e - ISSN - 2349 - 8005

INTERNATIONAL JOURNAL OF ADVANCES IN CASE REPORTS

Journal homepage: www.mcmed.us/journal/ijacr

A STUDY OF BONE MARROW DENSITY (BMD) AND BONE MINERAL CONTENT (BMC) AS A MEASURE OF OSTEOPOROSIS AND RELATED COMPLICATIONS IN THALASSEMIA MAJOR PATIENTS

[1]Ujjwal Bandyopadhyay, [2]Sarmila Guha (Banerjee), [3]Arijit Sinha, [4]Aparajita Samaddar, [5]Subhrajyoti Mitra, [6]Pradyut kumar Pan

[1]Assistant Professor, Dept of Pathology, R.I.O, Medical College, Kolkata -73, West Bengal, India.
[2]Dept of Anaesthesiology. [4]Dept of Pathology, RMO, Medical College, Kolkata -73, West Bengal, India.
[3]Assistant Professor, I.D and B.G Hospital, Kolkata, West Bengal, India.
[5]Assistant Professor, Dept of Medicine, Bankura Sammilani Medical College, Bankura Dist, West Bengal, India.
[6]Senior Specialist Medical Officer, Baranagar State General Hospital, Kolkata, West Bengal, India.

Corresponding Author:- **Ujjwal Bandyopadhyay**
E-mail: ujjwal.kalindi@gmail.com

Article Info
Received 15/01/2015
Revised 27/01/2015
Accepted 12/02/2015

Key words:
Thalassemia, osteoporosis, bone marrow density (BMD), bone mineral content (BMC).

ABSTRACT
Conservative management with blood transfusion and treatment of complication is the cornerstone of management of Thalassemia major patients. With this measure there is remarkable improvement in life expectancy of Thalassemia patients. But as these patients age, osteoporosis is emerging as a major complication and an important cause of morbidity. So the present study was set up to study the important parameters identifying osteoporosis in thalassemia patients. 54 Thalassemia (thal) major patients and 54 age and sex matched control were studied to see the bone mineral density (BMD) and bone mineral content (BMC) of lumber spine and femoral neck and to compare the same with values of normal control. (L_4-L_5) spine BMD values of thal major patients are lower than that of age and sex matched control group in our study. Bone mineral content (BMC) at the level of L_4-L_5 is significantly lowered in thal major patient with respect to control group and the lowering is statistically significant. Average BMC value of femoral neck of thal major patients is also lower than that of normal control. Results pointed out the fact that study of BMD and BMC in these patients are very good index of osteoporotic status of these patients and annual measurement of these parameters can be done to monitor the complication and morbidity related to osteoporosis.

INTRODUCTION

The thalassemia syndrome are a heterogenous group of hereditary disorders of reduced hemoglobin sysnthesis [1-5] when Beta chain of heme synthesis is suppressed, it is called Beta thalassemia and it is the most prevalent form of that all over the world [6-9]. As per WHO estimates 4.5% of world's population is carries of thal in the world [10]. In India frequently of thal gene varies between 0-17% in different ethnic group with over thirty million people are caries of thal gene in our country. Ten thousand thalassemic children are loss every year in India. Apart from common complications like anemia, hepatosplenomegaly, heart disease and recurrent infections, thalassemic patients show a variety of bone disorders like bone deformity, delay of bone age, growth failure, rickets, bone pain, spinal deformities, osteopenia and osteoporosis from very early age of life.

Osteoporosis is characterized by low bone mass and disruption of bone architecture, resulting in reduced bone strength and increased risk of fracture.

Thalassemia, previously thought to be a lethal condition of childhood is now well treated mainly conservatively with optimal safe blood transfusion and regular iron chelation therapy. This has substantially improved life expectancy and quality of life of the patients. Now as we are getting and treating aged thalassemic patients, osteoporosis is emerging as an important cause of morbidity

Bone mineral density (BMD) is a very good index of bone status and a good indicator of fracture risk of osteoporotic patients. Dual Energy X-ray Absorptiometry (DEXA) is a dependable, non-invasive process for repeated measurement of any changes of BMD. DEXA has got very low radiation exposure.

With this much knowledge of emerging threats of osteoporosis in thalassemia major patients with increased life expectancy due to appropriate conservative management and iron chelation, it was thought pertinent to study the Bone mineral density and bone mineral contents of thalassemic patients. Furthermore the result was compared with normal age and sex matched control groups and thus a study was set up to evaluate the degree of osteoporosis as a complication of thalassemia major patients.

MATERIALS AND METHODS

We conducted the study on a cohort of 54 thal major patients who were undergoing management conservatively at a subdivision level Govt. Hospital of West Bengal in one rural district, from 2013,Jan to 2014 Jan. 54 normal aged and sex matched cohort were also selected.

Our cases were categorized into two age group – i) 10-15 years, ii) 15-20 years.

In the study, we measured complete hemogram, serum ferritin and serum calcium. Also enrolled subjects were scanned for bone mineral density (BMD) and bone mineral content (BMC) at anteroposterior lumbar spine (L_4 – L_5) and neck of femur, using dual energy X-ray absorptiometry. Both BMD and BMC results were expressed as mean values (gm/cm^2) and gm respectively.

RESULTS

Table 1. BMD value of thal major patients

	No of cases	BMD value L4-L5 spine	No of cases	BMC value L4-L5 spine	No of cases	BMD value Femoral neck	No of cases	BMC value Femoral neck
Thalassemia Patient	54	0.54	54	10.03	54	1.02	54	3.25
Normal Control	54	0.68	54	20.08	54	1.04	54	4
P--Value	0.865187138		0.024911831		0.984353199		0.707660467	
Significance	Not Significant		Significant		Not Significant		Not Significant	

From the above table it is obvious that (L_4-L_5) spine BMD value of thal major patients are lower than that of age and sex matched control group in our study. Among BMD value measured at the femoral neck is also lower in the major patients with respect to normal control. However, it is obvious that decrease in BMD value of thal major patients is relatively more significant at the level of L_4-L_5 spine. However, P value is not significant.

Bone mineral content (BMC) at the level of L_4-L_5 is significantly lowered in thal major patient with respect to control group and the lowering is statistically significant ($p = 0.0249$). Average BMC value of femoral neck of thal major patients is also lower than that of normal central but that is not statistically significant however.

DISCUSSION

In review of literature we have found very scanty data of BMC and BMD value of thal major patients, especially in our country. Regarding data available, it can be said that our study was confined to thalassemia unit of a state run subdivision Hospital of rural west Bengal where conservative treatment of thal major cases include blood transfusion, iron chelation and prevention of complication as and when possible. Previous studies have shown a decrease in BMD value both femoral and lumbar spine [1-3]. Or only at lumbar region. We have seen decrease in BMD value in both lumbar spine and femoral neck area but in both the cases that was not statistically significant.

However, there was a significant ($p = 0.024$) decrease in bone mineral content of L_4-L_5 spine of thal major patients and BMC of femoral neck area was also less than that of normal control though this time decrease was not statistically significant ($p = 0.707$).

In existing reports no correlation was found between BMD and BMC values with treatment[3]. Also there was no significant difference between genders regarding decrease in BMD and BMC values in that major patients which is in line with the findings of other study group [2,4,7].

CONCLUSION

Thalassemia, is now well treated mainly conservatively with optimal safe blood transfusion and iron chelation therapy. This has substantially improved life expectancy.So now we are facing the challenge to improve the quality of life of the patients. As we are getting and treating aged thalassemic patients, osteoporosis is emerging as an important cause of morbidity [5,6]. In our present study we have documented effective use of simple parameters to measure the level of osteoporosis among

thalassemia patients which will guide us to apply necessary therapy. So in conclusion it can be said that one must monitor thalassemia major patients with a yearly DEXA scan for bone density to monitor osteoporosis and related complications.

REFERENCES

1. Mahachoklertwattana P et al. (2003). Bone histomorphometry in children and adolescents with beta thalassemia disease. *J Clin Endocrinol Metab*, 88, 3966-3972.
2. Cappellini M et al. (2000). Endocrine complications in thalassemia major. In, Guidelines for the clinical management of thalassemia. *TIF*, 41-49.
3. Siondas A et al. (1999). Bone mineral density of patients with thalassemia major, Four year follow-up. *Calcif Tissue Int*, 64, 481-484.
4. Dresner Pollack R et al. (2000). Bone mineral metabolism in adults with Beta thalassemia major and intermedia. *Br J Hematol*, 111, 902-907.
5. Abdollah Samshiraz A et al. (2003). Metabolic and endocrinologic complications in beta-thalassemia major, a multi centre study in Tehran. *BMC Endocr Discord*, 3, 4.
6. Vchinsky EP. (1998). The morbidity of bone disease in thalassemia. *Ann N Y Acad Sci*, 850, 344-348.
7. Jensen CE et al. (1998). High prevalence of low bone mass in thalassemia major. *Br J Hematol*, 103, 911-915.
8. Thalassemia International Federation. (2000). Guidelines for the clinical management of thalassemia. Nicosic Cyprus. TIF.
9. WHO. (2008). Weekly Epidemiological Record No.48, 28th November, 2008.
10. WHO. (2008). The Global Burden of Diseases, 2004 Updates.