Section: Dentistry

Original Research Article

ORAL AND CRANIOFACIAL MANIFESTATIONS AND DISTRIBUTION OF ABO BLOOD GROUPS IN β–THALASSEMIA PATIENTS—A CLINICAL STUDY

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ABSTRACT

Background: The aim of this study is to find out if orofacial manifestations and distributions of ABO blood groups in β-thalassemia patients.
Materials and Methods: The present study consisted of 49 clinically proven cases of β-thalassemia major who were enrolled members in the Thalassemia Society and who regularly attended blood transfusions. A blood sample was also collected for estimation of ABO blood grouping & Rh factor by the slide method. Data were analyzed using SPSS version 23. Frequencies and a chi-square test were done for the original data.
Results: The most prevalent age group involved was between 6 and 10 years, with male preponderance. A total of 53% had a history of consanguinity. Out of 49 patients, 53.2% had pale yellow discoloration of the skin and muddy black color in 34.6%. Frontal bossing was seen in 85.8%; 85.8% showed parietal bossing; hypertelorism was seen in 71.5%; depressed nasal bridging was seen in 83.7%; flaring of alae nasi was seen in 55.1%; and incompetent lips were present in 59.2%. Intraoral pigmentation was seen in 89.8%, and pallor of mucosa was seen in 81.7%. Gingivitis was seen in 51.1%. Proclamation of teeth was present in 44.9%. Spacing between teeth was present in 32.7%. Persistent mamelons are present in 36.8%. The most common group was O positive, with a total of 44.8%.
Conclusion: Patients receiving inadequate blood transfusions in childhood will face more bone changes like expansion and deformity in the form of intra-oral & extra-oral features in adolescence and cause hyperactivity of bone marrow to compensate for anemia.
Keywords: Thalassemia, ABO blood, intra-oral & extra-oral features.

INTRODUCTION

Thalassemia, a heterogeneous family of inherited disorders of hemoglobin synthesis, was first recognized in the USA and Italy in the years between 1925 and 1927.[1] The word thalassemia is derived from “thalassa,” the Greek word for sea, to relate the disease to the Mediterranean population. However, the disorder is not just limited to the Mediterranean region but occurs throughout the world, prevalent in the tropical and subtropical areas, including the Middle East, parts of Africa, the Indian subcontinent, and Southeast Asia.
Recent data indicate that the overall prevalence of β-thalassemia is 3-4%, with an estimate of around 8000 to 10,000 new births with the major disease each year.[2] Children with β-thalassemia also show dental and oral changes of varying degrees of severity, from normal to grossly abnormal. The deformities involve the long bones of the legs and vertebrae, endocrine abnormalities, splenomegaly, lack of sexual maturation, and growth retardation.[3] These skeletal abnormalities are caused by marrow erythroid hyperplasia to compensate for anaemia The deformities involve changes in the long bones of the legs and distinctive craniofacial changes. The distinctive features of orofacial findings are prominent cheekbones and protrusive premaxilla. Cephalometric analysis reveals dilatation of the diplopic space, subperiosteal bone growth, and

partially obliterated maxillary sinus. The findings are due to extramedullary erythroid hyperplasia.[4]

Several studies suggest the correlation of ABO blood groups with various diseases.[5] However, the association of the ABO blood group with thalassemia has mostly been under study.[6] The most common practical approach for developing countries like India is prevention, and significant efforts need to be directed at applying well-defined and straightforward strategies to control these disorders by carrier detection, genetic counseling, and prenatal diagnosis. Early detection of anemia allows timely intervention, preventing serious consequences.[7]

MATERIALS AND METHODS

Source of the data: This is a study done in the department of oral medicine and radiology after getting approval from the institution's ethics committee, and the clinical data were collected from subjects who are enrolled members in the Thalassemia Society and who were regularly attending blood transfusions. Duration of study: 2017-2019 (24 months) Inclusion criteria for the study is clinically proven cases of β-thalassemia major. Exclusion criteria is Subjects with systemic diseases like Diabetes mellitus and Down's syndrome and other systemic diseases known to influence the oral and maxillofacial manifestations.

Method of Collection of Study

The study was done after getting approval from the ethics committee IEC NO: CKS/Acad/IECC/2017. The study was done with a sample size of 49 subjects with a clinical history of β-thalassemia major, registered in the Thalassemia Society. Consent from the patients and parents/guardians was taken for their participation in the study on a voluntary basis. Details of the type of parents' marriage were also noted on a printed pro proforma. A thorough intraoral and extraoral examination of the patient was carried out on a dental chair with the help of examination instruments. A sample of 2 ml of blood was also collected for estimation of ABO blood grouping & Rh factor by slide method.

Statistical Analysis: Frequencies and chi-square tests were done on the original data. Data was analyzed using SPSS version 23.

RESULTS

Table 1: Table showing age distribution

Parameter	N	Minimum	Maximum	Mean	Standard Deviation
Age	49	3	36	10.27	5.97
Age @ presentation	49	.25	5.00	1.03	1.00

The most prevalent age group involved was between 6 and 10 years (1st decade), with 17 cases (34.6%). Thee-to-female ratio is 1.8:1, with male preponderance (table 1). The earliest age of presentation was three months, with a mean age of 1 year.

Table 2: Table showing marriage status of parents of study participants

Parent marriage status	Female		Male		Total	
	N	%	N	`%	N	%
Consanguinity	8	47	18	56.2	26	53
Non-Consanguineous	9	53	14	48.3	23	47
Total	17	100	32	100	49	100
Chi sq	0.377		P value		0.539 NS	

A total of 23 cases (53%) had a history of consanguinity, whereas 23 cases (47%) were non-consanguineous parents. (Table 2)

Table 3: Table showing results of extraoral findings

	PRESENT	ABSENT	TOTAL	chi-square	P-VALUE
SKIN COLOUR CHANGES	43	6	49	3.752	0.29 NS
FRONTAL BOSSING	42	7	49	1.501	0.22 NS
PARIETAL BOSSING	41	8	49	3.263	0.701NS
HYPERTELORISM	35	14	49	3.603	0.058
DEPRESSED NASAL BRIDGE	41	8	49	0.601	0.409
FLARING OF ALA	27	22	49	0.681	0.409
INCOMPETENT LIPS	29	20	49	0.761	0.859

Pale yellow discoloration of the skin is seen in 32 cases (53.2%), and the muddy black color in 17 cases (34.6%). Frontal bossing was seen in 42 cases (85.8%) and was absent in 7 cases. Parietal bossing, seen in 41 cases (85.8%), showed parietal bossing, and this feature was absent in 8 cases (14.2%). Hypertelorism was seen in 35 cases (71.5%) and was absent in 14 cases (28.5%). Depressed nasal bridge was seen in 41 cases (83.7%) and was absent in 8 cases (16.3%). Flaring of alae nasi was seen in 27 cases (55.1%) and was absent in 22 cases (44.9%). Incompetent lips were present in 29 cases (59.2%) and were absent in 20 cases (40.8%).

Table 4: Table showing results of oral Findings

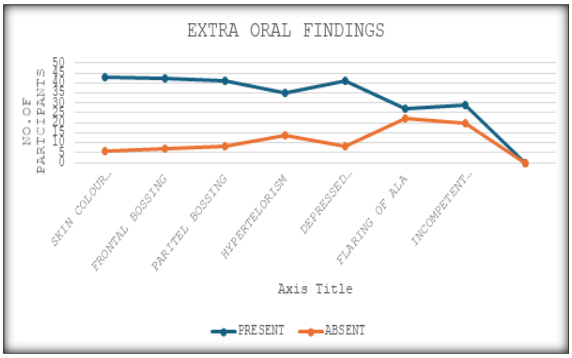
INTRAORAL FINDINGS					
	PRESENT	ABSENT	TOTAL	CHI SQUARE	P-VALUE
INTRAORAL PIGMENTATION	45	5	49	3.418	0.181
PALLOR OF ORAL MUCOSA	40	9	49	3.089	0.378
GINGIVITIS AND RECESSION	25	24	49	0.111	0.946 NS
PROCLINATION OF TEETH	22	27	49	1.428	0.699
SPACING IN TEETH	16	33	49	1.186	0.756 NS
PERSISTENCE OF MAMELONS	18	31	49	8.198	0.042 S

Intraoral pigmentation was seen in 44 cases (89.8%) and was absent in 5 cases (10.2%). The pallor of mucosa is seen in 40 cases (81.7%) and was absent in 9 cases (18.3%). Gingivitis was seen in 25 cases (51.1%) and was absent in 24 cases (48.9%). Proclination of teeth was present in 22 cases (44.9%) and was absent in 27 cases (55.1%). Spacing between teeth was absent in 33 cases (67.3%) and was present in 16 cases (32.7%). Persistent mamelons were present in 18 cases (36.8%) and were absent in 31 cases (63.2%) (Table 4).

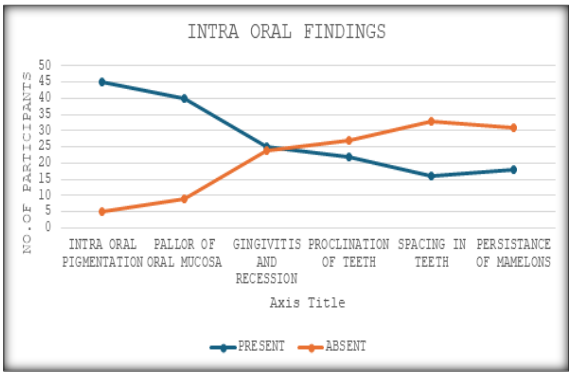
Table 5: Columns showing types of blood groups incidence

Blood Group	Female		Male		Total	
	N	Female	N	Male	N	Total
A-	2	11.7	1	3.1	3	6.1
A+	3	17.6	8	25	11	22.4
AB+	2	11.7	2	6.25	4	8.1
AB	0	0	1	3.1	1	2
B-	0	0	0	0	0	0
B+	1	5.8	5	15.6	6	12.2
O-	0	0	2	6.25	2	4.1
O+	9	52.9	13	40.6	22	44.8
Total	**17**	**100**	**32**	**100**	**49**	**100**

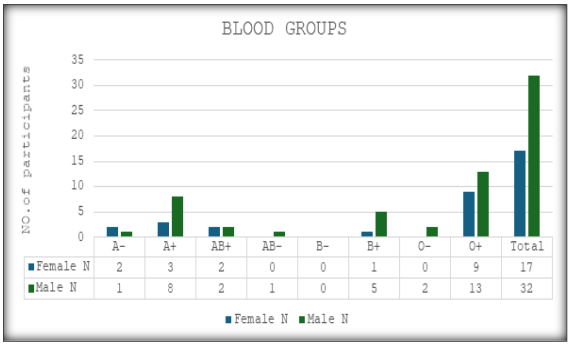
The most common group was O positive, with a total of 22 cases (44.8%), followed by A positive with 11 cases (22.4%). B Negative was absent, and AB Negative was the least prevalent blood group with one case (2%). (Table 5)



Graph 1: Graph showing extraoral findings



Graph 2: Graph showing intraoral findings



Graph 3: Diagram showing incidence of blood groups among participants

DISCUSSION

The inherited disorders of hemoglobin are the most prevalent single-gene/monogenic, with an estimated carrier rate of 7% among the world population. In the past, babies born with severe genetic diseases would have been unlikely to survive the first years of life, but the scenario has now changed dramatically with the improvements in hygiene and public health measures.[8]

Most children with severe forms of homozygous or compound heterozygous β-thalassemia are present within the first year of life. They fail to thrive, poor feeding, intermittent bouts of infections, and the general malaise. If the infant receives regular red cell transfusions, subsequent development is usually healthy. Until puberty, further symptoms do not occur, when, if they have not received adequate chelation therapy, the signs of iron loading start to appear. If, on the other hand, the infant is not

adequately transfused, the typical clinical picture of thalassemia major develops. Therefore, clinical manifestations of the severe forms of β thalassemia can be described in two contexts: in the well-transfused child and in the child with chronic anemia throughout early childhood.[1,9]

In the present study, the most prevalent age group involved was in the first decade, which correlated with a study done by Saheli MR et al,[10] and Salam K et al,[11] Our study also had male predominance, which was similar to study done by Saheli MR et al. [10], whereas a study done by Salam K et al,[11] had Female predominance.

The mutation spectrum varies significantly in different parts and different ethnic groups. Social factors such as the preference to marry within the community and among first-degree relatives (consanguinity) play an essential role in impeding the gene pool of the disease within the community. In the present study, a total of 23 cases (53%) had a history of consanguinity, while a study done by Asadi-Pooya et al. [12] reported 40.6% and Ravindra Kumar et al,[13] reported 10%, which was 43% lower than the present study. This was probably due to a lower rate of consanguinity marriages in communities from North India.

In the present study, standard color was found in 6 cases (12.2%), muddy black in 17 cases (34.6%), and pale yellow in 32 cases (53.2%), which were similar to a study done by Ali SM et al. [14]. In contrast, Girinath et al. [15] reported muddy pale skin color in 38% and muddy brown color in 28%, slightly less percentage than reported in the present study.

Frontal bossing was seen in 42 cases (85.8%), whereas Girinath et al,[15] reported frontal bossing in 74%, and Ali SM et al,[14] recorded frontal bossing in 58%, which was lower than the present study. Parietal bossing was seen in 41 cases (85.5%) in the present study, whereas Ali SM et al,[14] reported parietal bossing in 88%, while Girinath et al,[15] reported 28%. This finding was almost like a study done by Ali SM et al.[14] Hypertelorism was seen in 35 cases (71.5%), which was like a study done by Girinath et al,[15] who reported it in 74%, while Ali SM et al,[14] reported it in 64%.

A depressed nasal bridge was seen in 41 41cases (83.7%), which was similar to studies done by Dama SB et al,[16] who reported it in 84 %; Ali SM et al,[14] and Girinath et al,[15] recorded it in 70%. Few studies done by MR Salhi et al,[10] reported 67%, and Faiez Hatteb,[17] reported 59.2%. and Salem K et al. [11] reported 19.7%. Flaring of alae nasi was seen in 27 cases (55.1%). While Ali SM et al,[14] recorded it in 76% of cases and Girinath et al,[15] reported it in 36% of cases, which is less than the present study. Incompetent lips were present in 29 cases (59.2%) in the present study, while Ali SM et al. [14] and Girinath et al,[15] reported 54%, whereas Fiaz Hettab et al,[17] reported 51.8%, which was slightly more in the present study.

Intraoral pigmentation was seen in 44 cases (89.8%), which is almost similar to Ali SM et al,[14] who recorded it in 88% of cases. However, Girinath et al,[15] reported it at 60%. It is 29.8% higher in the present study. In the present study, gingivitis was recorded in 25 cases (51.1%), whereas Girinath et al,[15] reported 26%. Ali SM et al,[14] recorded 82% of cases, which is higher than the present study, probably due to betel and betel nut (pan, chalia) chewing habits.

The pallor of oral mucosa recorded in the present study was 81.7%, which was almost similar to Ali SM et al,[14] who reported 84%, but Girinath et al,[15] reported 60%, while MR Salehi,[10] reported 41.7% and Fiaz Hatteb,[17] reported 38.9%. Proclination of teeth in the present study was seen in 22 cases (44.9%), while MR Salehi,[10] reported 49.7%, whereas Girinath et al,[15] reported 40% and Ali SM et al,[14] reported 26%. Spacing between teeth in the present study was seen in 16 cases (32.7%), while Girinath et al,[15] reported it in 40%, whereas Ali SM et al,[14] recorded it in 20%.

In the present study, persistence of mamelons was present in 18 cases (36.8%), which was higher when compared to studies by Ali SM et al,[14] who recorded 22%, and Girinath et al,[15] who reported 24%. Increased overjet and overbite were due to maxillary hyperplasia, preventing anterior teeth from coming in contact, and this led to a super eruption of mandibular anterior teeth resulting in an overbite, which in turn led to attrition and gingival recession. The increased overbite thus contributes to incompetency of lips and leads to mouth breathing.[13]

The most common group was O positive, with a total of 22 cases (44.8%), followed by A positive with 11 cases (22.4%). B Negative was absent, and AB Negative was the least prevalent blood group with one case (2%). This study was like Laghari Z et al.'s,[18] study in which the sequence of distribution was O> B > A> AB. According to Sinha P A,[19] it was found that the most common blood group getting affected by the disease ß-thalassemia is O positive, with the same people having higher chances of family history of the same disease, which was similar in the present study.

Limitations: This study was conducted on all registered cases of β-thalassemia major at the Thalassemia Society, who receive regular blood transfusions at the center, focusing on these cases rather than determining prevalence, and duration is short.

Future prospects: With consistent treatment and monitoring, patients can achieve a longer and healthier lifespan. To reduce the incidence of genetic disorders, consanguineous marriages should be discouraged or restricted. This can be effectively addressed through public awareness campaigns utilizing both electronic and print media. Furthermore, a multidisciplinary approach is crucial for ensuring safe dental treatment in these patients.

CONCLUSION

Thalassemia major is a lifelong condition requiring ongoing medical and dental treatment. Regular and early treatment reduces the severity of the disease. Patients receiving inadequate blood transfusions in childhood will face more bone changes like expansion and deformity in adolescence and cause hyperactivity of bone marrow to compensate for anemia. Dentists should have an in-depth understanding of the proper management of dental problems of thalassemia patients.

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