diuretics and β-blockers have been shown to reduce cardiovascular morbidity and mortality in diabetic and nondiabetic subjects. Thiazides in small daily doses (12.5 - 25 mg hydrochlorthiazide or chlorthalidone) are effective. Side effects, such as hyperglycaemia, hypokalaemia, hypomagnesaemia and hyperuricaemia, may develop but are minimal with such low doses.

In addition to reducing cardiovascular morbidity and mortality in population-based studies, β-blockers have also been shown to reduce the recurrence of myocardial infarction and sudden death. However, their use may be associated with an adverse effect on lipid status and blood glucose control. β-blockers may interfere with the awareness of, and recovery from, hypoglycaemia. They may also cause worsening of peripheral vascular disease by causing vasospasm.

Angiotensin-converting enzyme (ACE) inhibitors have been shown to reduce microalbuminuria and delay the onset and progression of diabetic nephropathy in people with Type 1 diabetes. They have no adverse effects on lipid status or glucose levels but may cause hyperkalaemia in patients with renal impairment and in those taking potassium-sparing drugs or potassium supplement. ACE inhibitors are contraindicated in pregnancy and should therefore be used with caution in women of childbearing age. In people with renal artery stenosis, ACE inhibitors may induce impairment of renal function. Calcium channel blockers have no adverse effects on lipid and glucose metabolism.

α-1 receptor blockers have no adverse effects on lipids or glucose control but may cause postural hypotension and should be used with caution, particularly in people with autonomic neuropathy. This also applies to other sympatholytic drugs.

In conclusion, available evidence indicates that ACE inhibitors, calcium channel blockers and α-1 receptor blockers can be effectively used to lower blood pressure. Small dose thiazides can also be effective and have been shown to have a cardioprotective effect. The favourable cardioprotective action has also been documented with β-blockers but in this case cardioselective preparations in low doses are preferred and caution should be exercised in patients particularly predisposed to hypoglycaemia. Low-dose methyldopa may be considered in some cases particularly in the treatment of hypertension during pregnancy. At any rate, the choice of the antihypertensive drug used will be determined individually and by the presence or absence of other associated conditions like CVD, nephropathic or neuropathic complications. It is also important to consider the cost of treatment as a factor influencing drug choice since many of the drugs mentioned above may be beyond the reach of some patients.

DIABETES AND RAMADAN

Fasting is obligatory for all healthy adult Muslims during the Holy month of Ramadan. No food or drink is allowed between dawn

(Sehar) and sunset (Iftar), with no restriction on the amount of food or drink consumed at night. Alterations in the mealtimes, daily routines and use of certain traditional foods at Iftar and Sehar is also the feature of this month.

As diabetes and its treatment is directly related to diet control, proper timings of meals and medicines, the diabetic patients would like to know, from the medical point of view, if it is possible for them to fast during the month of Ramadan. If so, then what are the precautions that will enable them to fast as well as keep diabetes under good control.

Islam is a religion which does not believe in strictness under special circumstances and according to the situation permits Muslims certain favours and leniency. Keeping this in view, the advice given below for the month of Ramadan is appropriate from medical point of view.

Fasting in Ramadan will depend on the control and the type of treatment being given. According to the treatment received, the diabetic patients can be divided into three groups.

Group 1: Patients in whom blood sugar is under control on diet only.

If you belong to this group you can fast, provided you continue with your diet control. Obese patients belonging to this group can reduce weight by fasting which in turn will lead to better control of diabetes. Diet means eating healthy food, eating enough food and having regular meals. Diabetics should avoid becoming over weight.
The advice regarding diet during Ramadan is basically same as on normal non fasting days.

The adjustments to your diet are based on the following two principles.

i) Avoid sugar, sweet food and drink.

ii) If you are overweight, loose weight by reducing your intake

of all those foods which provide energy in excess of your requirements. Diabetics should therefore avoid foods containing sugar and fatty foods (1G of fat contains 9 calories of energy as against 4 calories of energy in 1G each of carbohydrate and proteins).

Weighing your food is usually not necessary; you can use common house hold measures such as tablespoons, desertspoons, or teaspoons, cups or fistful of flour or rice (an average Pakistani female fist holds 42G of flour and 44G of uncooked rice.)
Special diabetic foods are expensive and not really necessary for people with diabetes.
If you like eating sweet foods, it is better to include fresh fruits in your meal plan.

Avoid very sweet fruits like mangoes, grapes, dates and tinned fruits.

All vegetables including those which grow under the soil are good for you. Eat plenty of salad and vegetables including Potatoes, but avoid fried Potatoes.

You may find the following meal plan useful during Ramadan:
You may open fast with small amount of chick peas (Chola) or oil fried vegetable Samosa or two Pakora and water or Tomato juice. Eat full meal after Maghrib prayers.

Take plenty of vegetables both cooked and uncooked, dal, roti, boiled rice, yogurt, fish or meat or both (if blood lipids are high, avoid red meat i.e. mutton and beef). Finish your meal with fresh fruit. If you like you can take a glass of skimmed milk with dinner or at bed time. In practice, roti of whole wheat flour is as good as roti made of Gram, Maize and Millet flours.

Same principles should be followed for sehr meal. Avoid vermicelli (Khajla and Pheni). Instead whole wheat cereals or porridge may be taken.

Group 2: Patients in whom blood sugar is under control on diet and blood glucose lowering tablets (Oral hypoglycaemic drugs).
If you belong to this group you can also fast. You will have to continue with your diet control and in addition follow the advice given below regarding your oral hypoglycaemic drugs.

a) If you are taking oral tablets in single dose in the morning, then you should continue with the same dose in Ramadan but the tablets should now be taken at the time of breaking fast (Iftar).

b) If you are on twice daily doses, during Ramadan you will continue with the two doses but with the following modifications in the timings and quantity of drugs:

i. The morning tablets taken on normal days should be taken at the time of Iftar. The dose will remain the same.

ii. The second dose is taken at the time of starting your fast (Sehar) but reduce this dose to half of your usual evening dose.

iii. If you are taking tablets three times a day then you should first consult your doctor, as the dose and the timings of your tablets will have to be adjusted so that you are able to control your diabetes on twice daily doses. If on your doctor's advice you can do so and your diabetes is under control, you can fast, otherwise not. While fasting you will have to follow the same instructions as given above regarding the timing and the dose of your tablets.

Group 3: Patients who are on Insulin.
If you are on insulin treatment you are not a suitable candidate for fasting. Your blood sugar levels can fluctuate considerably (i.e. blood sugar level can increase or decrease). The control of your sugar levels depends on a continuous balance between the dose of insulin administered and the food intake all day long. During fasting you can therefore develop hyperglycaemia and ketosis or sudden hypoglycaemia which can be dangerous and life threatening. If you insist on fasting then you should be willing to break fast if hypoglycaemia develops. Shorter acting insulins and free mixtures rather than premixed insulins are recommended

General Instructions:

Your daily food intake should be as advised by your doctor as it is calculated according to your energy requirements while controlling your blood glucose at the same time. While fasting, do not forget that you are a diabetic and the traditional foods (usually sweets and high calorie fatty foods) cooked during Ramadan are not suitable for you. Divide your daily food intake in two equal portions. Take one portion at Iftar and the other at Sehr. The meal at Sehr should be delayed as much as possible, i.e the meal should be taken within the last 30 minutes before the beginning of fast.

Blood glucose control is achieved not only by diet control and medication but also by daily exercise. During Ramadan routine activity should not be reduced but some rest may be taken in the afternoon.

Exercise is good for keeping physically fit and healthy. Exercise helps diabetics by reducing their blood glucose levels thus decreasing their need for medication (tablets or insulin). All diabetics should exercise regularly such as 30 minutes daily brisk walk (120 steps per minute) on empty stomach. During Ramadan the best time for walking is before Sehr. Get up early, do brisk walk for 30 minutes, eat your sehar meal and begin fast

If you strictly observe these instructions, check your blood sugar levels regularly and follow doctor's advice, you should be able to fast during Ramadan and not face unusual problems. All diabetics should remember that; "Little knowledge is not a dangerous thing. The diabetic who knows the most about his disease, lives longest".

Every diabetic, therefore, should aim to be his own doctor, of course under the supervision of a physician.

DIABETES

10 COMMANDMENTS

1. All diabetic children need insulin for treatment and survival. Oral hypoglycaemic drugs have no role in the treatment of children with diabetes.

2. Most of the adult diabetics can be controlled on diet and/or oral hypoglycaemic drugs during first 5 to 10 years of diabetes. Every year, in 6 to 10% of adult diabetics, the oral hypoglycaemic drugs will fail to control blood sugar and they will then require insulin for optimal control.

3. Diabetics should avoid sugar and sugar rich food and drinks. Vegetables which grow under soil such as carrot, radish, potatoes, are good for diabetics because of their high fibre contents.

4. Overweight diabetics must loose weight and should take low calorie meals.

5. Brisk walk daily for 30 minutes, 120 steps per minute, before meals is good for control of diabetes and cholesterol levels.

6. Oral hypoglycaemic drugs should not be given to pregnant diabetics. These patients should be controlled on diet and/or insulin.

7. Acceptable control of blood sugar i.e. fasting or preprandial blood sugar below 120 mg % and blood sugar 2 hours after meal below 160 mg % is necessary to avoid chronic complications of diabetes which can adversely affect kidneys, eyes, nervous system and blood vessels of the legs, heart and brain.

8. Testing of sugar in the urine for control is helpful in those diabetics who can not afford glucose estimation. For the diagnosis of diabetes, presence of sugar in urine is not enough. For confirmation of diabetes, blood sugar estimation is essential.

9. Children with diabetes should test their blood sugar at least once a week and adults atleast once a month, but more frequently if their diabetes is out of control.

10. Those patients who need to be on insulin for short periods, such as during pregnancy, infections and surgery, should be given human insulin if they can afford it. Otherwise beef insulin is as good as human insulin for patients who need it on long term basis and also for short duration.

HINTS FOR LOSING WEIGHT

1. Avoid frying food - boil, stew or bake.
2. Use very little oil during cooking or serving
3. Avoid salad dressings, use vinegar or lemon juice instead.
4. Avoid oily 'take-aways' and thickened gravies and sauces.
5. Do without sugar completely, use sweeteners if necessary.
6. Drink plenty of water or sugar-free fluids.
7. Don't take excessive milk, cheese or eggs.
8. Use a smaller plate and avoid second-helpings.
9. Weigh yourself weekly - not daily - use same scales
10. NEVER use slimming pills, 'formula' drinks etc.

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CONSENSUS WORKSHOP FOR DEVELOPING CLINICAL PRACTICE GUIDELINES FOR THE MANAGEMENT OF DIABETES

Karachi, 12 - 14 March, 1999

Editor and Convener: Prof A Samad Shera
National Coordinator for Diabetes Prevention and Control

PARTICIPANTS

Resident Participants

1. Abdul Basit	Director, Baqai Diabetes and Endocrine Centre, Karachi
2. M. Ishaq	Associate Professor, NICVD, Karachi
3. Najumul Islam	Assistant Professor of Medicine, Aga Khan University & Hospital, Karachi
4. Abdul Jabbar	Assistant Professor of Medicine, Aga Khan University & Hospital, Karachi
5. Fatema Jawad	Research Fellow, Diabetic Association of Pakistan, Karachi
6. Iftikhar A. Khwaja	Pathologist, Sindlab, Karachi
7. Syed Ali Jaffar Naqvi	Former Professor of Nephrology, JPMC, Karachi
8. Noorjahan Samad	Former Professor of Obstetrics & Gynaecology, Dow Medical College & Civil Hospital Karachi
9. Zaman Shaikh	Associate Professor of Medicine, Dow Medical College, Karachi

Non-Resident participants

1. Khalida A.K. Akhtar	Professor of Obstetrics & Gynaecology Islamic International Medical College, Islamabad

2. Abdul Baqi Durrani	Assistant Professor of Medicine, Bolan Medical College, Quetta
3. M. Kabir	Professor and Chairman Gandhara Institute of Medical Sciences, Peshawar
4. Lt. Col. Dr Liaquat Ali	Consultant Physician & Endocrinologist, Military Hospital, Rawalpindi
5. Jan Mohammad Memon	Principal & Professor of Surgery, Liaquat Medical College, Jamshoro - Hyderabad
6. Mohammad Ali	Assistant Professor of Medicine Nishtar Medical College, Multan
7. Aftab Munir	President, Society of Obstetricians and Gynaecologists of Pakistan
8. Zareena Muzaffar	Professor of Medicine, PIMS, Islamabad
9. Aslam Khan Niazi	Consultant Physician, Federal Government Hospital Islamabad
10. Ghazala Rafique	Instructor, National Health Academy, Islamabad

Overseas Participants

1. A. C. Burden	Consultant Physician, Leicester General Hospital and Representative of British Diabetes Association, U.K.
2. Mary Burden	Diabetes Specialist Nurse and Representative of British Diabetes Association, U.K.
3. Jak Jervell	Professor of Endocrinology, University of Oslo, Norway & Past President International Diabetes Federation (IDF)
4. Hilary King	Officer Responsible for Diabetes Mellitus at the Division of Noncommunicable Diseases, WHO - Geneva