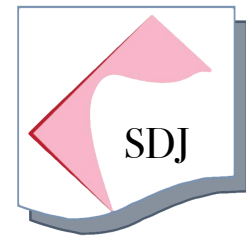


Prevalence of orofacial changes in patients with β -thalassemia major in Karbala City, Iraq

Muhammed Salah Abulsattar^a

Ali Mihsen Al-Yassiri^b



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Abstract:

Background: The thalassemias are a group of hemoglobinnopathies characterized by a reduced rate of production of one or more of these globin chains. The imbalance is due to disturbances in the control mechanisms of protein synthesis and results in altered function of the hemoglobin molecule and aberrant erythrocyte morphology. β -thalassemia major is the most severe congenital hemolytic anemia. The oral complications or manifestations are most common present in major thalassemic patients. The aim of this study was to investigate findings of oral abnormalities or changes in these patients, and compare it to healthy control subjects.

Materials and Methods: Patients were selected from Thalassemia Center of Pediatric of Al Hussaini Teaching Hospital in Holy-Karbala during the period from March to September 2013. Forty (40) subjects were incorporated in this study. All these patients with age range (4-15) years, (22 males, and 18 females). All these patients were without any other systemic diseases.

Results: The prevalence of orofacial complications in β -thalassemia major patients was: prominent maxilla (85%), bad odor (80%), oral ulcers (50%), angular stomatitis (40%), candidal infection (35%), changes in oral mucosa (30%), xerostomia (15%), and the last one was enlargements of salivary glands (zero).

Discussion: Thalassemia is among the most widely distributed genetic disorders to cause a major public health problem. β -thalassemia major is a life-threatening condition characterized by severe anemia, hepatosplenomegaly, growth retardation, skeletal changes due to hypertrophy and expansion of erythroid marrow, susceptibility to infection, endocrine dysfunction and cardiac failure following iron deposition in the myocardium.

Conclusions: Knowing the prevalence of complication can help the dentists to do properly for these patients to solve their problems and improve knowledge of the parents about their children's dental health.

Keywords: Orofacial changes, major β -thalassemia, prominent maxilla.

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Introduction:

The thalassemias are a group of congenital disorders characterized by a deficient synthesis of either the α or β chains of globin in the hemoglobin molecule. As a result, the red blood cells are microcytic and hypochromic with an aberrant morphology. The homozygous type that is known as β -thalassemia major or Cooley's anemia is the most common monogenic disorder in the Mediterranean basin, the Middle East, Asia and the South Pacific⁽¹⁻³⁾.

β -thalassemia major is the most severe congenital hemolytic anemia. At 4 to 6 months of life, with the change from fetal $\alpha\gamma$ chain to adult $\alpha\beta$ chain hemoglobin production, the first clinical manifestations appear. The hematocrit decreases to less than 20, the degree of anemia can reach a hemoglobin level of 2 to 3 g/dl, and the hemolysis is extensive, as in the iron overload^(1,4). Growth and development in children is slow. In adolescence, secondary sex characteristics are delayed. The skin color becomes ashen-gray due to the combination of pallor, jaundice, and hemosiderosis. Patients also present cardiomegaly, hepatomegaly, and splenomegaly⁽⁵⁾.

Bimaxillary protrusion and other occlusal abnormalities are frequent in thalassemia major cases. Dental and facial abnormalities include spacing of teeth, open bite, prominent maxillary bones, and protrusion of maxilla and saddle nose. In addition, the pneumatization of the maxillary sinuses is delayed. Because of these skeletal changes, the upper lip is retracted, giving the person a "chipmunk" or "rodent face"⁽⁶⁾.

In β -thalassemia major, there is no correlation between the chronologic, skeletal and dental age. The skeletal retardation increases with age due to hypoxia from severe anemia, endocrine hypodysfunction secondary to iron deposition, or the toxic action of iron enzyme systems leading to tissue injury.

The oral mucosa is pale or lemon yellow color due to anemia and deposition of bilirubin pigment, then decrease lysis of red blood cells cause less deposition of bilirubin^(1,5).

Radiographic changes resulting from expansion of the marrow spaces in long bones include cortical

^a Oral and Maxillofacial Surgery Department, College Of Dentistry, Karbala University, Iraq. Email: muhaned80@yahoo.com

^b Oral Medicine, Oral and Maxillofacial Surgery Department, College Of Dentistry, Babylon University, Iraq. Email: ali_mihsen@yahoo.com

erosions, subcortical lucencies, rarefaction, enlarged nutrient foramina, and "raindrop" spaces within the cortex^(7,8). In the jaws, there is generalized rarefaction of alveolar bone, thinning of cortical bone, and a "chicken-wire" appearance of enlarged marrow spaces and coarse trabeculation. In some cases, the lamina dura may be thin, the roots of teeth short, and the premaxilla prominent⁽⁹⁾. In the skull, proliferation of the marrow may completely erode the cortex, leaving only periosteum, and produce a hair-on-end Holy-Karbala radiographic appearance⁽⁶⁾. In addition, pneumatization of the paranasal sinuses may be delayed, and the nasal cavity or the middle ear may be encroached upon to the point of occluding the anatomic spaces⁽⁷⁾.

The common orofacial features among patients with severe β -thalassemia include: frontal bossing, skeletal changes, characteristic chipmunk facies, upper lip retraction⁽¹⁰⁻¹²⁾, and various malocclusion stages due to bi-maxillary, alveolar bone expansion, skeletal and dental retardation. Marginal gingivitis which was mainly located at the level of lower frontal teeth due to malocclusion and poor oral hygiene^(12,13), poor oral hygiene and high caries risk were reported in many studies⁽¹³⁾. Iron deposition (hemosiderosis) all over the body has been reported; face (ashen-gray color)⁽¹⁰⁾, oral mucosa (bluish-black discoloration)⁽¹⁴⁾, teeth (yellowish-brown)⁽¹⁰⁾ and in parotid glands cause swelling and pain⁽¹⁵⁾, iron overload from blood transfusion and increased iron absorption will lead to fatal complications⁽¹⁶⁾.

There is higher tendency of glossitis (Depapillation) and candidiasis of the tongue due to chronic anemia, poor oral hygiene and other causes^(17,18). There is susceptibility to recurrent infections, overwhelming and severe infections especially in splenectomized patients⁽¹⁸⁾.

Materials and Methods:

Patients were selected from Thalassemia Center of Pediatric of Al-Hussaini Teaching Hospital in Holy-Karbala during the period from March to September, 2013. Forty (40) subjects were incorporated in this study, Informed consent and ethical approval was obtained. For each individual a questionnaire case sheet was filled out. All these patients with age range (4-15) years, (22 males, and 18 females). All these patients were without any other systemic diseases.

All these Thalassemic patients were previously diagnosed by hematologist specialists, and were selected according to: clinical features, hematological examination (Hb<9.5 g/dl, RBC morphology), and Hemoglobin electrophoresis. Intra and extra-oral examination for these patients to record all the orofacial manifestations or findings (oral ulcerations, gingivitis, bad odor (halitosis), dry mouth or xerostomia, candidacies infections, prominent maxilla, enlargement of salivary glands, angular stomatitis, and changes in oral mucosa).

Results:

The total numbers of patients with β -thalassemia major were (40). The percentages of orofacial abnormalities in patients with β -thalassemia major was as follow (Figure 1):

1. Prominent maxilla (85%), 34 out of 40 cases.
2. Oral ulcers (50%), 20 out of 40 cases.
3. Changes in oral mucosa (30%), 12 out of 40 cases.
4. Candidal infection (35%), 14 out of 40 cases.
5. Xerostomia (15%) 6 out of 40 cases.
6. Halitosis (80%), 32 out of 40 cases.

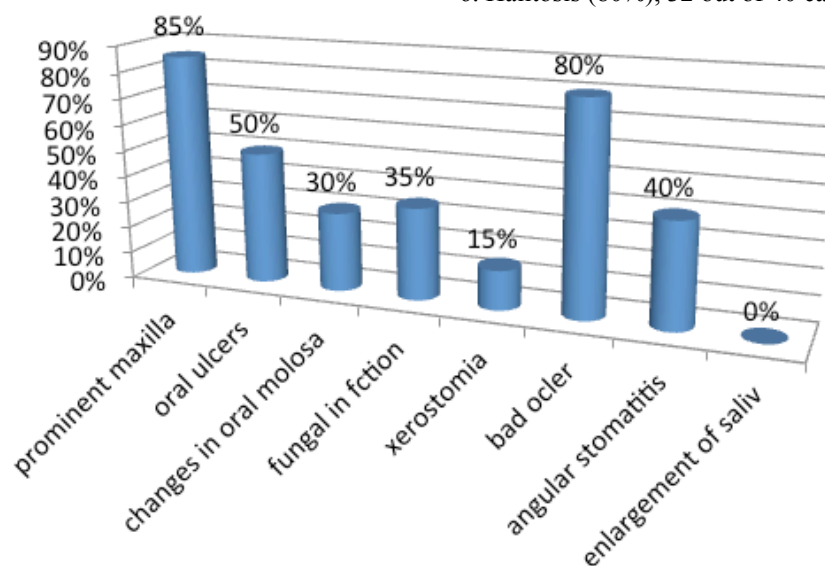


Figure 1: Distribution of orofacial abnormalities in patients with β -thalassemia major in the oral cavity

7. Angular stomatitis (40%), 16 out of 40 cases.

8. Enlargements of salivary glands (zero).

Discussion:

Thalassemia is among the most widely distributed genetic disorders to cause a major public health problem. β -thalassemia major is a life-threatening condition characterized by severe anemia, hepatosplenomegaly, growth retardation, skeletal changes due to hypertrophy and expansion of erythroid marrow, susceptibility to infection, endocrine dysfunction, and cardiac failure following iron deposition in the myocardium^(19,20). The clinical features of the disease are well documented^(14,15,21-23).

Forty thalassemic patients were studied, (22) males and (18) females, the age range (4-15) years. The incidence of thalassemia were more in males than females, these results were matched with [Mattia et al., 1996 and Al- Kaysi, 2002].

In this study, the most common oral findings or manifestations among thalasseemics maxillary prominence 85%, oral ulcers 50%, bad odors 80%, angular stomatitis 40%, change in oral mucosa 30%, candidial infection 35%, bad odors 10% and finally enlargement of salivary glands zero %.

Facial deformities such as maxillary prominence or expansion and protrusion of upper anterior teeth were observed 85% of the cases, as studies of [Caffey, 1957 and Baker, 1964]; we observe a close correlation between frequency and severity of bone changes and the severity of anemia. Patients with the mean low Hb. concentration have significantly higher and severe frontal bossing and facial deformities than those whose high or normal Hb concentration.

In our study, this was highly significant increase in maxillary prominence among beta-thalasseemic major patients.

In this study, most of the patients with β -thalassemia major were in the first or second decodes of life, which indicates a lack of life expectancy.

Alveolar expansion that causes maxillary prominence were observed in this study, significantly increasing with age and duration of the illness, due to gradual bulging of alveolar buccal bone overlying the upper central incisors with increasing age, these results were matched with findings of [Johnson and Kragman, 1964].

The incidence of oral ulcers, changes of oral mucosa, and angular stomatitis among thalasseemics were significantly higher than controls, the presence of these manifestations were multifactorial including: nutritional deficiency, folate, Vitamin-B complex

deficiencies. Rarely diabetes or staphylococcus, β . Hemolytic streptococcus. The majority of angular stomatitis cases were associated with candida albicans in thalasseemics⁽²⁷⁻²⁹⁾.

The incidence of candidial infection was significant among thalasseemic patients compared to controls, because they were prone to infection particularly opportunistic candidiasis, other factors as iron overloaded, these findings were matched with [Abbott and Galloway, 1986].

The severity of oral findings or abnormalities among thalasseemics of rural areas was higher than urban areas. This was because of: lower socio-economic status, difficult transplantation and difficulty of proper management in the rural areas unfortunately.

Dry mouth (Xerostomia) in thalasseemics found to increase with age and severity of oral findings, due to iron deposition, pain and swelling in the parotid glands of patients with thalasseemia major have been reported, possibly as a result of iron deposits in the serous cells, these findings were matched with [Hattab et al., 2001 and Goldfarb et al., 1983]. The presence of bad odors is due to bad oral hygiene.

Conclusions:

Thalassemia hemoglobinopathies produce a wide variety of signs, symptoms, and complications in those patients who inherit the diseases. The orofacial changes and bone deformities were common finding among severe β -thalasseemic patients.

Successful management of a patient with thalasseemia depends on a proper diagnosis and treatment plan that considers both the systemic and oral conditions. Regular and repeated blood-infusion preserving the hemoglobin amount in an appropriate level (at least 10g/dl), along with iron removal can prevent face and skull deformities. Therefore; skull and face deformities can be closely related to the patient's age, the intensity of anemia and the beginning time of treatment. Patients receiving inadequate blood transfusion in childhood will face more bone changes (expansion and deformity) in adolescence are cause of hyper activity of bone marrow to compensate anemia. Then early diagnosis and blood infusion cause less prevalence of complications.

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