Dietary Management of Diabetes mellitus

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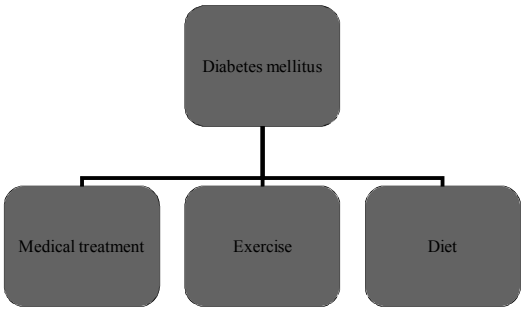
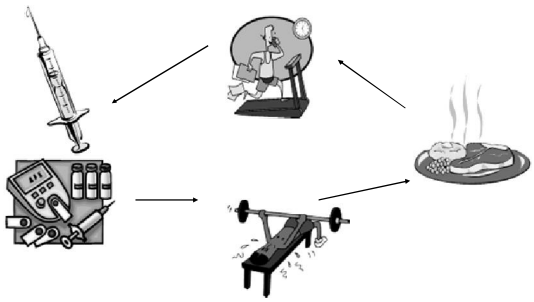
Principles of Management





Goals with dietary intervention

- Decrease HbA1c
- Losing weight
- Balancing CHO intake with insulin
- Exercise
- Prevent complications

Dietary management

One size does not fit all

- Different diets available:
- Low CHO diet
- High CHO diet
- Mediterranean diet
- Low glycaemia index diet
- CHO counting
- Plate model

Atkins diet (Low CHO)

- Bacon & eggs
- Steak & lettuce
- Fish & cheese sauce

Low CHO diet (Atkins)

- Improves HbA1c and lipid profile
- Constipation due to lack of fibre
- Requires supplementation with Vitamins A,C,B1, Folic acid, pre-& probiotics
- Expensive
- Boring!
- Gives halitosis and headaches due to ketoneamia, muscle cramps & fatigue
- Contra-indicated: type I DM; thyroid defects, children, nephropathy, corticosteroid deficiency

High CHO diet

- Portion control very important
- HbA1c does not always come down enough
- Can get elevated triglyceride levels
- No supplementation needed
- Not boring
- Cheap

Mediterranean diet

- Cardio- protective, can lower HbA1c
- Legumes and vegetables make up bulk of diet
- Fruit eaten daily
- Olive oil, olives, avocados eaten daily
- Seafood eaten regularly
- Meat and dairy used less frequently

Low glycaemia diet

- Preference is given to starches , fruit & vegetables with a low glycaemia index (0-55)
- Diet is lower in fat and high in CHO
- Foods with a high glycaemia index is combined with food from a low glycaemia index to bring down the glycaemic load of the meal

Low GI Foods

CHO counting

- This is only used in patients on basal bolus regimens
- CHO content of meal is counted and insulin is given accordingly together with supplemental insulin, if b-glucose is elevated
- CHO : insulin 500 ÷ total insulin /24hrs = g CHO which require 1IU insulin

CHO counting

- Patients are taught to count CHO according to exchange lists. Foods containing roughly the same amount of CHO are grouped together.

Food group	Portion size	Grams of CHO
Starch	½ cup	15
Fruit	1 small	15
Milk	½ cup	6
Vegetable	½ cup	7
Sugar/jam	1 teaspoon	5
Fat	1 teaspoon (5g)	0
Protein	30g (1 Tablespoon)	0

CHO counting

- Label reading is also valuable
- Labels always contain nutritional information including CHO content
- Patients may experience more insulin resistance in the morning – therefore may require a different CHO : insulin in the morning than in the evening

Plate model

- Allows patients to choose foods they enjoy, but within the recommended portion sizes.
- The focus is on increasing the portion size of the non-starchy vegetables and decreasing the portion of the starchy vegetables

JEMDSA

Goals : JEMDSA 2012:17(1):S15-17

- Weight loss if BMI is high
- Less saturated fats, trans fatty acids & cholesterol
- Less sodium
- Increase physical activity
- Monitor glucose levels to evaluate intervention

Carbohydrates

- CHO should make up 45 – 60% of energy
- Monitor CHO intake (plate model, CHO counting etc.)
- Glycaemic index can be used in type II
- Limit sugar alcohols (sorbitol, xylitol, mannitol, maltitol, lactitol, isomalt) to <10g/day
- Sucrose up to 10% of energy acceptable
- Fructose < 60g/day
- Soluble & insoluble fibre 25 – 50g/day

Implementation of Guidelines

- Eat a variety of fresh fruit & vegetables, but avoid juice
- Give preference to whole grains
- Use low-fat dairy products
- Use meat alternatives such as legumes
- Consume fish twice a week
- Limit take-aways & other convenience foods
- Increase water intake

FIBRE

SOLUBLE FIBRE

- pectin, mucilages, algal polysaccharides, hemicelloloses
- 0,5 cups dried beans, 0,3-1,2 cups dry oat bran, 0,7-1,7 cups dry oatmeal = lower LDL by 5%
- Diabetics do not need more fibre than non-diabetics
- Unpleasant side-effects

(JADA Jan 2002; 102(1))

SOLUBLE FIBRE (CONTINUED)

- increases faecal bile acid excretion + slows absorption dietary sugars
- displace SFA and cholesterol from diet
- pectin caused atherosclerotic lesions to regress despite a high fat diet and without lowering s-cholesterol
- recommendation:
  - >25g day adults
  - age + 5g children
- achieved with
  - 5 or more portions fruit + vegetables
  - and 6 or more servings whole grain

Artificial sweeteners

- Acesulfame-K, aspartame, saccharine, sucralose safe if used within set limits
- Rule of thumb : 500ml diet cold drink or 10 tablets/ day

Protein

- Protein can be eaten at 15 – 30% if renal function is normal
- Renal impairment requires protein restriction
- Protein increases insulin response & should not be used to treat hypoglycaemia

Fats

- Fats < 35% of total energy
- Saturated fats <7%
- PUFA < 10%
- Minimise trans fats
- Replace most fats with MUFA & omega 3 fatty acids like olive-, canola-,walnut-, peanut oil
- 2 or more servings of fish per week for omega 3

ALCOHOL

- lowest mortality = 1 drink per day
- alcohol raises HDL
- anti-thrombotic

NEGATIVE EFFECTS

- moderate to high consumption
- nutrient poor intake
- raises TG levels
- raises blood pressure

ALCOHOL (CONTINUED)

NEGATIVE EFFECTS

- increased risk of breast cancer
- inhibits gluconeogenesis = hypoglycemia
- alcohol interferes with glucagon action
- hypoglycemia can occur at blood levels which do not exceed mild intoxication
- used in moderation and with food = acceptable in well controlled diabetics
- abstention for pancreatitis, dyslipidaemia, neuropathy
- Increases risk of cataract development
- Increases weight gain (7kcal/g)

Salt

- guideline: 2400-3000mg/day for general population
- mild hypertension: <2300mg/day

(JADA Jan 2002 ; 102 (1); JEMDSA 2012)

PREVENTION OF ACUTE COMPLICATIONS

HYPOGLYCEMIA

- blood glucose < 3,9 mmol/l
- give 15g CHO
- 15 minutes : <3,9 mmol/l give 15g CHO
- repeat until blood glucose is normal
- time to next meal : > 1 hour – give 15g CHO
- 10g glucose increases BG 2,2 mmol/l for 30 min.
- 20g glucose increases BG 3,3 mmol/l for 45 min

(Diabetes Care Jan 2002 ;27(suppl 1))

GUIDELINES FOR PREVENTING HYPOGLYCAEMIA

- spread CHO evenly into meals and snacks
- avoid concentrated CHO with high GI
- avoid caffeine
- small frequent meals
- avoid/ limit alcohol use
- decrease fat intake when glucose is low
- Add fat to CHO to prevent glucose falling after 60 min
- Hypoglycaemia increases gastric emptying 200%

JEMDSA

- Patient-centred approach
- Assess nutritional status
- Assess diabetes self-management knowledge & skills
- Identify & negotiate patient's nutrition goals
- Tailor nutritional intervention to patient's needs, medical therapy & activity and allow flexibility
- Evaluate outcomes, ensure ongoing monitoring, support & assessment

LONG-TERM COMPLICATIONS

LONG-TERM COMPLICATIONS (CONTINUED)

TREATMENT OF GASTROPARESIS

- glycaemic control → hyperglycaemia increases lag-phase of gastric emptying which aggravates symptoms
- dietary modifications : low fiber →to prevent stomach retention; low fat → to speed up gastric emptying; small meals → to reduce neuromuscular work of gastric emptying
- pharmaceutical agents (cisapride, erythromycin, metochlopramide, domperidone)

RENAL DISEASE

STAGE V NEPHROPATHY MAY BE POSTPONED BY :

- anti-hypertensives
- tight glycaemic control
- protein restriction (0,8g/kg/day)

Micronutrient supplementation

- Routine supplementation not indicated- except vit.D in those >50 years
- Elderly, pregnant or lactating patients may need supplementation
- Anti-oxidant supplementation not recommended except for smokers
- Chromium supplementation only benefits those who have a true deficiency

COMPLIANCE

- Individualize meal plan according to preferences and treatment
- Customize favourite recipes
- Adapt insulin therapy to accommodate life style and exercise program
- Monitor blood glucose and adjust insulin and or meals
- Intensifying insulin therapy – offers more flexibility

Prescription

- Put all of this into individual foods and portion sizes
- You have to know what constitutes most foods
- Some foods share characteristics and are grouped together, eg. Starches such as rice and wheat, but potatoes and sweet potatoes also resort under this group
- Involve patient when making recommendations

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Balance is the key