

Liver Injury: Risk Factors in Human Diets

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Abstract

Safe diet is very important for preventing human body from liver injury. The risk factors existing in human diets have been analyzed. Many risk factors of liver injury could be present in human diets.

Keywords: Liver Injury; Human Diets

The illness of human body may result from viral or bacterial infection, physical damage, genetic inheritance or mutation, intake of toxic compounds, over- or under-intake of essential nutrients or an unbalanced diet [1,2]. Therefore, the evaluation of risk factors in human diets (including toxins and unbalanced nutrients in foods and over- or under-intake of some nutrients) is essential for the prevention or even the treatment of some chronic diseases [3]. Here, the risk factors of liver injury in human diets is summarized.

Over- or under-intake of some nutrients could increase the risk of liver diseases. Over-intake of nutrients including alcohol, vitamin A (liver injury observed in doses > 100,000 IU/day [4]), niacin (at adult doses > 3 g/day being potentially toxic [5]), high fat (or oil) foods. Over-intake of such mineral nutrients as iron, selenium and fluoride could increase the risk of liver injury. Conversely, under-intake of nutrients, especially protein/energy or arginine deficiency also increases the risk of liver injury.

Some potential hepatotoxins exist in foods. They include fagaramide in *Zanthoxylum bungeanum*, *Fagara heitzii* and *Piperaceae*, safrole in star anise, cumin, black pepper and ginger, capsaicin in red pepper (chili), coumarin in cinnamon, microcystins in *Cyanobacteria* (e.g. *Spirulina*) food products or aquatic animals fed cyanobacteria (or in water), gossypol in un-refined cotton seed oil, anthraquinone derivatives (e.g. emodin) in rhubarb (hepatotoxic or hepatoprotective effects depending upon dosage levels), pyrrolizidine alkaloids in the milk of animals fed the forage that contains the alkaloids [or the honey of bees fed tansy ragwort (*S. jacobaea*), comfrey (*Symphytum officinale*) tea, *Petasites japonicas Maxim*, etc.], cycasin in the seed of cycads (*Cycas circinalis*), heterocyclic amines in heated meat (or other cooked proteinaceous foods), hydrazines in commonly eaten mushroom and pyrones in kava products. Pennyroyal oil (*Mentha pulegium*) is also hepatotoxic.

The effect of some compounds on liver is contradistinctively reported. Hydrolysable tannins abundantly exist in beverages (e.g. coffee, cocoa, tea, red wine), fruits (e.g. persimmon, banana) and vegetables (e.g. spinach), which are hepatotoxic in animals though rare report on their hepatic toxicity in human could be found in the literature [6]. Contradistinctively, tannins were reported to have hepatoprotective effect [7]. Crude saponins from *Madhuca* were found to be hepatotoxic [8] (especially, pentacyclic triterpenoids), which are also widely present in many other food materials such as soybeans, potatoes, quinoa whereas there are also reports on their hepatoprotective effect [9].

Contaminants from environment or micro-organisms could also increase the risk of liver injury. They include heavy metals like mercury, lead, aluminium and arsenic from growing soil, aflatoxins from *Aspergillus flavus* and *A. parasiticus*, fumonisins from *Fusarium verticillioides*, *F. moniliform* and *F. proliferatum*, phomopsis from *Phomopsis leptostromiformis* and rubratoxin from *Penicillium rubrum* and *P. purpurogenum*. Some commonly used food additives such as butylated hydroxytoluene could be hepatotoxic.

Comprehensive review on dietary risk factors of liver diseases in details may be referred to the article titled "Diet and liver diseases: A review of contributing factors" [10]. So many risk factors of liver injury could exist in foods. Their cooperative effects of the risk factors that are present in one's customary daily diet need to be studied well even though the concentration of each factor might be safe for consumption. Does any unknown risk factor of liver injury exist in foods?

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