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Determinants of Parents' Delay for Diagnosis of Childhood Acute Lymphoblastic Leukemia at a Tertiary Care Hospital of Bangladesh

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Abstract

Background: It is very important to early diagnosis of cancer because it gives an opportunity for early treatment and prognosis. Unfortunately, late presentation and delayed diagnosis of childhood cancer remains a problem in developing countries including Bangladesh. **Objectives:** The purpose of the present study was to evaluate the factors behind parents' delay in the diagnosis of acute lymphoblastic leukemia among children in a tertiary care hospital in Bangladesh. **Methodology:** This was a descriptive cross-sectional study carried out in the Department of Pediatrics at Mymensingh Medical College Hospital, Mymensingh, Bangladesh from April 2013 to September 2013. Information was obtained from hospital records of children diagnosed as acute leukemia Information included socio-demographic variables, urbanization, parent education and other causes to delayed diagnosis of leukemia. **Results:** Seventy children (44 males, 26 females) were included where the most common age group was 5 to 10 years which was 37(52.9%). Among 70 acute leukemia patients 66 (94.3%) lived in rural area and 4(5.7%) lived in urban area. Most of the patients 59(89.3%) belongs to the low socioeconomic status and 11(15.7%) were from middle class family. Among the parents, 27(38.6%) fathers and 33(47.1%) mothers were illiterate. Delayed reaching tertiary care hospital after suspicion were lack of personal 2 (2.85%), economic constrain 6 (8.57%), lack of information about availability of proper treatment 1 (1.42%), other causes 30 (42.85%) and none 31(44.28%). Median lag time was 60 days. **Conclusion:** In conclusion factors contributing to delayed diagnosis are rural areas, parents' education, economic constrain and urbanization. *[Journal of National Institute of Neurosciences Bangladesh, January 2024;10(1):26-31]*

Keywords: Parent delay; acute lymphoblastic leukemia

Introduction

Acute leukemia is a malignant transformation of a clone of cells from lymphoid and myeloid progenitor cells. The majority of cases are of B-cell origin, but it can also arise from T-cell precursors[1]. Acute lymphoblastic leukemia (ALL) represents (80.0%) of all leukemias in children[2]. In developed countries, the age distribution of acute lymphoblastic leukemia shows a major peak at pre-school age with a slow decline toward adolescence[3]. Symptoms includes fatigue, dizziness and palpitation, severe and unusual bone and joint pain, recurrent and severe infections like oral, throat, skin, perianal, fever without obvious infection, left upper quadrant fullness and early satiety due to splenomegaly, dyspnea, headache, irritability or altered mental status and neck rigidity, hemorrhagic or thrombotic complications due to thrombocytopenia or disseminated intravascular coagulopathy (DIC) - for example, frequent nose bleeds, spontaneous bruising[1,4]. Diagnosis of acute lymphoblastic leukemia begins with a medical history, physical examination, complete blood count, and blood smears[5]. A bone marrow biopsy is conclusive proof of Leukemia[2].

Despite tremendous importance of early diagnosis of

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cancer in children, few studies are available. Early diagnosis of cancer is a fundamental goal in pediatric oncology because it gives an opportunity for early treatment. Consequently, prognosis may occur and a cure can be attained with or without minimal side or late effects[6]. Delay in cancer diagnosis is common with mental stress and delay prognosis[9]. Many researchers carried out studies to find out the time to diagnose a variety of childhood cancers and the factors associated with delayed diagnosis. Diagnostic delay is usually defined as the time from symptom onset until correct diagnosis[3]. There are many data about delay diagnosis and negative outcome[8].

Some researchers have focused on the time between a patient's first symptom and the diagnosis of cancer. This time period, called diagnostic delay has also been designated as 'time to diagnosis', 'lag time' or 'wait time' by different authors[6]. Others have made a distinction between patient and physician delays[10].The patient delay was defined as the length of time between the onset of signs and symptoms and the patient's first visit to the health care system, whereas the length of delay between the first health care visit and the diagnosis was designated as physician delay[11]. More than (12.0%) of cancer cases are initially misdiagnosed. Variations may be due to regional differences in health care systems, parent education, psychological and social factors[12]. A significant difference in lag time was found among tumour types with the shortest lag times in acute lympholastic leukemia and Wilms tumour and longest in Hodgkin's lymphoma[13]. This often leads to seriously delayed diagnosis of cancer, which can sometimes cause treatable cancers to become harder to treat or completely untreatable. This may lead to serious complications, disfigurement and wrongful death.

So far no known published data in Bangladesh regarding the factors influencing time lag between first appearances of symptoms to the final diagnosis of childhood acute lymphoblastic leukemia. From this point of view this study was conducted to find out the time lag between first appearances of symptoms to the first visit of doctor in childhood acute leukemia in a tertiary care hospital.

Methodology

Study Design and Population: This was a descriptive type cross sectional study conducted over a period of six months from April to September 2013 in Mymensingh Medical College Hospital, Mymensingh, Bangladesh. A predesigned questionnaire was used to collect data from parents and legal guardians of children of both sex admitted in the inpatient department of pediatrics were enrolled. Inclusion criteria were age bellow 18 years and diagnosed case of acute leukemia. Exclusion criteria were children above 18 years, childhood cancer other than leukemia and severe anemia other than acute leukemia.

Study Procedure: Sampling technique was non probability purposive sampling. Data related to demography of patients, urbanization, their socio-economic status, parents' education and other causes delayed reach in tertiary care hospital were obtained from hospital records and documented on predesigned data sheet.

Statistical Analysis: Statistical analysis was performed by Windows based software named as Statistical Package for Social Science (SPSS), versions 22.0 (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.). Continuous data were expressed as mean, standard deviation, minimum and maximum. Categorical data were summarized in terms of frequency counts and percentages. Chi-square test was used for comparison of categorical variables and Student t test was applied for continuous variables. Every effort was made to obtain missing data. A two-sided P value of less than 0.05 was considered to indicate statistical significance. Differences between case and control were tested.

Ethical Consideration: All procedures of the present study were carried out in accordance with the principles for human investigations (i.e., Helsinki Declaration 2013) and also with the ethical guidelines of the Institutional research ethics. Formal ethics approval was granted by the local ethics committee. Participants in the study were informed about the procedure and purpose of the study and confidentiality of information provided. All participants consented willingly to be a part of the study during the data collection periods. All data were collected anonymously and were analyzed using the coding system.

Results

A total number of 70 children were recruited for this study. Among 70 acute leukemia patients 25 (35.7%)

Table 1: Age Distribution of Study Population (n=70)

Age Group	Frequency	Percent
Less Than 5 Years	25	35.7
5 to 10 Years	37	52.9
More Than 10 Years	8	11.4
Total	**70**	**100.0**
Mean±SD	6.76±4.32	

cases were below 5 years and 37(52.9%) cases were between 5 to 10 years and 8 (11.4%) cases above 10 years (Table 1).

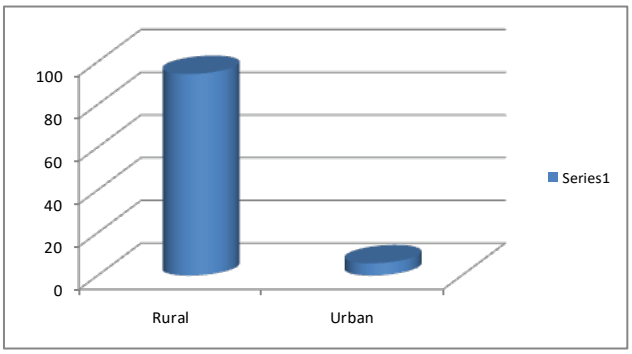

Figure I: Showing acute Leukemia Patients among Rural and Urban Area

Among 70 acute leukemia patients 66(94.3%) cases were from rural area and 4(5.7%) cases were from urban area (Figure I).

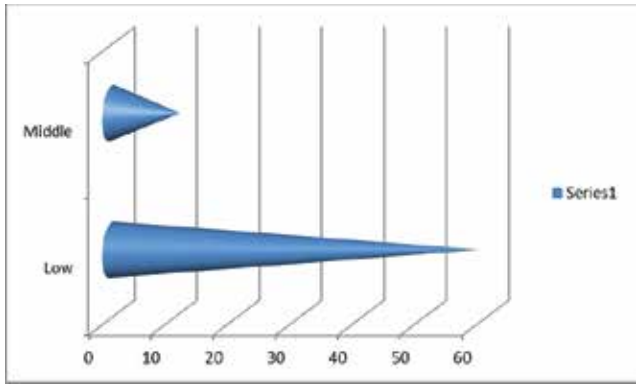

Figure II: Parents economic condition

Socioeconomic Status (SES): is an economic and sociological combined total measure of a person's work experience and of an individual or families economic and social position in relation to others, based on income, occupation and education. (NCES 2008). Lower class is defined as living on less than US$ 2 per day & Middle class is defined living on >2 US$ per day.) Most of the patients 59(89.3%) belongs to the low socioeconomic status and 11(15.7%) were from middle class family (Figure II).

A literate person is one who can read and write & a illiterate person is one who cannot read & write. Majority of the parents were illiterate. Among the parents of 27(38.6%) father and 33(47.1%) mother were illiterate. Among the literate mothers only 11(15.7%) mother completed secondary education & 26(37.1%) leave school before completing their primary education. Among the literate fathers only 15(21.4%) completed secondary education, 28(40%) completed their primary education (Figure IIIa & IIIb).

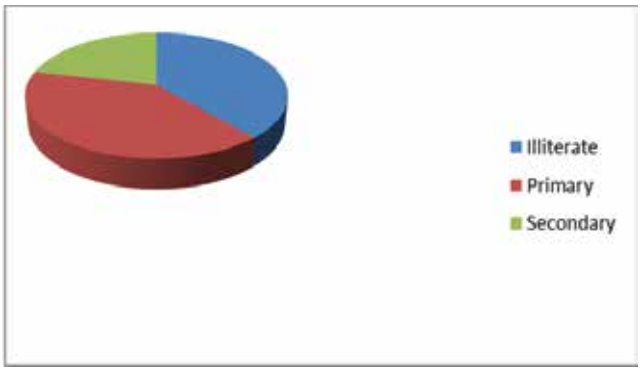

Figure IIIa: Parents education (Father Education)

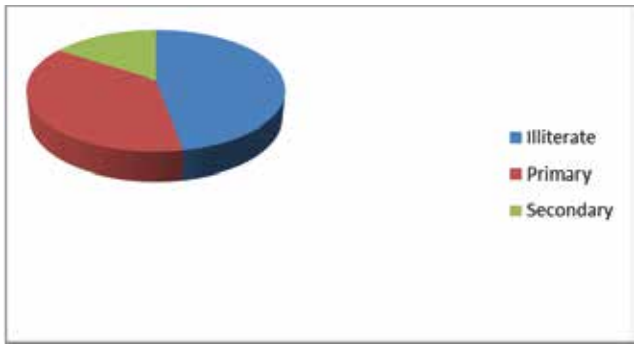

Figure IIIb: Parents education (Mother education)

In this study very low number of acute leukemia patients were unwilling to reach tertiary care hospital after suspicion only 8 (11.4%) (Table 2).

Table 2: Unwilling to Reach Tertiary Care Label after Suspicion

Unwilling to Reach	Frequency	Percent
No	62	88.6
Yes	8	11.4
Total	**70**	**100.0**

The causes of delay reaching tertiary care hospital after suspicion which include lack of personal 2 (2.85%), economic constrain 6 (8.57%), lack of information about availability of proper treatment 1 (1.42%), other causes 30 (42.85%) and none 31(44.28%). Others were long distance of tertiary care hospital, less confidence about scientific treatment, fear about hospital care and hospital stuff, attitude to avoid prolong hospital stay, fearless about diagnosis of cancer of their beloved child. Over confidence to believe in Tabeej (Table 3).

Table 3: Causes of Delay Reaching Tertiary Care Hospital after Suspicion

Causes of Delay	Frequency	Percent
Reaching	2	2.9
Lack of personal	6	8.6
Economic Constrain	1	1.4
Lack of Information	30	42.8
Others	31	44.3
None	**70**	**100.0**
Total		

Lack of information=about availability of proper treatment

Discussion

In developed countries, the age distribution of acute lymphoblastic leukemia shows a major peak at pre-school age between 1 to 5 years with a low decline toward adolescence[14]. This contrasts to the typical age distribution in less developed countries with no pre-school peak[15]. In this study median age for acute lymphoblastic leukemia was 7 years, whereas average age was 6.76. Abdelkhalek et al[16] found delayed diagnosis of cancer in age group less than 5 years. Jubayar et al[17] found maximum age group was 1 to 4, which was (82.0%) likely to die compared to children diagnosed in infancy. Hjalgrim et al[18] found in statistical analyzed data collected over 20 years that 1595 girls and 1859 boys were diagnosed as acute lymphoblastic leukemia. Other study done by James et al[9] revealed that there were 40 males and 24 females suffering from acute lymphoblastic leukemia. In this study we found 44 male and 26 female, which was similar with other studies. Another study done by Mehta et al[19] found that tumors were more common among male patients whereas Ali et al[20] found that there was no relationship with gender, age. Din et al[21] found there are difference in gender, age and region in time to diagnosis across the United Kingdom. James[9] found that the lag time is least for the 5 to 9 years' age group and longest for the 10 to 14-year age group.

Acute lymphoblastic leukemia incidence among children under 5 years of age was examined, the incidence of ALL decreased across the four strata of urbanization, from 67 to 62 and from 65 to 54 cases per million person-years at-risk (two-sided trend P=0.009), such that rates were significantly lower in urban area[16]. It was also found that urbanization decreases acute lymphoblastic leukemia diagnostic delay.

This study extends findings from comparative studies between countries and populations with a different socioeconomic status and different incidence of childhood acute lymphoblastic leukemia. These findings were acute lymphoblastic leukemia positive more in low socio-economic condition (84.3%) than in middle socio-economic (15.7%). The correlation between socioeconomic status and acute lymphoblastic leukemia incidence is one of the arguments supporting the hypothesis of infectious etiology of childhood acute lymphoblastic leukemia[22-23]. Statistically significant patient factors associated with delayed diagnosis were lower parental education and socio-economic status was done by Abdelkhalek et al[16]. In our study parenteral education also effect delayed diagnosis in acute lymphoblastic leukemia. This data was also similar with Lins et al[22]. The reported incidence of childhood leukemia is lower in low-income countries than in more prosperous countries[2]. Stefan[24] described his findings that gender, age of children and parental level of education did not have a significant influence on the total time to diagnosis. There was no significant difference in lag time between children whose parents had post secondary education and those with lower educational levels[9].

Some studies had shown that median total diagnostic delay was caused by patients and physician delay. In our study median total diagnostic delay was 60 days, which was higher than Lins[22] study. Abdelkhalek et al[16] said that misdiagnoses were initially recorded in 39.0% patients, where 47 days caused by patients and parents[16]. Stefen and Siemonsma[24] found in there study the physician delay was 20 days and patient delay was 5 days. Brown et al[25] found median lag times were shortest in ALL than other childhood tumor[25]. More than 12.0% cancer cases are initially misdiagnosed. Evans et al[6] found median diagnostic time was 3 weeks, patient diagnostic delay was 40.0% cases and health associated delays 46.7% cases. Dapkeviciute et al[27] found that factors significantly prolonging diagnostic intervals in multivariate linear regression were living in big cities (p=0.008), anxiety and depression (p=0.002), self-medication (p=0.019). This often leads to seriously delayed diagnosis of cancer, which can sometimes cause increased sufferings of the patient, increased duration of illness, increased economic burden and lastly may cause treatment failure or death

Wood et al[28] studied that time before diagnosis is very significant for parents. Parents were first alerted to their child's illness by a range of signs and symptoms and these early symptoms were often vague, non-specific, and common, and some older children

were reluctant to disclose symptoms. Ten families' accounts of this period before diagnosis included a dispute with doctors. Disagreements between parents and doctors about the seriousness of children's symptoms and some parents felt that doctors discounted their special knowledge of their child[29].
Patient unwilling to reach tertiary care hospital after suspicion, there are many causes in this study we found that lack of personal 2(2.85%), economic constrain 6(8.57%), lack of information about availability of proper treatment 1(1.42%), others included long distance of tertiary care hospital, less confidence about scientific treatment, fairness about hospital care and hospital stuff, attitude to avoid prolong hospital stay, fairness about diagnosis of cancer of their beloved child, 30(42.85%) and none 31(44.28%).

Conclusion

Delayed diagnosis results from many causes including patients age, sex, socioeconomic status, parent education, delayed reach in tertiary care hospital, which increased mortality rate of childhood cancer. So, further evaluation need to identify causes delayed reach in tertiary care hospital. The result of the study may help taking proper interventions at hospital and community level, improving awareness among parents about symptoms of acute lymphoblastic leukemia, early referral, early diagnosis, proper treatment and also increasing survival rate and better care.

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Contribution to authors: Mowla MG, Choudhury AM, Ahmed F conceived and designed the study, analyzed the data, interpreted the results, and wrote up the draft manuscript. Ara A, Yasmin T involved in the manuscript review and editing. All authors read and approved the final manuscript.

Data Availability
Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate
Ethical approval for the study was obtained from the Institutional Review Board. As this was a prospective study the written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

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