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Impact of drugs on Vitamins

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ABSTRACT

Vitamins are organic substances necessary for life; any disruption can cause an imbalance in the body, which is why it is necessary to control the intake. Vitamins are influenced by drugs whose some potentiate their effect and the other carries an antagonism. Vitamin-drug interactions are similar to drug interactions and should be treated in the same way to avoid possible complications. This work presents the main impacts of drugs on vitamins to prevent hyper or hypovitaminosis.

Keywords: Impact; drug; vitamin; mechanism; prevention.

INTRODUCTION

Vitamins are organic substances essential to life without clean energy value, made mainly by food in small quantities and they have other origins as the skin under the action of ultraviolet rays like vitamin D and intestinal flora like vitamin K [1,2].

Vitamins play many roles in the body and their presence at specific concentrations is imperative for the proper functioning of our system, however, these rates are largely influenced by several factors, the most important and often ignored is the vitamin-drug interactions. The drugs have a major influence on vitamins either increasing or decreasing the levels of the last level of the body by different mechanisms. What are these influences, their mechanisms, their consequences and how to prevent them?

I. OBJECTIVES:

Knowledge of the impact of vitamins on drugs is imperative in the drug prescription; however, there are few studies that describe these influences. This work presents a data bank through which the prescriber can identify the repercussions of drugs on vitamins and thus determine the best course of action (a supplementation dose adjustment, etc.)

II. CLASSIFICATION OF VITAMINS [1]:

Vitamins can be classified according to several criteria, the most important and best known is the water solubility; and there are two classes of vitamins:

- Water-soluble vitamins: which are the B vitamins (B1, B2, B3, B5, B6, B8, B9, B12) and vitamin C.
- Fat-soluble vitamins: in this class there are the vitamins A, D, E and K.

III. MECHANISM OF ACTION [1]:

Vitamins act via three mechanisms:

- Co-enzyme mechanism: it is a cofactor for action of certain enzyme proteins essential for catalytic reactions, in the case of water-soluble vitamins;
- Anti-oxidant mechanism: vitamins C and E inhibit oxidation phenomena (neutralizing free radicals);
- Hormonal Mechanism: vitamins A and D act like hormones with specific binding sites.

IV. DAILY VITAMIN NEEDS [3]:

Daily requirement of vitamins differ from person to person, they are influenced by age, sex, ethnicity, genetic component, the type of activity, drug intake, environmental factors, etc.

Tables of daily needs are not affirmative but give an idea about the recommended intakes without forgetting that there is no universal input.

V. INFLUENCE OF DRUGS ON VITAMINS [1-12]:

1- Water-soluble vitamins:

1.1. Vitamin B1 or thiamine: Administration of vitamin B1 (the same for the B vitamins) with magnesium, lithium and other B vitamins strengthens its activity.

Magnesium allows the transformation of the active form of vitamin B1 or co-enzyme. Vitamin C potentiates the action of B vitamins and protect against oxidation. It there's a synergy between vitamins from this group.

Gastric dressings, antacids, oral contraceptives, phenytoin, nitro antibacterial, 5-fluorouracil and certain molecules that interfere with the metabolism decrease the effectiveness of vitamin B1.

1.2. Vitamin B2 or riboflavin: Oral contraceptives, tetracyclines, aminoglycosides, macrolides and phenothiazines exert an antagonistic effect.

1.3. Vitamin B3 or vitamin PP - Niacin: Catecholamines (carbidopa) and anti-tuberculosis (isoniazid) reduce the effectiveness of the vitamin B3.

1.4. Vitamin B5 or pantothenic acid: Alcohol reduces tissue levels of vitamin B5.

1.5. Vitamin B6 or pyridoxine: Zinc enhances the activity of vitamin B6. Alcohol, dihydralazine, theophylline, isoniazid, penicillamine, corticosteroids and oral contraceptives reduce the effect of vitamin B6 by interfering with its metabolism.

1.6. Vitamin B8 or vitamin H-biotin: Avidin, which is a thermolabile protein found in egg white and forms nondigestible complex with vitamin B8, alcohol and antiepileptic reduce intestinal absorption of vitamin B8.

1.7. Vitamin B9 or vitamin M-folic acid: Zinc and certain amino acids enhance the activity of vitamin B9. Alcohol, sulfazalasine, antacids, gastric bandages, cotrimoxazole, antiepileptics, oral contraceptives, the aspirin cholestyramine or chelators and sequestering bile acid (colestipol) exert an antagonism on vitamin B9 either by direct inhibition or interference with its metabolism.

1.8. Vitamin B12 or cobalamin: Deficiency is often masked by folic acid. Potassium supplements, gout (colchicine), certain antibiotics, cholesterol-lowering drugs (cholestyramine) reduce the absorption of vitamin B12. Antacids reduce the absorption of vitamin B12 foodborne and not that supplements. Hypoglycemic agents (metformin) reduce the absorption of vitamin B12 dairy or calcium carbonate supplement corrects this.

1.9. Vitamin C or ascorbic acid [13]: In rats and other non-dependent species, certain drugs such as barbiturates increase the rate of synthesis of vitamin C. In man, who is unable to convert the glucuronic acid in ascorbic acid, these inducing drugs increase the synthesis of glucuronic acid and not that of ascorbic acid. Supplements of vitamin C and treatments containing ascorbic acid (symptomatic treatment of cold, analgesic and antipyretic combined with vitamin C) are subject to an increase in the rate of vitamin C.

Oral contraceptives and anti-inflammatory drugs including aspirin and alcohol lead deficiencies ascorbic acid.

2 Fat-soluble vitamins:

2.1. Vitamin A or retinol (free form) [14]: Medicines or supplements containing vitamin A under different names (retinol, retinal, retinoic acid, retinyl phosphate, retinyl palmitate) or its precursor provitamin A (beta carotene) potentiate the action of vitamin A. B-vitamins preserve the reserves of vitamin A. Mineral oils, oral contraceptives, cholesterol-lowering drugs, the gout, antacids, anticonvulsants and some aminoglycosides (neomycin) decrease absorption of vitamin A.

2.2. Vitamin D or calciferol [15-18]: Darunavir (unlike other antiretrovirals) and drugs or supplements containing vitamin D in the different denominations (calciferol, calcifediol, cholecalciferol, ergocalciferol, dihydroxycholecalciferol) potentiate vitamin D action, vitamin A promotes the use of vitamin D. Anti-tuberculosis drugs (isoniazid and rifampicin), antiretrovirals, antiepileptics (phenytoin, phenobarbital, carbamazepine), antifungal, anticancer and steroidal and non-steroidal anti-inflammatory drugs reduce levels of vitamin D.

2.3. Vitamin E or tocopherol [19]: Drugs or supplements containing vitamin E in the different denominations (d-alphatocopherol, d-beta-tocopherol, d-gamma-tocopherol, d-deltatocophérol, RRR-alpha-tocopherol, tocopherol conjugates, tocotrienol acetate succinate or d-alpha-tocopheryl) increase the rate of the vitamin E. Vitamin A, C and Group B improves the bioavailability of vitamin E seems to have a potentiating action.

2.4. Vitamin K: Medicines or supplements containing vitamin K under different names (phylloquinone phytomenadione (phytonadione or vitamin K1), menaquinone, menatetrenone (or vitamin K2), menadione (or vitamin K3)) increase the rate of vitamin K. Aspirin, estrogens, vitamin K antagonists and thyroid extracts antagonize vitamin K.

VI- Prevention vitamin-drug interactions:

Prevention is to have a reliable data base for detecting these interactions, however, it is necessary in some cases to make dosages of vitamins to detect any anomalies. Deficiency can be treated with simple supplementation; hypervitaminosis may require dose adjustment, discontinuation or administration of an antidote.

CONCLUSION

Databases that describe the influence of drugs vitamins are modest, for against the impact of these interactions on the health of patients appear to have some serious consequences which are unfortunately ignored by health professionals.

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