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Original Article

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Cytomorphological Changes in Bone Marrow in Leprosy

Abhay[1], **Garima**[2]

[1]Associate Professor, Department of General Surgery, Shri Venkateshwara University, Rajabpur, Venkateshwara Nagar, Gajraula, Uttar Pradesh, India, [2]Associate Professor, Department of Pathology, Shri Venkateshwara University, Rajabpur, NH-24, Venkateshwara Nagar, Gajraula, Uttar Pradesh, India.

Abstract

Background: This study was done to evaluate the cytomorphological changes and effectiveness of treatment on bone marrow involvement in leprosy. **Subjects and Methods:** Bone marrow aspiration was done in 126 cases (39 fresh and 87 on treatment) from sternum, smears were stained with leishman's stain and modified Ziehl-Neelsen stain to study the cytomorphological changes and presence of lepra bacilli. Maximum cases belonged to 4^{th} decade (31.74%). With male to female ratio of 4.7:1.**Result:** The bone marrow was normocellular in majority of cases (82.5 3%). The macrophage granuloma was found in (34.92%) of cases, while epithelioid granuloma was found in 31.74% cases. Out of 39 fresh cases acid fast-bacilli were demonstrated in bone marrow smears of 24 (62.53%) cases, while skin biopsies were positive in 28 (71.79%) cases. Of the 87 patients receiving treatment skin biopsies were positive only 16 (18.39%) cases whereas AFB persisted in bone marrow of 40 (45.97) cases. **Conclusion:** None of these cases of tuberculoid Leprosy should AFB in bone marrow as well as skin biopsy therefore study of bone marrow for AFB important in leprosy especially in multibacillary leprosy as with increasing duration of treatment although skin lesions became bacteriologically negative but AFB still persisted in bone marrow.

Keywords: Leprosy, Bone Marrow, Aspiration, Acid Fast Bacilli, Psychology.

Corresponding Author: Garima, Associate Professor, Department of Pathology, Shri Venkateshwara University, Rajabpur, NH-24, Venkateshwara Nagar, Gajraula, Uttar Pradesh, India.
E-mail: gbhatnagar1@rediffmail.com

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Introduction

Leprosy is a chronic granulomatous disease having worldwide distribution but is more prevalent in tropical and subtropical countries.[1] In patients of Leprosy, mycobacterium leprae can be detected in almost every system of body, special in reticuloendothelial system including bone marrow. The persistent of viable organism in the bone marrow may be a factor in the high rate of relapse.[2] While many workers have demonstrated acid fast bacilli in the bone marrow, few reports are available regarding details psychological changes. Taking all these consideration into account, this study was planned to work out the various cytomorphological changes and presence of lepra bacilli in bone marrow in fresh and trated cases.[3]

Subjects and Methods

A total of 126 patients attending outpatient department and admitted to skin ward of V. I. M. S. Gujranwala has been studied. Bone marrow aspiration from sternum was done and smears stained with leishman's stain and modified Ziehl-Neelsen stain to study the cytomorphological changes and presence of lepra bacilli respectively. Skin biopsy of the same patient was taken by standard technique and stained with hematoxylin - eosin and modified wade fite faraco method to demonstrate the presence of lepra bacilli. The cases were divided into multibacillary and paucibacillary on the basis of Ridley logarithmic scale. Skin biopsies and bone marrow smear were placed in different morphologies types according to Ridey and Jopling classification.

Result

The age range of these 126 cases varied 6 to 65 years with maximum number in the fourth decade (31.74%). Of these 82% were males and 18% were females with male to female ratio of 4.7:1.

Bone marrow aspiration of these cases revealed normocellular bone marrow in 104 cases (82.53%), hypercellular bone marrow in 16 cases (12.69%) and hypocellular bone marrow in 6 cases (4.76%) Myeloid hyperplasia was noted in 20% cases while erythroid hyperplasia was noted in 20% cases

Type of erythropoesis was normaloblastic in 84.24% cases while megaloblastic bone marrow was found in 15.75% cases.

As is evident from [Table 1] increased number of cosinophils were found in 34.92% cases, Plasma cells and 49.20% cases and Megakaryocytes in 68.25% of cases. Megakaryocytes showed large number of morphological abnormalities of the nucleus predominantly varying from giant from foreign body Type (1c, 1d). Some of them were nonfunctional and a few revealed decrease granularity. The macrophage granuloma [Figure 2B] was found in 34.92% cases while epithelioid cell granuloma was found in 31.74% case in 5 cases there was collection of lymphocytes around the macrophage forming microgranuloma.

The incidence of AFB in bone marrow of multibacilary group was more as compared to paucibacillary group and the bacteriological index was higher in untreated patients than in treated patients. No AFB was observed in bone marrow of Polar tuberculoid leprosy [Table 2].

hows the relationship of presence oflepra bacilli in skin biopsy and bone marrow. Out of 39 fresh cases 28 (71.79%) had baeilli in skin biopsy and 24 (61.53%) had in bone marrow. Out of 87 patients receiving treatment, only 16 (18.39%) patients had bacili in skin biopsy whereas AFB persisted in bone marrow of 40 (45.97%) patients.

Discussion

Bone marrow involvement in lepromatous leprosy has been traditionally characterized by granuloma formation, with the accumulation of virtual cells (cell containing globe of acid fast bacilli). In this study macrophage granuloma were found in 34.92% of cases and epithelioid granuloma in 31.74% of cases. Macrophages granuloma was more frequent in multibacillary group while epithelioid granuloma were more commonly seen in paucibacillary group. In five cases there was collection of lymphocytes around a macrophage forming micro granuloma.

Desikan and job found large number of scattered plasma cells and few scattered macrophages without lectometer granuloma. Presence of reticulum cell with epithelioid appearance in 25% cases of lepromatous Leprosy and distinct epithelioid cell granuloma in 10% cases of dimorphous leprosy was reported by Sood & Grauber. Bone marrow changes were not observed in tuberculoid and primary neurotic leprosy by later workers as also by McClean CM et al. found micro granuloma in the marrow tissue consisting of small collection of macrophages, Plasma cell and Lymphocytes.[4] The lipid present in the cytoplasm of the cells could be derived from the lipid of the cell wall of M. leprae.

The bone marrow differential count in this study revealed increased number of eosinophils in 34.92% of cases and plasma cells were increased in 49.20% of cases without any correlation with type of Leprosy. Increased number of eosinophils without intestinal parasitism, and plasma cells were also reported in the past by various workers. Increased number of plasma cells and macrophages may reflect enhance humoral immune response described by Jopling in patient with leprosy. Another finding in bone marrow smears of all types of Leprosy was increased percentage of megakaryocytes and morphological abnormalities of megakaryocytes. Abnormalities of the because of lowered vitamin B12 and folate levels reported among leprosy case than those of general population. Paniccia R et al found abnormal platelet function test in the form of impairment of platelet adhesiveness and aggregation to collagen which might be responsible for increase in the number of megakaryocytes.[5]

In the present study lepra bacilli were found in 64 (50.79%) cases out of which 24 (37.5%) were untrated and 40 (62.5%) treated cases. The incidence of AFB positivity in the bone marrow of multibacillary group was higher than paucibacillary group. These findings were similar to those reported in the past. None of the cases of tuberculoid leprosy showed acid-fast bacilli in bone marrow. It is in accordance with findings of McClean CM et al.[4] In majority of untreated cases, the bacteriological index was low in bone marrow as compared to skin lesions as also reported by Premalatha P. et al.[6]

In this study out of 87 patients receiving treatment ranging from 3 months to 7 years, only 16 cases, (18.39%) showed acid fast bacilli in skin lesions while in bone marrow.[7] AFB were seen in 40 cases (45.97%). It was also observed that with increase in duration of therapy skin lesions become bacteriologically negative while AFB still persisted in bone marrow. In the past also workers found AFB in bone marrow of patients showing bacteriologically negative skin biopsies and suggested that bacilli inviscera might take much longer time to be eliminated and dormant lepra bacilli, in RE system, to some extent might be responsible for the reactivation of disease.

It has been proposed that persistence of viable organisms in the bone marrow may be a factor in high rate of relapse/ recrudescence of leprosy following premature cassation of specific therapy. Presence of viable organisms in bone merrow may be an indication of incomplete treatment or may denote in accessibility of the drugs to organisms in the bone marrow. The latter possibility would support the contention that disappearance of viable bacilli from the skin may be indicated only of early response to therapy and that the continuation of treatment may therefore be necessary for a life time in some patients, to avoid relapse.[8]

Conclusion

Bone marrow is important in leprosy especially in multibacillary leprosy as with increasing duration of treatment although skin lesions became bacteriologically negative but AFB still

persisted in bone marrow,[9] so the continuation of therapy may therefore be necessary till bone marrow becomes, negative for acid fast bacilli, to avoid relapse.

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