International Journal of Applied Home Science ***REVIEW PAPER***
Volume 3 (5&6), May & June (2016) : 241-248 ISSN : 2394-1413 (Print)
Received : 17.05.2016; Revised : 25.05.2016; Accepted : 29.05.2016

Prevent food adulteration to save your kidney

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ABSTRACT

Now days, there are nearly 70 million people with kidney disease of varying severity levels in India. As mankind has travelled far from natural products to man made products with special reference to processed food. Kidney failure has become a buzz word. Kidney failure was a rare disease even until 10 years ago but today according to different surveys prevalence of kidney disease has increased up to 30% in recent years. Kidney diseases are a worldwide public health problem and if preventive measures are not taken they are expected to increase rapidly. So, it is important to realize the risk factors associated with kidney disease. Apart from Diabetes Mellitus, hypertension etc. food adulteration is also an important cause for kidney failure. Toxins and kidney work against each other. When toxins overshoot a given level the problem begin. A critical review of how toxic food affects the kidney will help us to prevent failure of kidney. As per the news, features and articles published in different newspapers, magazines, journals in India most of the foods manufactured or processed are adulterated in varying degrees and unsafe for human consumption. In this paper food adulteration and its harmful effects are critically reviewed with an objective of prevention of different health hazards and kidney diseases, caused by consuming adulterated food.

Key Words : Kidneys, Toxins, Food adulteration, Kidney failure, Food adulterants

Kidneys are vital life sustaining organs, performing many functions to keep the blood clean and our body chemically balanced. It perform a number of functions in human body, such as filter the waste product, maintain electrolyte balance and secrete a number of essential hormones in body . Their main job is to clean the blood from toxins and transform waste into urine. The kidney act as a very efficient filter for ridding out the waste and toxic substances from body and returning vital substances into the blood stream which makes body to work efficiently. But with a rising incidence of chronic kidney diseases in India, it's a matter of great worry. It is a worldwide public health problem. Globally it is 12th cause of death and 17th cause of disability (Tripathi *et al.,* 2007). So knowledge about the causative agents of the kidney diseases is the need of time. Through this review we intend to compile different types of adulterations made in different food items, the health risks imposed by these adulterants. The researcher reviewed a lot on causative factors for kidney disease and came across the fact that prevalence of adulteration in food is also an important cause for

Cite this Article: Singh, Monisha and Srivastava, Sangita (2016). Prevent food adulteration to save your kidney. *Internat. J. Appl. Home Sci.,* **3** (5 & 6) : 241-248.

kidney diseases. Most of the adulterants are toxic in nature and kidney's job to make human body free from toxins .But as we are eating this adulterated and toxic food all the time we are increasing the toxic level in our body. Kidneys act on these toxins and remove them from the body but if the toxins levels are very high then ultimately the kidney collapse.

Toxins are harmful agents found in the environment. They are naturally occurring poisons. It is a poisonous substance, especially a protein that is produced by living organisms and is capable of causing disease when introduced into the body tissues .It is an alternative term used for poison or toxicant. These toxins in food can cause both acute and chronic health effects with a range of clinical symptoms. Acute symptoms range from mild gastrointestinal upset, neurological symptoms, respiratory paralysis, and kidney failure to fatality.

Food is essential for nourishment and sustenance of life. It is the basic necessity of life. One works hard and earns to satisfy our hunger and relax (enjoy) later. Access to pure, nutritious food, free from any type of adulteration is the genuine expectation of every citizen. Food must be free from any adulteration or contamination. But at the end of the day, many of us are not sure of what we eat. We may be eating a dangerous dye, sawdust, soap stone, industrial starch, and aluminium foil and so on. Food adulteration is an act of intentionally debasing the quality of food offered for sale either by the admixture or substitution of inferior substances or by the removal of some valuable ingredient It takes into account not only the intentional addition or substitution or abstraction of substances which adversely affect nature, substances and quality of foods, but also their incidental contamination during the period of growth, harvesting, storage, processing, transport and distribution**.**(Gautam and Singh, 2013). "Adulterant" means any material which is or could be employed for making the food unsafe or sub-standard or mis-branded or containing extraneous matter. Food is adulterated if its quality is lowered or affected by the addition of substances which are injurious to health or by the removal of substances which are nutritious. And its ugly face has come out in the form of its harmful effects in different health problems like stomach disorders, giddiness, joint pain, diarrhoea, liver disorders, dropsy, gastrointestinal problems, respiratory distress, oedema, cardiac arrest, glaucoma, carcinogenic effects, paralysis, kidney failure etc. (Singh, 2011)**.** Adulterated food is dangerous because it may be toxic and can affect health and it could deprive nutrients essential for proper growth and development. Adulteration of food cheats the consumer and can pose serious risk to health in some case.

Food adulteration has become rampant in India. Fruits, vegetables, pulses, cereals, dairy products, meat, soft drinks, etc. might be contaminated (Gautam and Singh, 2013)**.**Adulteration of milk, sweets etc in festival seasons are very common practice in India. Food adulteration in India starts from the field itself where fertilizers and pesticides are overused. Therefore one kind of contaminant that is present across all range of food is very high level of pesticide residues. Improper agriculture practice and massive use of chemicals are the main causes of food adulteration in our country. Uses of poisonous chemicals in perishable foods are evident in highest degrees which are endangering the lives of the people .Chemicals like calcium carbide / ethephon and oxytocin are reportedly being used in fruit and vegetable farms for artificial ripening of fruits and for increasing the size of fruits and vegetables respectively (Sharma *et al.,* 2015, Rani *et al.,* 2013 and Sasikumar *et al.,* 2005). Usually fruits take 6-8 days for ripening but with advancement of science and technology. Now

days, there are chemicals which are used for ripening the fruits in 24-48 hours. But it is becoming a matter of great concern to various health related issues. Most of the ripening agents are toxic and their consumption can cause serious health problem such as heart disease, skin disease, and lung damage and kidney failure. By using these chemicals the fruits become bigger and ripen in less time with uniform colour. Different chemical agents used for ripening of fruits are-

– Calcium carbide-Calcium carbide is a chemical used to ripen fruits faster. It carry over toxic materials like arsenic and phosphorus lead to blindness and skin irritation (Asif, 2012).Nowadays with eagerness to earn more by making the fruit ripen fast farmers use calcium carbide without knowing its harmful effects on human health. The higher exposure to arsenic contained in calcium carbide can lead to cancer of lung, liver and kidney. It is a carcinogenic agent and banned under PFA Rules, 1955 (Sharma *et al.,* 2015 and Mursalat *et al.*, 2013).

– Ethephon –It is a pesticide but also has properties which help in ripening fruits faster but its intake can cause various health hazards (Mursalat *et al.*, 2013)

– Oxytocin- In market there is availability of bigger vegetables and fruits. We think that bigger is always better but that's not the truth. Farmers used a hormone named oxytocin for abnormally increasing the size of fruits and vegetables in a single day. Oxytocin is a mammalian hormone, also injected to the cow to produce more milk. Usage of this make milk more toxic and carries germs of typhoid, tuberculosis and also have adverse impact on the brain. When oxytocin is present in edibles it causes headache,drowsiness and is carcinogenic**.**(Pizarro *et al.,* 2007 and Rani *et al.,* 2013).

– Acetylene gas, commonly known as carbide gas is also used for ripening the fruits faster. When calcium carbide came in contact with water, acetylene gas is produced which effect neurological system in human body (Asif, 2012 and Mursalat *et al.,* 2013).

– Dipping green vegetables in Artificial colours like malachite green- We as a consumer always get attracted to fresh green vegetable , but this pleasant green colour may not be the natural colour of the vegetable . Many vegetable suppliers dip vegetables in artificial colours to give them a fresh, attractive and pleasant appearance. But usage of these harmful colourants causes cancer (Mursalat *et al.,* 2013).

– Pesticide residues, crop contaminants (aflatoxins, patulin, ochratoxin, etc.) naturally occurring toxic substances and heavy metals are the major contaminants found in fruit and vegetables (Sharma *et al.,* 2015).

– Heavy metals, such as lead, chromium and arsenic accumulate in the body that might cause kidney and liver damage and develop abnormality among children (Sharma *et al.,* 2015).

– Consumption of chemical-laden fruits and vegetables can prove disastrous for digestive system, eyes and liver. It can also results in vomiting and diarrhea in children and at last kidney failure (Sharma *et al.,* 2015).

Injurious adulterants/contaminants in foods and their health effects :

According to a survey conducted by Ashish Kumar in 2011, adulteration in milk was detected upto 70% with water, turmeric powder with 43% of chalk powder, red chilli powder

with 100% artificial colour, sugar with 37% of chalk powder etc. (Kumar, 2011).

Food adulteration with poisonous chemical like formalin is widespread and regularly applied on fish, fruit, meat and milk that causes different types of cancers, asthma and skin diseases.

Colouring dyes, calcium carbide, urea, brunt engine oil and even some permitted preservatives are used in excessive amount that affect multiple organs of human body. Mostly it causes cancer like colon, peptic ulcer diseases, and chronic liver diseases including cirrhosis and liver failure, electrolyte imbalance and eventually kidney failure (Lakshmi, 2012).

Heart diseases, blood disorders and bone marrow abnormality are also detected. Chance of malignancy increases and neurological impairment or brain functions are also often compromised. Skin problems are frequently seen including allergic manifestation (Rani *et al.,* 2013).

There are also many long term effects of food adulteration besides immediate effect.

Various food borne diseases are immediate result of eating adulterated food. But if adulterated food is eaten for a very long time then it results in chronic diseases like lung cancer, peptic ulcer, cardiac arrest, kidney failure leaded with death.

Since, kidney is the excretory organ of our body; its main function is to make our blood free from toxins. If we consume the adulterated food, then as reviewed, all of them are harmful and toxic in nature, so kidney has to remove toxins all the time from human body. If the amount of toxins are beyond the limit, it is the kidney our excretory organ which got affected and at last result in kidney failure.

Melamine and kidney faliure :

Melamine used for making plastic cups, plates and serving dishes. It is high in nitrogen content, giving a false impression that the food product is rich in protein. The addition of 1g of melamine to 1L of milk increases the apparent protein content by 0.4 percent. In China, milk was diluted with water to increase the volume but then it tested low for protein concentration when sold to infant feeds manufacturers. In order to avoid this, melamine was added to the diluted milk to mask the reduced protein content of the milk. The results of the adulteration were disastrous. Children younger than 3 years of age suffered from kidney stones, kidney failure and death. Melamine is excreted in the urine by the kidneys, and wreaks its havoc by blocking the tubules (one of the parts of kidney where urine is formed and drained). It does so by forming melamine crystals. This causes inflammation, bleeding, and cell death inside the kidney. Hence, non-fatal cases of melamine poisoning in infants that were reported from China developed kidney stones and kidney failure. Blood in urine and high blood pressure have been reported as well (Yu-Chang *et al.,* 2009).

A study on plastic dishware that had melamine showed that melamine can migrate very slowly out of the plastic into food that comes in contact with it. When food is put in melamine utensils and heated and reheated in microwaves, the temperature is above 160 degrees F, the melamine(plastic) melts and gets in cooperated in the food, making it toxic (Yu-Chang *et al.,* 2009).

Disposable paper cups have become quite popular due to the convenience in using

Table 1 : Long term effects of food adulteration besides immediate effect

Sr. No.	Food items	Adulterant	Health effects	Reference no.
1.	Asafoetida	Soap stones, chalk Foreign resin, gum arabic, gum resin, galbanum, moriacum	Dysentry	Ravichandran (2015) and Shelar *et al.* (2001)
2.	Spinach, Amranth	Oxalic acid	Cramps, renal pain	Lakshmi (2012)
3.	Puffed rice	Hydrose(sodium hydro sulphite, urea	Kidney failure	Lakshmi (2012)
4.	Meat	Sodium cyclamate, formalin	Carcinogenic	Lakshmi (2012)
5.	Black pepper	Dried papaya seeds	Liver problems and stomach disorders	Curl and Fenwick (1983), Dhanya *et al.* (2009) and Shelar *et al.* (2001)
6.	Milk	Melamine, Starch, milk powder, urea	Cancer and acute renal failure	Lakshmi (2012), Srilakshmi, (2001) and Shelar *et al.* (2001)
7.	Tea leaves	Iron flakes, Leather flakes, Coal tar dye	Cancer and liver disorder	Bandana and Mahipal (2003), Gautam and Singh (2013) and Shelar *et al.* (2001).
8.	Coriander powder and cumin powder	Saw dust	Cancer	Lakshmi (2012) and Shelar *et al.* (2001)
9.	Green vegetable	Malachite green	cancer	Sharma *et al.* (2015), Lakshmi (2012), Mursalat *et al.* (2013), Sasikumar *et al.* (2005) and Singh (2011)
10.	Arhar dal	Kesari dal, metanil yellow dye	Cancer, infertility, stomach disorder	Lakshmi (2012), Singh (2011) and Shelar *et al.* (2001).
11.	Coffee powder	Scorched persimmon stones	Ciarrhea, stomach disorders, giddiness and severe joint pains	Park
12.	Red chilli powder	Rhodamine B colour	Cancer	Cornet *et al.* (2006), Dhanya *et al.* (2008), Sasikumar *et al.* (2005) and Singh (2011)
13.	Turmeric powder	Metanil yellow colour, Lead chromate	Cancer	Dhanya *et al.* (2011), Singh (2011), Shelar *et al.* (2001) and Sasikumar *et al.* (2005)

Table 1 contd…

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14.	Mustard oil	Argemone oil, Cotton seed oil, Mineral oil, Castor oil	Epidemic dropsy, Glaucoma, Cardiac arrest, Loss of eyesight, heart diseases, and tumor.	Siddiqui and Dhua and Shelar *et al.* (2001)
15.	Jaggery	Sodium bicarbonate	Vomiting, diarrhoea	Lakshmi (2012)
16.	Edible oil	Cyanide, Mobil oil	Cancer	. Siddiqui and Dhua (2010) and Shelar *et al.* (2001)
17.	Ghee	vanaspati	Liver disorder	Lakshmi (2012) and Shelar *et al.* (2001).
18.	Butter	Oleomargarine or lard, a fatty acid,	Asthma and kidney disease	Lakshmi (2012)
19.	Ice cream	Pepperonil, ethylacetate	diseases affecting lungs, kidneys and heart.	Lakshmi (2012)
20.	Apple	Lead arsenate	Dizziness, paralysis, death	Sharma *et al.* (2015) and Rani *et al.* (2013)
21.	Fruit juices and soft drinks	Cadmium	Liver and kidney disease	Lakshmi (2012) and Rani *et al.* (2013)
22.	Potatoes	Solanine	Abdominal pain, diarrhoea	Lakshmi (2012)
23.	Fish	Formalin	Cancer, asthma, skin diseases	Lakshmi (2012)
24.	Wheat and other food grains	Ergot(a fungus)	It is poisonous in nature leading death.	Ravichandran (2015).

them. These paper cups are coated with a tiny layer of wax, which is essential to make them leak proof. When very hot liquids are pour in this cup, the wax coating melts, which mixes with our liquid and reaches to our stomach. There little use can be discarded but prolonged use is hazardous to health. This wax is coated over the organs and provides hindrance in working them properly. So it is advised to use glass and ceramic cups.

Conclusion :

In a country like India which has the culture of "sarve bhavnti sukhinah, sarve santu niramayaah, bhadraanni pashyantu ,maa kaschid dukha bhaag bhavet" we all should be aware at personal level and create awareness among society to make everyone happy and free from illness. Chronic kidney diseases are rising like an epidemic, so we should keep an eagle's eye on what we and our loved ones are eating. The best way to avoid these health hazards is prevention as "prevention is better than cure". One of the new branches of medicine developed is preventive medicine. By definition, preventive medicine is applied to "healthy" people with a primary objective of prevention from disease and promotion of health. There is very little awareness among the Indian public about adulteration. Stoppage

of adulteration practices may not be an easy task but creating awareness among the people about these practices is not that hard Consumer should be able to judge what is good and what is not. The consumer should avoid taking food from an unhygienic place and food being prepared under unhygienic conditions. Selection of wholesome and non-adulterated food is essential for daily life to make sure that such foods do not cause any health hazard. Wash the fruits and vegetables thoroughly to remove pesticides residues up to an extent but the best way is to grow fresh fruits and vegetables in a small garden at your home using organic manure. Besides this if you are buying any packed product then kindly see the label for ingredients and their amount and also the expiration date.

Tips for detoxifying the kidney

1. Drink plenty of clean water.
2. Water cooked with coriander leaves and refrigerated and used for drinking is also a good detoxifier.
3. Home grown veggies and fruits are always best.
4. Avoid processed food
5. Do not be allured by good looking large size vegetables.
6. Add few drops of $KMnO_4$ in the water to rinse vegetables
7. Use Indian disposable crockery's *i.e.* "kullhads" and "pattals".

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