

Article

Oral Mucosal Disorders in Pregnant *versus* Non-Pregnant Women

Fahimeh Rezazadeh ^{1,†}, Neda Falsafi ^{2,†}, Zahra Sarraf ^{3,†} and Mohammad Shahbazi ^{4,*}

¹ Department of Oral and Maxillofacial Medicine, School of Dentistry, Shiraz University of Medical Sciences, Shiraz 7195615878, Iran; E-Mail: rezazadehf@sums.ac.ir

² Baqeyatollah Polyclinic, Kazirun Gate, Shiraz 1993643114, Iran; E-Mail: nfalsafi@ymail.com

³ Division of Gynecology, Department of Obstetrics/Gynecology, Shiraz University of Medical Sciences, Shiraz 7139748479, Iran; E-Mail: zahrassarraf@gmail.com

⁴ Department of Behavioral and Environmental Health, Jackson State University, Suite 3201-B, Jackson Medical Mall, 350 Woodrow Wilson Ave, Jackson, MS 39213, USA

† These authors contributed equally to this work.

* Author to whom correspondence should be addressed; E-Mail: mohammad.shahbazi@jsums.edu; Tel.: +1-601-979-8845; Fax: +1-601-979-8848.

External Editor: Jukka Meurman

Received: 31 August 2014; in revised form: 8 November 2014 / Accepted: 20 November 2014 /

Published: 2 December 2014

Abstract: The effects of pregnancy on the Oral Mucosa Disorder (OMD) have been sporadically documented in some developed countries. Less known is the status of OMD during pregnancy in less developed/developing countries. Iran is no exception. This study assesses the prevalence of OMD in 200 pregnant women and compares the findings with the findings from a 200 non-pregnant woman of similar age distribution in Iran. The participants had been referred to a clinic to receive reproductive age-related services. Participants suffering from systemic chronic diseases, those on medications/drugs, smokers, needing biopsies, and those with urgent Oral Mucosal Lesion (OML) treatments were excluded from the study. Oral mucosal of all 400 participants were examined. The participants' age ranges were from 17 to 47; with the average age of 33.14 for one group; and 30.23 for the other group. Both groups had the same level of formal education. Out of 400 examined women; 62 had lesions, including 47 pregnant (23.5%); and 15 non-pregnant (7.5%) women. This result shows that the OMD rate of occurrence was significantly higher among the pregnant women. Higher OML prevalence in pregnant women, as compared to

the non-pregnant women, indicates the importance of timely oral examination of pregnant women and subsequent treatment plans for them.

Keywords: Oral Mucosa Disorder (OMD); Oral Mucosal Lesion (OML); pregnancy; pregnancy-related lesion; Shiraz; Iran

1. Introduction

Pregnancy is an important milestone in women's life. Complex physiological and hormonal changes take place during the pregnancy. The pregnancy itself is not the reason for these changes. The metabolic changes of tissues and increased immune system responses to the local and etiological factors are the cause for such changes [1,2].

Oral mucosa, which is a specialized type of tissue that lines the mouth, is supposed to protect the body from infections and debris. The protective line in the mouth is affected by various disorders. Oral mucosal changes, during pregnancy, have been subject of interest for years; however, the causes of these changes are not well documented [3,4]. Accordingly, different oral and dental complications are reported during the pregnancy. The majority of changes observed are the gingivitis and pregnancy tumor [3].

Pregnancy gingivitis is one of the most prevalent diseases of oral cavity during the pregnancy, which is observed in about 50%–98% of pregnant women. It starts around the 2nd or 3rd month and increases in the 8th month and then declines with the reduction in synthesis of these hormones [4]. Pregnancy tumors are one of the oral mucosal lesions, which are seen in 5% of pregnant women. Due to increased activity of estrogen and progesterone, these lesions are more common during pregnancy [4]. In other studies, sialorrhoea [3], tooth mobility [5], and severe diffused attrition [6] have been reported. The mechanisms by which women are susceptible to dental loss during pregnancy are believed to be due to periodontitis and hormonal changes; hygiene also plays a role [4].

Given that most Oral Mucosal Disorders (OMD) are chronic, they can affect the quality of life of those who suffer from them [7]. Some are debilitating for the patient and some may lead to serious disorders [4]. Other lesions like inflammatory hyperplasia tend to grow and cause prominent lesions in the oral cavity. These lesions may cause difficulty in swallowing, chewing, breathing, talking and oral hygiene [2]. Additionally, different studies show that some of oral mucosal change has negative effect on pregnancy outcome and the newborn. Some studies show an association between periodontal diseases and pregnancy outcomes such as Preterm Labor and low birth weight [8]. Treatment may prevent low birth weight [9]. Other studies point out the transmission of the infection from mother to the newborn [10].

Many Epidemiological and biological studies have focused on oral lesions. However, very few of them have provided appropriate information on oral disorder during pregnancy. Additionally, there is no clear information regarding prevalence of these diseases in Iranian pregnant women. Such information on pregnancy-related lesions will help in early diagnosis and its control, and assist dentists and the public health officials in estimating services needed and their related costs that would promote oral health. It will also increase the chance of quick recovery. Awareness of patients about the temporary nature of some of these conditions can be psychologically and or emotionally useful to the patients.

Given the existing gap in literature and the lack of specific studies on Oral Mucosal Lesion (OML), this study reports the finding of a comparative evaluation of the prevalence of OMD in pregnant and non-pregnant women. The findings will not only contribute to the existing body of knowledge in the field of dentistry but it can also encourage the oral health providers to follow best practices and perhaps advocate pertinent programs and policies that would ultimately serve the mothers, their unborn babies and the community at large.

2. Materials and Methods

In this case control study, 400 women, who were referred to treatment centers within public hospitals affiliated with Shiraz University of Medical Sciences in Shiraz, during August 2012 through March 2013, participated, by convenience sampling. Two hundred pregnant women (age range: 17–47 years old) were selected as the study group and the other 200 served as the control group. Individuals with systemic diseases, drug consumption (antibiotic or any drug used for treatments), smokers and alcohol users were excluding from this study. Non pregnant women who had history of pregnancy during previous year also were excluded.

After the patients signed the consent forms, a data sheet that included age, formal education, pregnancy duration and history of pregnancy and or abortion, were completed and all participants were examined by a dentist. The dentist, attending these participants, had undergone special training on diagnosis of OMD. The dentist was also trained to take pictures from the oral mucosal lesions. The oral examination was conducted in sitting positions, with the same condition and the dentist equipped with headlight, sterile plastic mirror and periodontal probe. The case history and clinical examination of each participant was recorded in her medical file. The World Health Organization (WHO) and “Bradley” indices were used as a diagnosis indices for OMD [11,12].

In case of unusual clinical appearance, rapid growth, history of paresthesia or pain, ulcer on the surface of lesion or suspicion of malignancy, participants were referred to Oral Medicine Department, Shiraz University of Medical Sciences for further diagnostic tests, biopsies and treatments as needed.

At the end, the collected data, which were categorized in two groups, was analyzed using SPSS, Version 18 [13]; *t-test* and OR were calculated. A *p* 0.05 was defined as the meaningful level of significance for this study.

3. Results

All 400 participants; 200 pregnant and 200 non-pregnant women, were examined. The participants' age ranged from 17 to 47 years; with the average age of 33.14 for the non-pregnant; and 30.23 for pregnant women.

The case- and control- groups had the same educational level. Out of 400 examined persons; 62 persons had OMD, including 47 pregnant (23.5%); and 15 non-pregnant (7.5%) women. This result clearly shows that the OMD rate was significantly higher among the pregnant women (OR: 3.79; 95% CI: 2.04–7.04).

Observed oral Disorders are shown in Table 1. The most common oral disorders in pregnant women were burning mouth sensation (5%); cheek biting (3.5%), petechia (3%), and geographic lesions (2.5%).

Table 1. Oral disorders in non-pregnant and pregnant women in this study.

Oral disorder	Non-pregnant women number and %	Pregnant women number and %
BMS	0(0%)	10(5%)
Parulis	1(0.5%)	8(4%)
Cheek biting	1(0.5%)	7(3.5%)
Petechiae	1(0.5%)	6(3%)
Geographic tongue	2(1%)	5(2.5%)
Pregnancy tumor	0(0%)	3(1.5%)
Physiologic Pigmentation	3(1.5%)	3(1.5%)
Lichen Planus	4(2%)	2(1%)
Oral Candidiasis	1(0.5%)	2(1%)
Fibroma	0(0%)	1(0.5%)
Buccal exostosis	1(0.5%)	0(0%)
Fissured tonuge	1(0.5%)	1(0.5%)
Epulis Fissuratum	1(0.5%)	0(0%)
Mucocele	0(0%)	1(0.5%)
HPV Related lesion	0(0%)	2(1%)

The mean age of pregnant women with oral lesion was significantly higher compared to pregnant women without the lesions ($P: 0.038$). There was no significant correlation between oral lesions in pregnant women and gestational age (OR: 1.7, 95% CI: 0.7–4.11).

Gravidity in pregnant women with lesions was significantly higher compared to those without lesions, ($p: 0.007$). The prevalence of OMD in pregnant women was higher in those with vomiting (OR: 4.94, CI: 1.79–140.1). Furthermore, the chance of OMD in women who had the positive history of previous abortion was eight times higher than those who had not previous history of abortion. (OR: 6.6, 95% CI: 2.8–15.8).

4. Discussion

Physiologic changes during pregnancy can occur along with the changes in oral mucosa. Due to importance of these changes, this study evaluated oral mucosa lesions in Iranian pregnant women. Previous studies, for most the part, report on the periodontal disease behavior in pregnant women. Given that this study involved only oral mucosa lesions, it is difficult to compare the results of this study with previously reported studies.

Major finding of this study have shown that 23.5% of the pregnant women have the lesions that have a meaningful difference as compared to the control group. High level of estrogen causes immune suppression by inflammatory cell function inhibition. As a result, the body reaction to bacterial plaques changes leads to the increase in clinical presentation of the lesions [14].

The finding of this study is similar to Sarifakioglu [15] and Annan [3] study and in contrast to the result of Diaz-Guzman [4] study. The cause of this difference can be due to the methodology of the study. In Diaz-Guzman study, which was a retrospective study, the control group consisted of 5537 files of non-pregnant women and only 93 pregnant women were examined. The possible higher percentage of the lesions in the control group is perhaps due to mismatching of sample volume.

Based on findings of this study, the biggest mucosal change during pregnancy is a burning sensation. Since different factors cause the mouth burn, to rule out the systemic diseases like gestational diabetes, anemia or Candidiasis, more laboratory evaluation is needed. Meanwhile, the most likely cause of burning sensation can be attributed to iron deficiency anemia or folic acid deficiency during pregnancy. Thus, the gynecologists' emphasis on the use of these supplements during pregnancy is very helpful in incidence reduction of this symptom.

Parulis is a mucosal lesion related to chronic periapical infection. Prevalence of this lesion may lead to high rate of caries and dental infections during pregnancy. Alteration of normal flora in oral cavity, buffering and saliva PH reduction, and also changes in oral hygiene are reported as some of the causes of high incidence of parulis in this period [16]. A few studies have also mentioned the high incidence of DMF during pregnancy [10,17]. However, parulis reflects the lack of tooth care and persistence of chronic oral infections during pregnancy, indicating that the patients are not aware of the importance and safety of dental care for mother and fetus. In this study, cheek biting, which refers to chronic cheek chewing and mucosal habit, was a common mucosal finding in the pregnant women. In an earlier study, Sarifakioglu, this was the most common OMD with a significant difference observed for the control group among the pregnant women. These higher incidences can be attributed to weight gain, stress and anxiety during pregnancy. In the study undertaken, the prevalence of geographic tongue was 2.5 times more than the control group (similar finding in Diaz-Guzman and Sarifakioglu with 3% and 5% respectively). Also in Musyka study, 6% of the HIV negative pregnant women and 4% of the HIV positive pregnant women had this oral finding [18]. Because of being multi factorial, the relation between this finding and pregnancy is unclear.

In this study, Pyogenic Granuloma, which is an old OMD and a part of the changes during pregnancy, was more common in pregnant women, which is similar to previous studies [3,4]. Nevertheless, in Sarifakioglu [15] study, there are no reported cases of this kind of OMD. In gingivitis, delay in metabolism of progesterone results in increasing of it in the tissue and intensify reaction to the local stimuli. Besides, high amounts of Vascular Endothelial Growth Factor (VEGF) and Fibroblast Growth Factor (FGF) in this lesion, which is responsible for vascularization are the causes of high prevalence of this finding in pregnancy [3,19–21].

To the best of our knowledge, no empirical study has established a relation between OMD and pregnancy condition. In this study, oral lesions prevalence and age have a meaningful correlation in pregnant women ($p = 0.038$)—accordingly the incidence of such changes increase with the age of the subjects. This finding is also similar to OMD prevalence of the reported epidemiologic studies [7,22,23].

Although there is not a significant relation between OMD and pregnancy age in this study, most of the oral lesions are seen in the second trimester of the pregnancy. Increase in hormonal change, weight gain and nutritional needs as well as stress and anxiety in the late months of the pregnancy can be the reasons for most oral mucosal changes.

Some cases of OMD are seen in multiparous women. This might suggest that this can be attributed to increasing nutritional deficiency, lack of dental health care or rising age during the next pregnancies. To answer this question, empirical studies are needed. However, with regard to the results of this study, pregnant women with vomiting had more oral lesions (similar to Sarifakioglu study [15]). Lack of oral health care can be referred to gag reflux. Furthermore, acid reflux to the mouth may cause oral

mucosal changes leading to atrophy or burning of the tongue, but as mentioned further studies are needed to closely examine such as a relation.

One of the limitations of this study was the lack of lesion biopsy, which in some cases, led to exclusion of the non-diagnosed subjects from the study. The biopsy was not done because subject's consent was not obtained for this testing. However, most epidemiological studies have this limitation due to the high sample volume. Only in some studies was a biopsy done to rule out the malignant lesions [7]. The latter cases were referred to biopsy tests. Another limitation was that dentist should have randomly rechecked some patients' initial dental examinations for quality control and consistency; however, restrictions imposed by the involved institutions prevented this.

Oral examination in some cases was done by the specialist, who was sometimes assisted by general practitioners. The later were trained prior to conducting the study [7]. For oral diseases diagnosis, a trained GP has the ability to gather and provide appropriate data and information [7]. This study took a similar approach. With regards to the relation between oral lesions and some medications or special disease, perhaps exclusion factors stated earlier were the reasons for the lower prevalence of OMD in control group of this study compared to other epidemiological studies in normal population.

Considering that the pregnant women were examined and oral lesion was not the cause of referring of any of the pregnant women, the result of this study may be generalized to the whole population.

Finally, it is clear that oral lesions diagnosis is an important part of dental practice. The OMD prevalence is also a significant index for oral health evaluation in every population. Thus, in planning health care, for target groups such as pregnant women, the planners must keep the oral health needs of this population in mind. Moreover, due to a possible relationship between periodontal diseases and individual health, and a possible correlation between oral health of the mother and child, the pregnant women health centers should operate in a close cooperation with dentists. There should be a plan in place to perform oral examination and evaluate oral lesions on all pregnant women during their first visit. The pregnant women must also be educated about the importance of oral hygiene and be advised to closely observe their oral health during the pregnancy. In addition to early diagnosis and treatment of the lesions, public health-based approach program can prevent developing lesions during pregnancy.

It is important to note that more prospective studies, with larger sample size (examination before, during and post partum) are undertaken to evaluate the oral lesions and its association with pregnancy complications during this vital period.

5. Conclusions

Higher OMD prevalence in pregnant women, compared to the non-pregnant women, indicates the importance of oral examination of pregnant women. Pregnant women who visit clinics should be routinely examined for OMD.

Acknowledgments

The authors would like to thank the staffs of the clinic in Shiraz where participants in this study were recruited and examined. We also would like to sincerely thank Mukesh Kumar for editing the revised draft. Furthermore, we wish to thank editors of the Journal as well as the reviewers for their

constructive feedback. Their inputs have significantly improved this manuscript and we cannot thank them enough.

Author Contributions

Authors have equally contributed to this work. Zahra Sarraf came up with the idea of his research and encouraged Neda Falsafi to operationalize it; Neda Falsafi worked closed with Fahimeh Razazadeh to design and conduct the study. Fahimeh Rezazadeh and Neda Falsafi wrote the early draft, reviewed and corrected by Zahra Sarraf. Mohammad Shahbazi worked on final draft of this paper with ongoing inputs from the co-authors.

Conflicts of Interest

The authors declare no conflict of interest.

References

1. Fritz, M.A.; Speroff, L. *Clinical Gynecologic Endocrinology and Infertility*, 8th ed.; Wolters Kluwer/Lippincott Williams & Wilkins: Philadelphia, PA, USA, 2011.
2. Gungormus, M.; Akgul, H.M.; Yilmaz, A.B.; Dagistanli, S.; Erciyas, K. Generalized gingival hyperplasia occurring during pregnancy. *J. Int. Med. Res.* **2002**, *3*, 353–355.
3. Annan, B.; Nuamah, K. Oral pathologies seen in pregnant and non-pregnant women. *Ghana Med. J.* **2005**, *39*, 24–27.
4. Diaz-Guzman, L.M.; Castellanos-Suarez, J.L. Lesions of the oral mucosa and periodontal disease behavior in pregnant patients. *Med. Oral Patol. Oral Cir. Bucal.* **2004**, *9*, 430–437.
5. Pirie, M.; Cooke, I.; Linden, G.; Irwin, C. Dental manifestations of pregnancy. *The Obs. Gynaecol. J.* **2007**, *9*, 21–26.
6. Kanotra, S.; Sholapurka, A.; Pai, K.M. Dental consideration in pregnancy. *Rev. Clin. Pesq. Odontol.* **2010**, *2*, 161–165.
7. Robledo-Sierra, J.; Mattsson, U.; Svedensten, T.; Jontell, M. The morbidity of oral mucosal lesions in an adult Swedish population. *Med. Oral Patol. Oral Cir. Bucal.* **2013**, *18*, e766–e772.
8. Kavar, N.; Alranyes, S. Periodontitis in pregnancy: The risk of preterm labor and low birth weight. *Dis Mon.* **2011**, *57*, 192–202.
9. Jeffcoat, M.K.; Hauth, J.C.; Geurs, N.C.; Reddy, M.S.; Cliver, S.P.; Hodgkins, P.M.; Goldenberg, R.L. Periodontal disease and preterm birth: Results of a pilot intervention study. *J. Periodontal* **2003**, *74*, 1214–1218.
10. Karunachandra, N.N.; Perera, I.R.; 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.
11. Kramer, I.R.; Pindborg, J.J.; Bezroukov, V.; Infirri, J.S. Guide to epidemiology and diagnosis of oral mucosal diseases and conditions. *Community Dent. Oral Epidemiol.* **1980**, *8*, 1–26.

12. Axéll, T.; Pindborg, J.J.; Smith, C.J.; van der Waal, I. Oral white lesions with special reference to precancerous and tobacco-related lesions: Conclusions of an international symposium held in Uppsala, Sweden, May 18–21 1994. International Collaborative Group on Oral White lesions. *J. Oral Pathol. Med.* **1996**, *25*, 49–54.
13. Coakes, S.J.; Ong, C. *SPSS: Analysis without Anguish (Version 18 for Window)*; John Wiley and Sons: Milton, QLD, Australia, 2011.
14. López, N.J.; Smith, P.C.; Gutiérrez, J. Higher risk of preterm birth and low birth weight in women with periodontal disease. *J. Dent. Res.* **2002**, *81*, 58–63.
15. Sarifakioglu, E.; Gunduz, C.; Gorpeloglu, C. Oral mucosa manifestation in 100 pregnant versus non-pregnant patients: An epidemiological observational study. *Eur. J. Dermatol.* **2006**, *16*, 674–676.
16. Honkala, S.; Al-Ansari, J. Self-reported oral health, oral hygiene habits, and dental attendance of pregnant women in Kuwait. *J. Clin. Periodontol.* **2005**, *32*, 809–814.
17. Villa, A.; Abati, S.; Pileri, P.; Calabrese, S.; Capobianco, G.; Strohmenger, L.; Ottolenghi, L.; Cetin, I.; Campus, G.G. Oral health and oral diseases in pregnancy: A multicentre survey of Italian postpartum women. *Aust. Dent. J.* **2013**, *58*, 224–229.
18. Muzyka, B.C.; Kamwendo, L.; Mbweza, E.; Lopez, N.B.; Glick, M.; Matheson, P.B.; Kershbaumer, R.; Nyrienda, T.; Malamud, D.; Constantine, N.T.; *et al.* Prevalence of HIV-1 and oral lesions in pregnant women in rural Malawi. *Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod.* **2001**, *92*, 56–61.
19. Whitaker, S.B.; Bouquet, J.E.; Alimario, A.E.; Whitaler, T.J., Jr. Identification a semiquantification of estrogen and progesterone receptors in pyogenic granulomas of pregnancy. *Oral Surg. Oral Med. Oral Pathol.* **1994**, *78*, 755–760.
20. Yuan, K.; Jin, Y.T.; Lin, M.T. The detection and comparison of angiogenesis associated factors in pyogenic granuloma by immunohistochemistry. *J. Periodontol.* **2000**, *71*, 701–709.
21. Yuan, K.; Wing, L.Y.; Lin, M.T. Pathogenetic roles of angiogenic factors in pyogenic granulomas in pregnancy are modulated by female sex hormones. *J. Periodontol.* **2002**, *73*, 701–708.
22. Bhatnagar, P.; Rai, S.; Bhatnagar, G.; Kaur, M.; Goel, S.; Prabhat, M. Prevalence study of oral mucosal lesions, mucosal variants, and treatment required for patients reporting to a dental school in North India: In accordance with WHO guidelines. *J. Family Community Med.* **2013**, *20*, 41–48.
23. Delavarian, Z.; Zavar, S. Prevalence of oral lesions and awareness of their presence in patients attending to Oral-Medicine Center of Mashhad Dental School. *Beheshti. Univ. Dent. J.* **2004**, *22*, 425–436.