Babylon **U**niversity – **C**ollege **O**f **M**edicine
Department of Community Medicine

Lectures in Community Medicine
For 4th Stage Students
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Lecture 29
Epidemiology of Cancer

Tumors are diseases characterized by abnormal proliferation of cells; if they are localized and do not invade the surrounding tissues it is called benign tumor, but if they invade the surrounding tissues called the malignant tumors.

Time trends:
The incidence of cancer with time is not static but shows temporal variation in many countries. In United States and Europe there was striking increase in lung cancer incidence in both sexes which is mainly attributed to smoking, now after antismoking programs lung cancer is decreasing.
There is also a sharp decline in stomach cancer due to increase consumption of fresh fruits and vegetables, a similar reduction has been observed in liver and uterine cancer as well as cancer of colon and rectum.
In females, the incidence of other tumors remains stationary e.g. breast cancer.

To measure the occurrence of cancer in defined population we can use;

1- Morbidity indices:

Incidence rate: The number of persons newly diagnosed as cancer per 100000 population.

Prevalence rate: Is a measure of existing disease (both new cases and previously diagnosed cases) annually per 100000 population.

The proportional (relative) frequency:

The percentage of a specific type of cancer among all cases of cancers diagnosed during a certain period of time.

2- Mortality indices:

Case fatality rate: it is the number of deaths of cancer per100 cases of cancer.

Cause specific mortality rate: it is the number of deaths of cancer per 100000 of population.
Proportional mortality ratio: it is the percentage of the number of deaths from cancer over the total deaths in a certain locality and year.

Aetiology of cancer:

The actual causes of malignant diseases of man are not known. All we have are the risk factors which if present among group of individuals they, most probably, will have cancer. So many studies were done to prove or disprove the association between risk factors and the occurrence of cancer.

These risk factors are classified into environmental (physical, chemical and biological) and host factors (genetic and familial risks).
There are known benign lesions which if not treated early will turn malignant they are called precancerous lesions as leukoplakia, rectal polyps, gastric ulcer and breast papilloma.

Host risk factors:

75% of cancer risk factors are related to human behavior as type of food he usually eats, smoking and alcohol consumption these risks are preventable (Modifiable) while gender and age are not.

Environmental factors:

A- Physical factors

Radiation: exposure to radiation is one of the important risk factor of cancer it can occur in occupational exposure or in non occupational exposure to radiation as in accidental exposure due to atomic explosions, leaking radiation from nuclear energy station as in Chernobyl in Russia or Sakishima in Japan,
There is indirect exposure through imported contaminated food from involved areas, rains of radiation carrying clouds, the effects of these crisis appear after years according to the dose and duration of exposure.
Cases treated with radiotherapy, they are also at risk.
Exposure to ultra violet rays of the sun for along time will predispose to skin cancer especially after Ozone depletion in the stratosphere. In Iraq skin cancer is highly prevalent in the north central region, (Aljazira region, north Baghdad) especially among farmers due to occupational exposure. Air craft crew, high voltage Tv repairers, nuclear plant workers, medical and paramedical personnel.

B- Chemical factors:

Carcinogenicity of chemicals may be due to:

1- Its chemical nature

2- Its metabolic product; chemicals are not carcinogenic themselves but they acquire carcinogenicity through metabolites produced by enzymatic actions.

3- Synergistic role: a particular chemical may be only carcinogenic when some other chemicals combine with it.

4- Pathological carcinogenic effect:

Chemicals produce pathological condition which predispose to cancer e.g alcohol causing liver cirrhosis that predispose to hematoma.

Important chemical carcinogens:

1- Tobacco: cigarette, cigar, pipe, shisha, and chewable tobacco which cause about 15 cancers

2- Hormones: Exogenous as synthetic estrogen, androgen hormones are potentially carcinogenic to liver.

Endogenous hormones:

Endocrine disorders as high prolactin hormone may be associated with breast cancer.

3- Dietary chemicals:

A- Aflatoxine is a chemical product of certain fungi which grows in food like peanuts and grains. Aflatoxine approved to produce liver cancer in experimental animals.

B- Artificial sweeteners: high doses may increase the risk of bladder cancer.

C- Food additives

D- Nitrites which are present in preserved meat and fish or which are formed from dietary nitrites by bacterial action that changes to N- nitroze which are carcinogenic compounds to stomach, colon and esophagus.

E- Carcinogenic polycystic aromatic hydrocarbons present in smoked food as well as charcoal grilled meat.

4- Air pollutants: chemical produced from exhaust products of fuel combustion of vehicles or from industrial pollution by fumes vapors or dust of different chemical substances as asbestos, nickel, lead manganese, chromate and cadmium.

C- Biological factors:

1- Viral infection: Herpes simplex virus affecting the genital tract is associated with cancer cervix, Virus B and C hepatitis predispose to liver cancer, HIV is blamed as etiological factor of Kaposi sarcoma.
2- Parasites: Schistosomes (Bilharziasis) is associated with bladder cancer.

The magnitude of different risk factor hazards is shown below:

Risk factors	% of hazards
Diet	35
Smoking	30
Infection	10
Sexual behavior	7
Industrial	4
Alcohol	3
Pollution (man made)	2
Natural pollution (geographical)	2
Drugs	1
Additives	1
Unknown	5
Total	100

Prevention of cancers

1- Primary prevention: by controlling the modifiable risk factors like

1- Cessation of smoking
2- Good dietary habit
3- Control of alcohol consumption
4- Protection of workers from occupation hazards leading to cancer such as radiation, chemical and biological hazards.
5- Immunization to prevent hepatocellular carcinoma
6- Maintaining standard for food, drugs, cosmetics (testing and monitoring for carcinogens).
7- Personal hygiene is important to prevent cancer like ca cervix.
8- Control of air pollution
9- Bilharzial control program
10- Avoid genetic and familial predisposition to cancer by premarital examinations and counseling and avoiding consanguineous marriage.
11- Cancer education which is very important aspect in primary prevention.

People are educated regarding the early symptoms of cancer so that detection and treatment which is vitalmay be started earlier. Education regarding self examination of the breast and proper screening for at risk group are essential, breast feeding should be encouraged.

Warning signals of cancer:

1- A lump in the breast.
2- Change in wart.
3- Blood loss from any natural orifice.
4- Persistent change in digestive & bowel habits.
5- Swollen or sore that does not heal.
6- Unexplained loss of weight.
7- Persistent cough or haematemesis
8- Excessive loss of blood at monthly period or loss of blood outside the usual dates.

2- Secondary prevention of cancer:

It includes:

1- Early case detection through screening, mass strategy and high risk strategy, high risk strategy most ideal. Cancers amenable to screening are cervical, breast, oral cancers, lung cancers and prostate cancer.

2- Cancer registration of cases and deaths, it is of type

A- Hospital based

B- Population based.

3- Treatment which adopt multimodality approach; includes surgery, radiation and chemotherapy

3- Tertiary prevention of cancer:

Beyond durable stage pain and palliative care assumes importance. Rehabilitation by finding proper job, group psychotherapy and psychosocial support services.