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Research Article

Liver Function Tests in Patients of Acute Leukemia Before and After Induction Chemotherapy

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Abstract

Patients of acute leukemia require careful assessment of liver function prior to start chemotherapy to determine which drugs may be appropriate or to be modified. Post chemotherapy abnormalities of liver function tests may be due to drugs or due to disease process itself. The aim of the study was to assess the status of liver function in acute leukemia patients before and after induction chemotherapy. It was a prospective study with fifty newly diagnosed patients of acute leukemia who fulfilled the selection criteria. Blood samples for serum total bilirubin, alanine transaminase (ALT) and aspartate transaminase (AST) were collected before chemotherapy (day 0) and after induction chemotherapy at 14th day and 30th day. Serum ALT and AST was done by kinetic method and serum total bilirubin was done by DMSO method in the Department of Biochemistry, Dhaka Medical college. In this study it showed that in acute leukemia patients before chemotherapy (day 0) mean level of serum total bilirubin was 0.89±0.64. At 14th day it was 1.55±1.05 which was significantly higher ($p<0.001$) than that of the value of day 0. At 30th day, mean serum total bilirubin was 0.72±0.35 which was significantly lower than the value of before chemotherapy (day 0). Before chemotherapy (day 0), mean serum ALT was 47.46±15.00 & at 14th day it was 87.08±57.45 which was significantly higher than that of the value of before chemotherapy (day 0). At 30thday mean serum ALT was 37.79±11.69 which was significantly lower than the mean level of 14th day (87.08±57.45). This study also found that mean AST level before chemotherapy (day 0) was 38.00±7.34. It significantly ($p<0.001$) increased at 14th day of chemotherapy (44.96 ± 8.29) and significantly decreased at 30th day (32.29±4.78). It is concluded that increased serum total bilirubin, ALT and AST are related with the chemotherapeutic drugs during treatment of acute leukemia.

Key words: liver function tests; acute leukemia; chemotherapy

Introduction

Liver involvement with acute myeloid leukemia is rarely reported. The majority of the published cases suggest a cholestatic picture and obstructive jaundice at presentation (Mathews et al., 2008). The effect of myeloid leukemia therapy has been widely noticed especially in acute myeloid leukemia mainly of liver enzymes (Alamin et al., 2016). Once the diagnosis of leukemia is suspected, a rapid evaluation and initiation of appropriate treatment is necessary because of its overwhelming impact on prognosis in terms of achieving complete remission or providing a better quality of life for longer period of time (Buzarbaruah and Phukan, 2016). After assessment of tumor histology, the next important factor to consider in the selection of chemotherapy regime is organ function. Patients who are to receive chemotherapy require careful assessment of liver function prior to treatment to determine which drugs may not be appropriate, and which drug doses should be modified. Following therapy abnormalities of liver function tests may be due to therapy rather than to progressive disease, and this distinction is of critical importance (King and Perry, 2001). Chemotherapy & bone marrow transplantation is the treatment of choice of acute leukemia. The toxicity of chemotherapy is a common cause of morbidity and mortality of

leukemia patient. Several studies in different centers of the world have shown there are alteration of liver function tests specially ALT (Alanine transaminase), AST(Aspartate transaminase) & total bilirubin in acute leukemia patients during diagnosis and after induction chemotherapy which delays the ongoing treatment schedule and even patient is expired due to hepatotoxicities. In Bangladesh, still now there is lack of published data regarding this. So aim of my study is to measure and compare the liver function tests in patients of acute leukemia before chemotherapy at 14th day and at 30th day, after induction chemotherapy to develop awareness regarding liver function.

Methods

The present study was prospective in nature, conducted from January 2017 to December 2017 at Department of Biochemistry, Dhaka Medical College, Dhaka among Acute Leukemia patients.

Purposive sampling was used.

Group A (50): Before chemotherapy

Group B (50): At 14th day of chemotherapy

Group C (50): At 30th day of chemotherapy

Data collection procedure: The present study was a prospective study which was conducted in the Department of Biochemistry, Dhaka Medical College, Dhaka from January 2017 to December 2017.For this purpose, 50 diagnosed patients of acute leukemia (AML and ALL) were selected according to selection criteria. After selection of the subjects, the objectives, natures, purpose and potential risk of all procedures used for the study were explained in details and informed written consent were taken from both the patients particulars, detail history, clinical examination, were taken in a predesigned data collection form and from all the samples included in this study. With all aseptic precautions, 6 ml of venous blood sample was collected from median cubital vein of each study participant by disposable syringe before chemotherapy. The needle was detached from the nozzle and blood from the syringe was transferred into a dry, clean and plain test tube with a gentle push to avoid hemolysis, test tubes were labeled and coded for identification and kept in slanting position till formation of clot, then centrifuged at 3000 rpm for 5 minutes and the separated serum was kept in labeled eppendorf after proper labeling. From each eppendorf, about 1000µL of serum was used for serum total bilirubin, 100µL for ALT, 100 µL for AST. Serum total bilirubin was measured by DMSO methods, serum AST, ALT were measured by kinetic method. All the biochemical tests were carried out as early as possible. Whenever there was a delay, the sample was stored at -20°C, to avoid loss of bioactivity and contamination. Blood was collected by following the same procedure from same study participants at 14th day and at 30th day of chemotherapy. All the biochemical tests were performed at the Department of Biochemistry, Dhaka Medical College, Dhaka. All the analytical measurements were done in the Department of Biochemistry, Dhaka Medical College, Dhaka. Serum bilirubin was estimated by DMSO method and recording was taken by Evolution-3000 semi- automated analyzer. Serum AST was estimated by kinetic method and the reading was taken by Evolution-3000 semi-automated analyzer. Serum ALT was estimated by kinetic method reading was taken by Evolution- 3000 semi-automated analyzer. All data were recorded in a predesigned data collection sheet. Continuous variables were expressed as mean ± SD and were compared by paired 't' test and were presented as absolute frequencies with percentages. Level of significance was defined as p value<0.05 at 95% confidence interval. All analysis was done using the SPSS version 22 package for windows.

Results:

Table 1: shows that AML and ALL distribution were 62% and 38%.

	Frequency	Percentage
AML	31	62.0
ALL	19	38.0

Table 1: Distribution of the study subjects according to the type of leukemia (n=50).

Table 2: Comparison of serum total bilirubin, before chemotherapy (0 day), 14th day and 30th day (n=50).

Group	Day of treatment	Mean ± SD(Range)	Comparison	p value
A	0 Day (Before Chemotherapy)	0.89±0.64 (0.20-2.50)	A vs B	<0.001
B	14th Day	1.55±1.05 (0.30-3.70)	B vs C	<0.001
C	30th Day	0.72±0.35 (0.25-1.60)	A vs C	0.002

Table 2: shows serum bilirubin rises significantly at 14th day and decreases significantly at 30th day in study subjects.

Table 3: Comparison of serum ALT, before chemotherapy (0 day), 14th day and 30th day (n=50).

Group	Day of treatment	Mean ± SD(Range)	Comparison	p value
A	0 (Before Chemotherapy)	47.46±15.00 (27.00-80.00)	A vs B	<0.001
B	14th Day	87.08±57.45 (32.00-251.00)	B vs C	<0.001
C	30th Day	37.79±11.69 (21.00-88.60)	A vs C	<0.001

Table 3: shows serum ALT rises significantly at 14th day and decreases significantly at 30th day in study subjects.

Table 4: Comparison of Serum AST, before chemotherapy (0 day), 14th day & 30th day of chemotherapy (n=50).

Group	Day of treatment	Mean ± SD(Range)	Comparison	p value
A	0 (Before Chemotherapy)	38.00±7.34 (25.00-49.00)	A vs B	<0.001
B	14th Day	44.96±8.29 (29.00-59.00)	B vs C	<0.001
C	30th Day	32.29±4.78 (24.00-40.00)	A vs C	<0.001

Table 4: shows serum AST rises significantly at 14th day and decreases significantly at 30th day in study subjects.

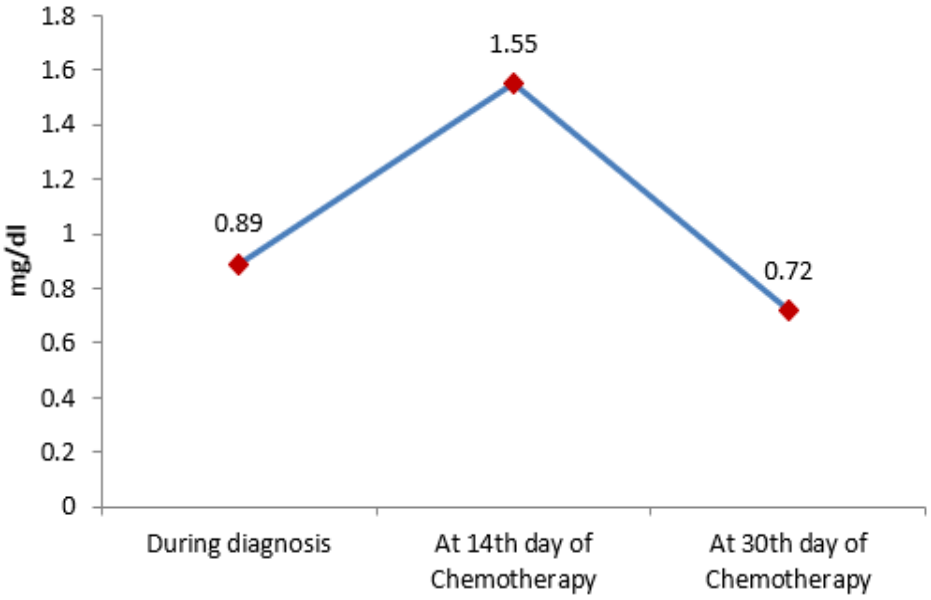

Figure 1: Line diagram of serum total bilirubin before chemotherapy (0 day) , at 14th day and 30th day.

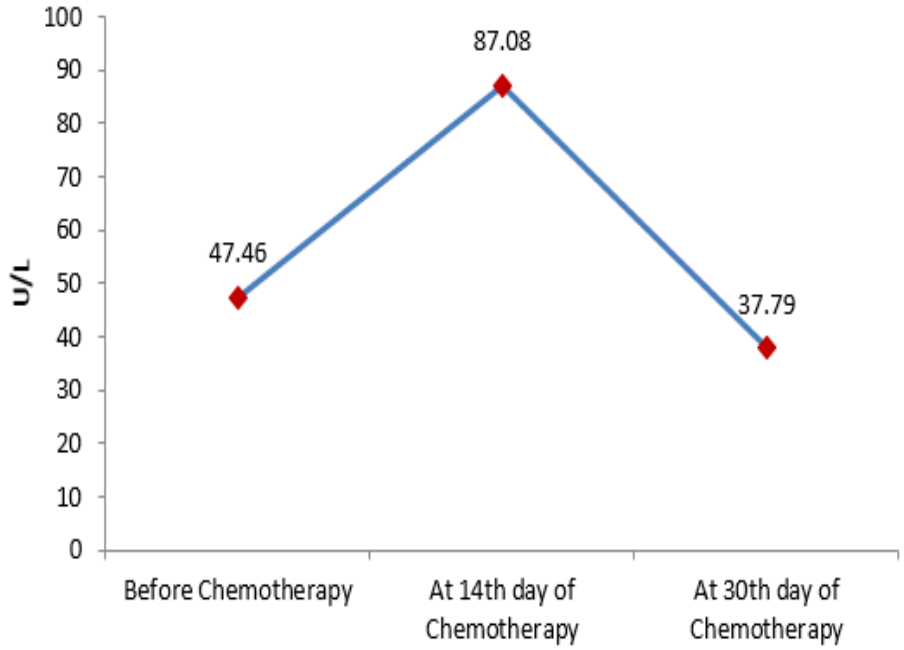

Figure 2: Line diagram of serum ALT before chemotherapy (0 day), at 14th day and 30th day.

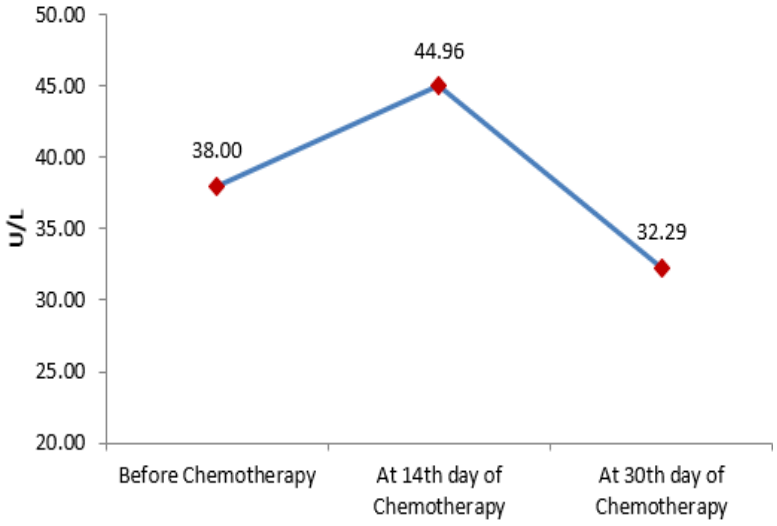

Figure 3: Line diagram of serum AST before chemotherapy (0 day), at 14th day and 30th day

Discussion

The present study was undertaken to observe the liver function status in newly diagnosed patients of acute leukemia before chemotherapy and at 14th and 30th day of induction chemotherapy. For this purpose a total number of 50 subjects were selected. In the present study, acute myeloid leukemia (AML) patient was 62% and acute lymphoblastic leukemia patient was 38%. This study showed before starting chemotherapy, mean serum total bilirubin levels in acute leukemia patients was 0.89 ± 0.64 mg/dl. Similar findings were observed in the study conducted by El-Shafey et al., 2017, Jahalla and Alameen.,2017, Sattar et al., 2016, Segal et al., 2010, Barker et al., 2015. At 14th day of chemotherapy, mean level of serum total blirubin was 1.55±1.05 mg/dl which was significantly higher than the value measured before starting chemotherapy. This finding was similar to the findings observed by El-Shafey et al., 2017, Jahalla and Alameen.,2017, Sattar et al., 2016, Segal et al., 2010.. At 30th day of chemotherapy, mean level of Serum total bilirubin was 0.72±0.35 mg/dl which was significantly lower than the value measured before starting chemotherapy. Similar findings were observed in the study conducted by El-Shafey et al., 2017, Jahalla and Alameen.,2017, Sattar et al., 2016, Segal et al., 2010. In this current study, before starting chemotherapy mean ALT level in acute leukemia patients was 47.46±15.00. Similar finding was observed in the study which was conducted by Segal et al., 2010, Rajeswari et al., 2012. Eisen et al., 2008, El-Shafey et al., 2017, Alawad et al., 2016, Jahalla and Alameen .,2017, Sattar et al., 2016, Rasool et al., 2014. At 14th day of chemotherapy mean level of ALT was 87.08±57..45 which was significantly higher than the value measured before starting chemotherapy (47.46±15.00). Similar finding was observed in the study which was done by Rasool et al., 2014 and El-Shafey et al., 2017. In this study we have observed that at 30th day of chemotherapy mean level of ALT was 37.79±11.69 which was significantly lower from the value measured before starting chemotherapy (47.46±15.00). This observation was consistent with other studies which was done by El-Shafey et al., 2017, Alawad et al., 2016, Jahalla and Alameen., 2017, Sattar et al.,2016. According to this study, at 14th day of chemotherapy, mean ALT was 87.08±57.. 45 and there is significant change of ALT between 14th day and 30th day of chemotherapy .Similar findings were observed in the study which was conducted by Sattar et al., (2010); El-shafey et al.,(2017) and Jahella and Alamin (2017). It was found in this study that the mean AST level before starting chemotherapy of acute leukemia patient was 38.00±7.34. This observation was consistent with other studies which was done by Jahella and Alamin (2017), Rasool et al., (2014), Alawad et al., 2016, Alamin et al., (2016), Segal et al., (2010). In the current study it shows, at 14th day of chemotherapy mean level of AST was 44.96± 8.29 which was significantly higher ($p< 0.001$) than the value measured before starting chemotherapy (38.00±7.34). Alawad et al., (2016) have conducted a cross sectional study in Sudanese Leukemic patients and showed similar findings. At 14th day of chemotherapy, mean level of AST was 44.96±8.29 & there is significant change between 14th day and 30thday (32.29±4.78). Similar findings were observed in the study of Segal et al., (2010); Sattar et al., (2016) and Jahella and Alamin (2017).

Conclusion

The present study showed that liver functions are hampered in acute leukemia patients before chemotherapy and it is improved after giving chemotherapy. So is advised that chemotherapy should start as soon as possible. Patients who received chemotherapy require careful assessment of liver function during treatment to determine which drugs may not be appropriate and which drug dose should be modified.

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