

**HYPO AND HYPER VITAMINOSIS
IN INFANTS AND CHILDREN**

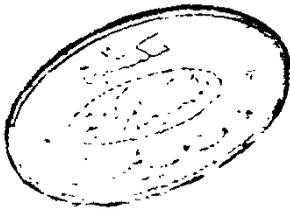
ESSAY

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TO :

MY HUSBAND,

MY DAUGHTERS,

AND MY SON



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Introduction

INTRODUCTION

Physicians should be aware of the vitamin supplementation practice of their patients. The dosage should be evaluated in relation to normal recommendation (Hanning and Zlotkin, 1985).

Hypovitaminosis is still common in many primitive communities and in the developing parts of the world where the diet is inadequate or in diseases like sprue, celiac disease and mucoviscidosis, vitamins may not be absorbed (Klintworth and Landers, 1976).

Deficiencies of water-soluble vitamins are less frequent because of the frequent fortification, particularly with B vitamins of many foods. However, deficiency states can develop more quickly than with fat-soluble vitamins because of limited stores and rapid excretion in the urine (Kempe et al, 1978).

Fat-soluble vitamins are usually not deficient from diet, but marginal nutrition, severe steatorrhea, altered gastrointestinal flora and hepatocellular injury may act synergically to cause deficiencies. The major vitamins to be considered are vitamin D and vit. K (Weininger and Brigs, 1983).

Vitamins are organic compounds that are required in small amounts for normal human metabolism. When they are used in megadose amounts, however, they no longer act as vitamins, but as pharmacologic agents. (Hanning and Zlotkin, 1985).

Megavitamin therapy is now a concept loosely defined as doses 10 or more times greater than daily recommended allowances (DRA) levels. It is used for the treatment and prevention of common cold, treatment of alcoholism, treatment of schizophrenia and various mental diseases (Stare and Williams, 1984).

Recent studies have shown that high intakes of some water-soluble vitamins are associated with toxicity and complications. In addition, they may interfere with the actions of other vitamins or drugs. It is well recognized that fat-soluble vitamin if taken in excess may be toxic (Hanning and Zlotkin, 1985).

The aim of the work is to discuss hypo and hyper vitaminosis of commonly used vitamins in pediatrics and its complication.

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VITAMINS



Vitamins

Vitamin is an organic compound that is needed in very small quantities in the diet to promote growth and maintain life (Stare and Williams, 1984).

Man can synthesize some vitamins in his body as vitamin D in the skin, nicotinamide from tryptophan, and vitamin K₂ in the intestinal lumen by bacteria.

Vitamins fall into two groups :

1. The water-soluble vitamins : The B group and C.
2. The fat-soluble vitamins : A,D,K, and E.

(Laurance and Bennet, 1985).

The vitamins have no chemical resemblance to each other, but because of a similar general function in metabolism they are considered together in groups (Harper , 1977).

Water-soluble Vitamins

Many of the water-soluble vitamins are coenzymes or essential parts of coenzyme and thus have an essential function in the enzymatic machinery of the cells (Goth, 1984).

Water-soluble vitamins are absorbed without involvement of fat absorption, and excess intakes are almost

immediately excreted in the urine. All except ascorbic acid and biotin must be metabolically converted to active forms (Kaplan and Pesce, 1984).

The name "Vitamin B" was originally given to a dietary factor which was necessary for the growth of rats. It was soon shown not to be a single component. A number of widely differing substances are now, for convenience, included in the vitamin B complex:

Thiamine (B_1), riboflavin (B_2), nicotinamide, pyridoxine (B_6), folic acid and cobalamines (B_{12}). Pantothenic acid, inositol, biotin, and para-aminobenzoic acid are not known to be of practical clinical importance as recognizable deficiency states do not occur in man, choline is usually included in the B group of vitamins, although it can be synthesized in the body if sufficient methyl groups are available (Laurance and Bennett, 1985).

There is currently much interest of the possible role of vitamin deficiencies in the etiology of neural tube defects. The intervention studies followed earlier report of an association between the birth of a baby with neural tube defect and low concentration of some vitamins,

notably folic acid, vitamin C, and vitamin B₁₂ in the mother's blood in early pregnancy (Molloy et al, 1985).

Fat-soluble vitamins

Because of impairment of normal bile flow to the gut for many months, most children with biliary atresia have fat-soluble vitamin deficiencies for several years. As rickets (vitamin D), ataxic neuromyopathy (Vitamin E), and hemorrhage (vitamin K) have been reported. Specific replacement therapy for fat-soluble vitamin deficiency has not yet been established (Lilly and Karrer, 1985).

A vitamin deficiency states have declined, toxic syndromes due to vitamin excess have increased in number and incidence (Gellis and Kagan, 1964).

There was unusual and severe combination of birth defects in a child born to a woman taking multivitamin preparation, as spina bifida, hydrocephalus, reduction defect in upper limb, affecting both proximal and para-axial structures and dislocation of elbow(David, 1984).

The recommended daily dietary allowances of vitamins are shown in tables 1 & 2 (according to the food and nutrition board, National Academy of Sciences, National Research Council (1980).

Recommended Daily Dietary Allowances of calories and the Water-Soluble vitamins

Adapted from the food and Nutrition Board, National Academy of sciences. National Research Council (1980).

Age (years)	Cal	Thiamine mg	Riboflavin mg	B ₆ mg	Folacin ug	B ₁₂ ug	Ascorbic acid(mg)	Biotin (ug)	Niacin mg	Pantothenic acid(mg)
Infants 0.0 - 0.5 0.5 - 1.0	Kg x 115	0.3	0.4	0.3	30	0.5	35	35	6	2
	Kg x 105	0.5	0.6	0.6	45	1.5	35	50	8	3
Children 1 - 3 4 - 6 7 - 10	1300	0.7	0.8	0.9	100	2.0	45	65	9	3
	1700	0.9	1.0	1.3	200	2.5	45	85	11	3
	2400	1.2	1.4	1.6	300	3.0	45	120	16	4
Males 11 - 14 15 - 18	2700	1.4	1.6	1.8	400	3.0	50	100-200	18	4
	2800	1.4	1.7	2.0	400	3.0	60	100-200	18	7
Females 11 - 14 15 - 18	2200	1.1	1.3	1.8	400	3.0	50	100-200	15	4
	2100	1.1	1.3	2.0	400	3.0	60	100-200	14	7
Pregnancy Lactation	+ 300	+0.4	+ 0.3	+ 0.6	+400	+ 1.0	+ 20	100-200	+ 2	4
	+ 500	+0.5	+ 0.5	+ 0.5	+100	+ 1.0	+ 40	100-200	+ 5	7

Table (1)

Recommended daily Dietary Allowances for the Fat-soluble Vitamins
 Adapted from the Food and Nutrition Board, National Academy of Sciences,
 National Research Council.(1980).

Age (Years)	Weight (Kg)	Vitamin A (ru)	Vitamin D (ug)	Vitamin E (mg)	Vitamin K (ug)
Infants 0.0-0.5 0.5-1.0	6	420	10	3	12
	9	400	10	4	10 - 20
Children 1 - 3 4 - 6 7 - 10	13	400	10	5	15 - 30
	20	500	10	6	20 - 40
	28	700	10	7	30 - 60
Males 11 - 14 15 - 18	45	1000	10	8	50 - 100
	66	1000	10	10	50 - 100
Female 11 - 14 15 - 18	45	800	10	8	50 - 100
	55	800	10	8	50 - 100
Pregnancy Lactation		+ 200	+ 5	+ 2	70 - 140
		+ 400	+ 5	+ 3	70 - 140

Table (2)

WATER SOLUBLE VITAMINS

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