ORIGINAL ARTICLE

Cancer in Nigeria: A 10-Year Analysis of the Kano Cancer Registry

Mohammed A Z, Edino S T*, Ochicha O, Gwarzo A K, Samaila A A*****

Department of Pathology, Surgery, Haematology**, and Medicine*** Bayero University Kano/Aminu Kano Teaching Hospital, Kano, Nigeria*

Abstract

Background: *Cancer is a major health problem in developed countries and epidemiological evidence shows the emergence of a similar tend in developing countries, particularly in sub-Saharan Africa where HIV/AIDS is predicted to augment the cancer burden. The present study analyses the profile of cancers recorded in the first decade (1995-2004) of establishment of the Kano cancer registry (KCR) a histology/ cytology-based registry in Kano, Nigeria.*

Methods: *Records of cancer cases diagnosed based on histology or cytology and entered into the registry were retrieved and categorized by type/ organ sites affected according to International Classification of Diseases for Oncology.*

Results: *There was a steady rise in frequency of cancer over the period where a total of 1990 cancer cases were recorded comprising of 1001 (50.3%) males and 989 (49.7%) females. Cancers of the cervix (22.9%), Breast (18.9%), Ovary (8.2%), non-melanoma skin cancer (6.3%), and Uterus (6.2%) were the most frequent female cancers. In males, cancer of the prostate (16.5%), bladder (10.2%), non-melanoma skin (9.9%), colorectum (9.3%) and connective tissue (6.3%) were most common. Burkitt's lymphoma (31.4%), other lymphoreticular cancers (23.8%) and retinoblastoma (20%) predominated in children.*

Conclusion: *The KCR supports existing predictions of an increase in incidence of cancers in developing countries. There is need for establishment of comprehensive cancer control programmes in developing countries for the common cancers of the cervix, breast, prostate, bladder, skin and colorectum which are amenable to prevention, early detection and cure.*

Key words: *Kano cancer registry; Nigeria; Cancer profiles*

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Introduction

Cancer is a major health problem world wide with an estimated 10 million new cases and 6 million deaths annually.[1] This is expected to increase to 15 million new cases and 10 million deaths by the year 2020, and 60% of these will occur in developing countries.[1,2] Cancer accounts for about one in ten deaths in less developed countries who experience their own unique forms of cancer and have less than 5% of global cancer control resources.[3] The increasing frequency of Human Immunodeficiency Virus (HIV) associated cancers particularly in sub-Saharan Africa poses new challenges to the cancer burden in these societies.[4]

Strategies for cancer prevention and control require predictions of the dominant types of cancer and their distribution in a particular geographical region. In Nigeria there is no comprehensive cancer data base, hence information on cancer incidence and mortality are based on individual cancer registry reports.[3-6]

The Kano cancer registry (KCR) is a hospital-based registry established in 1999, the records of which are coordinated in the Pathology department of Aminu Kano Teaching Hospital (AKTH), Kano. Its sources of data are from histologically or cytologically verified cases of cancer diagnosed based on the World Health organization (WHO) International classification of tumours[7], in the three principal tertiary health institutions in Kano, which serve the densely populated Kano metropolis and environs. The hospitals are AKTH, Murtala Mohammed Specialist Hospital (MMSH) and National Orthopedic Hospital, Dala. These are the only centers in Kano state with facilities for cancer verification.

Materials and Methods

Records of cases of cancer that have been histologically or cytologically confirmed were retrieved from the cancer registry over a 10 year period (1995-2004). In situ or borderline cancers were excluded and a single record per patient was included in our data even when multiple samples may have been examined. Cancers were then classified by the organ sites affected according to the International classification of diseases for Oncology.[8] Details of demographic data was analyzed in percentage frequencies and rank with respect to gender, and presented using tables and figures.

Correspondence to ***Dr A.Z. Mohammed,*** *Email: aminuzm@yahoo.com*

Results

The KCR recorded a progressive increase in number of cancer cases between 1995 and 2004 with a total of 1990 cases during the period (figure 1). There was a slight male preponderance with 1001(50.3%) males and 989(49.7%) females. Table I summarizes the most frequent cancers according to rank. Cancers of the cervix, breast, Prostate, Skin (non melanoma), Colorectum, Bladder, connective tissue, metastasis, eye, ovary, Non-Hodgkin lymphoma (NHL) and cancer of the uterus were in descending order the 12 leading cancers.

Cancer of the cervix emerged as the most common female cancer comprising 22.9% of female cases, followed by those of the breast (18.9%), ovary (8.2%), non- melanoma (Nm) skin (6.3%) and uterus (6.2%) as presented in table II. The most prevalent cancer in males was prostate cancer (16.5%), followed in decreasing order by cancer of the bladder (10.2%), Nm skin (9.9%), colorectum (9.3%) and connective tissue (6.3%) as shown in table III. Paediatric cancers constituted 9.3% of all malignancies. Table IV demonstrates the common paediatric cancers recorded. Lymphoreticular cancers notably Burkitts lymphoma (31.4%), NHL(10.3%), acute leukaemia's (7%) and Hodgkins lymphoma (6.5%) were preponderant. Retinoblastoma (20%) was the leading non- lymphoreticular cancer.

Table I: Profile of most common cancers in Kano cancer registry

Rank	Site	No. of cases	%
1.	Cervix	226	11.4
2.	Breast	193	9.7
3.	Prostate	165	8.3
4.	Nm skin	161	8.1
5.	Colorectum	127	6.4
6.	Bladder	124	6.2
7.	Connective tissue	105	5.3
8.	Metastasis	99	5.0
9.	Eye	85	4.3
10.	Ovary	81	4.1
11.	Non-Hodgkins lymphoma	75	3.8
12.	Uterus	61	3.1
13.	Burkitts lymphoma	58	2.9
14.	Melanoma	55	2.8
15.	Leukaemia	45	2.3
16.	Hodgkins lymphoma	40	2.0
17.	Bone	37	1.9
18.	Nasopharynx	33	1.7
19.	Liver	32	1.6
20.	Thyroid	30	1.5
21.	Stomach	26	1.3
22.	Kidney	24	1.2
23.	Salivary gland	19	1
24.	Larynx & Hypopharynx	17	0.9
25.	Oral	14	0.7
26.	Others	58	2.5
	Total	**1990**	**100**

Nm Non-melanoma

Table II: Profile of 12 most common female cancers

Rank	Site	No. of cases	%
1	Cervix	226	22.9
2	Breast	187	18.9
3	Ovary	81	8.2
4	Nm skin	62	6.3
5	Uterus	61	6.2
6	Metastasis	43	4.4
7	Connective tissue	42	4.3
8	Eye	38	3.8
9	Colorectum	34	3.4
10	Non-Hodgkins lymphoma	24	2.4
11	Bladder	22	2.2
12	Melanoma	21	2.1
13	Others	148	14.9
	Total	**989**	**100**

Nm Non-melanoma

Table III: Profile of 12 most common male cancers

Rank	Site	No. of cases	%
1	Prostate	168	16.5
2	Bladder	102	10.2
3	Nm skin	99	9.9
4	Colorectum	93	9.3
5	Connective tissue	63	6.3
6	Metastasis	56	5.6
7	Non-Hodgkins lymphoma	51	5.1
8	Eye	47	4.7
9	Burkitts lymphoma	37	3.4
10	Melanoma	34	3.2
11	Leukaemia	32	3.1
12	Hodgkins lymphoma	31	2.9
13	Liver	28	2.7
14	Others	160	17.1
	Total	**1001**	**100**

Nm Non-melanoma

Table IV: Profile of 10 most common Paediatric cancers

Rank	Type	No. of male cases	No. of female cases	Total	%
1	Burkitt's lymphoma	37	21	58	31.4
2	Retinoblastoma	19	18	37	20.0
3	Non-Hodgkins lymphoma	12	7	19	10.3
4	Acute leukaemia	12	1	13	7.0
5	Hodgkins lymphoma	9	3	12	6.5
6	Nephroblastoma	7	4	11	5.9
7	Osteogenic sarcoma	2	7	9	4.9
8	Rhabdomyosarcoma	4	4	8	4.3
9	Malignant Gonadal neoplasms	1	5	6	3.2
10	Neuroblastoma	3	0	3	1.6
11	Others	8	1	9	4.9
	Total	**114**	**71**	**185**	**100**

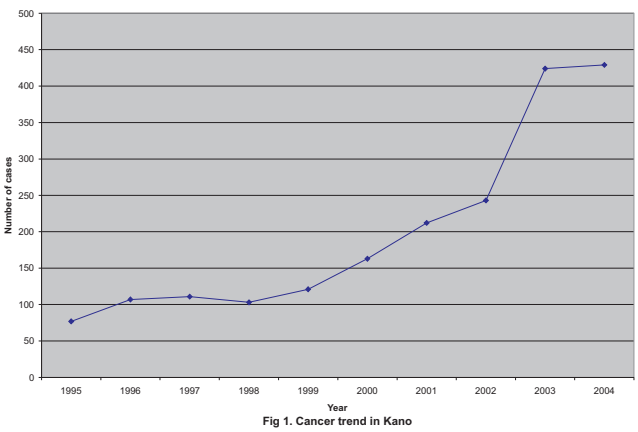

Fig 1. Cancer trend in Kano

Discussion

This study describes the pattern of cancer recorded in the Kano cancer registry over a 10 year period and noted a progressive increase in number of cancer cases. This supports existing predictions that major increases in cancer incidence and mortality will occur in developing countries as the population continues to expand.[4] The 1990 cases in this study is actually an under estimation of the actual cancer burden in the area served by the KCR since at present it limits its entries only to cases of cancer attending tertiary hospitals that have been confirmed by histology or cytology. Therefore the figures only represent the 'minimal cancer' frequency rates for the area of coverage. It is however acknowledged that the most widely accepted means of evaluating quality of cancer incidence report is by the proportion of histologically confirmed diagnosis.[9] Many cases would have been missed or died because of limited access to tertiary institutions in the area of coverage.

Globally, cancers tend to demonstrate slight female preponderance.[4] There was however a slight male preponderance in the KCR (50.2% vs.49.8%) in contrast to reports from other registries in Nigeria, where female cases predominated.[5,6] The reason for this finding is unclear, but recent estimates in Europe, show 54% of new cancers occurring in men, compared with 46% in females.[10]

Cancer of the cervix was the most common cancer, comprising of 22.9% of all female cancers. This cancer is reported to be the most frequent form of cancer seen in women in developing countries[1,2,4], even though some Nigerian studies have observed a changing trend with breast cancer superceding cervical cancer as the most common malignancy.[5,6] The risk factors for cervical cancer such as infection with high risk human papilloma virus (HPV) types 16,18,31,33 e.t.c, Human Immunodeficiency Virus and other reproductive factors are well established. It is potentially preventable through institution of comprehensive cervical cancer screening programmes which detect preinvasive lesions of the cervix with potential for progression to invasive cancer.[11] Unfortunately in Nigeria, there is no national or state cervical screening programme, and screening remains mainly opportunistic and limited to tertiary health institutions, utilizing the pap test.[12] It may be necessary that in low resource settings such as ours, alternative cost effective screening approaches such as visual inspection with acetic acid may be more applicable. This should be co-coordinated under a comprehensive national cervical cancer screening programme.[3,11-13] The introduction of HPV vaccination offers a relevant alternative for preventing cervical cancer and is already yielding promising results in some developed countries but will however take several decades to become widely available in developing countries.[14]

Breast cancer the leading female cancer worldwide was the second most frequent cancer in this study with a mean age of 46years.[15] Breast cancer has genetic, familial and environmental influences including high fat diet. It has been shown to be positively associated with menstrual and obstetric risk factors in a case control study in Ibadan, Nigeria similar to the finding in Caucasian populations in Europe and America.[16,17] Majority of our patients however did not exhibit these risk factors inconsonance with other studies in Africa and parts of the Middle East.[6,15,18] Early detection and "cure" are obtainable in developed countries, through mammographic screening and wide application of fine needle aspiration cytology (FNAC) for diagnosis. In developing countries, there is need to incorporate programmes that promote breast self examination, clinical breast examination and FNAC into mammography based screening services.

Prostate cancer was the most common cancer in men accounting for 16.5% of male cancers. Cancer registry reports from Nigeria and other parts of Africa have highlighted the emerging trend of prostate cancer as the commonest male cancer, in contrast to earlier studies that showed predominance of liver cancer.[5-7,19] Unlike some developed countries whose rising incidence of this cancer has been partly attributed to routine screening of males which results in early detection, the vast majority of our cases were diagnosed in symptomatic men with clinical prostate cancer since routine screening is currently not practiced in our setting. The mean age of patients was 64.2 years, and we did not observe a tendency to younger age at presentation as described elsewhere.[5,20] The principal factors contributing to high incidence of prostate cancer are genetic factors, increasing age, serum androgen (testosterone) levels, high fat diet and sexual factors amongst others.[21] The importance of race is demonstrated in the higher incidence amongst African-American men when compared to Caucasians in the USA. Available screening options include digital rectal examination (DRE) which is limited by low sensitivity, prostate specific antigen assays and transrectal ultrasound scans.

Non-melanoma skin cancers as a group ranked fourth representing 8.3% of all cancers. The sex ratio was, male to Female, 1.6:1. They were mainly squamous cell carcinomas and less frequently basal cell carcinomas. Skin cancer is also the most common cancer in some Arab populations and individuals of non-African descent in Africa, where exposure to sunlight is the most important risk factor.[17,18,9] In our environment different risk factors may be operative particularly as trauma is an important event preceding the development of these cancers which commonly present as chronic ulcers that refuse to heal.

Colorectal cancers in Black Africans have been suggested to represent unique molecular and clinical entities .[22] They were the fifth commonest cancer with a male to female ratio of 2.7:1. In general, race, family history, 'westernization of diet' and genetic alterations involving several genetic loci e.g. APC, DCC and FAP genes are associated with increased incidence.[23] The frequent association with infectious agents in developing countries is remarkable and requires further investigation.[6,22] Although principally a disease of elderly individuals in developed countries, it has been shown to affect a younger age group in Nigeria.[6,22] The recorded mean age in this study was 44.4 years. In high risk individuals with a family history, surveillance by colonoscopy is essential early in life and genetic testing for gene mutations is now standard care in many developed societies.[24,25]

Bladder cancer ranked sixth amongst the most frequent cancers. It exhibited a wide sex ratio (male to Female, 4.6:1), with 53% being of the squamous cell carcinoma histologic variety which was associated with *Schistosoma haematobium* in 12% of cases. This finding is consistent with the well established linkage between bladder cancer and *Schistosoma haematobium* infection.[26] A changing pattern towards a predominant transitional cell carcinoma histologic variety is now being recorded in other parts of Nigeria.[27] Schistosomiasis remains endemic in many parts of Africa, Asia and the Middle east where the high incidence of this parasite associated cancer documents the importance of infection-related malignancies in less developed countries.

Among the less frequent cancers, liver cancer deserves special mention as it constituted only 1.6% of all cancers with a male to female ratio of 7:1. Liver cancer is associated with Hepatitis B and C viruses, exposure to aflatoxin B1 through dietary contamination and liver cirrhosis of varied aetiology.[6] This cancer is generally underestimated in histopathology based studies because of reliance upon results of clinical tests, ultrasound scans and alpha-fetoprotein estimation by clinicians. This is because patients present late often with deranged clotting profile.[5] Although liver biopsy facilities are available at our institution, late presentation precludes clinicians from undertaking the procedure because of the high risk of bleeding. Postmortem examinations are also not routinely performed hence several suspected cases may be missed leading to underestimation of liver cancer. The viral aetiology of some cases of the disease provides potential for a preventive strategy through hepatitis B virus (HBV) vaccination. It is anticipated that a future decline in incidence may be seen as HBV vaccination is gradually being incorporated into the national programme on immunization in Nigeria.

Of major concern is the category of metastatic cancers of unknown primary site which together constituted 5.1% of cancers. This group comprises of advanced widely disseminated cancers in which the primary site could not be ascertained. The absence of immunohistochemistry in most Nigerian institutions hinders accurate determination of the primary site.

Paediatric cancers constituted 9.3% of all cancers and were dominated by lymphoreticular cancers and retinoblastoma. Although a declining trend of Burkitt's lymphoma has been reported possibly due to decrease in frequency of predisposing infections[28], it was the most common childhood cancer recorded in this study. Similar to observations elsewhere[28], we noticed a tendency for abdominal presentation. The male to female ratio was 1.8:1 and the mean age at diagnosis was 7.9 years.

Conclusion

Overall, the results of this study affords some guidelines to aid the design of cancer control programmes in the area served by the KCR. The spectrum of cancers are dominated by cancers of the breast, urinary and genital tracts, skin, large bowel, and connective tissue amongst adults, while those of the lymphoreticular system have a high incidence in children but low incidence in adults. Although the HIV epidemic continues to exert its toll on the populace of sub-Saharan Africa, it is yet to have a significant effect on cancer incidence in Nigeria.[29]

There is need for a concerted effort to develop a national cancer screening programme for the prevention and early detection of the major cancers of the cervix, breast, prostate, skin, bladder and colorectum. This should involve public health measures for vaccination against Hepatitis B virus, prevention and treatment of infectious diseases such as schistosomiasis, malaria,

hepatitis C virus, *Helicobacter Pylori* and availability of Highly Active Antiretroviral Therapy (HAART) for treatment of HIV/ AIDS. The importance of lifestyle and dietary modification as a component of health campaigns is also vital in decreasing cancer incidence. The need for development of regional oncology centers affiliated to tertiary health facilities for cancer treatment and research cannot be overemphasized. Present cancer registries in Nigeria should also be organized into well structured networks of population-based cancer registry systems coordinated by a national cancer registry. The recommendation for the establishment of a National cancer institute in Nigeria is a welcome suggestion, but requires the support of other National and International agencies for cancer research and control.

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