

## Lecture 5 Epidemiology of Cancer

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**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 per 100 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.

#### **A etiology 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 polycyclic 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 vital may 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.**

## **Epidemiology of Lung Cancer**

**It is the commonest cancer among males worldwide and in our country as well, incidence of lung cancer is increasing in developing countries and decreasing in developed countries.**

**Risk factors:**

**A- Host risk factors:**

**Males are at higher risk due to smoking and occupational exposure.**

**Habit: lung cancer is positively related to smoking, the occurrence of lung cancer in females is detected nowadays due to increasing cigarette smoking habits among females.**

**Residence: increased in urban areas than rural ones.**

**B- Environmental risk factors:**

**Air pollution by exhausts of vehicles and industry.**

**Industrial exposure to asbestos dust, arsenic and chromate.**

**Prevention:**

**1- Antismoking program.**

**2- National efforts must be made to minimize air pollution**

**3- Reduction of occupational exposure.**

## **Control:**

**Early case detection**

**Increase the health awareness.**

**Efficient health services.**

**Screening tests: radio diagnosis, sputum cytology, any adult male over the age of 40 and has chronic cough for two weeks and not responds to treatment should be considered lung cancer until proved otherwise. It is better to exclude cancer than to diagnose it lately.**

## **Epidemiology of Breast Cancer**

**Affects mainly females. It is the commonest type of all female cancers in Iraq.**

### **Risk factors:**

**A- Host risk factors:**

**1- Females > males**

**2- Age: peak 40-50 years.**

**3- Breast cancer is more prevalent in higher socioeconomic standard.**

**4- Menstruation: females with early menarche and late menopause are at risk.**

**5- Parity:**

**Nulliparas women are at risk.**

**Multiparas especially when breast feeding was not followed and breast was usually engorged with milk.**

**Delay of first child birth especially after the age of 35 years.**

**6- Morbidity: increase incidence in cases who has history of cancer of one breast, or who had cancer body uterus.**

**7- Family history of breast cancer: incidence is higher in families having cases of breast cancer.**

**8- Presence of precancerous lesion as papilloma, cystic hyperplasia or abnormal nipple discharge.**

**9- Trauma to the breast may be also a predisposing factor.**

**B- Environmental risk factors:**

**1- Hormonal disturbance due to endogenous or exogenous causes that lead to increase estrogen, progesterone or prolactin.**

**2- Contraceptive pills are incriminated when used continuously for long period and also when used after the age of 35 years.**

**Prevention:**

**1- Avoid risk factors.**

**2- Encourage breast feeding.**

**3- Proper family planning services.**

**4- Breast examination either by the women herself or during comprehensive medical examination and in follow up examination during the use of contraceptive pills.**

**Control:**

**Tumors markers for early case detection.**

**Increase the awareness of females for self examination of both breasts. Once per month (better after menstrual period).**

**Seeking medical care once any breast swelling is felt.**

**Mammography: to screen at risk group as those with positive family history.**

**Epidemiology of Cancer of Cervix**

**It is the most common cancer in female genital system.**

**Risk factors:**

**A- Host factors: multipara, early and frequent or multiple sexual relationships and estrogen disturbance.**

**B- Environmental factors:**

**Infection: Herpes Simplex virus is condemned**

**Prevention:**

**Hormonal treatment should be given under medical supervision.**

**Family planning to control the number of children.**

**Postpone the age of marriage.**

**Control:**

**Early case finding by cervical smear; if it contains abnormal cells, further investigations must be done (as biopsy) to confirm diagnosis.**

**Cervical smear should be done for females over 40 years every three years then every year for over 50 years females as a routine.**

**Early detection of abnormal cervical cells in these pap smears and proper management of cases give very good prognostic results.**