Original Article ISSN (O):2395-2822; ISSN (P):2395-2814

Study of Ocular Manifestations among Beta Thalassemia Major Patients

C. Harihara Prasad[1], Y. M. Satyanarayana Prasad[2]

[1]Associate Professor, Department of Ophthalmology, Government Medical College, Anantapuramu, Andhra Pradesh, India.
[2]Associate Professor, Department of Ophthalmology, Government Medical College, Anantapuramu, Andhra Pradesh, India.

Received: April 2019
Accepted: April 2019

ABSTRACT

Background: Person with thalassemia major may have severe symptoms and may need regular blood transfusions. Iron overload is due to repeated blood transfusions and enhanced iron absorption by gastrointestinal tract and also creates negative impact on the organs function. We aimed to study the ocular changes in beta thalassemia major at a tertiary care hospital. **Methods:** In this prospective observational study, 234 patients diagnosed with beta thalassemia major, receiving multiple blood transfusions as a part of treatment were included. Patient brief history was taken, along with family history. Complete eye examination done. Ocular examination done by measuring visual acuity, refractive error assessment with autorefractometer, slit lamp examination, fundoscopy, perimetry, tonometry, color vision testing and tear break up time (TBUT) test. **Results:** A total of 234 beta thalassemia major patients of both sexes were evaluated, among them 132 (56.4%) were males and 102 (43.5%)were females. The mean age of thalassemic study population was 25.6±6.3. Most commonly observed were pinguecula (44%), visual field defects (40.5%), vascular tortuosity (39.3%), dry eye (33.3%), Refractive error (20.5%), Anterior segment involvement (18.8%), Cataract (13.2%), color vision defect (5.1%), normalization of optical vessels (4%). **Conclusion:** Regular Opthalmological examination helps to detect early changes due to disease and chelating agents. Issue of iron overload among thalassemic patients can be reduced by decreasing the need or the frequency of blood transfusions.

Keywords: Beta thalassemia major, Ocular manifestations.

INTRODUCTION

Thalassemia is a genetic blood disorder, people with thalassemia disease are not able to mke enough hemoglobin, which causes mild to severe anaemia.[1] Severity of the beta thalassemia depends how many of the two genes for beta globin is missing.[2] Person with thalassemia major may have severe symptoms and may need regular blood transfusions. In Beta thalassemia major, there may be little or no hemoglobin A. Also, there is an excess of alpha globin not bound to beta globin that causes red cell breakdown known as hemolysis.

Worldwide, the estimated incidence of beta thalassemia is about one in 1,00,000.[3] It is autorecessive disorder, caused by mutations in HBB gene on chromosome 11. Every year, approximately 20 deaths worldwide, listed as a “rare disease”. 7% of the world’s population are carriers and 4,00,000 babies are born with the trait annually.[4]

Name & Address of Corresponding Author
Dr. Y. M. Satyanarayana Prasad,
Associate Professor,
Department of Ophthalmology,
Government Medical College,
Anantapuramu,
Andhra Pradesh,
India.

Beta thalassemia diagnosis is usually delayed because of fetal hemoglobin presence until six months of life. On appearance of clinical features such as pallor, fatigue etc. can suspect thalassemia.[2] Beta thalassemia patients require regular blood transfusions, to maintain adequate hemoglobin. Excessive blood transfusions causes iron over load and also create negative impact on the organs function.[1] Iron overload is due to repeated blood transfusions and enhanced iron absorption by gastrointestinal tract.[5]

Ocular changes may result due to beta thalassemia major are visual defect, conjunctival blanching, isolated cataratous, xerosis/bitot’s spots, retinal venous tortuosity, disc changes, retinal pigment epithelial degeneration and mottling etc.[6]

We aimed to study the ocular changes in beta thalassemia major at a tertiary care hospital.

MATERIALS AND METHODS

In this prospective observational study, 234 patients diagnosed with beta thalassemia major, receiving multiple blood transfusions as a part of treatment during the period of March 2015 to September 2017 were included. All patients were advised to undergo ophthalmic examination and investigations after

taking informed verbal consent. The study was conducted at Government Medical College, Anantapuramu.

Patients with diabetes, hypertension and had previous eye surgeries or ophthalmic disease were excluded from this study.

Beta thalassemia major patients were routinely checked for hemoglobin before each transfusion and serum ferritin every six months. Patients received chelation therapy with desferroxamine during blood transfusions.

Patient brief history was taken, along with family history. Complete eye examination done. Ocular examination done by measuring visual acuity, refractive error assessment with autorefractometer, slit lamp examination, fundoscopy, perimetry, tonometry, color vision testing and tear break up time (TBUT) test.

Ophthalmic manifestations of these patients were analyzed, after plotting the details of studied population in excel sheet.

RESULTS

A total of 234 beta thalassemia major patients of both sexes were evaluated, among them 132 (56.4%) were males and 102 (43.5%) were females. The mean age of thalassemic study population was 25.6±6.3.

The mean level of hemoglobin was 7.1±0.7. In thalassemic patients and the mean level of serum ferritin in them was 1724±856 mg/ml [Table 1].

Table 1: Distribution of various parameters among beta thalassemic patients.

Parameters	
Number of Males	132
Number of Females	102
Mean age in years	25.6±6.3
Mean Hb in g/dl	7.1±0.7
Mean serum ferritin in mg/ml	1724±856

Table 2: Ocular manifestations of beta thalassemia major patients.

S.No.	Ocular manifestation	Number of patients	Percentage
1	Pingueula	103	44.01%
2	Visual field defects	95	40.5%
3	Vascular tortuosity	92	39.3%
4	Dry eye	78	33.3%
5	Refractive error	48	20.5%
6	Anterior segment involvement	44	18.8%
7	Cataract	31	13.2%
8	Color vision defect	12	5.1%
9	Normalization of optical vessels	11	4%
10	Cotton wool appearance	0	0
11	Sub burst appearance	0	0

On assessment of ophthalmic defects in beta thalassemic major patients, following ocular manifesttions were observed [Table 2]. Most commonly observed were pinguecula (44%), visual field defects (40.5%), vascular tortuosity (39.3%), dry eye (33.3%), Refractive error (20.5%), Anterior segment involvement(18.8%), Cataract (13.2%), color vision defect (5.1%), normalization of optical vessels (4%) [Table 2].

20.5% thalassemia patients had refractive errors, which varied from myopia to hypermetropia and astigmatism.

DISCUSSION

Thalassemia is a group of inherited blood disorders, characterized by abnormal hemoglobin production. In Beta thalassemia production of the globin chain is affected. Beta thalassemia major is defined by the need for lifelong transfusions, usually monthly (termed as hypertransfusion therapy).

HBB blockage over time leads to decreased beta chain synthesis, which in turn leads to the under production of HbA.[7] Microcytic anemia ultimately develops in respect to inadequate HBB protein for sufficient red blood cell functioning.[8] Due to this factor, the patient may require blood transfusions to make up for the blockage in the beta chains. Iron toxicity due to repeated blood transfusions, can cause various problems, including myocardial siderosis and heart failure leading to patient's death.[9]

In the present study, mean age of thalassemic patients was 25.6±6.3 years and 56.4% were males. Reza Jafari et al,[10] observed female predominance (57.4%) and the mean age of thalassemic patients was 25.4±6.94 year. In similar to the present study, Reza Jafari et al,[10] documented the mean serum ferritin level of thalassemic patients was 1695±975 mg/ml, and the mean level of hemoglobin in them was 8.42±0.96 g/dl.

Aliki L Iaska et al,[11] noticed the significant correlation of ocular manifestations between control group and beta thalassemic patients (P=0.000), whereas in between ocular abnormalities and mean serum ferritin level and mean hemoglobin concentration there is no statistical significance observed.

Dhanalakshmi kumble et al did a study on pediatric population with beta thalassemia major in India, documented ocular abnormalities commonly observed in children >10 years and was less in children <5 years of age.

As per this study, most commonly observed were pinguecula (44%), visual field defects (40.5%), vascular tortuosity (39.3%), dry eye (33.3%), Refractive error (20.5%), Anterior segment involvement(18.8%), Cataract (13.2%), color vision defect (5.1%), normalization of optical vessels (4%).

Reza Jafari et al,[10] found a significant statistical correlation of ocular abnormalities (19.4%,95% CI), cataract (10.2% in thalassemic patients, 95% CI), TBUT (mean ± SD12.62 ± 6.06 s in thalassemic

patients) between thalassemia group and normal patients. They also documented the prevalence of various ocular manifestations observed in thalassemia group on comparison with normal population as dry eye [33.3% (95% confidence interval [CI], 24.29%, 42.36%)], cataract [10.2% (95% CI, 4.38%, 15.98%)], RPE degeneration [16.7% (95% CI, 9.52%, 23.80%)], color vision deficiency [3.7% (95% CI, 0.08%, 7.32%)], and VF defects [33.7% (95% CI, 24.57%, 42.73%). Visual Field defects were observed in 33.7% patients including 17.3% (95% CI, 10.03%, 24.57%) general depression, 6.7% (95% CI, 1.92%, 11.54%) paracentral scotoma, 4.8% (95% CI, 0.69%, 8.91%) superior arcuate scotoma, and 4.8% (95% CI, 0.69%, 8.91%) inferior arcuate scotoma, refers VF defects between two groups.

Aliki L Iaska,[11] observed Ocular findings including dry eye (33.3 %), cataract (10.2 %), retinal pigment epithelium degeneration (16.7 %), color vision deficiency (3.7 %), and visual field defects (33.7 %) were detected in 68.5 % of thalassemic group.

Dhanalakshmi kumble et al,[12] did a study on beta thalassemia major children documented 32% had retinal changes like, degeneration of retinal pigmentary epithelium, retinal venous engorgement, vessel tortuosity and angioid streaks with decreased visual acuity.

Lentiular opacities is one of the commonest ocular abnormalities among thalasssemic patients, were observed in the range of 17% to 44%.[13,14] Lenticular opacity with decreased visual acuity was observed by few studies in the range of 15.5% to 30%.[15,16]

Gartaganis et al,[17] and Taneja et al,[15] found lens opacities in 13.8% and 40% of their subjects, respectively. Nowroozzadeh et al,[18] documented the prevalence of cataract was 10.7% and 18.8% in those who consumed deferoxamine and deferiprone, respectively (P = 0.36). Mehdizadeh M et al,[19] documented two cases of cataract after using deferiprone raised the issue of a possible association between deferiprone consumption and development of cataract.

Chelation therapy aims to balance the rate of iron accumulation from blood transfusion by increasing iron excretion in urine and or faces with chelators. Approved iron chelators including deferoxamine, deferiprone, and deferasirox can be used as monotherapy or as part of combination therapy.

CONCLUSION

Regular Opthalmological examination helps to detect early changes due to disease and chelating agents. Issue of iron overload among thalassemic patients can be reduced by decreasing the need or the frequency of blood transfusions. Evidence based researches are helping a lot for clinical practices.

REFERENCES

1. Aksoy A, Aslankurt M, Aslan L, Gul O, GaripardM, Celik O, OkumuS, Ozdemir M, Ozdemir G. Ocular findings in children with thalassemia major in Eastern Mediterranean.Int j ophalmol.2014;7(1) :118-121.
2. Kesse-Adu R & Howard J. Inherited anaemias: sickle cell and thalassaemia. Medicine. 2013; 41, 4. 219-24.
3. Galanello Rinzo, OrigaRaffaella. Beta thalassemia.Orphanet J Rare Dis. 2010;5:11.
4. Thalassemia: Genetic blood disorders. Expected to double in Next few decades. Science Daily.Retrieved 4 April. 2017.
5. Mishra AK, Tiwari A. Iron Overload in Beta Thalassaemia Major and Intermedia Patients. Mædica. 2013;8(4):328-332.
6. Dalia S. M. Abdel-Malak; Ola A. E. Dabbous; Mohamed Y. S. Saif and Ahmed T. Sayed Saif. Ocular Manifestations in Children with B Thalassemia Major and Visual Toxicity of Iron Chelating Agents. J Am Sci 2012;8(7):633-638.
7. Carton James. Oxford Handbook of Clinical pathology.2012-02-16. OUP Oxford.
8. Perkin Ronald M, Newton Dale A, Swift james D. Pediatric Hospital Medicine. Text book of Inpatient management.2008. Lippincott Williams & Wilkins.
9. Galanello Renzo, Origa Raffaella. Beta thalassemia.Orphanet. Journal of Rare Diseases. 2010;5(1):11.
10. Reza Jafari, Samira Heydarian, Hosein Karami, Mohammad Momeni Shektaei, Kiumars Noruzpour Dailami, Ahmad Ahmadzadeh Amiri, Majid Reza Sheikh Rezaee. Ocular abnormalities in multi-transfused beta-thalassemia patients. IJO. 2015;63(9):710-715.
11. Aliki L Iaska, Petrous Petrou, Constantinos D Georgakopouls, Ramza Diamanti, Dimitris papaconstantinou, Menelaos G Kanakis and Ilias Georgalas. β-Thalassemia and ocular implications: a systematic review. BMC Ophthalmol.2016; 16: 102.
12. Dhanalakshmi Kumble, PrabhjotKaur Sekhon, Gayathri Devi C. Ocular involvement in beta thalassemia major: a prospective study in an Indian cohort. International Journal of Contemporary Pediatrics Kumble D et al. Int J ContempPediatr. 2017 May;4(3):780-782.
13. Sorcinelli, RSitzia A, Figus A, Lai ME. Ocular findings in beta thalassemia.Metabolic Paediatric and Systemic Ophthalmology (New York, NY; 1985). 1989;13(1).
14. Nowroozzadeh MH, Kalantari Z, Meshkibaf MH. Ocular refractive and biometric characteristics in patients with thalassemia major.ClinExpOptom. 2011;94(4);361-6.
15. 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.
16. 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.
17. Gartaganis S, Ismiridis K, Papageorgiou O, Beratis NG, Papanastasiou D. Ocular abnormalities in patients with beta thalassemia. Am J Ophthalmol 1989;108:699-703.
18. Nowroozzadeh MH, Kalantari Z, Namvar K, Meshkibaf MH. Ocular refractive and biometric characteristics in patients with thalassaemia major.ClinExpOptom 2011;94:361-6
19. Mehdizadeh M, Nowroozzadeh MH. Posterior subcapsular opacity in two patients with thalassaemia major following deferiprone consumption.ClinExpOptom 2009;92:392-4.

How to cite this article: Prasad CH, Prasad YMS. Study of Ocular Manifestations among Beta Thalassemia Major Patients. Ann. Int. Med. Den. Res. 2019; 5(3):OT01-OT03.

Source of Support: Nil, **Conflict of Interest:** None declared