

Importance of water in terms of health

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Abstract- Water is one of the most essential ingredients for life. The cells that make up living organisms require water in order to maintain their life activities. Human can live without taking food for about 5 weeks and but can only withstand 7-12 days without drinking water. 60-70% of the human organism consists of water. Water constitutes a large part of the blood and lymph systems. It helps moving and balancing of electrolytes that control blood pressure. Water is required to make of the immune system functional. It works as a construction material in muscles, bones, fat tissues and tooth dentin. It dissolves the substances the organism needs and carries them to tissue and cells. Therefore, metabolic waste are transported with the water. Drinking water must be sufficient and physically, chemically and microbiologically healthy. Depending on water shortage and pollution in the world, every day many people lost their lives because of illness from the water, and children are especially the most affected fraction.

Index Terms- Water, health

I. INTRODUCTION

Since very ancient history, water is regarded as one of the most valuable natural resources. In BC IV century, Empodekles said "World is made of water and soil." Later the boundaries of this description are further expanded and "Four Elements Theory" have been suggested. Accordingly, a definition is made: "All bodies are made of water, earth, air and fire." The following assessments are carried out under the light of modern science: "Life began in water." "No water, no life." [1]

II. WATER REQUIREMENT OF HUMAN

Water is one of the most essential ingredients for life. The cells that make up living organisms require water in order to maintain their life activities. Human can live without taking food for about 5 weeks and but can only withstand 7-12 days without drinking water.

95% of three-month fetus is water. 60-70% of the human organism consists of water. This water's 2/3 is in the cell, while the remaining part is located in the interstitial fluid and blood. Human must meet the physiological needs of water every day on a regular basis. 50% of it is provided from the beverage, and 35% of it is from the food and 15% of it is from oxidation water which is the combustion of food in the body. Generally, the water requirement is calculated as 2.5-3 liters to 1 liter per calorie calculation that corresponds to 2500-3000 calories per day.

III. FUNCTIONS OF WATER IN THE BODY

- a) Construction material: 75-80% of the composition of the muscles, 25% of bone tissue, 20% of fat tissue, 10% of the tooth dentin is made of water.
- b) Diluent: Water dissolves the substances the organism needs and carries them to tissue and cells. Therefore, metabolic waste are transported by the water. Also the softening, absorption and moving of the food in the digestive tract, and transport by blood circulation is with water.
- c) Heat regulator: Expelling heat from the body and regulation of body temperature is provided by water. For example, players lose 4-5 liters of water in a football match.
- d) Lubricant: Water prevents friction and corrosion, especially by providing adequate lubrication in the body's internal organs and loose parts [2].

IV. KIDNEYS

Kidneys continuously filter blood in the body.

As a result of chemical reactions that occur in the continuation of the vital activity of the organism, they collect and send the all water-soluble hazardous waste such as urea, uric acid and lactic acid to the urine bags.

In the absence of an adequate amount of water kidney is forced to use contaminated water that had been used previously and tries to work more to remove waste.

Table 1. Daily Liquid Requirements

Age	Weight (kg)	Total liquid (ml)	ml/kg/24 hour
3 days	3.0	250- 300	80-100
3 months	5.4	750- 850	140-160
1 year	9.5	1150-1300	120-135
2 years	11.8	1350-1500	115-125
4 years	16.2	1600-1800	100-110
6 years	20.0	1800-2000	90-100
10 years	28.7	2000-2500	70- 50
14 years	45.0	2200-2700	50- 60

In this case, people need to urinate at longer intervals and emptying bladder takes longer.

Failure to satisfy the daily water needs for a long time may permanently damage the kidneys.

Also; the risk of urinary tract infection in women who meet the daily water needs on a regular basis has been found very low.

However, kidney stones formation has been found to slowed down in people who meet their water needs completely.

V. LIVER

The most important function of the human liver is to convert stored body fat into energy.

In the absence of sufficient water intake to the body, metabolic wastes cannot be disposed by the kidneys and excreted from the body so that liver tries to make this task.

In this case liver works more heavily and fat storage in the body increases.

Consuming more water is recommended especially for people who make diet.

The main reason for this; during weight loss the body produces more waste than normal times.

Complete removal of this waste and still being able to continue the regular functions of the liver can only be achieved with drinking high amount of water.

Also drinking a glass of water will make the sensation of hunger suppressed in people who make diet.

Thus, the liver will directly convert the body fat to energy.

VI. PERSPIRATION

Sweating mechanism provides the body to constantly remain at the same temperature and thus to ensure the continuation of life.

Each day an insufficient amount of water consumption would naturally reduce perspiration and will cause deterioration of the organism's temperature stability.

VII. LUNGS AND BREATHING

The same level of humidity of the lungs is required to remain constant for respiratory function to be able to continue.

People lose an average of 1 liter of water a day from the body through breathing and loss of this water is replaced again by drinking water.

VIII. BRAIN

85% of brain tissue is water.

Failure to take sufficient water to body decreases energy production in the brain.

As a result, depression and chronic fatigue symptoms are frequent.

IX. DIGESTIVE SYSTEM

Water-soluble acids and enzymes in the stomach make the food homogenized and fluid and send them to the intestinal digestion.

However, in case of lack of sufficient water it takes the necessary water from bowel and constipation occurs.

This disorder can be removed by taking sufficient water to the body.

Colon cancer development risk in women who take daily water needs on a regular basis has been demonstrated to be very much reduced.

Especially at night, body cannot get enough water. Getting one glass of water when waking up in the morning should not be neglected.

Drinking one glass of water before lunch and dinner suppresses appetite, fills the stomach and is good for digestion.

Drinking one cup of water before doing sports again runs the metabolism and prevents muscle glycogen depletion.

X. EDEMA

Whenever there is no steady water supply emerges body's self-protection mechanism, and a portion of the first taken water collects in certain areas.

This in the body, composes swelling called edema especially in the feet, the legs and hands.

However, in regular and sufficient water inlet body does not need water collection mechanism.

For the body not to collect water, drinking plenty of water is necessary.

Also, if a diet is done, a point that should be noted is that for every 100 calories burned, there is need for at least 4 cups of water.

If water amount decreases, the amount of fat stored in the body starts to increase. The reason for this; if kidneys do not take enough water, they do not work well. This task also becomes liver's.

When taken on the task of kidney, liver converts less fat into energy. This effects slimming extremely negatively [3].

XI. OTHER BENEFITS OF WATER

It constitutes a large part of the blood and lymph systems.

It helps moving and balancing of electrolytes that control blood pressure.

When enough is consumed, the skin becomes smoother, softer, brighter and more flexible.

Being in saliva and gastric secretion, is involved in the digestion of food.

Water increases milk production in nursing women.

Water is required to make the immune system functional. With this feature it helps to stay fit and vigorous.

Although natural sources of drinking water vary from many regions; it always contain some minerals.

We get a portion of the minerals necessary for our body from the water we drink. Among these, calcium, magnesium and sodium are the more

	German HD	French HD	English HD
Very soft	0 - 4	0 – 7.2	0 - 5
Soft	5 - 8	7.3 – 14.2	6 - 10
Slightly hard	9 - 12	14.3 – 21.5	11 - 15
Moderately hard	13 - 18	21.6 – 32.5	16 - 22.5
Hard	19 - 30	32.6 – 54.0	22.5 – 37.5
Very hard	More than 30	More than 54	More than 37.5

quantity. Fluorine, iodine and other trace elements provide a portion in the water we drink [4].

XII. WATER HARDNESS

Hardness refers to the number of polyvalent ions contained in water, especially calcium and magnesium amount.

Water hardness is expressed by milliequivalents of calcium oxide or carbonate measurements in 1 liter of water, or the unit "hardness".

In measurements of drinking water the hardness unit is preferred rather than milliequivalents.

1 German hardness degree= 1 liter of water 10 mg

Table 2. Water hardness degrees

1 French hardness degree = 1 liter of water 10 mg CaCO₃

1 British hardness degree = 700 ml of water 10 mg CaCO₃

1 USA hardness degree = 1 liter of water 1 mg CaCO₃

(US hardness degree = French hardness degree x 10)

(1 French HD = 0,56 German HD = 0,70 English HD.)

Hard water, even if not directly harmful to health, is not suitable for cooking and drinking. Also if the water of this nature is used in laundry or in industry, it will result in more soap usage and accumulation of lime scale inside the boiler and the pipes.

Lead, copper and harmful substances such as cadmium, are thought to be less in hard water. Calcium in water plays an important role in this protective effect.

It has been determined that water hardness has reverse relationship with cardiovascular disease.

In people who live in areas with sweet or soft water; atherosclerotic and degenerative heart disease, hypertension and cardiovascular sudden death has higher incidence [5].

XIII. DISPOSAL OF WATER FROM THE BODY

a) Urine: 60% of the taken water is excreted with the urine. Water serves as a flux for the disposed waste materials in this way. In an adult human 1000-1500 ml of water is lost in this way per day.

b) With feces: In this way, 5% of taken water is discharged.

c) Skin: In the organism 20% of the water is removed by evaporation and transpiration. With sweat; water, sodium, potassium, calcium, minerals like magnesium is also lost from the body.

d) Lungs: in form of steam every day 400-500 ml of water is thrown out of organism.

Ultimately people take out of the body about 2.5-3 liters of water every day.

If this thrown over water is not taken back to the body, the first irregularity is that flow of saliva will stop and cause drying of the pharyngeal mucosa to occur thirst which will increase the osmotic blood pressure.

XIV. THIRST

Various body events is shaped according to the degree of thirst.

If there are more cons than 3% of water than the blood normal, kidneys cannot filter metabolic

Death from thirst, is formed as increase in the density of blood (blood contains 3-4 liters of water) that results of the cessation of circulation in the small blood vessels that causes asphyxia (choking).

Animal organism, even though it continues to live in despite losing glucose and fat of the entire composition or 50% of the protein, die if it loses 20% of water [2].

XV. IMPORTANCE OF HEALTHY WATER

Water that does not contain microorganisms and chemicals that may be harmful to human health, but that does contain adequate and balanced amounts of the minerals required for good health, and that is clear, odorless is; healthy water.

Healthy and safe water is free of contaminants from

Water loss		
1-1,5 %	6-7 %	11-12 %
Thirst	Headache	Cramps
Movement disorder	Difficulty in breathing	Difficulty in swallowing, swelling of the tongue
Anorexia	Change in blood volume	Difficulty in seeing and hearing
Increased rectal temperature, skin reddening	Difficulty in speaking	Fever
Impatience, fatigue	Difficulty in remembering	Decrease in susceptibility
Increased heart rate	Increased blood density	Termination of life

w **Table 3.** Effects of water loss on the body [2]

in damage human health.

Exiting 2 liters of water in the human body causes weakness, loss of 3 liters of water is considered as the beginning of a marked fondness and 4 liters of water is starting of hazard.

The loss of 11-12% of water from the body causes death.

Water is essential for the continuity of human life.

But this much important substance is not enough to be only more in terms of quantity, but also important to be, healthy, clean, drinkable and usable.

As is known to the establishment of settlements in the historical process places close to water sources has always been preferred because water is not only for drinking, but also is a substance used in cleaning, making agricultural production, animal husbandry, the construction area industrial production and related areas with landscaping.

A substance that respond that much of the needs, water must be free from foreign substances that may harm human health.

Unclean water is carrier of many diseases.

A lot of research revealed that, a person needs a minimum of 50 liters of water to meet the needs of drinking, cooking, bath and cleaning. This clean, safe water is a prerequisite for health.

Many diseases manifest itself in the absence of healthy and reliable water.

Because of household waste (cleaning, sewage, garbage, etc.), industrial waste (chemicals, radioactive materials, etc.) and the drugs and fertilizers used in agriculture; uncontrolled water is given to the water supply network and threaten human health.

XVI. DISEASES RELATED WITH WATER

Water pollution leads to various diseases:

Bacteriological contamination; diarrhea, typhoid, cholera, parasitic diseases, hepatitis A, polio, skin and eye diseases...

Chemical contamination; poisoning, chronic diseases and cancers.

Radioactive contamination; diseases effects that may occur from acute and chronic effects.

Diseases associated with water, occurs in the case where water is not healthy and safe and is contaminated with organic or inorganic substances, human or animal feces.

These diseases can be visible in short, medium or long term [6].

Diseases caused by water are examined under five main headings outside of the above diseases: Water-borne diseases, water-washed diseases, water-based diseases, diseases transmitted with aquatic organisms and water-scarce diseases.

Water-borne diseases are caused by fecal-oral transmission as a result of feces and urine contamination into the water, and are diseases caused by toxic substances in the water. They are also transmitted with the risky food. For e.g.: Diarrhea and dysentery, typhoid, polio, hepatitis A

Water-washed diseases are emerged by placing dirty water on the eye or skin. For e.g.: Skin and eye diseases

Water-based diseases occur as a result of a parasite in the drinking water. For e.g.: Schistosomiasis, dracunculiasis

Diseases transmitted with aquatic organisms are diseases carried by insects in water. This risk are also available if insects and mosquitoes are breeding near water. For e.g.: Sleeping sickness, filariasis, malaria

Water-scarce diseases are diseases that occur due to the lack of water. For e.g.: Typhus, relapsing fever [7]

XVII. IMPORTANT CHEMICALS IN WATER

Nitrate: The most important health effect of nitrate is methemoglobinemia. Blue baby syndrome (cyanosis, asphyxia) in particular, is seen more in the babies who drink bore water which has more than 10 mg / L nitrate concentration.

Benzene: Above 1.0 µg/L: Anemia, reduction in platelets, increased risk of cancer

Lead: Highly toxic. Represses the functionality of central nervous system in children and pregnant women, delays learning, decreases school performance, a risk factor for premature birth and LBW infant, leads to a delay of physical and mental development and can affect the level of intelligence in infants and children.

Arsenic: Long-term circulatory system problems, skin problems, increased risk of cancer (skin, lung, liver, cancer of the white blood cells), inorganic arsenic stomach problems, disruption of the function of red blood cells and white blood cells, infertility and abort in women, DNA degradation; organic arsenic adversely affects the nervous system.

Mercury: Affects brain, kidneys, nervous system, causes developmental toxicity and Minamata disease. Toxicity is determined by measuring with level in blood, hair and urine [8].

XVIII. QUALITY OF WATER

The classification of water quality in terms of water pollution on human health has been made in the Control Regulation. This classification is as follows:

First Grade Water: High-quality water

Second Grade Water: Slightly polluted water

Third Grade Water: Polluted water

Fourth Grade Water: Highly polluted water

According to the Water Pollution Control Regulation;

First and second grade purified water is potable;

Third-grade purified water can be used except food and textile industries;

Fourth grade water is low quality surface water.

Water Pollution Control Regulation is a legal and technical regulation which consists the protection of groundwater and surface water for all uses, including providing the necessary basis for the prevention of water pollution. It aims the protection of water resources and improvement of water that is required to meet national requirements.

Although the regulation regards the potential for groundwater and surface water resources, the main objective is drinking water control and improvement.

XIX. SAFE WATER

Whereas water matters that much to human health, pollution of drinking water threatens the entire world.

According to the World Health Organization and UNICEF joint statement made on 26 August 2004, over 2.6 billion people (more than 40% of the world population) have no access to sanitary water.

Within this figure 1 billion people drink unsafe water.

As a result of the direct relationship between water and health, the drinking water should have a set of properties.

Water without these properties can lead to permanent effects on human health.

Safe water:

- 1) should not contain pathogenic microorganisms.
- 2) should be odorless, colorless and clear and has a pleasant taste.
- 3) should not contain substances like phenols and oils that causes bad taste and odor.
- 4) must be sufficiently soft.
- 5) What must not be abrasive, nor make stone.

- 6) must not contain hydrogen sulfide, iron and manganese elements.
- 7) should not have harmful chemicals.
- 8) must be in accordant with the purpose of using.

Having the characteristics mentioned above, water is safe and potable for human health.

The World Health Organization, including 90% of children under age five, has determined that each year 1.8 million people dies of diarrhea and 1.3 million of malaria.

The cause of these diseases is using of unsafe water and lack of sanitation.

A child every eight seconds dies because of dirty water.

UNICEF Executive Director reported that 425 million children have no access to clean water, and 980 million children have no access basic sanitation.

Over the world, especially in sub-Saharan Africa children die from water-related diseases, like diarrhea and cholera.

XX. CONCLUSION

Depending on the expansion of the areas of water use and the increase in the consumption of water, the audit of water must be more carefully performed, and the consideration of factors relevant to human health gets more important every day.

Depending on water shortage and pollution in the world, every day many people lose their lives because of illness from the water, and children are especially the most affected fraction [6].

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