

Cancer, a preventable disease of the modern age-an overview from the Indian perspective

Subhadra Roy*

Assistant Professor, Department of Zoology, Surendranath College, Kolkata-9, India

*Corresponding author: roysubhadra28@gmail.com

Abstract

Cancer, the most alarming global problem of today, is emerging as an important health problem in India. In ancient Indians, the virtual absence of cancerous malignancies suggested that cancer is largely affected by the Industrial revolution resulting in changes in environment and lifestyle. The common lifestyle factors leading to cancer death include: tobacco, diet and obesity, infections, stress and lack of physical activity. Alcohol consumption, excessive sun tanning and occupational hazards are some other factors to blame. Excessive increase in environmental pollutants resulting from vehicular emissions, untreated industrial smoke, factory wastes, pesticides, radon exposure, radiation etc. pose a high risk of cancer. However, most of these risk factors are modifiable and thus cancer cases may also be prevented to a large extent. There is a critical need to limit exposures to avoid environmental and occupational carcinogens and to find safer alternatives to the present chemical and physical risks. Public awareness as well as urgent actions by public bodies to make our environment clean and green as well as adoption of a healthy lifestyle are therefore the most important tools to fight against cancer and other preventable diseases.

Keywords: Cancer, modern lifestyle, tobacco, environmental pollutants, public awareness

Cancer initiates from a network of extremely complicated causes and is posing a major health problem in India for the last few years. Most chronic illnesses arise not solely due to the genetic code but due to the complex interactions of all the products of such genes with the environmental factors. The occurrence of cancer among our recent ancestors was not very evident suggesting it as a 'modern' disease caused by environmental changes and changes in the diet pattern. The growing industrialization in a developing country like India is accompanied by the migration of a large portion of the rural population to the cities, their exposure to pollutants from vehicles, factories etc., and also changes in lifestyles. Evidences suggest that about 90-95% of cancer cases can be attributed to the environment and lifestyle factors (Anand *et al.*, 2008) reinforcing the need to

look back and create a healthy state of living in this age of industrialization and modernization.

Factors leading to cancer

Some common factors leading to cancer death include: tobacco (25-30%), diet and obesity (30-35%), infections (15-20%), radon exposure, radiation, stress, lack of physical activity and environmental pollutants (Anand *et al.*, 2008).

Almost about 2-20% of all cases represent cancers related to ones occupation (Irigaray *et al.*, 2007).

Lifestyle Factors

Tobacco use is the single most important risk factor leading to cancer development with more than 50 known carcinogens, which include nitrosamines and

polycyclic aromatic hydrocarbons (Kuper and Adami, 2002). Lung cancer is found to be etiologically linked to benzopyrenediol epoxide, a tobacco metabolite (Denissenko and Pao, 1996). Tobacco use is also reported to be associated with cancerous growth in the larynx, head, neck, stomach, bladder, kidney, esophagus and pancreas (Kuper and Boffetta, 2002).

The inclination towards western lifestyle, characterized by convenience food, TV and PCs, is taking its toll on youngsters as well as adults, by producing increased numbers of overweight and passive population with lifestyle diseases (Roelcke, 1995). Being overweight/obese is linked with colon, breast, endometrial, and possibly other cancers. Excessive consumption of alcohol (associated with increased risk of oral, esophageal, breast, and other cancers), stress and physical inactivity (associated with increased risk of colon, breast, and possibly other cancers), are other risk factors of cancer.

Reports suggest substantial link between diet and cancer (Buell and Dunn, 1965). For example, a prudent diet enriched with vegetables, fruits and refined grains, fish and poultry is associated with decreased risk of colon cancer (Slattery *et al.*, 1998) and consumption of coffee is associated with a reduced risk of liver cancer (Larsson and Wolk, 2007). Recent studies have linked consumption of grilled meat to an increased risk of stomach cancer (Ward *et al.*, 1997), colon cancer (Sinha *et al.*, 2005), breast cancer (Steck *et al.*, 2007), and pancreatic cancer (Anderson *et al.*, 2005), a phenomenon which is explained to be due to the presence of carcinogens such as benzopyrene in foods cooked at high temperatures.

Some mushrooms, termed as 'medicinal mushrooms' are known to strengthen the immune system of the body and provide anti-cancer effect by producing a group of polysaccharides, known as beta-glucans. Examples of such mushrooms include Reishi (Yuen and Gohel, 2005; Hsu *et al.*, 2008), *Agaricus blazei*, Maitake and *Trametes versicolor*.

Infections

Infections may lead to some types of cancers. Viruses are responsible for up to 20% of human cancers on

a global scale (Pagano *et al.*, 2004). These include human papillomavirus (cervical carcinoma), human polyomaviruses (mesothelioma, brain tumors), Epstein-Barr virus (B-cell lymphoproliferative disease and nasopharyngeal carcinoma), Kaposi's sarcoma herpes virus (Kaposi's Sarcoma and primary effusion lymphomas), hepatitis B and hepatitis C viruses (hepatocellular carcinoma), Human T-cell leukemia virus-1 (T-cell leukemias), and *Helicobacter pylori* (gastric carcinoma) (Pagano *et al.*, 2004) HIV is associated with Kaposi's sarcoma and non-Hodgkin's lymphoma.

Environmental factors

Cancer causing substances are increasing at a rapid pace owing to industrial development. Vehicular emissions, untreated industrial smoke, factory wastes, etc. are some of the major environmental factors that pose high cancer risks. Over the past two decades, vehicular pollution has increased eight times, while pollution from industries has quadrupled. Urbanization has resulted in the emergence of industrial centers without a corresponding growth in civic amenities and pollution control mechanisms. Components of air pollution mix having carcinogenic potential include soot, polycyclic aromatic hydrocarbons (PAHs), benzo[a]pyrene, benzene, some metals, particles (especially fine particles) and possibly ozone. Many workers run the risk of developing cancers such as lung cancer and mesothelioma from inhaling asbestos fibers and tobacco smoke, or leukemia from exposure to benzene at their workplaces (World Health Organization, 2007). With green revolution, agricultural runoff has become a major water pollutant as it contains fertilizers and pesticides. Sources of ionizing radiation, such as radon gas, can cause cancer. Currently very little evidence is available supporting non-ionizing radio frequency radiation from mobile phones as a cause of cancer (Feychting and Ahlbom, 2005). Prolonged exposure to ultraviolet radiation from the sun can lead to melanoma and other skin malignancies (English *et al.*, 1997).

Conclusion

More than 30% of cancer can be prevented by avoiding risk factors (World Health Organization). Public awareness using accelerated tobacco-control programs is an efficient way to reduce the rates of tobacco-related cancer mortality. Children spending too much time slouched in front of the Television or computers, should be encouraged to find a physical activity or outdoor sport they enjoy. Parents should include fun exercises in family outings. A healthy lifestyle along with a proper balanced diet, physical activity and giving due respect to biological clock are sure to improve the quality of life. Epidemiological evidence indicates that increased consumption of fruits and vegetables, and control of infections might reduce rates of cancer. Other factors are avoidance of intense sun exposure, increases in physical activity, and reduction in consumption of red meat and alcohol. Advances in cancer research have made a vaccine designed to prevent cancer available. A human papilloma virus vaccine, called Gardasil was approved by the U.S. Food and Drug Administration in 2006. The vaccine protects against four HPV types. An official recommendation was made in March 2007 by the US Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP) that females aged 11-12 should receive the vaccine. Another HPV vaccine on the market as of October 2007 is Cervarix (National Cancer Institute).

There is also a hepatitis B vaccine (HVB), which prevents infection with the hepatitis B virus, an infectious agent that can cause liver cancer (National Cancer Institute). The use of unleaded gasoline, switch to compressed natural gas (CNG) engines, use of solar energy and biogas may be encouraged to reduce the ill-effects of pollution and hence reduce cancer risks. Organic manure and biotechnological methods can be used to minimize the use of chemical fertilizers.

According to WHO (World Health Organisation) people should be educated so that they can recognize early signs of cancer and seek prompt medical

attention for symptoms, which might include lumps, sores etc. Screening programs will also help in early detection of cancer thereby facilitating effective treatment. Knowledge about the causes of cancer, and attempts to prevent and manage the disease can be highly fruitful. Implementation of evidence-based strategies for cancer prevention, early detection of cancer and palliative care of cancer patients can help to cope up with this dreaded disease.

References

- Anand P., Kunnumakara A.B., Sundaram C., Harikumar K.B., Tharakan S.T., Lai O.S., Sung B. and Aggarwal B.B. 2008. "Cancer is a Preventable Disease that Requires Major Lifestyle Changes" *Pharmaceutical research*, **25**(9): 2097-2116.
- Irigaray P., Newby J.A., Clapp R. *et al.* 2007. "Lifestyle-related factors and environmental agents causing cancer: an overview". *Biomedicine and pharmacotherapy*, **61**(10): 640-58.
- Kuper H., Boffetta P., Adami H.O. (September 2002). "Tobacco use and cancer causation: association by tumour type". *Journal of Internal Medicine* **252**(3): 206-24.
- Kuper H., Adami H.O., Boffetta P. (June 2002). "Tobacco use, cancer causation and public health impact". *Journal of Internal Medicine* **251**(6): 455-66.
- Denissenko M.F., Pao A., Tang M., *et al.* 1996. "Preferential formation of benzo[a]pyrene adducts at lung cancer mutational hotspots in P53". *Science* **274**: 430-2.
- Roelcke V., 1995. "Between individual therapy and political intervention: Campaigns against "diseases of civilization" between 1920 and 1960". *Gesundheitswesen*, **57**: 8-9.
- Buell P., Dunn J.E. 1965. "Cancer mortality among Japanese Issei and Nisei of California". *Cancer*, **18**: 656-64.
- Slattery M.L., Boucher K.M., Caan B.J., *et al.* 1998. "Eating patterns and risk of colon cancer". *Am. J. Epidemiol.* **148**(1): 4-16.
- Larsson S.C., Wolk A. 2007. "Coffee consumption and risk of liver cancer: a meta-analysis". *Gastroenterology* **132**(5): 1740-5.
- Ward M.H., Sinha R., Heineman E.F., *et al.* 1997. "Risk of adenocarcinoma of the stomach and esophagus with meat cooking method and doneness preference". *Int. J. Cancer* **71**(1): 14-9.
- Sinha R., Peters U., Cross A.J., *et al.* 2005. "Meat, meat cooking methods and preservation, and risk for colorectal adenoma". *Cancer Res.* **65**(17): 8034-41.
- Steck S.E., Gaudet M.M., Eng S.M., *et al.* 2007. "Cooked meat and risk of breast cancer--lifetime versus recent dietary intake". *Epidemiology* (Cambridge, Mass.) **18**(3): 373-82.

- Anderson K.E., Kadlubar F.F., Kulldorff M., *et al.* 2005. "Dietary intake of heterocyclic amines and benzo(a)pyrene: associations with pancreatic cancer". *Cancer Epidemiol. Biomarkers Prev.* **14**(9): 2261-5.
- Yuen J.W., Gohel M.D. (2005), "Anticancer effects of *Ganoderma lucidum*: a review of scientific evidence". *Nutr Cancer* **53**(1): 11-7.
- Hsu S.C., Ou C.C., Li J.W., *et al.* (October 2008). "*Ganoderma tsugae* extracts inhibit colorectal cancer cell growth via G(2)/M cell cycle arrest". *J Ethnopharmacol* **120**(3): 394.
- Pagano J.S., Blaser M., Buendia M.A., *et al.* (December 2004). "Infectious agents and cancer: criteria for a causal relation". *Semin. Cancer Biol.* **14**(6): 453-71.
- World Health Organization 2007. "WHO calls for prevention of cancer through healthy workplaces". Press release.
- Feychting M., Ahlbom A., Kheifets L., 2005. "EMF and health". *Annual Review of Public Health* **26**: 165-89.
- English D.R., Armstrong B.K., Kricger A., *et al.* (May 1997). "Sunlight and cancer". *Cancer causes & control : CCC*, **8**(3): 271-83.
- "Cancer Cancer". World Health Organization.
- "Cancer Vaccine Fact Sheet". NCI. 2006.