
بسم الله الرحمن الرحيم
In the name of ALLAH
the most Beneficent and the most merciful

NUTRITION AND HEALTH-2

FATS ; CARBOHYDRATES

FATS

- Fats are solid at 20 degree C.
- These are called **"OILS"** if these are liquid at this temperature.
- Both of these (Fats and Oils) are concentrated sources of energy.
- Each gram of fats provides up to 9 Kcal of energy

FATS

CLASSIFICATION OF FATS

1. Simple lipids e.g. triglycerides.
2. Compound lipids e.g. phospholipids.
3. Derived lipids e.g. cholesterol

FATS

- Human body can synthesize triglycerides and cholesterol endogenously
- Most of the body fat (99%) in adipose tissue is in the form of triglycerides

FATS

- In normal adult, adipose tissue constitutes 10-15% of body weight
- The accumulation of 1 Kg of adipose tissue corresponds to 7700 Kcal of energy

FATTY ACIDS

Fats yield fatty acids and glycerol on hydrolysis.

Fatty acids are divided into:-

1. **Saturated fatty acids** such as lauric acid, palmitic acid & stearic acid

FATTY ACIDS

2. **Unsaturated fatty acids**

which are further sub-divided into:

(a)Monounsaturated fatty acids; (MUFA) e.g. oleic acid

(b)Polyunsaturated fatty acids; (PUFA) e.g. Linoleic Acid (LA) & Alpha Linolenic Acid (ALA)

FATTY ACIDS

- PUFA are mainly found in vegetable oils while Saturated Fatty Acids(SFA) are found in animal fats.(exceptions are coconut & palm oil and fish oils)
- Not all PUFA are essential fatty acids.
- Linoleic acid is abundantly found in vegetable oils

FATTY ACIDS

Essential Fatty Acids (EFA) are those which can not be synthesized by man and can only be derived from food. The most important EFA is **linoleic acid** which serves as a basis for production of other essential fatty acids (e.g. linolenic acid & arachidonic acid)

SOURCES OF FATS

1. **ANIMAL FATS:** e.g. Milk, butter, cheese, ghee, eggs, meat, fish, have mostly saturated fatty acids except fish oils like cod liver oil and sardine oil.
2. **VEGETABLE FATS:** e.g. Plant seeds like mustard, cotton-seed, palm seed, groundnut, soya bean, coconut, maize etc are sources of vegetable oils.

SOURCES OF FATS

3. OTHER SOURCES:

Small quantities of fat (invisible fat) are found in cereals, pulses, nuts and vegetables. Large cereal consumption provides considerable amount of invisible fat. Moreover body can convert carbohydrates into fats.

FATS

- **VISIBLE FATS** are those separated from their natural sources e.g. butter from milk & cooking oils from oil-bearing seeds
- It is easy to estimate their intake in daily diet

FATS

- **INVISIBLE FATS** are those which are not visible to naked eye and are present in almost every food article e.g. cereals, pulses, nuts, milk, eggs, meat etc.
- It is difficult to estimate their intake in daily diet

SOURCES OF FATS

- In fact the major contribution to total fat intake is from invisible sources rather than visible sources as cereals, milk, meat and pulses constitute the bulk of our daily food

FUNCTIONS OF FATS

- Fats are high energy foods, providing as much as 9 Kcal/g
- Fats serve as vehicle for fat soluble vitamins
- Fats support viscera like heart, kidney and intestine etc

FUNCTIONS OF FATS

- Fats beneath the skin provide insulation against cold
- Fats make food tasty and palatable
- EFA are needed by the body for growth & structural integrity of cell membrane
- EFA reduce serum cholesterol & LDL

FUNCTIONS OF FATS

- PUFA are precursors of prostaglandins
- Cholesterol is essential as a component of membranes and nervous tissue and is a precursors of steroids & bile acids.

FATS

HYDROGENATION

When vegetable oils are hydrogenated under conditions of optimum temperature and pressure in the presence of a catalyst, liquid oils are converted into semi-solid and solid fats (Vegetable ghee or Vanaspati).

FATS

(HYDROGENATION)

During this process unsaturated fatty acids are converted to saturated fatty acids and EFA content is drastically reduced.

Vanaspati is lacking in fat soluble vitamins. It is fortified with vitamin A & D.

FATS

TRANS FATTY ACIDS

- These are geometrical isomers of unsaturated fatty acids that adapt a saturated fatty acid like configuration.
- Partial hydrogenation, create trans fatty acids.
- These increase the risk of coronary heart disease.

FATS

(TRANS FATTY ACIDS)

- Trans fatty acids render the plasma lipid profile even more atherogenic than saturated fatty acids, by elevating LDL cholesterol and decreasing HDL cholesterol.
- It takes years for trans fatty acids to be flushed from the body

FATS

SOURCES OF TRANS FATTY ACIDS

- Deep fried fast foods
- Chips & Crackers
- Cookies & Candies
- Packaged doughnuts

FATS

(SOURCES OF TRANS FATTY ACIDS)

- Pies & Cakes
- Cereal & energy bars
- Whipped toppings

FATS

REFINED OILS

- Refining is usually done by treatment with steam, alkali etc.
- Refining & deodorization of raw oil is done mainly to remove the free fatty acids and rancid material

FATS

(REFINED OILS)

- Refining does not bring about any change in the unsaturated fatty acid content of the oil
- It only improves the quality and taste of oils
- Refined oils are costly

FATS AND DISEASE

a) **OBESITY:** A diet rich in fat, can pose a threat to human health by encouraging obesity. In fat people, adipose tissue may increase up to 30%

b) **PHRENODERMA:** Deficiency of essential fatty acids in diet is associated with rough and dry skin , a condition known as phrenoderma or “Toad skin”. It can be cured by giving linseed or safflower oil which are rich in EFA

FATS AND DISEASE

c) **CORONARY HEART DISEASE:** High fat intake i.e. dietary fat intake representing 40% or over of the energy supply and containing a high proportion of saturated fats has been identified as a major risk factor for CHD.

Studies indicate that LDL and VLDL fractions are atherogenic and HDL exerts a protective effect against the development of atherosclerosis

FATS AND DISEASE

d) **CANCER:** In recent years, there has been some evidence that diets high in fat increase the risk of colon cancer and breast cancer

CHOICE OF COOKING OILS

- Use correct combination blend of two or more vegetable oils
- Limit use of butter/ghee
- Avoid use of PHVO (Vanaspati)
- Oils used for frying should have higher thermal stability

FAT REQUIREMENT

Taking into consideration the age, physiological status and physical activity, the minimum intake of visible fat should be 20-40 g/day. WHO's recommendations are that only 15 – 30% of total dietary energy should be provided by fats

CARBOHYDRATES

- These are Major component of food
- These are Main source of energy, (4 Kcal per gram)
- These are also essential for oxidation of fats and synthesis of certain non-essential amino acids

CARBOHYDRATES

- Carbohydrate reserve (Glycogen) of a human adult is 500 gram, which is rapidly exhausted when one is fasting
- If the diet is deficient in carbohydrates; proteins and glycerol from dietary and endogenous sources are used by the body to maintain glucose homeostasis

SOURCES OF CARBOHYDRATES

There are three main sources of carbohydrates:

1. **Starches:** These are basic to human diet and are found in cereals, roots and tubers.

SOURCES OF CARBOHYDRATES

2. **Sugars:** These comprise:- Monosaccharides (e.g. glucose, fructose and galactose) and Disaccharides (e.g. sucrose, lactose and maltose). These are highly water soluble and easily assimilated.

SOURCES OF CARBOHYDRATES

3. **Cellulose:** It is the indigestible component of carbohydrates, with scarcely any nutritive value and contributes to dietary fiber.

GLYCEMIC INDEX

- The “Glycemic Index” or GI is a number associated with a particular type of food that indicates the food’s effect on person’s blood glucose level. A value of 100 represents the standard, an equivalent amount of pure glucose
- The GI represents the total rise in person’s blood sugar level following consumption of food

GLYCEMIC INDEX

- The “Glycemic Index” of a food is defined by the area under the two-hour blood glucose response curve (AUC) following the ingestion of a fixed portion of a test carbohydrate (usually 50 g) as a proportion in % of the AUC of the standard (either glucose or white bread)

DIETARY FIBER

- It is physiologically important component of food
- It is mainly non-starch polysaccharide
- It is found in vegetables, fruits and grains

DIETARY FIBER

- It is divided into *cellulose* and *non-cellulose polysaccharides,* which include pectin, inulin, plant gums & mucilage
- Pectin, gums and mucilage are soluble fibers while other are insoluble

FUNCTIONS OF DIETARY FIBER

1) It absorbs water, increases bulk of stools & reduces tendency to constipation
2) Fiber reduces transit time of food in gut and thus reduces possibility of putrefaction and formation of gases

FUNCTIONS OF DIETARY FIBER

4) It is associated with reduced incidence of CHD.
5) It reduces blood cholesterol level
6) Cancer of stomach and colon have been linked to low fiber diet

FUNCTIONS OF DIETARY FIBER

6. It also reduces post prandial blood glucose

   Daily intake of 40 gram of dietary fiber is desirable


Thank You