ORIGINAL PAPER

Epidemiology Of Oral Kaposi's Sarcoma In Zimbabwe 1988-1997: A Population-based Study

C. Marimo

Department of Pathology and Microbiology
University of Zambia School of Medicine
P O Box 50110, Lusaka, Zambia
Email: chikacle@gmail.com

ABSTRACT

***Objective**:* To date, no study has investigated the incidence of oral Kaposi's sarcoma (OKS) in African populations affected by the human immunodeficiency virus (HIV) and the Acquired ImmunoDeficiency Syndrome AIDS epidemic. It is, therefore, the purpose of this study to assess the burden of OKS in the Zimbabwean population over a ten-year period.

Design: A descriptive epidemiological study was undertaken to assess the burden of OKS by determining the frequencies, incidence and cumulative rates, the lifetime risk and odds of developing OKS according to site (topography), gender, age, race/ethnic origin of the Zimbabwean population. Incident cases of OKS from the upper and lower lips, oral vestibule, retromolar area, floor of mouth, tongue, cheek mucosa, gums, hard and soft palate were accessed from the Zimbabwe National Cancer Registry (ZNCR).

Cases from the skin, pharynx, larynx and the major salivary glands were excluded from the study.

Setting: This comprised the population of Zimbabwe during a ten-year period 1988 to 1997 using population figures from the 1992 Census Zimbabwe National Report. The study population was standardised by the direct method against the world standard population to calculate the age standardized incidence rate (ASIR). The SPSS statistical software program (SPSS Inc.2001, USA) was used for the statistical analysis.

Results: OKS comprised 0.92% of total body malignancies and 51% of oral malignancies with a mean age of study cases of 37.6 years and median age of 32 years. Histology of the primary (64.5%) and clinical diagnosis (34.6%) were the predominant methods of diagnosis. OKS affected almost exclusively blacks and males more than females with a male to female ratio of 1.9:1. The most affected age groups by OKS were the 30-34 for males and 25-29 for both females and the whole population. OKS

mostly affected the palate (70,2%) followed by, in descending order, the tongue (13.3%) and mouth (8.3%). The age adjusted age standardised incidence rate (ASIR) of OKS exponentially increased the entire study period surpassing oral squamous cell carcinoma (OSCC) as the predominant oral malignancy in 1994.

Conclusions: OKS was the commonest malignancy of young adults affecting males more than females and surpassed oral squamous cell carcinoma in 1994 to become the commonest oral malignancy for the remainder of the study period. The palate was the most affected intraoral site by OKS. The possibility of human herpes virus 8 being HIV strain-specific in the aetiopathogenesis of oral Kaposi's sarcoma warrants further investigation.

Keywords: Oral Kaposi's Sarcoma, palate, incidence rate, lifetime risk, human herpes virus 8.

INTRODUCTION

Studies from Uganda, Rwanda, Zambia and Zimbabwe have reported sharp increases in the incidence of Kaposi's sarcoma (KS)[1-6] which has become the most common malignancy associated with human immunodeficiency virus (HIV) infection and the acquired immunodeficiency syndrome (AIDS) epidemic[1,2,7,8]. Oral Kaposi's sarcoma (OKS) is one of the seven cardinal lesions strongly associated with HIV infection and indicates HIV infection. OKS presents as one of the early clinical features and is a marker of HIV disease progression into full-blown AIDS[12] as well as being a prognostic marker during Highly Active AntiRetroviral Treatment (HAART). Sub-Saharan Africa has the highest number of HIV/AIDS cases globally which contrasts with the lack of population-based studies on OKS; one of the clinical cardinal signs of HIV/AIDS. To date, no study has investigated the incidence of oral KS (OKS) in African populations affected by the HIV/AIDS epidemic. It is, therefore, the purpose of this study to assess the burden of OKS in the Zimbabwean population over a ten-year period.

METHODS

The burden of oral Kaposi's sarcoma in Zimbabwe was assessed by determining the frequencies, incidence and cumulative rates, the lifetime risk and odds of developing OKS according to site (topography), gender, age and race/ethnic origin. During the study period, 1 January 1988 to 31 December 1997, 445 cases of incident OKS out of a total of 873 oral malignancies and 47 906 cases of whole body malignancies were recorded by the Zimbabwe National Cancer Registry (ZNCR). The intraoral sites investigated include upper and lower lips, oral vestibule, retromolar area, floor of mouth, tongue, cheek mucosa, gums, hard and soft palate. Cases from the skin, pharynx, larynx and the major salivary glands were excluded from the study. Distinction between lip vermilion and lip mucosal malignancies was not clarified in the original ZNCR data; hence the inclusion of some lip vermilion KS among intraoral KS was a distinct possibility. Oral squamous cell carcinoma (OSCC) is a common oral malignancy that was used to assess the relative rate of increase of OKS. The accessed data for each case comprised information on age, gender, race, date of diagnosis, basis of diagnosis and site/topography. Absolute anonymity of identities of patients whose case details comprised the raw data for this study was maintained throughout the study.

Population

The population figures used for this study were from the 1992 Census Zimbabwe National Report. Zimbabwe had a total population of 10 412 548 persons comprising 5 083 537 males and 5 329 011 females[12].

Statistical methods

The data was sorted into tables for males, females and the whole population in 5-year age groups against the site. The 5-year age groups and the upper limit of 75+ were set for concordance with the 1992 Census population figures. Statistical analysis was done using the SPSS statistical software program (SPSS Inc.2001, USA). The age specific incidence rate, crude rate, age standardised incidence rate (ASIR), cumulative rate, the cumulative (lifetime) risk and odds of developing OKS were calculated using Microsoft Excel on Windows 98. The ASIR was age adjusted and standardised by the direct method against the world standard population. The cumulative rate was calculated using a defined life span of 0-74 years. It follows, therefore, that the chances of developing OKS that were calculated apply to the same life span of 0-74 years.

RESULTS

OKS comprised 51% of oral malignancies and 0.92% of total body malignancies recorded during the study period. The mean age of recorded patients was 37.6 years while the median age was 32 years. The racial distribution was almost exclusively blacks with only one case recorded in a 25-year old European female. Males bore the greater burden of OKS with 65.6% of recorded cases and a male: female ratio of 1.9:1. The majority of cases were diagnosed from the histology of the primary (64.5%) followed by clinical only (34.6%) while clinical, x-ray and ultra sound accounted for only

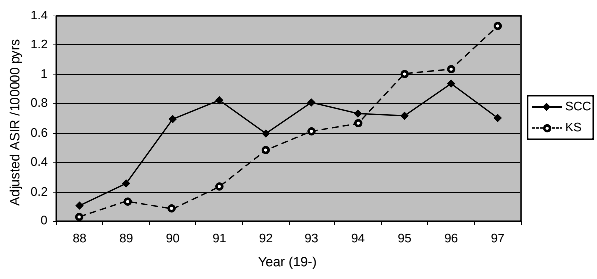
0.6%. Only one case of metastatic KS (0.2%) was recorded in the oral cavity. OKS mostly affected the palate (70.2%) followed by, in descending order, the tongue (13.3%) and mouth (8.3%). Frequencies for the other oral sites are as shown in Table I.

Site	Count	Frequency (%)
External upper lip	2	0.4
Mucosa of upper lip	1	0.2
Lip Not Otherwise Specified (NOS)	2	0.4
Tongue NOS	59	13.3
Gum NOS	16	3.7
Floor of mouth NOS	1	0.2
Hard palate	6	1.3
Soft palate	6	1.3
Palate NOS	312	70.2
Cheek mucosa	3	0.7
Mouth NOS	37	8.3
Total	445	100.0

Table I: Site/topographical distribution of oral Kaposi's sarcoma

The most affected 5-year age groups by OKS were the 30-34 for males and 25-29 for both females and the whole population. Other notable peaks in OKS rates were in the 0-4 and the 75+ age groups. The ASIR of OKS increased steadily in all three population categories. A graphical plot of the ASIRs of OKS and OSCC by year of study in Figure 1 shows OKS steadily increasing for the entire study period overtaking SCC in 1994. Interestingly, the ASIR of OSCC did not increase but stayed within a narrow range of 0.6 to 1.0 per 100000 personyears for eight of the ten years of study.

Fig. 1: Trends of OKS and OSCC for the whole population by year of study



The crude rate, age adjusted ASIR, cumulative rate, the lifetime risk and the chances to develop OKS of the study population are as given in Table II.

Variable	Oral Kaposi's sarcoma (OKS)		
	Male	Female	Whole population
Age specific incidence rate (Crude rate) /100 000 pyrs	0.57	0.29	0.43
Age standardised incidence rate /100 000 pyrs	7.87	3.56	5.62
Cumulative rate (%)	0.76	0.33	0.53
Cumulative (lifetime) risk (%)	0.8	0.3	0.5
Odds of developing OKS	1:132	1:299	1:188

Table II: Rates, risks and odds of developing oral Kaposi's sarcoma among males, females and the whole population

The corresponding figures for OSCC were 0.32 /100000 personyears, 0.64 /100000 personyears, 0.08%, and 0.01% with one chance in 1331 of developing OSCC for the study population. Males had higher ASIR for OKS (7.87 per 100 000 personyears) and OSCC (9.18 per 100 000 personyears) than females with 3.56 and 3.69 per 100 000 personyears respectively. Males had the highest ASIR for OSCC a decade earlier (50-54 five-year age group) than females (60-64 five-year age group) as depicted in figures 2 and 3.

Fig.2: Trends of OKS and OSCC among females by 5-year age groups

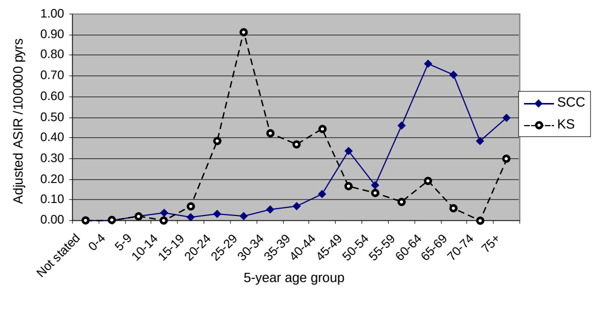
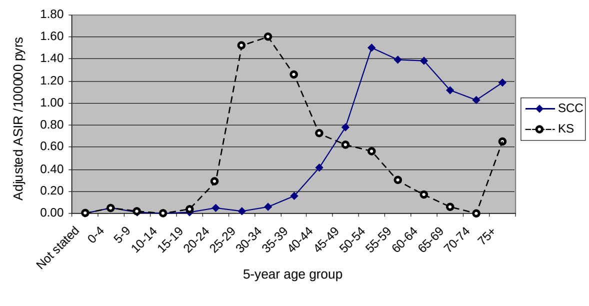


Fig.3: Trends of OKS and OSCC among males by 5-year age groups



Among AIDS-associated malignancies, OKS accounted for 98% while the balance comprised Burkitt's lymphoma, Hodgkin's and Non-Hodgkin's lymphomas, haemangiosarcoma and lymphoma not otherwise specified.

DISCUSSION

This study was prompted by a previous population-based study of the burden of oral malignancies in Zimbabwe where OKS was the commonest oral malignancy and mostly affected the palate[14]. Previous studies from Zimbabwe[7,13] on general cancer trends have reported dramatic increases in the incidence of Kaposi's sarcoma (KS) making KS the most common cancer in males and the second most common in females after cervical cancer. In this study, the study population is seven times more likely to develop OKS than OSCC while males have double the chances of developing OKS compared to females. Consequently Kaposi's sarcoma has overtaken squamous cell carcinoma to become the most common form of oral malignancy in the three population categories of males, females and the whole population during the study period. These changes were due to the HIV/AIDS epidemic in Zimbabwe where some of the highest HIV infection rates have been reported[15] and non-provision of Highly Active AntiRetroviral Treatment (HAART) in the public health sector during the study period.

The frequency of other AIDS associated malignancies in this study is very low. This can be attributed to a number of reasons. Despite the Zimbabwe National Cancer Registry attaining international accreditation for quality of its data during the study period by the International Agency for Research on Cancer (Lyon, France), missed cases remain an inherent weakness of studies using registry data. Another explanation could have been occurrence of the bulk of such malignancies at extraoral sites or death of the patients before intraoral involvement. It has been reported that survival of cases with AIDS related KS is worse in younger than in older age groups and the median survival for AIDS patients presenting with KS is between 19 and 22 months[16]. The non-provision of HAART during the study period at state hospitals in Zimbabwe worsened the prognosis of patients with KS.

The role of the g herpesvirus, human herpes virus 8 (HHV-8), in the pathogenesis of KS presents conflicting views. There is a widely held view that HHV-8 plays a synergistic role in the pathogenesis of KS[16-20]. HIV-1 is the most prevalent HIV strain in Zimbabwe[14]. However, evidence from Ivory Coast in West Africa prompts a revision of this view. A study from Ivory Coast reported high anti-HHV-8 antibodies comparable to levels seen in the high KS incidence areas and also that KS was a much less frequent complication of HIV-2 infection than it was of HIV-1 infection[22]. The same authors also reported that increases in infection rates since 1987 had been largely due to the transmission of HIV-1, whereas the infection rates of HIV-2 had remained stable or had declined. Furthermore, the same group of authors found that prior to the AIDS epidemic, KS was a relatively rare cancer in West Africa compared with the endemic areas in east and southern Africa. In their opinion, this did not appear to reflect a marked difference in the prevalence of infection with the causative agent, human herpes virus 8 (HHV8), because seroprevalence of anti-HHV-8 antibodies in West Africa was high and quite comparable to that seen in the high incidence areas for KS. In view of these findings, it can be hypothesised that in sub-Saharan Africa, HHV-8 plays a HIV strain selective synergistic role in the pathogenesis of KS. This role is illustrated with the HIV-1 strain and not HIV-2 strain. The high HHV-8 infection levels already prevalent in West Africa are fertile ground for the HIV-1 strain and dramatic increases in the incidence of KS more specifically OKS can be anticipated. This point calls for further studies from West Africa where HIV-1 infection has been on the increase and strengthening of oral health screening programs.

Oral KS by age.

The high rates of OKS in the 0-4 age group suggest that a high proportion of babies were born HIV positive then developed OKS in infancy as observed in a Zimbabwean study of total body KS[14]. At the other end of the age spectrum, the 75+ age group also had high OKS rates. The latter increase most likely reflects rates of the endemic form, which usually affects the lower extremities of the elderly than the epidemic form of KS or a mixture of the two. However, at which age group the epidemic form ends and the endemic form starts remains imprecise. This is further complicated by the reported increase of classic KS in Greece and a speculative role of HHV-8 in this increase[23]. This study illustrates that OKS is predominantly a disease of young adults, which is attributable to the HIV/AIDS epidemic.

Oral KS by site

The oral KS frequency of 51% in this study represents a ten-fold increase of KS frequencies reported in an earlier study in Zimbabwe[5]. Though the palate is the most commonly affected intraoral site in this study and Uganda[24] there are differences in subsequent intraoral sites affected by OKS as the Ugandan study had the palate followed by the gingiva, tongue and tonsil. Ziegler and Katongole-Mbidde (1996) reported a similar intraoral site distribution of OKS in another study from the same geographical region of east Africa[25]. Canto and Devesa (2002) reported that OKS accounted for 1.2%, mainly occurring on the hard palate and only 10% of total KS cases were found in the pharynx[26]. It can be concluded that even though the palate is the most commonly affected intraoral site, differences do occur at other intraoral sites affected by OKS possibly due to geographical and or intrinsic factors.

ACKNOWLEDGEMENTS

The raw data for this study was accessed from the Zimbabwe National Cancer Registry.

REFERENCES

1. Chokunonga E, Levy LM, Bassett MT, Mauchaza BG, Thomas DB and Parkin DM.. Cancer incidence in the African population of Harare, Zimbabwe: Second results from the cancer registry 1993-1995. *International Journal of Cancer* 2000; 85:54-59
2. Wabinga HR, Parkin DM, Wabwire-Mangen F and Nambooze S. Trends in cancer incidence in Kyadondo County, Uganda, 1960-1997. *British Journal of Cancer* 2000; 82(9):1585-1592.
3. Beral V and Newton R. (1998). Overview of the Epidemiology of Immunodeficiency-Associated Cancers. *Journal of the National Cancer Institute Monographs* 1998; No. 23;1-6.
4. Bassett MT, Chokunonga E, Mauchaza B, Levy L, Ferlay J and Parkin DM. Cancer in the African population of Harare, Zimbabwe, 1990-1992. *International Journal of Cancer*1995a; 63:29-36.
5. Bassett MT, Levy L, Chokunonga E, Mauchaza B, Ferlay J and Parkin DM. Cancer in the European population of Harare, Zimbabwe, 1990-1992. *International Journal of Cancer* 1995b; 63:24-28.
6. Bayley AC. Occurrence, clinical behaviour and management of Kaposi's sarcoma in Zambia. *Cancer Surv.* 1991;10:53-71.
7. Chokunonga E, Levy LM, Bassett MT et al. Aids and cancer in Africa: the evolving epidemic in Zimbabwe. AIDS 1999; 13(18):2583-2588.
8. Sitas F, Pacela-Norman R, Carrara H et al. The spectrum of HIV-1 related cancers in South Africa. *International Journal of Cancer* 2000; 88:489-492.
9. Newton R, Ngilimana PJ, Grulich A et al. Cancer in Rwanda. *International Journal of Cancer* 1996; 66:75-81.
10. Wabinga HR, Parkin DM, Wabwire-Mangen F and Mugerwa JW. Cancer in Kampala, Uganda, in 1989-91: Changes in incidence in the era of AIDS. *International Journal of Cancer* 1993; 54:26-36.
11. Banda LT, Parkin DM, Dzamalala CP and Liomba NG. Cancer incidence in Blantyre, Malawi 1994-1998. Tropical Medicine and International Health 2001; 6(4):296-304.
12. Coogan MM, Greenspan J and ChallacombeSJ. Oral lesions in infection with human immunodeficiency virus. Bulletin of the World Health Organization September 2005, 83 (9)
13. Central Statistical Office. Census 1992 Zimbabwe national report. Harare, Zimbabwe, Zimbabwe Government Printers. November 1994.15p.
14. Marimo C and Hille JJ. The burden of oral malignancies in Zimbabwe 1'988 to 1997: a population based study. *Central African Journal of Medicine* May/June 2006; 52(5/6):51-55.
15. Chitsike I and Siziya S. Seroprevalence of

Human Immunodeficiency Virus type 1 infection in childhood malignancy in Zimbabwe. *Central African Journal of Medicine* 1998; 44(10):242-245.
16. "Zimbabwe Epidemiological Fact Sheets on HIV/AIDS and Sexually Transmitted Infections, 2002 update" UNAIDS, UNICEF & WHO; 9th February 2003.
17. Brewster DH, Harris V, Black RJ and Goldberg DJ, (1999). Epidemiology of Kaposi's sarcoma in Scotland, 1976-1996. British Journal of Cancer 1999; 79:1938-1942.
18. Newton R, Beral V and Weiss R. Human immunodeficiency virus infection and cancer. Cancer Surveys 1999;Vol 33: Infections and Human Cancer.
19. Taylor MM, Chohan B, Lavreys L et al. Shedding of human herpesvirus 8 in oral and genital secretions from HIV-1-seropositive and -seronegative Kenyan women. *Journal of Infectious Diseases* 2004; Aug 1;190(3):484-8. Epub 2004 Jul 7.
20. Wamburu G, Masenga EJ, Moshi EZ, Schmid-Grendelmeier P, Kempf W, Orfanos CE. HIV - associated and non - HIV associated types of Kaposi's sarcoma in an African population in Tanzania. Status of immune suppression and HHV-8 seroprevalence. *European Journal of Dermatology* 2006; Nov-Dec;16(6):677-82.
21. Kumar N, McLean K, Inoue N et al. Human herpesvirus 8 genoprevalence in populations at disparate risks of Kaposi's sarcoma. *Journal of Medical Virology* 2007; Jan;79(1):52-9.
22. Echimane AK, Ahnoux AA, Adoubi I et al. Cancer incidence in Abidjan, Ivory Coast. First results from the Cancer Registry, 1995-1997. Cancer 2000; 89(3):653-663.
23. Touloumi G, Kaklamanis L, Potouridou I et al. (1997). The epidemiologic profile of Kaposi's sarcoma in Greece prior to and during the AIDS era. *International Journal of Cancer* 1997; 70:538-541.
24. Parkin DM, Whelan SL, Ferlay J, Raymond L and Young J, eds. Cancer Incidence in Five Continents, Vol VII 1997; IARC Scientific publications No.143. Lyon, IARC.
25. Ziegler JL and Katongole-Mbidde E. Kaposi's sarcoma in childhood: An analysis of 100 cases from Uganda and relationship to HIV infection. *International Journal of Cancer* 1996; 65:200-203.
26. Canto MT and Devesa SS. Oral cavity and pharynx cancer incidence rates in the United States, 1975-1998. Oral Oncology 2002; 38:610-617.
27. Chokunonga E, Levy LM, Bassett MT, Mauchaza BG, Thomas DB and Parkin DM.. Cancer incidence in the African population of Harare, Zimbabwe: Second results from the cancer registry 1993-1995. International Journal of Cancer 2000; 85:54-59
28. Wabinga HR, Parkin DM, Wabwire-Mangen F and Nambooze S. Trends in cancer incidence in Kyadondo County, Uganda, 1960-1997. *British Journal of Cancer* 2000; 82(9):1585-1592.
29. Beral V and Newton R. (1998). Overview of the Epidemiology of Immunodeficiency-Associated Cancers. *Journal of the National Cancer Institute Monographs* 1998; No. 23;1-6.
30. Bassett MT, Chokunonga E, Mauchaza B, Levy L, Ferlay J and Parkin DM. Cancer in the African population of Harare, Zimbabwe, 1990-1992. *International Journal of Cancer* 1995a; 63:29-36.
31. Bassett MT, Levy L, Chokunonga E, Mauchaza B, Ferlay J and Parkin DM. Cancer in the European population of Harare, Zimbabwe, 1990-1992. *International Journal of Cancer* 1995b; 63:24-28.
32. Bayley AC. Occurrence, clinical behaviour and management of Kaposi's sarcoma in Zambia. *Cancer Surv.* 1991;10:53-71.
33. Chokunonga E, Levy LM, Bassett MT et al. Aids and cancer in Africa: the evolving epidemic in Zimbabwe. AIDS 1999; 13(18):2583-2588.
34. Sitas F, Pacela-Norman R, Carrara H et al. The spectrum of HIV-1 related cancers in South Africa. *International Journal of Cancer* 2000; 88:489-492.
35. Newton R, Ngilimana PJ, Grulich A et al. Cancer in Rwanda. *International Journal of Cancer* 1996; 66:75-81.
36. Wabinga HR, Parkin DM, Wabwire-Mangen F and Mugerwa JW. Cancer in Kampala, Uganda, in 1989-91: Changes in incidence in the era of AIDS. *International Journal of Cancer* 1993; 54:26-36.
37. Banda LT, Parkin DM, Dzamalala CP and

Liomba NG. Cancer incidence in Blantyre, Malawi 1994-1998. *Tropical Medicine and International Healt*h 2001; 6(4):296-304.

38. Coogan MM, Greenspan J and ChallacombeSJ. Oral lesions in infection with human immunodeficiency virus. Bulletin of the World Health Organization September 2005, 83 (9)
39. Central Statistical Office. Census 1992 Zimbabwe national report. Harare, Zimbabwe, Zimbabwe Government Printers. November 1994.15p.
40. Marimo C and Hille JJ. The burden of oral malignancies in Zimbabwe 1'988 to 1997: a population based study. *Central African Journal of Medicine* May/June 2006; 52(5/6):51-55.
41. Chitsike I and Siziya S. Seroprevalence of Human Immunodeficiency Virus type 1 infection in childhood malignancy in Zimbabwe. *Central African Journal of Medicine* 1998; 44(10):242-245.
42. "Zimbabwe Epidemiological Fact Sheets on HIV/AIDS and Sexually Transmitted Infections, 2002 update" UNAIDS, UNICEF & WHO; 9th February 2003.
43. Brewster DH, Harris V, Black RJ and Goldberg DJ, (1999). Epidemiology of Kaposi's sarcoma in Scotland, 1976-1996. *British Journal of Cancer* 1999; 79:1938-1942.
44. Newton R, Beral V and Weiss R. Human immunodeficiency virus infection and cancer. Cancer Surveys 1999;Vol 33: Infections and Human Cancer.
45. Taylor MM, Chohan B, Lavreys L et al. Shedding of human herpesvirus 8 in oral and genital secretions from HIV-1-seropositive and -seronegative Kenyan women. *Journal of Infectious Diseases* 2004; Aug 1;190(3):484-8. Epub 2004 Jul 7.
46. Wamburu G, Masenga EJ, Moshi EZ, Schmid-Grendelmeier P, Kempf W, Orfanos CE. HIV - associated and non - HIV associated types of Kaposi's sarcoma in an African population in Tanzania. Status of immune suppression and HHV-8 seroprevalence. *European Journal of Dermatology* 2006; Nov-Dec;16(6):677-82.
47. Kumar N, McLean K, Inoue N et al. Human herpesvirus 8 genoprevalence in populations at disparate risks of Kaposi's sarcoma. *Journal of Medical Virology* 2007; Jan;79(1):52-9.
48. Echimane AK, Ahnoux AA, Adoubi I et al. Cancer incidence in Abidjan, Ivory Coast. First results from the Cancer Registry, 1995-1997. Cancer 2000; 89(3):653-663.
49. Touloumi G, Kaklamanis L, Potouridou I et al. (1997). The epidemiologic profile of Kaposi's sarcoma in Greece prior to and during the AIDS era. *International Journal of Cancer* 1997; 70:538-541.
50. Parkin DM, Whelan SL, Ferlay J, Raymond L and Young J, eds. Cancer Incidence in Five Continents, Vol VII 1997; IARC Scientific publications No.143. Lyon, IARC.
51. Ziegler JL and Katongole-Mbidde E. Kaposi's sarcoma in childhood: An analysis of 100 cases from Uganda and relationship to HIV infection. *International Journal of Cancer* 1996; 65:200-203.
52. Canto MT and Devesa SS. Oral cavity and pharynx cancer incidence rates in the United States, 1975-1998. *Oral Oncology* 2002; 38:610-617.