

MAGNITUDE AND CAUSES OF CANCER AND ITS PREVENTION

Introduction:

India is experiencing a rapid health transition with a rising burden of Non Communicable Diseases (NCDs). Overall, NCDs are emerging as the leading cause of deaths in India accounting for over 42% of all deaths (Registrar General of India). Based on the cancer registry data it is estimated that there will be about 800,000 new cancers cases in India every year. At any given point there is likely to be 3 times this load, i.e. about 24,00,000 cases. According to the National Commission on Macroeconomics & Health (NCMH) Report (2005), the Crude Incidence Rate (CIR) for Cervix cancer, Breast cancer and Oral cancer is 21.3, 17.1 and 11.8 (among both men and women) per 100,000 population respectively.¹ Epidemiological studies have shown that 70-90% of all cancers are environmental. Lifestyle related factors are the most important and preventable among the environmental exposures. Dietary practices, reproductive and sexual practices etc. account for 20-30% of cancers.²

Approaches to Cancer Control³

There are four principal approaches to cancer control:

1. Prevention
2. Early Detection
3. Diagnosis and Treatment
4. Palliative Care.

Prevention of cancer:

Prevention is the most effective means of control in terms of health gain as well as monetary gain. It also has a very long term and sustained effect. The major risk factors of majority of the NCDs including cancer are consumption of tobacco & alcohol, unhealthy diet, physical inactivity and stress. Behavior change communication focusing on the following five messages is being used currently under the National programme for prevention and control of cancer, diabetes, CVD and stroke (NPCDCS)¹:

- Avoidance of tobacco and alcohol
- Increased intake of healthy foods
- Increased physical activity through sports, exercise, etc.;
- Stress management
- Warning signs of cancer etc.

The early warning signs ("danger signals") of cancer are ⁴:

- A lump or hard area in the breast
- A change in a wart or mole
- A persistent change in digestive and bowel habits
- A persistent cough or hoarseness
- Blood loss from any natural orifice
- Excessive loss of blood at the monthly period or loss of blood outside the usual dates
- A swelling or sore that does not get better
- Unexplained loss of weight

COMMON CAUSES OF CANCER

a) Tobacco

The cancer registry data reveals that 48% of cancers in males and 20% in females are tobacco related and are totally avoidable. Common cancers caused by smoking tobacco are lung, larynx, pharynx and oesophagus, while cancers of the mouth, tongue and lip are due to chewing and smoking tobacco.¹ Also cancers of the kidney, bladder, pancreas, and stomach are related to tobacco.

Some common myths associated with the use of tobacco:

Myth: Tobacco smoke affects the smoker only.

Reality: The risk of tobacco smoke is not limited to the smoker. Environmental tobacco smoke, known as second hand or passive smoke, causes lung cancer and other cardiopulmonary diseases in nonsmokers also.⁵

Myth: Light- and low-tar cigarettes are safer.

Reality: Light- and low-tar cigarettes are not safer because smokers tend to inhale them more frequently and deeply.⁵

Myth: Smokeless tobacco only causes diseases of oral cavity.

Reality: Smokeless tobacco is the fastest growing part of the tobacco industry and represents a substantial health risk. Chewing tobacco is a carcinogen linked to dental caries, gingivitis, oral leukoplakia, and oral cancer. The systemic effects of smokeless

tobacco may increase risks for other cancers. Esophageal cancer is linked to carcinogens in tobacco being dissolved in saliva, swallowed, and coming into contact with the esophagus.⁵

Myth: Cancer occurs in old age; therefore smoking in teen age is not a problem.

Reality: The longer the duration of smoking the more is the risk of having cancer.⁵ The duration of smoking is more important than the amount of smoking for causing cancer. Therefore teen age students need to be targeted as most of them pick up habits at this time. The school curricula should involve messages for a healthy life style and warn about the harmful effects of tobacco and alcohol. Legislation has to be enforced for prohibiting tobacco advertisement and sale of tobacco to youngsters.

b) Diet

(i) Dietary fat - Diets high in fat are associated with increased risk for cancers of the breast, colon, prostate and endometrium (uterus).

(ii) Dietary fibre - Consumption of dietary fibre reduces the risk of colon cancer, breast and prostate cancer by absorbing and inactivating dietary estrogenic and androgenic cancer promoters.

(iii) Alcohol - Alcohol drinking increases the risk of cancers of the oral cavity, pharynx, larynx, oesophagus, and liver. An association is probable in the case of colon, rectal, and breast cancer. The risk of cancer is related to the amount of alcohol consumed. Alcohol drinking and tobacco smoking show an interactive effect on the risk of cancers of the head and neck.⁵

(iv) Micronutrients - Micronutrients such as Vitamin A and Vitamin C have a protective influence in cancer of the lung, stomach cancer and several other sites.

(v) Food additives and contaminants - Food additives and contaminants have also been associated with certain cancers.⁶

(vi) Fruits and vegetables - A healthy diet rich in green and yellow vegetables and fruits and unprocessed food has a preventive role.

In a nutshell, all that is natural and God-made is good for our health. The more we move away from nature, the more we become prone to various diseases.

(c) Obesity and Physical Activity

Obesity increases the risk of endometrial cancer and probably the risk of postmenopausal breast cancer and kidney cancer.⁵ Risk of cancer increases as body mass index increases over 25 kg/m². An association is possible also for gallbladder and colon cancer. Increasing physical activity should be part of any comprehensive cancer prevention strategy.

(e) Exposure to Sun

Nonmelanoma skin cancers (basal cell and squamous cell) are induced by cumulative exposure to ultraviolet (UV) radiation. Intermittent acute sun exposure and sun damage have been linked to melanoma.⁵

Myth: Sunscreen protects against skin cancer

Reality: Sunscreens decrease the risk of actinic keratoses, the precursor to squamous cell skin cancer, but melanoma risk may be increased. Sunscreens prevent burning, but they may encourage more prolonged exposure to the sun and may not filter out wavelengths of energy that cause melanoma.⁵

Avoidance of solar exposure, especially in childhood, is the only primary preventive measure that can be recommended at present. Reduction of sun exposure through use of protective clothing and changing patterns of outdoor activities can reduce the risk.⁵

(f) Radiation

Use of ionizing radiation for diagnostic purposes is likely to carry a small risk of cancer, which has been demonstrated only for childhood leukaemia following intrauterine exposure. Radiotherapy increases the risk of cancer in the irradiated organs. There is no clear evidence of an increased cancer risk following other medical procedures, including mammography and surgical implants.⁵

(g) Environmental agents and occupational factors:

International Agency for Research on Cancer (IARC) has classified approximately 25 occupational and environmental agents, groups of agents, and mixtures as carcinogenic.⁶ Measures to protect workers from exposure to industrial carcinogens should be enforced in industries. Risk of occupational exposure is considerably increased if the individuals also smoke cigarettes.

(h) Reproductive factors

Early age at menarche, late age at first pregnancy, and late age at menopause are all associated with a 1.5- to twofold increased risk of breast cancer. In addition, nulliparity increases the risk of ovarian and possibly endometrial cancer.⁵

(i) Infectious agents

Chronic infection with some viruses, bacteria, and parasites represents a major carcinogenic factor for humans, in particular in developing countries. Common agents encountered in developing countries are hepatitis B and hepatitis C virus related liver cancer, human papilloma virus related cervical cancer, and *Helicobacter*-related stomach cancer.⁵

(j) Genetic Factors:

Familial aggregation has been found in cancers of the breast, colon, prostate, retinoblastoma and lung. Mongols are more likely to develop cancer (leukaemia) than normal children. Screening of precancerous lesions should be undertaken in first degree blood relatives.

(k) Others:

There are numerous other environmental factors such as air and water pollution, medications (e.g., oestrogen) and pesticides which are related to cancer.⁶

SOME COMMON CANCERS IN INDIA AND THEIR PREVENTION: ⁵

(i) Cancer of the head and neck

Risk factors:

- Tobacco in any form including smokeless form is the most important risk factor.
- Consumption of alcoholic beverages increases the risk of oral and pharyngeal cancer.
- Infection with HPV and herpes simplex 1 and EBV may be associated.
- Poor oral hygiene and ill-fitting dentures, mouthwash with high alcohol content also have an association.

Prevention: Avoidance of all forms of tobacco and alcohol is the most important preventive action against mouth, throat and lung cancers. A diet rich in green and yellow vegetables and proper oral hygiene has been shown to offer protection against oral cancer. Cancer of the oral cavity can be detected early and every opportunity in which a health care person interacts with a tobacco habituee should be exploited to detect pre-cancerous conditions or cancers of the oral cavity.

(ii) Cancer of the uterine cervix is the most common cancer among women in India. ⁵

Risk factors:

- Chronic infection with Human papilloma virus is a necessary cause.
- Early age at first intercourse, multiple sexual partners, poor sexual hygiene, repeated child birth etc. are some of the reproductive risk factors for cervical cancer.

Prevention: Cancer of the uterine cervix can be controlled to a certain extent by practicing genital hygiene and safe sexual practices. Regular cervical cytology examination (Pap smear) by all women who have initiated sexual activity at the initiation and every three years thereafter can detect the cancer at the earliest.

(iii) Cancer of the breast in women is emerging as the leading cancer in women. ⁵

Risk factors:

- Early age at menarche, late age at first pregnancy (greater than 30 years), single child, late age at menopause, long-term use of hormone replacement therapy.
- Fibrocystic disease and fibroadenoma of the breast.
- A familial history of breast cancer in the mother or in a sister etc.

Prevention: Reduction of high calorie food especially fat, increase in fruit and vegetable consumption and physical activity is preventive. Regular breast self examination (BSE) by women themselves is a very good way of detecting breast cancer in early stages. Mammography in women older than 50 years is useful in early detection of cancer. Women under 35 years of age should not have mammography unless they are symptomatic or have a family history of early onset of breast cancer.

(iv) Lung Cancer has become the most frequent malignant neoplasm among men in most countries, and represents the most important cause of neoplastic death worldwide. Survival from lung cancer is poor.⁵

Risk factors:

- Tobacco smoke including passive smoking
- High total and saturated fat intake
- Alcohol drinking
- A positive familial history
- Radiation
- Pulmonary tuberculosis
- Silicosis
- Asbestosis
- Coal-burning heating devices without proper exhaust emission
- Air pollution
- High-temperature cooking.

Prevention: Control of tobacco smoking, reduction in exposure to occupational and environmental carcinogens (in particular indoor pollution), increase in consumption of fruits and vegetables, High intake of b-carotene and regular physical activity.

(v) Cancer of Stomach**Risk factors:**

- High consumption of salt and salted foods.
- Infection with the *Helicobacter pylori* bacterium.

- Tobacco smoking.

Prevention: Diets high in fruits and vegetables particularly raw vegetables, citrus fruits, and possibly allium vegetables (onions, leeks, garlic etc.), foods with high levels of carotenoid, high vitamin C intake and consumption of green tea.⁵

Diagnostic and treatment facilities available for cancer patients in Radiotherapy department of Guru Govind Singh Medical College and Hospital, the constituent college of Baba Farid University of Health Sciences, Faridkot, Punjab.

Diagnostic facilities available are:

- | | |
|--------------------|---|
| ❖ Chest X-ray | ❖ MRI |
| ❖ Mammography | ❖ Complete (Pathology, microbiology and Biochemistry) |
| ❖ Ultra Sonography | Lab Support. |
| ❖ Colour Doppler | |
| ❖ CT scan | |

Treatment facilities available are:

1. Teletherapy set-up

Iso-centrally mounted rotational telecobalt unit minimum 80 cm SSD (EQUINOX-80)

2. Brachytherapy setup

- i) Remote after loading Intracavitary sys (sets)
- ii) Remote after loading interstitial/surface mould sys (sets)

3. Simulator

4. Radiation Protection and Dosimetry set-up

- i) Secondary standard dosimeter with ionization chamber
- ii) Survey meter
- iii) Area / Zone monitors (by BARC) as per the number of staff members in the department

5. Other facilities

- | | |
|--|--|
| i) CT-sim 3D treatment planning system | iv) Customised compensator making system |
| ii) Isodose plotte (automatic) | v) Dosimetry system |
| iii) Customised shielding /Block making System | vi) Thermoliminiscent dosimetry system |

Facilities provided for patients' convenience

- Free Laboratory investigations, Day care admissions and Ward admissions for cancer patients is available.
- Chemotherapy is given by expert staff in daycare.
- Chemotherapy and supportive drugs for cancer patients at no profit no loss basis in the department of Pharmacy is under process.
- Department of Radiotherapy is part of National Cancer Registry Programme for making cancer Atlas in Punjab State.

References:

1. Operational guidelines for national programme for prevention and control of cancer, diabetes, cardiovascular diseases & stroke (NPCDCS), Directorate General of Health Services, Ministry of Health & Family welfare, Government Of India. Available from <http://health.bih.nic.in/Docs/Guidelines-NPCDCS.pdf>
2. Varghese C. Cancer prevention and control in India, 50 Years of Cancer Control in India. Available from http://www.indg.in/india/sitemap-1/health/national_health_programmes/Cancer%20Prevention%20and%20Control%20in%20India.pdf
3. Dinshaw KA, Shastri SS, Patil SS. Cancer control programme in India: challenges for the new millennium. Health Administrator Vol: XVII, Number 1: p10-13
4. Park K. Epidemiology of chronic non communicable diseases and conditions. 21st edition, M/s Banarsidas Bhanot publishers.
5. Boffetta P, Brennan P, Saracci P. Neoplasms. Oxford Textbook of Public Health. 4th Edition, Oxford University Press.
6. IARC monographs. Available at <http://monographs.iarc.fr>.