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Investigation on the prevalence of leukemia in North West Frontier Province of Pakistan

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ABSTRACT

A research project was carried out at Institute of Radiotherapy and Nuclear Medicine (IRNUM) Peshawar, in order to investigate the prevalence of different types of leukemias in North West Frontier Province of Pakistan, during 2001. During this study 60 leukemia patients admitted at IRNUM were investigated. It was found that acute leukemia was more prevalent than chronic leukemia as 90% of total investigations were of acute type. Male patients were 76.6% compared to 23.3% female patients, while most of the patients were below the age of 20. Subtypes study of acute leukemia revealed that ALL-L_1 (13 times) was more prevalent than ALL-L_2 while no case was registered for ALL-L_3. In AML subtypes, M_1 and M_2 subtypes were more frequent in patients than its other subtypes. AML-M_1 was twice more prevalent than AML-M_2. No case was registered for AML-M_6 while AML-M_1, AML-M_4 and AML-M_5 were found to be less prevalent. [Turk J Cancer 2005;35(3):119-122].

KEY WORDS:

Leukemia, ALL, AML, CLL, CML

INTRODUCTION

Cancer in all forms is causing about 12% of deaths throughout the world. In the developed world, cancer is the second leading cause of death, next to cardiovascular disease, accounting for 21% (2.5 million) of mortality. In developing world, it ranks 3rd as a cause of death and accounts for 9.5% (3.8 million) of all deaths (1).

The term leukemia usually refers to white blood cells malignancies; a rare case arising from red blood cells precursors is erythroleukemia, also termed as Di-Guglielmo's disease (2). Leukemias contain types and subtypes. Acute leukemia consists of malignant disorders that are rapidly fatal if left untreated but are potentially curable with appropriate therapy. They are characterized by sudden uncontrolled growth of immature hemopoietic cells at the expense of normal marrow function (3). Chronic myelocytic leukemia is a clonal disorder of pluripotent cells and is one of the myeloproliferative disorders (4,5). Chronic lymphocytic leukemia is a neoplasm resulting from proliferation of a single clone with heterogeneity of its own frozen at an early stage of lymphocyte differentiation and maturation (6). Acute leukemia is further classified according to the nature of predominant cells by FAB (French-American-British co-operative) group (7,8). Acute Myelocytic Leukemia (AML) further contains six subtypes (9,10). Acute Lymphocytic Leukemia (ALL) occurs at any age but is more prevalent in children under the age of fifteen. Lymphocytes are unable to fully mature, and crowd out regular blood cells. It is subdivided into three subtypes (7).

This study was conducted to investigate the prevalence of different types of leukemia in North West Frontier Province (NWFP) of Pakistan. The population of NWFP is more than 17 million. Thus, a representative data comprising 60 patients was collected at the Institute of Radiotherapy and Nuclear Medicine (IRNUM), Peshawar. The patients from all over the province visit this hospital for cancer treatment and diagnosis as it is the sole cancer hospital of the province. The analysis was based on gender and age groups. Also the prevalence of different types of leukemia has been studied.

MATERIALS AND METHODS

A total of 60 patients suffering from Leukemia were investigated at IRNUM, Peshawar during the year, 2001. Forms were developed in order to have complete knowledge of patients' characteristics, case history and physical and laboratory examination reports. Thin peripheral blood smears were made by slide to slide method in order to observe malignant cells under microscope. Bone marrow aspiration was also conducted to observe malignant cells in marrow and to categorize acute forms in their respective subgroups. The slides were stained with Giemsa stain to have accurate view of cells. The patients were looked for anemic condition as well as weight and heights were recorded for physical examination. Peripheral lymphadenopathy, hepatomegaly and splenomegaly were investigated by pressing pertinent areas with fingers.

RESULTS

Present investigation revealed that 89% of patients were suffering from acute forms of leukemia while only 9% suffered from chronic type. Of acute forms, 46.6% patients suffered from myelocytic and 43.2% from lymphocytic leukemia, indicating the presence of both types, while 6.6% were found to be CML and 3.3% CLL. In case of gender study, 76.6% were male patients and 23.2% were female patients. For ALL, 36.6% cases were observed in male patients while 6.6% in female patients. In cases of AML, 30% were male and 16.6 were female patients. All the chronic leukemia sufferers happened to be male. Investigation of age revealed that ALL type was more prevalent in children (39.9%) than adults (3.3%) as shown in table 1. In acute leukemia patients, 52% were suffering from AML while 48% showed ALL, thus exhibiting almost equal prevalence. It was also found that 84.5% of patients suffering from ALL-L_1 subtype were children, while 7.6% were

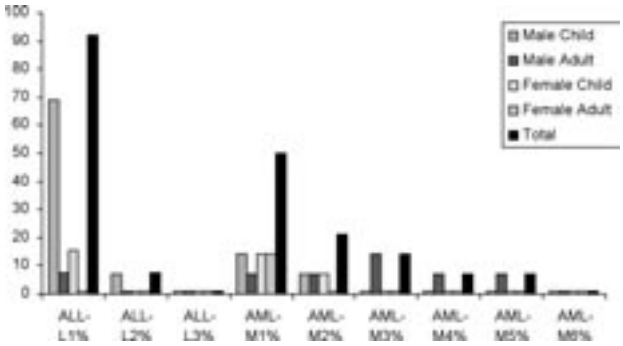

Fig 1. ALL/AML subtypes among leukemia patients at IRNUM

Table 1
The prevalence of different types of leukemia among patients examined at IRNUM

Gender	Child/Adult	ALL (%)	AML (%)	CLL (%)	CML (%)	Total (%)
Male	Child	33.3	10	-	-	43.3
	Adult	3.3	20	3.3	6.6	33.3
Female	Child	6.6	10	-	-	16.6
	Adult	-	6.6	-	-	6.6
Total		43.2	46.6	3.3	6.6	

adults. ALL-L_2 type was only prevalent in children and no adult case was reported for this type of leukemia (Table 2 and Figure 1). In Acute Myelocytic Leukemia (AML), AML-M_1 and AML-M_2 cases were more prevalent than rest of all AML subtypes (>70%). AML-M_1 was found to be twice more prevalent than AML-M_2. In AML-M_1 patients, about 56% were children while the rest were adults. About 57% of AML-M_1 patients were female. However, 67.6% of AML-M_2 patients were male and the same percentage was observed for children in comparison to adults. All the patients of AML-M_3, M_4 and M_5 subtypes were male adults while no case was registered for AML-M_6, thus indicating that this subtype of leukemia is almost non-existent in the Province (Table 2 and Figure 1).

DISCUSSION

Present study revealed that acute leukemia is more prevalent in the NWFP, than chronic leukemia. During present research it was found that ALL was more prevalent in children. In earlier investigations, ALL has been reported to strike children primarily (12,2,13). AML is said to occur twice as often as ALL, and high frequency is that of adults (11). However, current research revealed AML to be slightly more prevalent than ALL, while AML was also found more frequent in adults. CLL has been termed as leukemia of old age being uncommon below the age of 40 years, and more prevalent above 60 years of age (14). The CLL patients in current research were above the age of 80 years, and were only about 3% of total leukemia patients. Median age for CML has been designated between 40-50 years (4,5). About 6% of total cases investigated were CML patients that were all above the age of 40 years. All of them later exhibited blastic crisis, which is the characteristic of CML, during which CML converts into acute phase resembling AML that ends in death of patient (2,15). Gender analysis showed male dominance in all forms of leukemia, and this conforms with earlier studies (16,17).

The three FAB ALL subtypes, while still in use, have largely been replaced by immunologic classification. It is because FAB classification helps to understand the morphology of acute leukemia. According to various investigations ALL-L_1 has been found 85% more prevalent than the rest while about 14% of ALL-L_2 subtypes were reported. ALL-L_3 also termed as Burkitt's lymphoma is the rarest form of ALL as its occurrence has never exceeded 1% (18). In present study about 92% of ALL-L_1 cases were reported making it the most prevalent one while only about 7% cases were those of ALL-L_2. No cases of ALL-L_3 was reported during our investigation designating it to be the rarest of all ALL subtypes as found earlier. Earlier investigations regarding AML subtypes has revealed its M_2 subtype as the most common one (30-40%) and M_1 occupied the second position with about 10-20% prevalence (18). Present research designated M_1 subtype as the most common since about 50% of all the AML cases investigated were of this subtype while about 21% cases were reported for M_2 subtype. The occurrence rate for AML-M_3, M_4 and M_5 was reported to be 10-15% while present study gave even lower rates for AML-M_4 and M_5 (7.1%) (18). AML-M_3 was about 14.3% in occurrence, which coincided with earlier reports. No case for AML-M_6 was reported in this study while previous studies indicated this subtype to occur at low levels (5%) designating it as a rare form of AML subtype (18).

Table2
ALL/AML subtypes among leukemia patients at IRNUM

Gender	Child / Adult	ALL			AML					
		L_1 %	L_2 %	L_3 %	M_1 %	M_2 %	M_3 %	M_4 %	M_5 %	M_6 %
Male	Child	69.2	7.6	-	14.3	7.1	-	-	-	-
	Adult	7.6	-	-	7.1	7.1	14.3	7.1	7.1	-
Female	Child	15.3	-	-	14.3	7.1	-	-	-	-
	Adult	-	-	-	14.3	-	-	-	-	-
Total		92.1	7.6	-	50.0	21.3	14.3	7.1	7.1	-

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