

**Printer Friendly Version**WEB LINK - <http://www.expresspharmaonline.com/20080315/research01.shtml>**What really matters, food or drug?**

*Consumption of medicines with grapefruit juice or certain vegetables, could lead to heart attack or other chronic diseases. This may shock us but the medical community is well aware of these food-drug interactions. **Arshiya Khan** finds out more ...*

Medicines have become an integral part of life for many people. With new medicines and rapidly evolving technologies, accompanied with new drug delivery systems (NDDS), it is becoming more and more convenient to consume drugs. However, new technologies and medicines sometime cause unforeseen side effects with certain foods. Therefore drugs, whether prescription (Rx) or over-the-counter (OTC), need to be taken with caution. Sometimes, certain medications may interact with both the food eaten and the nutrients the food supplies to the body. When the body is unable to use a nutrient due to a drug that has been taken, a nutrient-drug interaction occurs.

**Food interacts with drugs**

Food-drug interactions may impact the body in several ways. Certain foods can affect the rate at which the body uses a medication. The effectiveness of a drug is also altered if a certain nutrient in a food speeds up or slows down metabolism. Elaborating on this Dr D B Anantha Narayana, Head Herbals Research, Hindustan Unilever, feels that, foods impact the availability of the drug and the profile of its concentration in the blood, depending on the nature of the food, time at which it is taken, gap between the time of consumption of food and drug. "It is therefore important that patients need to be told very clearly how and when to take the drug, before or after food and the time gap between food intake and also what kind of foods to avoid." He further illustrates this with the help of an example. It is best to have a diet high in fats when drugs like Griseofulvin (an antifungal) are to be taken to improve their absorption. Simple things like tea, coffee, and several fruit juices have been known to cause changes in drug availability. Taking the same drug with hot or cold water also makes a difference. Such information is well documented in Ayurveda, which recognises them as 'Anupana'.

**Food and its impact on the drug**

"Food or juice affects the bioavailability of certain medications by inhibiting certain intestinal enzymes such as CYP3A4 as well as P-glycoprotein and Organic Anion Transporting Polypeptide (OATP) transporters"



**- Dr Bhimangouda Patil**  
Director, Vegetable and Fruit Improvement Center,  
Associate Professor, Department of Horticultural Sciences, Texas A&M University

Too much of a good thing can create its own problems. For example, all of us binge out on a favourite food at some time or the other. And are left to nurse a bad bout of acidity. Most of us resort to antacids to counter this but this can lead to a fatal heart attack in certain individuals, because nutrients in the food consumed reacts with the drug in unforeseen ways.

"Food or juice affects the bioavailability of certain medications by inhibiting certain intestinal enzymes such as CYP3A4 as well as P-glycoprotein and Organic Anion Transporting Polypeptide (OATP) transporters", informs Dr Bhimangouda Patil, Director, Vegetable and Fruit Improvement Center, Associate Professor, Department of Horticultural Sciences, Texas A&M University. A medication has ingredients, just as food does, that allows it to function correctly when taken in order to help the body in some way. Food can interfere with the

effectiveness of a drug if it interacts with the ingredients in the medicine, preventing the drug from working properly. Nutrients in food may either delay absorption into the body, speed up elimination from the body, or can impact a drug's effectiveness. For example, the acidic ingredients in fruit juices are capable of decreasing the power of antibiotics, such as penicillin. Tetracycline, another infection-fighting drug, is impacted by the consumption of dairy products. Grapefruit juice may react with several medications, which will lead to an increase in systemic exposure. Apart from this, anti depressants can also be dangerous if mixed with beverages or foods that contain tyramine, which is found in items such as beer, red wine, and some cheeses.

The way the food is consumed can also impact the effectiveness of a drug. Generally, we consume medicine soon after or at the time of a meal. The simple reason being that drugs may upset the stomach if the stomach is empty. However, sometimes taking a drug at the same time that food is eaten can interfere with the way the medicine is absorbed by the body. Therefore, "It is best to always give a gap of 30 minutes to an hour between taking food and taking medicines. It is preferable to take medicines with plain water, unless prescribed to do otherwise," advises Narayana.

A drug has the capability to interfere with a person's nutritional status and stimulate the appetite, resulting in an increase in nutrient intake due to more food being eaten. On the other hand, drugs may also cause a decrease in appetite, leading to a decrease in nutrient intake. In this case, a drug could possibly cause a nutritional deficiency. Nutritional status may also be impacted by a drug's effect on the three main nutrients—carbohydrates, fats, and proteins. A drug may speed up or slow down the breakdown of these nutrients, which are essential for the body's functioning. When a drug affects the absorption of nutrients from food into the body, less energy is available to be used by the body. The impact of the nutrient-drug interaction may vary according to the medicine taken, the dose of the medicine, and the form taken (e.g., pill, liquid).

### At higher risk

The geriatric population is at a higher risk to food-drug interactions as this population often takes the highest amount of medications. With so many medications, daily problems are bound to exist. Elderly people, who take many drugs on a routine basis for long periods of time, are at greatest risk of nutrient depletion and nutritional deficiencies.



"Interestingly, food-drug and drug-drug interactions are not fully understood by many people. It is possible that the high risks are possible due to combination of food-drug and drug-drug interaction," informs Patil.

A loss of appetite, a reduced sense of taste and smell, and swallowing problems, may all result from medication use in elderly people. Malnutrition is a common problem among older adults. Therefore, nutritional status may be already impacted by decreased nutrient intake. This may only worsen the effect of a possible food-drug interaction.

### Companies not in action

Though drug-drug interaction is checked for efficacy and adverse reactions by most of pharma companies, not many study food-drug interactions. Very few drug companies are investing money on determining fruit juice or fruit/vegetable interaction with certain medications. "Currently, either commodity groups or food companies invest money for food-drug research," informs Patil.

Narayana states the reason for this, "Most of the requirements of drug discovery and development deal with Phase IV, ie during post marketing surveillance. With the already spiralling cost of new drug development, it is not possible to do studies with so many types of foods that are likely to be consumed while taking drugs. Therefore, to avoid any adverse drug events (ADEs), ADEs observed must be reported to the doctor or the hospital." According to him, adverse drug reaction (ADR) monitoring cells and a system of pharmacovigilance has been initiated about two years ago by the office of the Drug Controller General India (DCGI) and these efforts need to be enhanced. Also, massive consumer awareness programmes need to be created, and competencies to analyse causality of such ADEs need to be developed in the country. "The reason is that these ADEs, even if they occur, do not get reported, and hence, firms are not able to do much, though they would like to," he adds.

Patil cites another reason with the help of an example. In grapefruit-drug interaction, currently, only few studies have been conducted due to lack of availability of putative compounds in grapefruit. More research is needed using cell culture, animal, as well as human clinical trials and understanding the role of specific bioactive compounds responsible for the interaction. For example, it is very critical to isolate and quantify the levels of these compounds in juice so we can reduce the dose of drug while co-consuming grapefruit and/or any food which has interaction potential.

## Unveiling the Myths

- **Myth 1:** Food will not interact with medication
- **Reality:** Certain specific food we eat and/or drink may have interaction.
- **Myth 2:** Food-drug interaction is not safe and one should try to avoid co-consuming grapefruit with certain medications.
- **Reality:** Understanding the underlying mechanism and specific putative compounds responsible for the interactions will help reducing the cost of the medicine, while consumers can still co-consume fruits and/or vegetables specifically grapefruit with certain medications. Clinical pharmacokinetic studies are needed to answer the question

**Courtesy:** Dr Bhimangouda Patil, Director, Vegetable and Fruit Improvement Center, Associate Professor, Department of Horticultural Sciences, Texas A&M University.

## Avoidance is bliss

What can be done to reduce the adverse events in food-drug interactions?, The patient/consumer must read the label on a prescription medicine and ask a pharmacist or physician if something is not clear. Also make a note of the directions to use, warnings, and any possible side effects printed on all drug labels and information in the package. Ensure to take medicines with a full glass of water. A drug may not work correctly if a medicine is taken improperly; do not stir medication into food or take apart capsules (unless told to do so). Take vitamin and mineral supplements before or after medicine, as they may interact with certain drugs. Avoid stirring drugs into hot drinks such as coffee, as this may affect the effectiveness of the drug and the drug can also be destroyed by the hot temperature. Do not drink alcohol when taking any medicine. Always tell a physician and pharmacist about all medicines being taken, including both prescription and over-the-counter drugs.

Drug companies must be aware of the fact that food and/or drink, can interact with the medication they release to the market. They should invest enough money to conduct research on food-drug interaction. In a situation where there is lack of awareness and not much research is being done on food-drug interactions, consumers of these medicines are at a higher risk of being affected. Patil says that, "While we need to understand the toxic effects and bioavailability of the 80,000-1,00,000 bioactive compounds, it is better to continue to eat and/drink fruit, vegetables and their juices rather than stopping their consumption." He further informs that due to lack of resource allocation on commodity groups, currently, certain medications in the market advice the patient not to take grapefruit juice along with 'X' medication.

However, Narayana has a different view to offer, "It is a pity that such instructions are not fully and clearly given by either physicians or pharmacists, nor is there any patient information leaflets made available. The labels of drugs also do not give such information." Therefore, having complete information about one's medications and timing the medications around your food intake can help one avoid drug interaction problems.

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