SHORT REPORT

A PATHOLOGY-BASED CANCER REGISTRY FOR BLACK SOUTH AFRICAN CHILDREN AND ADOLESCENTS — 12-YEAR DATA ANALYSIS

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In 1991 a pathology-based cancer registry for children aged 0 - 15 years and adolescents aged 15 - 21 was created by the Department of Anatomical Pathology, Medical University of Southern Africa. The registry shows the relative frequency and incidence rates of benign and malignant neoplasms (MNs) in children and adolescents treated at Ga-Rankuwa Hospital. The hospital serves approximately 2 million black children and adolescents, mainly Tswanas and Vendas of the Northern Province. Regional population data were based on 1980 and 1985 census figures, and estimated figures for 1986 - 1996 were calculated by the Centre for Information Analysis, Development Bank of Southern Africa.[1] Benign neoplasms were studied and data were published.[2] In the study of MNs seen between 1985 and 1996, 1 458 cases were registered. The International Classification of Diseases for Oncology (ICD-O) code was used to index the pathology, and diseases were classified according to the scheme of Birch and Mardsen.[3]

We found that leukaemia (26.7%), nephroblastoma (15.4%), connective-tissue MNs (12.8%), central nervous system (CNS) MNs (10.3%), lymphoma (9.1%), soft-tissue MNs (8.6%), retinoblastoma (5.9%), neuroblastoma (5.9%), and epithelial MNs (5.3%) were the most frequent MNs in children. Carcinoma (24.4%), leukaemia (21%), osteosarcoma (24.6%), soft-tissue MNs (8.9%) and lymphomas (6.8%) were the most common in adolescents. The overall incidence rate for MNs per million person-years was 62.8 for males and 49.7 for females. The detailed relative frequencies and incidence rates (per million per year) for children and adolescents are presented in Table I. Age distributions for the most common MNs in children and adolescents are presented in Table II.

Our study shows that the pattern of malignant disease in the 0 - 14-year age group resembles those of developed countries, with a high incidence of acute leukaemia and a low incidence of lymphoma. High relative frequency of nephroblastoma and retinoblastoma resembles the pattern reported in Zimbabwe.[4] A 10-year record from Tygerberg Hospital shows leukaemia, CNS tumours and lymphomas to be leading malignancies.[5]

The pattern of childhood malignancies in Africa shows regional differences. The common feature is a high incidence of lymphoma, but in some regions soft-tissue sarcomas are dominant.[6-9] Nephroblastoma was reported to be the second most common tumour after lymphoma in certain regions.[7,8] The 1995 Zimbabwe National Cancer Registry annual report identified retinoblastoma as the most common tumour in boys, followed by leukaemia, Kaposi's sarcoma, lymphoma and nephroblastoma.[4] In girls, retinoblastoma was followed by nephroblastoma, Kaposi's sarcoma, lymphoma and brain tumours.

This study found acute leukaemias to be dominated by lymphoblastic types, which is consistent with earlier studies on childhood leukaemia in Africa. Epithelial tumours were significant in the 15 - 21-year age group, but were also quite common in the 0 -14 age group. Squamous-cell carcinoma was usually associated with genetic disorders such as albinism or xeroderma pigmentosum (skin cancers), or schistosomiasis (carcinoma of the bladder). Similar epidemiological observations were made in Zimbabwe and Kenya.[4,9]

The overall incidence of MNs in our study appears to be low; however the study included only histopathologically or haematologically proven cases. In addition the population data are only roughly estimated, and may be incorrect as the result of continuous population movement. As the Third-World incidence of cancer is expected to rise rapidly in response to urbanisation and the HIV epidemic, it will inevitably affect paediatric patients too. The establishment of an effective cancer surveillance system to monitor changing trends and to plan efficient medical services cannot be over-emphasised. This should be done as a South African Paediatric Oncology Registry based on histological diagnosis rather than on organ localisation, as tumours such as neuroblastoma or rhabdomyosarcoma may have different localisation, but are treated with the same protocol.

We were unable to detect any pattern in the annual analysis of MNs in the 12-year study period. The annual number of registered tumours fluctuated from 97 to 284, with the highest numbers recorded in 1989, 1990 and 1991. We think that only nationwide analysis will give us valid population-based information.

National study groups devoted to researching different groups of paediatric tumours should be established. An example of what can be achieved by a multidisciplinary approach is the National Wilms' Tumour Study in the USA.[10,11] Thanks to collaborative study the survival rate is now approaching 90%, and Wilms' tumour patients can be cured with less intense and prolonged therapy. Adverse effects of this therapy are far more significant for young children than they are for elderly patients cured of cancer.

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Table I. Relative frequencies and incidence rates (per million per year) of malignant neoplasms in black children and adolescents

Neoplasm	Males (*N* = 754)			Females (*N* = 596)			
	N	%	Incidence rate	*N*	%	Incidence rate	M/F ratio*
Leukaemia	225	29.8	18.8	127	21.3	10.6	1.8:1
ALL	129	17.1	10.8	65	10.9	5.4	2.0:1
ANLL	74	9.7	6.2	41	6.9	3.4	1.8:1
CML	11	1.5	0.9	12	2.0	1.0	0.9:1
Others	11	1.5	0.9	9	1.5	0.8	1.1:1
Lymphoma	82	10.9	6.8	32	5.4	2.7	2.6:1
Hodgkin's	35	4.7	2.9	10	1.7	0.8	3.5:1
Non-Hodgkin's	27	3.6	2.3	14	2.4	1.2	1.9:1
Burkitt's lymphoma	4	0.5	0.3	2	0.3	0.2	—
NOS	16	2.1	1.3	6	1.0	0.5	2.7:1
Epithelial MNs	63	8.4	5.1	95	15.9	7.9	0.7:1
CIN III/Ca *in situ*	0			29	4.9	2.4	—
Squamous cell Ca	21	2.8	1.8	34	5.7	2.8	0.6:1
Adenocarcinoma	18	2.4	1.5	13	2.2	1.1	1.5:1
Hepatocellular Ca	6	0.8	0.5	2	0.3	0.2	—
Others	18	2.4	2.8	17	2.9	1.4	1.1:1
Soft-tissue sarcoma	67	8.9	5.6	46	7.7	3.8	1.5:1
Rhabdomyosarcoma	43	5.1	3.6	30	5.1	2.5	1.4:1
Fibrosarcoma	11	1.5	0.9	12	2.0	1	0.9:1
Others	13	2.3	1.1	4	0.6	0.3	—
Bone MNs	90	11.9	7.5	56	9.4	4.7	1.6:1
Osteosarcoma	89	11.8	7.4	53	8.9	4.4	1.7:1
Ewing's sarcoma	0			1	0.2	0.1	—
Others	1	0.1	0.1	2	0.3	0.2	—
CNS MNs	54	7.2	4.5	50	8.4	4.2	1.1:1
Astrocytoma	31	4.1	2.6	30	5.0	2.5	1:1
Medulloblastoma	9	1.2	0.8	8	1.3	0.7	—
Glioblastoma	2	0.3	0.2	5	0.8	0.4	—
Ependymoma	4	0.5	0.3	4	0.7	0.3	—
Others	8	1.1	0.7	3	0.6	0.25	—
Neuro-epithelial MNs	61	8.1	5.1	45	7.6	3.8	1.4:1
Retinoblastoma	29	3.9	2.4	22	3.7	1.8	1.3:1
Neuroblastoma	32	4.2	2.7	21	3.5	1.75	1.5:1
Others	0			2	0.4	0.2	—
Germ-cell and trophoblastic MNs	4	0.5	0.3	35	5.9	2.9	—
Malignant teratoma	1	0.1	0.1	13	2.1	1.1	—
Seminoma/dysgerminoma	0			10	1.7	0.8	—
Endodermal sinus tumour	1	0.1	0.1	7	1.2	0.6	—
Choriocarcinoma	0			4	0.7	0.3	—
Others	2	0.3	0.2	1	0.2	0.1	—
Complex, mixed and stromal MNs	81	10.7	6.8	88	14.8	7.3	0.9:1
Nephroblastoma	70	9.3	5.8	73	12.3	6.1	0.95:1
Hepatoblastoma	3	0.4	0.3	10	1.7	0.8	—
Others	8	1.0	0.7	5	0.8	0.4	—
Subtotal	727	96.4	60.6	574	96.3	47.8	1.3:1
MNs not otherwise classified	27	3.6	2.6	22	3.7	1.8	1.2:1
Total	754	100	62.8	596	100	49.7	1.3:1

*M/F ratio not calculated when N < 10.
ALL = acute lymphocytic leukaemia; ANLL = acute non-lymphocytic leukaemia; CML = chronic myeloid leukaemia; NOS = not otherwise specified; CIN = cervical intra-epithelial neoplasia.

Table II. Age distribution and mean age for the commonest MNs (1985 - 1996)

Neoplasm	Age (yrs) 0 - 5	6 - 10	11 - 15	0 - 15	16 - 21	Mean age (yrs) (SD)
Leukaemias	62	111	99	272	92	10.5 (6.9)
Lymphomas	12	43	39	94	30	10.8 (4.98)
Epithelial MNs	8	12	34	54	107	15.5 (4.8)
Nephroblastoma	100	51	5	156	3	4.6 (4.4)
Soft-tissue MNs	34	34	15	83	39	9.7 (6.4)
Bone MNs	0	8	36	44	111	16.1 (6.1)
CNS MNs	24	51	30	105	19	8.9 (5.2)
Retinoblastoma	52	7	1	60	0	2.7 (1.9)
Neuroblastoma	37	18	6	60	1	4.9 (3.9)
Germ-cell MNs	16	4	6	26	26	9.6 (7.3)
Hepatoblastoma	12	2	0	14	0	2.7 (2.3)
Other	20	31	11	50	11	
Total	376	360	282	1 018	439	10.1 (6.7)

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