Paper No. 215

Environment and Cancer

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ENVIRONMENT AND CANCER

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ABSTRACT

Cancer is a family of diseases which is associated with polluted environment and lifestyle. Commonly affected sites are skin, prostate, oral cavity, cervix, liver and breast. At the global level about 10 million people are suffering from cancer. Contributory causes are age group, economic background, racial factor, gender effect, geographic locations, occupational exposure, obesity, smoking, dietary habits, etc. Preventive agenda against proliferation of cancer includes mitigation of eco-degradation, increased consumption of fibrous diet, drastic reduction in use of tobacco and suitable application of agricultural chemicals. The disease can be controlled if it is detected early and property treated. It is high time that international community adopts a collective methodology to curb the incidence of cancer.

INTRODUCTION

The today's world is strangulated by the cruel jaws of the worst ever environmental pollution. Consequent to unprecedented eco-degradation the mankind is searching for clean air to breathe, potable water to drink and pure food to eat. Disease, hunger, tension and poverty have become our way of life. The pollution has led to emergence of scores of fatal diseases hitherto unknown in the human societies.

Cancer is one of the killer diseases which is associated with polluted environment, lifestyle behaviors, geographic variations, racial characteristics and other reasons. It has exhibited a multiplying incidence level since the "Industrial Revolution". There are 200 kinds of cancer, that is why it is said to be family of diseases.

Three-fourth of the organ cancers are attributable to hostile environment. This disease occurs in all parts of the body except the heart which is affected only rarely. Notable sites are, skin, prostate, oral cavity, cervix, pancreas, endometrial parts, respiratory mechanism, digestive system, liver, blood, breast, uterus, ovaries and immune systems.

About 10 million people suffer from this disease and half of them are in the advanced stages. Breast cancer is the leading cause of death among the females. Melanoma is increasing at the annual rate of 4% in the world. In the advanced countries about 20% mortality is attributed to the familial cancer. After heart disease cancer is the most common disease in the United States of America.

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CONTRIBUTORY CAUSES OF CANCER

Environment Pollution

1. Air containing dust, smoke, particulate and the injurious gases provide a conductive environment for proliferation of cancer. Most of the patients hail from urban areas as these are more polluted than the rural areas.
2. Adulterated and high fat diet is a major cause for the development of this disease.
3. Many carcinogens including halogenated compounds are generated because of industrial activities. Such substances initiate the disease by polluting the land and water resources.

Age Group

1. It has been found that different forms of cancers attack different age groups. Generally the cancer patients are of 15 to 45 years age in Pakistan. The average age at which the American people are more prone to cancer is 60 years. Vitality of certain body parts is reduced with the advancement of age. Also the immunity and resistance to the disease are significantly lowered with aging. In fact the cancer is the disease of aging.
2. In the United States of America, lung cancer is mostly prevalent among the persons of 50 to 60 years age.
3. The men are more affected than the women. In Pakistan every tenth case among the men is that of lung cancer.
4. Prostate cancer mostly develops after age of 50 years and the incidence rises with advancing age.

Economic Background

1. Because of socio-economic disadvantage the poor communities depict rising rates of mortality and incidence as compared to wealthy classes.
2. The developed nations are supporting the preventive, curative and research programs with heavy financial investments. That is why the mortality cancer is lesser as compared to that in the developing countries.

Racial Factor

In the United States of America, the statistics reveal that the incidence of cancer is on the rise among the Afro-Americans vis-à-vis the whites. Also certain types of cancer like the prostate cancer is much more common among the Afro-Americans than the whites. Skin cancer is rarely found among Afro-American people.

Gender Effects

Some kinds such as lung, colo-rectal; prostate and bladder cancers are more prevalent among males than the females. After diagnosis the observed and relative survival rate of lung cancer in women is higher than that of the men.

Geographical Locations

1. The incidence and mortality rates vary from country to country and within a particular country itself. The rates also differ on the basis of continents.
2. More people are dying of breast, colon, lung and rectal cancers in industrialized countries than in the developing nations.
3. Mortality rates of cervical and stomach cancers are higher in case of developing world.
4. Japan has lower mortality rates associated with breast, colon and rectal cancers.
5. Lung cancer is on the rise with regard to mortality and incidence in Japan whereas its rate is declining in case of the United States of America.
6. Liver cancer is many times higher in certain African countries than in the United Kingdom.
7. Colorectal cancer is four times common in Luxembourg than in Greece.
8. Israel has 10 times lesser oesophageal cancer than the incidence in Northern Iran.

Industrial Pollution:

The family of cancers linked with industrial processes is shown in Table 1.

Table 1: Industries associated with exposure to carcinogens.

Industry	Carcinogen	Cancer
Shipbuilding, Demolition, Insulation	Asbestos	Lung, Pleura Peritoneum
Varnish, Glue	Benzene	Leukemia
Pesticides, Smelting	Arsenic	Lung, Skin, Liver
Mineral Refining & Manufacturing	Nickel, Chromium	Lung
Furniture Manufacturing	Wood Dust	Nasal Cavity
Petroleum Products	Polycyclic Hydrocarbons	Lung
Rubber manufacturing/Dyeing	Aromatic Amines	Bladder
Vinyl Chloride	Vinyl Chloride	Liver
Radium	Radium	Bone
Petroleum Refining/Coal Hydrogenation	Coal Tar Products, Mineral Oils	Skin

(Source: Text Book of Clinical Oncology)

Occupational Exposure

1. The factory workers are exposed to effects of chemicals in the work places. In the absence of protective measures the carcinogenic chemical compounds damage the disease sites.
2. Inhalation of Asbestos fibers is the main causation of Mesothelioma.
3. Scrotal Cancer is developed on account of chimney sweeps.
4. Exposure to Vinyl Chloride induces angiosarcoma of Liver.
5. Arsenic compounds cause skin cancer. The sole and plams are especially affected.
6. Use of sex hormones (estrogens and androgens) have some linkage with cancer.

7. Coal tar causes skin cancer.
8. Phenacetin is a causative agent of renal pelvic cancer.
9. Application of many radioactive isotopes and heavy metals leads to cancer.

Carcinogenic Substances

Carcinogenic substances are "DNA Reactive" "Epigenetic" and "Unclassified". The non-genotoxic and enhancing factors/promoters also contribute towards development of cancer.
Multidisciplinary studies and comprehensive diagnostic tests are required to be undertaken to ascertain the exact effects of the causative chemicals and their mixtures.
Carcinogenic chemicals are classified as under:-

Genotoxic: "Activation Independent" "Activation Dependent" (pro-carcinogen) and "Active Independent" (inorganic) are the main types of genotoxic agents.

Epigenetic: Solid state carcinogen, hormone, immuno-suppressor, peroxisome prolif-erator, cytotoxin and promoter are the common kinds of epigenetic carcinogens.

LIFE STYLES

Exposure to Sunlight

Prolonged exposure to sunlight and ultraviolet rays leads to development of skin cancer in less pigmented races. Ultra violet B rays cause cellular damage.

Exposure to Radiation

Certain people work in an environment where radiations are emitted. Under the influence of the harmful rays and particles the incidence of cancer is imminent. The growing organs are more sensitive to radiation effects as was the case during the atomic explosions over Hiroshima and Nagasaki where the incidence of breast cancer was four times more in age group of 10 to 15 years than the others.

Use of Tobacco

1. Tobacco is consumed in many forms including smoking and chewing. It is a self imposed vice which is more common among uneducated classes of lower society.
2. Organs affected by smoking are oral cavity, larynx and ooesophagus, lung, kidney, bladder, pancreas, etc.
3. Lung cancer is more prevalent than the breast cancer among females.
4. The tobacco contains carcinogens, promoters, enhancers and enzyme inducers.
5. The smoker needs higher levels of essential nutrients and vitamins.
6. Incidence of cancer is reversible if consumption of tobacco is altogether stopped or minimized.
7. Risk of lung cancer is 11 times higher in smokers than in the non smokers.
8. Chewing causes pre-malignant lesions like fibrosis and ultimately leads to oral neo-plasia.

Nutrition/Dietary Habits

1. The cancers caused due to dietary habits are ooesophagus, breast, stomach, prostate, endometrium and ovary, colon and rectum.
2. Alcohol, fat, pickled, fried and smoked food, nitrates, nitrosamines, mycotoxins (aflotoxin) and alkaloids are the main carcinogenic ingredients in the diet.
3. Due to excessive use of alcohol, organs like oral cavity, oesophagus, stomach and liver may develop cancer.
4. In Northern Japan cancers of liver, stomach and oesophagus are of frequent occurrence.
5. High fat diet is the causation of prostate, large bowl, ovary cancer. It produces hydroxyl radicals endogenously.
6. Consumption of friend or broiled mutton and fish results in onset of cancers of breast, pancreas and colon.
7. Pickled and smoked diets cause gastric and oesophagus cancers.
8. Higher consumption of table salt increases the risk of gastric cancer.
9. In the absence of anti-oxidant components a diet programme may turn to be carcinogenic.
10. An anti-oxidant helps in minimal generation of reactive oxygen.
11. The marine oils derived from fish and other fauna provide protection against cancer and cardio-vascular disorders.
12. The olive oil is mostly used in Mediterranean areas and Middle East. It is a monounsaturated fat with a lower promoting ingredient.
13. Low fiber content in the food is carcinogenic. In fact more quantity of fiber increases the stool bulk and inhibits concentration of bile and fatty acids. The cereal bran fiber is also important factor in controlling the intestinal pH.
14. The deficiencies of folate and vitamins A and C lead to development of cervical cancer.
15. Many vegetables and fruits have chemoprevention compounds creating the chemoprophylaxis effect. These compounds prevents the formation of carcinogens and act as blocking and suppressing agents.
16. Black or green tea has polyphenols which have anti-oxidant effect.
17. Many natural foods have chemopreventive substances. Laboratory analysis reveals presence of 30 chemo preventive compounds in garlic.

Obesity

Obesity is generally caused due to over eating, lack of exercise and haphazard lifestyle. The deposition of extra fat in the body is causative of scores of diseases like stroke, diabetes, hyphertension and cancer.

PREVENTIVE MEASURES AGAINST CANCER

Although cancer is an extremely fatal disease yet its incidence and the death rate can be minimized. This is possible if the preventive practices are adopted well in time and systematically. The battle against the recurrence of the killer disease is to be fought jointly by the individuals, governments, non-governmental organizations and world community at large well orchestrated for prevention, screening and treatment of the disease.

Preventive Technologies

As highlighted above, the lifestyle and environmental degradation are the major causation of cancer. It is therefore imperative to adopt the technologies which can bring about positive alterations in these factors with the underlying aim of minimizing the disease risks.

There is dire need of undertaking deliberate research programmes particularly in the field of epidimiology (descriptive) under the aegis of government and no governmental organizations. The developing nations need to benefit from the experiences of the United Nations and the advanced countries.

Improvement of Environmental Quality

The quality of environment needs to be improved at local, regional and international levels. Mitigation measures must be taken to prevent the entry of carcinogenic substances in ground, air and water resources. Radiation emissions should be controlled to minimize exposures to these hazards.

The gaseous and particulate emissions and liquid effluents from the industries contain many carcinogenic elements and compounds. Such pollutants are physical, chemical, biological and radioactive in nature. Examples of water pollutants are nitrates, Vinyl Chloride, viruses, Asbestos, Arsenic, Mercury and radiation. The carcinogenic substances present in the polluted atmosphere are polycyclic aromatic hydrocarbons, non aromatic organic compounds and certain aldehydes.

Avoid over and prolonged exposure to sun rays and radiations. Work place protective practices be strictly followed to ward off an untoward incident. The X-Ray operators must guard themselves against the ill effects of radioactive rays and particles. Similarly one should take care of oneself against the electromagnetic emissions from the electronic gadgets used in dwellings.

Many viral and parasitic infections lead to the incidence of cancer. Thus preventive measures should be taken for avoiding attack of an infectious agent. Hepatitis vaccine must be used in accordance with medical prescription. Screening of blood and blood products be done properly.

Preventive Medication

The disease can be prevented in three steps which are "Primary Prevention", "Secondary Prevention" and "Tertiary Prevention". "Primary Prevention" aims at preventing the incidence of cancer by leading a healthy and clean life and avoiding exposure to hazardous conditions. Thus the underlying theme is to nip the issue in the budding stage rather than letting this grow limitlessly. The purpose of "Secondary Prevention" is to detect and cure the disease at the early stage. "Tertiary Prevention" encompasses the complete treatment by chemotherapy or radiotherapy so that the disease is killed once for all. Certain preventive aspects are narrated below:-

1. The drugs must only be used as per the prescription of the specialist doctor. Prolonged use of heavy doses should not be resorted to.
2. Many medicines have ill desired side effects. Such situations demand careful and judicious medical practices.

3. Special emphasis is made on minimal use of hormones and radioactive substances. Pros and cons regarding such administrations be studies in advance.

NUTRITIONAL ISSUES

The advanced nations have taken revolutionary steps in the fields of mass awareness, food technologies, dietary standards, eating habits legislation etc. With a view to follow the slogan "Health for all by the year 2000" in the real sense they have enforced bold national policies on the subject. Unfortunately the developing countries have paid a little heed in this sphere and Pakistan is no exception. Some of the recommendations are given in the following:-

Increase Consumption of Fibrous Diets:

The food items with higher fiber content are helpful in controlling the body weight and decreasing the lipids in blood. In fact the better management of obesity is beneficial in curbing the diabetic tendency. Colon cancer is avoided by increased consumption of fibrous food. Many fruits, vegetables, grams, beans, sweet potato and whole grain cereals are rich in fiber materials. Eating of either uncooked or boiled vegetables pays dividends in maintaining good health. The fruits and vegetables are imbued with variety of readily available proteins, vitamins and minerals, thus providing balanced diet. Eat more fish as it is rich in calcium, phosphorus and proteins and is free of cholesterol.

Decrease Fat Content:

- Avoid the cooking of food by excessive use of flat and.oil. Use cholesterol free cooking coil. Cheese may be consumed more as compared to ghee or butter.
- The fat portion available with the beef or mutton should be used in minimum quantity.
- Age factor dictates the consumption of fatty foods. Fat rich diet is useful in infancy stage but is harmful for the older people.
- Low fat intake helps in controlling cancers of prostate, breast and colon. Calories from fats should not be more than 30% of total requirement.

Restrict Taking Drinks:

- Soft carbonated drinks have higher calorific value thus causing obesity. Their use should be minimal.
- Consumption of alcoholic beverages is forbidden by Islam. The believers are required not to use the addictive liquors. The use of alcohol leads to higher incidence of oral cavity, oesophagus, larynx and breast cancers. Liver cirrhosis/cancer is linked with excessive use of alcoholic beverages.
- Drink about 1.5 liters water/fluids daily.

Limit Consumption of Preserved Food:

- The food items are preserved by using variety of salts, sugars, chemical compounds and other substances. These extra-food ingredients are mostly used in high doses with aim of prolonging the shelf life of the food stuff. The preservatives continue their reactions during digestion tract also. Nitrites are known promoter of nitrosamines.

- Fresh food is always better than the preserved one as the former is in natural state. However, sun or air dried food is safe to eat.

Follow Healthy Cooking Practices

- The Asians use excessive quantities of pickles, spices, chillies and salts in the food dishes. The food may become tastier with the addition of such components but the health stakes are higher. For healthy cooking the spicy components should be used in the minimum possible quantity.
- Food be cooked in clean and hygienic utensils. The desired cooking procedures and duration should be adopted rather than the short-cuts.
- Treatments like charcoal burning, smoking, microwave and oven frying should not be applied.

DRASTIC REDUCTION IN TOBACCO USE

National Anti-Smoking Policy

This policy is required to be formulated at multi-sectoral and multidisciplinary levels. The underlying theme is to enforce cessation of tobacco consumption by minimizing the tobacco cultivation, limiting the manufactured products, persuading the target population to refrain from smoking, promulgation of strict legislation, effective employment of media for anti-smoking campaigns and uplift of sociodemographically disadvantaged sections of society. The ultimate aim of the National Anti-Smoking Policy is to create the smoke free society with complete ban on "Active Smoking" as well as "Environmental Tobacco Smoke".

Individual's Responsibility

It is the responsibility of every citizen to remain at arm's length from smoking. However, in case of smoker, one must endeavor with steadfastness to quit this vice the earliest. In order to reduce the negative effects of smoking anti oxidant rich (vitamins C & E, etc) and low fat diet be taken. Physical activity be enhanced by doing regular exercises like jogging and cycling. Women must resort to the breast feeding of children.

Collective Actions

The parents, teachers, doctors, NGOs, religious authorities and political leadership can play vital role against the spread of tobacco consumption in their respective circles of influence. They may adopt formal and informal means of advice/consultancy and punishment to uproot this addition from the society.

National and International Efforts

Similar to Polio campaign, the international community must join hands for curbing the menace of tobacco and other addictions on the face of earth. The advanced nations, in the best interest of humanity need to help the developing countries through financial, technical, educational and commercial assistance.

BANNING THE USE OF LEADED PETROL

Lead emission from petrol vehicles is a major cause of cancer and the limited mental growth in children. Therefore, use of leaded petrol warrants to be banned under law of the land.

Judicious Application of Agricultural Chemicals

Indiscriminate use of pesticides and the fertilizers is harmful for the environment. The human and animals eat the polluted cereals and vegetables and thus fall prey victim to many diseases including cancer. The chemicals must be administered to crops as advised by the expert and the manufacturer. The person who is applying such chemicals, must protect himself against their ill effects.

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