

## A cross-sectional survey on the relationship between some biologic maternal characteristics and dental status of pregnant women in Isfahan, Iran, in 2012

*Maryam Allameh DDS<sup>1</sup>, Heidar Khademi DDS, MS<sup>2</sup>, Masoomeh Eslami DDS<sup>3</sup>*

### Original Article

#### Abstract

**BACKGROUND AND AIM:** Dental caries is an infectious and transmissible disease. The interplay between pregnancy and oral health is obvious, but the risk factors are not known yet. The objective of this study was to determine the relationship between some selected risk factors in pregnancy and the dental status.

**METHODS:** The study sample consisted of 377 pregnant women attended for their routine antenatal visit at public hospitals in Esfahan city in 2012. Data, including age, number of previous deliveries, mean of pregnancy interval and gestational age were determined using interviewer-filled questionnaires. Oral health examination was performed by assessing mean number of decayed, missed and filled teeth (DMFT), according to the World Health Organization (WHO) criteria. Spearman analysis was used to identify maternal characteristics correlated to dental status.

**RESULTS:** The mean ( $\pm$  standard deviation) DMFT among antenatal women were  $10.6 \pm 4.21$ , with  $4.10 \pm 2.23$  decayed teeth,  $4.15 \pm 2.12$  missed teeth, and  $2.32 \pm 1.46$  filled teeth. No significant difference of DMFT means were observed among the 3 gestation periods ( $P > 0.05$ ). Moreover, the Spearman correlation test showed that the trend is for the DMFT to increase with age and the number of deliveries ( $P < 0.05$ ).

**CONCLUSION:** Results of the present study showed that the age of mother and number of previous deliveries are the risk factors for increasing DMFT. The importance of dental care and decreasing risk factors before and during pregnancy must be educated widely among both the public and providers.

**KEYWORDS:** Decayed, Missed and Filled Teeth, Iran, Pregnant Women, Risk Factors

**Citation:** Allameh M, Khademi H, Eslami M. A cross-sectional survey on the relationship between some biologic maternal characteristics and dental status of pregnant women in Isfahan, Iran, in 2012. *J Oral Health Oral Epidemiol* 2014; 3(2): 72-8.

Tooth decay is an infectious, transmissible disease commonly affected from biological, behavioral and socio-economic factors. In industrialized countries, it involves about 40-50% of adults.<sup>1,2</sup> Up to know many preventive approaches have been examined in different target populations to reduce dental decay in the whole community. For example, USA office of disease prevention and health promotion in 2010 established objectives to reduce disparities among preschool children.<sup>3</sup> However, programs aimed at reducing

disparities by focusing exclusively on children have encountered several barriers such as negative interactions with dentists and problems with access to dental care.<sup>4,5</sup>

Gradually health care providers realized that to promote community oral health the preventive oral health schedules should be started earlier before the child is born.<sup>3</sup> In this respect it is suspected that whenever oral health status in mothers is enhanced, both mother and child would experience benefits.<sup>6</sup> Some of the examples of mothers' oral health influences on oral health of their children are

1- MSc Student, Department of Oral Medicine, School of Dentistry, Isfahan University of Medical Sciences, Isfahan, Iran

2- Associate Professor, Department of Oral Medicine, School of Dentistry, Isfahan University of Medical Sciences, Isfahan, Iran

3- Dentist, Private Practice, Isfahan, Iran

Correspondence to: Maryam Allameh DDS

Email: maryamallameh14@yahoo.com

as following: (1) Mothers with high caries levels can transmit tooth decay pathogens such as *Streptococcus mutans* to their children by saliva.<sup>7,8</sup> (2) previous investigations show that there is a relationship between mother's oral hygiene and her pursuit for better oral health of her child.<sup>9,10</sup> This concept is not new, and has led to the formulation of policies to improve maternal health;<sup>11,12</sup> these programs mainly focus on pregnancy period of a woman life. However, recently Massachusetts extended dental care services to mothers from pregnancy to 3 years after the baby is born.<sup>13</sup>

Pregnancy is a cornerstone of a mother's life; in this time women may be more motivated to make healthy changes. Physicians can comment on their oral health issues, reduce the risk of mothers and so childhood caries through oral disease prevention, diagnosis, early management, and dental referral.<sup>14</sup> Although pregnancy in itself has never been clearly associated with an increased incidence of dental caries, oral health indices in this period are higher than the general population.<sup>15-18</sup> This may be due to financial, personal, and social barriers,<sup>19-21</sup> less desire to receive dental services in this period (may be as a result of concerns for fetal safety during dental treatment from both practitioner and mother), or may be as a result of intraoral biologic changes such as hormonal imbalance, low oral cavity pH caused by frequent refluxes.<sup>15</sup> To offer a comprehensive preventive program for oral health promotion, it is important to determine, which factors exactly place pregnant women at higher risk for dental infections. Although many studies have assessed social or behavioral risk indicators in mothers' oral health,<sup>22-28</sup> investigations to denote biologic risk factors are scarce.

In a study evaluating the correlation of pregnancy, caries and gingivitis the authors reported an increase in caries intensity with advancing age and a higher rate of caries in women who delivered 1 or 2 times than those

who had no child.<sup>29</sup> In another research conducted by Radnai et al.<sup>30</sup> no significant correlation was founded between the number of previous pregnancy and the incidence of caries.

In contrast to Jago et al.<sup>31</sup> and Kumar and Samelson<sup>12</sup> investigations, Vergnes et al.<sup>16</sup> demonstrated a higher caries prevalence in the lower aged pregnant population. Furthermore, a significant correlation was detected between the trimester of pregnancy (gestational age) and the rate of missing teeth and decayed, missed and filled teeth (DMFT) in Kumar and Samelson study.<sup>12</sup>

The purpose of the present study was to evaluate the oral health status of antenatal women referred to governmental hospitals in Esfahan and to investigate its relationship with some of the maternal biologic risk indicators.

## Methods

The present study involved a cross-sectional, population-based survey of a sample of 377 Isfahanian pregnant mothers attended for their routine antenatal visits from September until December in 2012 at public hospitals in Isfahan, Iran. The selection criteria for the participants of the present study were as follow: more than 16 years of age; do not have any mental or physical disease; have not received any medical treatment in the current pregnancy; being a moderate economic status (detected by directly asking family income and accessibility to health care services). They were all informed of the scope of the study and their written consent was obtained prior to clinical examination.

The survey collected data on maternal characteristics (age, number of pregnancies, pregnancies' intervals, gestational age) using an interviewer-administered pre-tested questionnaire. To assess dental status the DMFT index was measured for each individual as the sum of D + M + F (D = decayed teeth, M = missing teeth, which account for extracted teeth exclusively due to

caries; F = restored teeth only for the reason of caries) by two calibrated professional dentist. Examiners were given instructions to assess carious lesions according to the World Health Organization (WHO).<sup>32</sup> The presence of carious lesions was recorded at the surface level of the teeth using sterile dental mirrors and explorers.

Analysis was performed with SPSS software (version 13.5, SPSS Inc., Chicago, IL, USA). Descriptive statistics of mean DMFT in this population were reported as well as cross-tabulations by age of mother, number of pregnancies, pregnancies' intervals and gestational age. Spearman rank correlation coefficient was used to explore any relationship between the variables and DMFT.

## Results

Of a total of 377 pregnant women participated

in this study most of them (65.0%) were aged between 20 and 30 years old. More than one-half (55.9%) of pregnant women were in their third trimester while the minority (14.5%) were in their first trimester. The majority of women had experienced at least one birth prior to the index pregnancy, and the mean number of pregnancies in this study group was 1.99. The average of pregnancy intervals was 2.28 years and in up to 40% of cases the interval between this pregnancy and the previous one was below 1 year. Descriptive data about the means of D, M, F and DMFT for each maternal variable are presented in tables 1-4.

The mean DMFT among the whole sample were  $10.60 \pm 4.50$ , with  $4.10 \pm 2.23$  decayed teeth (D);  $4.15 \pm 2.12$  missing teeth (M), and  $2.32 \pm 1.46$  filled teeth (F), indicating that average 10 teeth were affected among pregnant women with at least 4 of these teeth

**Table 1.** Mean scores of D, M, F, DMFT ( $\pm$  SD) according to age of mother

Age range (year)	D	M	F	DMFT
< 20	$3.15 \pm 1.24$	$0.57 \pm 1.09$	$1.66 \pm 0.55$	$5.38 \pm 2.92$
21-30	$3.31 \pm 1.30$	$1.34 \pm 0.56$	$2.55 \pm 1.93$	$7.19 \pm 3.48$
31-40	$3.65 \pm 1.00$	$3.35 \pm 2.65$	$3.54 \pm 3.00$	$10.53 \pm 4.21$
> 40	$4.50 \pm 1.87$	$7.00 \pm 2.10$	$3.83 \pm 3.37$	$15.33 \pm 5.27$

DMFT: Decayed, missed, and filling teeth; D: Decayed; M: Missing; F: Filled; T: Teeth; SD: Standard deviation

**Table 2.** Mean scores of D, M, F, DMFT ( $\pm$  SD) according to mean of pregnancy interval

Mean of pregnancy interval (year)	D	M	F	DMFT
1	$3.19 \pm 0.93$	$2.25 \pm 2.40$	$1.66 \pm 2.13$	$7.09 \pm 3.97$
2	$3.97 \pm 1.23$	$2.97 \pm 2.96$	$2.45 \pm 1.99$	$9.37 \pm 4.59$
3	$3.47 \pm 1.00$	$2.06 \pm 2.28$	$3.42 \pm 2.88$	$8.94 \pm 4.20$
4	$3.42 \pm 1.21$	$1.67 \pm 1.43$	$3.04 \pm 2.46$	$8.12 \pm 3.27$
5	$3.13 \pm 1.77$	$2.26 \pm 2.12$	$3.17 \pm 2.71$	$8.56 \pm 3.65$
6	$2.92 \pm 0.76$	$1.54 \pm 1.66$	$4.08 \pm 3.45$	$8.53 \pm 4.23$
7	$3.23 \pm 0.83$	$1.92 \pm 1.32$	$5.23 \pm 2.13$	$10.38 \pm 3.06$
8	$4.11 \pm 2.30$	$1.61 \pm 1.50$	$2.78 \pm 3.89$	$8.50 \pm 4.60$

DMFT: Decayed, missed, and filling teeth; D: Decayed; M: Missing; F: Filled; T: Teeth; SD: Standard deviation

**Table 3.** Mean scores of D, M, F, DMFT ( $\pm$  SD) according to number of previous deliveries

Number of previous deliveries	D	M	F	DMFT
0	$2.00 \pm 1.25$	$2.19 \pm 1.24$	$1.80 \pm 2.13$	$6.00 \pm 4.24$
1	$3.16 \pm 1.19$	$0.81 \pm 1.17$	$2.14 \pm 2.86$	$6.10 \pm 3.22$
2	$3.28 \pm 1.36$	$1.72 \pm 1.87$	$2.71 \pm 2.75$	$8.29 \pm 3.46$
3	$3.77 \pm 0.92$	$3.05 \pm 2.48$	$3.59 \pm 2.52$	$10.40 \pm 3.92$
4	$4.00 \pm 1.05$	$4.70 \pm 2.26$	$2.20 \pm 3.68$	$10.40 \pm 3.92$
5	$4.00 \pm 1.05$	$4.70 \pm 2.26$	$2.20 \pm 3.68$	$10.90 \pm 5.27$
6	$4.00 \pm 0.82$	$6.50 \pm 2.52$	$3.00 \pm 3.46$	$13.50 \pm 6.55$
7	$4.33 \pm 0.58$	$7.67 \pm 4.04$	$4.33 \pm 3.90$	$16.33 \pm 7.37$

DMFT: Decayed, missed, and filling teeth; D: Decayed; M: Missing; F: Filled; T: Teeth; SD: Standard deviation

**Table 4.** Mean scores of D, M, F, DMFT ( $\pm$  SD) according to gestational age

Gestational age (month)	D	M	F	DMFT
1	2.06 $\pm$ 1.00	1.80 $\pm$ 0.19	1.54 $\pm$ 1.33	5.40 $\pm$ 2.25
2	2.75 $\pm$ 0.50	2.25 $\pm$ 1.26	3.00 $\pm$ 1.83	8.00 $\pm$ 2.44
3	2.82 $\pm$ 1.08	0.82 $\pm$ 1.78	2.55 $\pm$ 1.66	6.18 $\pm$ 2.96
4	3.64 $\pm$ 2.29	1.82 $\pm$ 1.94	2.27 $\pm$ 3.20	7.72 $\pm$ 4.81
5	3.59 $\pm$ 1.84	2.00 $\pm$ 2.20	2.06 $\pm$ 2.88	7.64 $\pm$ 4.49
6	3.48 $\pm$ 1.78	1.00 $\pm$ 1.14	1.71 $\pm$ 2.15	6.19 $\pm$ 3.35
7	3.32 $\pm$ 1.12	1.95 $\pm$ 2.42	2.75 $\pm$ 2.84	8.01 $\pm$ 3.98
8	3.35 $\pm$ 1.22	1.33 $\pm$ 1.70	3.05 $\pm$ 3.24	7.73 $\pm$ 3.98
9	3.38 $\pm$ 1.14	1.70 $\pm$ 2.06	2.55 $\pm$ 2.87	7.61 $\pm$ 4.04

DMFT: Decayed, missed, and filling teeth; D: Decayed; M: Missing; F: Filled; T: Teeth; SD: Standard deviation

having untreated dental caries. On average, among pregnancy months the highest mean of DMFT was related to 7<sup>th</sup> month; similarly, the highest mean of decayed teeth was in 4<sup>th</sup> month, the highest average of missing teeth was in 2<sup>nd</sup> month and in 8<sup>th</sup> month the average of filled teeth was the most. Nevertheless, table 5 shows there is not any significant relationship between D, M, F and DMFT with gestational age.

As it is demonstrated in table 5, the means of DMFT were correlated with the numbers of previous deliveries: Antenatal women who had experienced more than 3 deliveries, had significantly higher amounts of decayed, missed, filled teeth and DMFT compared with women in their intimate pregnancies ( $P < 0.05$ ). Moreover, there is a significant correlation between F and mean pregnancies' interval. It is also followed from the table that the trend is for DMFT to increase with age: women aged 40 years and more presented a significantly higher number of decayed, missed, filled teeth and mean DMFT.

## Discussion

Mean score of DMFT index in this study was

10.60  $\pm$  4.21 with an average of 4.15  $\pm$  2.12 for decayed teeth. A similar score was found in the city of Mashhad, Iran;<sup>22</sup> where pregnant women had a mean DMF-T index of 10.29  $\pm$  4.92 and an average D component equal to 5.55  $\pm$  3.77 and Manaus, Amazonas (Brazil)<sup>33</sup> with the mean score of 10 for DMFT index. However, lower scores among pregnant women were found in Ahvaz (Iran),<sup>34</sup> where the average DMF-T index was 6.23  $\pm$  3.01. Perhaps this discrepancy can be explained by differences of dietary habits of people in southern areas of Iran (like Ahvaz); as they consume more seafood and water (which naturally contain fluoride) due to climatic characteristics of these regions.<sup>35</sup>

When comparing the prevalence of dental caries and mean of DMFT among pregnant and average population in the same range of age,<sup>36</sup> no significant difference was observed. The objective of this survey was to study the risk indicators associated with tooth decay and DMFT during pregnancy; we found that the mean DMF-T index and prevalence of dental caries among gravid women are positively correlated with age. This data confirms the results of Karunachandra et al.<sup>27</sup>

**Table 5.** Spearman test of correlation between dental indices and risk indicators

Index	Age	Number of previous deliveries	Mean of pregnancy interval	Gestational age
DMFT	0.480	0.371	0.110	0.029
P	< 0.001*	< 0.001*	0.107	0.572
D	0.195	0.262	-0.107	0.051
P	< 0.001*	< 0.001*	0.118	0.321
M	0.466	0.418	-0.077	0.041
P	< 0.001*	< 0.001*	0.258	0.425
F	0.289	0.160	0.225	0.009
P	< 0.001*	0.002*	0.001*	0.862

\*Significant at  $\alpha = 5\%$ ; DMFT: Decayed, missed, and filling teeth; D: Decayed; M: Missing; F: Filled

and Jago et al.<sup>31</sup> studies; however, it is in conflict with Vergnes et al.<sup>16</sup> investigation that demonstrated tooth decay among pregnant women in France was statistically associated with lower age. Nevertheless, data achieved in the present study is in agreement with the findings of Pakshir<sup>36</sup> who showed in the general population of Iran prevalence of decayed teeth and mean DMFT score increases with advancing age. This may reflect the promoted awareness of individuals to health care behaviors with advancing age in developed countries like France and on the other hand double the importance of launching educational programs with adequate follow-ups to control its efficacy in different stages of a person life.

Number of previous deliveries as a predisposing factor for tooth decay has already been studied in Radnai et al.<sup>37</sup> survey, which demonstrated no correlation with tooth decay incidence, in spite of showing a significant relationship with DMFT index. In the present study, a significant association was found between the number of previous pregnancies with both DMFT index and the number of decayed teeth. Although not explored in the present investigation, this may be attributable to improper dietary habits and less self-care in women with more deliveries. Hence, older pregnant women and women with more previous deliveries may need more oral and nutritional health care than younger prenatal women expecting their first or the second baby.

Similar to gingivitis, which is aggravated by fluctuations in hormones during pregnancy,<sup>15</sup> significant differences were noticed between the trimesters of pregnancy for mean decayed component,<sup>38</sup> and as the etiologies of caries flare during and after pregnancy is not well understood, achieving a good caries control by managing peripheral factors such as appropriate oral hygiene and instructing self-care to mothers is suggested.<sup>39</sup> For this and other reasons, it is necessary to conduct prenatal appointments along with more educating approaches in

order to preclude dental conditions from worsening later during and after pregnancy. In the present study although an increasing manner was observed in D component with advancement of gestational age but the difference was not significant ( $P = 0.051$ ).

In this study, the relation was detected between F component and pregnancies' intervals. Given the above, the data suggest that there may be barriers that make it difficult for this population to obtain care, such as child bearing and homework after delivery, which make them to stay at home and even they do not feel any need for self-care.<sup>40</sup> Hence, it is recommended that in antenatal visits health professionals and obstetrician educate women about the importance of maintaining sufficient intervals between pregnancies.

As the sampling in the present study was performed in Isfahan, the results of the present study should not be generalized to the whole nation. A limitation of the present study was the lack of information on the social background of the sample population, and it is suggested in future studies to assess biologic markers in the context of the individual's socio-economic status.

## Conclusion

Taken together, our data demonstrated that the oral health status of Isfahanian pregnant women was not satisfactory and there were some risk factors (age and number of previous deliveries) significantly correlated with DMFT index in pregnant women. It will be interesting to see these results confirmed in larger populations as they may add to our understanding of risk indicators and their prevention ways to maintain good oral condition during and after pregnancy. The importance of dental care and decreasing risk factors before and during pregnancy must be educated widely among both the public and providers.

## Conflict of Interests

Authors have no conflict of interest.

## Acknowledgments

This study was supported by a grant from the

vice chancellor of Research of the Isfahan University of Medical Sciences.

## References

1. Brown LJ, Wall TP, Lazar V. Trends in caries among adults 18 to 45 years old. *J Am Dent Assoc* 2002; 133(7): 827-34.
2. Hescot P, Bourgeois D, Doury J. Oral health in 35-44 year old adults in France. *Int Dent J* 1997; 47(2): 94-9.
3. Weinstein P, Harrison R, Benton T. Motivating parents to prevent caries in their young children: one-year findings. *J Am Dent Assoc* 2004; 135(6): 731-8.
4. Mofidi M, Rozier RG, King RS. Problems with access to dental care for Medicaid-insured children: what caregivers think? *Am J Public Health* 2002; 92(1): 53-8.
5. Kelly SE, Binkley CJ, Neace WP, Gale BS. Barriers to care-seeking for children's oral health among low-income caregivers. *Am J Public Health* 2005; 95(8): 1345-51.
6. Milgrom P, Weinstein P. Early childhood caries: a team approach to prevention and treatment. Washington, DC: University of Washington in Seattle, Continuing Dental Education; 1999.
7. Berkowitz RJ. Acquisition and transmission of mutans streptococci. *J Calif Dent Assoc* 2003; 31(2): 135-8.
8. Kloetzel MK, Huebner CE, Milgrom P. Referrals for dental care during pregnancy. *J Midwifery Womens Health* 2011; 56(2): 110-7.
9. Dye BA, Vargas CM, Lee JJ, Magder L, Tinanoff N. Assessing the relationship between children's oral health status and that of their mothers. *J Am Dent Assoc* 2011; 142(2): 173-83.
10. Grembowski D, Spiekerman C, Milgrom P. Disparities in regular source of dental care among mothers of medicaid-enrolled preschool children. *J Health Care Poor Underserved* 2007; 18(4): 789-813.
11. Ressler-Maerlender J, Krishna R, Robison V. Oral health during pregnancy: current research. *J Womens Health (Larchmt)* 2005; 14(10): 880-2.
12. Kumar J, Samelson R. Oral health care during pregnancy and early childhood practice guidelines. New York, NY: New York State Department of Health; 2006.
13. Waldman B. Dental providers participating in mass health [Online]. [cited 2006]; Available from: URL: <http://www.mass.gov/eohhs/docs/masshealth/bull-2005/den-33.pdf>
14. Hughes D. Oral health during pregnancy and early childhood: barriers to care and how to address them. *J Calif Dent Assoc* 2010; 38(9): 655-60.
15. Silk H, Douglass AB, Douglass JM, Silk L. Oral health during pregnancy. *Am Fam Physician* 2008; 77(8): 1139-44.
16. Vergnes JN, Kaminski M, Lelong N, Musset AM, Sixou M, Nabet C. Frequency and risk indicators of tooth decay among pregnant women in France: a cross-sectional analysis. *PLoS One* 2012; 7(5): e33296.
17. Bakhmudov BR, Alieva ZB, Bakhmudov MB. Caries incidence assessment in young and mature nulliparous pregnant. *Stomatologiia (Mosk)* 2011; 90(5): 19-21.
18. Rakchanok N, Amporn D, Yoshida Y, Harun-Or-Rashid M, Sakamoto J. Dental caries and gingivitis among pregnant and non-pregnant women in Chiang Mai, Thailand. *Nagoya J Med Sci* 2010; 72(1-2): 43-50.
19. Bolden AJ, Henry JL, Allukian M. Implications of access, utilization and need for oral health care by low income groups and minorities on the dental delivery system. *J Dent Educ* 1993; 57(12): 888-900.
20. Atchison KA, Davidson PL, Nakazono TT. Predisposing, enabling, and need for dental treatment characteristics of ICS-II USA ethnically diverse groups. *Adv Dent Res* 1997; 11(2): 223-34.
21. Gilbert GH, Shelton BJ, Chavers LS, Bradford EH. The paradox of dental need in a population-based study of dentate adults. *Med Care* 2003; 41(1): 119-34.
22. Bahri Binabaj N, Bahri Binabaj N, Iliati H, Salarvand Sh, Mansoorian MR. Assessment of DMFT Index in Pregnant Women and its Relationship with Knowledge, Attitude and Health Behaviors in Terms of Oral and Dental Cares (Mashhad-2009). *Iran J Obstet Gynecol Infertil* 2012; 15(3): 13-20. [In Persian].
23. Marchi KS, Fisher-Owen SA, Weintraub JA, Yu Z, Braveman PA. Most pregnant women in California do not receive dental care: findings from a population-based study. *Public Health Rep* 2010; 125(6): 831-42.
24. Thomas NJ, Middleton PF, Crowther CA. Oral and dental health care practices in pregnant women in Australia: a postnatal survey. *BMC Pregnancy Childbirth* 2008; 8: 13.
25. Boggess KA, Urlaub DM, Massey KE, Moos MK, Matheson MB, Lorenz C. Oral hygiene practices and dental service utilization among pregnant women. *J Am Dent Assoc* 2010; 141(5): 553-61.
26. Timothe P, Eke PI, Presson SM, Malvitz DM. Dental care use among pregnant women in the United States reported in 1999 and 2002. *Prev Chronic Dis* 2005; 2(1): A10.

27. Karunachandra NN, Perera IR, Fernando G. Oral health status during pregnancy: rural-urban comparisons of oral disease burden among antenatal women in Sri Lanka. *Rural Remote Health* 2012; 12: 1902.
28. Keirse MJ, Plutzer K. Women's attitudes to and perceptions of oral health and dental care during pregnancy. *J Perinat Med* 2010; 38(1): 3-8.
29. Banoczy J, Orosz M, Gabris K, Nyarasdy I, Rigo O, Schuder L. Investigation on the correlation of pregnancy, caries and gingivitis (author's transl). *Zahn Mund Kieferheilkd Zentralbl* 1978; 66(6): 573-81.
30. Radnai M, Gorzo I, Nagy E, Urban E, Eller J, Novak T, et al. The oral health status of postpartum mothers in South-East Hungary. *Community Dent Health* 2007; 24(2): 111-6.
31. Jago JD, Chapman PJ, Aitken JF, McEniery TM. Dental status of pregnant women attending a Brisbane maternity hospital. *Community Dent Oral Epidemiol* 1984; 12(6): 398-401.
32. World Health Organization. *Oral Health Surveys: Basic Methods*. 4<sup>th</sup> ed. Geneva, Switzerland: World Health Organization; 1997.
33. Bressane LB, da Silva Costa LN, Rebelo Vieira JM, Bessa Rebelo MA. Oral health conditions among pregnant women attended to at a health care center in Manaus, Amazonas, Brazil. *Rev Odonto Cienc* 2011; 26(4): 291-6.
34. Gharizadeh N, Haghiighizadeh MH, Sabarhaji W, Karimi A. A study of dmft and oral hygiene and gingival status among pregnant women attending Ahwaz health centers. *Jundishapur Sci Med J* 2004; 4(43): 40-7. [In Persian].
35. Basir L, Khanehmasdjedi M, Haghghi M, Nemati Asl S. Evaluation and comparison of floozies and DMFT and their relation with the amount of fluoride in three flowing source of drinking water (Karooon, Maroon, Karkheh) in 12-15 years old students in Khozestan 2002. *J Dent Sch* 2006; 24(1): 14-23. [In Persian].
36. Pakshir HR. Oral health in Iran. *Int Dent J* 2004; 54(6 Suppl 1): 367-72.
37. Radnai M, Gorzo I, Nagy E, Urban E, Eller J, Novak T, et al. Caries and periodontal state of pregnant women. Part I. Caries status. *Fogorv Sz* 2005; 98(2): 53-7.
38. Kumar S, Tadakamadla J, Tibdewal H, Duraiswamy P, Kulkarni S. Factors influencing caries status and treatment needs among pregnant women attending a maternity hospital in Udaipur city, India. *J Clin Exp Dent* 2013; 5(2): e72-e76.
39. Vadiakas G, Lianos C. Correlation between pregnancy and dental caries. *Hell Stomatol Chron* 1988; 32(4): 267-72.
40. de Albuquerque OM, Abegg C, Rodrigues CS. Pregnant women's perceptions of the Family Health Program concerning barriers to dental care in Pernambuco, Brazil. *Cad Saude Publica* 2004; 20(3): 789-96.