INTERNATIONAL JOURNAL OF CURRENT MEDICAL AND PHARMACEUTICAL RESEARCH
ISSN: 2395-6429, Impact Factor: 4.656
Available Online at www.journalcmpr.com
Volume 6; Issue 04(A); April 2020; Page No. 5080-5083
DOI: http://dx.doi.org/10.24327/23956429.ijcmpr202004869

Research Article

STUDY OF BASAL LEVEL PARAMETERS IN VARIOUS LEUKEMIAS

[1]Agte A.B, [2]Gaikwad S.B, [3]Dharwadkar S.M and [4]Anshula G

[1]Professor, Department of Biochemistry, Ulhas Patil Medical College-Jalgaon-425001(MS), India
[2]Prof. & Head, Department of Biochemistry, GMCH- Jalgaon (MS) – 425001.India
[3]Professor, Department of Biochemistry, SB College of Science, Aurangabad-431002 (MS), India
[4]Intern Student of B.J Medical College, Pune (MS)-411001, India

ARTICLE INFO

Article History:
Received 06th January, 2020
Received in revised form 14th February, 2020
Accepted 23rd March, 2020
Published online 28th April, 2020

Key words:
Leukemia, AML, CML, ALL, CML, CLL

ABSTRACT

The leukemias are best viewed as malignant neoplasia of white blood cells precursors. The present study is undertaken to evaluate the extent of changes in the biochemical parameters and their significance helps in the differential diagnosis of these diseases. The diagnosis of leukemia's is confirmed by haematological and histological examinations. The various basal biochemical parameters in leukemia's such as serum alkaline phosphatase and acid phosphatase, serum calcium, serum phosphorus and serum uric acid were estimated which are the basal level in various leukemias & are conducted in our biochemistry laboratory and requires no extra cost & can be performed in our daily routine investigation and thus will be helpful for further diagnosis of the disease.

INTRODUCTION

Leukemia is a cancer of blood cells characterized by the abnormal increase in the number of white blood cells in the tissues **[1, 2].** It is characterized by the anemia, thrombocytopenia and loss of normally functioning leucocytes, incident to the replacement of normal bone marrow elements by leukemic cells. It is particularly devastating in children under age 15 years and peak incidence occurs at about 4 years and age. Acute myeloid leukemia dominates in the 15-39 years of age range, while both AML and CML are encountered at age of 40-59 years. All predominates in adults over 60 years of age [3].

Leukemia is divided into four categories: myelogenous or lymphocytic, each of which can be acute or chronic**.** All lymphomas are characterized by lymphadenopathy and as disease advances splenomegaly, hepatomegaly and eventually involvement of other viscera occurs. For prediction of the clinical behavior of the disease, this classification is very important and the diagnosis in order to determination about the treatment that should be given to the patient. In the advancement of disease more nodules are affected and tumors tissue nodes extended into pericapsular tissue to produce inadherence and matter nodular tumor masses [4, 5]

MATERIAL AND METHODS

The diagnosis was made on the brief clinical history with haematological and bone marrow aspiration examination and by biochemical examination. Thirty one healthy individuals were taken as a control group. Estimation of serum alkaline/ acid phosphatase were carried out by method - King and King [6] using 4-aminoantipyrine, serum calcium by method Clark and Collip [7]. Serum phosphorus by Fiske and Subbarow [8] and serum uric acid by Caraway method [9]

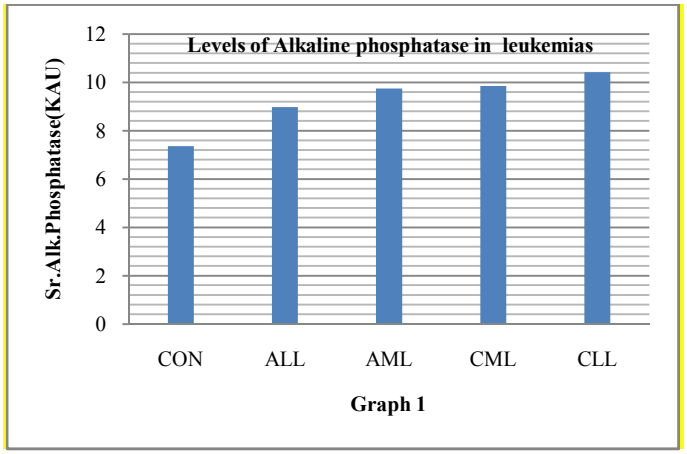
Table I Showing various parameters in Leukemias

	Serum alkaline phosphatase (KAU)	Serum acid phosphatase (KAU)	Serum calcium (Mgs%)	Serum phosphorus (Mgs%)	Serum uric acid (Mgs%)
Average level in control	6.54-8.18 =7.36	3.73-4.21 =3.97	9.77-10.29 =10.03	2.77-3.37 =3.07	3.35-3.95 =3.65
			Leukemias		
ALL (mean±S.D. 't'	8.98±0.81 2.01 (p<0.05)	4.85±0.44 2.68 (p<0.05)	11.22±0.35 3.99 (p<0.01)	3.60±0.24 3.33 (p<0.01)	5.55±0.64 4.05 (p<0.01)
AML ALL (mean±S.D. 't'	9.75±1.39 4.65 (p<0.01)	5.40±0.66 2.80 (p<0.01)	11.73±0.32 5.19 (p<0.01)	3.96±0.53 2.26 (p<0.005)	4.30±0.37 3.94 (p<0.01)
CML ALL (mean±S.D. 't'	9.85±0.33 3.64 (p<0.01)	4.98±0.21 4.43 (p<0.01)	10.62±0.32 2.05 (p<0.05)	3.44±0.16 3.29 (p<0.01)	4.87±0.30 4.07 (p<0.01)
CLL ALL (mean±S.D. 't'	10.42±0.85 2.57 (p<0.05)	5.80±0.65 2.77 (p<0.01)	11.60±78 3.74 (p<0.01)	3.56±0.78 2.30 (p<0.05)	4.56±0.25 2.38 (p<0.05)

Corresponding author:* **DrGaikwad S.B
Prof & Head, Department of Biochemistry Govt.Medical College, Jalgaon-425001(MS)

Table II Serum Alkaline Phosphatase in Leukemias

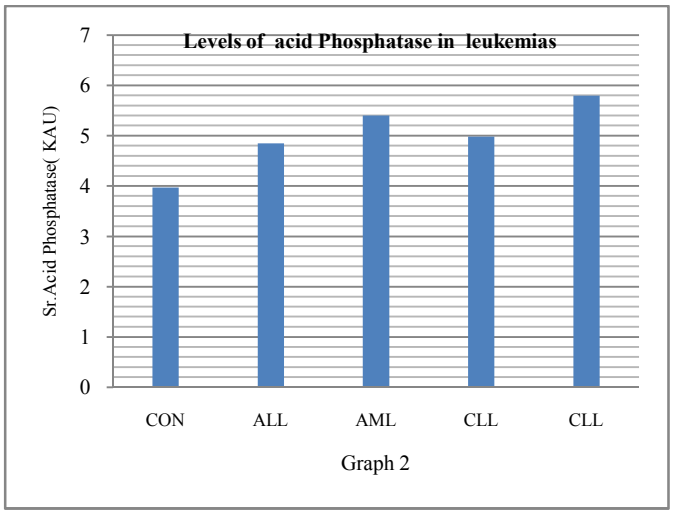
Types of Leukemias N=	Mean (KAU%)	't' (P)	Remarks
Control N=31	7.36 ± 0.41		
Acute lymphocytic leukemia N=13	8.98 ± 0.82	2.01(P<0.05)	Significant
Acute myeloid leukemia N=6	9.75 ± 1.39	4.65(P<0.01)	Highly significant
Chronic myelocytic leukemia N=12	9.85 ± 0.33	3.64(P<0.01)	Highly significant
Chronic lymphocytic leukemia N=5	10.42 ± 1.85	2.57(P<0.05)	Significant



Graph 1

Table III Serum Acid Phosphatase in Leukemias

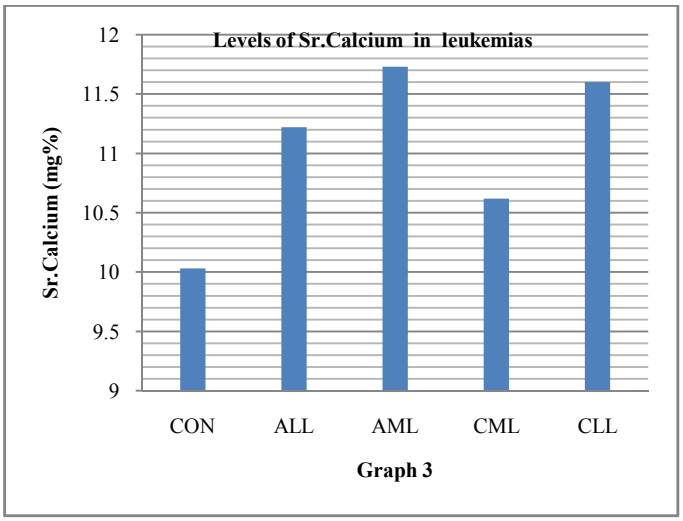
Types of Leukemias N=	Mean (KAU%)	't' (P)	Remarks
Control N=31	3.97 ± 0.44		
Acute lymphocytic leukemia N=13	4.85 ± 0.44	2.68(P<0.05)	Significant
Acute myeloid leukemia N=6	5.40 ± 0.66	2.80(P<0.01)	Highly significant
Chronic myelocytic leukemia N=12	4.98 ± 0.21	4.43(P<0.01)	Highly significant
Chronic lymphocytic leukemia N=5	5.8 ± 0.65	2.77(P<0.05)	Highly significant



Graph 2

Table IV Serum Calcium in Leukemias

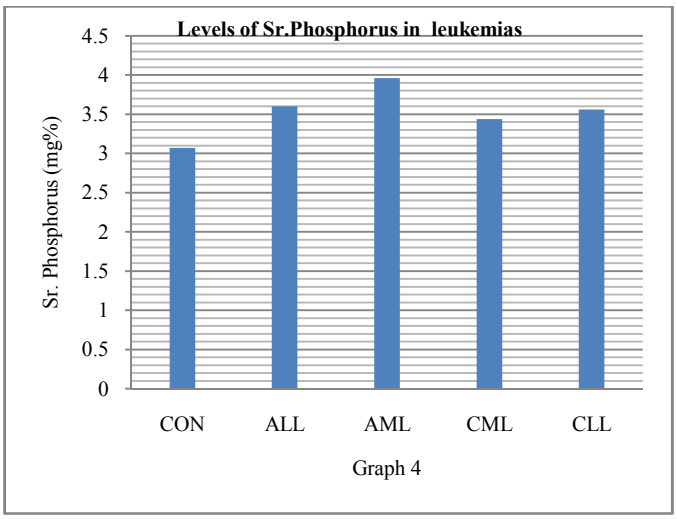
Types of Leukemias N=	Mean (mg%)	't' (P)	Remarks
Control N=31	10.03 ± 0.34		
Acute lymphocytic leukemia N=13	11.22 ± 0.35	3.99(P<0.01)	Highly significant
Acute myeloid leukemia N=6	11.73 ± 0.32	5.19(P<0.01)	Highly significant
Chronic myelocytic leukemia N=12	10.62 ± 0.32	2.06(P<0.05)	Significant
Chronic lymphocytic leukemia N=5	11.60 ± 0.78	3.74(P<0.01)	Highly significant



Graph 3

Table V Serum Phosphorus in Leukemias

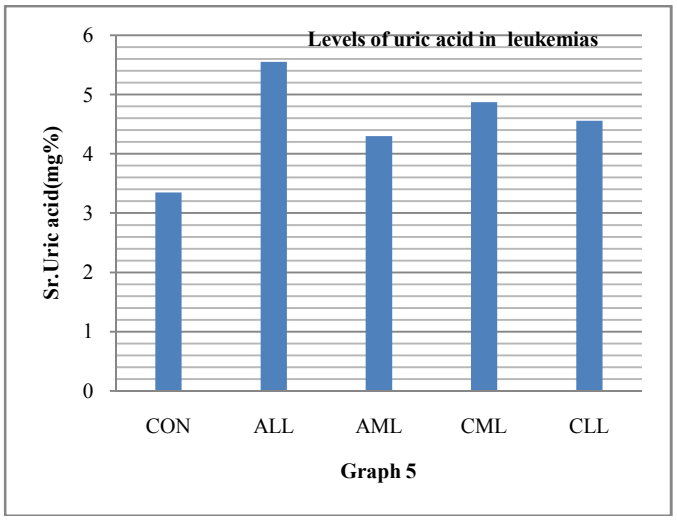
Types of Leukemias N=	Mean (mg%%)	't' (P)	Remarks
Control N=31	3.07 ± 0.15		
Acute lymphocytic leukemia N=13	3.60 ± 0.24	3.33(P<0.01)	Highly significant
Acute myeloid leukemia N=6	3.96 ± 0.53	2.26(P<0.05)	Significant
Chronic myelocytic leukemia N=12	3.44 ± 0.16	3.29(P<0.01)	Highly significant
Chronic lymphocytic leukemia N=5	3.56 ± 0.36	2.30(P<0.05)	Significant



Graph 4

Table VI Serum Uric acid in Leukemias

Types of Leukemias N=	Mean (mg %)	't' (P)	Remarks
Control N=31	3.65 ± 0.15		
Acute lymphocytic leukemia N=13	5.55 ± 0.64	4.15(P<0.01)	Highly significant
Acute myeloid leukemia N=6	4.30 ± 0.37	3.94(P<0.01)	Highly significant
Chronic myelocytic leukemia N=12	4.87 ± 0.30	4.07(P<0.01)	Highly significant
Chronic lymphocytic leukemia N=5	4.56 ± 0.25	2.38(P<0.05)	Significant



Graph 5

RESULT AND DISCUSSION

In this study the healthy control of various age groups and either sex were included. For biochemical parameters 31 normal individuals assessed to establish average level in control group for each parameter and considered for comparison with test group (Table – 1).

In the present study serum alkaline phosphatase levels were significantly increased in all patients of leukemias significantly elevated in myeloid leukemia than the lymphoid leukemia. We found significantly increased levels of serum alkaline phosphatase in 5 cases of CLL, the values were found to be highly significant in AML (6 cases) and CML (12 cases), while they elevated significant in ALL (13 cases) and CLL (5 cases). The probable explanation are : i) leukemia causes bony abnormalities, leukemic cells infiltrates into bone causes osteoclastic activities, so bony ALP is released into extracellular circulation causes increase in enzyme activity. ii) It may be due to cortisone treatment, which lowers calcium levels with increase in enzyme activity. iii) The increase in enzyme activity may be related to degree of bone deterioration in disease processes, the enzyme activity is maximum in advance stages of disease. iv) Damage hepatic cells, due to leukemia cell infiltration may release ALP into circulation. v) Elevated levels may be due to elevated calcium levels. We observed significantly raised levels of alkaline phosphatase level in both types of lymphomas. The probable cause might be – i) due to increase relationship between serum calcium and alkaline phosphatase level and ii) may be due to osteoblastic activity lesions in Hodgkin's disease**.(10)**

In present study serum acid phosphatase was significantly increased in ALL. It was more significant in AML, CML and CLL. The increase level may be due to – i) raised serum alkaline phosphatase, ii) as spleen is one of the important organ containing acid phosphatase and due to pathological changes (splenomegaly) in it, its enzyme content released into circulation, iii) due to high leukocyte count, iv) may be due to progressive increase of the disease and also due to increase number of blast cells in the peripheral smear. In the present study, the increase in acid phosphatase level in both the types of lymphomas and rise in may be due to increase in alkaline phosphatase levels.

Serum calcium and phosphorus levels found to be elevated significantly. The probable causes are – i) The high value of serum calcium may be due to extensive infiltration of leukemia cells in the bone. ii) May be due to PTH or serum calcium binding substance responsible for carrying out excess of calcium, vitamin D intoxication etc. iii) May be due to rapid osteolysis due to destructive metastases. It may also be due to decrease tubular reabsorption. iv) May be also due to disturbed calcium metabolism, secondary to bone involvement. The increased level in the present study may be due to i) Direct release of calcium from bone as a result of extensive infiltration with malignant cells, ii) elevated serum calcium level may be due to disturbed calcium level secondary to Neoplasia. iii) We could not ascertain the cause of non-significant levels of serum phosphorus in non-Hodgkin's lymphoma.

CONCLUSION

1. Serum alkaline phosphatase was elevated significantly in myeloid leukemia than lymphoid leukemia acute form. Increased values are more significant in AML.
2. Serum calcium is found to be elevated in both the forms of leukemias.
3. Serum phosphorus is elevated significantly in all types of leukemias.
4. Serum uric acid is elevated significantly in acute forms than chronic forms of leukemia.

We conclude that even though the individual parameter could not be helpful for the differential diagnosis of the disease, as most of the cancers do not show any symptoms till they detect only in II or III stage directly. Therefore we had tried to perform simple biochemical investigations, which can be performed in our laboratory which will cost less and can show the progress of the disease. This work was undertaken to perform simple cost effective tests such as , serum alkaline phosphatase, serum calcium and serum uric acid etc. which shows the severity and progression of the disease, recovery prognosis of the disease without using more sophisticated instruments which may increase the cost of the same.

Acknowledgement: We are thankful to Drwasim Hiroli, Asst. Lecturer in Anatomy for the help in preparing the graphs.

References

1. Aimi Salihah,.A.N., M.Y.Mashor, Nor Hazlyna, H.Rosline ―Color Image Enhancement Techniques for Acute Leukaemia Blood Cell Morphological Features‖ IEEE Transactions on Image Processing, 2010, 15(9):2588 - 2595.
2. Leukemia Disease, http://en.wikipedia.org /wiki/Leukemia, retrieved on 1 June 2011.
3. Lascari, A.D.: General aspects. I n Leukemia in childhood, fifth Edition, Springfield, Illinois, Charles C Thomas, 1973; pp 3-29.

4. N.R. Mokhtar, Nor Hazlyna Harun ―Image Enhancement Techniques Using Local, Global, Bright, Dark and Partial Contrast Stretching For Acute
5. Leukemia‖, Proceedings of the World Congress on Engineering 2009 Vol I WCE2009, July 1 - 3, 2009, London, U.K.K. B. Taylor and J. B. Schorr, "Blood vol.4"1978.
6. King,E.J and Armstrong, A.R (1934),Canad Med.Asso.J,31,376.
7. Clark,E.P, and Collip,J.B(1925),J.Biol Chem,63,461.
8. Fiske, C.H and Subbarao, Y.(1925), J.Biol.Chem,66,375.
9. Caraway, W.T (1955), amer.J.Clin.Path, 25,840.
10. Viviane O. van hoof & Allan T Van osteroom Clin.Chem.38 (12), 2546-2551(1992)

How to cite this article:

Agte A.B *et al* (2020) 'Study of Basal Level Parameters in Various Leukemias', *International Journal of Current Medical and Pharmaceutical Research,* 06(04), pp 5080-5083.

****