Food and medication interactions

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ABSTRACT

Food and medication interactions occur when specific nutrients in foods or beverages interact with medications taken at the same time, resulting sometime in adverse reaction or treatment failure. Food and medication interactions have profound influence on the compliance and success of drug therapy and most of these interactions remain unnoticed and under informed due to lack of knowledge, proper history, follow-up or unawareness.

Key words: food, drug, nutrients, interaction

Introduction

Food and medication interactions occur when specific nutrients in foods or beverages interact with medications taken at the same time [1,2] and they can interrupt the pharmacokinetics, pharmacodynamics, bioavailability, and therapeutic effects of medications [2,3].

Food and medication interactions per se are very complex, varying in nature and there is a need for greater attention from the health care community[3].

The interaction between food and medications could lead to treatment failure or predispose patients for many adverse reaction that could be life-threatening[4,5].

For example, tyramine interactions, which is a substrate present in aged and fermented foods as cheese, and monoamine oxidase inhibitors, may lead to a hypertensive crisis and myocardial infarction [6,7,8].

Food and medication interaction is among the significant factors that determine the quality of treatment and care. It is essential to pay attention to the dosage and frequency of medications used in the treatment in addition to nutrient elements and amounts during the treatment. Because medications can change metabolism of nutrients just as the nutrients which is taken can affect medication pharmacokinetics and pharmacodynamics [9]. This effect is a result of the presence of mix of minerals, organic matters, proteins and

vitamins in foods, in addition to the complex formulation of medication. Also, in many cases these effects cannot be predicted. Thus, the prevention of food-medication interactions is very difficult[10].

Food frequently decreases the rate and extent of medication absorption. Reducing the rate of absorption delays the onset of effects; but the peak effects are not lowered. While, reducing the extent of absorption reduces the intensity of peak responses. The interaction between tetracycline antibiotics and calcium-containing foods is a common example of food reducing drug absorption. Tetracyclines bind with calcium to form an insoluble and non-absorbable complex. Therefore, if tetracyclines are administered with milk products or calcium supplements, absorption is reduced and antibacterial effects may be lost[5].

High-fiber foods can reduce absorption of some medications. For instance, absorption of digoxin, used for cardiac disorders, is reduced by wheat bran, rolled oats, and sunflower seeds. Since digoxin has a narrow therapeutic index, reduced absorption can result in treatment failure.

When the food increases the extent of absorption, the peak effects of medications increase. For instance, a high-calorie meal increases the absorption of saquinavir (a drug for HIV infection). If saquinavir drug is taken without food, absorption may be insufficient for antiviral activity .

Metabolism of certain medications can be inhibited by taking grapefruit juice simultaneously, thereby elevating their blood levels. The effect is sometimes quite remarkable. In one of the studies, co-administration of grapefruit juice produced increase in blood levels of felodipine, a calcium channel blocker used for hypertension.

Grapefruit juice can also rise blood levels of lovastatin, cyclosporine, midazolam, and many other. This effect is not seen with other citrus juices, including orange juice. Grapefruit juice elevates medication levels mainly by inhibiting metabolism [5].

Certain liquids for example soda pop or high-acid fruit or vegetable juices can cause an increase in the gastric acidity that can dissolve some medications before they reach the intestine. Because most medications are absorbed in the intestines, this interaction will decrease the amount of medication that can be absorbed into the body.

Medication-food interactions sometimes increase toxicity. Theophylline, an asthma medicine, and caffeine, which can lead to excessive CNS excitation. Potassium-sparing diuretics (e.g., spironolactone) and salt substitutes, which can lead to serious high potassium levels. Aluminum-containing antacids (Maalox) and citrus beverages (orange juice), which can result in excessive absorption of aluminum

Nutritional sources of vitamin K, such as spinach or broccoli, have been shown to cause a pharmacodynamic antagonism of warfarin causing the warfarin dose requirement to increase. Grapefruit juice contains a bioflavonoid that inhibits CYP3A, an enzyme that is involved in the metabolism of many medications. Concomitant intake of grapefruit with medications that are metabolized by CYP3A enzymes could increase the bioavailability of these drugs by 5-fold. This occurs when grape juice is administration with felodipine , an antihypertensive drug that is metabolized by CYP3A enzymes[11].

Administration of medications at the suitable time with respect to meals is an essential part of drug therapy. The absorption of some medications can be significantly reduced by food, and therefore these medications should be administered on an empty stomach. In contrast, the absorption of other medications can be improved by food, and hence these medications should be administered with meals[5].

Many medicines cause stomach upsets when eaten without food. If food does not affect their absorption, these medicines should be used in combination with a diet. However, if the food lacks its digestion, we will have a problem that we can manage with food and thus reduce bad stomach, but also reduce absorption. Unfortunately, the exact choice is not clear. The best solution may be to appoint another drug that does not affect the stomach. Medication orders often fail to indicate when medication should be given in relation to meals. As a

result, other damages may occur .The clinical consequence of food and medication interactions depends on different factors like particular food consumed, medicine dosage, herbs, patient's conditions like age and state of health [(2)].

Some patients are more at risk from food and drug interactions and are more susceptible to serious effects, such as elderly patients and hospital patients, patients on medications with narrow or low therapeutic index and patients with chronic diseases taking three or more medications (polypharmacy) such as diabetes, hypertension, depression, high blood cholesterol, or congestive heart failure[(12)].

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