INTERNATIONAL JOURNAL OF PLANT, ANIMAL AND ENVIRONMENTAL SCIENCES
IJPAES
VOLUME-2, ISSUE-1, JAN-MAR-2012 ISSN 2231-4490

Accepted: Nov-2011 *Research Article*

CHROMOSOME CHANGES IN HUMAN NON HODGKIN'S LYMPHOMA (NHL)

[1]Umesh Kumar Parida, [2]Nibaran Satpathy, [3]Santosh Kumar Jena, [4]Siba Prasad Mohanty and [5]Sagarika Samantray* Niranjan Rout*

[1,3,5,6]Acharya Harihar Regional Cancer Center, Cuttack- 753004, Odisha, India
[2,4]Ravenshaw University, Cuttack, Odisha India.

ABSTRACT: Non Hodgkin's Lymphoma (NHL) or Lymphoma is a cancer that affects the lymphocytes of the immune system and present as a solid of lymphoid cell mass. Genetic disorder is one of the important factors for development NHL .The present study of bone marrow sample includes 65 NHL patients (46 male and 19 female) Chromosome analysis demonstrated that about 73.84 % of metaphase plate of NHL patients showed numerical aberration, i.e Polyploidy observed in 26 cases and 22 cases showed hypoploidy. The high frequency of chromosomal aberration indicates chromosomal instability that invariable associated with malignancy. The results of the present preliminary investigation will provide a basis for future diagnosis, prognosis and curability of NHL.
Keywords: Karyotyping, NHL, Polyploidy.

INTRODUCTION

Lymphocyte is a type of white blood cell, circulate in Blood and found in lymphoid organ. They play a definite role in protecting our body through both humoral and cell mediated immunity. During neoplastic change these lymphoid cell not only loose the properly to protect us but also proliferate indiscriminately and forms solid neoplasm known as Non Hodgkin's lymphoma (NHL) or Lymphoma. These lymphoma cells when invade bone marrow and appear in blood resulted in lymphatic leukemia. Numerous environmental and industrial chemicals are capable of causing cytogenetic damage in experimental animals. Similar effects are also observed in Human body (1).

Indiscriminate use of pesticides may contribute to the etiogenesis of Leukemia. Also 22.88% of patient (n=126) suffering from leukemia were addicted to Tobacco (2).

Early in this century, Boveri hypothesized that all cells of malignant tumors had karyotypic abnormalities, and that any event leading to chromosomal abnormalities would result in a malignant tumor. However, it took many decades before the Philadelphia chromosome in chronic myelogenous leukemia was described (3). Since then, cytogenetic abnormalities have been found in several diseases, including acute leukemia, myelodysplastic syndromes, and nom Hodgkin's lymphomas (NHL). (4-14).

MATERIAL AND METHOD:

During a period of 8 months from January to August 2010 this study was conducted at Acharya Harihara Regional Cancer Center, mCuttack . Healthy Human being (*Homo sapiens*) 30 to 65 year old, ranging in weight from 45 to 65 kg were included in the study. Routine bone marrow examination was a part of protocol for treatment of NHL patients. With proper consent 90 bone marrow samples from posterior superior iliac spine were collected and karyotyping was done by modified Direct Flame technique as per the procedure followed in our center. (15-21). Bone marrow sample were collected from 90 NHL patients. In 25 cases spreading was not successful. In 65 cases karyotyping was done.

Metaphase scoring:

Per patient, 20 metaphase spreads were examined microscopically for chromosomal aberrations. Only cells with well spread chromosomes were selected for scoring. All metaphase spreads, were examined for both structural and numerical aberration.

Mitotic index:

The number of dividing cells, including late prophases and metaphases (3000 cells/person) were counted. The mitotic index was calculated as the number of dividing cells 1000 cell/ person.

RESULT AND DISCUSSION

During this study Bone marrow sample were collected from 90 NHL patients. In 25 cases spreading was not successful. In 65 cases karyotyping was done .The male to female ratio was (M:F=46:19) of NHL patients in different stages(stage I=18 cases, stage II=20 cases, stage IV=27 Cases). Most of the cases were in 4^{th} -6^{th} decades of life. Fifty percents were addicted to chewing tobacco and farmers by occupation. Chromosome analysis showed by numerical abnormalities in 73.84% out of which 22 (33.84%)patient showed hypoploidy and 26 (40%)patients showed polyploidy.Hypoploidy was marked in stage-I disease (33.84 %cases) .

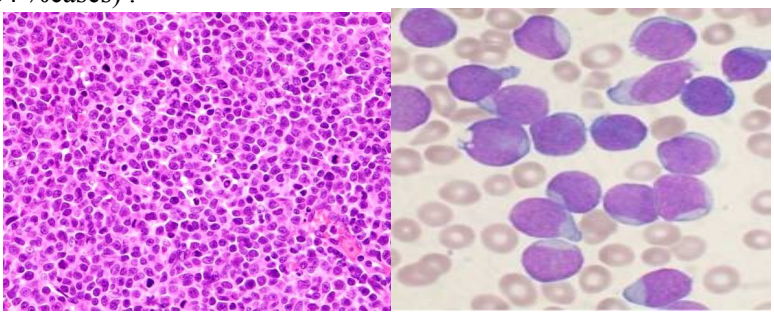


Fig-1 (a) FNAC of lymph node in lymphoma (HE×100) (b) Blood smear in acute lymphocyte (Leishman×1000)

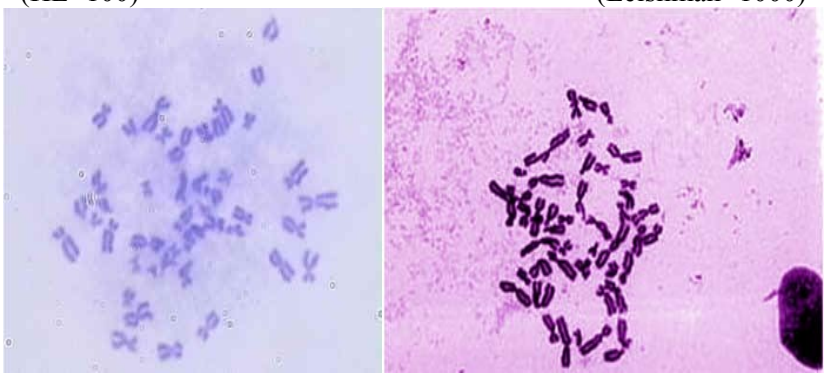


Fig-2. (a) 46 number of chromosome (b) 46 number of chromosome

Fig-3 (C) 20 number of chromosome Hypoploidy

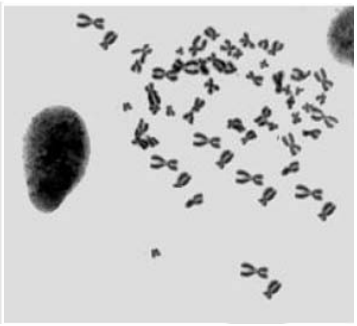
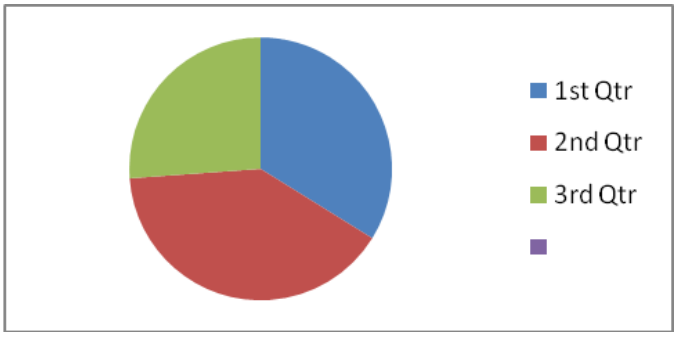


Fig-4 (D) 61 number of chromosome Polyploidy

A number of studies have been undertaken to access the cytological abnormalities and chromosomal aberrations in the patients diagnosed with NHL. The high frequency of chromosomal aberrations indicates chromosomal instability that is invariably associated with malignancy.Aneuploidy was a major type of chromosomal aberrations reported (22). During our study we have observed aneuploidy in 73.84% caes which is similar to observation reported earlier. Hypoploidy was observed in all cases of our series with stage-I disease which may represente deletion of cancer suppressor genes Polyploidy is noticed more patients with stage –IV disease which is related to the aggressiveness of neoplasm.



1. 33.84 % in Hypoploidy, 2. 40% in Polyploidy, 3. 26.15 % in Normal.

CONCLUSION

Chromose abnormalities were observed in the metaphase spreads of 65 NHL patients who visited the AHRCC, Cuttack between Jan 2010 to Aug 2010 .The chromosomal aberrations showed aneuploidy in most of the cases. This study shows that chromosomal finding have a strong influence on clinical behavior of the lymphoma. Further studies are required to validate these findings which will ultimately help to define high risk group of patients who might be benefited from early treatment. Chromosome analysis will be advantageous in clinical and research fields for many years to come. Since it is one of the important techniques to accurately evaluate the DNA content.

REFERENCES

1) Burn SGW (1972). The Science of Genetics; An Introduction to Heredity, MacMillan, New York, pp. 211.
2) Rupa Das (1994). Epidermiological study on Leukemia at SCB Medical College, Cuttack. Thesis for the degree of Doctor of Medicine,(Pathology) Utkal University,vanivihar, pp 96.
3) Riccardi VM (1977). The Genetic Approach to human Disease: Oxford University press, New York.
4) Nowell PC, Hungerford DA **(1960)** A minute chromosome in human chronic granulocytic a leukemia. Science **132:1497**
5) Han **T,** Sadamori N, Ozer H, Gajera R, Gomez GA, Henderson ES, Bhargava A, Fitzpatrick J, Minowada J, Bloom ML, Sandberg AA **(1984)** .Cytogenetic studies in **77** patients with chronic lymphocytic leukemia: Correlations with clinical, immunologic, and phenotypic data. J Clin Oncol **2:1121.**
6) Yunis JJ, Frizzera G, Oken MM, McKenna J, Theologides A, Arnesen M **(1987)** Multiple recurrent genomic defects in follicular lymphoma. A possible model for cancer. N Engl J Med **316:79** -84.

7) Kaneko Y, Abe R, Sampi K, Sakuarai M (1982) An analysis of chromosome findings in non-Hodgkin's lymphomas. Cancer Genet Cytogenet 5:107
8) Kristoffersson U, Heim S, Mandahl N, Olsson H, Ranstam J, Akerman M, Mitelman F Prognostic implication of cytogenetic findings in 106 patients with non-Hodgkin's lymphoma. Cancer Genet Cytogenet 2555, 1987
9) Kaneko Y, Rowley JD, Variakojis D, Haren JM, Ueshima Y, Daly K, Kluskens 1983,LF Prognostic implications of karyotype and morphology in patients with non-Hodgkin's lymphoma. Int J Cancer 32:683
10) Koduru PRK, Filippa DA, Richardson ME, Jhanwar SC, Chaganti SR, Koziner B, Clarkson BD, Lieberman PH, Chaganti RSK (1987) Cytogenetic and histologic correlations in malignant lymphoma. Blood 69:97.
11) Sanger WG, Armitage JO, Bridge J, Weisenburger DD, Fordyce R, Purtilo DT (1987) Initial and subsequent cytogenetic studies in malignant lymphoma. Cancer 140:3014,
12) Offit K, Richardson ME, Quanguang C, Hampton A, Koduru PRK, Jhanwar SC, Filippa DA, Lieberman PH, Clarkson B, Chaganti RSK (1989) Nonrandom chromosomal abberations are associated with sites of tissue involvement in non-Hodgkin's lymphoma. Cancer Genet Cytogenet 37:85
13) Yunis JJ, Mayer MG, Arnesen M, Aeppli DP, Oken MM, Frizzera G (1989) bcl-2 and other genomic alterations in the prognosis of large-cell lymphoma. N Engl J Med 320:1047
14) Cabanillas F, Pathak S, Grant G, Hagemeister FB, McLaughlin P, Swan F, Rodriguez MA, Trujillo J, Cork A, Butler JJ, (1989) Refractoriness to chemotherapy and poor survival related to abnormalities of chromosomes 17 and 7 in lymphoma. Am J Med 87:167
15) Mohapatro S.,Rout N., Satpathy B.,Nanda B.K. (1994), Cytogenetic study in a case of CML Orissa Medical Journal,; 13:55
16) Jena R.K, Patnaik S.C, Sahu G.R. Ray B. Swain K. (2002). Secondary chromosomal abnormalities in acute lymphoblastic leukemia Caryologia; 55:349-355.
17) Jena R.K, Patnaik S.C, Swain T.R, Nayak U., Swain K.P ., (2003).. Clinico Hematology presentation and prognosis of Acute Leukemia Indian Journal of Hematology and Blood Transfusion ,; 11:40-43.
18) Satpathy S., Patnaik S.C., Rout N., Nayak B. (2003) Chromosomal abnormalitirs in cerical cancer- a study from Orissa, India Journal of Pathology and Microbiology; 47:113.
19) Patanayak S.C., Swain T., Jena R.K Ray B. (2004) Chromosomal abnormalities in acute myloid leukemia patitent of Orissa and their prognostic implementation. Cytology,; 69 (1):13-23.
20) Nayak B.L., Mohapatra J., Parija J., Giri S.K., Mohanty B.K , Rout N, Patnaik S.K., (2008) Human Papilloma virus and chromosomal changes in cancer cervix.Indian Journal of Gynaecologic Oncology,; 8:48-51.
21) U.K Parida, S.K Jena , N. Satpathy, 3, S. P Mohanty and N. Rout (2010) "Chromosomal Profile of non-Hodgkin's lymphoma Patients" Orissa Journal of Pathology and Microbiology 13: 25-26
22) Fernando, C., Sen, P., Jose, T., John, M., Ruth, K., Peter, Mc., William, S.V., Fredrick, B. H., Angela, G., Ann, C., James, J. B., and KmÂ Jl., (1988). Frequent Nonrandom Chromosome Abnormalities in 27 Patients with Untreated. (CANCER RESEARCH 48, 5557-5564