



# Asian Journal of Epidemiology

ISSN 1992-1462

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## Research Article

# A Cross-sectional Study of Socio-demographic Characteristics of Pregnant Women on the Dental and Periodontal Health

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## Abstract

**Background and Objective:** During pregnancy, changes are observed in the oral cavity including bleeding, tooth shift or loss, halitosis or periodontal abscesses may occur. This study aimed to determine the impact of pregnancy and sociodemographic characteristics of pregnant women on teeth and periodontal health. **Materials and Methods:** A cross-sectional study was conducted amongst 53 of pregnant women and 52 of non-pregnant women who consulted in two public health centers urban and rural in the Marrakesh, Safi region in Morocco. Clinical examinations were performed to assess dental and periodontal conditions. **Results:** A statistically significant difference was found in the degree of tooth mobility that is greater among the pregnant women than the non-pregnant women, a high DMFT index (decayed missing filled teeth) in both groups and an average periodontal pockets depth over 5 mm in both groups. It was also found that plaque index and gingival index are significantly higher among rural pregnant women than urban pregnant women and a higher degree of tooth mobility was found among urban pregnant women than rural pregnant women. Furthermore, pregnant women aged over than 27 years old had significant high DMFT index; gingival recession and tooth mobility compared to pregnant women aged less and equal to 27 years. Finally, it was observed that multiparous pregnant women had a significant higher DMFT index than primiparous pregnant women. **Conclusion:** During pregnancy, dental mobility increases. Also, dental and periodontal status deteriorates over age, parity and rural living environment.

**Key words:** Urban pregnant women, tooth mobility, periodontal condition, rural pregnant women, multiparous women

**Citation:** Rachid Ait Addi, Abdelhafid Benksim, Mariam Zouini and Mohamed Cherkaoui, 2018. A cross-sectional study of socio-demographic characteristics of pregnant women on the dental and periodontal health. *Asian J. Epidemiol.*, 11: 14-19.

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**Competing Interest:** The authors have declared that no competing interest exists.

**Data Availability:** All relevant data are within the paper and its supporting information files.

## INTRODUCTION

During pregnancy many affections can touch women like dental caries, gingivitis and periodontal diseases which may produce ache and complications<sup>1-3</sup>. Pregnancy is also synonym of several changes in body with a higher risk of periodontal disease and an enhanced gingival inflammation due to hormonal, immunological and vascular changes with the presence of plaque<sup>4-8</sup>. Periodontal disease is recognized by clinical symptoms as bleeding, tooth shift or loss, periodontal abscesses or halitosis and it's already known as a cause of high risk of preterm birth and low birth weight during<sup>9,10</sup>. Furthermore, it has been demonstrated that the health practices and health care utilization during pregnancy have improved dental and periodontal health: plaque removal by a good oral hygiene can reduce the gingival inflammation and a regular dental care during pregnancy ameliorates periodontal health<sup>11-13, 7</sup>. Moreover, treatment (scaling and root planning) for maternal periodontal disease may not effectively reduce adverse pregnancy outcomes<sup>14</sup>. Several epidemiological studies showed the effects of pregnancy on dental and periodontal status, gingivitis during pregnancy, called pregnancy gingivitis has prevalence between 35 and 100%. This type of gingivitis is characterized by gingival erythema, hyperplasia and bleeding<sup>6,15,16</sup>. Severity enhances around the 2nd month of pregnancy and worsens in the 8th month<sup>17</sup>. Otherwise, 40% of pregnant women in the United States had some form of periodontal infection which can be gingivitis or periodontitis reported cohort study<sup>18</sup>. In the United States also the prevalence of dental caries, untreated tooth decay and periodontal disease among dentate women aged 20-64 years was 93, 23 and 6%, respectively<sup>19</sup>. Another study compared the national prevalence and severity of dental caries and the prevalence of periodontal disease among pregnant women and nonpregnant women of reproductive age and found that the prevalence of untreated dental caries among women aged 15-24 years was significantly higher in pregnant women than in nonpregnant women, this study did not compare pregnant and non-pregnant women yet (18)<sup>20</sup>.

In Morocco, a study conducted of 50 pregnant women and 50 women control who consulted in two public health centers in the Casablanca-settat region found a high prevalence of periodontal disease during pregnancy, an increase in the plaque index and gingival index and an elevation in the degree of dental mobility<sup>21</sup>.

However, no study in relationship with pregnancy and oral health status was conducted in the other region of Morocco neither with the comparison of sociodemographic characteristics as age and rural and urban areas were done.

Therefore this study conducted an analytic cross-sectional survey of 53 pregnant women and 52 women control, 53 urban and 52 rural women who consulted in two public health centers in the Marrakesh, Safi region in Morocco. The aims of this survey were to determine the level of dental and periodontal health in pregnant women compared with control subjects, to assess the impact of pregnancy and socio-demographic variables on dental and periodontal health status.

## MATERIALS AND METHODS

**Ethics statement:** The women were examined after having the full explanation of the purpose of this study and receiving their verbal consent. The consent procedure was approved by the health ministry delegation. Also present study had been independently reviewed and approved by the health ministry delegation. There was not any local ethics committee yet, because of that the health ministry delegation ensured that function. Finally The research had been conducted in full accordance with the World Medical Association Declaration of Helsinki.

**Consulting methods:** After having requested and obtained the authorization to carry out the survey with the Ministry of Health, this study was preceded in consultation with the regional delegation of the Ministry of Medical Health to the choice of two health centers (urban and rural). A meeting with the leaders of these centers allowed them to explain the objectives and the progress of this study. The sample of women were randomly selected and invited to the study from the inhabitants of the sector covered by the two centers without any appointment; these were pregnant and non-pregnant women drawn randomly from those attending the health center for many reasons (pregnancy monitoring, accompaniment of sick or vaccinated children or other patients, request for contraceptives, etc.). It should be noted that pregnant women in the first trimester attend rarely the health center because of doubt of pregnancy and lack of access to pregnancy tests due to poor socio-economic conditions. The sample was examined by a dentist. This sample consists of 53 women forming a group of pregnant women or test group and 52 non-pregnant women or experiment group, 53 urban women and 52 rural women. These women must meet the inclusion criteria which were as follows: Age between 18 and 40 years and the presence of adjacent teeth.

The exclusion criteria were as follows: Systemic disease, smoking and lack of cooperativeness. The clinical measurements were conducted between January, 2016 and

August, 2017 and performed by one and the same practitioner. In mean of five women were examined in each visit.

The variables used:

- DMFT index (decayed missing filled teeth)
- Plaque index (PI) (Loe and Silness)
- Gingival index (GI) (Silness and Loe)
- Gingival recession
- Periodontal pocket depth
- Dental mobility (Mühelemann index)
- Inter-radicular lesion (Hamp index)<sup>3</sup>

DMFT index is a numerical expression of the caries prevalence of an individual or groups and are widely used in epidemiological surveys of oral health. DMFT was calculated by adding up permanent teeth that are caries affected wherein D is for decay, M is missing due to caries and F is filled teeth. If one tooth has filling as well as a caries lesion, then it is counted as D for the DMFT index<sup>3</sup>.

Plaque index was measured with manual periodontal probe by evaluating the thickness of plaque in 6 teeth with scores from 0 to 3 and then the score is divided by the number of subjects examined. Gingival index was measured by manual periodontal probe by evaluating the degree of gingival inflammation in 6 teeth with scores from 0-3 and then the score is divided by the number of subjects examined. Gingival recession was measured by a manual periodontal probe from Cement-enamel Junction to the gingival crest. Periodontal pocket depth was measured with a manual periodontal probe from gingival margin to the bottom of the sulcus/pocket at 6 sites/tooth (mesiobuccal, midbuccal, distobuccal, mesiolingual, midlingual and distolingual). Dental mobility was measured in all teeth by moving crowns between handles of two instruments; the degree of mobility is defined by scores from 0-3. Inter-radicular lesion was measured by a manual probe of Nabers to determine the class of lesion<sup>22</sup> from 1-3.

The reproducibility of the measures was tested previously, 50 sites in five patients of the health center not included in the study were evaluated twice and at different times for all the parameters studied and the reproducibility (%) is 98.4% within a range of difference of  $\pm 1$  mm for measurements by a periodontal probe.

**Statistical analysis:** Data was entered and analyzed by SPSS ver. 13.0 (Chicago, IL, USA). In this study, averages DMFT index,

plaque index and gingival index were calculated. In the case of the variables like gingival recession, periodontal pocket depth, dental mobility and inter-radicular lesion choosed the higher value for each woman and calculated the average by therefore. Independent-sample t-tests were used and were considered statistically significant at p-values below 0.05.

## RESULTS

The result of demographic and clinical characteristics of pregnant and non-pregnant women groups were given in Table 1.

In the study, the average age in the test group is lower than the control group. The plaque index is more important in the test group than the experiment group and the degree of tooth mobility is significantly important in the test group compared to the control group. It also found no significant difference in the average of DMFT index, gingival index, gingival recession, periodontal pocket depth and the degree of inter-radicular lesion between the test group and the control group. Furthermore, the results of this survey showed that half of the women (55.2%) had no inter-radicular lesion and the periodontal examination showed that periodontal disease is present in both groups.

Results in Table 2 demonstrated the clinical characteristics differences in the test group between living environment, ages and parity classes.

In the test group overall, 31 women aged less than or equal to 27 (the youngest) and 21 women over 27 years old (the oldest). In this sample, it had significant difference in the average of DMFT index, gingival recession and dental mobility between the youngest women oldest women. Also, the study found an average of plaque index, gingival index and pocket depth with no significant difference between the youngest and the oldest women.

In the same test group overall (28 urban women and 25 of rural women) an average DMFT index, pocket depth, gingival recession and the degree of inter-radicular lesion with no significant difference between urban and rural women was found.

Additionally, it was found that an average of plaque index, gingival index significantly higher and tooth mobility significantly lower in rural women.

Overall, in the test group it had 17 primiparous women and 35 multiparous women. In this sample, it had an average dmft index significantly increase in multiparous women.

Table 1: Comparison of socio-demographic and clinical characteristics between pregnant and non-pregnant women

Variables and modalities	Pregnancy women (Mean±SD)	Control women (Mean±SD)	t-test
Average women's age	25.59±5.83 (N = 52)	28.50±6.48 (N = 52)	-2.40*
Average DMFT index	10,26±5.7 (N = 50)	11.49±5.6 (N = 51)	-1.32 <sup>ns</sup>
Average PI index	2.31±0.66 (N = 53)	2.69±0.50 (N = 50)	-3.33**
Average GI index	1.88±0.34 (N = 53)	1.81±0.41 (N = 51)	0.97 <sup>ns</sup>
Average periodontal pockets	5.77±1.36 (N = 53)	5.65±1.35 (N = 52)	0.45 <sup>ns</sup>
Average gingival recession	2.45±1.4 (N = 53)	2.3±1.02 (N = 52)	0.64 <sup>ns</sup>
Average dental mobility	0.67±1.03 (N = 53)	0.32±0.78 (N = 52)	1.97**
Average inter-radicular lesion	0.47±0.60 (N = 53)	0.63±0.76 (N = 52)	-1.21 <sup>ns</sup>

\*SD: Standard deviation, The statistical analysis was performed by t-test, significant at  $\alpha = 5\%$ , DMFT index: Decayed missing filled teeth, PI index: Plate index, GI index: Gingival index

Table 2: Socio-demographic and clinical characteristics in the pregnant women

	Living environment			Age classes			Parity		
	Rural	Urban	t-test	≤27 years	>27 years	t-test	Primiparous	Multiparous	t-test
DMFT	9.54±4.65 (N = 24)	10.92±4.65 (N = 26)	1.2 <sup>ns</sup>	8.60±3.44 (N = 30)	12.79±3.66 (N = 19)	-4.05***	8.12±3.61 (N = 16)	11.24±3.90 (N = 33)	-2.68**
PI	2.78±0.35 (N = 25)	1.89±0.58 (N = 28)	-6.9***	2.38±0.59 (N = 31)	2.26±0.71 (N = 21)	0.61 <sup>ns</sup>	2.48±0.66 (N = 17)	2.26±0.62 (N = 35)	1.13 <sup>ns</sup>
GI	2.00±0.28 (N = 25)	1.79±0.37 (N = 28)	-2.3*	1.91±0.34 (N = 31)	1.88±0.30 (N = 21)	0.32 <sup>ns</sup>	1.97±0.37 (N = 17)	1.87±0.30 (N = 35)	0.97 <sup>ns</sup>
Periodontal pocket depth	5.96±1.64 (N = 25)	5.60±1.64 (N = 28)	-9 <sup>ns</sup>	5.70±1.53 (N = 31)	5.90±1.13 (N = 21)	-0.50 <sup>ns</sup>	5.88±1.90 (N = 17)	5.74±1.06 (N = 35)	0.34 <sup>ns</sup>
Gingival recession	2.32±0.85 (N = 25)	2.57±0.85 (N = 28)	0.7 <sup>ns</sup>	2.11±0.88 (N = 31)	3.00±1.83 (N = 21)	-2.06*	2.23±0.90 (N = 17)	2.6±1.59 (N = 35)	-0.84 <sup>ns</sup>
Tooth mobility	0.32±0.9 (N = 25)	1±0.9 (N = 28)	2.5*	0.38±0.84 (N = 31)	1.09±1.18 (N = 21)	-2.40*	0.35±0.86 (N = 17)	0.83±1.09 (N = 35)	-1.70 <sup>ns</sup>
Inter-radicular lesion	0.4±0.70 (N = 25)	0.53±0.70 (N = 28)	0.8 <sup>ns</sup>	0.45±0.62 (N = 31)	0.52±0.60 (N = 21)	-0.41 <sup>ns</sup>	0.35±0.60 (N = 17)	0.54±0.61 (N = 35)	-1.05 <sup>ns</sup>

The statistical analysis was performed by t-test, significant at  $\alpha = 5\%$ , DMFT index: Decayed missing filled teeth, PI index: Plate index, GI index: Gingival index

Finally, the average plaque index, gingival index, pocket depth, gingival recession and inter-root lesion were found with no significant difference between primiparous and multiparous women.

## DISCUSSION

It has been known that the inflammatory and immunity response mediators are altered during pregnancy which is due to enhanced progesterone and estrogen levels, because of these changes, as well as oral self-care and life habits; risk to periodontal disease may increase among pregnant women<sup>5,6</sup>. Jain and Kaur<sup>23</sup> reported that the higher incidence of dental caries in the third trimester group is due to increased levels of *Streptococcus mutans* and *Lactobacillus* in late pregnancy.

In addition, Vergnes *et al.*<sup>24</sup> found a high frequency of tooth decay and decayed teeth among pregnant women, in the study it found an important average of DMFT index in both groups which it means that women have a bad dental status whether they are pregnant or not. Otherwise, the study conducted by Alejandro *et al.*<sup>20</sup> that showed the prevalence of untreated dental caries among women aged 15-24 years was significantly higher in pregnant women than in non-pregnant women (41% vs. 24%,  $p = 0.001$ ) which it confirms the results.

Also, Maybodi *et al.*<sup>25</sup> remarked an enhanced gingivitis between the first and the third trimester and Tilakaratne *et al.*<sup>26</sup> found a significantly increased average of gingival index among pregnant women in both the 1st and 2nd trimesters compared to the non-pregnant women.

Likewise Gursoy *et al.*<sup>21</sup> demonstrated the recovery from gingivitis after childbirth. Furthermore, the study conducted by Carrillo-de-Albornoz *et al.*<sup>27</sup> elucidated that plaque index was the strongest predictor implicated in the gingival index throughout pregnancy and after.

It was already observed that tooth mobility may enhance during pregnancy but and decrease in postpartum.

The changes in the lamina dura, in the attachment apparatus or from the underlying pathology can produce mobility<sup>28</sup>. Sidqui *et al.*<sup>29</sup> found a degree of tooth mobility significantly higher in the test group than in the experiment group which is confirm the study.

Equally, the study of Xie *et al.*<sup>16</sup> found a significant difference of periodontal pocket depth in pregnancy and post-partum and the study of Gursoy *et al.*<sup>21</sup> and WHO<sup>30</sup> remarked that depth of periodontal pockets increased without relation to plaque between the 1st and 2nd trimesters. Moreover the studies conducted by Mascarenhas *et al.*<sup>28</sup> and Chung *et al.*<sup>31</sup> found that gingival bleeding and periodontal pocket depth increase for pregnant women with some periodontal symptoms before pregnancy<sup>32</sup>.

Finally Taani *et al.*<sup>33</sup> found a higher plaque, gingival index and periodontal pocket depth with multiparous than primiparous and Tilakaratne *et al.*<sup>26</sup> found similar values of plaque index for pregnant and non-pregnant rural women of Sri Lanka.

## CONCLUSION

The oral health status of the population studied showed high prevalence of oral pathology (dental caries and gingivitis). Pregnancy indeed contributes to the development of dental and periodontal diseases but secondarily with the involvement of other factors such as age, parity and rural living environment. Oral health promotion programs must continue to inform pregnant women about proper oral hygiene self-care and utilizing of professional dental care before during and after pregnancy and especially rural, aged and multiparous women.

## SIGNIFICANCE STATEMENT

Dental and periodontal diseases are serious problems of public health all over the world; especially among pregnant women which can cause many pregnancy outcomes. The lack of oral education and dental cares, particularly in developing countries and rural areas may increase these affections. Many

studies found that pregnancy contribute to the development and the worsening of dental and periodontal diseases.

The result of this study shows the implication of the status of pregnancy in dental and periodontal outcomes but also determines the implication of socio-demographic disparities that sometimes could mask the effect of pregnancy.

This work will complement the limited knowledge of the existing interaction between pregnancy, environment living and dental and periodontal affections. It is also a fundamental starting of public health preventive or therapeutic strategies.

## ACKNOWLEDGMENT

We thank Dr. ABBASSI BOUCHRA periodontist and member of the Moroccan Society of Periodontology and Implantology who provides us scientific support; the employees of health centers of ZERKTOUNI-MARRAKESH and EL ATTAOUIA for their support and all contributions.

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