Vitamins

Lecture. 6

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- **Vitamins:** are organic nutrients that are required in small amounts to perform biochemical functions of normal growth and health of human body.
- **Vitamins** generally cannot be synthesized by the body and must therefore be supplied by the diet.

Classification of vitamins:

1. **Fat soluble vitamins** which include vitamin A, vitamin D, vitamin E and vitamin K.
2. **Water soluble vitamins** include vitamin **C** and vitamin **B complex**

Vitamin B complex includes:

- thiamine (B1)
- riboflavin (B2)
- niacin (B3)
- pantothenic acid(B5)
- pyridoxine (B6)
- biotin (B7)
- Folic acid and (B12).

Differences between water soluble and fat soluble vitamins

Difference between fat soluble and water soluble vitamins

Fat soluble vitamins	Water soluble vitamins
Soluble in fat	Soluble in water
Absorbed along with other lipids	Absorption is simple
Requires carrier proteins	No requirement of carrier protein
Stored in liver	Excreted in urine
Deficiency manifests only when stores are depleted	Deficiency manifests rapidly as there is no storage
Toxicity - Hypervitaminosis may result	Unlikely , since excess is excreted
Single large does may prevent deficiency	Regular dietary supply is required
E.g. A,D,E & K	E.g. B complex & C

Fat soluble vitamins(A,D,E,K):

- Transported through the blood by lipoproteins.
- Stored in the liver.
- High doses consider toxic.

Vitamin A

- **Sources: Animals:** liver, whole milk, cream.
- **Plants:** (carrots, tomato, apricot), etc.
- **Functions:**

1. Maintenance of vision
2. Increase release of **calcium, phosphate** in the bone
3. Maintenance of mucous membranes and healthy skin .
4. Growth and development of bones.
5. Healthy immune system

- **Deficiency Vitamin A causes**:

1. Night blindness.
2. Respiratory infections.
3. Bone growth ends.

Vitamin D (anti rickets)

Vitamin D3:

- **Sources:** eggs, butter, liver, fatty fish, sun exposure.
- **Functions:**

1. Regulation of absorption of Ca and phosphors from small intestine
2. Building and maintenance of normal bone and teeth.
3. Necessary for growth and development.

Deficiency Vitamin D :

1. Cause hypocalcemia and hypophosphatemia.
2. Rickets in children.
3. Osteoporosis.
5. Poorly developed teeth and bones.
6. Muscle spasms.

Vitamin E (Antifertility):

- **Functions:**

1. antioxidant

2. Protects erythrocytes.

- **Deficiency:**

1. Reduced activity of certain enzymes

2. Hemolysis of RBC

3. Muscular weakness.

4. Anemia.

Vitamin K (Coagulation):

- are essential to blood clotting.
- **Sources:** broccoli, spinach, dairy products, eggs, meats, fruits.
- **Deficiency:**

Delayed blood clotting by increases clotting time.

Water-Soluble Vitamins:

- **Include Vitamin B complex and C**.

1. Dissolve in water

2. Not stored in the body.

Vitamin C:

- Important role in the formation of **collagen,**
- During trauma, fever need more amount of vit. C.
- **Sources:** citrus fruits, melon, tomatoes, potatoes.
- **Deficiency:**

1. Bleeding gums
2. Loose teeth.
3. Poor wound healing

- **Excess of vitamin C causes:**

1. kidney stones
2. Headache, weakness, irritability and insomnia.

Vitamin B Complex

- ***Vitamin B1 (Thiamine***):
- **Function:**

1. Protein metabolism as (coenzyme).

2. Needed for healthy nerve.

- **Deficiency: Beri – Beri** (disorder of nerve system).

Vitamin B2

- **Sources:** liver, eggs, milk, fish, green vegetables.
- **Deficiency causes:**

1. Inflammation and break down of tissue around the mouth, tongue, nose.
2. Dermatitis
3. impaired wound healing

Vitamin B3 (Niacin)

Sources: liver, kidney.

- **Deficiency**

1. Glossitis.
2. Skin rashes.

Folate (Folic Acid):

- 50% to 90% of folate may be destroyed during food processing and preparation**.**
- **Requirements:** 400 gm for female and male.
- **The recommended** amount for a woman 1 month before conception and through the first 6 weeks of pregnancy is 600 µg / day.
- **Function:**

1. Play important role in synthesis of hemoglobin.

2. Play important role in synthesis of nucleic acid.

3. Play important role in synthesis of methionine.

4. Deficiency: anemia

Vitamin B6 : (Pyridoxine):

- Vitamin B6 is essential for protein metabolism and absorption.

Deficiency causes:

- irritability
- depression
- dermatitis
- **In infants:** its deficiency can **cause various neurological symptoms and abdominal problems**.

- **Vitamin B7 (Biotin)**
- **Sources:** egg yolks, milk, poultry, fish, spinach.
- **Deficiency can causes** :

1. Nausea
2. Anorexia
3. Depression
4. Dermatitis

Vitamin B12:

- It can be stored in the human body for 3 to 5 years.
- **Sources:** The best food sources of B12 are animal foods**.**
- **Functions:**

  1. Maintenance of the myelin sheath, and healthy red blood cells.

  2. Synthesis of nucleic acid.

Thank you