Cancer awareness exposure and attitude towards the common chemical carcinogens

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ABSTRACT

This article tries to bring out the awareness about many household products, which are used in our daily life, containing chemicals capable of promoting cancer in human body due to the action of the carcinogen present in the household items causing dangerous changes at the cellular level. It discusses various food products in which preservatives are used which contain chemicals which increase the probability of abnormal DNA synthesis. It also explains about the danger of exposure to electromog, perfumes, air fresheners, cosmetics, hair dyes, mosquito coils and the toxic chemicals present in these substances accelerating the cellular changes leading to genetic mutations.

Keywords: Carcinogen; Cancer; Mosquito Coils; Mawa, Hans; perfumes; cosmetics; Hair dye.

INTRODUCTION

Cancer is a slowly progressive disease which develops over several years leading to its manifestation in a patient. It is a disease that is caused due to several factors including a patient’s exposure to carcinogens directly such as radiations, drugs, hormonal and steroidal supplements etc. In this article, we focus on the common household appliances and food that act as the carcinogen and precipitates the incidence of cancer. A wider literature review has been carried out in PubMed, Cochrane library and special reports that have been published on carcinogenic potential of household products and food items. Alcohol and tobacco are known carcinogens which have been reported by several investigators. Hence, we are looking at other substances with carcinogenic potential.

Food

Food is a vital necessity for mankind for the survival. The origin of food is the main source for carcinogenesis in human beings. The use of pesticides for cultivation, processed foods, fermented foods, preservatives used in the foods and chemicals used for ripening fruits and vegetables etc. lead to tumor development over prolonged usage. Although 2008-09 is a year declared as the year of Food Safety and Control by the Government of India, hardly there are a few changes in the safety potential of food.

Fermented Food Products and Pickling

Fermentation is one of the oldest and most economical methods for producing, processing and preservation of food products. As quoted in the Handbook of Indigenous Fermented Foods, 1983 (Steinkraus K, 1995), South-East Asians depend largely on fermented foods like Tempeh (Indonesia), Idli (India) and Fish sauces (Indonesia). A Published case-controlled report on salted fish intake, quoted that an overall range of 1.28 odds ratio for the incidence of nasopharyngeal cancer among people who consume Salted Fish (Continuous Update Report, 2016). Beevers et al (2004) and Gancz et al (2008) have concluded that high salt intake can facilitate the carcinogenic potential of Helicobacter pylori in developing stomach adenocarcinoma. A meta-analysis has also agreed with these results giving an overall 1.52 odds ratio for incidence of gastric cancer (Ren JS et al, 2012). Kim et al (2010) compared odds for development of gastric cancer between fresh and pickled vegetables and it has been found that pickled vegetables gives odds as high as 1.28 while fresh vegetables have odds of 0.62. When the preservatives used in meat is cooked in oil, the reaction takes place which produces N-Nitroso which is a known compound for the cause of cancer. Odds of about 1.82 are observed suggesting H. pylori induced gastric carcinoma (Jakszny P et al, 2006). A prospective cohort study of 82,022 Swedish men and women showed that after 9.4 years of follow up 485 cases developed bladder cancer (Larsson S et al, 2008). In the same study, a trend analysis suggested that the development of cancer is higher among people who consume cultured milk. All these studies have correlated the factors and odds for the development of various...
cancers with pickled and fermented foods as a risk factor. All these results suggest that there is a definite relationship on the incidence of cancers because of these food products.

**Bread**

Additives are used in the flour for making bread and bakery products to give a uniform finish to the product. Potassium bromate and potassium iodate are two such agents used as additives. Although India has permitted its use to a smaller extent (Food Safety and Standards Regulations, 2011), it has been completely stopped in countries like Australia (Commission of the European Communities, Food-Science and Techniques, Reports of the Scientific Committee for Foods, Twenty Sixth Series) and Europe (Electronic Code of Federal Regulations). Recently, the Centre for Science and Environment (CSE) has published a report on estimation of potassium bromate and potassium iodate levels in bread and pizzas of more famous brands (CSE Study: Potassium Bromate or Potassium Iodate in Bread and Bakery Products PML/PR-49/2015)). This report showed that almost all famous brands of breads and pizzas used potassium bromate and potassium iodate in higher limits than permitted levels, and this has not been mentioned in their labels. The use of potassium bromate has shown positive indications for thyroid and peritoneal cancers (Kurokawa Y et al, 1986). CSE has now recommended prohibiting the use of potassium bromate with immediate effect (CSE Study: Potassium Bromate or Potassium Iodate in Bread and Bakery Products PML/PR-49/2015)).

**Pesticides in Food**

Pesticides are one of the important components of modern agriculture which could improve the productivity. The use of pesticide can affect the farmer directly as well as the consumer, as pesticides tend to stay with food and environment for a long time (Clapp RW et al, 2007). Consumption of foods with pesticides tends to cause lung, kidney and ovarian cancers as well as lymphomas (Clapp RW et al, 2007). Among all the pesticides, Dichlorodiphenyl Trichloroethane (DDT) is considered one of the highly carcinogenic substances. A study has reported that there is a 1.7 times higher incidence of testicular germ cell carcinoma among those who consumed food with DDT than those who did not (McGlynn KA et al, 2008). Fertilizers with nitrogenous bases may increase the cancer risk due to the breakdown of nitrogen by digestive enzymes. A cohort study about the use of nitrates revealed that there is an increased risk of bladder and ovarian cancers (Weyer PJ et al, 2001). The best ways to overcome the effects of these nitrates are crop rotation with legumes (Marsh M et al, 2008). Phosphate based fertilizers tend to cause an increased risk of pancreatic cancer risk (IARC, 1974). The use of phosphate fertilizers has constantly improved cadmium retention in food. A study revealed as high as 4 times urinary cadmium levels in such pancreatic cancer patients (IARC, 1974).

Exposure to pesticides can be minimized by resorting to Organic Farming.

**Chemicals Used for Ripening Fruits**

Marketable ripening is an important measure of fruit commerce as ripe fruits are not appropriate to transmit and dispense due to their fast rottting. Consequently, fruit sellers pick unripe fruits and employ diverse practices to secure the maturing process of fruits. The most frequently used substance for ripening fruits is calcium carbide (CaC₂) which is described to be carcinogenic in nature. The other commonly used ripeners are acetylene gas, potassium sulphate, oxytocin etc. Although the Prevention of Food Adulteration Act 1955 had banned the use of these chemicals, it is impossible to deny that they are not used in commercial purposes. The use of such chemicals usually leads to lung, colon and gastric cancer (Kjuus H et al, 2007). Calcium carbide has the potential to cause cancer (Fattah SA, 2010). Peeling of the pericarp of fruits and vegetables is an ideal way to overcome the pesticides.

**Packing Product**

Food items are usually packed with aluminium foil, Polyethylene Terepthalate (PET) bottles etc. A study performed by Biscardi et al, revealed that mineral water and aerated drinks showed carcinogenicity when they are stored in the PET bottles (Biscardi D, 2003). The popcorn bags comprehend trace levels of perfluoro-octanoic acid or PFOA. PFOA is listed in the United States Environmental Protection Agency (EPA) as a cancer-causing agent. Lab analysis shows that when PFOA is heated, it releases a toxin that causes infertility and cancer (Steenland K et al, 2010). Hence, these substances should be avoided, but there is no better alternative for storing of such substances.

**Household Items**

Chemicals are invariably most essential components in our household. They make up the constituents of cleaning aids, mosquito repellent, cosmetics, perfumes, paints and plastics etc. The heavy metals and radiations are the main carcinogenic substances present in these household items.

**Eletrosmog and Cell Phone Radiation**

Electrosmog is the invisible radiation of electromagnetic origin obtained from the use of electricity and wireless technology. Electrosmog are commonly produced through the use of cordless technology. Several researches have shown that there is a definitive relationship between these electrosmog and cancer showing that electrosmog is a human carcinogen pertaining to glioma and brain tumour (Hardell L et al, 2006, Hardell L et al 2013, Khuranna et al, 2009). Certain studies revealed that there is a significant association between long time mobile phone usage and brain tumour (Hours M, 2007); while certain studies have denied this
Cancer has reported that kidney cancer is preventable by avoiding substances such as gutka, mawa, Hans and other coal tar products. The only way to reduce this risk is in the reduction in the usage of these products. United States Food and Drug Administration have started a campaign in reducing the use of these chemicals (FDA, 2016).

**Mosquito Repellents**

Mosquito repellents such as mosquito coils etc. have become an essential element in day to day life, as mosquito borne diseases are invariably increasing and are fatal e.g. dengue, chikunguniya and malaria etc. Sumithrin- a pyrethroid used for mosquito repulsion has shown to cause breast and prostate cancers (Garey J, 1998). Similarly a study conducted in 1997 showed the development of leukemias in children over long term nasal exposure (Environmental Science & Technology 1998). A similar product permethrin is also known to produce cancers of the breast (Chromosome/Genetic Damage Evident in Immune System Cells from Permethrin.1994). Similarly a study showed the anti-flea and anti-tick pet products also have produced tumours among human beings (David W, 2000). N, N-Diethyl-meta-toluamide, a commonly used product in vaporizers has shown incidences of testicular cancers (ATSDR, 2016). Although this cannot be completely avoided, the use should be minimized to the possible extent.

**Cosmetics and Perfumes**

Personal care is the need of the century. Not only women, even men and kids are more frequently using these personal care products. Coal tar – a common product in makeup and hair dye tend to cause skin cancer over long term use (Environmental Working Group 2004). Similar to coal tar, phthalates - a fragrant substance commonly used in perfumes and nail polishes, tends to cause testicular cancer especially in young men (Center for Disease Control CDC(2003)). Similarly, European Union has given a directive on the use of formaldehyde, which is widely used in eye shadow, mascara; blush etc. can cause skin cancers (The EU Directive). A case control study in Iowa showed odds of as high as 4.3 in white men who used hair dyes in developing multiple myelomas (Brown LM, 1992). The European Union has banned the use of Phenylenedia mine which is an essential constituent in hair dye preparation as it tends to cause skin cancers (The EU Directive). The only way to reduce this risk is in the reduction in the usage of these products. United States Food and Drug Administration have started a campaign in reducing the use of these chemicals (FDA, 2016).

<table>
<thead>
<tr>
<th>S. No</th>
<th>Cancer Type</th>
<th>Household Source</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Brain Cancer</td>
<td>Eletrosmog (wireless, cordless devices), Cell Phones , Lead</td>
</tr>
<tr>
<td>2</td>
<td>Glioma</td>
<td>Eletrosmog (wireless, cordless devices)</td>
</tr>
<tr>
<td>3</td>
<td>Skin Cancer</td>
<td>Hair dye, Eye Shadows, Mascara</td>
</tr>
<tr>
<td>4</td>
<td>Gastric Cancer</td>
<td>Pickling, Lead, Pickled veggies, Fruit ripening agents</td>
</tr>
<tr>
<td>5</td>
<td>Lung Cancer</td>
<td>Fruit ripening agents, Pesticides</td>
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<tr>
<td>6</td>
<td>Breast Cancer</td>
<td>Mosquito repellent, Plastics</td>
</tr>
<tr>
<td>7</td>
<td>Thyroid Cancer</td>
<td>Bread</td>
</tr>
<tr>
<td>8</td>
<td>Testicular Cancer</td>
<td>DDT, Mosquito Vaporizers, Perfumes</td>
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<tr>
<td>9</td>
<td>Ovarian cancer</td>
<td>Nitrate pesticides</td>
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<tr>
<td>10</td>
<td>Leukaemia</td>
<td>Mosquito repellent</td>
</tr>
</tbody>
</table>

**Lead and Plastics**

Lead is one of the toxic heavy metals available in daily use. The common sources of lead are water pipes, paints, toys, sindoor etc. The International Agency for Research in Cancer has reported that kidney cancer is the most frequented cancer among all other cancers when lead is used. Lead consumption in any form such as ingestion, inhalation etc. can possess carcinogenic risk. The other forms of cancer caused due to lead are brain and stomach cancers (International Agency for Research on Cancer, 1974). Hence the use of lead should be minimized although practically not possible. Plastics are the other commonly used items in day to day life. It's hard to overcome the use of plastics in modern day world. Studies have shown that Bisphenol A (BPA), an ingredient used to harden plastics, has caused breast cancers (VomSaal FS, 2006). Certain studies even revealed that this BPA can interfere and hinder the treatment of cancers (LaPensee EW et al, 2006).

These are some of the products which cannot be completely avoided by the human beings but the usage can be minimized.

**Use of Prohibited Substances**

The prohibited substances such as gutka, mawa, hans etc. are still in use. All these products have the ability of carcinogenesis. A study conducted by Uma Maheswari (Uma Maheswari et al, 2015) in Saveetha Dental Hospital, Chennai, India, revealed that among subjects using Mawa and Hans 76.9% had mucosal changes in the oral cavity. Mucosal changes were more prevalent among Mawa users 81.2% than Hans users 71.4%). Everyone who combined Mawa and Hans showed mucosal changes. The commonest lesion among Hans users was Tobacco Pouch Keratosis 60%) and among mawa users fibrosis 69.2%) which may lead to oral cancers (Uma Maheswari et al, 2015). The use of these substances should be strictly stopped.
CONCLUSION

All these scientific evidences clearly showed the nature and type of carcinogen present in each of the household items. Although not all could be completely avoided, many can be reduced in its usage. The awareness to common public is another important aspect which could reduce the cancer risk and increase the prognosis among survivors. Public awareness programmes, government restrictions and regular monitoring by government agencies can therefore reduce the higher incidence of cancer.

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