Vitamins

- Vitamins are class of organic compounds categorized as essential nutrients.
- Required only in small amounts so called as micronutrients.
- They do not provide the energy but enable the body to use other nutrients.
- They are not synthesized by body so should be supplied by the food.

Two groups:

a) Fat soluble - A, D, E, K
b) Water soluble - B. group vitamins, C.

- Vitamin E deficiency is not yet known.

Vitamin - A

- Covers both i) pre Formed vitamin - Retinol
  ii) Pro Vitamin - β Carotene which is converted into retinol in intestine mucosa.
- Some food composition tables give separate values for retional and beta-Carotene. To convert these into one value - Retinol equivalent is used.

1 mcg of retinal - 1 RE
1 mcg of β-Carotene = 0.167 mcg of RE,
1 RE = 8.333 IU of Vitamin A.

Functions:

i) Normal vision - Productions of retinal pigments that are need for vision in dimlight
ii) Maintanance of Normal functioning of

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glandular and epithelial tissue which line internal, respiratory and urinary tract, as well as skin and eyes.

c) Growth of skeletal muscles.

d) It is anti-infective.

e) Protect of epithelial cancer like bronchial cancer.

Sources:

Animal Foods (Retinol). Plant Foods (Carotene)

a) Animal Foods → liver, eggs, butter, cheese, milk, fish, meat.

Fish liver oils are richest source used as supplement rather than food sources.

b) Plant foods (Carotene)

- Green leafy vegetables like spinach.
- Darker the leaves the higher the carotene)
- Green and yellow fruits (Pappaya, Mango, Pumpkin and roots (carrot).
- Usually they are β carotene which are converted in the intestinal mucosa which is poor in malnourished and those suffering in mucus associated diseases.

c) Fortified foods

- Yanarpathi, Ghee, Milk are fortified with Vit-A.

[1/2 is lost in β carotene.

Storage and Transport

- stored in liver as retinol palmitate.
- stores a reserve needed for 6-9 months.
- Free retinol is highly toxic, so when they are transported in blood: they binded with retinol-binding protein-which gets dissociated in Protein deficiency.

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Deficiency:

- The signs of vitamin A deficiency are predominantly ocular.
  - i) Night blindness
  - ii) Conjunctival Xerosis
  - iii) Bitot's Spots
  - iv) Corneal Xerosis
  - v) Keratomalacia

  } Xerophthalmia (Dry Eyes)

a) Night blindness:

- Inability to see in dim light.
- Mothers can detect it when their children cannot see in late evenings or found in darkened room.
- It is due to impairment in dark adaptation.
- It may get worse when children suffer from diarrhea or other infection unless vitamin A is taken.

b) Conjunctival Xerosis:

- First clinical sign of vitamin A deficiency
- Conjunctiva becomes not wettable and dry, instead of smooth and shiny they become muddy and wrinkled.
- When the child cannot cry it appears like a sand banks at receding tide.

c) Bitot's Spots

- They are triangular pearly white or yellowish, foamy spot on the bulbar conjunctiva on either side of cornea

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- Usually Bilateral.
- In children indicated Vitamin A Deficiency.
  In adults indicated sequale of previous disease.

d) Corneal Xerosis:
- Very serious condition.
- Cornea becomes Dull, dry, Non wettable and opaque → Corneal ulceration → Scar → Vision affected.

e) Keratomalacia:
- liquefaction of cornea is a grave medical emergency.
- The cornea (part or whole) may liquefy and may lewert causing vision loss.

Extra ocular
- Hyperkeratosis, Anorexia and growth retardation.
- They are non-specific.
- Mild deficiency of Vitamin A causes increase in morbidity and mortality due to Respiratory and intestinal infections.

Treatment:
- All children with corneal ulcer should be given vitamin A if deficiency is suspected or not.
- All every stages of xeroophthalmia can be reversed by administration of massive dose of ~~H.D.D~~ 200,000 IU ~~mg~~ of Retinol palmite for two days orally.

Prevention:
a) Ensure the diet rich in Vitamin A.
b) Reducing the frequency and severity of contributing factors - eg. PEM, Regression, diarrhea.

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- Since Vitamin A can be stored in body for 6-9 months they formed a strategy to administer a single massive dose of 200,000 IU of Vitamin A in oil (Retinol palmitate) orally every 6 months to preschool children (1 years to 6 years) and half the dose (100,000 IU) to children between 6 months - 1 one year. So the children in immunized age cirt xeropthalmia

Vitamin A Toxicity

- Daily allowance is 600 µgm for adults.
- An excess of retinol causes nausea, vomiting, anorexia and sleep disorders followed by desquamation and enlarged liver and papilledema.
- High intake carotene causes colour in plasma and skin but do not appear to be dangerous.

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