INCREASED INCIDENCE OF PROSTATE CANCER IN NIGERIANS

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An increased incidence of prostate cancer among African-American men (now the second most common cause of cancer death) has been attributed mainly to the introduction of screening techniques, which have enabled earlier diagnosis of patients. This study reviewed male cancer patients recorded in a Nigerian cancer registry to assess the current trends in prostate cancer in Nigeria. For comparison, data were broken into two groups: 1980-1988 and 1989-1996. Only the top 10 cancers occurring in both periods were considered initially in this report. For emphasis, an analysis of adult male cancers was done per decade since 1960.

Results show that prostate cancer has become the number one cancer in Nigerian men and constitutes 11% of all male cancers. The median age of patients was 67.5 years (variance 5.6), and the mean age was 71.4 years (variance 14.3). These results indicate that despite the absence of screening programs in Nigeria, the number of prostate cancer cases has increased. The known risk factors probably contribute to a varying degree among Nigerians, who are generally of average build or in the low-normal range for body mass index. Moreover, the role of genetics cannot be underplayed. Given its biological characteristics, more cases of prostate cancer probably would be recorded among this population if screening were undertaken. (*J Natl Med Assoc.* 1999;91:159-164.)

Key words: prostate cancer ◆ Nigerians

Prostate cancer has emerged to be the most common cancer among African-American men in the past few years. It is also now the second most common cause of cancer death in the Western world,[1] with the increasing prevalence being due primarily to an increase in the number of cases occurring in younger men. Prostate cancer is rarely diagnosed before the age of 50 years, but the incidence and mortality from the disease increase exponentially thereafter.

This increased incidence has been attributed mainly to the introduction of screening techniques (especially the estimation of serum prostate-specific antigen), which have enabled earlier diagnosis. The number of unsuspected carcinomas discovered in surgical specimens has diminished because of two factors: the development of nonsurgical management of patients with obstructive symptoms and an emphasis on early detection using prostate-specific antigen testing.[2]

There is a great variation in the geographic epidemiology of the disease,[3-5] and environmental factors appear to be significant contributors to this difference. However, African-American men have a 47% higher incidence and a 128% higher mortality than white men in the same geographic location.[6,7] Even within the African continent, major variations exist in prostate cancer incidence. In most of the eastern, western, and southern countries of the continent, prostate cancer ranks in the top 10 and usually the top 5 for male cancers, while in Algeria, prostate cancer ranks as number 15 (Table 1). This low incidence among Arabic men was noted previously by Akhtar et al.[8] In Harare, Zimbabwe, prostate cancer ranks number 2 among Europeans and number 5 among Africans.[5]

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Table 1. Comparative Data of Top 10 Cancers in African Men*

	Present Study				Zimbabwe[5]		
Rank	1980-1988	1989-1996	Algeria[5]†	Mali[5]	African	European	Uganda[5]
1	Liver	Prostate	Lung & bronchus	Liver	Kaposi's	Skin‡	Kaposi's
2	Prostate	Liver	Stomach	Stomach	Liver	Prostate	Prostate
3	Bone	Non-Hodgkin's lymphoma	Nasopharynx	Bladder	Esophagus	Colon & rectum	Esophagus
4	Colon & rectum	Colon & rectum	Non-Hodgkin's lymphoma	Colon & rectum	Lung & bronchus	Lung & bronchus	Liver
5	Bladder	Skin	Liver	Lung & bronchus	Prostate	Bladder	Non-Hodgkin's lymphoma
6	Non-Hodgkin's lymphoma	Larynx	Larynx	Skin‡	Bladder, stomach	Melanoma	Colon & rectum
7	Stomach	Nasal cavity	Lymphoid leukemia	Prostate	Colon & rectum	Liver	Eye
8	Skin‡	Nasopharynx	Hodgkin's	Non-Hodgkin's lymphoma	Non-Hodgkin's lymphoma	Brain	Stomach
9	Hodgkin's	Stomach, bone	Skin cancer‡	Kidney, Hodgkin's, Kaposi's	Myeloid leukemia	Stomach	Lung & bronchus
10	Lung & bronchus	Bladder	Gall bladder	Pancreas	Pancreas	Connective tissue	Skin‡

*Aged ⩾18 years.
†Prostate cancer is number 15 in Algeria.
‡Nonmelanoma.

These black/white differences and the variability among African populations transcend socioeconomic variables, unlike the case with other chronic diseases such as hypertension and hepatocellular carcinoma. This ordinarily would suggest that some genetic influence also operates at a significant level. Some of the evidence for genetic influence includes the following: 1) a study reporting cases of prostate cancer clustered among Mormons in Utah,[9] 2) Scandinavian twin studies showing concordance rates higher for monozygotic twins than for dizygotic twins,[10] and 3) studies demonstrating that male relatives of prostate cancer patients have an increased risk of developing the disease.[11-13] Heredity, however, appears to play a prominent role in only a small percentage of prostate cancer cases (mostly early-onset disease) with the majority of patients falling in the category of sporadic cancer.

Within a population, occupation and lifestyle do not seem to be important except that there appears to be an association between high dietary intake of animal fats and the development of prostate cancer. Heavy metal exposure (cadmium in particular) appears to play a role.[14] The most consistent factor is hormone concentration and metabolism. Testosterone levels have been shown to be higher in young African-American men than in white men.[15] In Europe, the incidence is increasing by 10% to 20% every five years, even when screening-detected cancers are disregarded.[16]

The University College Hospital in Ibadan, Nigeria, has been the major center for the management of cancer cases for years because of its initial acquisition of cesium and then later, a radiotherapy suite. It was the first center in Nigeria to acquire a CAT scanner. It has had an official cancer registry since 1960. The coverage

Table 2. Most Common Cancers in Nigerian Men*†

Site	Ranking Order of Tumor			
	1960-1969	1970-1979	1980-1989	1990-1995
Liver	1	1	1	2
Non-Hodgkin's lymphoma	2	5	3	3
Burkitt's lymphoma	3	3	5	NR
Connective tissue	4	5	6	10
Stomach	5	4	NR	NR
Skin	6	7	9	5
Hodgkin's lymphoma	7	5	7	NR
Prostate	8	2	2	1
Bone & adamantinoma	9	8	8	NR
Colon & rectum	10	6	4	4
Nasal cavities	NR	9	NR	8
Bladder	NR	10	NR	NR
Lung & bronchus	NR	NR	10	NR
Larynx	NR	NR	NR	6
Brain	NR	NR	NR	7
Eye	NR	NR	NR	9

*All ages; data from the Ibadan Cancer Registry.
†Truncated at 16 by choice.
Abbreviations: NR=not ranked.

area of the registry initially was the whole of Nigeria and some of the surrounding West African countries.

Recent observations indicate that there might be a changing trend in cancer incidence in Nigeria. In retrospect, an earlier report based on analysis of data from the same registry showed a trend toward an increasing incidence of prostate cancer as early as in 1973.[17]

MATERIALS AND METHODS

Cases of cancer in Nigerian men (age >18 years) recorded in a cancer registry were reviewed to assess the current situation with prostate cancer in Nigeria. For comparison, the data were considered in two groups: 1980-1988 and 1989-1996. These time frames represent years in which the records were reliably accessible and also coincide with one of the author's stay (J.O.O.) in the department.

For ease, only the top 10 cancers occurring in both periods were considered initially in this report. For emphasis, an analysis of adult male cancers was done per decade since 1960. Cases of prostate cancer occurring in the 1990s were then further analyzed. Patient ages were recorded. Statistical analysis was done using an F-test to compare the median and mode of ages, while a *t*-test was used to compare the means of both groups.

RESULTS

Table 1 ranks the order of adult male cancers in the current study compared with other African countries with cancer registries.[5] Liver, colorectal, and prostate cancers commonly ranked in the top five, except for Kaposi's sarcoma, which topped the list in the East, and lung and bronchial cancer, which topped the list in the North. In Ibadan, Nigeria, prostate cancer has become the number one cancer in men.

In the 1960s, prostate cancer was number eight, but in the 1990s, prostate cancer topped the list, with only liver cancer coming next to it in incidence (Table 2). Further appraisal of prostate cancer cases reveals that between 1990 and 1996, patient ages ranged from 25 to 100 years, with a peak in the seventh and eighth decades (Figure 1). The median age was 67.5 years (variance 5.6), and the mean age was 71.4 years (variance 14.3). There was no statistically significant difference in patient age from year to year. Currently, prostate cancer constitutes 11% of all male cancers in Nigeria. Prostate cancer constituted 2.2% of all cancers reported by Nkposong and Lawani[17] in 1973.

Table 3 and Figure 2 compare hepatocellular and prostatic cancers. The actual figures indicate a gradual increase in the number of cancer cases per decade but a much steeper rise in the number of prostate cancer

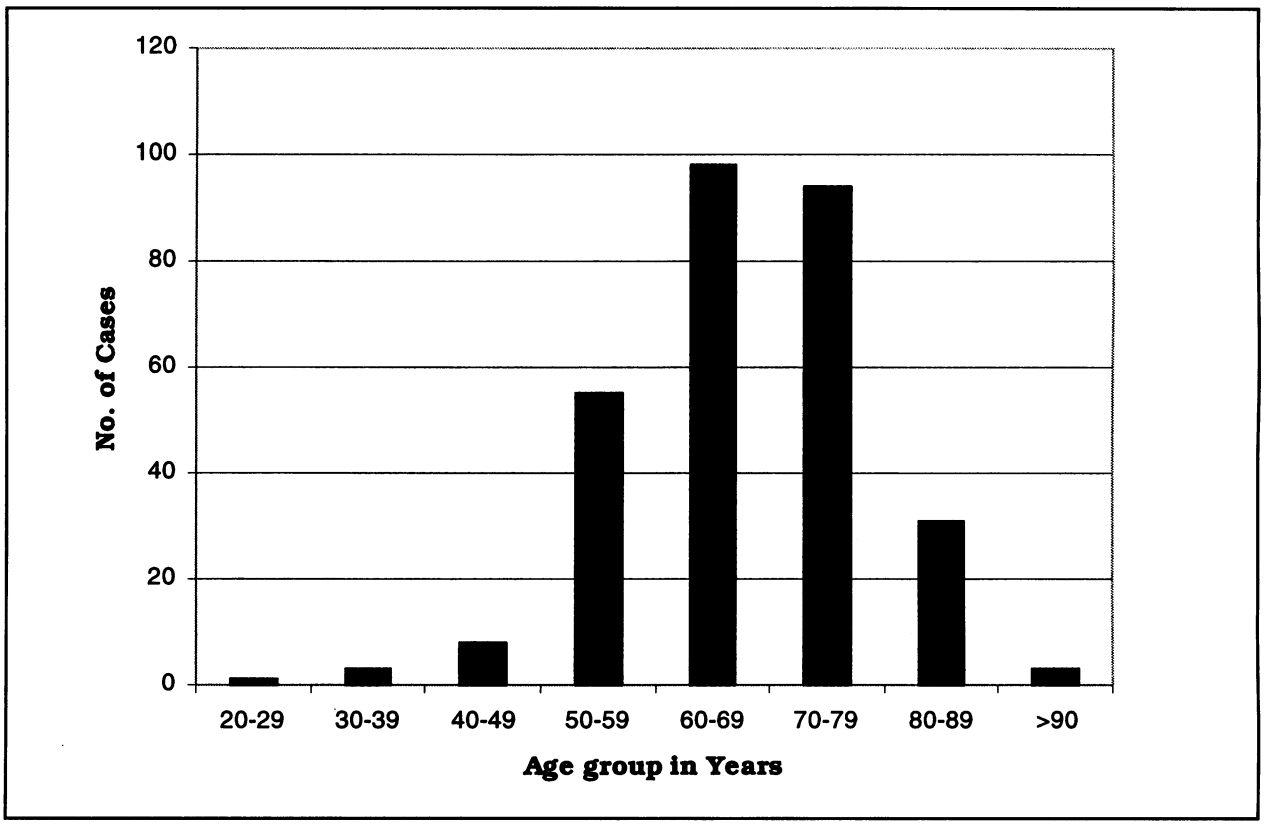

Figure 1.
Age distribution of 310 prostate cancer cases seen between 1990 and 1996.

cases. The relative ratio frequency for prostate cancer has gone from 4.45% of male cancers to 10.7% over the past three decades. The decrease in number for both cancers is likely due to the number of years considered so far in the current decade. Both cancers continue to increase in incidence, but prostate cancer demonstrates a definite rise above liver cancer.

DISCUSSION

Until now, liver cancer generally was believed to be the most common cancer among adult male Nigerians. This assumption was the result of the work conducted by Adetuyibi et al,[18] who in 1976 published figures on the causes of death at University College Hospital, Ibadan. A second study by Junaid[19] in 1979, which was based on a review of autopsy cases, further strengthened this position as liver cancer was the most common cause of cancer death in men followed closely by lymphoma. Prostatic cancers did not feature in these reports.

The first reference to prostatic cancer was made in 1982 when Abioye[20] reported a relative ratio frequency of 6.3% for prostate cancer. The reason adduced was that prostate cancers were essentially slow-growing tumors and would expectedly only begin to be seen in the later years of the registry. Other African centers also reported liver cancer to be in the top 10 even if it was not the most common. The current data indicate that prostate cancer has become the most common cancer among men in the records of the Ibadan Cancer Registry. Furthermore, the data suggest that prostate cancer is increasing in prevalence in the West African subregion, or at least among Nigerian males. However, this study has some limitations in that this study is hospital-based, which may ordinarily bias the findings, and is retrospective.

In several studies, risk factors for prostate cancer have been shown to include age, race, positive family history, access to health care, and dietary fat intake.[21-23] With respect to age, prostate cancer increases with age faster than any other malignancy and is expected to continue to be a major health problem as life expectancy continues to increase.[21] In this study, the youngest patient was 25 years old, and the median patient age

Table 3. Incidence and Relative Ratio Frequency of Liver and Prostate Cancers in Nigeria, 1960-1996, by Decade

	1960-1969	1970-1979	1980-1989	1990-1996
Total male cancer	4086	4187	4648	2985
Liver cancer	393	450	571	246
Relative ratio frequency (%)	9.62	10.75	12.3	8.24
Prostate cancer	182	337	540	319
Relative ratio frequency (%)	4.45	8.05	11.62	10.7

was 67.5 years while the mean age was 71.4 years. More than 77% of cases were seen in patients aged >60 years (data not shown). A recent report from Lagos, Nigeria, found the mean age of prostate cancer patients to be 68.3±9.4 years.[24] Nkposong and Lawani[17] reported a mean age of 61.2 years for prostate cancer. The current picture may in fact suggest a shift toward an older age group for prostate cancer in this environment. This age distribution is similar to that found in Algeria, Mali, Uganda, and Zimbabwe; in all of these countries, prostate cancer was observed from the fourth or fifth decade on, with the majority of cases occurring in men between the ages of 60 and 80 years.[5]

As for race, a study of 11 racial and ethnic groups in the United States showed that prostate cancer was the most common male cancer in six groups and either second or third in the other groups. African-American men had the highest rate of prostate cancer of all these groups.[25] Most African Americans are descendants of slaves transported from Africa and the Caribbean during the 17th and 19th centuries.[23] When assessing the family history of patients, an increased relative risk for prostate cancer has been reported in first-degree relatives of cancer patients, with a relative risk ranging from 1.9 to 17. This finding provides evidence that prostate cancer is familial. This relative risk rises markedly with decreasing age at presentation, increasing closeness of affected relative, and an increased number of affected individuals within families.[9,26,27] An increased risk for prostate cancer also has been found among relatives of patients with other forms of cancer including breast and colorectal cancers.[28] However, it would seem that familiality in prostate cancer is important in only a few cases (ie, those occurring at younger ages), with the majority of cases being sporadic. Because this study was retrospective, it was impossible to obtain information on cancer within the patients' families. However, we found the majority of our patients were aged ≤70. It remains to be seen whether familial associations will be observed among cases of prostate cancer in this environment.

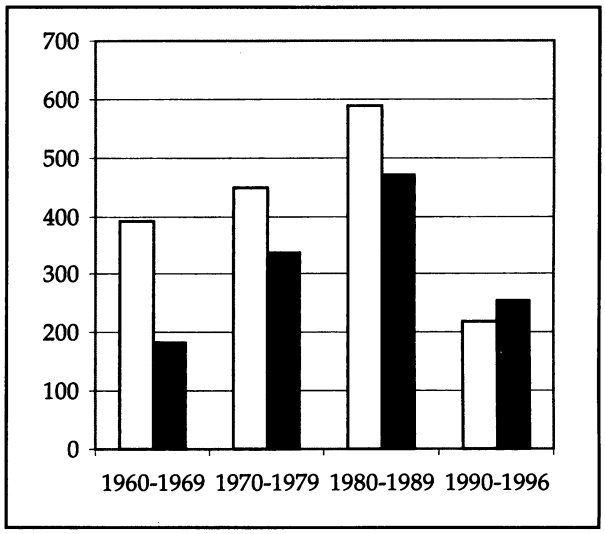

Figure 2.
Relative incidence of prostate and liver cancer from 1960-1996 by decade.

The role of access to health care and dietary contribution to prostate cancer incidence also needs to be considered. African-American men and women were assessed to be overweight compared with other racial groups. In fact, for the period 1991-1992, the Centers for Disease Control and Prevention reported that 37.7% of African-American women and 28.4% of African-American men were overweight.[29] The amount of body fat is generally crudely measured by assessing body mass index (BMI). Most studies of BMI in Nigeria show a gradient from the rural to the urban population but with a majority of adult Nigerians being normal or below average BMI.[30] The BMI of the prostate cancer patients being discussed in this report cannot be ascertained due to nonaccessibility of clinical notes. Moreover, it would be difficult to assess the role of body fat in our patients.

The current ratio of doctors to patients in Nigeria is about 1:2200 (Nigerian Medical and Dental Council;

personal communication, 1988). The ratio of urological surgeons to patients is even smaller. These factors may impact on access to health care.

The other major factor in the changing prevalence of prostate cancer is the effect of screening. In Nigeria, screening for prostate cancer is not yet a well-developed program in all centers. Two separate groups in Ibadan are starting screening programs for cancer, but no data have yet emerged.

CONCLUSION

Despite the absence of screening programs, the number of prostate cancer cases in Nigeria has increased. A recent study from Cameroon also confirms that prostate cancer is common in black Africans, with the incidence increasing annually.[31] Most patients are older men, but the clinical progression is more rapid in the younger age groups. If screening was undertaken in this population, even more cases would be recorded. Finally, while the prevalence of latent cancer is unknown at this time, it is the subject of an ongoing autopsy study of prostate cancer at this center.

Literature Cited

1. Haas GP, Sakr WA. Epidemiology of prostate cancer. *CA Cancer J Clin.* 1997;47:273-287.
2. Potosky AL, Miller BA, Albertsen PC, et al. The role of increasing detection in the rising incidence of prostate cancer. *JAMA.* 1995;273:548-552.
3. Parker SL, Tong T, Bolden S, et al. Cancer statistics 1997. *CA Cancer J Clin.* 1997;47:5-27
4. Parkin DM, Muir CS, Whelan SL, et al. *Cancer Incidence in Five Continents,* vol 6. Lyons, France: IARC; 1992.
5. Parkin DM, Whelan SL, Ferlay J, et al. *Cancer Incidence in Five Continents,* vol 7. Lyons, France: IARC; 1997.
6. Boring CC, Squires TS, Heath CW Jr, et al. Cancer statistics for African Americans. *CA Cancer J Clin.* 1992;42:7-17.
7. Baquet CR, Horn JW, Gibbs T, et al. Socioeconomic factors and cancer incidence among blacks and whites. *J Natl Cancer Inst.* 1991;83:551-557.
8. Akhtar SS, AbuBakr MA, Dawi SA, et al. Cancer in Libya. A retrospective analysis. *Afr J Med Med Sci.* 1993;22:17-24.
9. Cannon L, Bishop DT, Skolnick M, et al. Genetic epidemiology of prostate cancer in the Utah Mormon genealogy. *Cancer Surv.* 1982;1:47-69.
10. Gronberg H, Damber L, Damber JE. Studies of genetic factors in prostate cancer in a twin population. *J Urol.* 1994;152:1484-1489.
11. Carter BS, Bova GS, Beaty TH, et al. Hereditary prostate cancer: epidemiology and clinical features. *J Urol.* 1993;150:797-802.
12. Isaacs SD, Lambertus ALKM, Baffoe-Bonnie A, et al. Risk of cancer in relatives of prostate cancer probands. *J Natl Cancer Inst.* 1995;87:991-996.
13. Gronberg H, Damber L, Damber JE. Familial prostate cancer in Sweden. *Cancer.* 1996;77:138-143.
14. Armstrong B, Doll R. Environmental factors and cancer incidence and mortality in different countries, with special reference to dietary practices. *Int J Cancer.* 1975;15:617-631.
15. Ross R, Bernstein L, Judd H, et al. Serum testosterone levels in healthy young black and white men. *J Natl Cancer Inst.* 1986;76:45-48.
16. Coleman MP, Esteve J, Damiecki P, et al. *Trends in Cancer Incidence and Mortality.* Lyons, France: IARC; 1993.
17. Nkposong EO, Lawani J. Primary carcinoma of the prostate in Ibadan. *West African Medical Journal.* 1973:108-111
18. Adetuyibi A, Akinsanya JB, Onadeko BO. Analysis of the causes of death on the medical wards of the University College Hospital, Ibadan over a 14-year period (1960-1973). *Trans R Soc Trop Med Hyg.* 1976;70:466-473.
19. Junaid TA. Mortality in middle-aged Nigerians: an autopsy study. *Tropical and Geographical Medicine.* 1979;31:389-394.
20. Abioye AA. The Ibadan Cancer Registry. In: Olatunbosun DA, ed. *Cancer in Africa, Proceedings of a Workshop of the West African College of Physicians.* Ibadan, Nigeria: The Caxton Press (West Africa) Limited. 1981:1-33.
21. Sakr WA, Haas GP, Cassin BF, et al. The frequency of carcinoma and intraepithelial neoplasia of the prostate in young males. *J Urol.* 1993;150:379-385.
22. Pienta KJ, Esper PS. Risk factors for prostate cancer. *Ann Intern Med.* 1993;118:793-803.
23. Office of Management and Budget. Directive no. 15: race and ethnic standards for federal statistics and administrative reporting. In: *Statistical Policy Handbook.* Washington, DC: Office of Federal Statistical Policy and Standards, US Dept of Commerce; 1978.
24. Osegbe DN. Prostate cancer in Nigerians: facts and nonfacts. *J Urol.* 1997;157:1340-1343.
25. Parker SL, Davis KJ, Wingo PA, et al. Cancer statistics by race and ethnicity. *CA Cancer J Clin.* 1998;48:31-48.
26. Steinberg GD, Carter BS, Beaty TH, et al. Family history and the risk of prostate cancer. *Prostate.* 1990;17:337-347.
27. Carter BS, Beaty TH, Steinberg GD, et al. Mendelian inheritance of familial prostate cancer. *Proc Natl Acad Sci USA.* 1992;89:3367-3371.
28. Neuhausen SL, Skolnick MH, Cannon-Albright L. Familial prostate cancer studies in Utah. *Br J Urol.* 1997;79(suppl 1):15-20.
29. Centers for Disease Control and Prevention. Prevalence of selected risk factors for chronic disease by education level in racial/ethnic populations–United States, 1991-1992. *Morb Mortal Wkly Rep.* 1994;43:894-899.
30. Kaufman JS, Owoaje EE, James SA, et al. The determinants of hypertension in West Africa: contribution of anthropometric and dietary factors to the urban-rural and socio-economic gradients. *Am J Epidemiol.* 1996;143:1203-1218.
31. Angwafo FF, Yomi J, Mbakop A. Is cancer of the prostate rare in tropical (black) Africa? Case series from the Centre Hospitalier et Universitaire and the Hospital General de Yaounde from 1986 to 1990. *Bull Cancer.* 1994;81:155-159.