

Course Title: NORMAL AND THERAPEUTIC NUTRITION

Course No : FSN 204 3(2+1)

Course offered : II year B.Sc (Hons), College of Community Sciences UAS Dharwad

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TOPIC – THERAPEUTIC DIETS

Contents- importance, types, modification of diets. Methods of feeding- normal and artificial, tube and parenteral feeding

Diet therapy is a branch of dietetics concerned with the use of food for therapeutic purpose. Diet therapy is a broad term used for the practical application of nutrition as a preventive or corrective treatment of a disease. It concerns with recovery from illness by giving good diet and prevention of disease. It may involve the modification of the existing dietary lifestyle to promote optimum health.

The principles of diet therapy are to:

- maintain good nutritional status,
- correct deficiencies or disease, if any
- provide rest to the body
- help metabolize the nutrients, and
- make changes in body weight, when necessary.

Diet therapy may include prescribing specialized dietary regimes or meal plans. These specialized diet regimens or meal plans are called therapeutic diets. Therapeutic diet refers to a meal plan that controls the intake of certain foods or nutrients. They are adaptation of the normal, regular diet. Some common examples of therapeutic diets include clear liquid diet, diabetic diet, renal diet, gluten free diet, low fat diet, high fibre diet etc. Therapeutic diets are usually prescribed by dietitians, nutritionists or physicians.

Therapeutic diet is a qualitative/quantitative modified version of a normal regular diet which has been tailored to suit the changing nutritional needs of patient/individual and are used to improve specific health/disease condition. It is a planned diet used to supplement the medical or surgical treatment.

ILLNESS AND NUTRITION:

- Illness has many effects on body ability to use nutrient and upon specific requirement.
- Lack of appetite, vomiting and pain prevent the intake of food.
- In severe diarrhoea, the absorption of all nutrients is poor, so that loss of weight, dehydration and sign of malnutrition may be found.
- Fever increases the rate of metabolism, thus increases the need for energy, protein and vitamin
- In diabetes the nutrients are not utilised fully diabetic will not make use carbohydrate properly.
- A patient who remains on bed or in a chair for along time usually loses increases amount of nitrogen, calcium from his body. These are numerous examples of effect of illness nutrition

Balanced diet is defined as one which contains a variety of foods in such quantities and proportions that the need for energy, proteins, vitamins, minerals, fats and other nutrients is adequately met for maintaining health and well being

Normal or general diet in a hospital setting is a balanced diet which meets the nutritional needs of an individual/patient. It is given when the individual's medical condition does not warrant any specific modification. Most hospitals follow simple dietary recommendations (given by ICMR(Indian council for Medical Research) for Indian population) while planning the general diet. It is planned keeping the

basic food groups in mind so that optimum amount of all nutrients is provided. Further, since the patient is hospitalized or on bed rest, reduction of 10% in energy intake should be made. The diet provides approximately 1600 to 2200Kcal, and contain around 180 to 300g carbohydrates, 60 to 80g of fat and 40 to 70 g of protein.

Soft diet and the liquid diets which are examples of therapeutic diet. In addition to these there may be other modified diets which individuals may require as part of their therapeutic needs. The reasons for modifying the diets may include:

- For essential or lifesaving treatment: For example in celiac disease, providing gluten free diet,
- To replete patients who are malnourished because of disease such as cancer and intestinal diseases by providing a greater amount of a nutrient such as protein,
- To correct deficiencies and maintain or restore optimum nutritional status,
- To provide rest or relieve an affected organ such as in gastritis,
- To adjust to the body's ability to digest, absorb, metabolize or excrete: For example, a low fat diet provided in fat malabsorption,
- To adjust to tolerance of food intake. For example, in case of patients with cancer of esophagus tube feeding is recommended when patients cannot tolerate food by mouth,
- To exclude foods due to food allergies or food intolerance,
- To adjust to mechanical difficulties, for example for elderly patients with denture problems, changing the texture/consistency of food recommended due to problems with chewing and/or swallowing,
- To increase or decrease body weight/body composition when required, for example as in the case of obesity or underweight,
- As helpful treatment, alternative or complementary to drugs, as in diabetes or in hypertension

Modification of Normal Nutrition to Therapeutic Needs

A diet may need to be altered and adjusted in many ways before it meets the therapeutic needs of an individual patient. These adaptations may include:

- Change in consistency of foods, such as liquid diet, soft diet, low fibre diet, high fibre diet.
- Increase or decrease in energy value of the diet such as low calorie diet for weight reduction, high calorie diet for burns.
- Increase or decrease in specific nutrients or type of food consumed, such as sodium restricted diet, lactose restricted diet, high fibre diet, high potassium diet.
- Elimination of spices and condiments, such as bland diets.
- Omission of specific foods such as allergy diets, gluten free diet.
- Adjustment in the ratio and balance of proteins, fats and carbohydrate such as diabetic diet, renal diet and cholesterol-lowering diets.
- **Test diets:** These are single meals or diets lasting one or few days that are given to patients in connection with certain tests e.g. the fat absorption test used to determine if steatorrhea is present.
- Change in frequency of meals, feeding intervals, re-arrangement of the number and frequency of the meals such as diabetic diet, diet for peptic ulcer disease.

Remember, normal nutrition is the foundation upon which the therapeutic modifications are made. The various dietary adaptations for therapeutic needs are briefly highlighted here.

Diets of Altered Consistency

Therapeutic diets are modified for consistency, texture to fit the nutritional needs. Some individuals may require a clear liquid diet, while others a fully liquid diet or soft diet based on their medical condition.

A) **Liquid Diet** consists of foods that can be served in liquid or strained form in room temperature. They are usually prescribed in febrile states, postoperatively i.e. after surgery when the patient is unable to tolerate solid foods. It is also used for individuals with acute infections or digestive problems, to replace fluids lost by vomiting, diarrhoea. The two major types of liquid diets include - Clear liquid diet and full liquid/fluid diet.

- i) **Clear liquid diet-** The diet is made up of clear liquid that leave no residue and is non gas forming, non- irritating and non stimulating to peristaltic action. This diet entirely inadequate from nutrition point of view since it is deficient in protein, minerals, vitamin and energy. It should not be continue for more than 24-48 hours. The amount of fluid is restricted to 30-60ml/hr at first, then gradually the amount is increased as patients condition improved. Clear liquid diet gives 400-500kcal. Given to acute illness or following surgery, acute vomiting and diarrhoea and distension. In acute inflammatory condition of intestinal tract. When it is desirable to prevent evacuation from colon or rectum clear liquid is given. It is given to relieve thirst and to provide water to tissues provide sodium and potassium in addition to water. The juices that do not agree with the patients are omitted.

It provides fluids that are clear and liquid at room temperature. The purpose of the clear liquid diet is to provide fluids and electrolytes to prevent dehydration. It provides some amount of energy but very little amount of other nutrients. It is also deficient in fibre. Hence it is nutritionally inadequate and should be used only for short periods i.e. 1-2 days.

Examples of clear liquid diet: Water, strained fruit juices, coconut water, lime juice (nimbu pani), whey water, barley/arrowroot water, rice kanji, clear dal soup, strained vegetable or meat soup, tea or coffee without milk or cream, carbonated beverages, ice pops, plain gelatin are some examples of clear liquid diet.

ii) **Full liquid diet**

Full fluid diet contains all that foods that are liquid at room temperature. Example: ice cream is considered as liquid. 6 feedings are given. This is considered adequate for maintenance. The diet gives 1200kcal and 35-45 g of protein. By careful planning the protein and energy requirement may be increased to approach normal diet. If the diet has to continued for indefinite period the protein and vitamin supplements are added to liquids. It is the transiting diet between clear and soft diet. Used for following acute infections of short duration, patients to ill to chronic GIT disturbances and diarrhoea.

It provides food and fluids that are liquid or semi liquid at room temperature. It is used as a step between a clear liquid diet and a regular diet. The purpose of the full liquid diet is to provide an oral (by mouth) source of fluid for individuals who are incapable of chewing, swallowing or digesting solid food. It provides more calories than the clear liquid diet and gives adequate nourishment, except that it is deficient in fibre. It is indicated for post-operative patients and for gastrointestinal illness. The nutritive content of the full liquid diet can be increased by using protein, vitamin and fibre supplements.

Examples of full liquid diet: Foods allowed or included in a full liquid diet include beverages, cream soups, vegetable soups, daal soups, strained food juices, lassi/buttermilk, yogurt, hot cocoa, coffee/tea with milk, carbonated beverages, cereal porridges (refined cereals) custard, sherbet, gelatin, puddings, ice cream, margarine, butter, cream (added to foods), poached, half boiled egg etc.

B) Soft diet as the name suggests provides soft whole food that is lightly seasoned and are similar to the regular diet. The term 'soft' refers to the fact that foods included in this type of diet are soft in consistency, easy to chew and made of simple, easily digestible foods. It does not contain harsh fibre or strong flavors. It is given during acute infections, certain gastrointestinal disorders and at the post-operative stage to individuals who are in the early phase of recovery following a surgery. The soft diet provides a transition between a liquid and a normal diet i.e. during the period when a patient has to give up a full liquid diet but is yet not able to tolerate a normal diet. Soft diet can be nutritionally adequate (providing approximately 1800-2000 calories, 55-65g protein) provided the patient is able to consume adequate amount of food.

Examples of soft diet: A soft diet freely permits the use of cooked vegetables, soft raw fruits without seeds, broths and all soups, washed pulses in the form of soups and in combination of cereals and vegetables (like khichri, dalia), breads and ready-to-eat cereals (most preferable refined such as poha, upma, pasta, noodles etc.), milk and milk beverages, yogurt, light desserts (including kheer, halwa, custard, jelly, ice cream), Egg and tender and minced, ground, stewed meat and meat products, fat like butter, cream, vegetable oil and salt and sugar in moderation. Foods to be best avoided in the soft diet include coarse cereals, spicy highly seasoned and fried foods, dry fruits and nuts, rich desserts.

C) Bland Diet: A bland diet is made of foods that are soft, not very spicy and low in fiber. It consists of foods which are mechanically, chemically and thermally non-irritating i.e. are least likely to irritate the gastrointestinal tract. Individuals suffering from gastric or duodenal ulcers, gastritis or ulcerative colitis are prescribed this diet.

Foods Included: Milk and milk products low in fat or fat free; Bread, pasta made from refined cereals, rice; cooked fruits and vegetables without peel and seeds; Eggs and lean tender meat such as fish, poultry that are steamed, baked or grilled; Cream, butter; Puddings and custards, clear soups.

Foods Avoided: Fried, fatty foods; Strong flavored foods; Strong tea, coffee, alcoholic beverages, condiments and spices; High fiber foods; hot soups and beverages; whole grains rich in fiber; strong cheeses.

1. Modification in Quantity

Depending on the clinical condition some individuals may require a restriction diet such as sodium restricted diet (as in high blood pressure), purine restricted diet (as in gout) or low residue diet (prescribed and/or before abdominal surgery) designed to reduce the frequency and volume of fecal output. Sometimes a complete elimination diet may be recommended when there is food intolerances or complete insensitivity to a particular food such as a gluten free diet or a dairy free diet or nut free diet etc. Occasionally an increase in the amount of a specific dietary constituent may be prescribed such as a high potassium diet or a high fibre diet (as in constipation) or an iron-rich diet (as in anemia) when the clinical condition demands.

2. Modification in Nutrient (Proteins, Fat, Carbohydrate) Content

The nutrient content of the diet is modified to treat deficiencies, change body weight or control diseases such as hypertension or diabetes. You may have come across patients with high blood sugar levels, being prescribed a diabetic diet which requires changes in the quantity and type of carbohydrates included in each meal. Refined carbohydrates (such as sugar, honey, refined flour, semolina etc.) are best avoided and use of complex carbohydrates (whole wheat flour, coarse

cereals etc.) recommended. Patients with heart diseases require a fat controlled low cholesterol diet while patients with renal (kidney) failure and advanced liver diseases a low protein diet, patients with HIV disease, cancer or malnourished a high protein, high calorie diet. Others as in the case of overweight, obesity a weight reduction diet, low in fat and calories.

3. Changes in Meal Frequency

Individuals suffering with gastro-esophageal reflux disease (GERD) stand to benefit by consuming small but frequent meals. 5 to 6 small meals instead of three regular meals are recommended.

4. Changes in Method of Cooking

Leaching is indicated for cooking vegetables for people with chronic kidney diseases because the kidney's no longer maintains the ideal level of potassium necessary for optimum health. Leaching (soaking in water) drains out excessive potassium and phosphorous from the vegetables. In elderly people food may be modified by mechanical processing such as mashing, blending or chopping. For patients on bland diet foods steamed, baked or grilled are recommended. A review on the methods of cooking is presented for your understanding at the end of the book.

5. Modification in the Method of Feeding

To provide adequate nutrition, normally oral feeding (by mouth) is recommended. Sometimes oral feeding is not possible, under such circumstances special feeding methods such as enteral feeding (provision of liquid formula diet delivered via nasogastric feeding tube) and parenteral feeding (fluids containing water, glucose, amino acids, minerals, vitamins given through the peripheral and central veins) is recommended.

Methods of Feeding

NORMAL, ARTIFICIAL (TUBE AND PARENTERAL FEEDING)

- ⊙ **Normal feeding** – Oral or normal feeding is the method preferred for a patient when he is able to tolerate food by mouth. The diet may be normal/ soft / soft bland/ liquid, depending upon the need.
- ⊙ **Artificial feeding / parenteral feeding** – When the patient is not able to tolerate food by mouth artificial feeding is recommended.

a) Tube feeding- During surgery or inflammation of mouth, or when patient is unable to swallow tube feeding is recommended, it can be nasal tube feeding or rectal tube feeding. The diet prescribed may be homogenized strained and given through tubes or commercial formulae may be used.

b) Intra venous feeding – In case of surgical conditions, severe burns or when complete digestive system requires rest, intravenous feeding is recommended, the objective being to restore and maintain fluid and electrolyte.

c) Blood plasma transfusions – In severe hemorrhagic condition transfusion is recommended for sustaining normal blood supply.

Modifications of normal diet for therapeutic purpose :

Therapeutic diets are nothing but modification of normal diet. The modifications are made to help to compensate for the days function of affected part or to meet the specific needs of a disease and to give rest to the needy organ. The normal diet may be modified as follows-

1. Change in texture and consistency of foods : Body condition

2. Increase or decrease in energy value of diet

High calorie diet : Underweight

Low calorie diet : obesity/ over weight

3. Inclusion of greater or lesser amounts of one or more nutrients

High fibre diet : Kwashiorkar

Low sodium diet : Hypertension, kidney diseases, CVD

4. Increase or decrease in bulk

High fibre diet: Constipation

Low fibre diet: Peptic ulcer, typhoid

5. Change in flavour bland food: Ulcer

6. Omission of specific foods: Food allergy

7. Change in number and frequency of meals: Diarrhoea, febrile conditions

Special feeding methods

Enteral nutrition can be provided either orally or by tube feeding. By definition enteral means “within or by the way of the gastrointestinal tract”. In practice enteral nutrition is generally considered as tube feeding.

Oral feeding is the best for the nourishment of the patient. But in the following conditions it is not possible to give the feeding orally and tube feeding or parenteral feeding is restored.

- ⊙ Those who cannot swallow due to paralysis of the muscles of swallowing (diphtheria, polio-myelitis) or cancer of the oral cavity or larynx.
- ⊙ Those who cannot be persuaded to eat.
- ⊙ Those with persistent anorexia requiring forced feeding.
- ⊙ Semiconscious or unconscious patients.
- ⊙ Short bowel syndrome.
- ⊙ Those who are undernourished or at risk of becoming so.
- ⊙ Those who cannot digest and absorb.
- ⊙ After surgery.
- ⊙ Patients with neurological and renal disorders or have continued fevers or diabetes.

- ⊙ Babies of very low birth weight.

Tube feeding:

This is done by passing a tube into the stomach or duodenum through the nose which is called nasogastric feeding or directly by surgical operation known as gastrostomy and jejunostomy feeding.

A satisfactory feeding must be:

- ⊙ Nutritionally adequate
- ⊙ Well tolerated by patient so that vomiting is not induced
- ⊙ Easily digested with no unfavorable reactions such as distension, diarrhoea or constipation
- ⊙ Easily prepared
- ⊙ Inexpensive
- ⊙ Water is added to make the volume 1500 ml
- ⊙ Gives 1500 calories (each ml gives one calorie)
- ⊙ Gives 50g protein
- ⊙ Cost is no more than an average meal in hospital.

Composition of blenderised food for tube feeding for hospital practice

Ingredient	Amount (g)
Rice	75
Green gram dhal	40
Bread	20
Milk	200
Skim milk powder	60
Spinach	50
Pumpkin	50
Carrots	50
Banana	70
Sugar	60
Refined oil	20
Butter	7

- ⊙ In tube feeding presterilisation, minimal preparation time and ease of administration are must.
- ⊙ The disadvantage are high cost and unpleasant taste and sometime high osmolarity.

Feeding requirements:

A concentration of about 1 kcal per milliliter is satisfactory. Lesser concentration increases the volume which must be given to meet the nutrient and energy needs. Greater concentration is more likely to produce diarrhoea and may be too thick to pass through a nasogastric tube.

Feeding requirements in tube feeding

Nutrient	Amount
Fluids	30 ml/kg
Energy	32 kcal/kg
Protein	1g/kg body weight
Sodium	30-40 mMol(provided there are no external losses)
Potassium	1 mMol/gram of protein

Total parenteral nutrition: it is providing the nutrients through parenteral route that is directly into a vein. The same process is called hyperalimentation when at least 150 per cent of daily requirements are provided to produce a positive nitrogen balance for gain in weight.

Partial parenteral nutrition provides 30-50 percent of daily nutrients the rest is provided through enteral route.

TPN includes:

- ⊙ Glucose
- ⊙ Emulsified fat
- ⊙ Crystalline amino acids
- ⊙ Vitamins including B12, folic acid and vitamin K
- ⊙ Electrolytes: sodium, chlorine, phosphorous, potassium, calcium and magnesium
- ⊙ Trace elements: zinc, copper, chromium, manganese and iodine
- ⊙ Water

Adequate non- protein calories 150 NPC/g of nitrogen are provided in the programme so that amino acids are used for protein synthesis.

TPN formula for Children

Calories- a rule of the thumb for calorie requirement would be 110-125 kcal/kg/day for new born 100- 110 kcal/kg/day for older child similar to normal requirements.

Hypertonic glucose- 50%, 25%, 20% and 8% are used for providing calories. Glucose more than 15% requires central vein for insulin. Maximum rate of infusion should be 6mg/kg/mt. Upto 70% of total requirements can be met with glucose. Providing more glucose than recommended only leads to fat and water accumulation. Addition of potassium and insulin prevents loss of sugar in urine. 15-30 g/kg/ day can be provided by glucose.

Isotonic fat solution: provides more calories with low osmolarity as calories are provided in concentrated form. So peripheral vein can be used. It is not lost in urine.

- ⊙ Amino acids- 2-3g/kg/day should be given. One liter of Astymin gives approximately 90g of amino acids. The solution can be mixed with routine glucose based maintenance solutions. Adequate calories as glucose and lipid have to be provided to prevent amino acids from being used up for energy production.
- ⊙ Electrolytes- 3.5 mEq of sodium/potassium/chloride to be provided daily.
- ⊙ Vitamins- standard multivitamin preparations are available. They can be added to the drip. Vitamin K and B12 can be given intramuscularly. Folic acid can be added separately.
- ⊙ Trace elements- oral preparation called Aquamin which contains all the major trace elements can be given (1-3 tsp/day). Standard trace elements solution contains zinc sulphate, copper sulphate, sodium fluoride, sodium iodide and magnesium sulphate.
- ⊙ Iron is not to be used in the presence of infections due to potentiation of gram negative septicameia multiplication of bacteria in blood stream.
- ⊙ Guidelines for protein, carbohydrate and fat are the same for enteral and total parenteral nutrition.
- ⊙ TPN formulas for adults
- ⊙ TPN solution is given 100 ml per hour. For 24 hours, 2400 ml is given.

Calories from carbohydrates-

TPN solution contains 25% dextrose

That is 100ml contains 25 g

2400 ml contains - 600g

1 g of dextrose in monohydrate form gives – 3.4 kcal

Therefore, 600g of dextrose gives- 2040 kcal.

Calories from protein-

TPN solution contains 4% amino acids

That is 100ml contains

2400 ml contains - $4 \times 24 = 96$ g

1 g of amino acids gives – 4 kcal

96 g of amino acids gives- $4 \times 96 = 384$ kcal

Calories from fat-

Minimum requirement of fat is 50 g

1ml 10% fat emulsion gives - 1.1 kcal

500 ml of 10% fat emulsion – $1.1 \times 500 = 550$ kcal (to run over 6 hours)

Total calories-

Calories from CHO	-	2040
Calories from protein	-	384
Calories from fat	-	<u>550</u>
		<u>2974 kcal</u>

DIETICIAN AND ROLE OF DIETICIAN

Dietician is the specialist who is uniquely qualified to plan and direct the activities related to the patient nutritional case.

ROLE OF DIETICIAN

- Dietician looks after the diets of individuals who are healthy and who need the therapeutic diets and the community on the whole.
- She interprets the physician diet order in terms of meal pattern which have been individualized according to patients food habits as well as therapeutic needs.
- Dietician is responsible for preparation and service of food to the patient, the evaluation of patient's response to his diet and subsequently counselling of patient and his family if a home diet is required.
- She should know how to adapt principles of normal nutrition to the various regimens for adequacy, accuracy, economy and palatability. She should be able to calculate the nutrients.
- She should know the need for dietary supplements such as vitamins and minerals, when diet imposes severe restriction, the patient's appetite poor absorption and utilization are impaired.
- Dietician should be able to apply the principle of preparation and service of appealing, palatability and nutritious food. They must have the necessary understanding of psychology of patients and emotional factors influencing food acceptance.
- Planning necessitates consideration of social, religious and cultural pattern, availability of food, cost and suitable methods of preparation.

FACTORS TO BE CONSIDERED IN STUDY OF DIET THERAPY

Certain understanding and abilities are to be developed

- The underlying disease condition requires a change in diet.
- Possible duration of disease.
- Factors in diet which need to be altered to overcome the condition.
- The patients tolerance for food by mouth

Scope of dietetics

Dietetics- is the combined science and arts of feeding individuals or groups under different economic or health conditions according to the principles of nutrition and management.

Nutrition and health go hand in hand. Proper body functioning requires supplementation of all the nutrients in optimum amounts. Food provides energy.

Dietetics include-

- Planning of meals for the healthy and sick, selection, preparation and serving of foods with due emphasis on economic and social and psychological factors.
- Other materials for construction, regeneration of tissues, continuous production of hormone and enzymes. For this the diet should furnish all the nutrients protein, CHO, fats, vitamins and minerals. Nutrients are important for growth and maintenance of body tissues both in health and sickness. Lack or deficiency of one or more nutrients may lead to disease. Susceptibility in healthy individuals, it may aggregate the disease in sick persons. This intimate relation of health and nutrients was recognized in olden days.
- Diet is also implicated in cause, care and prevention of disease.
- Nutrients requirement may not be same and vary during different parts and condition of life. The nutrient requirement may increase or decrease in ailments depending on the condition of health and type of disease and require modification in the diet.
- A hospital caters to needs of the patients through drugs and diet. There is increased protein need in surgical patients, restricted simple CHO in diabetics, failure to ingest sufficient quantity of food and inability to digestion can lead to nutrients deficiency which aggregates disease and lead to malnutrition, malnutrition leads to disease and prolongs convalescence period in sick.

Recognizing the importance of nutrition in patients Govt. Of India in 1965 has formed national nutritional advisory committee to formulate various general and modified diets for patients and set guidelines for functioning of dietary departments.

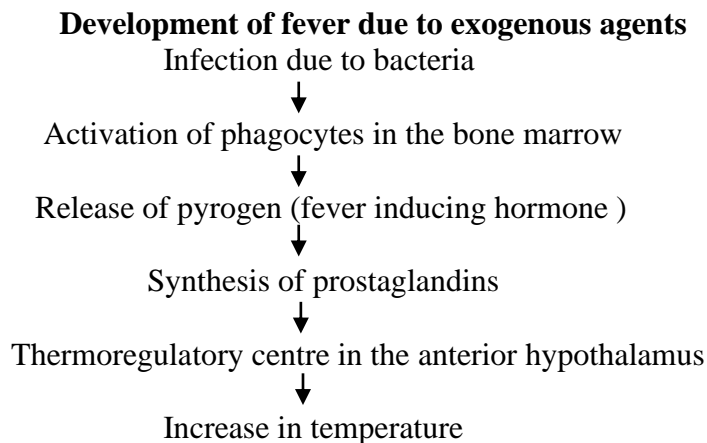
TOPIC – DIETARY MANAGEMENT DURING FEVER

Contents - Aetiology, symptoms and dietary management in acute and chronic fever- typhoid, influenza, tuberculosis

METABOLIC ALTERATIONS AND DIET IN FEVERS

Fever is elevation in temperature above normal which may occur due to Exogenous or Endogenous factors or due to the imbalance between heat produced and heat eliminated.

- Exogenous- Micro organisms (bacteria and fungi)
- Endogenous - antigen and antibody reactions.



Basal Metabolic Rate is defined as the rate at which our body uses energy when we are resting in order to keep the vital body functions (such as breathing, heart beating etc.) going and are typical of chronic bacterial infections such as tuberculosis, viral infections like HIV, cancers etc.

TYPES OF FEVER

- 1) Acute fever – short duration fever (Influenza, cold, measles, chicken pox, typhoid, tonsillitis)
- 2) Chronic fever – such as Tuberculosis, AIDS lasting for years
- 3) Intermittent fever – such as Malaria, infectious hepatitis.

METABOLIC CHANGES DURING FEVER

- 1) Increase in the basal metabolic rate (BMR). Note, there is a 13% increase in BMR with every 1°C rise in body temperature.(or 7% increase with every 1°C increase in temperature).
- 2) Decreased glycogen stores and stores of adipose tissue.
- 3) Increased catabolism (breakdown) of proteins, especially in case of typhoid, malaria, tuberculosis fevers. This results in production of excess amount of nitrogenous wastes, which places an additional burden on the kidneys.
- 4) Increased excretion of sodium, potassium, chloride etc. through sweat, urine, vomiting leading to electrolyte imbalance.
- 5) Accelerated loss of body fluid in the form of excessive sweat and urine formation.
- 6) Loss of appetite which limits the food intake thus leading to weight loss.

- 7) Decrease in the absorption of nutrients like proteins, vitamins, minerals.
- 8) Modified motility of GIT,
 - a) in some infectious motility increases diarrhoea interferes with nutrient absorption.
 - b) In some infections motility is reduced and nausea and vomiting interfere with intake of food.

GENERAL DIETARY CONSIDERATIONS

Diet depends on nature and severity of fever

- 1) **Energy**- calorie requirement may increase by 50% if temperature is high.
- 2) **Protein**- about 100g proteins are prescribed if fever is prolonged. The calorie intake should be liberated for efficient utilisation.
- 3) **Carbohydrates**- glycogen stores are replenished by liberal intake of carbohydrates. Glucose, corn syrup and cane sugar which are readily absorbed are used.
- 4) **Fats**- energy intake can be increased by use of fat, but fried food and rich pastry retard the digestion.
- 5) **Vitamin** – fevers increases the requirement of vitamin A, ascorbic acid and B complex vitamins. (for every 1000kcal additional calories 0.5mg thiamine, 0.6mg riboflavin and 6.6mg of niacin).
- 6) **Minerals** – sodium chloride intake is increased by liberal sprinkling of salt in broths and syrups. Fruit juices and milk are good sources of potassium.
- 7) **Fluid** - intake of fluids must be liberated to compensate losses from skin excretion of wastes. 2500-5000ml is necessary. Include beverages, soups and fruit juices etc

Food should be soft blend and readily digestible, should facilitate digestion and rapid absorption. Solid foods are better tolerated.

Interval of feeding - 2-3 hours.

DIET IN TYPHOID

Typhoid is an infectious disease with acute fever of short durations and occurs only in human beings. *Salmonella typhi* causes typhoid, *salmonella schottmulleri* causes paratyphoid B. Faeces and urine of the patients or carriers of diseases are source of infection. Drinking water or milk and food contaminated by intestinal contents of patients or flies transmit the diseases.

Typhoid bacillus do not multiply in water but survive for 7 days. They may survive for 1 month in ice cream and ice. Typhoid bacteria multiply in milk without affecting its taste and appearance. Vegetables grown in sewage water or washed in contaminated water may cause typhoid. Incubation period is 10-14 days, it may be as short as 3 days or as long as 3 weeks depending on the dose of bacilli ingested. The disease begins in small intestine where bacteria attach to the epithelium of intestinal wall, penetrate this layer and multiply in mesenteric lymph nodes and reach the blood stream. Here lysis of bacteria by action of antibodies results in liberation on endotoxins which causes symptoms such as fever. Some bacteria pass from liver to gall bladder and secreted into small intestine where they cause diarrhoea.

- During acute phase appetite is poor.
- Small feeding of soft or liquid diets is needed. Fluids and salt is essential.
- If the illness persists high protein and high energy foods are needed. (3500kcal energy and protein in excess of 100g). Low fibre diet due to intestinal inflammation and diarrhoea.

SIGNS AND SYMPTOMS

- High intestinal inflammation
- Intestinal ulcers
- Haemorrhage and enlargement of spleen
- Payers patches or flat patches of lymphatic tissues situated in small intestine
- Severe stomach ache
- Diarrhoea or constipation

PRINCIPLES OF DIET- High calorie, high CHO, high protein, low fat, high fluid, low fibre and bland diet is suggested for typhoid patients.

Foods included- Fruit juices with glucose, barley water, milk if no diarrhoea, custard, thin dhal, eggs, baked fish, cottage cheese, cereal gruels, steamed vegetables juices, milk pudding, vegetables purees.

Foods avoided- Butter, ghee, vegetable oil, fibrous foods, chillies, spices, fried foods, pastries.

DIET IN TUBERCULOSIS (T.B)

Tuberculosis is infectious disease spread by bacillus mycobacterium tuberculosis. It affects lungs and localised in lymph nodes, intestines, bones and joints and skin. Pulmonary tuberculosis is an inflammatory disease of lungs accompanied by wasting of tissues, exhaustion, cough and fever. There is high fever and increased respiration in acute phase and chronic phase has low grade fever though metabolic rate is high, loss of appetite, pain in chest, fatigue, weight loss, worst cough and blood in sputum, catabolism of tissues is seen. Pulmonary tuberculosis is an inflammatory disease of lungs accompanied by wasting of tissues.

Diet is modified as follows-

- 1) **Energy** – metabolic rate is not as high as in other fevers hence satisfactory weight gain can be maintained. 2500-3000 kcal energy is needed.
- 2) **Protein-** a protein intake of more than normal is needed. Since serum albumin levels are low in long standing of T.B 80-120g of protein is recommended.
- 3) **Minerals-** calcium intake is to be liberal for healing of T.B. Iron needs may be increased if there is haemorrhage. Atleast one litre of milk should be taken daily.
- 4) **Vitamins-** the metabolism of vit A is adversely affected in TB hence carotene is poorly converted to vitamin A. So diet should contain vitamin A and dietary supplementation is needed.

Ascorbic acid deficiency is present in T.B so vitamin C rich foods such as orange juice are included.

PRINCIPLES OF DIET- high energy, high protein, diet rich in vitamins and minerals and high fluid, soft diet is recommended.

During acute stage of T.B a high protein high calorie fluid diet is given progressing to soft and regular diet when improvement occurs. Most patients have poor appetite. Six meals are advised but some eat better with 3 meals and 1 bed time feed. Meals should be appetising and appealing in taste.

DIET IN POLIOMYELITIS

Some attention as in other acute fever is needed. Difficulty or failure in swallowing is present. Four stage feeding is advised-

Stage 1 - tube feed of 30-50ml up to 150-200ml every 2 hours. Egg, sugar, milk, orange juice can be included.

Stage 2 - if swallowing is successful then tube feeding is continued + oral liquid feeding.

Stage 3 - a soft low fibre diet is started with continued tube feeding.

Stage 4 - more solid foods are included.

Calories- prescribed food allowance must provide sufficient fuel value to meet Energy requirement and an additional allowance of 500-1000 calories. Calories should be gradually increased to deposit fat in adipose tissue. Average high calorie diet contains 3000 kcal. If he is consuming 1000 kcal then for him high calorie diet should contain 2000kcal.

Proteins- in average high calorie diet for underweight high protein of 1.2g in place of 1g/kg body weight or more is given. If we cannot digest protein, crystalline amino acids are given.

CHO and fat- butter, cream, cereals, potatoes and desserts, sweets, nuts, kheers and high protein drinks are added.

Minerals and vitamins – allowances of minerals and vitamins are maintained at optimum level. Thiamine is given to stimulate appetite.

500kcal increases over should allow given according weight.

SUGGESTIONS-

1) Breakfast should include heavy cream and banana, butter, jelly, jam, cake, pudding, egg, malted milk, skim milk powder, milk beverages, ice cream, dried fruits. In between meals quick digesting foods such as fruits juices, biscuits can be given. 3 meals with mid morning and mid afternoon are given, bulky foods are avoided.

INFLUENZA

Sneeze or cough contains many viruses and is wide spread by inhalation.

SYMPTOMS- onset is sudden and consist of headache, lassitude, myalgia, shivery and fever. Dry cough and sneezy, lassitude and depression for 1-2 weeks. Bronchitis and pneumonia are the frequent complication.

Dietary treatment is similar as suggested earlier.

MALARIA

Plasmodium species responsible are P.vivax, P. malaria, P.ovale; P.falciperum spreads by the bite of infected female anopheles mosquitoes, or by blood transfusion.

SYMPTOMS- Malarial attack shows sequentially 4-6 hours. Cold stage where there are shaky chills, then fever (hot stage) 41°C or high. Then sweat stage, fatigue, headache, dizziness, diarrhoea, backache, cough, myalgia. Attacks are seen every 2nd day. Dietary treatment same as that of fever

TOPIC – DIETARY MANAGEMENT OF GASTRO INTESTINAL DISORDERS

Contents - Aetiology, symptoms and dietary management of Diarrhea, peptic ulcer and constipation – types- Atonic and spastic constipation

DIARRHOEA

Diarrhoea is passage of stools with increased frequency, fluidity and volume compared to usual one. Acute diarrhoea is cause of morbidity and mortality in young babies all over the world.

Causes of diarrhea

- Diarrhoea, is usually a symptom of bowel infection. The infection may be caused by a wide range of pathogens, including bacteria, viruses and protozoa. These include:
- Bacteria, such as Campylobacter, Clostridium difficile (C. difficile), Vibrio cholerae (causing cholera) (Escherichia coli (E. coli), Salmonella and Shigella: they all may cause food poisoning
- Virus, such as a Norovirus or Rotavirus
- Parasites, such as the Giardia intestinalis, that causes Giardiasis

Infection is spread through contaminated food or drinking-water or from person to person as a result of poor hygiene. Poverty, ignorance, poor sanitation is often the underlying risk factors Diarrhoea caused by contaminated food or water while travelling is often known as traveller's diarrhoea.

ACUTE WATERY DIARRHOEA- diarrhoea that shows passage of loose watery stools without visible blood.

Simple foods are served broths, gruels, dry toast and tea gradually proceed to low fibre diet high in calorie and high in protein, glucose and fructose may be added to beverages. Increase intake of cereals, custards jelly is given, emulsified fats such as butter. In the beginning vegetables and fruits, then soups are included. Pectin has value treatment. Raw apple scraped and apple sauce are included

DYSENTERY- is diarrhoea with visible blood.

CHRONIC DIARRHOEA- is due to non-infectious causes such as sensibility to gluten or inherited metabolic disorder.

Acute diarrhoea in children is due to weaning food, that is due to lack of enzymes leading to indigestion.

Poor food hygiene or cleanliness, viruses are the cause specially rota virus (40%). 50% due to bacterial infection in the gut.

OSMOTIC DIARRHOEA- is characterized by large, frothy, explosive and acidic stools.

DIARRHOEA IN ADULTS- nutritional care

Increasing the intake of fluids and electrolytes. Sodium and potassium such as broths and electrolytes solutions, pectin from cooked apples and soluble fibres are also useful.

Caffeine is avoided as it promotes secretion of fluid.

Sugar, alcohol, lactose, fructose and sucrose worsen the osmotic diarrhoea.

The major objectives in the management of diarrhoea include:

1. Fluid and electrolyte replacement
2. Removal of cause (especially if infection)
3. Nutrition concerns
4. Determining the status of dehydration
5. Fluid management(ORT-Oral rehydration therapy)
6. Nutritional management

The term ORS refers to the complete oral rehydration salt mixture. ORS is potentially the most important medical advance of this century. It is safe, effective and cost saving. ORS can alone successfully rehydrate 95-97% individuals with diarrhoea. A single universal ORS solution containing: sodium - 75 mmol/l and glucose - 75 mmol/l, osmolarity 245 mosmol/l is recommended for all ages and all types of diarrhoea.

PEPTIC ULCER

Any localised erosion of mucosal lining of those portions of alimentary tract that come in contact with gastric juice. Majority of ulcers occur in oesophagus, stomach or jejunum.

ETIOLOGY-

- 1) In duodenal ulcers hyper secretion of acid is found, in gastric ulcer there is decreased tissue resistance.
- 2) Repeated irritation of mucosa by bad eating habits, irregular eating, smoking, or alcohol may lower tissue resistance to acid.
- 3) Certain drugs steroids and salicylates have irritates effects on mucosa and cause gastric ulcer or stimulate acids.
- 4) Personality type- highly nervous emotional individuals are susceptible, anxiety, worry and strain may cause hyper secretion.
- 5) Positive family history is also cause.
- 6) Inadequate rest and sleep.
- 7) Men are more susceptible than women.

SYMPTOMS AND CLINICAL FINDINGS-

- Epigastric pain occurs as deep hunger contractions 1-3 hours after meals.
- Low plasma proteins levels are present.
- Weight loss and iron deficiency anaemia are common.
- Haemorrhage is sometimes first indication of ulcers.
- In tract ability, obstruction, and perforation and carcinoma are other complication.
- Hematemesis (blood vomiting) Melena (blood in stool is seen)

TREATMENT - drugs, rest and diet therapy.

- 1) **DRUGS** – antacids are prescribed to neutralise excess acid.
Anticholinergic drugs- to inhibit acid secretion.
Anti spasmodic- delay gastric emptying. Nowadays drugs are outdated, H2 blockers which decrease acid secretion are used.
- 2) **REST** – good physical and mental rest and modifications in working habits.

3) DIET-

- High quality protein, ascorbic acid and iron are stressed.
- Small feeding every 2 hours are initially given. Later 3 meals + snack at mid morning, mid afternoon and bed time.
- Individualization to meet patients needs and preferences.
- Bland, fibre restricted diet is given in severe stage only.

FOODS TO BE PERMITTED-

- Bread, chapattis, rotis, rice, breakfast cereals of wheat, rice and cooked rice.
- Pulses and dals- in moderate amounts (since they cause gas and pain in some persons)
- Soups- vegetable soups are permitted, excludes vegetables with coarse fibre and/or over ripe seeds.
- Potatoes, sweet potatoes and yam – permitted
- Fats for cooking or butter – permitted excluding fried foods
- Sugar, jaggery or honey-permitted
- Pastries and desserts- permitted as biscuits and soft cakes
Permitted as pudding or jellies

- Jam or marmalade – permitted
- Sweet and sweet meats – excluded
- Fruits fresh and dried – permitted avoid sour fruits
- Nuts – permitted
- Condiments and species – excluded
- Papad, chutney and pickles – excluded
- Beverages – permitted as light tea or coffee

FOODS TO BE AVOIDED –

- Species, chillies, pickles, chutney
- Meat soups
- Coarse vegetables like raw onions
- Pan, betel nut, tobacco chewing
- Very hot or very cold drinks
- Sour foods
- Alcohol is avoided

DIET IS GIVEN IN THREE STAGES FOR PEPTIC ULCER-

- 1) **DIET I** – is given during 1st stage. During acute pain due to peptic ulcer. Recommended for hematemesis and melena
- 2) **DIET II** – it is given when pain of ulcer is relieved or is only occasionally present when patient is kept under observation.
- 3) **DIET III** – consists of general instructions when patient is declared relieved of attack.

Bland diet – is described as mild in flavour, texture, and temperature.

DIET IN DISTURBANCES OF SMALL INTESTINE AND COLON

Very low residue diet

The function of small intestine may be influenced by disease effecting the tract itself or organ related to digestive processes- the liver, gall bladder and pancreas.

PHYSIOLOGY AND FUNCTIONS OF INTESTINE

The absorption of food is particularly completed in the small intestine. The food from stomach is emptied into duodenum where the process of digestion continues. Secretion from intestine, pancreas, and liver has prepared the gastric contents to be digested in the small intestine. The large intestine or colon takes up considerable space in the abdomen. It is 1.5 metres long starts with cecum, from this segmentation projects the appendix, ascending, transverse and descending colon and connected with rectum by a small plot sigmoid.

The main function of colon is the absorption of water and crystalloids and transfer faecal. The sigmoid presents the passage of faecal material into rectum. The mechanism of entire alimentary tract is controlled by nervous system.

CONSTIPATION

DEFINITION – is the retention of the faeces in the colour beyond normal length of the emptying time. Majority of persons have bowel movements every day. Some persons have it once every 2nd and 3rd day.

Constipation is less than 3 motions per week or as difficult or painful defecation. In this condition hyper motility of sigmoid colon increases resistance to movement of intestinal contents.

Infrequent elimination will lead to headache, coated tongue, foul breath and lack of appetite.

CAUSES FOR CONSTIPATION-

- 1) Inadequate diet
- 2) Failure to establish regular diet for eating, rest and elimination.
- 3) Inadequate fibre intake and less water intake and eating highly refined foods.
- 4) Changes in routine diet illness, tennia, travel away from home.
- 5) Use of laxatives (constantly).
- 6) Painful defecation due to haemorrhage and tissues.
- 7) Poor muscle tone of intestine due to lack of exercise , in the bed ridden and aged patients.
- 8) Ingestions of drugs such as sedatives,
 - In young children emotional upset over toilet training
 - Pregnant women have it due to pressure of uterus on colon
 - Neuromuscular reflexes are impaired in old aged leading to constipation.

Daily faecal output is 75-200g of which 50-75g is water.

TYPES OF CONSTIPATION

- 1) Atonic constipation
- 2) Spastic constipation or irritable colon syndrome
- 3) Obstruction constipation

ATONIC CONSTIPATION – is also called ‘ lazy bowel’ constipation, due to the loss of rectal sensibility, there is no urge to defecate.

- 1) Observed in older people whose body processes are slowly down.
- 2) Seen in obesity, accompanying fevers, following operations and during pregnancy.
- 3) Inadequate diet, irregular meals, insufficient liquids.
- 4) Failure to establish regular time for defecation.

TREATMENT-

- 1) Develops regularity of habit through bowel and regular time for elimination.
- 2) Good health habits and regular meals.
- 3) Adequate diet providing ample fiber, adequate intake of fluids and relaxation.

DIETARY TREATMENT-

- 1) Adequate (800g) of fruits and vegetables are included to have enough bulk along with whole grain cereals.
- 2) 8-10 glasses of fluid daily is necessary, butter, milk and other liquids are suggested.

SPASTIC CONSTIPATION- also called irritable colon syndrome or spastic colitis or mucus colitis.

Definition- it is caused by over stimulation of the intestinal nerve endings, incorporated sigmoidal motility accompanied by constipation or diarrhoea.

CAUSES-

- 1) Attacks are associated with an emotional upset or prolonged stress.
- 2) Excessive use of cathartics (laxatives) and tobacco or eating worse food, drinking too much tea coffee , alcohol.
- 3) Antibiotic therapy, enteric infections.
- 4) Poor sleep, rest, fluids intake and evacuation.

TREATMENT- helping patients to cop up with stressful condition and good habits of personal hygiene.

DIETARY TRETMENT- persons with spastic constipations are under weight and tense.

Low weight diet is given

Smooth non-irritating foods such as milk, eggs, refined bread and cereals, oils, simple dessert, fruits and vegetables juices are allowed in very small amounts. Fats oils and butter are recommended.

OBSTRUCTIVE CONSTIPATION AND CANCER OF BOWEL-

An obstruction or closure hinders the passage of intestinal residue. The obstruction may be complete or partial. Surgical treatment is indicated.

DIET TREATMENT- Recommendation is similar to the spastic constipation. Residue to kept minimum. If obstruction is extensive liquid diet may be necessary. Sometimes parental feeding is needed.

Low residue foods- sucrose, dextrose, gelatine, broth, hard cooked eggs.

Large residue foods- fruits, potatoes, bread, butter, cheese, raw egg albumin, milk lactose, soft boiled eggs.

TOPIC – DIETARY MANAGEMENT DURING LIVER DISEASES

Contents - Aetiology, symptoms and dietary management of liver diseases, hepatitis, jaundice and cirrhosis of liver

Liver is the largest organ of the body constituting 2.5 to 3% of the body weight. It is multifunctional organ which plays an important role in carbohydrate, fat and protein metabolism. Most of the end products of digestion of food are transported directly to the liver. Compounds which it synthesizes, or stores are sent to other parts of the body when needed. Toxic substances which may enter via food or are produced in other parts of the body are detoxified here. Thus, liver has an important bearing on the nutritional status and diseases of this organ markedly affect health.

Functions of liver:

Protein Metabolism	- Synthesis of plasma proteins, carrier proteins like transferrin and coagulation factors
Carbohydrate Metabolism	- Synthesis, storage and release of glycogen. Synthesis of heparin, Gluconeogenesis from amino acids, conversion of glucose into fatty acids, interconversion of monosaccharides
Lipid Metabolism	- Synthesis of lipoproteins, phospholipids and cholesterol, conversion of fatty acids, carbohydrates and protein intermediates to fat, formation of bile, conjugation of bile salts.
Mineral and Vitamin Metabolism	- Storage of iron, copper etc., large reservoir of vitamin A and Vitamin D, Conversion of blood coagulation factors to prothrombin in the presence of vitamin K, conversion of β -carotene to retinol and Vitamin D to its active metabolites.
Immunological	- Important part of lymphoreticular system
Detoxification	- Of bacterial decomposition products, mineral poisons, alcohol and certain drugs like morphine and dyes.
Hemopoiesis	main site for erythrocyte formation in early foetal life.

Deficiency agents responsible for liver damage

A fatty change in liver in kwashiorkor is attributed to low protein intake, liver is enlarged, uncontrolled diabetes and obesity can lead to fatty changes in liver.

Infective agents- virus can cause infections and damage to liver.

- Types A, B, C, D, E and G can cause hepatitis 10% of patients may reach chronic stage. Hepatitis B vaccination is given to prevent this.
- Yellow fever like hepatitis virus have affinity for hepatocytes. Infections like typhoid abscess and people working in dirty water can have liver diseases.

Toxic agents-

- ❑ Alcohol- in malnourished patients consumption of alcohol produces acute liver damage and jaundice. Lipids accumulate in liver and increases in liver size.
- ❑ Drugs and chemicals- drugs like paracetamol (fever), INH(TB) and oestrogen (contraceptive) damages the liver.
- ❑ Workers in chemical industry may develop liver damage.
- ❑ Toxicity and liver damage is seen in herbal preparations.
- ❑ Excess stores of copper, iron, glycogen may accumulate in liver and can lead to cirrhosis.
- ❑ Inborn errors of metabolism- children with inborn errors of metabolism may develop liver damage.

Damage caused to liver

Fatty globulation- due to disturbance in liver cells, the droplets of triglycerides are formed and function of liver are impaired. The process is reversible.

NECROSIS- due to excess alcohol intake the liver becomes tender and enlarged. This is due to inflammatory reaction by necrosis and death of hepatocytes due to excessive globulation or direct toxic effect.

CIRRHOSIS OF LIVER- cirrhosis refers to colour of nodules of hepatocytes. The normal liver cells are replaced by fibrous tissues. Hepatocytes regenerate in between the fibrous tissues.

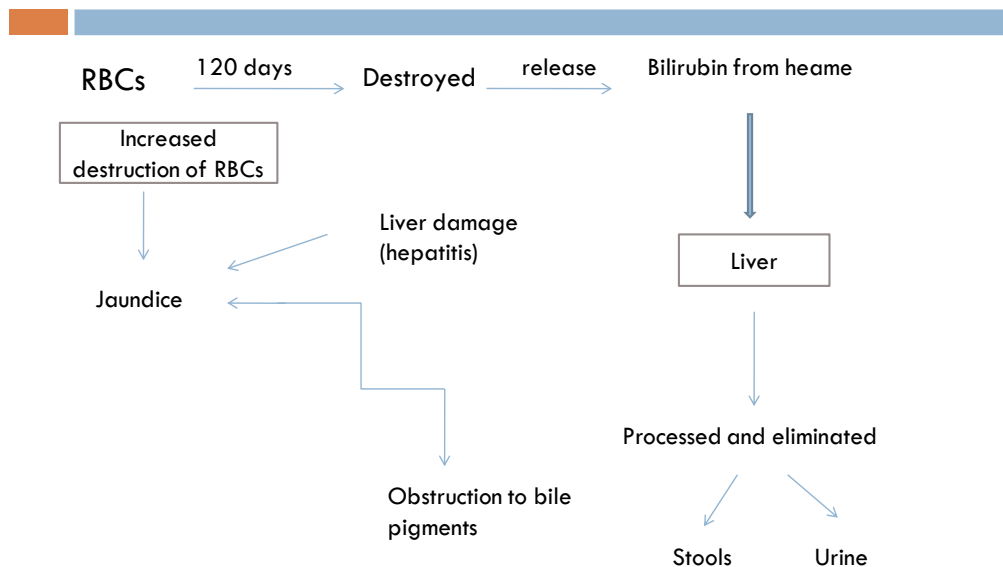
- Fibrous tissues are replaced with time and cause obstruction of portal vein and bile duct.

Complications of cirrhosis-

- Intrahepatic obstruction causes rise in pressure in all branches of portal vein called portal hypertension.
- Enlargement of spleen.
- Varicosis which may bleed, oesophageal bleeding is common and serious complications of liver cirrhosis.
- Increased venous pressure impedes the return of tissue fluid into capillary circulates. So fluid accumulates in the peritoneal cavity called ascitis.

JAUNDICE- damage to liver cells leads to increased bilirubin resulting in jaundice.

- Jaundice is a term given to yellow discoloration of the skin, mucus membranes, sclera and body tissue because of accumulation of bile pigments in the blood. Jaundice is a common symptom for all liver diseases. It results due to increase levels of bilirubin in the blood. Jaundice is clinically detected when the bilirubin level is above **2.0 to 2.5 mg/dl**. (Normal level **0.2 to 0.8 mg/dl**).
- After 120 days of life RBCs are broken and bilirubin is produced. This is excreted in stool and urine along with bile. Problems like increased destruction of RBCs (hemolysis). Decreased functioning of liver (hepatitis) obstruction to the flow of bile can result in jaundice.
- Infective hepatitis- is also called viral hepatitis. Is common cause of jaundice. Hepatitis can be due to type A and E or B, C, D and G virus.



Symptoms- anorexia, fever, head ache, rapid weight loss, nausea and vomiting, abdominal discomfort. Colour of urine changes from dark yellow to red and faeces becomes whitish. These develop into jaundice. Symptoms continue for 4-8 weeks. Neglected viral hepatitis leads to cirrhosis of liver. Hepatitis B, C, D and G may lead to chronic hepatitis. A and E are self limiting.

Dietary management-

- High protein, high carbohydrate, moderate fat is recommended.
- Small attractive meals at regular intervals is better tolerated, overfeeding is avoided.

Energy – in nasogastric feeding stage about 1000 kcal are supplied. In severe 1600 to 2000 kcal are suggested.

Proteins – adequate proteins supply is needed severe jaundice 40g while in mild jaundice 60-80g of protein is permitted. In hepatic coma protein is not given and only CHO rich foods are given.

Fat- fats make food palatable and increase calorie intake.

- In severe liver failure fats are not metabolised so fat is restricted.
- Severe jaundice 20g, moderate 20-30 g of fat is recommended.

Carbohydrates- high carbohydrates are needed in diet to prevent tissue proteins broken down for energy purpose.

- In fever, nausea and vomiting the patient is given intravenous glucose.
- As soon as he can take oral feeds fruit juice, sugar, jaggery and honey are given which gives carbohydrates and electrolytes.

Vitamins- are essential to regenerate liver cells, 500 mg vitamin C, 10 mg vitamin K and B complex supplements are given. If these supplements are not tolerated by mouth vitamin injection are given.

Minerals- if food is not taken orally then careful watch should be kept on serum Na and K levels. Oral fruit juices, vegetable and meat sugars with added salts are given.

Intravenous feeding- if oral feeds are not tolerated intravenous administration of 10% glucose solution is done.

Foods included- cereal porridge, soft chapattis, bread, rice, skim milk, tapioca, potato, yam, fruit juices, sugar, jaggery, honey, biscuits and soft custard.

Foods avoided- pulse, beans, meat, fish, chicken, egg, sweet preparations with ghee, bakery products, dried fruits, nuts, spices, papads, whole milk, cream, alcoholic beverages. Small and frequent meals and enough fluids are recommended.

Cirrhosis- is condition in which there is destruction of liver cells due to necrosis, infiltration, fibrosis and nodular regeneration. It is serious irreversible disease. Cirrhosis may commence many years before it becomes clinically obvious.

Aetiology – cause

- 1) Viral infection- hepatitis virus B, C, D and G are more likely to produce cirrhosis.
- 2) Alcohol- it is estimated that 60g alcohol for men, 20g for women over prolonged periods increases risk of cirrhosis.
 - Alcohol makes liver susceptible to infections and toxins. (Band C hepatitis and drug toxicity)
 - It increases fatty acid synthesis.

Nutrition- malnutrition aggravates injury to liver vitamin A, β carotene, vitamin E and C.

Toxins in food- Aflatoxin, chillies and spices can damage liver, haemochromatosis (no control on iron synthesis) and Wilson's disease (disturbance of copper metabolism) can lead to liver cirrhosis.

Symptoms- onset of cirrhosis is gradual with,

GIT symptoms- anorexia, nausea, vomiting, pain and distension.

- Weakness, muscle cramps, weight loss and fever and later jaundice.

Other serious complications are

Ascitis- accumulation of water, abnormal amounts of fluid in abdomen. Due to portal hypertension, impaired albumin synthesis increased Na retention or impaired water excretion.

- Oesophageal varicose- varicose veins in oesophagus or upper part of stomach; due to portal HTN and haemorrhage results if high fiber diet is eaten.
- There may be accumulation of NH_3 and subsequent hepatic coma.

Principle of diet-

A high calorie, high protein, high carbohydrate, moderate or restricted fat, high vitamin diet and minerals should be given. Sodium is restricted if ascitis is present. Fiber is restricted when there is esophageal varicose and HTN.

Energy – high calorie diet is necessary due to prolonged under nutrition. Calorie requirement is 2000-2500 kcal.

Protein- serum albumin is synthesized by liver cells, is low in cirrhosis. A high protein diet is useful for regeneration of the liver. 1.2gm/kg of body weight is given. Addition of casein to milk, soups and ice creams. Vegetable proteins are very useful.

Fat- About 20gms of fat is given. Medium Chain Triglycerides containing C10 fatty acids are given; coconut oil contains medium chain fatty acids.

Carbohydrate- CHO are supplied liberally as it is needed to replenish glycogen stores. 60% of the calories should come from carbohydrate.

Vitamins and minerals- liver is the major storage of vitamins and minerals. Vitamin B complex is supplemented. Sodium is restricted in oedema and ascitis. In all patients with ascitis Na intake is restricted to 400-800 mg/day. Restriction of water to 800-1000 ml/day for hyponatremia.

- Anemia is common, so iron supplementation is given (FeSO₄ tablets 0.3g 3 times daily). Folic acid 1 mg/day is indicated in macrocytic anemia.
- Patient is kept on enteral feeding if oral feeding is not possible. If enteral feeding is unsuccessful the parenteral feeding is given.

TOPIC - DIETARY MANAGEMENT DURING CARDIOVASCULAR DISEASES

Contents - Aetiology, symptoms and diagnosis, types and dietary management of cardiovascular diseases, Atherosclerosis and hypertension

A heart disease affects people of all ages but is more frequent in middle age & caused by atherosclerosis. The diseases of heart may affect the pericardium, myocardium, & endocardium. In addition, the blood vessels within the heart, leaving the heart or heart valves may be affected.

- ✚ **Atherosclerosis-** The valves of small arteries become thickened due to aging or hypertension. In the word atherosclerosis, athero means gruel, sclerosis means hardening.
- ✚ **Coronary artery disease-** It is precipitated by obstruction of coronary arteries which nourish the heart muscles. It can manifest angina & heart attack.
- ✚ **Angina-** Narrowing of coronary arteries results in insufficient blood supply (ischemia) causing severe pain across the chest. This kind of pain subsides after sometime but this is the first sign of trouble. This pain is called cry of hungry heart.
- ✚ **Hypertension-** Persistent elevation of blood pressure it impairs the pumping function of heart & if indicated damages heart, brain & kidneys
- ✚ **Stroke-** Stroke results from block in the vessels supplying blood to brain or when the artery ruptures leads to cerebral hemorrhage. A stroke occurs more often in patients with high B.P. It can lead to paralysis, speech, vision defects, mental deterioration, memory lapses, fainting spells
- ✚ **Peripheral artery disease-** Occurs when blood vessels supplying blood to limbs are blocked. Reduced blood supply may result in irreversible damage & death of tissue (gangrene) it occurs in blood vessels of legs is common.

Risk factors for heart disease

Statifications or non- modifiable factors-

- **AGE-** The incidence of heart disease increases in the middle age around 50-55years
- **GENDER-** Coronary artery disease is twice as high in men than women. After menopause it is similar in men & women.
- **FAMILY HISTORY -** Those with family history of disease are more prone to disease. If it is present in both the mother and father the offspring are more likely to get it.
- Asians and Indians are more prone to the disease.

Risk factors that can lower the CVD risk

- **Cigarette smoking-** cigarette smoking enhances the endothelial damage, heart rate and B.P. lowers the good cholesterol, promotes thrombus formation. There is reduction in CVD risk in those who quit smoking
- **High saturated fat, increased cholesterol diet-** High intake of saturated fatty acids increases plasma cholesterol so promotes the formation of atheroma. Saturated fat increases the thrombus

formation. Animal fat like egg yolk, butter, meat fat have high saturated fat and cholesterol. Margarine, ghee, hydrogenated fat and coconut oil have high saturated fat.

- **Elevated low density lipoprotein cholesterol-** High LDL cholesterol is associated with the development of atherosclerosis
- **Hypertension-** Hypertension is an independent risk factor for CHD & stroke. Reducing B.P can lower incidence of stroke, CHD and heart failure.
- **Left ventricle hypertrophy-** It is the condition that develops due to chronic pressure i.e. high B.P
- **Thrombogenic factors-** High fibrinogen levels leads to coronary heart disease.
- **Other dynamic factors-** Diet, obesity, diabetes, sedentary habits and stress.

ATHEROSCLEROSIS

Is the process by which arteries narrow due to deposition of gruel like substances made up of lipids and blood cells. It is a vessel clogging disorder which is dominant for some time and manifests age advances.

- It occurs in large arteries, aorta, coronary arteries, arteries of brain, lower limbs and kidneys. The walls of arteries become roughened in atherosclerosis which narrows the passage; the blood cells adhere to roughened walls and forms blood clots (thrombus). The clot reduces the blood supply to tissue\ organs (ischemia)

Dietary management for atherosclerosis-

Objectives-

- 1) Maximum rest to the heart
- 2) Maintain good nutrition
- 3) Acceptability of the program

Principles of diet- Low calorie, low fat. Particularly low saturated fat, low cholesterol, high in PUFA, n6 to n3 ratio of 10 : 1 & normal protein, minerals, vitamins are suggested. High fiber diet is recommended.

Fat- The fats should form 20% of total calories consumed. The proportion of saturated to monounsaturated to PUFA ratios of fat have to be 5:6:4.

Fish are good sources of n3 fatty acids. Consumption of 100-200g of fish 2-3 times a week helps preventing heart disease.

Daily consumption of 10-15g of fish oil everyday can represent 3-5g of n3 fatty acid adequate to control hypertriglyceridemia.

Cholesterol- Levels in diet should not exceed 300mg. vegetarian foods have no cholesterol they are low in fat & calories.

- Mustard oil and soya oil are rich in n3 fatty acids, alpha linolenic acid.
- Safflower and corn oil are rich in (n6) linolenic acid.
- Blends of these oils are considered good..
- Sunflower oil: Palmolein oil- 1:1
- Safflower: Groundnut oil- 1:3
- Sunflower: Groundnut oil 1:3

Carbohydrates - The total sugar content of diet is decreased. The calories from the complex CHO should form 55-65% of total energy.

Proteins- The proteins should form 15-20% of total energy intake for atherosclerosis. Animal proteins are restricted since they are rich in cholesterol & saturated fats, animal fats, organ meats, eggs are restricted.

Sodium – Is restricted whenever there is hypertension. The total salt intake should be less than 1 tea spoon i.e. 5g totally. Sodium restricted of severe kind is not done for all the patients but ordered individually as the condition of patients requires. WHO recommends 6g of salt from all food sources.

Low glycemic index food- Studies have shown that low G.I foods have positive effect on reducing the coronary heart disease.

Fiber- High fiber diet is useful for atherosclerosis & reduces cholesterol. Apples & Guava rich in pectin lowers the serum cholesterol & enhances excretion of fecal sterols. Legumes, vegetables, & fruits lower the serum cholesterol. So whole grain cereals are used.

Dietary Guidelines-

- Patient should maintain slightly lower weight than standard weight.
- Diet should be rich in fiber by including raw vegetables, salads, fruits, GLVs & whole grains.
- 5 servings of fruits & vegetables should be included. Since they are rich in anti oxidants.
- Fish in the diet is beneficial as it contains omega 3 fatty acids.
- Concentrated foods like sweets, chocolates, cakes, pastry, ice creams & fried foods should be restricted,
- Soft drinks, alcohol, sugar & sago are avoided.
- Egg yolks are rich in cholesterol. Eggs should be restricted to 2-3\week
- Coconuts should be restricted.
- Coffee & tea to be taken in moderate amount. Excess caffeine increases the heart rate.
- Animal fats like meat & pork contain saturated fat so it should be restricted.
- Shrimp and crabs have less amount of fat & may be included.
- Hypertensives should reduce the fish since they contain more sodium.
- Soya bean, fenugreek, garlic, onion and turmeric are hypocholesterolemic and have to be included in diet.
- Small & frequent meals are included.

HYPERTENSION

Hypertension is fast becoming a common health problem in India, likely because people are adopting increasingly sedentary lifestyles and poor eating habits. It is important to note that men/women, young/old adults all are at risk of this problem and it is a major risk factor for coronary heart disease, heart failure, renal disease and other complications. What is alarming is the fact that hypertension is known as a silent killer. It often occurs without any symptom or warning signs until more serious problem arises. Modifying lifestyle factors is important for managing hypertension.

Hypertension is a health condition characterized by high blood pressure. Blood pressure (BP) is the force of circulating blood against the inner walls of blood vessels. When blood travels through the blood vessels with more force than is considered healthy it is called hypertension. An instrument/device called sphygmomanometer is used to measure BP.

An optimum blood pressure level is a reading under 120/80mm Hg. The numerator 120 represents the pressure when the heart contracts and is referred to as “Systolic pressure”. The systolic measurement is the peak pressure in the arteries. The denominator 80 represents the pressure when the heart relaxes (is at rest) between beats, called the “Diastolic pressure”. Diastolic pressure is the minimum pressure in the arteries.

Blood Pressure Category	Systolic blood pressure (SBP)	Diastolic blood pressure (DBP)
Normal	<120 mm Hg	<80 mm Hg
Elevated	120–129 mm Hg	<80 mm Hg
Hypertension		
Stage 1	130–139 mm Hg	80–89 mm Hg
Stage 2	≥140 mm Hg	≥90 mm Hg
Hypertensive Crisis	≥180 mm Hg	≥120 mm Hg

WHO defines hypertension as condition in which systolic pressure exceeds 160mm and diastolic pressure exceeds 95mmHg.

- High BP is not a disease; it is a symptom indicating some underlying disease in progress.
- High BP is cause for 1 in 8. Death worldwide making hypertension the 3rd leading killer in world.
- Hypertension impairs the pumping function of the heart and if untreated damage the hear, brain and kidneys. A stroke occurs more often in patients with high BP.

CAUSES-

CVD, renal disease like glomerulo nephritis, polycystic renal disease, pyelonephritis, tumors of brain or adrenal glands, hyperthyroidism or disease of ovaries and pituitary glands may cause hypertension.

Predisposing factors are heredity, stress, obesity, smoking, high viscosity of blood due to too many RBCs in circulating blood, narrowing of blood vessels due to hormones, cortisone, aldosterone, adrenaline and nor adrenaline.

CLASSIFICATION OF HYPERTENSION-

- 1) **MILD HYPERTENSION-** diastolic BP is 90-104mmHg. Treatment is based on weight loss, sodium restriction and behavioural techniques.
- 2) **MODERATE HYPERTENSION-** Diastolic BP is between 105-119mmHg with moderate hypertension nutrition therapy is accompanied by drugs such as B Blockers.
- 3) **SEVERE HYPERTENSION-** Diastolic pressure is 120-130mmHg and above. The treatment for moderate hypertension peripheral vasodilatation is given.

SYMPTOMS-

Many persons do not have any symptoms. Head ache dizziness, impaired vision, failing memory, shortness of breath, pain over the heart, GIT disturbances, unexplained tiredness are some of the symptoms.

PRINCIPLES OF DIET

Low calorie, low fat, low sodium diet with normal protein is prescribed.

Dietary management-

Earlier kempners diet was suggested for hypertension. It is rice and fruit diet. Diet is deficient in many nutrients.

Energy -about 20 kcal/kg of ideal body weight is prescribed for sedentary worker and 25kcal/kg body weight for moderately active worker. Alcohol consumption is reduced.

Protein –In severe hypertension proteins are restricted to 20g/day.

Fats – as they are prone to atherosclerosis about 20g of fat is advised. High intake of hydrogenated fat and animal fat is avoided as they are prone to atherosclerosis.

CHO- complex CHO are useful for management of hypertension.

Sodium- increased Na in diet leads to increased intravascular volume and increases cardiac output elevating blood pressure.

Moderate Na restrictions of 2-3g/day reduces the diastolic BP by 6-10mmHG. Na restriction with weight reduction can control mild or moderate BP of arteries.

Potassium- low levels of K causes the body to retain more Na and water and elevate the BP. Lowest risk of high BP is high K and low sodium groups. 350mg of K is needed daily and fruit and vegetable intake liberally meets K requirements.

Calcium- high calcium decreases the high BP

DO NOT USE

- Salt in cooking or at table
- Monosodium glutamate (ajinomotto) baking powder, sodium bicarbonate and sodium benzoate
- Pickles, canned foods, potato chips
- Ketchup, sauces, frozen peas
- Shell fish, dry fish
- Biscuits, cakes, pastries
- Salted butter, cheese

MODIFICATION OF LIFE STYLE-

- Weight reduction- maintain normal weight
- Adopt (DASH) dietary approach to stop hypertension- consume diet rich in fruits and vegetables and low fat, dairy products and reduces saturated and total fat.
- Dietary sodium reduction- no more than 6g NaCl/day
- Physical activity- regular aerobics physical activity brisk walking of 30mins/day
- Alcohol consumption- not more than 2 drinks per day

DASH DIET-

DASH (Dietary Approaches to Stopping Hypertension) dietary pattern. The DASH diet consists mainly of fruits, vegetables and low-fat dairy products and includes whole grains, poultry, fish and nuts while limiting the amount of red meat, sweets and sugar-containing beverages

- high amounts of fruits and vegetables 4-5 servings
- inclusion of fish
- inclusion of low fat milk 2-3 servings
- reducing fat intake
- reducing sodium levels
- lean meat- 2-3 servings
- gravies- 7-8 servings.

TOPIC – DIETARY MANAGEMENT DURING DIABETES MELLITUS

Covered - Aetiology, symptoms, types, diagnosis and dietary management of diabetes mellitus, glycemic index, low GI foods

Diabetes Mellitus (DM) is a condition, when the blood glucose or so called “blood sugar” is too high. Diabetes is a disease that affects body’s ability to produce or respond to insulin. Insulin, is a hormone that is released in response to food we eat. In a normal healthy person, the pancreas release insulin to help the body store and use the sugar from the food they eat. Foods, particularly carbohydrate-rich foods in our diet namely, rice, wheat, potatoes etc. are digested and broken down into a sugar called glucose. Glucose is vital for our health because it is an important source of energy for our body. Insulin helps to utilize this glucose to produce energy by the body for our daily activities. Insulin also stimulates the cells to take up glucose, thus prevents a rise in blood glucose and maintains its level within certain normal limits

- It is known as disease related to sweetness since centuries, India will become one of the countries with highest number of diabetes (50 million)
- **Insulin is the hormone produced by the β cells of pancreas. It helps for uptake of glucose by the cells and maintains the blood glucose levels within normal limits.**

In diabetes,

- 1) Pancreas cannot produce enough insulin
- 2) Insulin produced is not effective in controlling the blood sugar.

Types of diabetes

Type I- Insulin dependent diabetes mellitus(1DDM) seen in adolescents and children, onset is very rapid. There is little or no insulin production. Symptoms are severe if insulin injections are not given patient develops ketoacidosis and diets.

Type II- Non insulin dependent diabetes mellitus(N1DDM) affects the adults who are overweight, obese, insulin production is normal or high but insulin produced is not effective. The onset is gradual. The diet, exercise and anti diabetic drugs are enough to control the blood sugar.

Gestational diabetes: diabetes developed during pregnancy is called gestational diabetes. Pregnant women should be checked for diabetes if there is a family history of diabetes.

IGT- impaired glucose tolerance – when rise of blood sugar after 75g glucose load is between normal and diabetic patients condition is called impaired glucose tolerance. Such persons should be careful in diet and avoid obesity and do regular exercises.

Risk factors :

1. Heredity – N1DDM runs in families.
2. Obesity
3. Sedentary life- people who eat too much and lead sedentary life, insulin sensitivity goes down
4. Aging is also considered as a risk factors

Prevalence: higher in affluent societies and obese persons 2-4% in rural areas, higher in urban areas.

Symptoms – many times the diabetes is asymptomatic, it is called silent killer. It is detected after blood check up

1. Excess thirst (Polydypsia)
2. Increased appetite (Polyphagia)
3. Frequent urination (Polyuria)
4. Loss of weight
5. Easy tiredness
6. Slow healing of cuts and wounds.

Diagnosis: Fasting blood sugar, is more than 128mg/dl and 2 hours after glucose loading of 75g it is 180mg/dl. The diabetes is confirmed by oral glucose tolerance test (OGTT).

OGTT – test is conducted after 12 hours of overnight fast. Glucose 75g in adults and 1.75g/kg of body weight in children is orally administered. Before glucose load and 2 hours after it, blood samples are collected and glucose levels are estimated.

Plasma Glucose Level (mg/dl)

	Fasting	Post prandial (PP) 2-hr post meal
Normal	<110	<140
Diabetes	>126	≥200

Classification of diabetes

I) Type I diabetes-

1. Immune mediated diabetes. Previously called IDDM, auto immune destruction of β cells occurs, seen in adolescent and childhood.
2. Idiopathic diabetes- this form is strongly inherited but no evidence of auto immunity.

II) Type II diabetes- It is adult onset diabetes. Insulin resistance and relative insulin deficiency . Do not need insulin for survival.

- A. Genetic defects of β cells – maturity onset diabetes of young (MODY) it is associated with monogenic defect in β cells.
- B. Genetic defect in insulin action
- C. Disease of exocrine pancreas –Pancreatitis, Trauma/pancreatotomy, Neoplastic(tumour) ,cystic fibrosis, hemochromatosis, fibrocalculus pancreatopathy (FCPB)
- D. Endocrinopathies- excess of growth hormone, cortisol, glucagon and epinephrine can cause diabetes.
- E. Drug or chemical induced diabetes
- F. Infections- virus congenital are associated with destruction
- G. Uncommon forms of immune mediated diabetes
 - i. Stiff man syndrome
 - ii. Anti insulin receptor antibodies.

III) Gestational diabetes mellitus- any degree of glucose intolerance with onset of 1st recognition during pregnancy is called GDM.

IGT- impaired glucose tolerance when glycein response after administration after administration of 75g of oral glucose is intermediate between normal and diabetic condition is called IGT. Fasting blood glucose more than 110 and more than 126 hour after 75g glucose load more than 140 and less than 200.

Urinary sugar – urinary sugar is tested using Benedict's test or commercially available diagnostic strips (unistix)

Benedict's test- 8 drops of urine + 5ml Benedict's solution are taken and kept for boiling in a water bath for 5 minute. Second urine sample is taken in the morning that will reflect urine sugar level. Self monitoring of urine samples will provide valuable information to patient and doctor to fix the dose of drugs.

COMPLICATIONS OF DIABETES

Acute complications-

1)Hypoglycaemia- Rapid and severe lowering of blood sugar(below 40-50mf/dl) is called hypoglycaemia. The person with low blood sugar experiences increased appetite, weakness, sweating, restlessness, palpitation (rapid beating of heart) and giddiness. This can result from excessive dose of insulin and inadequate intake of food or due to intake of alcohol along with antidiabetic drugs or following strenuous exercise.

2) Ketoacidosis- when body cannot utilize carbohydrates to provide energy it burns increased amounts of fats and certain amino acids and results increase of metabolic products called ketosis. When ketones produced are more it accumulates in the in the body resulting in ketoacidosis. In this serious condition the patient may go into coma. Before going into come he may experience thirst, weakness, drowsiness with or without vomiting. It may result from inadequate treatment of diabetes during acute infection.

3) Infection – in diabetic cuts and wounds heal slowly. The patients are prone to T.B, infections of skin, urinary tract and foot.

Long term complications-

1) Increased predispositions to atherosclerosis- (hardening of blood vessels due to deposition of fatty substance) due to high levels of blood lipids, cholesterol and triglycerides makes them susceptible to heart diseases and shock.

Serum cholesterol levels: Increased cholesterol levels is a risk for heart disease. Desirable levels less than 200mg/dl, Borderline high- 200-239, high more than 240.

2) Lesions that affect- small blood vessels of eyes and kidneys, retinopathy and nephropathy results in excretion of protein in urine and neglect may lead to kidney failure, diabetes can develop. Neuropathy due to peripheral lesions of nervous system leads to numbness and burning sensation in distal parts of upper and lower limbs and tingling and numbness.

Objectives of diabetes management:

- 1) Reduce the blood sugar level
- 2) Maintain ideal body weight
- 3) Treat the symptoms
- 4) Reduce serum lipids
- 5) Provide adequate nutrition
- 6) Avoid acute complications
- 7) Prevent vascular complication

Treatment- diet, exercise, drugs, education

Diet in diabetes- Normal Indian diet is suitable for diabetic but nutrient intake has to be tailor made based on age, sex, height, weight, physical and physiological needs of patients.

Diet prescription- is made based on day to day activity, diet history, based on physical activity, body weight and the total calorie requirement is calculated.

Calories - energy should allow patient to loose or gain weight and maintain 10% lower than ideal body weight.

Ideal body weight- calculated by using the formula

IBW = Height in cm - 100

Based on body weight- for obese (20% above ideal weight) or under weight (20% below ideal body weight) based on these the daily calorie requirement of individual /kg body weight can be worked out

For over weight 20 kcal/kg body weight/day, for ideal body weight- 30kcal/kg

For under weight- 40kcal/ kg body weight/day

Generally the calorie recommended for diabetes than normal.

Pregnant women- pregnant women with diabetes are more prone to certain illness than non diabetic pregnant women. Insulin requirement of pregnant women goes up by 1-3 times. In absence of insulin the ketoacidosis results. Pregnant women with diabetes are more prone to:

- Pre-eclampsia (condition characterised by albuminuria, hypertension and oedema in pregnancy)
- Toxaemia (poisoning of body by products of bacteria or damaged tissue)
- Hydroamniosis (excess water in amniotic fluid)
- Increased risk of abortions, congenital malformations.

Blood sugar should be controlled by dietary treatment and treatment with insulin. Delivery should be conducted under medical supervision. Neonatal hypoglycemia and respiratory distress is common in newborn of diabetic mothers. Children are typically heavy and need special attention.

Pregnancy requirements- 30 - 35 kcal/kg of desirable weight.

Proteins- 1.5-2.5g/kg body weight

Children- 1000kcal+125 cal for boys

1000kcal+100 cal for girls for every year of age

For 10 years boys and girls 1000+1250=2250

For diabetic persons adults

CHO- Diabetics have to alter the type of CHO in diet 60-65% of calories should come from CHO. Cereals and pulses should be included. Refined CHO like honey, jaggery, sugar and jam are avoided. Sugars present in fruits and milk raise blood sugar at slow rate.

Distribution of CHO- Blood sugar levels depends on intake of CHO. Total CHO are divided into 4-5 parts 1/3(33%) is served during lunch and dinner. Out of remaining 1/3(25%) during break fast and 9% during tea or bed time.

In insulin dependent patient- Additional CHO are given before patient goes to sleep to prevent hypoglycemia, if patient is on slow acting insulin.

Proteins- are essential for growth and tissue repair, RDA is 1g/kg body weight. Children, pregnant and lactating mothers need more. The requirement of protein increases during burns and trauma. In diabetes associated with renal problems, protein is restricted to 0.6/kg body weight. In NIDDM patients 15-20% of total calories should be derived from proteins should get 1-1.5g proteins/kg body weight. Proteins from vegetables are better than proteins from animal foods, since they add fiber to diet.

Fats – fats contain soluble vitamins. 3 types of fats are:

- 1) Ghee, butter, vanaspati, coconut oil (saturated fats)
- 2) Sunflower and safflower (poly unsaturated fatty acids PUFA)
- 3) Groundnut oil, palm oil and olive oil (mono unsaturated fatty acids MUFA) type of fat and quantity of fat are important. 15-25% of total calories come from fats, non- vegetarian diabetes consume fish or chicken without skin, instead of egg, mutton , liver and brain that increase cholesterol. Diabetics can take 4 tea spoon of fat/day.

Vitamins and minerals- green leafy vegetables, fresh fruits , milk , cereals , nuts, fish and egg provide vitamins and minerals. During infection and other complications may require increased vitamins and minerals in form of supplements.

Dietary fiber- fiber is present in fruits, legumes, fenugreek(soluble fiber) control blood sugar, is more effective than insoluble fiber of cereals and millets. Dietary fibre can reduce cardiovascular disease. 25g fiber/1000kcal is recommended. Diabetics should consume low calorie foods with low glycaemic index.

Fenugreek seeds- certain mucilaginous fiber and total fiber is 20-50%. It contains trigonelline an alkaloid known to reduce blood sugar levels and serum lipid levels and have overall beneficial effect. 25g of fenugreek in 2 divided doses.

Dietary guidelines-

- 1) Avoid sweets, sugar, honey, jam, cakes, fruit juices with sugar.
- 2) Use fats in limited amounts.
- 3) Use of cereals and pulses in right amounts.
- 4) Use high fiber foods as much as possible.
- 5) Use vegetables as desired.
- 6) Take permitted fruits in limited amount.

Glycemic index- extent of rise in blood sugar in response to a food in comparison with response to equivalent amount of glucose. Diabetics should consume low glycemic foods. Cereals and root vegetables have 65-75% glycemic index(GI), fruits and vegetables have 45-55% dried peas and beans have GI 45-55%. Diet alteration in associated disorders- diabetes with heart disease – fat intake to be limited. Diabetes with renal disease- protein intake to be limited.

Diabetes with HTN- salt intake to be limited.

Alcohol- alcohol intake may lower the blood sugar levels and result in hypoglycemic, continuous, consumption may lead to peripheral neuropathy, likely to cause overweight and obesity.

Exercise-

- 1) exercise helps for general well being of diabetes.
- 2) Reduces body weight
- 3) Other risk factors for heart disease.
- 4) Increases peripheral circulation
- 5) Enhances action of insulin and reduce the dose of anti diabetic drugs.
- 6) Reduces stresses and strain.

Brisk walking, jogging, bicycling, swimming and playing, badminton and tennis. Diabetic patients on insulin should seek medical advise before energy in strain our exercise. Prevent hypoglycaemia and consume extra CHO before and after exercise.

Insulin- short acting, intermediate acting and long acting insulin are there. IDDM patients need regular breakfast, lunch, snacks, dinner and bed times snacks to avoid hypoglycemia.

Sometimes during the following conditions NIDDM subjects need insulin,

- 1) Drug acute infections
- 2) Surgery
- 3) Pregnancy
- 4) When oral drugs do not work.

Oral dugs – in most diabetic patients diet, exercise, weight reduction are enough to control high blood sugar. If blood sugar cannot be controlled with diet and exercise after 6-8 weeks drugs are prescribed. The anti diabetic drug tablets enhance the production of insulin or improve the action of insulin. Sulphonyl ureas and bi guanides are 2 group of drug used.

Educatiosn- diabetics should be educated on nature of disease and probability of development of acute and long term disease, importance of monitoring of blood sugar and lipids, urine sugar, symptoms of hypoglyce

Ketoacidosis - diabetics illness diabetics should be careful about diet and drugs. Urine should be tested and anti diabetic drugs should be taken.

Glycemic index- the foods that are more slowly absorbed may have metabolic benefits to diabetes. Glycemic index is a ranking of foods based on post prandial blood glucose. Response of a food compared with a reference food. The low glycemic foods are prescribed for diabetics. The composition of low glycemic foods influence glucose and lipid metabolism and HDL levels. The reduced rate of glucose

absorption after consuming low glycemic foods will reduce the post prandial blood insulin. These low glycemic foods help in achieving low glucose concentrations and low free fatty acids.

The fruits, vegetables and cereals reduce the efficiency of enzyme hydrolysis and slow the rate of glucose entering the blood.

- Starch in its seed coat does not get hydrolysed and to glucose and hence good food.
- Milk, curds and many have low glycemic index. The pulses and legumes have low glycemic index.
- Chapati that have to be chewed have low glycemic index compared to Kanji. Amylose rich rice varieties are digested slowly and have low glycemic index.
- Phytic acid in cereals reduce the glycemic index.

Natural foods have low glycemic index compared to processed foods. The GI of fructose is low (23). Small servings of nuts in place of cereals have better control on diabetes in snacks. Soluble dietary fiber along with low glycemic fats are useful for diabetes mellitus.

TOPIC - DIET IN OBESITY AND UNDER WEIGHT

Contents - Aetiology, symptoms and dietary management of over weight and obesity – assessment

OBESITY- is a state in which there is a generated accumulation of excess adipose tissue in body leading to more than 20% of desirable weight.

OVER WEIGHT – is a condition where the body weight is 10-20% greater than mean standard weight for age, height and gender.

AETIOLOGY

Obesity is a complex multifactorial chronic disease developing from influence id different factors such as social, behavioural, psychological metabolic cellular and molecular (genetic).

GENETIC FACTORS- 10% of children born to normal persons born to normal weight are obese. 40-50% of children born to one obese parent are obese, 80% of children born with two obese parents are obese.

Ectomorphs are wiry and slender and do not become over weight, endomorphs are round, soft individuals who gain weigh readily.

AGE AND GENDER- it occurs at any age and when persons is in positive energy balance and more common in women than men.

EATING HABITS-

- Nibbling in between meals.
- Eating faster in short time.
- Eating when tasty foods are there.
- Women preparing food in kitchen may become obese.
- Eating left over foods.
- Eating outside home.

ACTIVITY PATTERN- seen in persons giving less importance to activities.

- Many persons gain weight because they fail to adjust the appetites to reduce energy requirements.
- Basal metabolic rate reduces with age.
- Change of occupation may lead to reduces activity.
- Illness like cardiac disease and arthritis will reduce the need for calories.

INTAKE OF CALORIES- beyond need for energy.

2 types – exogenous: develops through excessive eating.

Endogenous: constitutional due to metabolic disorder or heredity influence.

TRAUMA – injury to hypothalamus due to head injury, since it cannot regulate appetite or satiety.

METABOLIC ANOMOLY- deficiency of thyroid secretion can reduce BM and obesity can result.

Hypogonadism and cushing syndrome, puberty, pregnancy and menopause can lead to weight gain and obesity.

COMPLICATION-

- 1) Excessive weight is associated with CVD, renal disease, diabetes, degenerative arthritis, gout and gall bladder disease.
- 2) Obese persons are likely to have high triglycerides levels, cholesterol levels and decreased carbohydrate tolerance.
- 3) It increases the respiratory cost in normal persons and decreases lung volume and may lead to pulmonary hypertension.
- 4) Hazards of pregnancy, Childs birth and surgery are multiplied in obesity.
- 5) Obese persons are more uncomfortable in warm weather, more susceptible to accidental, back aches and hot troubles.

ASSESSMENT OF OBESITY

1) Based on body mass index-

BMI- $\frac{Wt. (kgs)}{Ht (m)^2}$

Ht (m)²

Grade III - > 40

Grade II- 30-40

Grade I- 25-29.9

Not obese - <25

2) Brocas index –gives ideal body weight

HEIGHT in cms – 100 = ideal body weight

3) Waist circumference

Men >40 inches (>102cm)

Women >35 inches (>88cm) are at high risk.

It is most practical tool to evaluate patients abdominal fat before and during weight loss.

4) Ponderal index- it is the ratio of height to cube root of weight

An index of <13 is associated with obesity.

5) Weight to hip ratio- the ratio of waist circumference to hip circumference indicates abdominal obesity.

$\frac{\text{Waist circumference}}{\text{Hip circumference}} = 0.7$ is normal

Hip circumference

≥ 0.85 and ≥ 0.95 among females and males indicate abdominal obesity.

Obesity among hips is called as gynoid obesity. Android obesity is obesity around the abdomen or apple obesity.

Specific gravity- of body is found by weighing in air and in water and corrections are made for air in lungs.

UNDERWEIGHT

When individuals who are more than 10% below the normal abolished standard of weight the person is said to be underweight.

CAUSES-

- 1) When energy intake is not meeting the energy requirement.
- 2) Occurs in people who are very active, tensed and nervous and who obtain very little test.
- 3) Psychological factors- eating too little, worry and strain, some people with mental illness reject food.
- 4) Underweight occurs in fever when appetite is poor but energy needs are high.
- 5) In GIT disturbances characterized by nausea, vomiting and diarrhoea.
- 6) In hyperthyroidism where metabolic rate is greatly increased.
- 7) Insufficient intake of quality and quantity of foods, poor choice of foods.
- 8) Poor absorption and utilization of foods.
- 9) In wasting decreases like TB and starvation and famine.

CLASSIFICATION-

$$\text{Body mass index} = \frac{\text{wt (kgs)}}{(\text{Ht}) \text{ m}^2}$$

CED = chronic energy deficiency

<16 = CED grade III

16-17 = CED grade II

17-18.5 = CED grade I

18.5-20 = low weight normal

20-25 = Normal

25-30 = obesity grade I

30-40 = obesity grade II

>40 = obesity grade III

DIET THERAPY FOR OBESITY

Low calorie diet are prescribed

TREATMENT:

- 1) Diet therapy
- 2) Physical exercise
- 3) Stress management
- 4) Pharmaco therapy
- 5) Weight loss surgery

VERY LOW CALORIE DIET (<800kcal)

Although more weight is lost on very low calorie diet but more is usually regained. Rapid weight reduction does not teach behavioural changes. Patients on very calorie diets are at risk of developing gall stones. Very low calorie diet (400-800kcal/day) are safely for extremely obese individuals under the care of physicians.

Reducing diet – the goal of weight loss therapy is to reduce body weight by 10% from baseline. The person is put on negative energy balance usually 500-1000 kcal less than the RDA. An ideal reduction of 500g-1kg/ week is recommended. The reducing diet should be adequate in protein, minerals and vitamins. After sufficient weight loss as occurred with reducing diet the person is put on weight maintenance diets.

Weight maintenance diets – provides 1500-1800kcal when body weights are reduced to optimum levels, weight maintenance programmes consists of diet therapy, physical activity and behaviour therapy continued indefinitely.

PRINCIPLES OF DIETARY MANAGEMENT IN OBESITY –

low calorie, normal protein, vitamins and minerals (except sodium), restricted CHO, restricted fat and liberal fluids, high fibre diet are given in each case.

ENERGY- 20kcal/kg ideal body weights are recommended in obesity.

PROTEIN- 1g of protein/ kg body weight for desirable weight is sufficient. 15-20% of energy should come from proteins.

FATS AND CHO- the fat allowed should form 15-20% of total energy and CHO form 60-65% of total energy. High fibre diet are recommended, 25g of fibre for 1000kcal of energy is given.

MINERALS AND VITAMINS- multivitamin preparations, iron and calcium are indicated for low diets containing 1000kcal or less. The diet should be planned with increased vitamins and minerals from children and pregnant women.

FLUIDS – can be taken liberally and glass of extra water before food.

HIGH FIBRE DIET- High fibre low calorie foods like GLVs, fruits, vegetables, salads, whole grains, cereals and pulses are included.

FOODS AVOIDED –

High fat foods- chocolates, cream, ice cream, fried foods, butter, pastry and bakery foods.

High CHO foods- bread, cake, fruits, sugar syrups.

Beverages – chocolate, carbonated beverages, and alcoholic drinks.

Exercises- moderate exercise on daily basis is important aid in weight loss.

Drugs- anorexia drugs such as amphetamine sulphates are prescribed, it has many side effects, it may have some side effects.

Suggested recipes-low calorie, high fibre

- Vegetable soups
- Chapattis without oil
- Thin dhal curries
- Steamed foods like idly
- Thin soups
- Poached fish
- Boiled vegetables
- Coffee and tea without sugar

DIETARY MODIFICATION FOR UNDERWIGHT-

High calorie, high protein, with liberal vitamin intake is recommended. Balanced diet is planned based on requirements.

Energy- for increasing weight total calorie intake should be in excess of the energy requirement. An additional 500kcal per day is recommended.

Protein- 1.2g protein/day is recommended for tissue building. Good quality protein is completely utilized by body and must be liberally included.

Fats- easily digestible fats are included. Too many fried foods are avoided as they are not digestible. Fats such as cream, butter and oils help to increase weight.

Carbohydrates- dried fruits ,sweet, nuts, desserts, jam, jellies, cereals and products and non-vegetarian foods rich in energy are given. No. Of meals should be given in between meals.

Porridge, cutlets, desserts, potato chips, high protein drinks, malted drinks, badam drinks.

Vitamins and minerals- with a liberal diet mineral and vitamins supplements are given.

Fluids-enough fluids are needed for preventing constipation.

Exercise and bowel- regular outdoor exercise helps to stimulate appetite. Constipation should be avoided by enough fluids, fruits and exercise. Synthetic drinks soft drinks, alcohol, aerated drinks should be avoided. Porridge, cutlet, desserts, badam kheer are included. Thick soups are digestible and nutritious are included.