Diabetes Management

When is World Diabetes Day?

world diabetes day

14 November

Diabetes

- Diabetes is a world wide problem.
- Obesity is a single risk factor for developing this chronic disease.
- Diabetes main symptom is high blood glucose level.

Types of Diabetes

Type I Diabetes

- Autoimmune disease
- Autoimmune destruction of the beta cells of the islets of Langerhans which are the regions of the pancreas that contain its endocrine cells (i.e., hormone-producing cells).

Blood glucose level management:

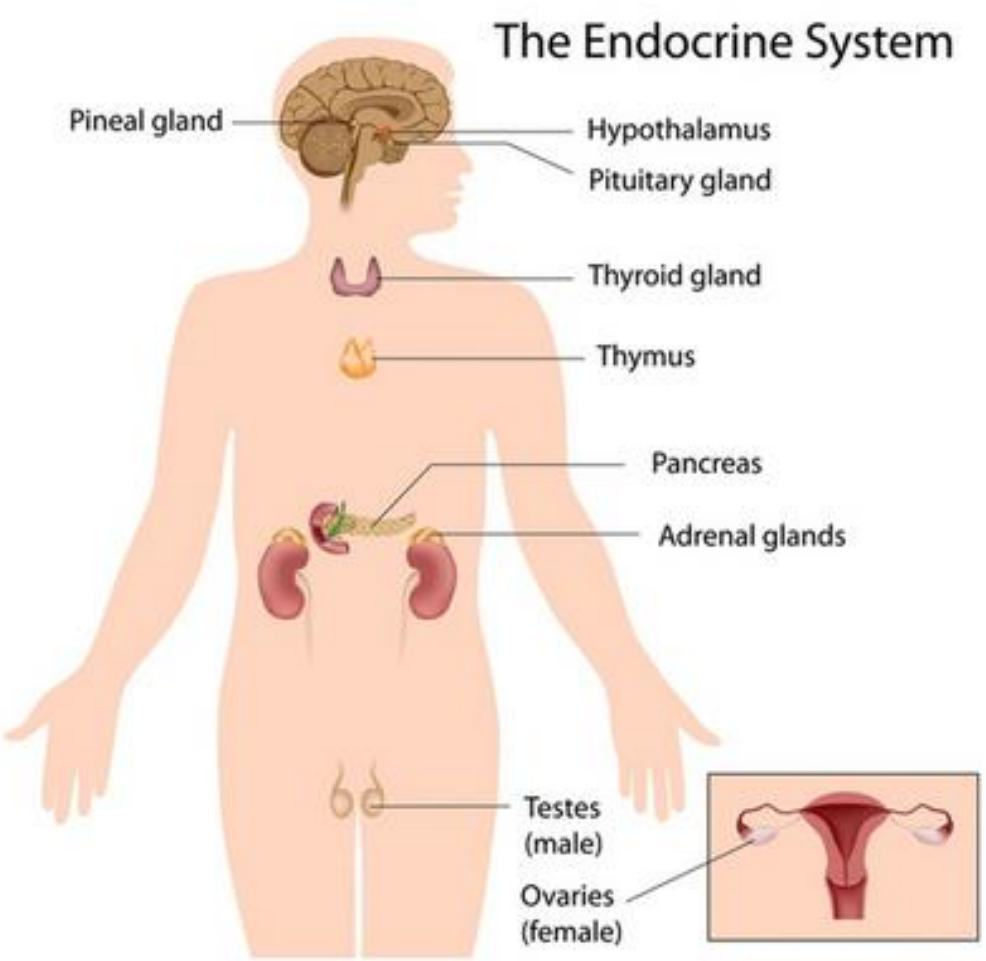
- Insulin injections +
- Diet management

Pineal gland: is a small gland in the brain, it produces melatonin, a serotonin derived hormone, which affects the modulation of sleep patterns.

Hypothalamus : maintains body's homeostasis e.g. body temperature, electrolyte balance etc.

Pituitary gland: produces many hormones such as the prolactin, growth hormone, TSH (Thyroid-stimulating hormone) , etc.

Thyroid gland: and metabolic rate.



Types of Diabetes Cont'd.

Type II Diabetes:

- A key abnormality is Insulin Resistance
- In the early stages of the disease insulin may be ↑raised in an attempt to overcome the resistance
- At some stage of the disease and in some patients:
  - Pancreas becomes unable to function properly,
  - Insulin production diminishes.

Type II Diabetes
Blood Glucose Level Management

- Dietary management

- At some point may need
    1. Oral medication

    2. Incretin mimetic injection (a group of metabolic hormones that cause an increase in the amount of insulin released from the pancreas)

    3. Insulin injections

❖ Insulin injection does not make them type I diabetics, they are still type II.

Diabetes Oral Medications

1. Some
   - Cause the pancreas to release more insulin.

2. Some
   - Improve insulin's ability to move sugar into cells especially into the muscle cells, and
   - Prevent the liver from releasing stored sugar.

3. Some
   - Make fat cells more sensitive to the effects of insulin, and
   - Lower the amount of sugar released by the liver.

4. Some
   - Block enzymes that help digest starches.

5. Some
   - Block the reabsorption of glucose by the kidneys, and
   - Increase glucose excretions in urine.

Diabetes Oral Medications Cont'd.

- GENERIC NAME: Metformin.
- BRAND NAME: Glucophage, Glucophage XR, Glumetza, Fortamet, Riomet.
- Metformin suppresses glucose production by the liver.
- Metformin causes few adverse effects.
- Metformin is now believed to be the most widely prescribed anti-diabetic drug in the world.

Incretin Mimetic Injection

Incretin is a natural hormone that the body makes. It stimulates the release of insulin from the pancreas after eating.

Incretin mimetic act like (mimic) the natural incretin.

Incretin mimetic injection:

- Prompts pancreas to release insulin when blood sugar is rising.
- Prevents the pancreas from releasing too much glucagon. Glucagon is a hormone that causes the liver to release its stored sugar into the bloodstream.
- Helps to slow the rate of stomach emptying after eating. This may make you feel less hungry and more satisfied after a meal.

❖ Blood sugar should not get too high too fast after a meal.

Types of Diabetes
Cont'd.

Pre-Diabetes

- Blood glucose level is higher than normal,
- Not classified as diabetes,
- Predisposed for type II diabetes.

❖ Usually weight management and exercise

➢ Can delay the onset of type II diabetes.

Types of Diabetes

Cont'd.

Gestational Diabetes

- Higher than normal blood glucose level
  1. Occurs during pregnancy,
  2. Goes back to normal after delivery,
  3. Remains susceptible to type II diabetes.

❖ Blood glucose level management usually needs
  1. Meal planning
  2. + Exercise
  3. + maybe Medication.

Most Widespread Type of Diabetes?

- 90-95% of diabetics are Type II Diabetes (adult onset or non-insulin dependent).

- 5-10% are Type I Diabetes (Juvenile or Insulin Dependent Diabetes) [IDD]).

Guidelines for Normal Blood Sugar Levels American Diabetes Association

Blood Glucose Testing	mg/dl
Fasting Glucose	< 100
2 hr after eating	< 140
HbA1c (glycosylated hemoglobin)	< 5. 7%

American Diabetes Association Guidelines for Blood Sugar Levels for Diagnosing Diabetes & Pre-diabetes

Diagnosis	Fasting Glucose (mg/dl)		2 hr after eating or 75-gram OGTT (mg/dl)		HbA1c
Pre-diabetes: IFG	100 – 125				
Pre-diabetes: IGT			140 – 199		
Pre-diabetes					5.7-6.4%
Diabetes	≥ 126	Or	≥ 200 (or random sugar)	Or	>6.5%

IFG = Impaired fasting glucose; IGT = Impaired glucose tolerance
OGTT = Oral glucose tolerance test

What are the Blood Glucose Targets for People with Diabetes?

ADA Targets for Blood Glucose Level	My Usual Results	My Goals Before meals
Before meals: 80 to 130 mg/dl	_____ to _____	_____ to _____
2 hours after the start of a meal: below 180 mg/dl	_____ to _____	_____ to _____

Overall Goals of Nutritional Management

- MAINTAIN: blood glucose level as near normal as possible.
- ACHIEVE: optimal serum lipid levels.
- PROVIDE: adequate energy to achieve and maintain a reasonable body weight.
- PREVENT AND TREAT: short-term complications such as hypo and hyperglycemia, and long-term complications such as renal disease, cardiovascular disease, neuropathies and amputations.
- IMPROVE: overall health through optimal nutrition.

Optimal Serum Lipid Levels

Cholesterol Test	General Targets
LDL	< 100 mg/dl (lower numbers are better)
HDL	Men: > 40 mg/dl Women: > 50 mg/dl (higher numbers are better)
Total cholesterol	< 200 mg/dl (lower numbers are better)
Triglycerides	< 150 mg/dl (lower numbers are better)

Classification of Blood Lipids American Heart Association

Total Cholesterol mg/dl	Classification
< 200 →	Desirable
200-239 →	Borderline high
≥ 240 →	High

Classification of Blood Lipids American Heart Association

LDL Cholesterol mg/dl	Classification
< 100	Optimal
100-129	Near optimal/Above optimal
130-159	Borderline high
160-189	High
≥ 190	Very high

Classification of Blood Lipids American Heart Association

HDL Cholesterol mg/dl	Classification
< 40 (for men); < 50 (for women)	Low
≥ 60	High

Classification of Blood Lipids American Heart Association

Triglycerides mg/dl	Classification
< 150 →	Normal
150-199 →	Borderline high
≥ 200 →	High

Diet Planning for Diabetics

Individualization

Dietitian should evaluate the following:

- Blood glucose level,
- Blood lipid levels,
- Willingness and understanding of the importance of decreasing the blood glucose level through diet,
- Financial status,
- Follow up.

Diet Planning for Diabetics Cont'd.

Energy

- Caloric content should be adequate to manage weight,
- In most cases of Type II diabetes:
  - A weight loss of 5-10 kg (or ≈ 10% of current body weight)
    - Reduces blood glucose level,
    - Reduces blood pressure level.

Diet Planning for Diabetics Cont'd.

Carbohydrates

- Regular diet with regular food is manageable for diabetics.
- No need for special foods because they might be expensive.
- All carbohydrate containing foods raise blood glucose level.
  - ❖ Normally:
    Pancreas releases insulin according to the amount of CHO consumed.
  - ❖ Diabetics:
    Either insulin production (Type I) or insulin use (Type II) is suboptimal.

Diet Planning for Diabetics Cont'd.

Carbohydrates

Most important:

- Total amount of CHOs
- Consistent amount of CHOs in meals
  - Almost equal distribution of CHOs:
    - Among meals,
    - From day to day,
    - Meals and snacks.

When foods containing simple sugars (concentrated sweets such as desserts are to be included in the diet, they should be eaten in small portions only.

Recommendations for the Nutritional Management of Diabetes Mellitus

Carbohydrate:

- DRI recommends total carbohydrate: 45-65% of daily energy requirements, preferably coming from starchy foods, with half of starch coming from whole grains as well as from fresh fruits and vegetables and milk products.

Total dietary fibers: DRI recommends:

14 g/1000 kcal

Adults: at least 25-35 g/day.

Children: 5 g +1 g per year of age as a guide.

Should include both soluble and insoluble fibers.

Protein: Adults 0.8 g per kg/day, or 15-20% of total energy intake; Children: RNI for age and gender.

Daily Protein Requirement for Healthy People

Stage of life	Grams of protein /kg / day
Adulthood, (for maintenance), (anabolism = catabolism) →	0. 8 g/kg/day
0-2 years, (for growth), (anabolism > catabolism) →	1.2 g/kg/day
11-14 years (for growth) M & F , (anabolism > catabolism) →	1 g/kg/day
15-18 years, (for growth), (anabolism > catabolism) M → F →	 0. 9 g/kg/day 0. 8 g/kg/day
Pregnancy, (anabolism > catabolism) →	1.1 g/kg/day
Lactation : (anabolism > catabolism) First 6 months → Second 6 months →	 1.2 g/kg/day 1.1 g/kg/day
Bare minimum even in kidney or liver failure →	0.66 g/kg/day (below this amount protein synthesis falls)

Recommendations for the Nutritional Management of Diabetes Mellitus

Fats:

- Total fat: 25-35 % of daily energy requirements.
    - Saturated fats: < 7% of daily energy requirements.
    - Polyunsaturated fats: < 10% of daily energy requirements.
    - Monounsaturated fats: 10-15% of daily energy requirements.
    - Cholesterol: < 200 mg/day

❖ Use of monounsaturated fats should be encouraged where possible because they might help improve blood lipid profile especially TAGs

❖ Fish rich in omega-3 fatty acids should be consumed 2 or more times per week.

Recommendations for the Nutritional Management of Diabetes Mellitus Cont'd.

Alcohol:

- Alcohol consumption should be limited

  - ❖ Regular alcohol intake can contribute to weight gain, poor glycemic control, and elevated lipids.

Micronutrients (Vitamins &Minerals) :

- ❖ Routine use of vitamin or mineral supplements is not recommended for people with diabetes except in cases of inadequate food consumption or other special needs.

- ❖ Daily vitamin and mineral requirements should be obtained from a well-balanced diet.

Recommendations for the Nutritional Management of Diabetes Mellitus Cont'd.

Sweeteners

- Nutritive and nonnutritive sweeteners:
  - May be used moderately as part of a well-balanced diet.
  - Use of saccharin and other artificial sweeteners can be used occasionally.
  - Aspartame (Brand names Equal & NutraSweet) is contraindicated in individuals with phenylketonuria (PKU).

❖ Special foods are not necessary (expensive!)

Total Amount of Carbohydrate

- Monitoring the total amount of carbohydrate is a key strategy for glycemic control.

- Research shows that all carbohydrate foods whether simple or complex (g of CHO) have similar effect on blood glucose level, the glycemic load is the important issue .

  – Sugar, when and if used, should be part of the carbohydrate allowance within a balanced diet.

  – Use Sugar sparingly if & when used.

Diets for Diabetes

ARE NOT RESTRICIVE (no food is forbidden completely).

Consist of eating a:

- Variety of nutritious foods in moderation at consistent mealtimes
- Healthy-eating plans that are rich in nutrients.
- Calorie content: depends on body weight.
- Focus on fruits instead of sweets,
- Focus on vegetables and whole grains.

Consistent Carbohydrate Diet for Diabetics

- Provides Consistent Carbohydrate Consumption at Meals.
- The diet is adequate; it includes quantities of food that meet the RDIs for adults.
- In fact, the diet for diabetes is the best eating plan for almost everyone.

Menu Planning
Consistent Carbohydrate Diet

- This diet states that:
  - The amount of carbohydrate is consistent
  - The time of meals and snacks are consistent as well.

- Blood glucose level
  - Is a reflection of CHO consumption.
  - Should be monitored and CHO consumption adjusted as needed.

Carbohydrate Counting Method

- Consistent Carbohydrate Diet implies carbohydrate counting method:
    - Which is based on CHOICES of CHO or GRAMS of CHO per meal and snack.
    - Each choice is one exchange unit from each of the foods listed in the starchy foods, fruits, and milk groups which supplies ≈ 15 grams of CHO.
- Occasionally desserts and sweets can be included as part of the day's CHO consumption.

CHO counting: is based on CHO choices/meal or CHO g/meal
Each CHO choice = ≈ 15 g of CHOs

CHO Choice	Grams of CHO in 1 Choice	CHO Choice Range
1	15	11-20
2	30	26-35
3	45	41-50
4	60	56-65
5	75	71-80

Carbohydrate Content of Some Selected Foods

Food	Serving Size	CHO Content
Ice cream any flavor	½ c	15 g
Frozen fruit yogurt	1/3 c	15 g
Cheese pizza thin crust	¼ (25 cm pan)	30 g

1 CHO Choice & Serving Size of Some Selected Foods

Food	CHO Choice	Serving Size
Brownie	1	30 g (3x3 cm)
Angel food cake	1	≈ 30 g
Chocolate chip cookies	1	2 cookies (≈ 20 g)
Vanilla wafer	1	5 cookies
Chocolate	1	≈ 20 g
Honey	1	1 Tbsp
Non dairy creamer	1	1 ½ Tbsp
Chocolate syrup	1	1 Tbsp
Pancake syrup (regular)	1	1 Tbsp
Jam or jelly (regular)	1	1 Tbsp

Suggested Menu Plan for a Consistent Carbohydrate Diet that provides 2000 kcal/ day

- DRI = CHO: 45-65% of total calories, lets use 55%
  - 2000 X 0.55 = 1100 kcal
  - 1100/4 = 275 grams

    Cho provide 4 kcal
  - One choice of CHO is 15 grams
  - # of choices for the day would be: 275/15 = ≈ 18choices

SUGGESTED MENU PLAN FOR CONSISTENT CARBOHYDRATES DIET

Meal Pattern	Consistent CHO Diet	General Diet
Breakfast (4 choices) 60 g CHOs	3 slices bread (3 choices) 1 egg 30 g cheese 1 tsp olive oil 3 small fresh vegetables (1 choice) Coffee	3 slices bread 1 egg 30 g cheese 1 tsp olive oil 3 small fresh vegetables Coffee
Snack (2 choices) 30 g CHOs	1 c milk or yogurt (1 choice) 1 small apple (1 choice)	1 c milk or yogurt 1 small apple
Lunch (4 choices) 60 g CHOs	4 oz chicken breast 1½ c cooked vegetables (1 choice) 1 c rice or pasta (3 choices) 2 tsp oil Tea	4 oz chicken breast 1½ c cooked vegetables 1 c rice or pasta 2 tsp oil Tea

Meal Pattern	Consistent CHO Diet	General Diet
Snack (2 choices) 30 g CHOs	1 c milk (1 choice) 1 small banana (1 choice)	1 c milk 1 small banana
Dinner (4 choices) 60 g CHOs	2 slices whole grain bread (2 choices) ½ cup tuna 3 small vegetables (1 choice) ½ cup fruit salad (1 choice)	2 slices whole grain bread ½ cup tuna 3 small vegetables ½ cup fruit salad
Snack (2 choices) 30 g CHOs	1 slice bread (1 choice) 2 Tbsp. labaneh (1 choice)	1 slice bread 2 Tbsp. labaneh

Diabetics on a Clear Liquid Diet

In general:

- 1/2 cup serving of regular soda, juice or gelatin provides one choice.

Diabetics on Clear or Full Liquid Diets: CHO counting is important too. CHO content of some of the foods that are given on a clear or full liquid diet

Food	Volume	CHO g	CHO choices
Soft drinks (regular)	1c	27	2
Soft drinks (diet)	1c	0	0
Jello (flavored gelatin)	½ c	18	1
Pudding	½ c	18	1
Ice cream	½ c	15	1
Sherbet	½ c	30	2
Sugar	1 Tbsp.	12.5	1
Honey	1 Tbsp.	16	1
Yogurt (flavored, low fat, sweetened)	1c	40	3
Creamed soup	1c	20	1
Cooked cereal	½ c	15	1

Hypoglycemia

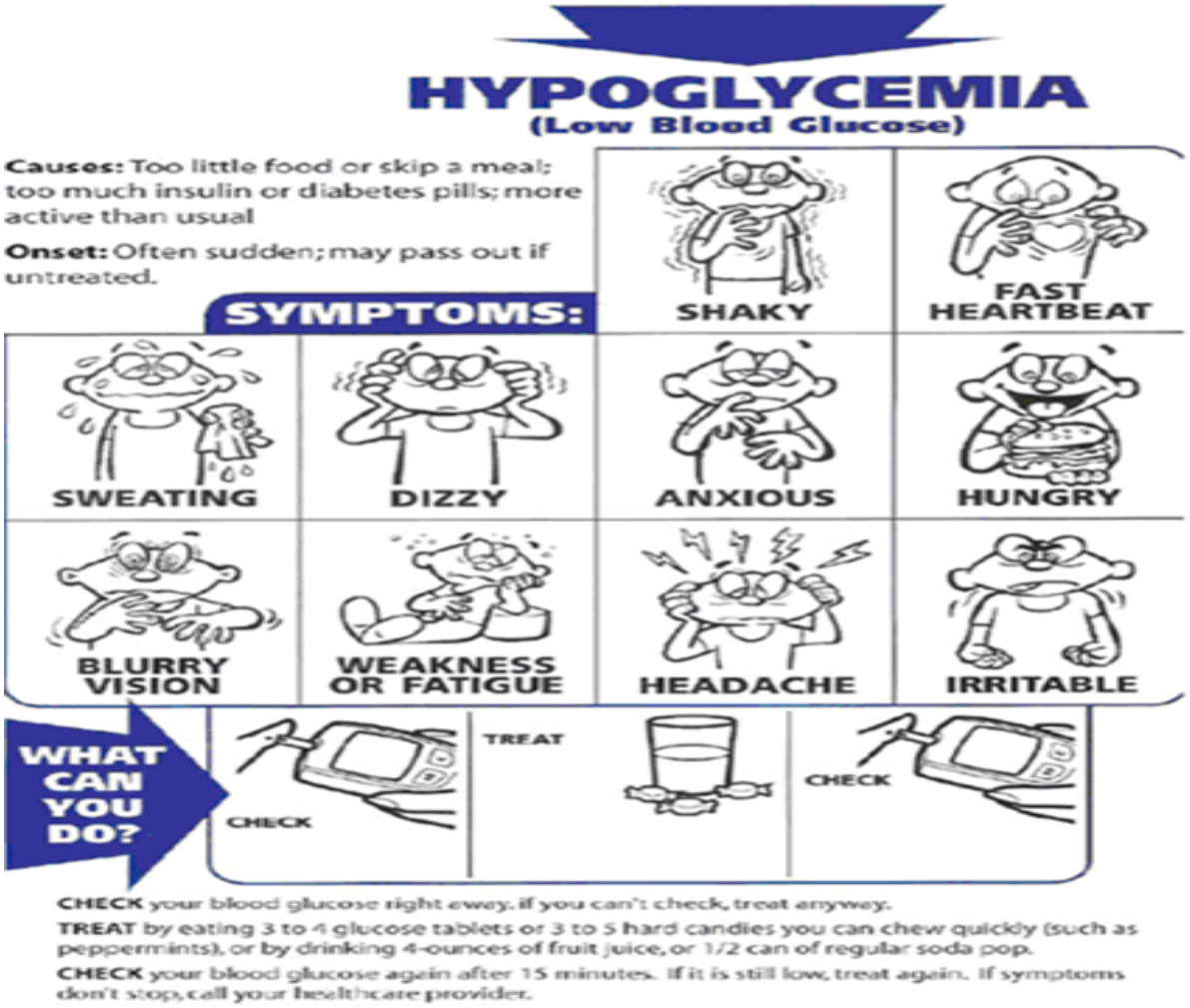
- Hypoglycemia: blood sugar level (glucose) is too low.
  Blood sugar below < 70 mg/dl is considered low

- What causes hypoglycemia?
  - High amount of diabetes medication.
  - Eating the wrong amount of carbohydrates at meal time.
  - Skipping meals.
  - Getting more exercise than usual.

Symptoms of Hypoglycemia

- Feeling shaky
- Sweaty
- Tired
- Hungry
- Confused
- Rapid heart rate
- Blurred vision
- Headache
- Numbness in mouth and lips
- If severe may lose consciousness

Symptoms



MNT for Hypoglycemia

- The nutritional treatment for low blood glucose is the "Rule of 15"

- This means once the low blood sugar is known, 15 grams of CHO-of high glycemic index food are given.

- Then blood sugar should be rechecked in 15 minutes if it is still low, then re-treat with 15 grams of CHO.

- Repeat until blood sugar is within normal.

Treatment of Hypoglycemia
Rule of 15 : 15 g of CHOs or 1 CHO choice

.	Bad Choices
½ c juice	Creamed soup
½ c regular soda	Buttermilk, Laban-up
1c skim milk	Ice cream
1 Tbsp. honey	Nuts
1 Tbsp. sugar in water	Meat, Cheese
2 Tbsp. raisins	Doughnuts

Carbohydrate Foods Classification

- Carbohydrate foods can be classified using the glycemic index which is a scale of 1-100
- The glycemic index (GI) is a measure of the speed of effect of CHO containing foods on blood glucose level.
- CHO foods that break down quickly during digestion and release glucose rapidly into the bloodstream have a high GI.
- CHO foods that break down more slowly, releasing glucose more gradually into the bloodstream, have a low GI.

Glycemic Load

- Glycemic load: refers to the amount of CHO containing food that is consumed; the portion size of the CHO containing food.

  - ✓ The bigger the portion the higher is the rise in blood glucose level.

  - ✓ The bigger the portion the higher is the glycemic response.

Exercise

- Improves the body's response to insulin,
- Helps lower blood glucose level; and
- Helps reduce body weight and keep the weight loss.

Other Recommendations

As a dietitian:

- Teach your client to use measuring cups and spoons and weights
  - ✓ Especially at the beginning to understand what is meant by amounts.

- Teach your client to read nutrition facts labels.

Gestational Diabetes Recommendations

- Consistent CHO diet,
- Total CHO recommendation: (45-65)% of TER,
- Provide enough kcal to meet energy needs to prevent ketosis:
  - Ketosis can become dangerous when ketones build up. High levels of ketones in blood lead to dehydration and change the chemical balance in blood.
  - Diabetic ketoacidosis (DKA) is a serious condition that can lead to diabetic coma, may be caused by hyperglycemia or hypoglycemia.

❖ Ketone bodies are 3 water-soluble molecules: acetoacetate, beta-hydroxybutyrate, and their spontaneous breakdown product, acetone.

Gestational Diabetes Recommendations Cont'd.

- Limit breakfast CHO to 2 choices due to hormonal surges and insulin resistance in the morning,

- An evening snack is necessary to prevent ketosis.

❖ Human placental lactogen (hPL):

  - Stimulates lipolysis and fatty acid metabolism by the pregnant woman, conserving blood glucose for use by the fetus.

  - Decreases maternal tissue sensitivity to insulin, this might result in gestational diabetes.

Herbal Remedies

- May interact with diabetes medication,
- Are sold as tablets, capsules, powders, teas, extracts, and fresh or dried plants,
- Herbal industry is not regulated. Herbal remedies are sold as dietary supplements.

❖ Consult with the physician.

Gastroparesis (Delayed Stomach Emptying)

- Is a complication of diabetes,
- Can interfere with normal digestion,
- Can cause nausea and vomiting, and
- Can cause problems with blood sugar levels and nutrition.

- Low fat, low fiber diet is prescribed:
  - Fat, fiber, and solid foods slow stomach emptying.

- 6 or more small meals may help
  - Large meals → slow stomach emptying.

Treatment in General

Diabetes is a chronic incurable disease, which could have adverse health implications on diabetic patients!

Lifestyle modification is needed to avoid the complications and this could be done through:

1. Following a healthy carbohydrate consistent diet
2. Exercising
3. Following the medical and diet prescriptions carefully
4. Losing extra weight