A comparative study in dental caries prevalence and treatment needs of pregnant women and single females in Mosul City, Iraq

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ABSTRACT

An epidemiological study was carried out to compare the prevalence of dental caries and treatment need of pregnant women and single females in Mosul City, Iraq.

A total sample of 666 women (399 pregnant women and 267 single females) selected randomly. Pregnant women were selected from four health care centers, when attending to periodic maternal check up with different stages of pregnancy in Maternal and Child Health Care Center. Single females were selected randomly as control group to compare with pregnant group from health centers. Each group subdivided into 4 subgroups according to the age.

Caries experience and the treatment need were diagnosed and recorded according to the criteria suggested by WHO (1997).

The results showed a significant difference in the mean Decayed, Missing and Filled Surfaces (DMFS) between pregnant and single females, and the prevalence of dental caries increase with advanced age. The mean DMFS value for pregnant women is 28.78 and for single females 19.09. The study demonstrated that the decay surface component was formed more than the half of DMFS value.

Educational programmes to pregnant women through medical and dental centers as well as mass media are suggested to increase the dental awareness and preventive behaviour.

الخلاصة

تـم إجـراء دراسـة وبائيـة لمقارنـة انتشـار تسـوس الأسـنان والحاجـات العلاجيـة للنسـاء الحوامـل وغيـر المتزوجات في مدينة الموصل، العراق.

اختيـرت عينـة عشـوائية مكونـة مـن ٦٦٦ امـرأة (٣٩٩ حامـل و٢٦٧ غيـر متزوجـة) مـن أربـع مراكـز صـحية عنـد زيـارتهن الدوريـة لمركـز رعايـة الأمومـة والطفولة لغرض الفحص وفي مراحل مختلفة من الحمل؛ بينما اختيرت النساء غير المتزوجات عشوائياً كمجموعة سيطرة لمقارنتها مـع مجموعـة الحوامـل. وتم تقسيم كـل مجموعة إلى ٤ مجاميع فرعية اعتماداً على العمر.

تم تشـخيص وتسـجيل تسـوس الأسنان والحاجـات العلاجيـة وفقـاً لمعـايير منظمـة الصـحة العالميـة لعـام ١٩٩٧.

أظهـرت النتـائج اختلافـاً معنويـاً فـي قيمـة (DMFS) بين النسـاء الحوامل وغير المتزوجات، كمـا لوحظ ازدياد نسبة تسوس الأسنان مع تقدم العمر. وكان معدل تسوس أسطح الأسنان (DMFS) للنساء الحوامل ٢٨.٧٨ ولغيـر المتزوجـات ١٩.٠٩. كمـا بينـت نتـائج الدراسة أن قيمة تسوس أسطح الأسنان شكلت أكثر من نصف قيمة (DMFS) الكلية.

لذا يُنصَح بتطبيق البرامج التثقيفية للنساء الحوامل عبر المراكـز الصـحية والمتخصصـة في طب الأسنان بالإضافة إلى الوسائل الإعلامية لزيادة الوعي والسلوك الوقائي فيما يختص بالأسنان.

INTRODUCTION

Oral health is important to general health because of the fact that stomatologic disease affects more than the mouth.[1] The mouth contains a number of different tissues; among them, the teeth and the periodontal structures which represent two specialized tissues that account for a great importance among mouth conditions, since dental caries and periodontal disease spread widely that almost everybody in the world, particularly every adult has either one or both of these conditions.[2, 3]

Oral environment could show certain changes in women. In regard to the genetic and hormonal differences existing between women and men, these alterations could reflect the probable hormonal influences during life stages of women from childhood through adulthood including menstruation, pregnancy, menopause and the post–menopause period.[4]

There are many myths about dental health and pregnancy. Although there are a lot to think about, during this time, oral health is important during pregnancy and should not be neglected. Therefore, pregnant women may be considered as patients with temporary but higher than normal risk of developing periodontal complication.[5]

Pregnancy may be accompanied by an increased dental caries incidence. There is much diversity of opinions on this subject. There is a popular belief that the mother loses "a tooth for every child" and that caries incidence or progress of existing lesion increases during pregnancy or that calcium is withdrawn from the maternal dentition to supply fetal requirements "soft teeth".[6, 7]

In Iraq, there are no many longitudinal and cross–sectional studies concerning dental health. It is of importance to achieve such studies in order to plan preventive and dental health educational programs to such a community.

So it is decided to carry out a study to evaluate the dental caries prevalence in pregnant women and compare it with single females in Mosul City.

MATERIALS AND METHODS

Three hundred ninety nine (399) pregnant women were included in this study, with an age range of 18–39 years old. They were attending to the Maternal and Child Health Care Center (MCHCC) for their monthly periodic checkup with different pregnancy stages, and 267 single females were also included in this study. They were selected randomly from health center with the same age range to represent comparison group.

There are 16 MCHCCs for pregnant women in the center of Mosul City. The sample of the study was randomly selected from four MCHCCs.

The examination was performed in a suitable room under standardized condition following the recommendation of WHO (1997).[8] Subjects were examined by seating on a portable chair fixed with an adjustable headrest.

Caries experience and the treatment need were diagnosed and recorded according to the criteria suggested by WHO (1997).[8] The examination of dental caries was carried out using plane mouth mirror and sharp probe. The Decayed, Missing and Filled Surfaces (DMFS) index was used to assess the decayed, missing and filled surfaces. Each decayed surface of tooth takes one point, also each filled surface of tooth takes one point; while for missing tooth, the tooth takes four points as a realistic average for missing surfaces.[9] The D, M, F surfaces were added to obtain and calculate the DMFS component for women. Immediately after the status of a tooth is recorded and before proceeding to the next tooth or tooth space, the type of treatment required, if any, was recorded.

The statistical analyses of the data include: Classification of data and calculation of frequency and percentage; calculation of the mean and standard error of DMFS and its components; F–test was used to determine the significant differen-ces in the mean DMFS between pregnant and single groups according to age and for the total sample; One–way analysis of variance (ANOVA) and Duncan's Multi-ple Range Test have been used

to compare the differences among the age groups.

The differences were considered significant (S) when the probability (p) was less than 5% level, and when the probability (p) was more than 5% it was regarded as non–significant (NS).

RESULTS

Table (1) shows the distribution of the sample by age group for pregnant women and single females.

Table (2) shows the mean DMFS score for both pregnant and single females according to age group distribution. The results revealed that the mean DMFS score increased with the age for both pregnant and single females. This age difference was found to be statistically significant between age in pregnant women and also in single females except between the age group 25–29 years and 30–34 years which were statistically not significant. The pregnant women reported higher mean DMFS than the single females in all age groups and for the total sample and there were highly significant differences between pregnant and single females.

Table (1): Distribution of the sample by age groups

Age	Pregnant Women		Single Females	
	No.	%	No.	%
18 – 24	99	24.80	90	33.10
25 – 29	103	25.80	67	25.10
30 – 34	97	24.30	68	25.50
35 – 39	100	25.10	42	15.70
Total	399	100.00	267	100.00

Table (2): Mean of DMFS ($\pm$ SE) by age for both pregnant and single females

Age Group	DMFS (Pregnant)	DMFS (Single)	F–test	p	Significance
	Mean $\pm$ SE*	Mean $\pm$ SE*			
18 – 24	20.02 ± 0.77 [A]	14.17 ± 1.01 [A]	21.53	< 0.001	S
25 – 29	26.33 ± 0.90 [B]	19.19 ± 1.01 [B]	26.17	< 0.001	S
30 – 34	30.79 ± 1.08 [C]	20.33 ± 1.06 [B]	44.20	< 0.001	S
35 – 39	37.89 ± 1.10 [D]	27.42 ± 1.76 [C]	25.97	< 0.001	S
Total	28.78 ± 0.58	19.09 ± 0.63	119.46	< 0.001	S

* Means for the age group with different letters are statistically significant at $p<0.05$.
SE: Standard error; S: Significant.

Tables (3, 4 and 5) illustrate the distribution of the mean component of DMFS (decayed, missing and filled surfaces) score according to age. Table (3) shows the mean Decayed Surface (DS); the ratio of DS component to the total DMFS (D/DMFS) for pregnant women is 54.5% and 49.5% for single females. There is no significant difference in the mean decayed surface between the age group of pregnant women, while single females show differences in the mean decayed surface by age. When compared between single and pregnant females there have been significant differences between them in all age groups and in the total sample.

Table (4) shows the mean Missing Surface (MS), the ratio of the MS component to the total DMFS was 31.9% for pregnant and 30% for single females. The results demonstrated an increase in the missing surfaces with an increase in the age of subjects, with significant differences between them, except between the age groups 25–29 and 30–34 years.

When compared between pregnant and single females in each age group, it was found that the mean MS was equal in younger age group (18–24 years) for both groups, and it was lower mean of MS in single females than pregnant women, and statistically high significant difference in age groups 30–34, 35–39 years as well as in total sample.

Table (5) shows the mean of Filling Surface (FS); the ratio of the FS component to DMFS was 13.5% for pregnant and 20.5% for single females. The study revealed that the increase in mean of FS with age of the subjects with significant difference between them for pregnant women. The higher score was in the age group 35–39 years and it was significantly different than the other age groups; while the lowest score of FS was in the age group 18–24 years and it was significantly different than the other age groups. As well as the results found, for single females, that there is a significant difference between all age groups, except the age group 25–29 and 30–34 years. When compared between single and pregnant women, the mean score was equal in age groups below 30 years and for total sample, while in age group above 30 years the pregnant women reported lower mean score than the single females, with no significant difference between them.

Table (3): Mean of decayed surface ($\pm$ SE) by age
for both pregnant and single females

Age Group	Pregnant Women	Single Females	F–test	p	Significance
	DS Mean $\pm$ SE*	DS Mean $\pm$ SE*			
18 – 24	16.07 $\pm$ 0.62 ^{A}	10.25 $\pm$ 0.65 ^{B}	41.31	< 0.001	S
25 – 29	14.96 $\pm$ 0.88 ^{A}	9.37 $\pm$ 0.70 ^{AB}	20.51	< 0.001	S
30 – 34	16.65 $\pm$ 0.90 ^{A}	9.41 $\pm$ 0.72 ^{AB}	34.16	< 0.001	S
35 – 39	15.13 $\pm$ 0.89 ^{A}	7.85 $\pm$ 0.76 ^{A}	24.54	< 0.001	S
Total	15.69 $\pm$ 0.41	9.44 $\pm$ 0.36	112.44	< 0.001	S

* Means for the age group with different letters are statistically significant at *p*<0.05.
SE: Standard error; S: Significant.

Table (4): Mean of missing surface ($\pm$ SE) by age
for both pregnant and single females

Age Group	Pregnant Women	Single Females	F–test	p	Significance
	MS Mean $\pm$ SE*	MS Mean $\pm$ SE*			
18 – 24	2.81 $\pm$ 0.40 [A]	2.84 $\pm$ 0.61 [A]	0.018	< 0.89	NS
25 – 29	7.50 $\pm$ 0.74 [B]	5.74 $\pm$ 0.83 [B]	2.69	< 0.10	NS
30 – 34	9.41 $\pm$ 0.93 [B]	5.64 $\pm$ 0.92 [B]	7.89	< 0.006	S
35 – 39	16.92 $\pm$ 1.24 [C]	12.00 $\pm$ 1.64 [C]	5.03	< 0.026	S
Total	9.19 $\pm$ 0.50	5.72 $\pm$ 0.49	21.90	< 0.001	S

* Means for the age group with different letters are statistically significant at *p*<0.05.
SE: Standard error; S: Significant; NS: Not significant.

Table (5): Mean of filled surface ($\pm$ SE) by age
for both pregnant and single females

Age Group	Pregnant Women	Single Females	F–test	p	Significance
	FS Mean $\pm$ SE*	FS Mean $\pm$ SE*			
18 – 24	1.11 $\pm$ 0.24 [A]	1.07 $\pm$ 0.27 [A]	0.008	< 0.92	NS
25 – 29	4.02 $\pm$ 0.49 [B]	4.08 $\pm$ 0.62 [B]	0.006	< 0.93	NS
30 – 34	4.61 $\pm$ 0.56 [BC]	5.27 $\pm$ 0.62 [B]	0.607	< 0.43	NS
35 – 39	5.83 $\pm$ 0.62 [C]	7.57 $\pm$ 1.03 [C]	2.12	< 0.14	NS
Total	3.89 $\pm$ 0.26	3.92 $\pm$ 0.32	0.004	< 0.95	NS

* Means for the age group with different letters are statistically significant at *p*<0.05.
SE: Standard error; NS: Not significant.

Table (6) illustrates the mean number of teeth/person of the total sample for both pregnant and single females that required treatment. The study indicated that the need for one surface filling in single females group has higher mean number (3.51) than pregnant group (2.72) and this difference was significant, while for the two surface filling treatment need, in the pregnant group was higher mean (5.35) than in single females group (2.86) and there are significant differences between them, as well as pregnant group has higher and significant mean of teeth indicated for extraction (1.82) than single females (1.37). Also, they need for the replacement of space and bridge (3.11) higher than single females (2.47).

Table (6): The mean number of teeth per person require dental treatment for dental caries for both pregnant and single women

| Type of TN | Pregnant Women | Single Females | Z–test | p | Significance |
	TN (Mean $\pm$ SD)	TN (Mean $\pm$ SD)			
1	2.72 $\pm$ 1.75	3.51 $\pm$ 2.00	4.86	< 0.001	S
2	5.35 $\pm$ 2.72	2.86 $\pm$ 1.75	11.26	< 0.001	S
3	1.27 $\pm$ 0.57	1.71 $\pm$ 1.32	1.19	< 0.83	NS
4	1.82 $\pm$ 1.38	1.37 $\pm$ 0.73	2.22	< 0.026	S
5	3.11 $\pm$ 2.09	2.47 $\pm$ 1.87	3.64	< 0.001	S

1: One surface filling; 2: Two surfaces filling; 3: Root canal; 4: Extraction; 5: Space replacement.
TN: Treatment need; S: Significant; NS: Not significant.

DISCUSSION

Caries experience was measured by the DMFS index, a valid, simple and reproducible index used for the assessment of the past caries experience. Its components (DS, MS, FS) could be evaluated separately.[10]

In evaluation of dental caries prevalence among pregnant women compared with single female in Mosul City, the present study found a significant difference in the mean value of DMFS for each age group and total pregnant group than the single female. This study was in agreement with other studies [11–13] that found DMFS scores were higher in pregnancy.

Pregnant women in this study reported high mean of DMFS (28.78) comparing with other studies: Sulaiman [14] who found that DMFS value of pregnant women is 15.01, and Al–Guboory [15] who found the mean value of DMFS is 14.18 of pregnant women in Baghdad City, as well as Jago *et al.*[16] found that the mean DMFS of pregnant women in Australia is 15.81. The higher mean of DMFS value of pregnant women in this study comparing with these mean values of DMFS in previous studies due to more than half of pregnant sample are from the adult age over 25 years old; caries incidence increase with age and the number of the missing teeth becomes higher (each tooth represent by four surfaces). This is in agreement with Boross and Molnar[17] who found the mean DMFS value between 14.78 and 67.39. This increased according to the age of the subject; as well as the pregnant women become neglecting their dental health with advance age and multiple children and pregnancy. Also, different criteria and method for examination were used, leading to this variation.[5, 18]

According to the DMFS components, the DS reported the higher mean followed by MS and the least one is FS. The ratio of DS to DMFS is 54.5% and 49.5%, the ratio of MS to DMFS is 31.9% and 30% and the ratio of FS to DMFS is 20.5% and 13.5% for pregnant and single women respectively.

The decay component (DS) present was highly significant for pregnant group in all age groups and total than single female. The mean DS value is equal within all age groups of pregnant women; but in single female group, it was showed slight changes with age. This is due either to certain decrease in caries severity with age and tooth resistance demineralization with age or due to treatment carious teeth by filled or extraction of badly carious teeth.[5]

The filling component (FS) present was equal in younger age group under 30 years while there was higher in single females than pregnant women with no significant difference between them. This is due to that the attitude of single female is better than the pregnant women about

treatment carious teeth and education level is better than pregnant group; while pregnant women preferred to extract teeth due to caries rather than treated by filling due to lack of time to dental visit or due to low income of the family.

The mean missing surface (MS) was equal in young age group 18–24 years, while in other age group the single female reported less mean than pregnant women with significant difference between them in age group 30 years and over. This indicating that, in younger age, the effect of pregnancy does not lead to an increase in the missing teeth due to caries with an increase in the age and increase of the number of pregnancy which leads to an increase of the missing surface significantly.

According to the treatment need, the result revealed that the pregnant women need more complex treatment than the single females. As the fillings of two surfaces or more, the mean treatment required by pregnant women was 5.35 and for single females was 2.86. The teeth need for extraction and replacement of space were more in pregnant than single females with significant differences between them, while one surface filling was more in single females than pregnant women.

The more need for replacement space in pregnant women was in accordance with the finding that more MS was found in pregnant women. This may be due to carelessness and tendency to extract painful teeth rather than to do root canal filling. Also, this is due to negligence treatment of early carious teeth or did not attending to dental clinic for dental check-up especially during the pregnancy period. This is in agreement with the finding of study carried by Gonzaga *et al*.[19] The high percent of caries that was not treated and the type of treatment that carried out for them. It may be due either to the carelessness or due to difficulty in getting the dental services that can provide them the appropriate treatment at the cost they can pay, because the dental treatment is very costly in private clinic and more than $1/3$ of pregnant women mentioned they visit private clinic, while more than half of them visit MCHCCs. However, the type of treatment that provided by these centers is very limited.

The results indicated that pregnant women and single females in Mosul City still have poor oral health due to lack of dental health education program and this lead to a poor knowledge about preventive measures that can be used to prevent most oral diseases (dental caries and periodontal disease). This is in agreement with a study by Ali[20] who reported an important objective of dental health education is the change of dental knowledge into preventive practice.

So a program to educate the mother is important which includes the use of tooth brushing technique thoroughly with fluoridated dentifrice and use other cleaning aids correctly, use different types of fluoride supplements and visit the dental clinic and carry out some preventive measures. Also, the effect of the diet on their dental health and for general health should be explained to them.

Therefore, dental health education through the mass media, MCHCCs and United Women in Iraq to pregnant and mothers with young children is very important to increase the dental awareness and preventive behaviour for them and that they will determine about health related behaviour on their children to be adopted.

CONCLUSIONS

1. Pregnant women have higher mean value of DMFS (28.78) than the single female group (19.09) for the total sample.
2. DMFS value increases in pregnant women as well as in single females with increasing the age. So the age has direct effect on increase DMFS value.
3. DS value of pregnant women in all age groups and for the total sample is significantly higher than DS value in single female group; as well as there is a significant difference in MS value bet-ween pregnant and single females, espe-cially over 30 years old.
4. No significant difference was found in all age groups and in total group in mean

FS value between pregnant and single females.

REFERENCES

1.   Skay K, Ship JA. The importance of oral health in the older patient. *J Am Geriatr Soc*. 1995; 43(12): 1414-1422.

2.   Murray JJ. The Prevention of Dental Disease. 2nd ed. Oxford University Press, NY. 1989; p: 1-3.

3.   Khamrco TY, Makani LA. Dental health status in Sadda and Bahwiza village, Ninevah City. *Iraqi Dent J*. 1997; 20: 3-23.

4.   Folkers SA, Weine FS, Weissman DP. Periodontal disease in the life stages of women. *Compend Contin Educ Dent*. 1992; 13(10): 852-865.

5.   Machuca G, Khoshfeiz O, Lacalle JR, Machuca C, Bullon P. The influence of general health and sociocultural variables on the periodontal condition of pregnant women. *J Periodontol*. 1999; 70(7): 779-785.

6.   Burket LW. The reproductive system. In: Burket LW (ed). Oral Medicine, Diagnosis and Treatment. 6th ed. Pitman Medical Publishing Co. Ltd. 1971; Pp: 249-254.

7.   Little JW, Falace DM, Millar CS, Rhodur NL. Dental Management of the Medically Compromised Patient. 5th ed. The CV Mosby Co. 1997; Pp: 441-442.

8.   World Health Organization. Oral Health Surveys; Basic Method. 4th ed. World Health Organization. Geneva, Switzerland. 1997.

9.   Dunning JM. Principle of Dental Public Health. 3rd ed. Harvard University Press, Cambridge Mass and London. 1979.

10.   Muhlemann HR. Oral epidemiology–caries. In: Introduction to Oral Preventive Medicine. Buch und Zeitschriften Verlag, Die Quintessenz. 1976; Pp: 75-80 (English Abstract).

11.   Gerson F. Dental caries in pregnancy. *Int J Orthod*. 1921; 7: 459-463. Cited by: Dragiff DA, Karshan M. Effect of pregnancy on the chemical composition of human dentin. *J Dent Res*. 1943; 22: 261-265.

12.   Starobinsky I. Densche Monatschrift F. *Zahnheilk*. 1929; 47: 238. Cited by: Dragiff DA, Karchan M. Effect of pregnancy on the chemical composition of human dentin. *J Dent Res*. 1943; 22: 261-265.

13.   Papp PE, Kengyeli I, Banoczy J, Csordas T. Longitudinal study of the dental status of pregnant women under prenatal care. *J Fogorv Sz*. 1990; 83(7): 199-204.

14.   Sulaiman AW. Oral health status and cariogenic microflora during pregnancy. MSc Thesis. University of Baghdad. College of Dentistry. 1995.

15.   Al–Guboory IK. Evaluation of dental health knowledge, attitude and oral health status of pregnant women in Baghdad City. MSc Thesis. University of Baghdad. College of Dentistry. 1999.

16.   Jago JD, Chapman PS, Aitken SF, Mceniery LM. Dental status of pregnant women attending a Briban Maternity Hospital. *Community Dent Oral Epidemiol*. 1984; 12: 398-401.

17.   Boross E, Molnar L. Caries intensity and oral hygiene in adult dental patient in Budapest. *J Fogorv Sz*. 1995; 88(3): 95-102.

18.   Miyazaki H, Yamashita Y, Shirayama R, Gotokimura K, Shimada N. Periodontal condition of pregnant women assessed by CPITN. *J Clin Periodontol*. 1991; 18: 751-754.

19.   Gonzaga HF, Buso L, Gorge AM, Gonzaga LA. Intra–uterine dentistry: An integrated model of prevention. *Braz Dent J*. 2001; 12(2): 139-142.

20.   Ali NA. A comparative study: Evaluation the effect of dental health education programme on the oral health status of 12 years old students in Baghdad. MSc Thesis. University of Baghdad. College of Dentistry. 1999.