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Dental Caries experience of Thalassemia Versus Healthy Individuals in Mosul City

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ABSTRACT

Aim of the Study: The aim of the study wasto evaluate thedental caries experience of individuals with thalassemiain comparisonwith healthy individuals.

Materials and Methods: The samples consisted of (802) individuals, (401) for thalassemia patients and (401) for control(healthy) sample,the ages of the sample were divided into 6 age groups, these age groups for thalassemia and control sample ranged from (5-≥30), were matched inage,gender and numbers for bothsamples. In our study dental caries wasassessed by using of the DMFT index (Decayed, Missing, Filled, teeth) for WHO (2013) [1].

Results: Dental caries was increasing with increasing age for booth healthy and thalassemic individuals, thalassemia patients have dental caries experience was worse compared to healthy with significant difference. There was no significantdifference in dental caries experience between male and female thalassemia individuals.

Key words: Thalassemia, Healthy, DMFT.

INTRODUCTION

Thalassemia is a major public health problem worldwide, this disease characterized by having a blood disorder, which effects on the formation ofhemoglobin, were abnormal form of hemoglobin is synthesized[2].Thalassemia is an inherited genetic abnormality that affects the synthesis of α- or β- globin chains and consequently normal erythropoiesis and the oxygen- carrying capacity of blood by hemoglobin. This condition is inherited as an autosomal recessive disorder and it can be classified into two main types, α- and β- thalassemia [3],the individuals suffering from the disease are characterized by having hypochromic microcytic anemia and excessive destruction of red blood cells, the body doesn't have enough normal healthy red blood cells and results into anemia[4].The manifestations of thalassemia are modulated by several racial, genetic, and environmental factors, there are geographical variations in dental awareness of the oro-facial manifestations, all these factors effect on the experience in treating patients with this condition[5].

Oral health status of thalassemia patients in Mosul are scarce, so this study was performed to evaluate dental caries experience of these patients which affect general, oral health and quality of life.

MATERIALS AND METHODS

Sample Selection

The study sample consisted from individuals who attended regularly tothalassemia center for routine monthly check ups and blood transfusion as patients andthe controls were selected from different primary, intermediate, secondary schools and those attending to the collage of dentistry for dental treatment, all individualsexamined were residing in Mosul city.

Criteria for Selection of the Sample
Inclusion and Exclusion Criteria were:

1. Age group between 5 to40 years.
2. patients who were diagnosed previously for β-thalassemia (available in appropriatenumber in thalassemia center) .
3. The controls are free of thalassemia andother systemic diseasethat may have influence on dental caries disease such as diabetes were excluded .
4. Matching in age and gender for cases & controls[6].

Data regarding name, age, gender of all the patients were recorded on a specially designed case sheet.

The teeth examined by using the DMFT index (Decayed, Missing, Filled, teeth) the Oral Health Survey of the WHO, (2013)[1] was used to assess the dental caries experience.

Information concerning decayed, missing and filled teeth index was calculated as

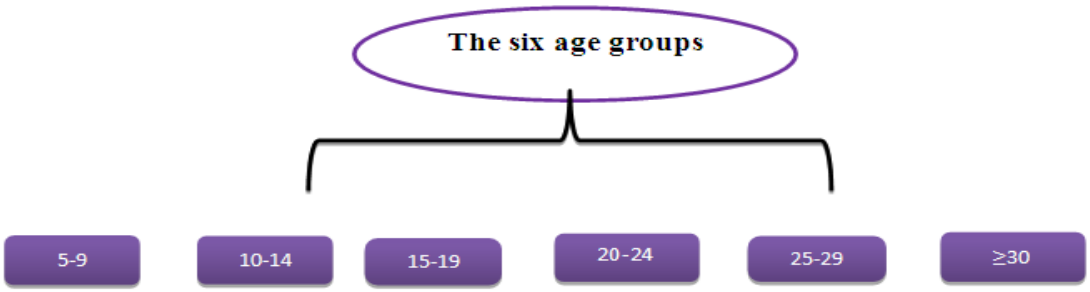
D: Includes all teeth with code 1+2,M: Includes all teeth with code 4 for under 30 years and 4+ 5 for over 30 years and finally F: Includes all teeth with code 3.

Statistical Analysis
Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 19).

RESULTS

Distribution of Sample by Age andGender

The sample consisted of (802) individuals,(401) for thalassemia patients and (401) for control(healthy) sample , the sample was divided into 6 age groups namely (5-9),(10-14),(15-19),(20-24),(25-29)≥30 years.



(Table1) displays mean DMFT values and it is component for the total sample dental caries experience had a range between (2.533) for the smallest age group female and (11.857)for the female of the ≥30 years old for thalassemia, while for healthy group dental caries ranged between(0.520)for the smallest age group male and(10.429)for the females of the ≥30 years.

Table1: Mean DMFT ±SD and it is Components for the Total Sample

Ag	gender	Mean(D±SD)		Mean(M±SD)		Mean(F+SD)		Mean(DMFT±SD)	
		Th	H	Th	H	Th	H	Th	H
5-9	M	3.187±3.92	0.493±1.13	0.040 ±0.35	0.00 ±0.0	0.00 ±0.0	0.0267±0.23	3.227±3.33	0.520±1.14
	F	2.453 ±2.59	1.160±1.59	0.0533±0.22	0.0533±0.28	0.0267±0.23	0.040 ±0.197	2.533±2.65	1.253 ±1.69
10-14	M	5.220±3.93	1.136±1.65	0.322±1.75	0.0 ±0.0	0.1695±1.18	0.2373±±1.33	5.712±4.96	1.373±2.02
	F	6.515±3.76	2.206±1.72	0.2794±0.65	0.1029±0.74	0.2941 ±1.05	0.2206±0.59	7.088±4.52	2.529±1.92
15-19	M	9.659±3.91	4.268±3.42	0.6585±1.19	0.1707 ±0.38	1.1463 ±2.83	0.4878±0.98	11.463±5.39	4.927 ±3.65
	F	8.538±4.12	5.769±2.98	0.2308 ±0.81	0.2692 ±1.19	1.0385±2.78	0.1538±0.37	9.808 ±5.49	6.192±3.18
20-24	M	10.556±4.55	4.778 ±3.71	0.4444±0.73	0.2222±0.44	0.5556±0.88	0.7778±1.30	11.556±4.93	5.778±3.73
	F	8.864±5.73	5.682±3.75	0.2273±0.75	0.3636±0.58	0.7273 ±1.48	2.00±2.05	9.818 ±5.65	8.045 ±3.76
25-29	M	8.571±2.22	4.500±2.73	0.8571 ±0.89	0.0±0.0	0.4286 ±0.79	0.6667± 1.63	9.857±2.73	5.167 ±3.31
	F	7.833 ±3.60	4.833±4.36	0.6667±1.03	0.16670.41	0.1667±0.41	1.666±2.887	8.667 ±4.13	6.667±4.27
≥30	M	9.000 ±3.52	7.000±2.71	2.6667 ±5.61	1.00 0.82	0.1667±0.41	1.00 ±1.0	11.833±7.35	9.00 ±2.58
	F	6.714±3.09	6.286±3.04	3.1429±3.43	1.2857±1.11	2.00±4.04	2.8571±2.34	11.857±3.72	10.429±2.64
General Total		5.7107	2.45114	0.3367	0.12968	0.3641	0.37406	6.4115	2.9551
Total M		5.8384	2.0201	0.3788	0.0808	0.3333	0.3081	6.5505	2.3990
Total F		5.5862	2.8818	0.2956	0.1773	0.3941	0.4384	6.2759	3.4975

M:male,F:female,Th:Thalasemia,H:Healthy, D:Decay, M:Missing, F:filling

(Table2) display the difference in mean of D between both samples thalassemia and healthy for male and female within the same age group shows significant difference only between the same gender of thalassemia and healthy sample for(5-9),(10-14) age groups and no significant difference for the remaining age groups, also a significant difference between the total samples and for total male and total female between both samples was observed, as the decayed component was larger in the thalassemia group regardless of gender.

The difference in mean of M between both samples for male and female within the same age group shows significant difference between male of thalassemia and male of healthy sample for (5-9),(10-14),(15-19),(25-29) age groups and female of thalassemia and female of healthy for(10-14), ≥30 age groups and no significant difference for the remaining age groups, the difference between total samples and between total male and total female between both samples for M was significant difference as thalassemia individuals tended to have more teeth extracted due to caries.

F component in the sample was scarce, the difference in mean of F between both samples for male and female within the same age groups shows significant difference only between the same gender of thalassemia and healthy sample for (15-19) age group and between female of thalassemia and female of healthy sample of (20-24)age group ,between male of thalassemia and male of healthy sample for(25-29) age group, no significant difference for the remaining age groups , the difference between total samples and between total male and total female between both samples for F no significant difference.

Mean DMFT values were greater in thalassemia individuals compared to healthy with a highly significant difference with in the small age groups (5-9)and(10-14)years for both gender and significant in the male of age group (15-19)years old and although caries experience was higher in thalassemia groups , no significant difference was apparent in other groups, a highly significant difference existed for the total mean DMFT for the sample and total males and females.

Table2: Mean DMFT and it is component for the Total Sample (According to Disease)

Age	Gender	D				M				F				DMFT			
		Th	H	T-value	Sig	Th	H	t-value	Sig	Th	H	t-value	Sig	Th	H	t-value	Sig
5-9	M	3.187	0.493	6.703	0.00**	0.040	0.00	1.0	0.044*	0.00	0.0267	-1.0	0.44	3.227	0.520	6.656	0.00**
	F	2.453	1.160	3.682	0.000**	0.0533	0.0533	0	0.970	0.0267	0.040	-0.380	0.470	2.533	1.253	3.527	0.002**
10-14	M	5.220	1.136	7.343	0.000**	0.322	0.0	1.416	0.006**	0.1695	0.2373	0.293	0.602	5.712	1.373	6.226	0.000**
	F	6.515	**2.206**	8.447	0.000**	0.2794	0.1029	1.467	0.017	0.2941	0.2206	0.502	0.250	7.088	2.529	7.527	0.000**
15-19	M	9.659	4.268	6.632	0.266	0.6585	0.1707	2.488	0.000**	1.1463	0.4878	1.407	0.003**	11.463	4.927	6.422	0.04*
	F	8.538	5.769	2.775	0.248	0.2308	0.2692	-0.136	0.725	1.0385	0.1538	1.610	0.004**	9.808	6.192	2.909	0.245
20-24	M	10.556	4.778	2.952	0.415	0.4444	0.2222	0.784	0.111	0.5556	0.7778	-0.424	0.717	11.556	5.778	2.804	0.365
	F	8.864	5.682	2.181	0.172	0.2273	0.3636	-0.673	0.573	0.7273	2.00	-2.360	0.019*	9.818	8.045	1.226	0.260
25-29	M	8.571	4.500	3.322	0.363	0.8571	0.0	2.521	0.001**	0.4286	0.6667	-0.033	0.014*	9.857	5.167	2.834	0.644
	F	7.833	4.833	1.165	0.583	0.6667	0.166	0.307	0.332	0.1667	1.666	-0.958	0.080*	8.667	6.667	0.892	0.90
≥30	M	9.000	7.000	0.781	0.098	2.6667	1.00	0.793	0.065	0.1667	1.00	-1.746	0.294	11.833	9.00	0.737	0.139
	F	6.714	6.286	0.261	0.752	3.1429	1.2857	1.360	0.001**	2.00	2.8571	-4.86	0.553	11.857	10.429	0.830	0.798
General Total		5.7107	2.45114	12.165	0.00**	0.3367	0.12968	2.970	0.00**	0.3641	0.37406	0.106	0.830	6.4115	2.9551	10.758	0.000**
Total Male		5.8384	2.0201	10.038	0.000**	0.3788	0.0808	2.808	0.0**	0.3333	0.3081	0.299	0.503	6.5505	2.3990	8.981	0.000**
Total Female		5.5862	2.8818	7.222	0.000**	0.2956	0.1773	1.252	0.021*	0.3941	0.4384	-0.369	0.740	6.2759	3.4975	6.250	0.000**

M:male,F:female,Th:Thalasemia,H:Healthy, D:Decay, M:Missing, F:filling
T-Test*significant differences at p≤ 0.05,**highly significant difference

Table 3: Difference of DMFT and it is Components Between Total Age Groups for Healthy and Thalassemia Samples

Age	Mean D		Mean M		Mean F		Mean DMFT	
	Thalassemia	Healthy	Thalassemia	Healthy	Thalassemia	Healthy	Thalassemia	Healthy
5-9	2.8200(c)	0.8267 (c)	0.0467(c)	0.0267 (b)	0.0133(c)	0.0333 (c)	2.880 (d)	0.8867 (d)
10-14	5.9134 (b)	1.7087 (c)	0.2992(bc)	0.0551(b)	0.2362 (c)	0.2283(c)	6.449 (c)	1.9921 (d)
15-19	9.2239 (a)	4.8507 (b)	0.4925(bc)	0.2090 (b)	1.1045 (ab)	0.3582 (c)	10.821 (ab)	5.4179 (c)
20-24	9.3548 (a)	5.4194 (b)	0.2903 (bc)	0.3226 (b)	0.6774 (abc)	1.6452 (ab)	10.323 (ab)	7.3871 (b)
25-29	8.2308 (a)	4.6667 (b)	0.7692 (b)	0.0833 (b)	0.3077 (bc)	1.1667 (b)	9.308 (b)	5.9167 (c)
30≥	7.7692 (ab)	6.6429 (a)	2.9231 (a)	1.1429 (a)	1.1538 (a)	1.9286 (a)	11.846 (a)	9.7143 (a)

Duncan's multiple Range Test.

-Small later between brackets compare between totals for each age groups for thalassemia and healthy sample (vertical)

(Table 3)demonstrates the dental caries experience expressed in mean DMFT and it is component s for the total age groups for both healthy and thalassemia individuals, mean DMFT appeared to be increasing with increasing age for both healthy and thalassemia individuals with significant difference,there was slight decline in (25-29)years old ,age group that later increased in 30 and over for both groups with a statistically significant difference,little difference existed in the M, F component for the DMFT between thalassemia and healthy individual, the D component contributed to the largest proportion of the DMFT values for both healthy and thalassemia sample, for thalassemia group the decayed component was increasing with significant difference until age groups (20-24),(25-29)years no significant difference was observed**.** For healthy individuals no significant difference was found in D component between groups (5-9),(10-14)years and alsobetween age groups (15-19),(20-24)and (25-29),but later D component increasing for agegroup30years and over with significant difference**.**

Table 4: Difference of Mean DMFT for Total Sample (According to Gender)

Age	G	D				M				F				DMF			
		M	F	T-v	Sig	M	F	T-V	Sig	M	F	T value	Sig	M	F	T value	Sig
5-9	Th	3.1867	2.4533	1.516	0.197	0.0400	0.0533	-0.279	0.628	0.0	0.0267	-1.0	0.044	3.2267	2.5333	1.410	0.185
	H	0.493	1.160	-2.953	0.001	0.0	0.0533	-1.652	0.001*	0.0267	0.040	-0.380	0.470	0.520	1.253	-3.118	0.001**
10-14	Th	5.2203	6.5147	-1.892	0.423	0.3220	0.2794	0.186	8	0.1695	0.2941	-0.630	0.293	5.7119	7.0882	-1.636	0.315
	H	1.136	2.206	-3.554	0.756	0.0	0.1029	-1.074	0.032*	0.2373	0.2206	0.093	0.686	1.373	2.529	-3.301	0.778
15-19	Th	9.659	8.538	1.118	0.833	0.6585	0.2308	1.601	0.005*	1.1463	1.0385	0.153	0.718	11.463	9.808	1.216	0.507
	H	4.268	5.769	-1.834	0.501	0.1707	0.2692	-0.495	0.223	0.4878	0.1538	1.665	0.001*	4.927	6.192	-1.453	0.479
20-24	Th	10.556	8.864	0.788	0.762	0.444	0.2273	0.737	0.427	0.5556	0.727	-0.322	0.085	11.556	9.818	0.805	0.982
	H	4.778	5.682	-0.612	0.950	0.22	0.3636	-0.655	0.175	0.7778	2.00	-1.651	0.038*	5.778	8.045	-1.527	0.967
25-29	Th	8.571	7.833	0.453	0.231	0.8571	0.6667	0.356	0.492	0.4286	0.1667	0.732	0.127	9.857	8.667	0.622	0.197
	H	4.500	4.833	-0.777	0.258	0.0	0.1667	-1.593	0.001**	0.6667	1.666	0.727	0.061	5.167	6.667	-0.523	0.514
30≥	Th	9.00	6.714	1.247	0.550	2.6667	3.1429	-0.188	0.621	1.667	2.00	-1.099	0.085	11.833	11.857	-0.008	0.219
	H	7.00	6.286	0.464	0.612	1.00	1.285	-0.548	0.280	1.00	2.857	-1.931	0.042*	9.00	10.429	-1.024	0.771
Total		3.9242	4.2340	01.061	0.211	0.2298	0.2365	-0.078	0.975	0.3201	0.4163	-0.998	0.124	4.4747	4.8867	-1.190	0.277
Total TH		5.8384	5.5862	0.0543	0.513	0.3788	0.2956	0.0650	0.192	0. 3333	0.3941	-0.403	0.587	6.5505	6.2759	0.508	0.282
Total H		2.0201	2. 8818	-2.981	0.714	0.0808	0.1773	-1.745	0.001**	0.3081	0.4384	-1.159	0.051	2.3990	3.4975	-3.189	0.382

M:male,F:female,Th:Thalasemia,H:Healthy, D:Decay, M:Missing, F:filling
T-Test*significant differences at p≤ 0.05,**highly significant difference at p≤ 0.01

(Table 4)display no significant difference in general ,no significant difference was found in mean DMFT values according to the gender for all age groups for both healthy and thalassemia group , but a highly significant difference was observed for total healthy for M component ,as female tended to have a higher mean DMFT for total sample compared to total males.

DISCUSSION

The patients with beta thalassemia individuals had higher mean for DMFT than healthy specially for D component for all age groups with significant difference , as seen in (table1,2),Thalassemia patients complain from poor oral health and worse dental caries experience because of the chronic nature of the disease and so the patients and their parents might focus on the medical procedures required to overcome this disease during early childhood neglect the basic preventive dental care[7]. Studies that is in agreement with this studyshowed that thalassemia patients with high mean DMFT than healthy subjects[8,9,10,12].this study disagrees with other studies that showed mean DMFT similar in both healthy and thalassemia groups[11,13].

The study also revealed that the decayed component of the DMFT score had the greatest value with significant difference when compared to missing and filled teeth in the index . Increased prevalence and severity of dental caries among thalassemia patients may be attributed to poor oral cleanliness, related to certain oral structural changes that take place in patients with thalassemia which appear as maxillary enlargementthat results in protrusion of anterior teeth, increase space between teeth, over-bite or open-bite and varying degrees of malocclusion, which aid in more plaque accumulation [13].

There was a dramatic increase in mean of DMFT and it is components with advancing age for both healthy and thalassemia individuals with a statically significant age difference as seen in (table 3) , this is attributed to the irreversibility accumulative and chronic nature of dental caries[14],then at the age group (25-29)years there was a decline for both individuals ,that later increased in age group of 30 years and over , this might be attributed to the united nations economic sanction impose on Iraq in the year of 1990 , sugar consumption decreased from 50kg person /year to very limited quantities , after 1995 there was a slight increase in the sugar available for each individuals due to the united nation oil for food program ,so that Iraqi had an annual consumption of 16.28kg/ person /year ,that increased after 2003 to larger values[15],so that healthy and thalassemia individuals at this period had lower mean DMFT compared with the 30 years and over that was exposed to larger quantities of sugar before the embargo.

In this study gender had less effect on dental caries experience as see in (table4),with no significant difference in mean DMFT between male and female between both samples except for the difference in totals,This in agreement with other studies [9,6],that show total males and females of thalassemia demonstrated higher DMFT compared to control ,in these studies gender has no effect on dental caries at $P > 0.05$.

The mean for DMFT and it is component was higher in female as (4.8867) than male as (4.4747) for the total sample. the same for healthy individuals ,this might be attributed to the fact that teeth in females erupt earlier than males, thus exposed more to oral environment[16,17],morphological differences between teeth of males and females, increased fondness toward sweets among girls and hormonal change[18]unlike thalassemia patients that show high mean for DMFT and it is component for males was(6.5505)than females (6.2759),this might be attributed to poor oral hygiene, poor motivation, malocclusion, and anomalies in dental and oral skeletal structures which was more in male of thalassemia than female, all these factors associated with increase dental plaque, the main etiological factor for increase dental caries[19],this in agreement withanotherstudy[20],who found that dental caries was 90% of thalassemia males and 60% of thalassemia females .

CONCLUSIONS

Within the limits of this study, dental caries experience of thalassemiapatients had a worse condition compared with the normal,There was a significant age difference for both samples , but no gender difference in dental caries experience for both samples.Dental caries is a preventable if we intervene at early stages, so more focus on preventive programs for thalassemia patients should be considered and also treating at the early stages of the disease to prevent further complications.

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