Original Article

Frequency of epulis gravidarum in pregnant

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Abstract

Context: Epulis gravidarum in pregnancy is a condition usually affecting pregnant women between the 3rd and 9th months of pregnancy.

Aims: Considering the lack of precise statistics about the prevalence of this condition in the Mazandaran province, we set out to conduct a study for examining the frequency of epulis gravidarum among pregnant women in Sari and Ghaemshahr cities in 2020.

Setting and Design: In this cross-sectional investigation, 1800 pregnant women were studied by stratified random sampling method in healthcare centers in Sari and Ghaemshahr in 2020.

Materials and Methods: In total, 30 centers were monitored during 2 working months and from each center, about 60 pregnant women were selected. A checklist was designed to record the data, including demographic characteristics as well as the oral health status of the participants. Then, intraoral examination was performed to detect the epulis gravidarum.

Statistical Analysis Used: Data were analyzed through descriptive (mean, standard deviation, and frequency) Chi-square, and Cramer's V correlation coefficient.

Results: The prevalence of epulis gravidarum was 4.38% (79 pregnant women). Furthermore, 11.27% of the total participants in the study were women in their 1st to 3rd months of pregnancy; 47.55% in 4th to 6th months, and 41.18% in 7th to 9th months of pregnancy. Based on multivariate logistics analysis, a significant relationship was observed between the use of cigarette smoking ($P < 0.001$), low age ($P = 0.002$), and don't use of floss ($P < 0.001$) and presence of epulis gravidarum.

Conclusion: The results indicated that oral and dental health care is very important during pregnancy, and if women observed any atypical lesions during pregnancy in their mouth, they should consult a dentist.

Keywords: Epulis, Gravidarum, Tumor, Pyogenic, Granuloma

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Received: 12 July 2021; **Revised:** 15 August 2022; **Accepted:** 24 September 2022; **Published:** 14 December 2022

Access this article online	
Quick Response Code:	Website: www.jnmsjournal.org
	DOI: 10.4103/jnms.jnms_115_21

How to cite this article: Molania T, Salehabadi N, Zahedpasha S, Yazdani J, Imani B, Ghasemi S, *et al*. Frequency of epulis gravidarum in pregnant women in Sari and Ghaemshahr cities in Iran in 2020. J Nurs Midwifery Sci 2022;9:303-09.

INTRODUCTION

Pregnancy is a condition through which changes in the physiology of women's bodies leads to development of the fetus. These changes that occur in tissues, organs, the immune system, and the level of hormones lead to fetal development and eventually termination of pregnancy and delivery.[1] Elevation of hormones is associated with changes in the oral mucosa and skin such as striae and angioma. In addition to the changes in tissue and mechanisms, levels of steroid hormones in the blood and saliva will also increase.[2] These hormones are a reason for changes in the oral mucosal and gum. According to Strawinsky classification, gingival problems in pregnant women are as follows: simple pregnancy gingivitis (gingivitis gravidarum simple), gingivitis gravidarum hemorrhagic (hemorrhagic pregnancy gingivitis), gingivitis gravidarum hypertrophic localisata, gingivitis gravidarum hypertrophic generalist, and epulis gravidarum (pregnancy tumor). In the last and fifth class, he states epulis gravidarum (pregnancy tumor),[2] which is a type of pyogenic granuloma.[2] Epulis means tumor or local development of the tissue, which can be best described by a pseudo-inflammatory tumor rather than a real neoplasm or granuloma.[3] Pregnant women with this condition are usually in the middle of their 3rd and 9th months of pregnancy.[4,5] Pregnancy epulis is a local and soft hyperplastic lesion in the gingiva occurring in about 5% of pregnant women.[6,7] Clinically and histologically, this lesion is similar to pyogenic granuloma in men and nonpregnant women.[6,7] Clinically, it is an exophytic lesion with a smooth or lobulated surface which are pedunculated or sessile papules,[8,9] which bleed either with stimulation or sometimes spontaneously. Its color can be variable depending on age and ranges from pink to purplish red. The young lesions are apparently highly vascular,[10] because they consist of hyperplastic granular tissue with prominent capillaries. Thus, a minor trauma in the lesion may lead to notable bleeding because of the prominent vessels[8] while the older lesions tend to make collagen fibers and pink discoloration.[10] The tumor size may be variable, which can even grow to a diameter of 2 cm. The growth of this lesion can occur in any part of gingiva, although it mostly occurs at labial mucosa and in the interdental papilla, and is more prevalent in the maxilla than the mandible.[11] The teeth around this lesion may shift or become loose.[6] Furthermore, sometimes, bone degradation occurs around the teeth that are directly involved.[7,11] It is believed that the origin of this lesion is in response to chronic stimulating factors such as traumatic occlusion, dental plaque, or rough surface of a dental filling. In addition, pregnancy-associated hormonal changes that cause overreaction to dental plaque can be another factor affecting the formation of pregnancy epulis.[12] For example, estrogen causes the increased production of vascular endothelial growth factor in macrophages, which may be associated with the growth of pregnancy tumor.[13] This lesion, because of its special tissue structure, easily causes ulcers or bleeding during brushing teeth, resulting in the development of secondary problems such as oral infection.[14,15] Further, severe bleeding can also cause physical and psychological complications for the patient. The epulis gravidarum, in case it grows considerably, may clinically interfere with mastication, causing insufficient nutrition for the mother and thus inadequate fetal development. In case the lesion remains undiagnosed, taking the wrong treatment such as a drug prescription can be inessential and dangerous.[3,16] Thus, the control and treatment of this condition or its complications considering the problems of pregnancy period are considered a major issue for both the patient and clinician.[7,10] Note that once the pregnancy period is completed and hormonal conditions reverse to the normal state, these cases will improve. In order to prevent stimulation of the gingiva, observing the oral health as well as removing the dental plaques are among the essential measures to be taken for preventing epulis formation.[10,17,18] Considering the prevalence of epulis gravidarum in pregnant women and its resulting complications and since this tumor can be easily prevented by observing oral health and performing prophylactic treatments during pregnancy,[4] awareness about the tumor prevalence in our society is important for planning in this regard. Considering the absence of precise statistics about the prevalence of this lesion in the region, we intended to conduct a study for investigating the prevalence of epulis gravidarum among pregnant women in Sari and Ghaemshahr cities in Iran in 2020.

MATERIALS AND METHODS

The present study is a cross-sectional study performed on pregnant women referring to healthcare centers of Sari and Ghaemshahr cities in 2020. This research was approved by the Ethics Committee of Mazandaran University of Medical Sciences (ethics code: IR.MAZUMS.REC.1399.7817). In Ghaemshahr city, there were 13 urban health centers, of which 10 more active centers (based on the number of referrals and available files) were identified and included in the study. In Sari city, there were 20 urban health centers that were all included in the study (the study population included only urban health centers and rural health centers were not included to make the information more homogeneous). In total, 30 centers were monitored during 2 working months and from each center, about 61 pregnant women were selected based on the negative

bionomial model (this model allows sampling to continue until the sample size is reached). Based on the study by Kia *et al.* (2013), for calculating the sample size, according to the results obtained from the study and significance level of 95%,[19] the sample size was considered 1824 subjects based on the stratified random sampling method.

$$n = \frac{Z^2_{1-\frac{\alpha}{2}} p(1-p)}{d^2} = 1824, p = 0.05, \alpha = 0.05, d = 0.01$$

The inclusion criteria were pregnant women of Iranian nationality, living in Sari and Ghaemshahr, who were willing to participate in the study, were able to answer questions and allow clinical examinations. The exclusion criteria included the pregnant women with a history of systemic disease, a poor behavioral background favoring malignancy, human immunodeficiency virus infection, as well as hormonal abnormalities such as hyperparathyroidism.[20,21]

Initially, the aim of study and its stages were explained to all participants, and after acquiring written informed consent forms, the patients were assured that their information would remain confidential. Information form was developed in which the demographic and oral health status (use of toothbrush, dental floss, and mouthwash), cigarette smoking, site of oral lesion, the involved jaw, the patients' complaints of swelling and bleeding, or presence of unsuitable dental crown or filling at the site of lesion were examined through inquiry or clinical examination.

Data collection methods involved observation, clinical examination, completing the demographic form, and investigating the medical files of pregnant women by referring to the healthcare centers daily and making phone contact with the pregnant women for presence. Using a mirror and adequate light, the buccal and lingual or palatal gingival surface of the mandible and maxilla were examined. Any red or pink pedanculated or sessile protruding lesion with a soft to hard tissue developed after the beginning of pregnancy or at any time during pregnancy on the gingiva was included in the research, considered as a case of epulis gravidarum (pregnancy tumor).[20] Further, the lesions that appeared pink must absolutely have had a history of red to pink discoloration. In other words, all pregnancy tumors should emerge initially as red with a soft tissue. Examinations were performed by oral medicine specialists participating in the research. In order to discover pyogenic granuloma, the gingiva, vestibule, alveolar mucosa, lips, floor of the mouth, throat, buccal mucosa, as well as the dorsal, ventral, and lateral surfaces of the tongue, plus soft and hard palate were carefully examined.[20]

After completing the information and clinical examinations, the data were analyzed by SPSS version 25 (IBM, New York, USA). Descriptive statistics were used to express frequency, percentage, and mean and standard deviation of variables. Furthermore, for analyzing data and determining the relationship between the variables, the Chi-square test was employed, while for finding correlation between the variables, Cramer``s V correlation coefficient and multivariate logistic regression analysis were utilized. $P < 0.05$ was considered statistically significant.

RESULTS

Initially, 1824 people were included in the study, but 24 did not cooperate and were excluded. Eventually, 1800 of pregnant women were examined in the study. Thus, the response rate was about 98%. The mean age of the participants in the study was 26.43 ± 7.12 years, and the mean age of those with epulis gravidarum in this study was 28.9 ± 10.27 years.

Investigation of the frequency of epulis gravidarum in 1800 pregnant women showed that 79 of them (4.38%) had this lesion. Furthermore, 79 participants with epulis gravidarum were in their 3rd to 9th months of pregnancy, while no lesion was observed in the 1st and 2nd months of pregnancy. The prevalence of epulis gravidarum in different trimesters of pregnancy was not statistically significant [Table 1].

All lesions were sessile and the site of lesion was in the gingiva. Soft-tissue lesion was seen in 55 (70.12%) of participants with epulis gravidarum, while 24 (29.88%) showed a hard-tissue lesion. The color of lesion in most of the patients at the time of referral was purple-red, 65 subjects (82.65%), and in 14 (17.35%) it was pink. The only site of epulis gravidarum was the gingiva; it was observed in the maxilla among 64.55% of women with tumor and in mandible among 35.45% of them. A significant relationship was observed between the involved jaw and epulis gravidarum. The chief complaint of the patients in this study in 17.8% of pregnant women was swelling. The rest of the participants either did not have the chief complaint or were not aware of the presence of the lesion in their mouth at all. The other findings about oral health obtained from the research are presented in Table 1.

There was no significant correlation between the age groups and presence of epulis gravidarum. There was a strong and significant correlation between times of

Table 1: The relation between Epulis gravidarum with some demographic and oral health characteristics in the pregnant mothers referred to Sari and Qaemshahr health centers, 2020

Variables	Total, *n* (%)	Epulis gravidarum, *n* (%)	*P* (Cramer's V)
Month of pregnancy			
1-3	203 (11.27)	7 (8.86)	0.30 (0.024)
4-6	856 (47.55)	41 (51.53)	
7-9	741 (41.18)	31 (39.25)	
Age			
18-23	686 (38.11)	9 (11.4)	<0.001
24-29	939 (52.16)	37 (48.83)	(0.171)
Over 30 years	175 (9.73)	33 (41.77)	
Brushing			
Once a day	590 (32.77)	21 (26.58)	<0.001
Twice a day	368 (20.44)	11 (13.92)	(0.213)
Three times a day	193 (10.74)	3 (3.81)	
Never	649 (36.05)	44 (55.69)	
Use of mouthwash			
Yes	646 (35.89)	8 (10.12)	<0.001
No	1154 (64.11)	71 (89.87)	(0.140)
Flossing			
Yes	409 (22.72)	12 (15.19)	<0.001
No	1391 (77.28)	67 (84.81)	(0.115)
Smoking			
Yes	194 (10.78)	53 (67.08)	<0.001
No	1606 (89.22)	26 (32.99)	(0.413)
Total	1800 (100)	79 (100)	

brushing teeth and epulis gravidarum in the participants; as the number of brushing times increased, the prevalence of epulis gravidarum decreased. Failure to use of mouthwash also showed a significant positive correlation with epulis gravidarum. Finally, there was a significant correlation between the use of dental floss and prevalence of epulis gravidarum. There was a significant correlation between cigarette smoking and presence of epulis gravidarum in this study [Table 1]. Out of 79 women with epulis gravidarum, 57 (72.15%) had inappropriate restoration or dental crown; there was a significant correlation between inappropriate restoration or dental crown and epulis gravidarum in this study ($P = 0.029$). The prevalence of epulis gravidarum in the maxilla and mandible was 64.51% ($n = 51$) and 35.46% ($n = 28$), respectively. A significant correlation was observed between the involved jaw and prevalence of epulis gravidarum among the participants. A significant correlation was also found between the site of lesion (anterior or posterior) and prevalence of epulis gravidarum among the pregnant women ($P = 0.044$).

Table 2 shows the results of multivariate logistics analysis (classification rate = 95%). The results of this analysis showed that smoking increases the average chance of developing this lesion by 20 times. With age, the incidence of this disease decreases. The under-30 age group was 3.68 times more likely to get the disease than the over-30 age group. Mothers who did not floss were about 6% more likely to develop epulis gravidarum.

DISCUSSION

This study aimed to investigate the prevalence of epulis gravidarum among pregnant women in Sari and Ghaemshahr cities in Iran in 2020. Based on the findings, the frequency of epulis gravidarum was reported 4.38%. Epulis gravidarum was found in the 3rd to the 9th months of pregnancy, while no tumor was observed in the 1st and 2nd months. The frequency of epulis gravidarum in previous studies has been reported with different results, some of which have been close to ours, while some were discrepant. A study in Iran, Tehran, reported the prevalence of pregnancy tumor as 72 subjects (4.5%).[20] The results of a study in Iran, Kerman, in 2009 showed that 31 subjects (4.2%) of the study population had pregnancy tumor.[22] Studies in Iran (Rasht) and India reported the frequency of pyogenic granuloma as 1%.[19,23] A study in Iran, Mashhad, evaluated the periodontal tissue of pregnant women referring to the faculty of dentistry of Mashhad and estimated the prevalence of PG as 10%.[24] These differences of frequencies across various studies can be attributed to different sample sizes as well as the cultural and health conditions plus differing the inclusion and exclusion criteria and diagnostic methods (clinical or histological).

The only site of epulis gravidarum in this study was the gingiva; presence of epulis gravidarum in the maxilla was significantly higher than mandible. The results of a study in Iran, Tabriz showed that the frequency of this lesion was higher in the gingival region.[25] A study examined 38 cases of PG lesions in Nigeria and observed that the gingiva was the main site of involvement (74%).[26] An examination in India, in 2009 showed that 55% of PG lesions was in the maxilla and in 83% gingiva was the main site of involvement.[27] In another study in Jordan, it was found that the gingiva was the major site of pyogenic granuloma (44.4%).[28] A study in India (2012) evaluated the prevalence of PG in patients referring to an educational hospital in the southern India showed that 50.23% of lesions occurred in the maxilla and 46.53% in the mandible.[29] Another study in Iran, Kerman, observed PG oral lesions in the anterior region of the maxilla (34.7%), posterior region of maxilla (22.1%), anterior region of the mandible (20%) and posterior region of the mandible (15.7%).[30] In addition, in a study in Iran, Tehran, similar to our study, all lesions occurred in the gingiva, and in 66 pregnant women, the site was observed in the maxilla, while it was observed in the mandible in only six pregnant women.[20] In Iran, Kerman, most common site of PG was in the anterior part of the gingiva and in the maxilla.[22] In a study in Nigeria,[26] in 74% of cases and in the other research in Jordan[28] in 44% of cases, lesions

Table 2: Multivariate logistics analysis on some demographic and oral health characteristics in the pregnant mothers with Epulis gravidarum referred to Sari and Qaemshahr health centers, 2020

Variables	B	β (regression coefficient)	SE	OR	95% CI	*P*
Month of pregnancy (over 7/under 7)	0.157	0.38	0.27	1.46	0.85-2.51	0.17
Age (under 30/over 30)	0.55	1.3	0.42	3.68	1.59-8.49	0.002
Brushing (no/yes)	0.19	0.517	0.372	1.678	0.8-3.48	0.10
Use of mouthwash (no/yes)	0.29	0.44	0.67	1.55	0.4-5.88	0.52
Flossing (no/yes)	0.0003	0.057	0.006	1.059	1.045-1.072	<0.001
Smoking (yes/no)	0.88	3.036	0.29	20.82	11.8-36.7	<0.001

R=0.97, R^2=95.1%, Adjusted R^2=98%. SE: Standard error, OR: Odd ratio, CI: Confidence interval

were observed in the gingiva. The results of a study in Pakistan (2020) suggested that the anterior region of the maxilla, followed by anterior mandible were the major involved regions.[31] This was also reported in our study and indicates congruence of the present research with previous studies. The frequency of PG is variable across different sites of the oral cavity, and it seems to be affected by presence of connective tissue in the region, the extent of response to the inflammation resulting from different factors, degree of sensitivity of the region to trauma or stimulants, absence of teeth or presence of abnormalities, malocclusion, as well as unsuitable restoration or oral health and hygiene. The difference in the percentages reported for the site of PG in our study with other studies seems to be due to both the mentioned reasons above as well as the differences in the studied communities, cultural differences, and different health status across various countries.[30]

The chief complaint of the patients in this study in 17.8% of pregnant women was swelling, which was also mentioned in a study in Iran (Tehran) as the chief factor (6.9%) for patient referral.[20] In another study in Jordan, the chief complaint of the patients was bleeding from the lesion (59.3%) and ulcerous lesions (9.2%).[28] The difference in the results may be due to the fact that the patients were not aware about the existence of the tumor and, as a result, didn't pay attention to their symptoms. Furthermore, the characteristics of the tumor, such as the size and duration of its development, have been different in patients.

The consistency of lesion during the examination in this study was soft in most cases. The color of lesion in most of the patients at the time of referral was purple-red. A study in Iran (Kerman) reported that the consistency of 80.6% of lesions was soft, while 19.4% showed hard or rubber like consistency. They also reported that 25 tumors (80.6%) were red and 6 tumors (19.4%) were pink.[22] In other study in India, the tissue of the lesion was solid and almost pale, while the oral hygiene status of the patient was reported to be poor.[32]

There was a significant relationship between dental floss and frequency of epulis gravidarum among pregnant women. The results of a study in Iran (Tehran)[20] indicated poor oral health among the majority of the participant women (80.6%). A study in Iran (Kerman) also reported that there was a significant relationship between use of dental floss and the number of dental visits and prevalence of PG.[22] In another study in Iran (Kerman) (2009), poor oral and dental health was one of the most important predisposing factors for PG[30] In 2013, a study in India reported that in pregnant women, prevalence of PG and gingivitis is higher than in nonpregnant women. The reasons for the higher incidence of gingivitis in pregnant women can be constant hormonal changes, leading to altered physical and psychological conditions as well as influence on their oral and dental health status.[23] Thus, considering special hormonal changes in pregnant women and their direct impact on gingivitis, periodontal problems and resulting complications such as PG may be predicted.[33] PG in pregnancy occurs because of hormonal imbalance. Nevertheless, bacterial dental plaque as well as oral and dental health is among the major factors in the development of the lesion. This is confirmed by the results of the present research which showed that there is a significant correlation between the dental health status and PG.

There was a significant correlation between inappropriate restoration or dental crown and epulis gravidarum in this study. In the study in Iran (Tehran), it was reported that six cases of PG were adjacent to unsuitable restoration or crown.[20] It was reported that the presence of deep cavities, as well as unsuitable restorations or crowns is directly involved in the development of PG.[33] This can justify the higher prevalence of PG who have unsuitable restoration or crowns.

Another factor which showed significant relation with epulis gravidarum was cigarette smoking. In the study in Iran (Tehran), information was taken about cigarette smoking among pregnant women, but in their study, none of the participants smoked cigarettes.[20] Poor oral health in cigarette smokers and the damaging effects of cigarettes on periodontal tissues can justify this significant relationship.

In this study, because the study period was limited, to achieve the desired sample size, for pregnant women, the

trimester of pregnancy was not considered as an inclusion criterion. It is recommended that in future studies, an equal number of pregnant women in each trimester of pregnancy be included in the study so that the prevalence of this lesion can be assessed in each trimester. In this study, personal demographic and obstetric variables were not examined, which can be compensated in future studies.

CONCLUSION

Based on the findings obtained from the present study, it was found that the frequency of epulis gravidarum was 4.38% among pregnant women. Meanwhile, the frequency of involvement of the maxilla and anterior region was higher than the mandible and posterior region. A significant relationship was observed between the use of cigarette smoking, low age, and don't use of floss and presence of epulis gravidarum. Thus, women who intend to become pregnant should be informed about the dental and oral health during pregnancy and its possible consequences for their health and fetus. It is also recommended that if required they should be referred to dentists to receive the necessary advice about prevention and dental care.

Conflicts of interest

There are no conflicts of interest.

Authors' contributions

BI and NS collected the data. JYC performed the statistical analyses, interpreted data, and drafted and revised the manuscript for important intellectual content. TM reviewed the analyses and the final version of the manuscript. MS and ShZ interpreted data and revised the manuscript for important intellectual content and approved the final version. ShGh and NS edited the manuscript. All authors have read and approved the manuscript.

Financial support and sponsorship

Nil.

Acknowledgment

This study is the result of a research project with project code IR.MAZUMS.REC.1399.7817 approved by Mazandaran University of Medical Sciences. We would like to thank the Mazandaran University of Medical Sciences.

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