**DEPARTMENT OF HUMAN ANATOMY**

**AFE BABALOLA UNIVERSITY, ADO EKITI STATE**

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BY

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**Write on cancers epidemiology in Africa generally, and Nigeria in particular**.

Cancer epidemiology is the study of the distribution, determinants, and frequency of malignant disease in specific populations (Hennekens and Buring, 1987). The objective is to define causative factors to formulate preventive strategies for control of the disease. Epidemiologic assessment provides the clinician with a quantification of cancer risk, outlines the basis for screening modalities for high-risk populations, and determines the efficacy of any preventive intervention.

Three types of epidemiologic research apply to the field of cancer. Descriptive epidemiology focuses on the trends and frequency of disease in a given population. Analytic epidemiology deals with identifying causes and the predisposing risk associated with the development of disease. Clinical epidemiology outlines screening programs and evaluates the impact of prevention strategies on overall outcome.

**Cancer Epidemiology in Sub-Saharan Africa**

GLOBOCAN is a database of the International Agency for Research in Cancer (IARC) that provides estimated incidence, mortality and prevalence of cancers worldwide. In 2012, it reported that there were 14.1 million new cancer cases worldwide, 8.2 million cancer-related deaths and 32.6 million people living with cancer (within 5 years of diagnosis) (Ferlay et al. 2012). Alarmingly, 57% (8 million) of new cancer cases and 65% (5.3 million) of mortality occurred in the less developed countries of the world in 2012. There is regional variation in cancer incidence and mortality across continents with some cancer’s commoner in some parts of the world. Genetic susceptibility, cancer biology, environmental and risk factors’ exposures can explain the geographic differences observed. In the WHO Africa region, in 2012, the estimated age-standardized incidence rates for all cancers (excluding non-melanoma skin cancer) were 645 per 100,000 population (both sexes), 265 per 100,000 in males and 381 per 100,000 in females (Ferlay et al. 2012). The changes in population dynamics, lifestyles and diet across Africa have coincided with the increasing cancer burden. Life expectancy is improving in developing countries so more people live longer with disease. In Sub-Saharan Africa, the five most frequent cancers in males, in order of decreasing age- standardized incidence are: prostate, liver, Kaposi sarcoma, oesophageal and colorectal cancer and in females, they were: cervix uteri, breast, liver, colorectal and ovarian cancers.

**Males**

Prostate cancer accounted for the highest estimated number of cancer cases for all ages in males in 2012 with 20.3% of the overall cancer burden, followed by liver cancer (9.7%), Kaposi sarcoma (9.2%), Non-Hodgkin lymphoma (5.7%) and Colorectal cancer (5.6%). In prostate cancer, there is genetic predisposition and patients in SSA tend to present late. Liver cancer is associated with hepatitis B & C infection and alcohol consumption including local spirits. Kaposi sarcoma is linked to the Human Herpes Virus 8 (HHV8; also known as Kaposi Sarcoma Associated Herpes-Virus (KSHV)) infection and AIDS with on-going epidemics of the latter in SSA. Dietary and lifestyle changes with a trend towards those of the developed world has contributed towards the colorectal cancer proportions. Men tend to be younger at presentation with colorectal cancer in South Africa with median age of 59 years (Wentink et al. 2010) compared with 71 years in North America (Horner et al. 2009). Age-standardized mortality rates from cancers in Sub-Saharan African men in 2012 was highest for prostate cancer (20.9%), followed by liver cancer (9.6%), Kaposi Sarcoma (6.5%), Esophageal (6.4%), Colorectal (4.9%) and lung (4.3%) cancers. The high mortality rates for these cancers are often due to late presentation, lack of diagnostic and treatment facilities and an immunocompromised state (especially with Kaposi sarcoma). In comparison to the rest of the world regions, mortality rates from prostate cancer, for example, is disproportionately higher.

**Females**

The most burden of cancer cases for all ages in women in SSA in 2012 was from breast (25.5%) and cervix uteri cancer (25.2%). The lack of optimal screening programs for these cancers, Papanicolaou smears or HPV DNA screening for cervical cancer and mammography for breast cancer drives late presentation which ultimately leads to poor quality of life and high mortality. In 2012, the age-standardized mortality rate from cervix uteri cancer was highest in SSA at 22.5%, compared to 2.6% in North America and mortality from breast cancer was 17.2% compared to 14.8% in North America.

**Cancer Epidemiology in Nigeria**

The burden of cancer in Nigeria is unknown; mainly because of lack of statistics or under-reporting. This is not peculiar to only Nigeria but most parts of Africa. Large proportions of the population still never seek orthodox medical care and so are not recorded. Other reasons are inadequate diagnostic facilities, limited access to care, inadequate technical manpower and infrastructure as well as quality of cancer data systems all contribute to inaccurate data on cancer burden. There are 11 cancer registries in Nigeria; located in various tertiary hospitals in various parts of the country. Most of the Registries are poorly funded and except probably The Ibadan Cancer Registry, they all produce hospital-based data

 In a study of cancer registry literature update from all over the world, only 1% of the literature emanated from Africa compared to 34% and 42% from Europe and Asia respectively. This is partly due to inaccurate population statistics which makes age specific incidence rates impossible or if available inaccurate.

The earliest study from Nigeria was from the Ibadan Cancer Registry-1960-69(ICR); Edington and MacLean reported higher rates of cancer in females with age standardized rates (ASR) of 105.1 and 78 per 100,000 females and males respectively. In 1998, 74.5 per 100,000 females and 63.9 for males was recorded from the same center. In Zaria, 1976-78 data reported 1575 cases with 52% of cases in males and 48% in females; a latter study however showed more cancers in females than males (Abdulkareem, 2009).

Current data (2001-2005) from Ibadan showed increasing incidence and the ASR for all cancers as 81.6 per 100,000 for males and 115.1 per 100,000 for females with 65.9% and 34.1% in females and males respectively. From Kano, of 1001 cancers recorded for period 1995-2004, male cancers accounted for 50.3% and49.7% in females. Mandong et al (2001) recorded 1162 and 1657 cancer cases respectively for males and females for the period between 1995 and 2002 from the Cancer Registry in Jos University Teaching Hospital. Report from University of Benin Teaching Hospital showed 2258 cases over a 20year period with female cancers predominating (64%) while that from Calabar showed a total of 588 cancers between 2004-2006 with 50.9% and 49.1% respectively for males and females. The WHO estimated incidence of cancer from all sites in 2002 for Nigeria was 90.7 and 100.9 per 10,000for males and females respectively while mortality rates were 72.2 and 76 respectively (Globocan, 2008).This is comparable to 89.1 and 104.1/100,000 incidence for males and females and 72.2 and 79.6 crude mortality rates recorded for Ghana but much less than figures recorded for United Kingdom and USA. Generally, cancer incidence in Nigeria appears low compared to developed countries which may not truly reflect the burden Similar to reports from other parts of the world, it is slightly higher in female (Abdukareem, 2010).

Thus, data from various parts of the country show that cancer incidence is increasing with female cancers leading, changing pattern has also been noticed from all the regions other country. Increasing incidence has been attributed to poor awareness about the risk factors and changes in lifestyle (Abdukareem, 2009).

The six most common cancers in Nigeria in descending order of frequency are

1) Breast,

2) Cervix,

3) Prostate,

4) Colorectal

5) Liver Cancer And

6) NHL.

Critically examine the involvement of angiogenic genes in the development and progression of osteosarcomas.

The process of metastasis includes tumor cell migration, invasion, entry into the circulation, and eventual arrest and extravasation at distant secondary sites, which has been reviewed extensively. (Mendoza and Khanna, 2009). Many of the genes that have been associated with osteosarcoma formation (i.e., oncogenesis) are likely to contribute to progression and metastases. Unfortunately, as discussed earlier, the underlying genetic complexity has complicated efforts to identify driving and causal genetic drivers for metastasis in osteosarcoma despite a number of biologic motifs (i.e., growth factor signaling paths, angiogenic phenotype, and mesenchymal stem cell origin) that are consistently associated with osteosarcoma progression and may be described as metastasis ‘‘virulence’’ factors, as recently coined by others.( Nguyen *et al*., 2009). The following progression (i.e., virulence) factors in osteosarcoma have been consistently held across several investigative platforms and studies (Khanna, 2008): Angiogenesis. The development of an angiogenic phenotype is a recognized determinant of metastatic cells. In osteosarcoma, several associations with such an angiogenic phenotype have been denied. This includes an association with metastatic risk and primary tumor microvessel density, expression of angiogenesis-associated growth factors, and the use of inhibitors of angiogenesis in osteosarcoma model systems. (Yin *et al*., 2008) Ezrin. The cytoskeleton linker protein ezrin, a member of the ezrin, radixin, and myosin (ERM) family, has been connected to the metastatic phenotype in murine, canine, and human osteosarcoma. ( Khanna *et al*., 2004). It is reasonable that a physical connection between the actin cytoskeleton and the cell membrane is of value to a metastatic cell as it engages its microenvironment in cancer. Studies of ezrin in osteosarcoma have demonstrated a functional efficiency provided by the linkage between the cell membrane and actin cytoskeleton that is related to the signal-transduction activity of membrane proteins that are associated with metastasis. (Wan *et al*., 2005). The specific mechanisms associated with ezrin’s role in metastasis is not known; however, a uniting hypothesis suggests that ezrin is part of a complex solution used by metastatic cells to deal with the stresses of the process of metastasis

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