International Journal of Contemporary Pediatrics
Kumble D et al. Int J Contemp Pediatr. 2017 May;4(3):780-782
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20171487

Original Research Article

Ocular involvement in beta thalassemia major: a prospective study in an Indian cohort

Dhanalakshmi Kumble[1]*, Prabhjot Kaur Sekhon[2], Gayathri Devi C.[1]

[1]Department of Paediatrics, Bangalore Medical College and Research Institute, Bengaluru, Karnataka, India
[2]Department of Paediatrics Chacha Nehru Bal Chikitsalya, New Delhi, India

Received: 10 March 2017
Accepted: 22 March 2017

***Correspondence:**
Dr. Dhanalakshmi Kumble,
E-mail: dhanalakshmi.kumble@gmail.com

ABSTRACT

Background: Thalassemia is the commonest haemoglobinopathies worldwide. Repeated blood transfusions lead to hemosiderosis which affects all the organs in the body including eyes. This study aims to study Ocular manifestations in these children and its correlation with age and serum Ferritin level.
Methods: 75 children diagnosed with B-Thalassemia major (BTM) and on regular transfusions underwent detailed Ocular examination between 2013 and 2015, including visual acuity, slit lamp bio microscopy, direct & indirect Opthalmoscopy).
Results: Mean age for children was 9.73 years, with 77 % males and 23% females. Average S. Ferritin being 2701.96 ng/dl. The most common eye changes seen were in the Retina (32%, n=24), Iris (34.7%, n=26) and lens (32%, n=24). Retinal changes were temporal Retinal thinning (29.3%, n=22), retinal venous engorgement (21.3%, n=16), vessel tortuosity (17.3%, n=13), atrophy of disc (17.3%, n=13). Lens opacities were seen in 32 %, posterior sub capsular haze, streaks in posterior capsule, and heterochromia in 34.7%. Retinal changes correlated with duration of disease in children above 10 years and with increasing Serum Ferritin levels.
Conclusions: Corneal dryness, lenticular opacities, disc atrophy and thinning were observed in children with B-Thalassemia and on blood transfusions. These changes increased with duration of disease. Hence there is need to screen BTM adolescents and follow up.

Keywords: B-Thalassemia major, Ferritin, Ocular

INTRODUCTION

Thalassemia is the most common single gene disorder worldwide. Beta globin chain mutations in B-Thalassemia cause defective red cell maturation and giving rise to ineffective erythropoiesis and multisystem involvement. Severe anemia in these children warrants lifelong regular blood transfusions to maintain optimum haemoglobin for normal growth and development. Repeated multiple transfusions lead to Siderosis.[1] Increased intraocular iron has been shown to cause oxidative injury to the retina particularly retinal pigment epithelium (RPE). RPE is the chief site of iron deposition. Angioid streaks due to the defects in Bruch's membrane underlying the RPE can be observed in these patients. But it is difficult to differentiate the effects of iron overload, intra-ocular haemorrhages and chelation therapy on the retina. It is possible that these patients have retinal iron overload.[2]

Ocular Manifestations are seen in patients suffering from thalassemia. They range from decreased visual acuity, colour vision anomalies, night blindness due to cataract, visual field defects and optic neuropathy. Western studies reported ocular changes in figures of 41.3% and 71%.[3,4]

Indian studies have shown figures of 40% of lenticular opacities and 33% of decreased visual acuity.[5] Electroretinograghic and visual evoked potentials are also affected in children with thalassemia which are very similar to early forms of siderosis bulbi. There is a relative low awareness of these ophthalmic manifestations due to very few studies in Indian populations. Hence the need for the study. The objective of this study is to evaluate visual acuity, anterior segment, fundus, and retina and to correlate these findings with age and serum Ferritin in these children.

METHODS

This is a descriptive cross sectional study done in Bangalore Medical College and Research Institute, Bangalore, Karnataka, between October 2013 and September 2015. Children diagnosed with beta thalassemia major, confirmed by clinical, haematological and electrophoretic studies were included in the study.

Children with pre- existing ocular abnormalities, ocular trauma, infections, children below 3 years were excluded from the study. This study was approved by the Institutional Ethical Committee.

After obtaining informed consent from the patients and/or parents relevant history like age of diagnosis, number of transfusions received annually, serum Ferritin levels, chelation therapy were recorded.

Enrolled children were asked about any difficulty in vision, presence of any floaters, grittiness, blurring of vision or any eye problem if any. Ocular examination was done for any major eye abnormality, congenital malformations or trauma. Visual acuity was tested by Snellen's chart and expressed as fraction. Slit lamp examination was done to see corneal surface changes, anterior chamber and lens. Tear film was examined for break up time (BUT). BUT <10 seconds was taken significant. Fluorescence dye was instilled to see for any erosions and ulcers. Corneal thickness was determined by Patchymeter.

Retinal examination was done using direct and indirect ophthalmoscope, changes were recorded. Statistical analysis was done using SPSS version (IBM) and p value of <0.05 was considered significant.

RESULTS

75 children were enrolled for the study. Mean age of these children were 9.73 years ranging from 5-17 years. 58 children were males and 17 were females. 6 children were on chelation therapy (8%). 2 on intravenous as well as oral Deferiprone, 3 on only oral Deferiprone and 1 on Deferasirox. All the children had irregular chelation treatment and poor compliance.

Table 1: Distribution of different parameters of the children.

Age distribution	Number (%) n=75
3-5 years	11 (14.6)
5-10 years	36 (48)
10-15 years	20 (26.7)
>15 years	08 (10.7)
Age at diagnosis	**Number (%)**
<6 months	03 (04)
6 months -1 years	25 (063)
1 year -2 years	47 (033)
>2 years	Nil
Ferritin Levels	**Number (%)**
0 -1499 ng/ml	26 (35)
1500 -2500 ng/ml	30(40)
2501 ng/ml and above	19 (25)

Table 2: Eye changes of the children.

Parts of the eye	Number (%) n = 75
Cornea	10 (13.3)
Anterior chamber	00 (00)
Iris	26 (34.7)
Lens	24 (32)
Retina	24 (32)
Visual acuity	13 (17.3)

13.3% of the children had corneal dryness, with break up time less than 10 sec. No erosions or ulcerations were seen. Average corneal thickness was 534.48um±9.895. Opacities in the lens were seen in 32% of the children, lenticular opacities seen in patients comprised mainly posterior sub capsular haze, streaks in posterior capsule, and posterior cortical opacities. None of the opacities were visually significant to warrant treatment. Changes in the Iris were heterochromia, mottling in 26 children and one child also had iridodenesis. Most common retinal changes seen were thinning of the disc in 29.3%, followed by retinal venous engorgement in 21.3%, and vessel tortuosity in 17.3%, disc atrophy 17.3%, and psuedoxanthoma elasticum in 2.7% of the children. With the ROC curve, it was derived that children with B-thalassemia had the risk of developing retinal changes after the age of 10 yrs. Decreased visual acuity was observed in 17.3% (n=13) children. Average age of the children with corneal changes was 14.6±3.3 years, Average age of the children with lenticular abnormality was 11.28=/- 2.56 years. Average age of Children with retinal changes were 13.16=/- 3.04 years. Regarding correlation of various eye changes with the serum ferritin level, corneal changes were seen in 60% (n=10) children, with S. ferritin 2501-4500 ng/ml, 20% (n=2) children with S. ferritin 1501-2500 ng/ml, 20% (n=2) children with S. ferritin <1500 ng/ml, statistically insignificant (p=0.020). Iris changes were seen in 10 (20.4%) Males and 7 (26.9%) females. On comparing the children with S. feritin in 1500-2500 ng/ml range, with children having S. ferritin 2501-4500 ng/ml, Iris was significantly

affected in children with S. ferritin >2500 ng/ml. statistically significant (p=0.001). Children with higher level of S. ferritin, >4500 ng/ml had more of lenticular changes. The distribution was 21.4% (n=6) children with S. Ferritin, >1500ng/ml, 39.3% (n=11) with S. ferritin >2500- ng/ml, and 39.3% (9n=11) with S. ferritin. 4500 ng/ml, not statistically significant.

DISCUSSION

The incidence of Beta thalassemia in Indian subcontinent is 11,316 per year.[5] In a resource poor country like India, definitive therapy like stem cell therapy is beyond the reach of majority of the children. These children are on multiple blood transfusions, giving rise to iron over load. Iron overload affects all the organs in the body including the eyes. In this study 75 children were examined for eye changes. Mean age of the children in this study was 9.7 years, similar to the earlier Indian study. Ocular changes were seen more in children above 10 years of age and was less in children below 5 years of age. This clearly shows that longer the duration of the illness more are the eye changes, which is seen in similar other studies.[3,5] Retina was the most commonly affected part, ranging from 78.6% to 16.6%.[7,8] In our study 32% of the children had retinal changes like, degeneration of retinal pigmentary epithelium, retinal venous engorgement, vessel tortuosity and angioid streaks with decreased visual acuity. This has been observed in other studies also.[3,5,7,9] Higher serum Ferritin levels, multiple transfusions, age of the children had given rise to the retinal changes. Lenticular opacities were the other common abnormalities detected, ranging from 17% to 44%.[9,5,10] In the present study 34% of the children had lenticular opacities, without causing any visual impairment. Decreased Visual acuity was also observed in other studies from15.5% to 30% of the children, our study also had similar range.[6,7] In our study, corneal dryness with BUT <10 sec was found in 13.3% of the children. When comparing the S. ferritin level with eye changes, only Iris changes were statistically significant in our study (p=0.001). In other studies correlation of eye changes with the S. ferritin level was not significant.[3] Limitation of our study was that very few children were on chelation therapy, due to low socio economic status. Hence, we could not evaluate the effect of chelation therapy on the retina in these children. Electroretinographic examination could have revealed few of the retinal changes in these children, but was not feasible in our setting.

CONCLUSION

Children with B-Thalassemia develop various eye problems. Retinal changes are more with increasing age and increasing duration of transfusions. Lenticular opacities do not warrant any therapy. There is a need to screen these children regularly for eye manifestations.

ACKNOWLEDGEMENTS

Author would like to thank all children who participated in the study, Dean cum Director, Professor and Head, and all faculty and PG's of Department of Paediatrics, for their useful contribution in carrying out this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Addy D Forfar and Arneil's Text Book of Pediatrics. Arch Dis Child. 1993; 8:434-5.
2. Song D, Dunaief JL. Retinal Iron homeostasis in health and disease. Front Aging nuerosci. 2013:5:24.
3. Gartaganis S, Ismiridis K, Papageorgiou O. Ocular abnormalities in patients with beta thalassemia. Am J Ophthalmol.1989:108;699-703.
4. Gaba A, Souza PD, Chandra J, Narayan S, Sen S, Ocular changes in beta thalassemia. Ann Ophthalmol.1998; 30:357-60.
5. Verma IC. Burden of genetic disorders in India. Indian J Peditrcs. 2000:67:12(893-8).
6. Taneja R, Malik P, Sharma M, Agarwal MC. Multiple transfused thalassemia Major;Ocular Manifestations in a hospital based population.Indian J Ophthalmol. 2010;58(2):125-30.
7. Taher A, Bashshur Z, Shamseddeen W, Adbulnour REE, Aoun E, Koussa S, et al. Ocular findings Among Thalassemia patients. Am J Ophthalmol. 2006;142(4);704-5.
8. Gartaganis SP, Georgeakopoulos CD, Exarchou A, Mela EK, Psachoulia C, Eliopoulou MI, et all. Alterations in conjunctival cytology and tear film dysfunction in patients with B-thalassemia. Cornea. 2003:22(7); 591-7.
9. Sorcinelli, RSitzia A, Figus A, Lai ME. Ocular findings in beta thalassemia. Metabolic Paediatric and Systemic Ophthalmology (New York, NY; 1985). 1989;13(1).
10. Nowroozzadeh MH, Kalantari Z, Meshkibaf MH. Ocular refractive and biometric characteristics in patients with thalassemia major.Clin Exp Optom. 2011;94(4);361-6.

Cite this article as: Kumble D, Sekhon PK, Gayathri DC. Ocular involvement in beta thalassemia major: a prospective study in an Indian cohort. Int J Contemp Pediatr 2017;4:xxx-xx.