Vitamin A

Ques- What is Vitamin A?

Ans- Vitamin A is a micro-nutrient which is needed in small amounts by the body. Vitamin A is a fat soluble vitamin which is stored in the body, unlike any water-soluble vitamin (which is not accumulated in the body, but are readily excreted) and therefore, considerable amounts of Vitamin A can be stored in the liver and made available for use as the arises.

Ques- What are the forms of Vitamin A?

Ans- Foods provide Vitamin A either in the **preformed state (Retinol)** from animal sources such as milk, butter, egg and fish or **its precursor carotenoids,** specially Beta-carotene, derived from leafy vegetables and yellow and orange-coloured fruits and vegetables. Beta-carotene and other carotenoids can be readily converted into Vitamin A in the body.

Ques-What is Retinol (Pre-formed Vitamin A)?

Ans- Retinol is a pre-formed Vitamin A which is present in some animal foods like butter and ghee, whole milk, curds, egg, yolk, liver etc. The liver oils of certain fish like cod, halibut, shark and saw fish are some of the richest known sources of Retinol.

Ques- What are Carotenes?

Ans- Vitamin A is not present as retinol in vegetable food. These foods contain yellow pigments called Carotenes which are converted to Vitamin A in the body. Carotenes are therefore termed as Provitamin A. Since these pigments are isolated from carrots, they are called Carotenes.

Ques- Is the efficiency of conversion and absorption of β-Carotene different from that of Retinol?

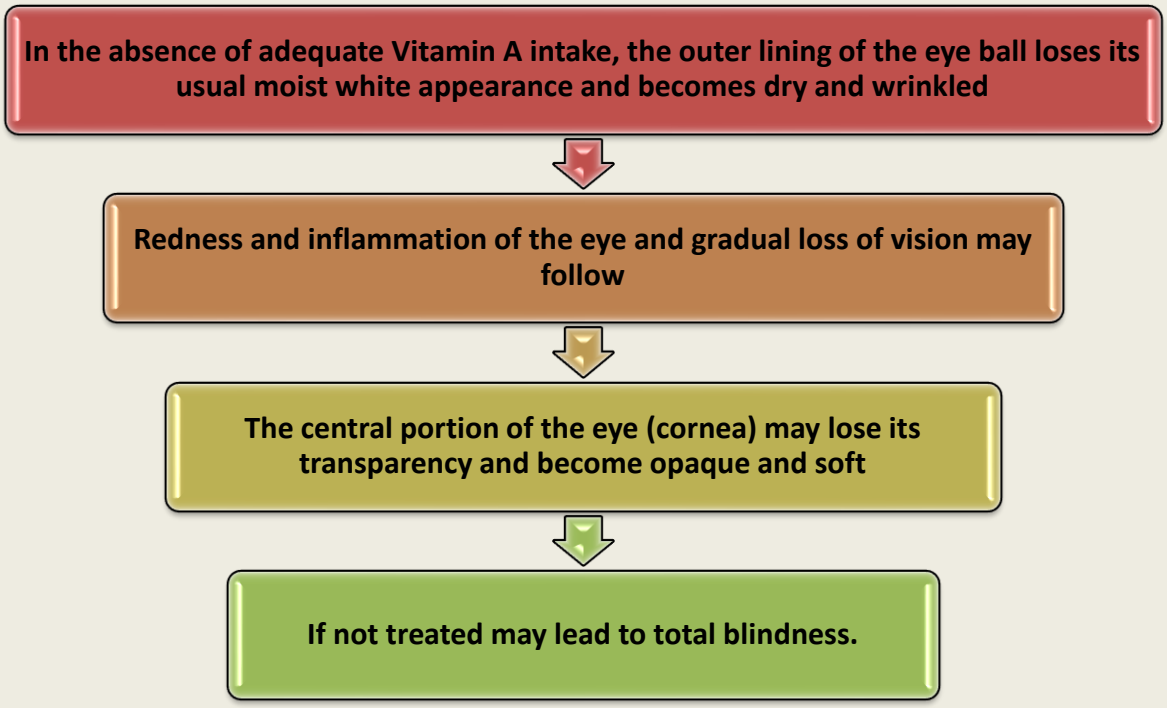
Ans- There are different types of carotenes-α,β,ϒ and of these β-carotenes have such a chemical structure that on a unit weight basis it can yield equal amounts of Vitamin A. But when β-carotenes are converted into retinol in the body, the efficiency of conversion in less, i.e., 1µg of carotene yielding only 0.5µg of retinol. Further , while preformed Vitamin A is completely absorbed, carotene present in vegetable food is not completely absorbed. For practical purposes, only about 50% of β-carotene in foods is considered to be absorbed.

Ques-What functions does Vitamin A performs in the body?

Ans-Vitamin A is essential for normal vision, for maintaining the integrity of the epithelial tissues and for a wide variety of metabolic functions. Vitamin A is necessary for clear vision in dim light.

Ques- What are the manifestations of Vitamin A deficiency?

Ans-One of the earliest manifestations of Vitamin A deficiency is night blindness (inability/reduced ability to see in dim light) and more severe deficiencies include ocular changes leading to blindness, particularly in young children.



Ques-What are the Recommended Dietary allowances (RDA) for Vitamin A for different age groups for Indians?

Ans-ICMR, 2010 suggests the following RDA

Group	Age	RDA (µg/day)	
		Vitamin A (Retinol)	β-carotene*
Men		600	4800
Women		600	4800
Pregnant women		800	6400
Lactating women		950	7600
Infants	0-6m	350	----
	6-12 m	350	2100
Children	1-6 yrs	400	3200
	7-9 yrs	600	4800
Adolescents	10-17 yrs	600	4800

***A conversion ratio of 1:8 is used.**

Ques- What are the causes of Vitamin A deficiency among Indians?

Ans- Very low intakes, poor bio-availability of pro-vitamin A from the predominantly vegetarian diet and recurrent infections are thought to be the main reasons for widespread prevalence of Vitamin A deficiency.

Ques-What is the status of Vitamin A deficiency in India?
Ans-

- Prevalence of mild vitamin A deficiency in the world ranges between 20-40 million cases at any one time, nearly a half of which is in India.
- Other sources (Ministry of Health and Family Welfare, undated) report a 5-7% prevalence of "eye-signs" of vitamin A deficiency among children in India, while NNMB (NIN 1991) (which covered eight states in the country) reports a 0.7% incidence of Bitot's spots among children in 1988-90, the figures being 1.0% for Andhra Pradesh and 0.6% for Tamil Nadu.
- WHO'S cut-off for identifying a public health problem is 0.5% thus identifying both states as vitamin A deficient.

Ques-What are the steps taken by the GOI for combating Vitamin A deficiency.

Ans-Government of India has initiated a two-pronged approach to combat vitamin A deficiency in India:

i) ***Fortification of vegetable oils***. It is mandatory by law for all vegetable oils marketed in India for human consumption, to be fortified to the level of 25 IU retinol per gram of oil. 60% of the vitamin A utilized in the country is used for fortification of vegetable oils or animal feeds. However, in view of the low level of consumption of vegetable oils by poorer/vulnerable sections, much of this fortification benefits the less vulnerable sections of the population.

ii) ***The National Prophylaxis Programme for Prevention of Blindness due to Vitamin A Deficiency.*** This was initiated by the government in 1970, to target children 1-5 years of age. A recent review of the situation in 1989 has led to the inclusion of 6-12 month old children with a single dose of 100,000 IU of retinol, linked with the Universal Immunization Programme (UIP).
The prophylaxis programme comprises a long-term and a short-term strategy.

- ✓ Short-Term Strategy- While the short-term strategy focuses on administration of prophylactic mega-doses of vitamin A periodically
- ✓ Long-Term Strategy- Aims to improve dietary intakes as the ultimate solution to the problem.

Ques-What are the four major thrusts of National Prophylaxis Programme for Prevention of Blindness due to Vitamin A Deficiency?

Ans-The four major thrusts of the programme are:

- ✓ Promotion of regular consumption of dark-green leafy vegetables or yellow fruits and vegetables;
- ✓ Promotion of breast-feeding and colostrum to protect against vitamin A deficiency;
- ✓ Oral prophylactic doses of vitamin A as follows: one dose of 100,000 IU to infants 6-11 months, and six-monthly doses of 200,000 IU to children 6-60 months;
- ✓ Treatment of vitamin A-deficient cases by administrating: a single oral dose of 200,000 IU of vitamin A immediately at diagnosis, and a follow-up dose of 200,000 IU 1-4 weeks later.

Ques- How many doses of Vitamin A must be given, by the time the child completes 5 years?

Ans-By the fifth year, each child is expected to have received a total of nine oral mega doses of vitamin A under the national programme (although in frequent situations of limited availability of vitamin A, the unstated policy has been to preferentially target the 6-36 month child, and treat deficiencies in the older preschool children).

Ques- Vitamin A dose is administered in combination with which Vaccine?

Ans-For infants, it is proposed to use the 9-12 month contact for measles vaccine as the point for administration of the vitamin A supplement of 100,000 IU. This link with the Universal Immunization Programme - UIP has been promoted by WHO as part of its official policy.

Ques- Where is Vitamin A doses administered?

Ans- The prophylaxis programme is implemented through Primary Health Centres and sub-centres. Prophylactic doses of vitamin A, (supplemented with nutrition advocacy) are administered by para-medical staff manning the PHC.

In areas where the ICDS is in operation, vitamin A administration is conducted under the auspices of the ICDS. Records of administration of doses are kept in registers/weight cards/health cards maintained by ICDS functionaries.

Ques- What is the status of Vitamin A prophylaxis coverage?

Ans- Assessments by the Ministry of Health and Family Welfare (1988) claim that 85% of the target for vitamin A prophylaxis was met in 1987-88. However, these estimates of programme performance seem unrealistically optimistic especially in view of the limitations in supply and logistics of delivery of the prophylactic dose. Further, none of the assessments pertain to information/education/communication efforts.

- One programme review found a "low" level of awareness of the prophylaxis programme and it's benefits among health workers and the general public.
- In Tamil Nadu, coverage in 1987-88 is reported at 0.32 million children for the first dose and 0.37 million children for the second bi-annual prophylactic dose (UNICEF, 1990).
- In Andhra Pradesh, coverage was reported at 0.37 million children in 1985 (Rao*et al,* 1988). More recent data (Govt of Andhra Pradesh 1992), estimate coverage in Andhra Pradesh at 1.14 million children i.e. about 14% of the total preschool population in the state.

Ques-what are the rich sources of Retinol and β-carotene?

Ans-

CAROTENE RICH FOODS

(all the values are per 100 gm of edible portion)

NAME OF THE FOOD STUFF-Green Leafy Vegetables	CAROTENE µg	NAME OF THE FOOD STUFF-Vegetables	CAROTENE µg
Amaranthus (Tender)	20160	Kankoda	1620
Bathua	1740	Carrot	8840
Carrot Leaves	5700	Turnip	260
Colocasia leaves green	15700	Mustard Seeds	162
Coriander leaves	6918	Coriander	952
Radish leaves	13000	Cumin seeds	522
Spinach	9440	Raspberry	1248
Turnip green	9396	Apricot	2166
Drumstick leaves	42000	Jack fruit	175
Cow Pea Leaves	6072	Mango ripe	2210
Curry leaves	21000	Orange	2240
Fenugreek leaves	11800	Papaya	2740
Mint	18950	Sweet potato yellow	2200
Mustard leaves	2622	Butter	960
Spinach	9440	Ghee	600
Curry leaves	21000	Hydrogenated oil	750
Beet greens	5862	Pumpkin	2100
Green chillies	2430	Tomato ripe	3010

Ques-Does consumption of excess amount of Vitamin A has any harmful effects?

Ans- Yes, intake of large amount of Vitamin A for prolonged periods can lead to toxic symptoms which include irritability, headache, nausea and characteristic forceful vomiting. The symptoms subside on stopping of the intake.

Ques- Explain the concept of Vitamin A Bioavailability/Retinol Equivalent.

Ans- Most of the Indian diets have β-carotene as the main source of Vitamin A. The Availability of β-carotene from these diets may vary from 12.5 % to 50 %, depending on the fat content of the diet. Thus taking into consideration the physiological conversion of β-carotene to retinol and the absorption of β-carotene, one unit of β-carotene in foods is assumed to yield only 0.12 units of retinol. The requirement of β-carotene will be therefore 8 times [Retinol Equivalent-RE → 1:8 eg. 600 RE (retinol) for adult man] the requirement of retinol.

The committee on Vitamin A RDA recommends that a minimum of 50% RE be drawn from animal sources to ensure adequacy at least in vulnerable groups like pregnant and lactating women.

Ques- How can one meet the RDA for Vitamin A?

Ans-The requirement of Vitamin A is greater during pregnancy, lactation and during growth. Animal foods rich in Vitamin A (retinol) are expensive and hence the most inexpensive and convenient way of ensuring adequate intake of Vitamin A is to include green leafy vegetables GLV in the daily diet. About 50gm of common green leafy vegetables like amaranth (cholai) will provide adequate β-carotene to meet the Vitamin A requirement of an adult.

- Pre-school children upto 6 yrs may have to consume daily about 20 gm of GLV.
- In case of infants and very young children who cannot eat and digest leafy vegetables, can be given carotene rich fruits like papaya, mangoes (50-100 gm) or animal foods like milk, liver, egg etc.

Ques- Name a few rich sources of Vitamin A.

Ans- The concentrated source of Vitamin A in our country is shark liver oil and Synthetic Vitamin A.

Green leafy vegetables like agathi, drumstick, spinach, amaranth etc., and fruits like papaya, seasonal fruits like mangoes; tomatoes, yellow pumpkin are some of the alternatives that can be consumed. They can be consumed in amounts equivalent to

30-35g of GLV,
100g of mango,
200g of papaya etc.

Ques- How many doses of Vitamin A must be administered to children starting from birth?

Ans-Vitamin A supplements are given to protect the child against blindness due to Vitamin A deficiency. Vitamin A also reduces illness and deaths in children. Child should be given total five doses of Vitamin A drops starting from 9 months through 5 years of age, every six months.

Vitamin A: 0-12 Months

First Vitamin A dose of 1,00,000 IU is also given at 9-12 months of age alongwith measles vaccination.

Vitamin A: 12-24 months

For children older than 12 months of age, Vitamin A dose of 2,00,000 IU needs to be given once in 6 months till the child is 5 years of age.

Vitamin A: 24-36 months

During 24 to 36 months, child needs 2 doses of Vitamin A supplements

Vitamin A Doses	Age of Administration
1st Dose	9 months (along with Measles vaccine)
2nd Dose	16 months (along with DPT Booster dose)
3rd Dose	24 months (along with Polio Booster dose)
4th Dose	30 months
5th Dose	36 months
6th Dose	42 months
7th Dose	48 months
8th Dose	54 months
9th Dose	60 months

References:

- Dietary Guidelines for Indians- A Manual. National institute of Nutrition, 2010.
- Recommended Dietary allowances for Indians, NIN. 2010.