ORIGINAL ARTICLE

ANALYSIS OF CLINICOEPIDEMIOLOGICAL FEATURES OF LEUKEMIA AT A TERTIARY CARE FACILITY IN PESHAWAR

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ABSTRACT

Objective: To analyze the clinical presentation, epidemiology and laboratory results of various types of leukemia at a tertiary care facility in Peshawar.

Material & Methods: Bone marrow biopsy reports from January 2016 to March 2017 were studied and 145 cases of leukemia were detected amongst a total of over 500 reports. A proforma regarding the relevant information including epidemiological features i.e.name, age, gender, address, clinical features, physical exam findings and results of bone marrow biopsy and other laboratory tests was filled.

Results: Bone marrow reports of 145 cases were analyzed. 49.7% patients were diagnosed as having ALL, 26.9% were having AML, 9.7% patients were detected with CLL and CML was found in 13.8% patients. Males were affected more (87) compared to females (52). Most of the patients were from Afghanistan, which accounted 43 (29.65%) of cases. Fever was found in highest number of patients and accounted for 101 cases followed by pallor which was found in 82 cases. Other symptoms include malaise, body aches, fatigue, petechiae, bruising, sweating, weakness, headache, dyspnea, hepatomegaly, splenomegaly and lymphadenopathy.

Conclusion: In all types of leukemias ALL was predominant having ALL-L1 as the most common sub-type. Fever was the most common symptom followed by pallor. Males were more commonly affected compared to females.

Key Words: Leukemia, Epidemiology, Laboratory.

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INTRODUCTION

Leukemia is a group of cancers that usually begins in the bone marrow and result in high numbers of abnormal white blood cells[1]. Leukemias may either be of an acute or chronic nature. Moreover, acute and chronic cases are further subdivided on the basis of the type of white blood cell affected. Commonest types are four in number: Acute Lymphoblastic Leukemia (ALL), Acute Myeloid Leukemia (AML), Chronic Lymphocytic Leukemia (CLL), Chronic Myelogenous Leukemia (CML)[2]. There is significant difference between acute and chronic leukemia. In acute leukemias, immature young cells known as "blast cells" are affected which continue to divide but do not differentiate. While in Chronic Leukemias, mature progenitor cells are affected which divide without differentiation.

A common type of leukemia found in children is Acute Lymphoblastic Leukemia (ALL) which is divided according to FAB (French, American, British) classification into L-1, L-2 and L-3 subtypes. Similarly Acute Myeloid Leukemia is a malignancy of immature myeloblast cells, with the subtypes of M-0, M-1, M-2, M-3, M-4, M-5, M-6 and M-7 according to FAB classification[3]. Chronic Leukemia is the type which mostly affects the elderly, having a higher frequency in males[4].

It has been found in 2013, that mostly males were affected with different types of leukemia and this high ratio of leukemias in males was due to increased exposure to occupational and environmental carcinogens. However greater burden of leukemia is noticed in developing countries due to variety of causes like tobacco use, radiations, uncontrolled infections, increased population and poor lifestyle etc[5].

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This study was performed to analyze and provide information about the various types and sub-types of leukemia among the patients who visited Rehman Medical Institute (RMI), Peshawar, KPK, Pakistan.

MATERIAL AND METHODS

This was an Observational, Descriptive study conducted at Rehman Medical Institute, Hayatabad, Peshawar, Pakistan from January 2016 to March 2017. All cases of leukemia in the specified period were included while Non-leukemic patients like Polycythemia, multiple myeloma, myelodysplastic syndrome etc were excluded from the study. After approval from the Head of Pathology Department, Rehman Medical Institute, Peshawar, a proforma was filled after studying over 500 bone marrow biopsy reports of patients presenting to the department of Pathology, Rehman Medical Institute, Peshawar. The data obtained was analyzed by using SPSS software version-20 (Statistical Package for Social Sciences). Results were recorded as frequencies, percentages and mean ± standard deviation for qualitative and quantitative variables respectively. Fisher's Exact test was applied to the results and p-value of less than 0.05 was taken as criteria of significance.

RESULTS

Amongst over 500 bone marrow biopsies performed during the study duration, 145 cases of leukemia were found. These cases were of both acute and chronic leukemia. Seventy-two (49.7%) patients were having Acute Lymphoblastic Leukemia (ALL), Thirty-nine (26.9%) were having Acute Myeloid Leukemia (AML), Fourteen (9.7%) patients were detected with Chronic Lymphocytic Leukemia (CLL) and Chronic Myelogenous Leukemia was found in twenty (13.8%) patients. Out of all these cases ALL was the most common type of leukemia and CLL was the least common type.

Figure 1 and 2 show gender wise distribution of different types and sub-types of leukemia respectively. Out of 145 cases of leukemia as a whole 87 were males and 52 were females. Out of 72 cases of ALL, 43 (59.7%) were males and 29 (40.27%) were females. In 39 cases of AML, 20 (51.28%) were males and 19 (48.7%) were females. In 14 cases of CLL, 12 (85.7%) were males and 2 (14.28%) were females. Similarly in 20 cases of CML, 12 (60%) were males and 8 (40%) were females. Most of the males were affected with ALL and similarly most of the females were also affected by ALL. Regarding the sub-types of leukemia, Figure 2 shows that ALL-L1 is the most common sub-type because it was found in 11 males and 13 females.

Leukemia predominantly is a disorder of children, taking the lives of a large number of patients in early ages. Table 1 shows the age-wise distribution of Leukemia. A large number of cases were found in children i.e :29 (20%) cases were detected in the age group of 1-10 years and 19 cases in the age group of 41-50 years, 16 cases in the age group 51-60 years and 11 cases after the age of 60 years. ALL appears to be the most common type of leukemia in children and pediatric age groups, whereas AML was found predominantly in adults. Table shows clinical features of leukemia patients.

Table 3 is concerned with marital status of leukemia patients. For marital status two aspects are important, like on one hand leukemia patients are children and

Table 1: Age wise distribution of different types of Leukemia

Age in years	Type of Leukemia			
	ALL	AML	CLL	CML
	Count	Count	Count	Count
1-10	22	5	0	2
11-20	21	2	0	3
21-30	15	12	1	4
31-40	4	7	0	1
41-50	2	9	2	6
51-60	6	0	7	3
>60	2	4	4	1

Table 2: Clinical Features of 145 Leukemia Cases

Clinical Features	Number of Responses Percent of Symptoms
Fever	101 (70.6%)
Pallor	82 (57.3%)
Body Pain	26 (18.2%)
Fatigue	39 (27.3%)
Petechiae	3 (2.1%)
Bruising	15 (10.5%)
Sweating	5(3.5%)
Weakness	22 (15.4%)
Headache	4(2.8%)
Malaise	2(1.4%)
Dyspnea	11(7.7%)
Hepatomegaly	8(5.6%)
Splenomegaly	13(9.1%)
Lymphadenopathy	7(4.9%)
Total Number of Cases Studied	145

Table 3: Marital Status wise distribution of different types of Leukemia

	Types of Leukemia			
	ALL	AML	CLL	CML
Marital Status	Count	Count	Count	Count
Married	16	23	13	11
Unmarried	56	16	1	9

Table 4: Location wise distribution of different types of Leukemia

Address	Type of Leukemia			
	ALL	AML	CLL	CML
	Count	Count	Count	Count
Unknown	44	20	11	10
Afghanistan	19	12	2	10
Peshawar	2	1	0	0
Swat	0	1	0	0
Mardan	2	0	0	0
Attock	1	0	0	0
Bannu	0	0	1	0
Dargai	0	1	0	0
Bajaur	0	1	0	0
Skhakot	1	0	0	0
Waziristan	1	1	0	0
Chatral	0	1	0	0
Sherghar	1	0	0	0
Swabi	1	0	0	0
Dir	0	1	0	0

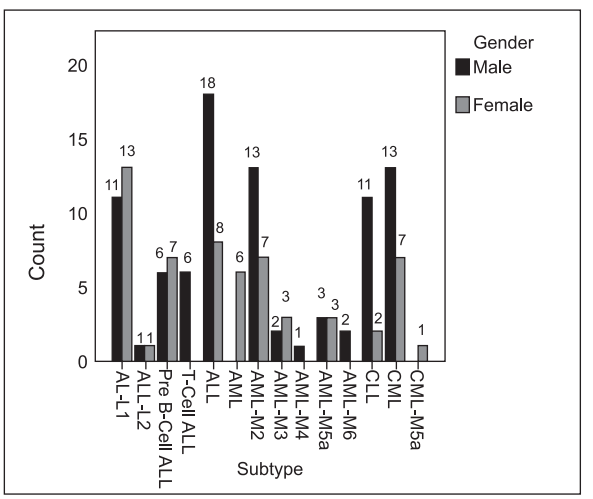

Figure 1: Gender wise distribution of the various Subtypes of Leukemia

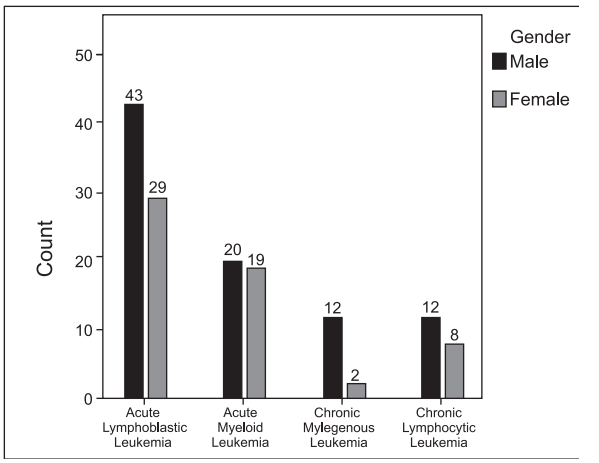

Figure 1: Gender wise distribution of Leukemia patients

therefore are unmarried and on the other hand leukemia patients which are adults are unable to lead a successful reproductive life and hence may remain unmarried. Amongst the 145 cases diagnosed as leukemia, only 63 patients were married and 82 were unmarried, which is due, in part to the fact that the majority of patients were in the pediatric age groups, and also, to the fact that adult leukemic patients are normally not able to lead an economically productive life, hence hampering the social aspects of their lives.

Since certain environmental factors are among the risk factors for leukemia the location and address of patients is very important. During the study period most of the patients were received from Afghanistan which accounted 43 (29.65%) out of 145 patients. In the 43 cases 19 were of ALL, 12 of AML, 2 of CLL and 10 cases of CML. Similarly 3 cases were reported from Peshawar and remaining cities include Swat, Mardan, Attock, Bannu, Dargai, Bajaur, Skhakot, Waziristan, Chitral, Sherghar, Swabi and Dir. Table 4 shows locations wise distribution of the sub-types of leukemia.

DISCUSSION

Acute and Chronic leukemia have different subtypes. Each type and its sub-type have a lot of differences on the basis of age, gender, location, racial and many factors. All of these clearly suggest that different sub-types might have different causes and etiology. Therefore leukemia has paramount importance on the basis of complications that it causes[1].

The registry data of Armed Forces Institute of Pathology from a study based on tumor, shows that leukemia are the second commonest hematological malignancy in adult males and fourth most common

malignancy in females in the northern areas of Pakistan. Similarly a study from Karachi shows that leukemia is the fifth most common hematological malignancy in both males and females of Pakistan. While it's an uncommon issue in USA, according to National Cancer Institute and Surveillance, Leukemia affects almost 5 people per 100,000[6,7].

Blood malignancies are common in India and many studies have been conducted regarding epidemiology and clinical features. Hematological malignancies are more common in Delhi than in Mumbai and acute types of these accounts for 51% in comparison with chronic types which is reported 49%. Hence acute leukemia is more common in comparison to chronic leukemia. These are more common in urban location rather than rural areas. And possibly the cause responsible is the difference in their environments. Urban areas are mainly industrialized and lifestyle is similar to that in western countries while that of rural is traditional, more conservative i.e the foods and life style is simple[8,9,10].

This study is showing ALL to be the most common type of leukemia with an incidence of 49.7% by affecting 72 patients out of 145. Second most common type is AML having incidence of 26.9% with 39 patients affected. The third most common type is CML having incidence of 13.8% by affecting 20 patients. And the fourth and least common type is CLL which has affected 14 patients with 9.7% incidence. Different other studies has reported with their results of AML as the most common type of leukemia in Yemen because it has an incidence of 39.5%. And second most frequent type is ALL with incidence of 27.9%. CML has incidence of 21.7% and CLL has 10.9%[11,12]. A study in Lahore, Pakistan has reported Clinicoepidemiological features of adult leukemias. In which 113 leukemia cases were studied and ALL was reported in 43 (38%) cases, AML in 44 (39%) patients, CML in 20 (18%) cases and CLL in only 6 (5%) cases[13]. Another study (Maliha Zahid, Asif Khalid et al) shows that ALL is being reported in 82% cases and AML in 16% cases. Their study was about acute leukemias only[14].

Age is an important factor in not only leukemia but also in many other diseases. In this study, ALL which is most commonly appeared in age group of 1-10 years shows that it mainly affects children. AML occurred in age group of 21-30 years, which means its victims are mostly adults. CLL was found in age group of 50-60 years, showing that it's a disorder of old age and CML appeared most commonly in age group of 41-50 years. This age related information shows somewhat similarity with a study in Yemen (Gamal Abdul Hamid and Afif Nabhi 2015), where the predominant age for ALL was 11-30 years, for AML was 21-50 years, for CLL was 51-60 years and for CML was 41-50 years[1]. Similarly the age distribution in Haryana, India (Radha Rathee and Minakshi Vashist et al 2014) was found 1-50 years with the mean of 22 years for ALL, 5-70 years with a mean of 28 years for AML, 15-65 years with the mean of 26 years for CML and for CLL the range was 50-70 years with the mean of 58 years[16]. Certain environmental factors, racial, genetic and hygienic practices etc account for the differences among these studies.

Gender related description of this study can be compared with a study in Nigeria (Caroline Edijana Omoti et al 2012), where 391 patients were included in the study and showed male predominance. Out of 391 patients, 138 (60.9%) were males and 153 (39.1%) were females[17]. Another study in Agha Khan, Karachi (Zehra Fadoo et al 2012) was done for only Acute Myeloid Leukemia, which clearly shows male predominance because 37 children were included in study and 28 of them were males and only 9 were females[18].

Main clinical features noticed in this study were fever, pallor and fatigue. Fever was found in highest number of patients and accounted for 101 cases, followed by pallor which was found in 82 cases and fatigue found in 39 cases, while malaise was found in lowest number of cases. Other symptoms of leukemia patients included body pain, fatigue, petechiae, bruising, sweating, weakness, headache, dyspnea, hepatomegaly, splenomegaly and lymphadenopathy. In Yemen (Gamal Abdul Hamid and Afif Nabhi 2015) it was found that fever is the most common symptom followed by pallor, weakness, body pain. Splenomegaly was found in all of CML cases and in most of acute leukemia cases. However anemia was most common in acute leukemia[1]. In Lahore, Pakistan, 113 patients were included in a study and the main symptoms found included fever being the most common followed by pallor, hemorrhage, weight loss, hepatomegaly, splenomegaly and lymphadenopathy[13]. The symptoms/clinical features documented by this study closely resemble a study in India where clinicopathological features of only AML was studied. Main symptoms were fever, pallor, weakness, fatigability, lymphadenopathy, loss of appetite, splenomegaly, weight loss and hepatomegaly[20].

CONCLUSION

Acute Lymphoblastic Leukemia is a disorder of young age while AML is a disorder of adults. Acute and chronic leukemias are more common in males. Fever is found the most common symptom of all leukemias followed by pallor.

RECOMMENDATIONS

The condition of the healthcare facilities for treating leukemia in Pakistan is still not up to the adequate

standards to provide a leukemia free society, given the growing prevalence of the disease in the area. The fact that the majority of patients are in the young, economically productive age group, the disease also proves to a potential threat to the economic development and progress of the state, given the various factors like late diagnosis, poverty, ignorance and illiteracy, poor financial status, lack of availability of effective drugs, expensive therapy and many more, that are in good abundance in developing countries like Pakistan. There is, thus, a great need for effective, cheap, reliable and readily available treatment, qualified doctors and education of the society about the menace of Leukemia.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

Khan AR: Idea data completion & data collection.

Ahmad M: Bibliographic.

Khan SA: Overall supervision.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.