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A Study on Demographic Status in Children with ALL

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Abstract **Original Research Article**

***Objective*:** To assess the demographic status in children with ALL. ***Method*:** This prospective study was carried out at Department of Pediatric Hematology & oncology, Bangabandhu Sheikh Mujib Medical University, Dhaka from Six months (1st October 2014 – 31st March 2015). Where sample was selected from the population by purposive sampling technique. Sample size was 80. Detail demographic data were collected from the informant and recorded in structured case report form. Clinical examination and relevant investigation were done meticulously. ***Results*:** During the study, most of the subjects 37(46.25%) belongs to age 02 to 06 yrs. Next group of patients 31(38.75%) observed in 7-11 years of age group. 80 cases 58(72.5%) were male and 22(27.5%) were female. Male – female ratio was 2.63:1. Among the patients the poor class 29(41%) comprising the major percentage of the ALL patients, which is followed by middle class 26(37%) and remaining are upper class 15(21%). Fever was the commonest presentation (100%) of ALL, followed by abdominal pain (26.25%), joint pain (17.5%), lump in the abdomen (15%) and bleeding manifestation 22.5%. Among the all-clinical sign, anaemia (96%) was commonest sign, followed by Lymphadenopathy (57.5%) and Hepatomegaly 55%. ***Conclusion*:** From our conclusion we can conclude that, majority of patient's belong to 2-6 years age group and most of them were male. Plus, according to our study majority had poor economic status which can be key contributor for diseases progression.

Keywords: Acute Lymphoblastic Leukemia (ALL), Cancer, Demographic status.

INTRODUCTION

Acute Lymphoblastic Leukemia (ALL) is the most prevalent form of cancer among children worldwide. It is a malignancy of the blood and bone marrow characterized by the uncontrolled proliferation of immature lymphoid cells. The management and outcomes of ALL are influenced by various factors, including demographic characteristics such as age, gender, race/ethnicity, socioeconomic status, and geographical location.

Understanding the relationship between demographic status and ALL is essential for several reasons. Firstly, it provides valuable insights into the epidemiology of the disease, allowing researchers and healthcare professionals to identify potential risk factors and patterns of occurrence. Secondly, demographic factors may influence disease presentation, treatment response, and overall prognosis, thereby guiding treatment decisions and supportive care strategies. Finally, examining demographic disparities can help identify vulnerable populations that may require targeted interventions and improved access to care [1-3].

Age is a crucial demographic factor in pediatric ALL, as the incidence and clinical characteristics of the disease can vary significantly among different age groups. ALL is most commonly diagnosed in children between the ages of 2 and 5 years, with a second peak occurring in adolescents. The age at diagnosis can impact treatment options and outcomes, as younger children often require less intensive therapy and have a higher chance of cure compared to older adolescents [4-6].

Gender has also been associated with differences in ALL incidence and treatment outcomes. Boys have a slightly higher risk of developing ALL than girls, although the reasons for this disparity are not yet fully understood. Moreover, certain subtypes of ALL, such as infant ALL and mixed-lineage leukemia are more prevalent in specific gender groups [7, 8].

Race/ethnicity has been shown to play a role in the incidence, biology, and treatment outcomes of ALL. Variations in genetic and environmental factors among different racial and ethnic populations contribute to differences in disease risk, genetic subtypes, response to therapy, and overall survival rates. Understanding these disparities can guide personalized treatment approaches and support the development of targeted interventions.

Socioeconomic status (SES) has a significant impact on the management of pediatric ALL. Children from lower socioeconomic backgrounds may face barriers to timely diagnosis, have limited access to specialized medical care, and experience challenges in adhering to treatment protocols. These factors can lead to disparities in treatment outcomes and overall survival rates. Addressing these socioeconomic disparities is crucial to ensure equitable access to high-quality care for all children with ALL.

Geographical location and access to healthcare resources also influence the diagnosis, treatment, and outcomes of children with ALL. Disparities may arise due to differences in healthcare infrastructure, availability of specialized pediatric oncology centers, and regional variations in treatment protocols. Understanding these geographical disparities is essential for optimizing healthcare delivery and ensuring that all children with ALL receive appropriate and timely treatment [9-11].

In conclusion, demographic status plays a significant role in the incidence, presentation, treatment response, and overall outcomes of children with ALL. Recognizing and addressing demographic disparities are critical for improving the care and outcomes of all children affected by this devastating disease. By understanding the impact of age, gender, race/ethnicity, socioeconomic status, and geographical location, healthcare professionals and researchers can develop targeted interventions, optimize treatment strategies, and work towards reducing disparities in pediatric ALL care [12, 13].

OBJECTIVE

To assess the demographic status in children with ALL.

METHODOLOGY

This prospective study was carried out at Department of Pediatric Hematology & oncology, Bangabandhu Sheikh Mujib Medical University, Dhaka from Six months (1st October 2014 – 31st March 2015). Where sample was selected from the population by purposive sampling technique. Sample size was 80. Detail demographic data were collected from the informant and recorded in structured case report form. Clinical examination and relevant investigation were done meticulously. The anthropometric measurements taken were body weight, height, body mass index (BMI), mid upper arm circumference (MUAC), Triceps skin fold thickness (TSFT). All the measurements were collected by the same investigator to avoid inter-observer error and to maintain uniformity and accuracy in techniques. All collected questionnaire were checked very carefully to identify the error in the data. Data processing work consist of registration schedules, editing computerization, preparation of dummy table, analyzing and matching of data.

The case definition of operational variable had been described. Patient data such as age, sex, clinical presentation of disease etc. were noted. This questionnaire was used for collection of information by interviewing patients. Collected all questionnaire checked very carefully to identify the error in collecting data. Data processing work were consisting of registration of schedules, editing, coding and computerization, preparation of dummy tables, analysis and matching data. The technical mater of editing, encoding and computerization looked by me.

Socio-demographic and clinical variables: Data for socio- demographic and clinical variables were obtained from all participants by the use of a pre-designed and easily understandable questionnaire. The socio-demographic variables studied- age, sex, place of residence and occupation. Socioeconomic levels were determined by occupation, household's income and expenditure. After collection of all information, these data were checked, verified for consistency and edited for finalized result. After editing and coding, the coded data directly entered into the computer by using SPSS version 6. Data cleaning validation and analysis was performed using the SPSS/PC software and graph and chart by MS excel. The result was presented in tables in proportion. A "P" value <0.5 considered as significant.

RESULTS

Table-1 shows age distribution of the patients where 80 patients were taken as sample for study according to inclusion, exclusion criteria, to evaluate the value of triceps skin fold thickness in the assessment of nutritional status of children with acute lymphoblastic leukaemia at diagnosis and after induction therapy. The age group was divided into three groups: ≤2 years, 2 to 6 years, 7 to 11 years and 12 to 15 years. Most of the subjects 37(46.25%) belongs to age 02 to 06 yrs. Next group of patients 31(38.75%) observed in 7-11 yrs of age group.

Table 1: Demographic status of the patients

Age (years)	Number of patients (n)	Percentage (%)	Mean ± SD
≤2	5	6.25	5.7 ± 1.3
2-6	37	46.25	
7-11	31	38.75	
12-15	7	8.75	

Figure-1 shows gender distribution of the patients where Out of 80 cases 58(72.5%) were male and 22(27.5%) were female. Male – female ratio was 2.63:1

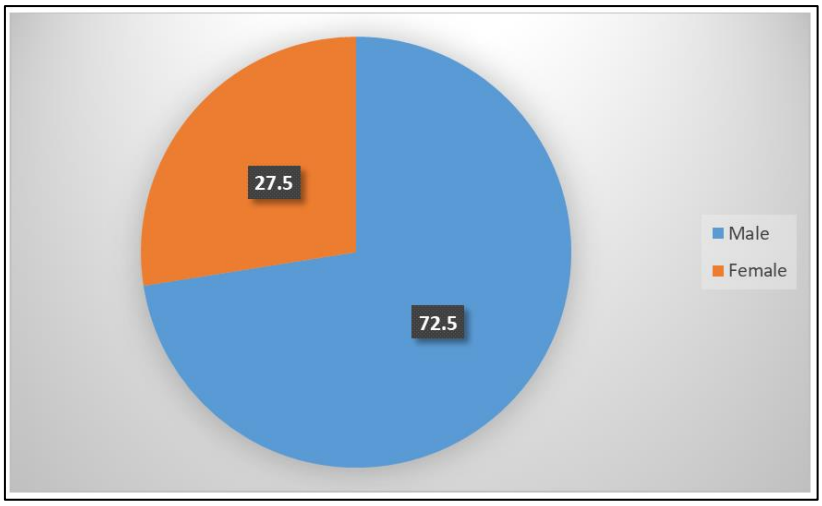

Figure 1: Gender distribution of the patients

Figure-2 shows economic status of the patients socioeconomically patients are grouped into three classes. Poor class GNI per capital income (In Tk.) : <7000, Middle class GNI per capital income (In Tk.): 7000-27000 and Upper class GNI per capital income (In Tk.) : >27000. Among the patients the poor class 29(41%) comprising the major percentage of the ALL patients, which is followed by middle class 26(37%) and remaining are upper class 15(21%).

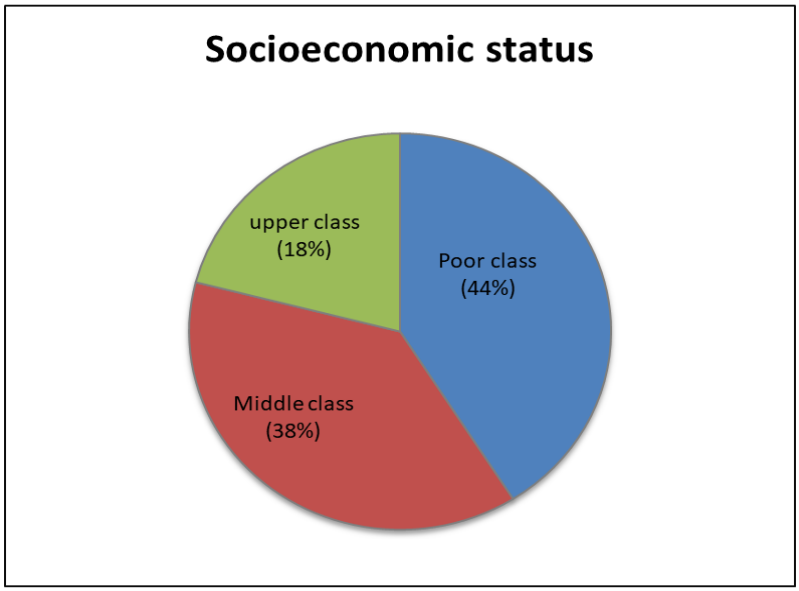

Figure 2: Economic status of the patients

Table-2 shows clinical symptoms of respondents where Fever was the commonest presentation (100%) of ALL, followed by abdominal pain (26.25%), joint pain (17.5%), lump in the abdomen (15%) and bleeding manifestation 22.5%.

Table 2: Clinical symptoms of respondents

Symptoms	Number of patients (n)	Percentage (%)
Fever	80	100
Joint pain	14	17.5
Sore throat	9	11.25
Abdominal pain	21	26.25
Lump in abdomen	12	15
Bleeding manifestation	18	22.5
Respiratory distress	14	17.62
Headache	7	8.75
Testicular swelling	2	2.5

Table-3 shows Clinical sign of ALL patients (n=80) where among the all clinical sign, anaemia (96%) were commonest sign, followed by Lymphadenopathy (57.5%) and Hepatomegaly 55%.

Table 3: Clinical sign of ALL patients (n=80)

Sign	Number of patients (n)	Percentage (%)
Anemia	77	96.25
Bony tenderness	32	40
Lymphadenopathy	46	57.5
Hepatomegaly	44	55
Splenomegaly	39	48.75
Ankle oedema	4	5
Evidence of infection	16	20

DISCUSSION

The age group was divided into three groups: ≤2 years, 2 to 6 years, 7 to 11 years and 12 to 15 years. Most of the subjects 37(46.25%) belongs to age 02 to 06 yrs. Next group of patients 31(38.75%) observed in 7-11 years of age group. Findings are correlates with the results of similar studies at home and abroad, e.g. a cross-sectional study conducted in Universiti Kebangsaan Malaysia Medical Centre [9] demonstrated that subjects comprised 32 (62.7%) males and 19 (37.3%) females. Most of the subjects (41.2%) were in the age group of 4 to 6 years. Another study in India, conducted by Kumar R *et al.*, [1] reported that of the 25 cases with ALL, 6 were in the age range of 1-4 years, 7 between 4 to 8 years and the remaining between 8-12 years. Another longitudinal study, at Brazil showed that study group consisted of 16 girls and 29 boys, and their median age was five years. In a Bangladeshi study 20 showed that maximum cases 35(58.3%) were in the age group 2-6 years. We also found that out of 80 cases 58(72.5%) were male and 22(27.5%) were female. Male – female ratio was 2.63:1. Maximum numbers of male patients 28(48.27%) were in age group between 2 – 6 years. The next age group 20(34.48%) was 7-11 years. Females were significantly older than males. Female patients 11(50%) were in the age group 7-11 years. It is found that the incidence of acute lymphoblastic leukaemia gradually decreased with raised age. In case of female 7-11 years was highest incidence and in case of male 2-6 years observed peak age for ALL.

Malnutrition is a common problem among children in developing countries. According to the National Nutrition Monitoring Bureau (NNMB-1989-90) only 10% of Indian children are normal (Gomez classification), while 8.7% are severely malnourished, 68.7% are underweight, 65.1% are stunted and 19.9% are wasted [12]. Wasting occurs commonly in any disease state because skeletal muscle is the largest reservoir of protein [13]. Malignant neoplasms may also cause and/or aggravate protein - energy malnutrition (PEM). Children with cancer are often observed to be malnourished. The degree of malnutrition is likely to influence the pharamacokinetics of chemotherapeutic drugs and the host responses to therapy-related complications, such as infection [1]. In our study, patients came from both urban and rural areas with urban 51(63.75%) preponderance. The majority of parents of the patients comprised of businessman (25), service holder (16) and farmer (14). Socioeconomically patients are grouped into three classes. Poor class GNI per capital income (In Tk.) : <7000, Middle class GNI per capital income (In Tk.): 7000-27000 and Upper class GNI per capital income (In Tk.): >27000. Among the patients the poor class 29(41%) comprising the major percentage of the ALL patients, which is followed by middle class 26(37%) and remaining are upper class 15(21%). Sgarbieri U *et al.*, [4] reported that socioeconomic indicators for the children's families demonstrated that these children were mainly from low-income families.

Study at the advanced pediatric center, PGIMER, Chandigarh a tertiary care teaching hospital India [1] reported that out of the 25 cases with ALL, 11 (44%) cases had hepatosplenomegaly of more than 5 cm below the costal margins. Infection was the most

important complication during the first 5 weeks of chemotherapy. Fifteen cases had febrile neutropenia, 2 had candida esophagitis and 7 patients had other complications in their study. The mean duration of symptoms was 1.97 ± 1.52 months in the malnourished group (defined as weight for age <80%) whereas in the well-nourished group it was 1.46 ± 0.9 months ($p > 0.05$) [13]. We found that fever was the commonest presentation (100%) of ALL in this study, followed by abdominal pain (26.25%), joint pain (17.5%), lump in the abdomen (15%) and bleeding manifestation 22.5%. Among the 80 ALL patients, anaemia (96%) were commonest sign, followed by Lymphadenopathy (57.5%) and Hepatomegaly 55%. Which was resembles to other studies [13-17].

CONCLUSION

From our conclusion we can conclude that, majority of patients belong to 2-6 years age group and most of them were male. Plus, according to our study majority had poor economic status which can be key contributor for diseases progression.

REFERENCES

1. Kumar, R., Marwaha, K., Bhalla, A., & Gulati, M. (2000). Protein energy malnutrition and skeletal muscle wasting in childhood acute lymphoblastic leukaemia. *Indian Pediatrics*, *37*, 720-726.
2. Pui, C. H., Relling, M. V., & Downing, J. R. (2004). Mechanisms of disease: Acute Lymphoblastic Leukaemia. *N Engl J Med*, *350*, 1535-48.
3. Delbecque-Boussard, L., Gottrand, F., Ategbo, S., Nelken, B., Mazingue, F., Vic, P., ... & Turck, D. (1997). Nutritional status of children with acute lymphoblastic leukemia: a longitudinal study. *The American journal of clinical nutrition*, *65*(1), 95-100.
4. Sgarbieri, U. R., Fisberg, M., Tone, L. G., & Latorre, M. D. R. D. (2006). Nutritional assessment and serum zinc and copper concentration among children with acute lymphocytic leukemia: a longitudinal study. *Sao paulo medical journal*, *124*, 316-320.
5. Sala, A., Pencharz, P., & Barr, R. D. (2004). Children, cancer, and nutrition—a dynamic triangle in review. *Cancer*, *100*(4), 677-687.
6. Maldonado-Alcázar, A., Núñez-Enríquez, J. C., García-Ruiz, C. A., Fajardo-Gutierrez, A., & Mejía-Aranguré, J. M. (2013). Alterations of nutritional status in childhood acute leukemia. *Clinical epidemiology of acute lymphoblastic leukemia-from the molecules to the clinic. Rijeka: InTech*, 277-96. http://dx.doi.org/10.5772/52715
7. Frisancho, A. R., & Tracer, D. P. (1987). Standards of arm muscle by stature for the assessment of nutritional status of children. *American journal of physical anthropology*, *73*(4), 459-465.
8. Ani, M. A. (2008). Nutritional status of acute childhood lymphoblast leukemia (ALL) pre &post induction chemotherapy. *IRAQI JOURNAL OF COMMUNITY MEDICINE*, *21*(3).
9. Conter, V., Rizzari, C., Sala, A., Chiesa, R., Citterio, M., & Biondi, A. (2004). Acute Lymphoblastic Leukaemia. *Orphanet Encyclopedia.*
10. Kamps, W. A., Van der Pal-de Bruin, K. M., Veerman, A. J. P., Fiocco, M., Bierings, M., & Pieters, R. (2010). Long-term results of Dutch Childhood Oncology Group studies for children with acute lymphoblastic leukemia from 1984 to 2004. *Leukemia*, *24*(2), 309-319.
11. Pui, C. H., Mullighan, C. G., Evans, W. E., & Relling, M. V. (2012). Pediatric acute lymphoblastic leukemia: where are we going and how do we get there?. *Blood, The Journal of the American Society of Hematology*, *120*(6), 1165-1174.
12. Calle, E. E., Rodriguez, C., Walker-Thurmond, K., & Thun, M. J. (2003). Overweight, obesity, and mortality from cancer in a prospectively studied cohort of US adults. *New England Journal of Medicine*, *348*(17), 1625-1638.
13. Butturini, A. M., Dorey, F. J., Lange, B. J., Henry, D. W., Gaynon, P. S., Fu, C., ... & Carroll, W. L. (2007). Obesity and outcome in pediatric acute lymphoblastic leukemia. *Journal of Clinical Oncology*, *25*(15), 2063-2069.
14. Acute Lymphoblastic Leukaemia. The Leukaemia & Lymphoma Society. Revised 2014.
15. den Hoed, M. A., Pluijm, S. M., de Groot-Kruseman, H. A., te Winkel, M. L., Fiocco, M., van den Akker, E. L., ... & van den Heuvel-Eibrink, M. M. (2015). The negative impact of being underweight and weight loss on survival of children with acute lymphoblastic leukemia. *haematologica*, *100*(1), 62.
16. Reilly, J. J., Brougham, M., Montgomery, C., Richardson, F., Kelly, A., & Gibson, B. E. S. (2001). Effect of glucocorticoid therapy on energy intake in children treated for acute lymphoblastic leukemia. *The Journal of Clinical Endocrinology & Metabolism*, *86*(8), 3742-3745.
17. WHO expert committee on Physical status: The use and interpretation of Anthropometry. WHO technical report series: 854.