

THE SPECTRUM OF MALIGNANT NEOPLASMS IN SARAWAK JANUARY 1976 — DECEMBER 1977

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SYNOPSIS

This is an analysis of histologically proven neoplasms encountered in Sarawak in 1976 and 1977. There were 1447 benign and 1368 malignant tumours. The detailed break down of malignant neoplasms with their racial and sex distribution is reported. Lymph node involvement, with primary and metastatic lesions, constituted the largest single group with 22.3 per cent of all malignancies. The next in order of frequency was the Reproductive system with a marked preponderance of Cervical Carcinoma in females. The next in frequency were Skin cancers (8.85%) and Nasopharyngeal Carcinoma (8.4%). Primary liver cell cancer and Breast cancer constituted 5.85 per cent and 5.79 per cent respectively of all malignant tumours. The high prevalence of malignant neoplasms in Chinese is suggestive of racial predisposition.

INTRODUCTION

Geographic pathology is an accepted basis for unravelling trends of disease patterns and for epidemiological studies. Industrialisation and the consequent movement of rural population into cities and towns are two important factors which reflect in the changing pattern of disease, particularly in developing countries. Properly documented data in the initial stage of development of a country should serve as a useful pointer towards a better understanding of health problems and their prevention. Periodic assessment of similar data would also give an indication of the strategy that may be necessary for prevention or early detection of a particular disease for the betterment of the community as a whole.

With increasing longevity the population is being exposed for longer periods to known and unknown oncogenic factors. Amongst the many less known factors environment, diet and heredity are indeed important and are likely to influence neoplastic diseases. Hence, a study of such lesions and their prevalence is justified. It appears that only two papers have

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been published on "Cancer in Sarawak" by Arulambalam (1968) and Muir and Oakley (1966).

Sarawak is situated within the latitude 1° - 4° North of the Equator and is one of the states in Federation of Malaysia with a total area of 48,050 Square miles.

The country is essentially covered with equatorial rain forest, criss-crossed with rivers, having a hot, humid, wet climate over most of the year. The total population according to figures for the year 1975, was 1,102,956 with an estimated annual growth rate of 2.5 per cent. The population is multi-racial and consists of several ethnic groups, with Dayak (Sea and Land) forming the largest single group, followed by Chinese and Malay. Other ethnic groups including those of Indian origin constitute a small minority group. The sex distribution of the whole population is more or less equal (Siaran Perangkaan Tahunan - Annual Statistical Bulletin, Sarawak 1976). The expected 1976 and 1977 population is shown in Table I. Kuching is the Capital of Sarawak with the largest population; the other big towns being Sibul and Miri. The three main industries of Sarawak are Timber, Crude oil and Pepper, the first two constituting the bulk. The total number of registered motor vehicles in 1976 was 80,444, (Siaran Perangkaan Tahunan - Annual Statistical Bulletin, Sarawak (1976), page 111) with a rise of nearly 8,000 over the previous year. Added to this is an ever increasing number of Rivercrafts of various types and capacities operated on diesel motors and engines. With deforestation, haphazard use of herbicides and insecticides, industrialisation and increase in motor vehicles of all kinds, the factor of environmental pollution has to be reckoned with in the context of the material

presented in this article.

MATERIAL AND METHODS

This an anlysis of benign and malignant neoplasms encountered in Sarawak hospitals during the year 1976 and 1977, and confirmed histologically, in the Central Laboratory, Kuching and Divisional Laboratory, Sibul. Reasonable care has been exercised to exclude repeat biopsies of the same patient; however, the possibility of inclusion of a few repeat biopsies cannot be entirely ruled out. In this article it is proposed to deal in detail with malignant neoplasms only, although data for benign tumours is documented in brief. The patient population has been broken down into four main groups — "Dayaks", "Chinese", "Malay" and "Others", with their sexes. The Sea Dayak, Land Dayak are included in "Dayaks". In "Others" are included patients of other indigenous ethnic groups, Indian and Europeans. During the two year period 2,815 neoplastic lesions were detected. Out of these 1368 were malignant, with an incidence of 48.6 per cent of all tumours. Cases of Leukaemias with accurate figures, their sex and racial distribution were not available from all hospitals and laboratories. Generally doubtful cases of leukaemias and those on Chemotherapy were referred to the Central Laboratory or the Divisional laboratories. In view of these lacunae they are shown separately to indicate the prevalence of different types and not included in the neoplastic lesions, (Table 2).

Tumours were classified according to Systems except those which showed a high frequency in order to highlight their importance (Fig. 1).

TABLE I: Estimated Population

RACES	YEAR		Malignant tumour per 100,000	
	1976	1977	1976	1977
MALAY (Inc. MELANAU)	282,756	290,108	43.5	46.5
CHINESE	353,281	362,466	78.4	79.5
DAYAK (SEA & LAND)	437,566	448,943	52.3	52.1
"OTHERS"	70,410	72,241	58.2	56.8
TOTAL POPULATION	1,144,013	1,173,758	—	—

For 1976 : 2.5% increase over the known 1975 population figure.

For 1977 : 2.6% increase over the estimated 1976 population.

Benign Tumours:

Amongst the benign tumours the largest group was of soft tissues which include leiomyoma of the uterus and lipoma. The next largest group consisted of tumours of the Female Reproductive System amongst which the majority were cystic tumours of the ovary. Benign tumours of the skin and adnexa form another large group. The majority of these were epidermal cysts and 8 of Calcifying epithelioma. The youngest patient with Calcifying epithelioma was

only 6 months old, and all occurred in Chinese. Whether to consider this lesion a neoplasm in its true sense, or a malformation of hair follicles is indeed a moot point as discussed by Turhan and Krainer (1942). Amongst the breast tumours Mammary dysplasia and Gynaecomastia were excluded. Hydatidiform mole, though few in number, is separately shown for easy comparison with its malignant counterpart. Amongst the benign tumours of the Respiratory System there were 85 nasal polypi and the rest were laryngeal polyps. A single case of

TABLE II: Leukaemia (Jan. 1976 — Dec. 1977) (From Central Laboratory, Kuching and Divisional Laboratory, Sibul.)

	AC. LYMPHO-BLASTIC		CHR. LYMPHO-CYTIC	AC. MYELO-BLASTIC	CHR. MYELO-CYTIC	MYELO-MONO-CYTIC
CHINESE (19)	MALE	5	NIL	8	2	NIL
	FEMALE	1	NIL	3	NIL	NIL
DAYAK (22)	MALE	6	NIL	1	2	NIL
	FEMALE	1	NIL	7	2	3
MALAY (4)	MALE	NIL	NIL	NIL	NIL	NIL
	FEMALE	2	NIL	2	NIL	NIL
OTHERS	NIL		NIL	NIL	NIL	NIL
TOTAL	15		NIL	21	6	3 = 45

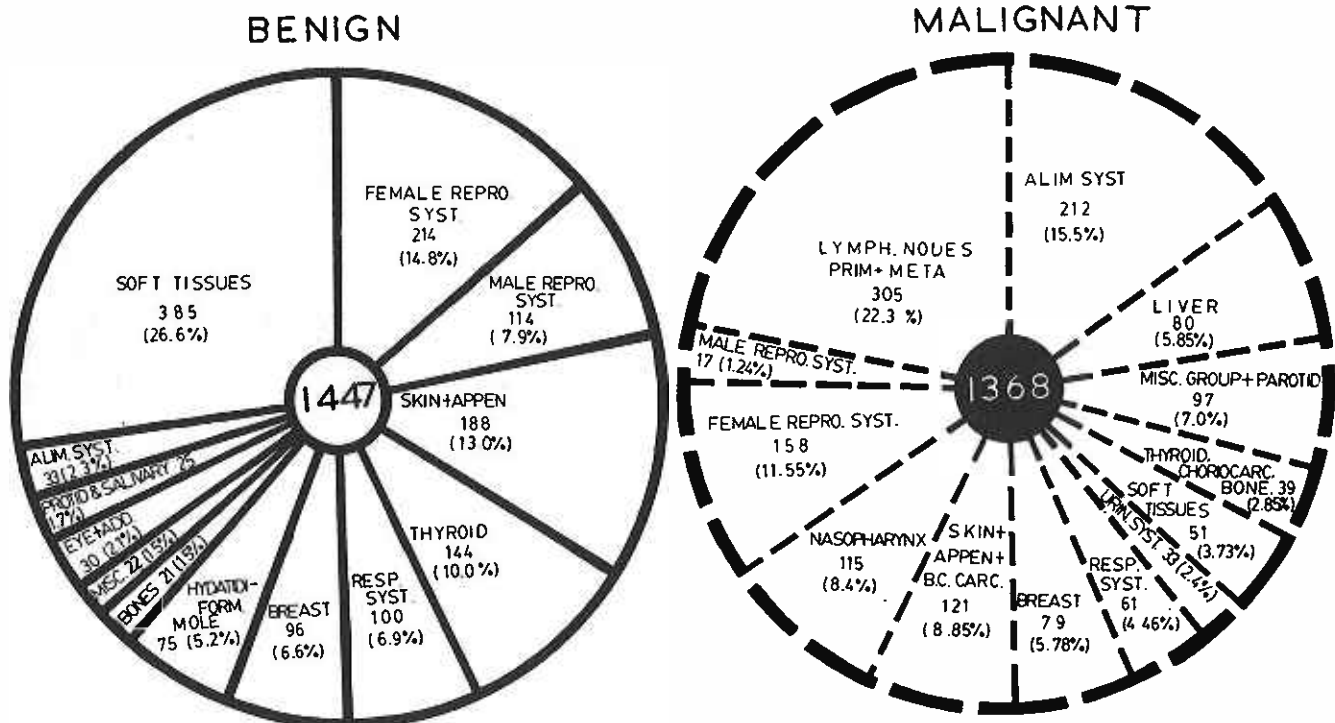


Fig. 1: Spectrum of Neoplasms in Sarawak (Jan. 1976 — Dec. 1977).

CHART BY: MOHD FAIDZIAL BACHOK central laboratory (30-1-78)

Biliary Cyst and one of Carcinoid of the appendix were recorded. Two Adenomatoid tumours, one of the fallopian tube and the other of the testis, were also encountered.

Malignant neoplasms: (Table.3 and Fig. 2)

Alimentary System: Two hundred and twelve malignant tumours were recorded with an incidence

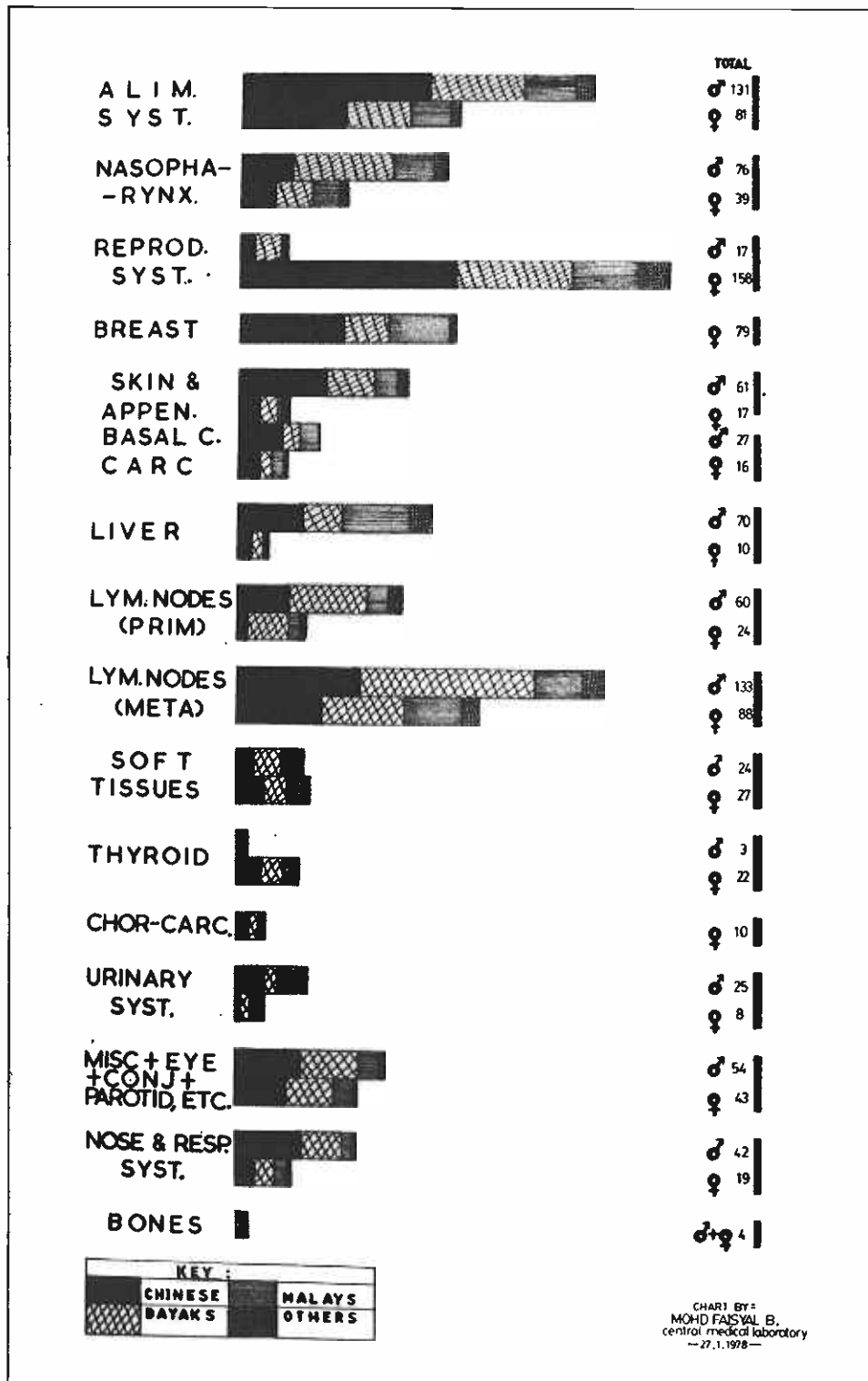


Fig. 2: Malignant Neoplasms and their Racial Distribution

TABLE III: Racial and sex distribution of Malignant Neoplasms (Jan. 1976 — Dec. 1977)

SITE	CHINESE		DAYAK		MALAY		"OTHERS"		TOTAL 1368
	M	F	M	F	M	F	M	F	
ALIM. SYST.									
Mouth & Cheek	3	1	2	7	3	1	—	2	16
Tongue	3	2	1	2	—	—	3	—	11
Pharynx	9	1	1	3	1	—	—	—	15
Oesophagus	9	3	—	—	2	2	—	1	17
Stomach	16	7	25	7	5	4	1	—	65
Duodenum)								
S. Intestine	)	3	2	—	1	—	—	—	6
Caecum	3	1	—	1	2	—	—	—	7
Colon	12	13	—	—	1	—	1	—	27
Rectum	12	9	4	2	4	8	2	—	41
Anus	—	—	2	1	1	—	—	—	4
RESP. SYST.									
Larynx	1	1	3	1	1	5	—	—	12
Bron. & Lung	12	3	4	2	—	—	—	—	21
Pleura	4	1	1	—	—	—	—	—	6
Nasopharynx	19	12	37	14	15	10	5	3	115
Nose & Acc.)								
Sinuses	)	7	1	7	4	2	—	—	22
REPR. SYST. (F)									
Vulva	—	2	—	—	—	—	—	1	3
Vagina	—	4	—	—	—	—	—	—	4
Cervix	—	50	—	25	—	13	—	6	94
Uterus	—	6	—	3	—	4	—	2	15
Ovary	—	18	—	14	—	8	—	2	42
REPR. SYST. (M)									
Penis	5	—	5	—	—	—	—	—	10
Testis	—	—	1	—	—	—	1	—	2
Prostate	—	—	4	—	1	—	—	—	5
URIN. SYST.									
Kidney	1	—	2	1	3	1	—	—	8
Bladder	9	1	3	2	4	2	3	1	25
SOFT TISSUES	6	10	10	9	6	6	2	2	51
Choriocarc.	—	4	—	3	—	3	—	—	10
Skin & Appen.	32	7	17	6	9	1	3	3	78
Basal C. Carc.	16	8	5	3	6	4	—	1	43
Bones	—	—	1	—	2	1	—	—	4
Breast	—	39	—	16	—	22	—	2	79
PRIM. LY NODE	19	3	29	15	8	4	4	2	84
MET. LY. NODE	45	31	63	30	17	21	8	6	221
Thyroid	—	9	1	8	2	3	—	2	25
Liver	23	5	14	3	25	1	8	1	80
"Misc. Group"	24	18	22	17	6	7	2	1	97

of 15.5 per cent of all malignancies. There were only 30 lesions in the oral cavity, 11 of the tongue and 19 of the buccal mucosa. All were Squamous Cell Carcinoma. In 15 patients, lesions in the oropharynx and hypopharynx were detected.

Oesophageal Carcinoma was noted in 17 cases with a male to female ratio of 1.8:1. The youngest was 45 and the oldest 77 years. All were Squamous Carcinoma.

Carcinoma of the Stomach was detected in 65 cases with a male preponderance of 2.6:1. The youngest patient was 24 and the oldest 82 years. The duodenum and small intestine were involved in 2 and 4 cases respectively. In the duodenum the adenocarcinoma was in the first and the second part. Two jejunal tumours were leiomyosarcoma, one a lymphosarcoma and one poorly differentiated neoplasm.

Caecum, Colon, Rectum and Anal Canal: There were 79 patients with adenocarcinoma, of which 41 occurred in the rectum. The sex distribution was more or less equal in all sites. The age range was between 22 - 86 years. The youngest patient with colonic carcinoma was 22 years and the oldest 79. Amongst the rectal carcinoma the youngest was 36 and the oldest 86 years. An Ileo-caecal mass showing Malignant carcinoid in a Dayak female 24 years old was also recorded. Majority of the patients were in the age group 41 - 60 years.

Reproductive System: Malignant tumours in both sexes together numbered 175 with a percentage of 12.79 of all malignancies.

FEMALE: In this system the most notable finding was the high frequency of Cervical Carcinoma (including "Carcinoma-in-Situ") with the maximum number occurring in Chinese. Except 3 all were of the Squamous type. The youngest female was 24 and the oldest 80 years, majority were between 41-60 years. As against this, carcinoma of the uterine body was comparatively uncommon. Amongst 42 cases of ovarian malignancy there were 4 cases of Dysgerminoma, 1 of Granulosa cell carcinoma and 1 of Krukenberg tumour. The youngest patient with Dysgerminoma was 16 and the oldest 27 years; both were Chinese. The Dayak and Malay community had 1 case each. The rest were ovarian cysts with malignant change. Amongst these there was a case of Adenoacanthoma in a Chinese 45 years old (Table IV).

MALE: There were only 17 tumours with 10 penile, 5 prostatic and 2 testicular malignancies. One of the latter was Lymphoma in a Dayak child of 9 years and the other an Embryonal cell carcinoma in an adult Indian.

Urinary System: Urinary bladder was the most frequently involved organ, totalling 25 cases, with 3:1 male to female ratio. The youngest patient was 26 and the oldest 80 years. Majority occurred after the age of 51 years. In one of these there was evidence of Schistosomiasis. Amongst the renal tumours there

were 5 cases of Nephroblastoma; the youngest child was 18 months and the oldest 4 years. Amongst the three cases of Renal cell carcinoma the youngest was 7 years and the oldest 51 years.

Skeletal System: Bone tumours appear to be rare in this country. Only four cases were recorded one of which was Ewing's tumour. This was a Dayak male age 16 years; the rest were diagnosed as Spindle Cell Sarcoma.

Respiratory System: There were 12 cases of laryngeal carcinoma, and 21 of Bronchogenic and Lung carcinoma together. The rest were metastatic pleural lesions.

Nasopharynx: This group as expected was the largest single group with 115 cases constituting 8.41 percent of all malignancies, with male to female ratio 2:1. The majority of patients were Dayaks, with Chinese, Malays and "Others" in decreasing number. The youngest patient was 9 and the oldest 79 years. Majority of the patients were between 31 - 60 years age group.

Breast: The maximum number of carcinoma recorded were amongst Chinese and more or less equal number in Malay and Dayak. The youngest female was 25 and the oldest 76 years; all were female patients. This lesion thus constituted 5.78 per cent of all malignancies. However, when considered amongst malignancies of females only it formed nearly 12.3 per cent of all such lesions.

Lymph node: Primary tumours of the lymph node were detected more frequently in males than in females, with preponderance of Dayak patients over the Chinese and Malay. Primary malignant lymphomas were detected in 84 patients whereas there were 221 instances of metastatic tumours in lymph nodes. Metastatic Poorly differentiated carcinoma constituted the large bulk of such a lesion in cervical lymph nodes. Only 74 nodes showed metastases other than those of Poorly differentiated carcinoma. Thus primary and metastatic lymph node lesions formed 22.30 per cent of all malignancies.

Soft tissues: All soft tissue tumours as suggested in W.H.O. Classification of Soft Tissue Tumours (1969), excluding Chorio-carcinoma and Malignant melanoma, were grouped together. There were 51 Sarcomas of various tissues with 3.73 per cent of all malignancies. The tumours were more or less equally distributed between the two sexes. One case of

TABLE IV: Female Reproductive System

RACE	VULVA	VAGINA	CERVIX	UTERUS	OVARY
CHINESE	2	4	50	6	18
DAYAKS	—	—	25	3	14
MALAYS	—	—	13	4	8
OTHERS	1	—	6	2	2
TOTAL	3	4	94	15	42

GRAND TOTAL : 158

Myosarcoma of the urinary bladder in a Chinese male child age 5 years were recorded.

Skin and Appendages: This group included Basal cell carcinoma and Malignant melanoma. There were 121 malignant tumours of the skin with an incidence of 8.85 per cent of all malignancies; 43 Basal cell carcinoma, 5 Malignant melanoma and the rest Squamous cell carcinoma. Amongst the Basal cell carcinoma the youngest was 35 and the oldest 78 years and amongst the skin carcinoma the youngest was 36 and the oldest 86 years. The majority of skin tumours occurred after the age of 50 years. Sex-wise skin cancers were almost three times more frequent in males than in females.

Liver: There were 78 cases of Primary carcinoma of the Liver with a percentage of 5.80 of all malignancies. The youngest adult was 25 and the oldest 72 years. There were 70 males as against only ten females. There was one case of Hepatoblastoma in a Malay male child age 8 years and one of "Mixed Malignant Tumour" of the liver in a Chinese male child, 10 years of age. Metastatic tumours in the liver were included amongst the Miscellaneous Group. Majority of the Liver cell Carcinomas occurred in the age group 41 - 60 years.

Miscellaneous Group: This consists of malignant tumours of the Parotid and other salivary glands, Eye, Conjunctiva and Eyelid and also metastatic tumours in unusual sites e.g. peritoneum, soft tissue etc. There were 97 such instances with an incidence of 7.09 per cent. A single case of Pancreatic carcinoma in a male of 61 years, a single case of Common bile duct carcinoma in Dayak male of 50, two of Gall bladder carcinoma in Chinese women, one case each of Retinoblastoma and Malignant melanoma of the eye, were also recorded.

Thyroid: There were 25 cases with an incidence of 1.83 per cent of all cancers. Amongst these there were 22 females.

Choriocarcinoma: This constituted only 0.73 per cent of all malignant tumours, there being only 10 recorded cases. The youngest was a Chinese, 21 years old.

DISCUSSION:

The maximum number of malignancies were recorded in the Lymphatic system; nearly 72 per cent of these being metastatic tumours. In the latter group

the majority of lymph nodes showed metastases of Poorly Differentiated Carcinoma. In numerous instances lymph node lesion was first detected followed by post nasal or nasopharyngeal strip biopsy, confirming the same. A similar observation has been made by Arulambalam (loc cit) and Kannan Kutty and Balasegaram (1972).

In the present series nearly 50 per cent of the Nasopharyngeal Carcinomas occurred in Dayaks, followed by Chinese, Malays and "Others". In the series published by Kannan Kutty and Balasegaram (loc cit) the vast majority occurred in Chinese. The youngest patient in the present series was a child of 9 years. From this it appears that factors inducing Nasopharyngeal Carcinoma are different in Sarawak and in West Malaysia and racial predisposition is not the only important factor.

Alimentary system with 15.5 per cent malignancies was the next in the order of frequency. The majority of cancers occurred in the stomach, rectum and colon in decreasing numbers. More than 50.0 per cent of all cancers occurred in Chinese, followed by Dayaks and Malays.

In the Female Reproductive System there were 94 cases of carcinoma of the cervix of which 50 occurred in Chinese, 25 in Dayaks, 13 in Malays and 6 in "Others". These findings are in agreement with those of Arulambalam (loc cit). In Kannan Kutty and Balasegaram's series (loc cit) nearly 55.0 per cent occurred in Chinese followed by Malays and Indians. When considered with malignancies of the female sex only, the incidence of Cancer of the Cervix is 14.6 per cent, and the majority occurred in the age group 41 - 60 years. Cervical carcinoma is associated with early marriage, multiparity and low income level. A prospective study in Chinese may prove fruitful in understanding the influence of these factors and their interplay.

Amongst the malignant tumours of the Skin and its appendages, which included Basal Cell Carcinoma and Malignant melanoma, more than 51.0 per cent occurred in Chinese, 25 per cent in Dayak, nearly 16.5 per cent in Malays and the rest in "Others". Majority of skin cancers, be they Squamous cell type or Basal cell carcinoma, occurred in patients in their 5th and 6th decade. In Kannan Kutty and Balasegaram's series (loc cit) such tumours occurred most frequently in Chinese. The other point of agreement is in the sex distribution of such tumours, being more common in Chinese males and overall preponderance of male involvement in all races. A high incidence of skin cancer in Tropical countries in nonpigmented races

is a well known fact. Exposure to the Tropical Sun of the male population, due to their outdoor occupation, is probably an important factor in the causation of skin cancers.

Primary Liver Cancer with 80 patients and marked male preponderance deserves consideration. Amongst males there were 25 Malays, 23 Chinese, 14 Dayaks and the rest in "Others". Kannan Kutty and Balasegaram (loc cit) reported the highest incidence in Chinese and an almost equal incidence in Malay and Indian communities. Amongst the predisposing conditions Cirrhosis of liver, Viral hepatitis, protein malnutrition and aflatoxin are enlisted. Except the last, other conditions are present in the Sarawak population. With increasing production of Ground nut the danger of aflatoxin as a hepato-carcinogenic agent has to be borne in mind and due precautions must be taken to prevent contamination with *Aspergillus flavus* which grows easily in hot, humid climate.

Breast Carcinoma constituted 5.78 per cent of all malignancies. All were female patients. When considered amongst malignancies of the female sex alone, the incidence is 12.3 per cent. The majority of patients were between 41 and 60 years age group. The racial distribution in Chinese, Malay, Dayak and "Others" occurred in diminishing frequency, contrary to the general belief that Mammary cancer is less common in oriental races. The highest incidence in Chinese indicates that breast cancers are probably induced by factors more important than race.

The incidence of Cancers of the Urinary system is as low as 2.41 per cent of all malignancies. Amongst these there were 25 Bladder cancers, 19 being in males and 6 in females. However, there were only 8 cases of Renal cell carcinoma out of which 8 were in males. Out of 33 malignancies in this system 11 occurred in Chinese, 10 in Malays, 8 in Dayaks and the rest in "others". In the series published by Kannan Kutty and Balasegaram (loc cit) Urinary bladder carcinoma was thrice as common as Renal carcinoma and the most frequently affected race being Chinese. Similar observations is noted in the present series. The frequent involvement of the bladder raises the possibility of concentration of the carcinogenic agent and its consequent effect on the bladder mucosa.

It is worth recording that one bladder carcinoma

was associated with Schistosomiasis in an Arab male aged 66 years. Although this could be an imported case of Schistosomiasis, the possibility of indigenous Schistosomiasis should not be overlooked. This case should serve as a warning to Health authorities of the inherent danger of Schistosomiasis. All that is required is the introduction of the parasite and a suitable intermediate host species in the snail population which abounds in Sarawak.

There were only 10 cases of Choriocarcinoma with an incidence of 0.73 per cent of all malignancies. This compares favourably with that reported by Kannan Kutty and Balasegaram (loc cit).

Finally the break down of all malignancies on Racial basis reveals the highest incidence of 41.3 per cent in Chinese, 33.8 per cent in Dayaks, 18.9 per cent in Malays and 6.0 per cent in "Others". On the population basis the prevalence of malignancies is as stated in Table I.

It would be interesting to observe, in future, the effect of air pollution on malignancies of the lung and bronchus which at present is as low as 1.5 per cent of all malignancies. The high prevalence of Primary liver cell Carcinoma offers an opportunity to undertake a prospective study in sibling to determine the role of genetic predisposition in this condition.

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