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"Morphological and Immunophenotypic characteristics of Aeute Leukaemia in children:A Observational studyDhaka, Bangladesh"

Dr.Nilufar Akhtar Banu Choudhury[1], Prof.Dr. Syed Khairul Amin[2]
[1.] *Registrar, PaediatricHematology-oncology Department, Dhaka Shishu (Children) Hospital, Dhaka, Bangladesh.*
[2.] *Ex. Prof. & Head of Department,PaediatricHematology-oncology, Dhaka Shishu (Children) Hospital, Dhaka, Bangladesh.*
Corresponding Author:Dr .Nilufar Akhtar Banu Choudhury

Abstract:*Leukemia, also spelled leukaemia, is a group of blood cancers that usually begin in the bone marrow and result in high numbers of abnormal blood cells. Acute lymphoblastic leukaemia is characterized by the proliferation of lymphoid cells but represents indeed a heterogeneous group of diseases that vary with respect to the morphological, cytogenetic, molecular and immunologic features of the neoplastic cells. The acute leukaemia are defined pathologically as blast cell leukaemia or malignancies of immature hacmopoitic cells which show >30% blast cells in the bone marrow On the basis of clinical findings and peripheral blood film study thesuspected cases of acute leukcmias whose age group between 2yrs to l2yrs were included. Total 30 patients of leukaemia of both sexes were selected for this study. After clinical diagnosis a complete blood count with film (CBC) was done for every patient and subsequently the diagnosis was confirmed by bone Marrow study and also, immunophenotype was done. Detailed clinical informations were obtained by meticulous history taking and through physical examination. Relevant investigations were also f enrolled as per prescribed proforma.Bone marrow aspiration was done by Salah marrow puncture needle. 2% lignocaine used as local anesthesia. Aspiration was done from posterior superior iliac spine sometimes from anterior superior iliac spine.Films were made, 3-5cm in length of the aspirated marrow using a smooth edge glass spreaded of not more than 2cm in width. The marrow fragments were dragged behind the spreader and left a trail of cells behind them. . About 80-85% of childhoor acute lymphoblastic leukaemias (ALL) represent leukemic transformation of lymphocytes arrested at a primitive Stage of development, but nevertheless already committed to the B-lymphocyte pathway. Thoseleukemias derived from the most mature B-lymphocytes are eharacterized by the presence of immunoglobulin on the leukemic cell Surface; they tenthly represent less than 4% of childhood acute lymphoid leukemias. A total of 30 patients were studied in this study. Among them majority arc between 5 to 8 years of age (56.66%). There are male predominance (73.33%). Fever is present almost in 100% cases. Bone pain in 73.33% cases, bleeding manifestation in 76% cases and 60% patient presented with lymphadenopathy. 60% patients have hepatomegaly and 79% pt have splenomegaly. In 40% cases Hb% was 5 to 6 gmIdL and in 33% cases Hb% was 7 to 8 gmIdl. A study was done previously by Dr.BclayetHossain in Dhaka Shishu Hospital that showed Fever, and pallor in (88%), hepatomegaly (75%), Splenomegaly 67%, Lymphadenopthy (76%), bleeding manifestation (50%), Another report by Iloflbrand[1] showed Lymphadenopathy (65%), bone pain (50%). This study reveals that in addition to Morphological study of bone Marrow; Immunophenotyping is also required to know the specific Lineage marker which will help to choose the specific chemotherapy schedule and also the prognosis of the patient.*

Key words: *LMIC, Survival Rate, acute lymphoblastic leukemia.*

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I. Introduction

Acute leukemia is a clonal malignant disorder affecting all age groups. It is a heterogenous groups of neoplasm affecting uncommitted or partially committed hcmatopoiclic stem cells. It is characterised by accumulation of abnormal white blood cells in the bone tissue including haemopooietic precursor cells. This results in bone marrow failure and peripheral blood involvement.' In children, acute lymphoblastic leukemia is the most common malignant disease. Acute lymphoblastic leukemia is commonest in the age range 2-10 year with a perk at 3-4 years. It accounts 85% of childhood leukemia.[7] Acute mycloid Leukaemia comprises 20% of all childhood acute leukaemia. It is more common in older children and occurs equally in both sexes[2]. It has been increasingly important to initially evaluate those children who have failed to response to current treatment

regimens. It is possible that unresponsive children with acuteleukeamia represent subsets of this disease that are "biologically distinct and as such require different therapeutic strategies. A progressive understanding of the biologic and genetic characteristics of ALL has not only improved our knowledge of leukemogenesis but also allowed us to identify different prognostic subgroups with specific molecular and cellular features.[1] At present immunophenotyping of haematological malignancies represents one of the most relevant clinical analysis and at least 30% blast cells were required for processing at bone marrow samples. Positivity of any given antibody stain was by quadrant analysis as compared to the isotopic negative Results in excess 30% positivity were considered to be positive for a given antibody analysis and at least 30% blast cells were required for processing at bone marrow samples. Positivity of any given antibody stain was by quadrant analysis as compared to the isotopic negative Results in excess 30% positivity were considered to be positive for a given antibody.

II. Literature Review

Within the space of just over 20 years childhood acute lymphoblastic Leukaemia (ALL) has changed from begin a fatal disease to being curable in two-thirds of Cases. It has become possible to more completely define stages of differentiation in both lymphoid and myeloid lineage and to characterize the leukemias that correspond to these stages with respect to biological features and more specific therapeutics requirements. Current management is based on phenotypic characterization of Leukemia cells at diagnosis.[5]Disseminated cancer can be cured only if all the malignant cells at the primary and metastasis sites arc eradicated. To achieve this goal, active cytotoxic agents are required and it is a bonus if the host -defense mechanism assist in the process. The development of effective chemotherapy agents and successful combination regimens are a milestone in oncology and resulted in previously fatal conditions becoming potentially curable. Morphological examination of blood or bone marrow smears sometimes fails to provide an unequivocal diagnosis. However Identification of various differentiation antigens on the surface of the abnormal cells by flow cytometry studies can rapidly provide this critical information. Aberrant expression of surface antigens at diagnosis also provide a marker for the malignant clone that can be used for detection of minimal residual disease lifter treatment.[6]

III. Classification

A uniform classification system for the acute leukemia's and myolodysplastic syndrome was developed by an international group of investigator in 1976. Known as the FAB classification. This system is based on Romanovsky stained blast morphology and cytochemicals stain. Modification for the assessment of Lymphoblast were introduced in 1981 to improve reproducibility and in teraservers concordance. Three subtypes of ALL are distinguished on the basis of cell size nuclear ihapc, number and prominence of nuclei and the relative amount and nppearance of the cytoplasm.[7]

IV. Clinicanl features

The Symptoms occur as a consequence of almost complete replacement of Normalmarrow elements by leukcmic blast cells, resulting either bone marrowfailure or specific tissue infiltration[13]. The initial presentation of ALL usually is nonspecific and relatively brief. Anorexia, fatigue and irritability often are present, as is an intermittent, low grade fever. Bone or less often joint pain particularly in the lower extremities may be present. pf, Paticnts often have a history of an upper respiratory tract infection in the preceding 1-2 month.Lesscommonly symptoms may be of several months duration, may be localized predominantly to the bones or joints and may include joint 1 swelling. Bone pain is severe and may wake the patient at night.[10]**A**sthe disease progresses signs and symptoms of bone marrow failure become more obvious with the occurrence of pallor, fatigue, bruising or epitasis as well as fever, which may be caused by infection.Onphysical examination, findings of pallor, listlessness, purpuric and patchily skin lesions or mucous membrane haemorrhage may reflect bone marrow failure. Respiratory distress usually is related to anemia but may occur in patients with an obstructive airway problem due to a large anterior mediastinal mass. This problem is most typically seen in adolescent boys with T cell ALL. T-cell ALL also has a higher leukocyte count.The clinical characteristic of AML are often the same as those of ALL but unlike ALL, chaloromas may present and usually arise in the orbit or in the pnraspinal area. More commonly seen in M4, M5 types are gum hypertrophy DIC may be present with M3, M4, M5 variants.In all types of leukemia CNS symptoms are seen at presentation in 5% of patients (10-20% have blasts in the CSF), Testicular (20%) and ovarian (30%) involvement occurs but does not require a biopsy[10].

V. Diagnosis

Acute leukeamia can usually be diagnosed from (1) the presence of blastCells in the peripheral blood (2) a bone marrow aspiration (or one at theCurliestoppourtunity to define its morphology) (3) cytochemicalstainin, characteristics which are often periodic acid Schiff reagent (PAS) positive and Negative to sudden black, peroxidase, non-specific esterase andchloroacetate esterase (4) immunophenotype (5)

cytogenetic features. [10]A lumber puncture is usually performed at the same time and the CSF is examined by cyto centrifuge. CNS leukemia is diagnosed by the presence of than five white blood cells/mm3 and blast cells on the smear. A chest film should be obtained for diagnosis of mediastinal or hilarlymphnode enlargement or infection. [10]

VI. Flow cytometry

It is very accurate in determining the exact type of Leukaemia. The cell being examined by howcytometry are treated with selected antibodies and passed In Frusta Laser beam. Each antibody sticks only to certain types of Leukaemia Cells, if the sample contain those cells. The laser will cause them to give off height, which is measured and analyzed by a computer. Floweytometry is also used to estimate the amount of DNA in the Leukemia cells. All cells with height DNA content more than 15% above normal, are more sensitive to chemotherapy.[11]

VII. Pragaustie Stratification

Beeause treatment is the single most important prognostic factor, the relative Pregnostic power of disease characteristics varies from study to study. Consequently different sets of prognostic variable have been found useful. Ifthese includes the WBC count, age, race and karotypeploidy. WBC count and siz of liver and spleen and WBC count and age alone. The children's Caneer Study group used the latter two variables to identify three prognostic grups within a large population of patient less than 21 years of age treated n in a uniform fashion. Children with an initial WBC count less than $10xl0^9$/L and between 3 and 7 years of age had a 4 year continuous remission rate of eagerly 90%. This good prognosis group accounted for 27% of the study population. Average risk patients were defined as those of all ages with an aliased WBC count between 10 and $50x1\ 0^9$/L and those younger than 3 years 'as older than 7 years with a WBC count less than $10xl0^9$/L. This group andtltuted 54% of the total and had a 4 years continuous remission rate of esproximatel 60%. High risk patients identified by a WBC count above 10 /L made up 10% of population and a median survival of only 2 years. Children's can or study group subsequently used the WBC count at is, age, sex, extent of cxtramedulalry disease, T[7]ABmorphologicaliflcation and platelet count to stratify patients in to five groups that with respect to prognosis, relapse patterns, and thempeutic priorities. Differences among the risk classification criteria used in clinical trials ofchildhood ALL has heretofore rendered accurate comparisons of outcomesthatarc the consequences of varying treatment strategies across organizations. To overcome this obstacle, a consensus workshop sponsoredby the NCI in collaboration with representatives from major organizations lit involved in the design and conduct of therapeutic trials for childhood ALL fjtled to the development of uniform criteria for risk based treatment as I li'iusignifleant, Henceforth, the standard risk group of patients will include those JjWith B precursor ALL ages 1 to 9 years with a WBC count less than , 50,000/dLwith an estimated event free survival (EPS) appropriately 80% the remaining high risk patients have an estimated EPS of approximately , 65%As different treatment strategic have yielded varying conclusions regarding the prognostic significance of the T-cell phenotype, some groups T-cell patients accordingly to WBC count and age; whereas other salsify all T-cell ALL patients as high risk. Other prognostic factors that will be obtained in all patients include DNA index, cytogenetic, early response to treatment, immune phenotype and CNS statues.[7]

Prognostic factors in acute lymphoblastic leukemia:

Determinants	Favorable	Unfavorable
(1) WBC count	**<10xl0^9/L**	**- >50xl0^9/L-**
(2) Age	**3-7 yrs**	**- <l,>10yrs**
(3) Sex	**Female**	**- Male**
(4) Race	**White**	**- Black**
(5) Hb%	**<7gm/dL**	**- >l0g/dL**
(6) Platelet	**>100xl0^9/L**	**- < 30,000**
(7) hepatosplenomegaly	**<5cm**	**>5cm/grossly visible**

(8)	Lymphnode	-<3cm	->3cm
(9)	Medlatinal mass	-1/3 Width at T5 thoracic	- > 1/3
			Width at T5 thoracic
(10)	FAB morphological	- L_1	- L_2 L_3
(11)	Serum immunglobulin	- Normal	- Decreased
(12)	Immunophenotype	- Earlypre- T cell	
		B cell	Bcell
			Mixed Lineage
(13)	Cytogenic marker	- Hyperdiploidy	- Pseudodiploidy

		6q-	+ (9:22)
			+ (8: 14)
			+ (1: 11)
			+ (14q)
(14)	Time of remission	- < 14 days	- > 28 days

Treatmcnt:
Recommended treatment induction, consolidation, and delayedintensification. Followed by maintenance therapy for 2yrs. Remission induction is desirable eradicate the leukemic cells (4-wks) from the bone marrow?
Induction:
Vincristinci.v weekly for 4 wks
Prednisolone orally daily for 4 wks
L-asperginage 1/m 3 dose in a wk for - 9 days
Doxorubicin in case of high risk patient

Cossolidtio phase-(4 wks)
Inj. Vincristine
Tub. 6¯incrcuptopurinc
Inj. Cytarabin(in case of high risk group)
lnj, Cyclophosphamide (In case of T cell leukemia)
CNSprophylaxis (8 wks) during remission induction and consolidation Phasc), inlrathccalMTX, cytosor, Hydocortione. If CNS involvement occurs Thencranial eradication.

Mnlntenance- 2yrs
Tab. 6- mercaptopuine
Tab. MTX
Monthly vincristine with predinisolone- 5 days.

AML
Induction
Comprises two or three courses of the 7 & 3 regimen.
InjDonomycin
InjCytarabine
Intrathecal
Repeat on day 1 4
Maintenance
InjDonomycin
InjCytarabine
InjEtoposide
Inj I hioguanine
Inj I Vxnmethason
It is not certain whether BMT is the best treatment for children with AML in First remission.

Camplications:
Cameral nervous system relapse - A diagnosis of CNS disease is established amination of CSF reveals more than five white blood cells/mm3 and apreparation demonstrates lekcmic blast cells. CNS leukemiail.so be diagnosed when the white blood cells count is normal in the clinical signs of CNS leukemia such as facial palsy or hypothalamicifornc are present.**13**

Articular relapse: Management involves local control with 2400 CGY, Bfetomy might be considered in some situation. Intensification of lotherapy to the CNS and bone marrow is also indicated [13].

Marrow relapse: The outlook for patients whose relapse is extremely P, and investigations approaches to their treatment are wan-ante. Bonetransplantation step. Children who do not have HI,A identical donor Jiveon-going intensive maintenance chemotherapy [13].

Care

(1) trimethoprin and sulfamcthoxa/.olc (l0mg/kg/day) twice daily by HHHith is recommended at diagnosis to prevent pneumocystisinflections and is continued for all patients with ALL who are in ^mission or in maintenance therapy.
(2) VZIG prophylaxis can help prevent or modify varicella zoster Infection if administered within 96 hour of exposure to the disease.
(3) Acyclovir treatment of herpes varicella zoster prevents the development of pneumonia or other visceral involvement. The best result are obtained when therapy is started before the third day of illness.
(4) Irradiated (>1500CGY) non family donor blood products, including frozen fresh plasma, may be considered to reduce chances of graft — versus- host reaction from immunocompetent donor lymphocytes.
(5) Fever is of infectious etiology unless proven otherwise
(6) For-scverc neutropenia (<500/mm3) Granulocyte stimulation factor (G CSF) and broad spectrum antibiotics.
(7) Organism of low virulence can cause serious infections.

VIII. Objectives

a) Inclusion Criteria

On the basis of clinical findings and peripheral blood film study thesuspected cases of acute leukcmias whose age group between 2yrs to l2yrs were included.

b) Exclusion Criteria

Previously received chemotherapy.Patients with relapse. Severely ill patients.Age less than 2 yrs and more than 12 yrs. Congenital anomaly.

To determine the Morphological and Immunophenotype characteristics of Acute Leukaemia in children

IX. Materialsand Methods

Study Design: Observational study.

Please of Study: This study was conducted at Haematooncology Department, Dhaka Shishu (Children) Hospital and Armed forces Institute of Pathology (AFIP), Dhaka cantonment.

Duration of the Study: From 1st september 2007 to 31st August 2008.

Total 30 patients of leukaemia of both sexes were selected for this study. After clinical diagnosis a complete blood count with film (CBC) was done for every patient and subsequently the diagnosis was confirmed by bone Marrow study and also, immunophenotype was done. Detailed clinical informations were obtained by meticulous history taking and through physical examination. Relevant investigations were also f enrolled as per prescribed proforma.Bone marrow aspiration was done by Salah marrow puncture needle. 2% lignocaine used as local anesthesia. Aspiration was done from posterior superior iliac spine sometimes from anterior superior iliac spine.Films were made, 3-5cm in length of the aspirated marrow using a smooth edge glass spreaded of not more than 2cm in width. The marrow fragments were dragged behind the spreader and left a trail of cells behind them. After drying fix the films of bone marrow and stain them with Romanowsky dyes. We have seen in the bone marrow film cellularily, Eythropoiesis. Leucopoicsis Megakaryocytes, Lymphocytes, Abnormal cells.Farimmiopliiiiolyping, peripheral blood and bone marrow aspirates eelleeted in EDTA tubes were used. Bone marrow samples were filtered and Suspension were prepared before reagent was mixed. One hundred fill Hie (ul) of the sample was taken and mixed with 10 ul of monoclonal (Mcab). The mixture was incubated in dark at room temperature 15 min, then 100 u.1 of leucocyte fixative reagent added and incubated at Hi lemp for 10 min. After that 2, 5 ml crythrocyte lysing agent was added incubated again at room temp in dark for 20 min. Then the prepared was ready for run in flow cytometrer (Partec, Germany).Monoelonal antibodies from Pratec, GmbH, Munster Germany for Immunophenotyping included the fluorescein isothiocyanate (FITC) and Phyocrythrin (PE) conjugated monoclonal antibodies (Mcab). Bone marrow samples were analysed with partec flow cytometer equipped with argon laser emitting at 488 nm. The morphologic characteristics of the blast cell population were determined by light microscopy prior to flowsnalysis and at least 30% blast cells were required for processingat bone marrowsamples. Positivity of any given antibody stain was by quadrant analysis as compared to the isotopic negative Results in excess 30% positivity were considered to be positive for a given antibody.

X. Observation and results

Based on the study 30 leukaemia children are participated in the study. Among them majority of the participants (56.66%) from 5 years to 8 years. 33.33% from less than 5 years (Table 1). Majority of the participants are male (73.33%) (Table 2). During observation, 100% children were suffered by fever, 73.33% had bone pain, and 76.66% had bleeding manifestation. (Table 3, 4, 5). There were others symptoms like Lymphadenopathy among Study Population where we observed that 40% of the study population had cervical lymphadenopathy, 20% had generalized. And the rest of the patients does not have any lymphadenopathy. (Table 6).

Table: 1 Age Distribution of study Population (N=30).

Age	No	Percentage
2 yrs-5yrs	10	33.33%
5 yrs-8 yrs	17	56.66%
8 yrs – 12 yrs	03	10%

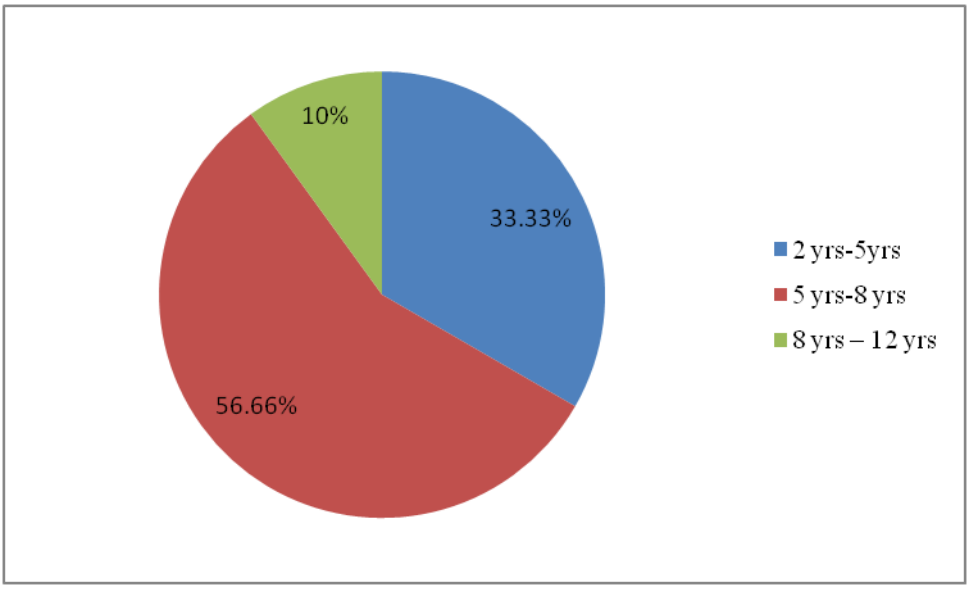

Figure: 1. Age Distribution of study Population.

Table: 2. Sex Distribution of Study Population (N=30).

Sex	**No**	**Percentage**
Male	22	73.33%
Female	08	26.66%

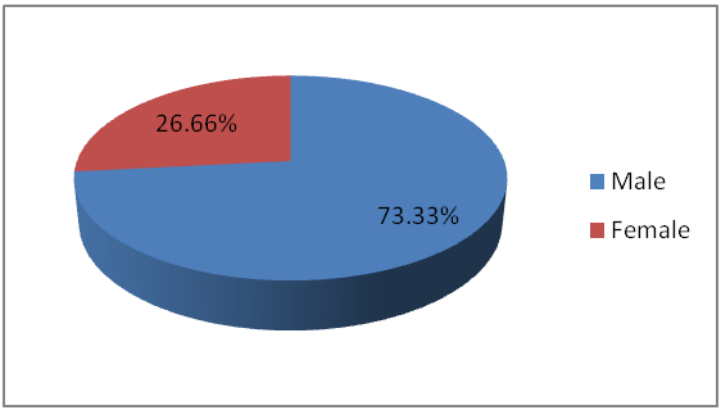

Figure: 2. Sex Distribution of Study Population.

Table 3: Fever among Study Population (N=30).

Fiver	No	Percentage
Present	30	100%
Absent	00	-

Table 4: Bone pain among Study Population (N=30).

Bone	No	Percentage
Present	22	73.33%
Absent	08	26.66%

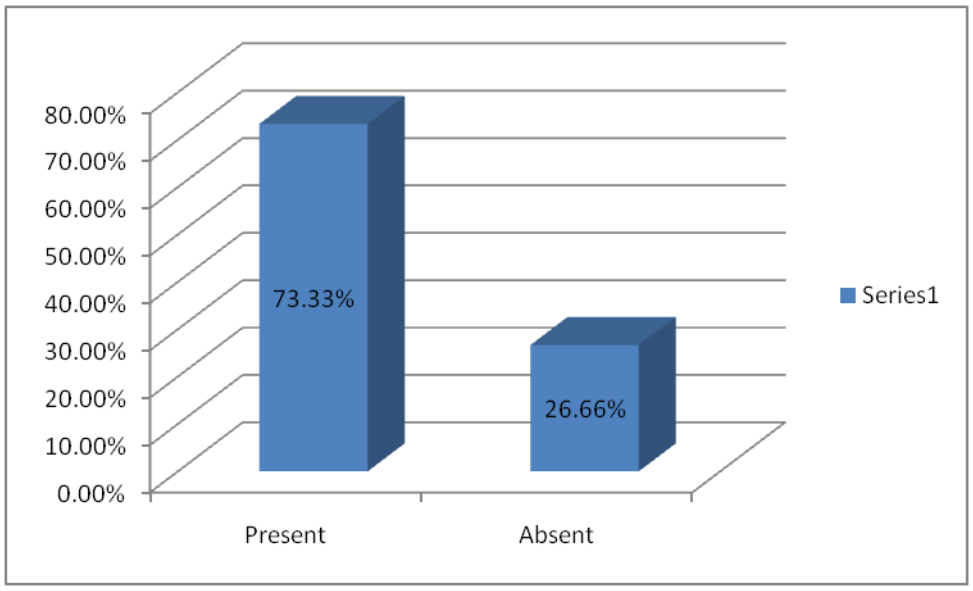

Figure: 3.Bone pain among Study Population.

Table: 5 Bleeding Manifestation among Study Population (N=30).

Bleeding	No	Percentage
Present	23	76.66%
Absent	07	23.33%

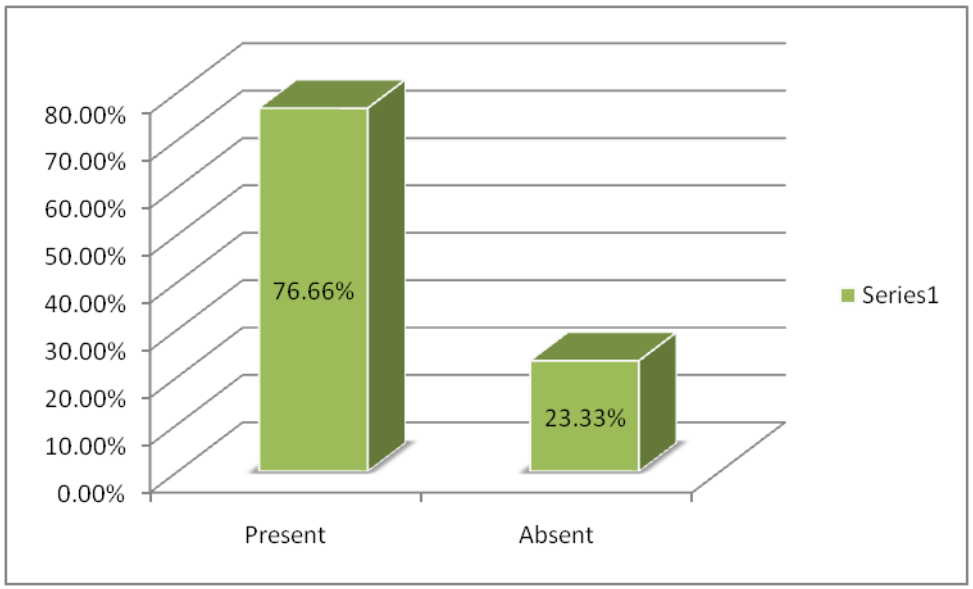

Figure: 4. Bleeding Manifestation among Study Population.

Table: 6. Lymphadenopathy among Study Population (N=30).

	Sites	No	Percentage
Present	Cervical	12	40%
	Generalized	06	20%
Absent		12	40%

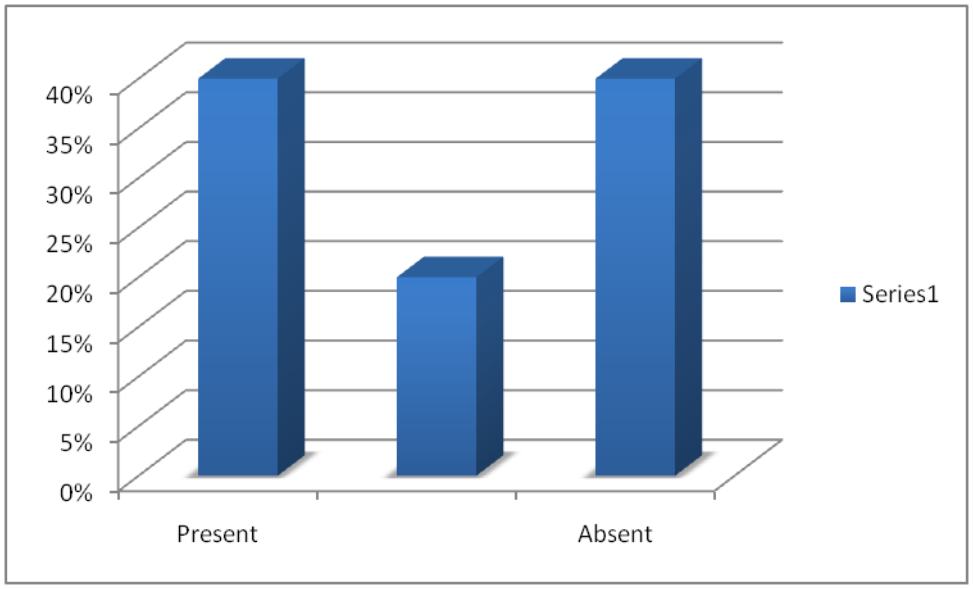

Figure: 5. Lymphadenopathy among Study Population.

Table: 7. Hepatosplenomegalyamong Study Population.

Hepatosplenomegaly	**Size**	**No**	**Percentage**
Hepatomegaly	<5cm	18	60%
	>5cm	02	6.66%
Splenomegaly	<5cm	22	73.33%
	>5cm	02	6.66%

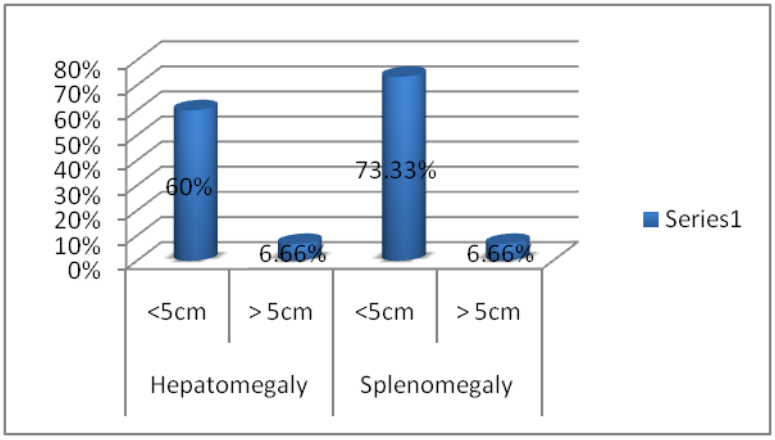

Figure: 6. Hepatosplenomegalyamong Study Population.

The study suggested that 66.66% of the respondents had hepatomegaly where 60% had < 5 cm size and 6.66% had >5cm size. 80% participants had splenomegaly where 73.33% had <5cm size and 6.66% had >5cm size. 40% participants had 5-6gm/dl Hemoglobin concentration, 33.33% had 7-8gm/dl haemoglobin concentration and 26.66% had 10-12 gm/dl haemoglobin concentration of the study population. In the study we have observed that most of the participants had minimum leukocyte count. 26.66% had less than 2500/cumm which is significant as the study population considered.

TabIe-8: Hemoglobin Concentration among Study Population (N=30).

Hb%	No	Percentage
5-6 gm/dL	12	40%
7-8 gm/dL	10	33.33%
10-1 2 gm/dL	08	26.66%

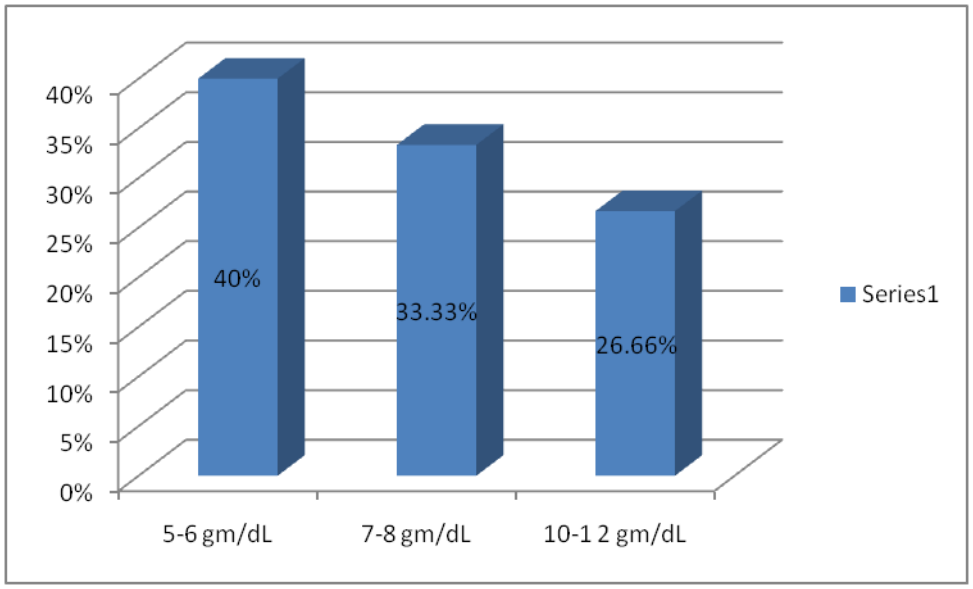

Figure: 7. Hemoglobin Concentration among Study Population.

Table-9: Total Leukocyte Count in Study Population (N=30).

Total Leukocyte count	No	Percentage
<2500/cum	08	26.66%
2500-5000/cumm	04	13.33%
5000-1 0,000/cumm	05	16.66%
10,000-20,000/cumm	05	16.66%
20,000-50,000/cumm	04	13.33%
>50,000/cumm	04	13.33%

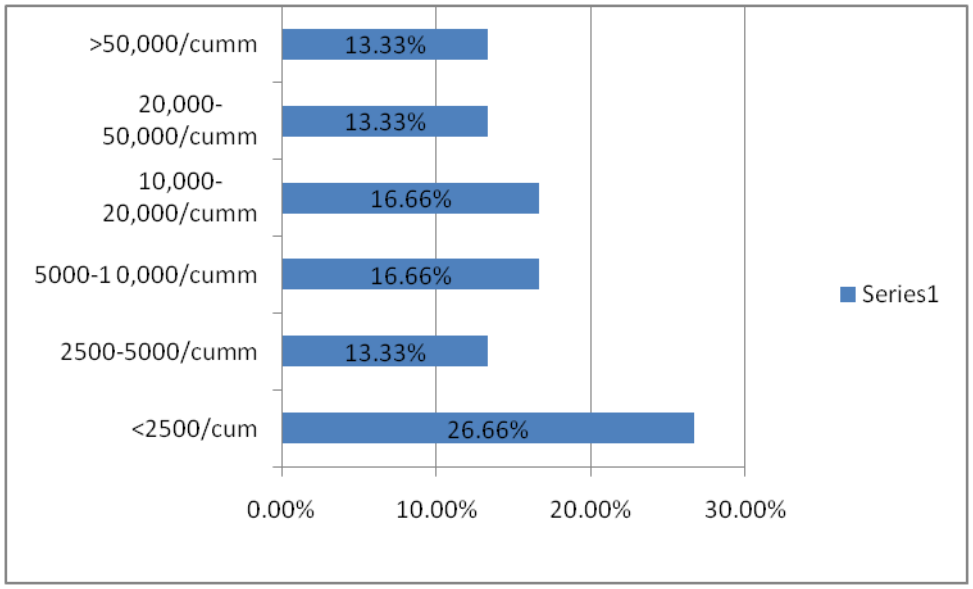

Figure 8: Total Leukocyte Count in Study Population.

Considering morphological characteristics of ALL (N-18), 77.77% had L1 type, 16.67% had L2 and 5.56% had L3. Based on morphological of AML (N-8), 37.5% Participants had M1, 25% participants had M3 and 12.5% participants had consequently M2, M4&M5. 60% participants had ALL, 26.66% participants had AML of acute leukaemia by immunophenotyping (N-30). 83.33% patients had b-Cell which is larger than other

sub type of ALL (N-18). Considering all other characteristics by acute leukaemia, the prevalence of B-cell is mostly dominating than any other morphologicl consideration.

Table-10: Morphological characteristics of ALL (N-18).

Morphological Type	No	Percentage
L1	14	77.77%
L2	03	16.67%
L3	01	5.56%

Table-11: Morphological characteristics Of AML (N-8).

Morphological Type	No	Percentage
Ml	3	37.5%
M2	1	12.5%
M3	2	25.00%
M4	1	12.5%
M5	1	12.5%
M6	0	0%
M7	0	0%

Table-12: Prevalence of Acute Leukaemia by Immunophenotyping (N-30).

Acute Leukaemias	No	Percentage
ALL	18	60.00%
AML	8	26.66%
Biphenotypic	3	10.00%
Mixed	1	3.33%

Tablc-13: Prevalence of sub type of ALL (N-18).

Subtypes of ALL	No	Percentage
B-cell ALL	15 -	83.33%
T-ccll ALL	3	16.67%

Table-14: Characteristics of acute leukaemia (N-26).

Immunophenotypic Pattern	Morphological type	No of cases
BCell	LI	11
BCell	L2	1
TCell	LI	1
T Cell	L2	2
Biphenotype	LI	2
Biphenotype	M3	1
Mixed	L3	1
CD, $_3$, CD_{33}	Ml	^{3}
CD_{13},CD_{33}	M2	1
CD_{13}, CD_{33}	M3	1
CD,$_3$, CD_{14}, CD_{33}	M4	1
$CD_{13>}CD_{14}$. CD_{33}	M5	1

XI. Discussion

A total of 30 patients were studied in this study. Among them majority arc between 5 to 8 years of age (56.66%). There are male predominance (73.33%). Fever is present almost in 100% cases. Bone pain in 73.33% cases, bleeding manifestation in 76% cases and 60% patient presented with lymphadenopathy. 60% patients have hepatomegaly and 79% pt have splenomegaly. In 40% cases Hb% was 5 to 6 gmIdL and in 33% cases Hb% was 7 to 8 gmIdl. A study was done previously by Dr.BclayetHossain in Dhaka Shishu (Children) Hospital that showed Fever, and pallor in (88%), hepatomegaly (75%), Splenomegaly 67%, Lymphadenopthy (76%), bleeding manifestation (50%), Another report by Iloflbrand[1] showed Lymphadenopathy (65%), bone pain (50%). In comparison with those studies bone pain is slightly higher in present study and splenomegaly is more than Hepatomegaly.In this study morphological characteristic of ALL showed LI 77.77%, L2 16.66%, L3 5.56% and morphological characteristics of AML showed M 1=37.5%, M2=12.5%, M3=25.00%, M4=12.5%, M5=12.5%. A study was done in abroad by Richard A LathsonMD[3] which showed LI 80%, L2 18% and L3 1 to2%. Another study by Susan et al[14] which showed LI 80% L2 20%, No L3. Both of those studies more or less similar with the present study.Prevalence of acute Leukaemia by Immunophenotyping (N-30) cases showed AML 26.66%, ALL 60.00%, Biphenotypic acute Leukaemia 10%, mixed acute Leukaemia 3.33%. A study done by Susan etal[14] where 19%myeloid antigen expression in ALL. Khalit el al at King Faisal Hospital found Biphenotypic 12%.In this study prevalence of subtype of acute Lymphoblastic Leukaemia were B cell 83.33%

and T cell 16.67%. Sallanet al[3] was found B cell 80% and T cell 20%. A study was done by Khalil et al[12] at King Faisal Hospital and Research Center which showed ALL lo be the commonest (63.2%) of all leukaemias by immunophenotyping followed by AML (21%) and Biphenotypic leukaemia (12%).[ry] In another study at Tata Memorial Hospital, AML constitutes (39.8%)) of all leukaemia.[20]Tn another study in American Journal of Clinical Pathology ScherrTR et al. found on the basis of immunophenotyping AML to be (78.2%) and ALL (19.1%).[21] Comparison with those studies there is slight variation in present study. We find Morphological LI type which bears good prognosis but by immunophenotypic analysis we can see some bad prognostic lineage marker associated with LI type which we cannot find out by only morphological study.There are wide variation in the results of immunophenotypic findings, still it has been used as a major tool for diagnosis of haematological malignancies. There are many studies which showed that co expression of myeloid antigen in ALL and lymphoid antigen in AML[6? 3]. Flow cytometricimmunophenotyping has been used as one of the important tools of diagnosis for haematological malignancies. It is used not only for diagnosis but also to differentiate and classify different types of hematological malignancies, characterization of sub population of leukaemia and detection ofMRD.

XII. Limitation of the study

In my study there was some limitation that according to definition, Children considered as up to 18 yrs. But I had studied this part in Dhaka Shishu (Children) Hospital where patients admitted up to 12 years of age. That's why only up to 12 years of age is considered. Moreover, the study considers only the children who were admitted in Dhaka shishu (Children) hospital. Moreover, the study had only a few number of sample population.

XIII. Conclusion

This study reveals that in addition to Morphological study of bone Marrow, Immunophenotyping is also required to know the specific Lineage marker which will help to choose the specific chemotherapy schedule and also the prognosis of the patient. Although Acute Leukaemia have been illustrated in this study, the value of immunophenotyping can play an important role in the diagnosis of virtually all other types of hematopoietic malignancies. Immunophenotyping opened the new era of diagnosis of different haematological neoplastic conditions in our country. Though it is in its infancy in Bangladesh, still it remains a valuable tool in the diagnosis and prognosis of different types of haematological malignancies.

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