D.Pharm, First Sem

Social Pharmacy

Basics of nutrition

Importance of water in our diet


IMPORTANCE OF WATER IN OUR DIET

Body Composition: Water is the major component of our body. If you weigh 50 kg, 31 kg of that weight is water Approximately 55 to 70 per cent of the total body weight is made up of water. The percentage of water tends to decrease as a person gets older. Thus infants and children have a much higher content of water than adults. Fat individuals have less water than lean ones. Water is an essential nutrient next only in importance to oxygen. Deprivation of water even for a few days can lead to death.

Water is an essential component of every cell of our body. There is a variation in the water content of various tissues. Metabolically active tissues such as brain, liver, blood and muscles contain more water than bone and fat tissue, which are less active. For example, blood plasma has 90 per cent, muscle tissue 75–80 per cent and fat tissue 20 per cent water.

Water holds innumerable body components in solution or suspension. Therefore, it is more appropriate to refer to these as fluids. The fluids, which exist inside the cells, are called intracellular fluids, which form about 55 per cent of water in the body. The rest is found as extracellular fluid (outside the cells). Blood, lymph circulation and interstitial fluid (fluid between cells or tissues) are part of extracellular fluid (Figure 1).
The fluid balance is maintained between the compartments as also between blood and interstitial fluid; kidneys are the final regulators of fluid balance.

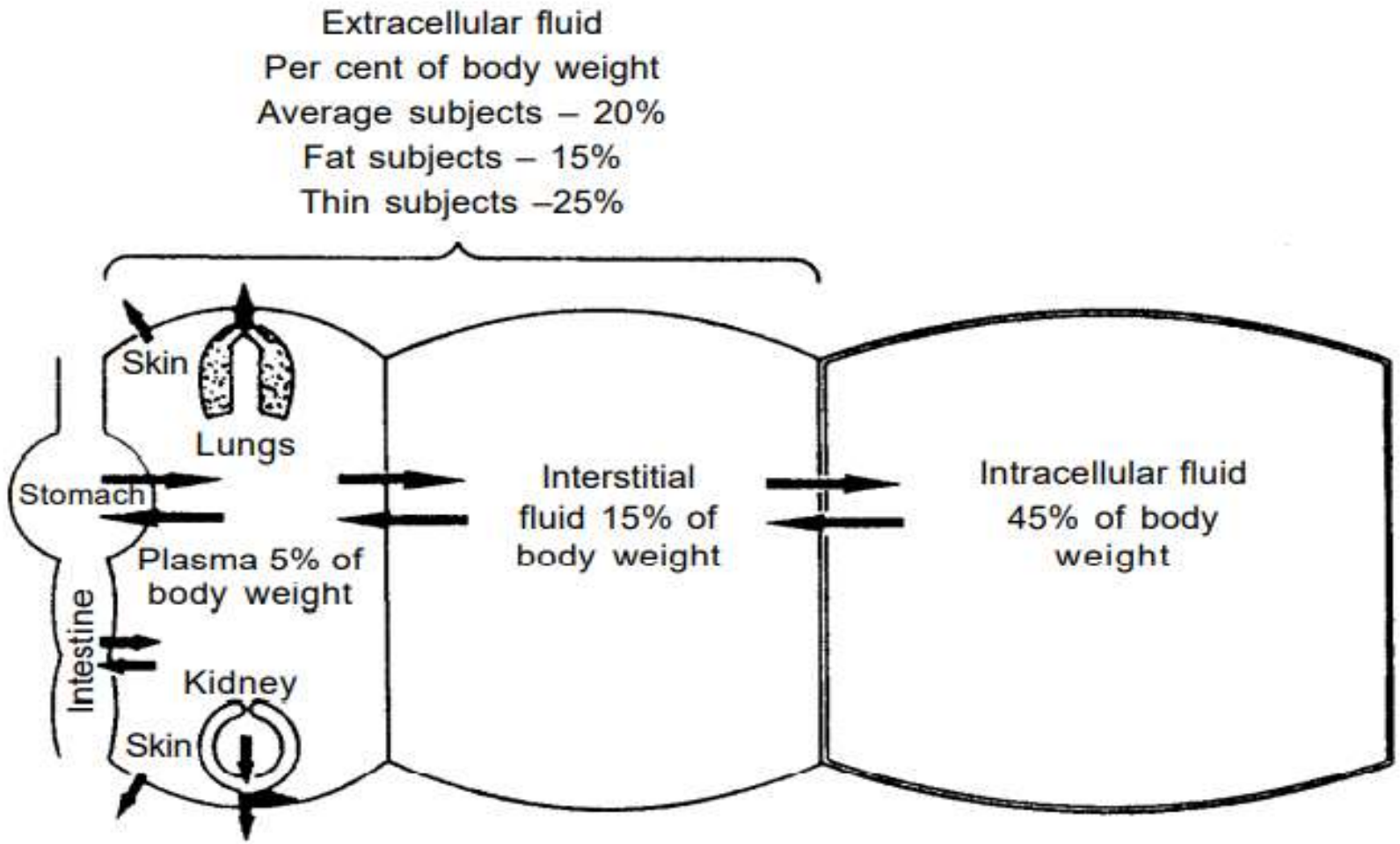

Fig: 1 Body fluid compartments

- **Functions** : Water serves as a building material for each cell of the body. Water is a universal solvent and is able to dissolve all the products of digestion.
- Further as it is a constituent of all body fluids, it helps in the transport of the products of digestion to the appropriate organs. For example, blood, which contains 90 per cent water, carries carbon dioxide to the lungs, nutrients to the cells and waste nitrogenous material and salt to the kidneys.
- Urine which contains 97 per cent water has all the waste material dissolved in it and the body is thus able to excrete soluble waste products of metabolism.
- Water is needed for many chemical reactions to occur in the body. For example, the breakdown of sugar to simpler substances needs the presence of water.
- Water acts as a lubricant preventing friction between moving parts of the body.
- The body temperature is regulated through the evaporation of water from the skin and lungs.

- For normal Losses kidneys and lungs carry out water from the body.
- Water is also lost as perspiration through the skin and as part of excreta from the bowel. The volume of urine voided depends on the intake of fluids and varies from 400 to 1400 ml. The minimum or obligatory excretion of urine is about 600 ml to keep all the solutes (salt, urea, etc.) to be excreted in solution.
- Water is lost as vapour through the skin (insensible perspiration) and also as visible perspiration in hot weather and after strenuous activity.

Water Balance: The body normally maintains a water balance precisely, i.e., the amount of water ingested is equal to the water excreted or lost from the body . This water balance is maintained even though the fluid intake may vary widely from day-to-day. How exactly this regulatory mechanism works is not known; but certain regions of the hypothalmus are believed to regulate the intake. The water excretion is controlled by hormones.

Sources: The water we drink as such is the main source from which maximum water is obtained by the human body. In addition to this, the intake of all beverages and liquid foods that contain water, contribute water to the system. Certain metabolic reactions carried on inside the body also release water and this is another source of water. In a water balance study it was found that of the total 2200 ml available water in the system, 1100 ml was obtained by drinking water as such, 900 ml was obtained from the diet and 200 ml obtained from the metabolic oxidation.

Requirement:

- About 1 ml of water is needed per 1 kcal energy intake; thus about 2000 ml water is necessary when energy intake is 2000 kcal.
- Infants who have a large body surface area, in proportion to body weight, need 1.5 ml water/1 kcal energy intake.
- The amount of water needed by an individual will depend on many factors such as the environmental temperature, humidity, occupation and the diet.
- In general, apart from water obtained in the food, an individual may need to drink about 1.5 to 2 litres of water per day.
- An athlete or a player, playing a strenuous game such as football or hockey, may lose several litres of water and dissolved salts during the game and would need replacement early. On the other hand, a sedentary individual would need much less water.

Problems

- Dehydration: When intake of water and other fluids is less than the body needs, dehydration occurs.
- Dehydration is a serious medical problem, which needs prompt attention and remedial action. Dehydration results from excessive loss of water due to vomiting and/or diarrhoea.
- Infants who have a high body water content and high water requirement get dehydrated very quickly, when they suffer from diarrhoea.
- If the loss of water and electrolytes is not promptly made up by feeding beverages such as oral rehydration solution, coconut water, weak tea, lemon sherbet, etc., the infant may not survive.

- Vomitting due to either gastrointestinal disturbances or any other cause can lead to appreciable loss of fluid from the body.
- Excessive perspiration due to strenuous exercise, while playing games such as hockey, football can result in losses of many litres of water.
- Protracted fevers can lead to appreciable loss of water due to perspiration. In all such instances where there is loss of water, it is important to replace the water and soluble salts lost quickly to maintain body composition.
- Any loss more than 10 per cent of fluid from the body can be serious. Progressively, deprivation of water can cause poor absorption of food, delayed elimination of wastes, elevation of body temperature, failure of the circulatory system and malfunctioning of the renal system.

- Oedema is accumulation of excess fluid in the tissues.
- It occurs when the sodium content in the extracellular fluid increases due to the inability of the kidneys to excrete sodium.
- Water is retained with the excess sodium, resulting in oedema.
- In protracted protein deficiency, the tissues are unable to ensure water balance, and the oedema, which follows, is called nutritional oedema.
- Other conditions, which lead to oedema, are kidney disease, cirrhosis of the liver and heart ailment.

Electrolytes

Chemical compounds, which break up into their constituent ions, when dissolved in water, are known as electrolytes, because each carries an electric charge. The positively charged electrolyte is known as a cation and the negatively charged one as an anion. In an electrolyte solution, the total number of cations are exactly equal to the total anions.

- Electrolytes are necessary to regulate the water and acid-base balance in the body. Sodium is the principal cation and chloride the anion in blood plasma.
- The other cations are potassium, calcium and magnesium; other anions are bicarbonate, phosphate, sulphate, proteinate and organic acids.
- In contrast, inside the cell, the main cation is potassium and the main anion is phosphate. There is a strict maintenance of concentration of electrolytes in the fluids inside and outside the cell in a healthy person.
- Thus sodium stays mainly outside the cell and potassium inside the cell. Any change in the level of electrolytes in the blood plasma is an early warning of disorder in the body.


THANK
YOU!