

Evaluation of Salivary Immunoglobulin A, and Iron Ion in Relation to Dental Caries among Children with Beta Thalassemia Major (Karbala/Iraq) (Part One)

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ABSTRACT

Background: Beta Thalassemia Major is a hereditary disease, accompanied by many complications which may affect the oral health condition. The purpose of the present study was to assess the dental caries in relation to salivary immunoglobulin A, and iron concentration in saliva, among a group of boys and girls with beta thalassemia major in comparison with a control group.

Materials and methods: The study involved 40 children (boys and girls) with beta thalassemia major, aged 8-9 years compared to 40 healthy children with the same age and gender. dmfs/ds and DMFS/DS indices (WHO, 1987) were applied, unstimulated salivary samples were collected for estimation of Secretory Immunoglobulin A and iron ion in saliva.

Results: Caries-experience was higher among beta thalassemia children compared to healthy children. dmfs/ds and DMFS/DS mean values were higher in study group compared to control group, the differences were statistically not significant ($p > 0.05$), except dmfs/ds for girls the difference was statistically significant ($p < 0.05$). Secretory Immunoglobulin A level was higher in control group compared to study group, the difference was statistically not significant ($p > 0.05$). Iron ion concentration was higher in study group compared to control group, the difference was statistically not significant ($p > 0.05$). There was a negative statistically significant correlation ($p < 0.05$) between secretory immunoglobulin A level and dmfs/ds in study group. The correlation between iron ion concentrations and dental caries was positive and statistically not significant ($p > 0.05$).

Conclusion: Dental caries was higher in beta thalassemia major patients compared to normal children.

Key word: Beta Thalassemia Major, Salivary Immunological Parameters, Iron in Saliva.

INTRODUCTION

Thalassemias are a group of blood disorders caused by an inherited genetic defect that blocks the formation of hemoglobin, the type of hemoglobin in the red blood cells of healthy adults. Hemoglobin is formed by a combination of four proteins- two alpha proteins and two beta proteins- that enable red blood cells to carry oxygen to tissues⁽¹⁾. The studies regarding dental caries among patients with beta thalassemia were concluded that the prevalence and severity of this disease were higher among those patients than in normal subjects^(2,3).

There was no previous study concerned about the relation between salivary immunological components and oral health condition for children with beta thalassemia major. This is the first study in Iraq (Karbala city) that dealt with the correlation between some salivary immunological components (secretory immunoglobulin A) and oral health condition among children with beta thalassemia major.

MATERIALS AND METHODS

The study group included 23 girls and 17 boys, with an age range of 8-9 years. They were already diagnosed with β -thalassemia major, attending

the thalassemia centre in Al-Hussein medical city (Karblaa city). The control group included 40 children matching in age and genders with the study group; they were examined from primary schools of Karblaa city. Prior to clinical examination, collection of unstimulated saliva samples from both study and control group were done⁽⁴⁾. Caries-experience measured according to dmfs/ DMFS indices⁽⁵⁾. Secretary I-gA was analyzed by ELISA kit, and iron ion was analyzed chemically by (mindray BS-120, Apple 303; Japan). Statistical analyses were achieved by using statistical package for social science (SPSS), version 19. Descriptive statistics (Median, Mean, Standard Deviations, Minimum and Maximum Values, and Statistical tables), and Inferential statistics (Mann-Whitney U- test, and Spearman's correlation coefficient) were applied. The Probability value was accepted at 95% ($p < 0.05$).

RESULTS

Clinical examination showed that both groups were affected by dental caries. Caries-experience was higher among study group. Median, means and standard deviations of decay fractions in primary (ds) and permanent teeth (DS) for study and control groups are represented in tables (1) and (2). Secretary IgA mean values were higher in control group (333.11 ± 241.31) than in study group (330.80 ± 220.77) with statistically not significant differences ($p > 0.05$). Iron mean values were higher in study group (19.47 ± 10.24) than in control group (15.80 ± 9.87) with statistically not significant differences ($p > 0.05$). Tables (3) and (4) illustrate the results of correlation coefficient between S-IgA and iron ion with decay fractions of primary and permanent teeth.

Table 1: Caries-experience of primary teeth according to decay fractions (ds) among study and control groups

Variable	Gender	N O.	Study group			Control group			Z-test	p-value
			Median	Mean	S.D \pm	Median	Mean	\pm S.D.		
ds	Boys	17	7	9.94	8.54	9	7.65	4.33	-0.32	0.74
	Girls	23	7	8.17	4.26	3	5.87	6.02	-2.22	0.02*
	Total	40	7	8.93	6.40	5	6.63	5.38	-1.68	0.09

* Significant at the level $p < 0.05$

Table 2: Caries- experience of permanent teeth according to decay fractions (DS) among study and control groups

Variable	Gender	N O.	Study group			Control group			Z-test	p-value
			Median	Mean	S.D \pm	Median	Mean	\pm S.D.		
Ds	Boys	17	1	0.65	1.32	0	0.59	0.62	-1.17	0.23
	Girls	23	0	0.61	1.20	0	0.57	0.84	-0.39	0.69

	Total	40	0	0.63	1.23	0	0.58	0.75	-1.06	0.28
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Table 3: Correlation coefficients between salivary parameters and decay fraction of primary teeth(ds) in study and control group

Variables	ds			
	Study group		Control group	
	r	p	r	p
S-IgA($\mu\text{g/ml}$)	-0.35	0.02*	0.28	0.07
Fe(ng/ml)	0.03	0.85	0.04	0.79

* Significant at the level $p < 0.05$

Table 4: Correlation coefficients between salivary parameters and decay fraction of permanent teeth(DS) in study and control group

Variables	DS			
	Study group		Control group	
	r	p	r	p
S-IgA($\mu\text{g/ml}$)	0.11	0.49	0.01	0.92
Fe(ng/ml)	0.21	0.19	0.01	0.93

DISCUSSION

For both dentition, caries-experience as measured by dmfs/DMFS index was higher in the study group compared to the control group, the differences for dmfs/ds were statistically not significant for boys, but significant for girls; the differences for DMFS/Ds were not significant for both boys and girls. This may indicate a higher severity of dental caries among study group compared to control group; The same results were recorded by other authors^(1,2,6). This may be explained on the basis of chronic nature of thalassemia. Patients preoccupied with their main, life threatening problem, neglected basic preventive dental care⁽⁷⁾. Another reason could be because of the increased sensitivity to local factors: oral hygiene program, tooth brushing habit and frequency of sugar intake⁽⁸⁾. The present study showed that the S-IgA level was higher in control group compared to study group and the differences were statistically not significant. The same result was recorded by other authors⁽⁹⁾. There was a negative correlation between S-IgA and dmfs/s for study group, with statistically significant differences. This result in agreement with other authors⁽¹⁰⁾. This result can explained by that the higher accounts of salivary mutans streptococci may be related to the lower S-IgA levels in saliva of patients with thalassemia major, that may lead to increased in dental caries as a sequence of increased microbial proliferation for those patients⁽⁹⁾. Secretory IgA was positively correlated with DMFS/DS with statistically not significant differences for study group and the same result was found with dmfs/ds and DMFS/DS for control group. The increased of S-IgA level with an increased dental caries was to give protective mechanism against dental caries and the Streptococcus mutans which are active in caries-active mouth, the S-IgA antibodies can play an important role in control of dental caries⁽¹¹⁾. Iron ion was higher in study group compared to control group, with statistically not significant. This result agree with other authors^(12,13), The correlation between iron ion and dental caries of study and control groups was positive for both primary and permanent teeth with statistically not significant differences, this result disagreement with other author⁽¹⁴⁾, (used stimulated saliva

and iron was analyzed by colorimetric method) . More iron levels in saliva provide an essential factor for bacterial growth and metabolism (for both gram positive and gram negative bacteria) ^(15,16) .

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الخلاصة:

المقدمة: يعتبر فقر دم البحر الابيض المتوسط النوع الكبير أحد الأمراض الوراثية و غالبا ما يكون مصحوبا بالعديد من المضاعفات التي قد تؤثر على حالة الفم الصحية.

اهداف الدراسة: تهدف هذه الدراسة الى حساب شدة تسوس الأسنان و علاقتهم مع بعض مكونات اللعاب المناعية (S-IgA) وتركيز عنصر الحديد في اللعاب غير المحفز عند مجموعة من الاطفال الذكور والإناث المصابين بمرض فقر دم البحر الابيض المتوسط النوع الكبير بالمقارنة مع مجموعة ضابطة.

المواد و طرق العمل: شملت الدراسة 40 طفلا من كلا الجنسين مصابين بفقر دم البحر المتوسط النوع الكبير تتراوح اعمارهم ما بين (8-9) سنوات بالمقارنة مع 40 من الاطفال الاصحاء ومن نفس الجنس و الفئة العمرية. تم قياس حدة تسوس الاسنان حسب مؤشر (تسوس, قلع حشوه) (DMFS, dmfs) لمنظمة الصحة العالمية (1987). تم جمع اللعاب غير المحفز تحت ظروف موحده لقياس مستوى بعض مكونات اللعاب المناعية مثل (S-IgA) وتركيز عنصر الحديد في اللعاب. **النتائج** اظهرت النتائج نسبة تسوس الاسنان اللبنية والدائمة كانت اعلى لدى مجموعة الدراسة مقارنة بالمجموعة الضابطة مع عدم وجود فروقات معنوية ($p > 0.05$). ماعدا تسوس الاسنان اللبنية بين الاناث اذ وجد فرق معنوي ($p < 0.05$). مستوى ال (S-IgA) كان اعلى لدى المجموعة الضابطة مقارنة بمجموعة الدراسة مع عدم وجود فرق معنوي ($p > 0.05$). تركيز عنصر الحديد في اللعاب كان اعلى لدى مجموعة الدراسة مقارنة بالمجموعة الضابطة مع عدم وجود فرق معنوي ($p > 0.05$). اظهرت النتائج وجود علاقة سلبية بين ال (S-IgA) وتسوس الاسنان اللبنية لدى مجموعة الدراسة مع وجود فرق معنوي ($p < 0.05$). العلاقة بين عنصر الحديد وتسوس الاسنان اللبنية والدائمة كانت ايجابية مع عدم وجود فروقات معنوية ($p > 0.05$) لكلا المجموعتين.

الاستنتاج وجد ان تسوس الأسنان كان اعلى لدى مجموعة الدراسة من اقرانهم في المجموعة الضابطة. **كلمات مفتاحية:** فقر دم البحر المتوسط النوع الكبير مكونات اللعاب المناعية (S-IgA) ، عنصر الحديد في اللعاب.