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Knowledge, Attitude, and Practice towards Oral Health among Pregnant Women Attending Antenatal Care at Siriraj Hospital

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ABSTRACT

Objectives: To evaluate knowledge, attitude, and practice towards oral health of pregnant women, and to compare characteristics between women with different levels of oral health knowledge.

Materials and Methods: A total of 304 low-risk pregnant women, before 20 weeks of gestation, were randomly selected to complete a self-administered questionnaire during their first antenatal care visit. The questionnaire consisted of 4 parts, including baseline characteristics, knowledge, attitude, and questions about personal practice and related information received. Women were further categorized into having lower, medium, and higher knowledge level according to knowledge score tertiles. Various characteristics were compared between the 3 groups.

Results: Overall knowledge score was 7.5 out of 15. Majority of women reported correct answers about oral health care during pregnancy (58.9%-98.4%). Fewer women reported correct answers on relationship between oral health and pregnancy (26.6%-66.1%). Only 14.1% and 15.5% reported that oral and dental surgeries and local anesthetics were safe. Women had misconceptions on many issues including swollen gum, loose tooth, and dental treatments. More than half of the women (56.3%) had ever received information on oral and dental health during pregnancy and 54.9% reported to receive information from medical personnel. Women with higher knowledge scores were more likely to have higher education and income, have dental visits before pregnancy, and receive information from health care personnel.

Conclusion: Pregnant women had relatively limited knowledge on some issues of oral health during pregnancy. Higher level of knowledge was related to higher education and income.

Keywords: oral health, pregnancy, knowledge, attitude, practice.

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ความรู้ ทัศนคติ และการปฏิบัติตัว เกี่ยวกับสุขภาพช่องปากในสตรีตั้งครรภ์ที่มาฝากครรภ์ที่โรงพยาบาลศิริราช

ฉัตรแก้ว บริบูรณ์หิรัญสาร, ดิฐกานต์ บริบูรณ์หิรัญสาร

บทคัดย่อ

วัตถุประสงค์: *เพื่อศึกษาความรู้ ทัศนคติ และ การปฏิบัติตัว เกี่ยวกับสุขภาพช่องปากในสตรีตั้งครรภ์ และเปรียบเทียบลักษณะต่างๆ ของสตรีตั้งครรภ์ที่มีความรู้เกี่ยวกับสุขภาพช่องปากในระดับที่ต่างกัน*

วัสดุและวิธีการ: *ทำการสุ่มเลือกในสตรีตั้งครรภ์ที่มีความเสี่ยงต่ำ จำนวน 340 ราย ที่มีอายุครรภ์น้อยกว่า 20 สัปดาห์ โดยให้สตรีตั้งครรภ์ตอบแบบสอบถามด้วยตนเองในระหว่างการมาฝากครรภ์ครั้งแรก แบบสอบถามประกอบด้วย 4 ส่วน ได้แก่ ข้อมูลพื้นฐาน ความรู้ ทัศนคติ และการปฏิบัติตัว และการได้รับข้อมูล สตรีตั้งครรภ์จะถูกแบ่งเป็น 3 กลุ่ม ตามคะแนนของความรู้ เป็นกลุ่มที่มีความรู้ น้อย ปานกลาง และมาก จากนั้นทำการเปรียบเทียบลักษณะต่างๆ ของสตรีตั้งครรภ์ ระหว่างสตรีตั้งครรภ์ 3 กลุ่ม ดังกล่าว*

ผลการศึกษา: *คะแนนความรู้โดยรวมเท่ากับ 7.5 จากคะแนนเต็ม 15 คะแนน สตรีตั้งครรภ์ส่วนใหญ่ตอบคำถามได้ถูกต้องเกี่ยวกับการดูแลสุขภาพช่องปากระหว่างตั้งครรภ์ (ร้อยละ 58.9-98.4) ในขณะที่สตรีตั้งครรภ์จำนวนน้อยกว่าตอบคำถามได้ถูกต้องเกี่ยวกับความสัมพันธ์ระหว่างสุขภาพช่องปากกับการตั้งครรภ์ (ร้อยละ 26.6-66.1) สตรีตั้งครรภ์เพียงร้อยละ 14.1 และ 15.5 ให้คำตอบว่าการทำหัตถการเกี่ยวกับช่องปากและฟัน และการใช้ยาระงับความรู้สึกเฉพาะที่ มีความปลอดภัย พบว่าสตรีตั้งครรภ์ยังมีความเข้าใจไม่ถูกต้องในหลายประเด็น เช่น การมีเหงือกบวม ฟันโยก และการรักษาทางทันตกรรม เป็นต้น สตรีตั้งครรภ์ร้อยละ 56.3 เคยได้รับข้อมูลเกี่ยวกับสุขภาพช่องปากในระหว่างตั้งครรภ์ และร้อยละ 54.9 ได้รับข้อมูลดังกล่าวจากบุคลากรทางการแพทย์ สตรีตั้งครรภ์ที่มีคะแนนระดับความรู้สูง ได้แก่ กลุ่มที่มีระดับการศึกษาและรายได้สูงกว่า ได้รับการตรวจทางทันตกรรมก่อนการตั้งครรภ์ และได้รับข้อมูลจากบุคลากรทางการแพทย์*

สรุป: *สตรีตั้งครรภ์มีความรู้เกี่ยวกับสุขภาพช่องปากขณะตั้งครรภ์ค่อนข้างจำกัด ระดับคะแนนความรู้ที่สูง สัมพันธ์กับการมีระดับการศึกษาและรายได้สูง*

คำสำคัญ: *สุขภาพช่องปาก ตั้งครรภ์ ความรู้ ทัศนคติ การปฏิบัติตัว*

Introduction

The World Health Organization has recognized that oral health, which includes health of the gum, teeth, and jawbone, is among important indicators of overall health, well-being and quality of life. It is estimated that oral diseases affect as many as 3.5 billion people worldwide[1]. Among others, oral health is considered as an important health agenda that could improve quality of life[2, 3]. Oral health problems during pregnancy are of concern and have been recognized by many organizations, including the World Health Organization[3], the American College of Obstetricians and Gynecologists[4], the American Dental Association[5], and the American Academy of Pediatric Dentistry[6].

It is evident that there are considerable changes in oral health status due to normal physiologic alterations that occur during pregnancy. Therefore, pregnant women are at increase vulnerability to oral health problems. Gingivitis, gingival lesions, tooth mobility, tooth erosion, dental caries, and periodontitis are commonly reported during pregnancy with varying prevalence[4-8]. A previous Thai study reported as many as 58.5% of pregnant women had some form of oral health problems, including plaque, gingivitis, and periodontitis[9]. Another study reported that as many as 74.0% of Thai pregnant women had dental caries and 86.2% had gingivitis[10]. Periodontal disease, including gingivitis and periodontitis, can commonly occur in pregnant women[11], and it has been associated with various adverse pregnancy outcomes[4-7]. Although a causal relationship has not been established, periodontitis has consistently reported to be associated with many adverse pregnancy outcomes including preterm delivery, low birth weight, gestational diabetes, and preeclampsia[8, 12, 13]. Exact mechanisms are not clear but these were possibly due to chronic inflammation and interactions with inflammatory cytokines. These important issues signify the importance of appropriate oral health care during pregnancy.

Awareness of changes in oral health during pregnancy and possible relationship with adverse outcomes should be raised among both pregnant women and health care providers. In many settings, the knowledge is still limited and many misconceptions are still perceived by both pregnant women and care providers. Some health care providers are unaware of the importance of oral health in pregnant women. Some tend to avoid dental evaluation and treatment during pregnancy were possibly due to misbelief that some dental procedures are unsafe for the fetus, etc. A previous study reported that pregnant women have some oral health knowledge and it varied by race or ethnicity, and maternal education[14]. Another study showed that pregnant minority (African and Hispanic American) had only limited knowledge on oral health during pregnancy[15]. A recent study also reported that most of the pregnant women reported that they were unaware about gingivitis, its cause, effects, treatment, and preventive measures[16]. A Thai study reported that low education, inadequate oral health care, poor oral hygiene, and lack of knowledge were important risk for oral health problems during pregnancy[10]. A Study in Muslim Thai pregnant women reported that the majority of pregnant women had fair oral hygiene, improper self-oral hygiene care, and inadequate knowledge of the importance of oral-systemic health relationships[17]. Another study reported that only 41.5% of Thai pregnant women had normal oral health and 60.6% incorrectly identified their oral health status[9]. This can infer that knowledge on oral health during pregnancy is limited and more oral health education should be additionally provided, awareness on this important issue should be raised, and related misconceptions should be clarified.

Siriraj Hospital is a university-based tertiary care hospital with over 6,000 deliveries a year. Its antenatal care clinic serves pregnant women who seek antenatal care from all parts of Thailand who live or work in Bangkok and vicinity areas. However, information on knowledge, attitude, and practice on oral health during pregnancy are limited and the issues are rarely evaluated in Thailand as well as in Siriraj Hospital. Therefore, the objective of this study was to evaluate knowledge on oral health during pregnancy. Attitude of the women on this specific issue and related practice were also assessed. In addition, various baseline characteristics, attitude, and personal practice were compared between different knowledge levels to evaluate possible

associated factors. As relating evidence is limited with only a few studies in Thailand regarding the issue and application of results from previous studies might not be appropriately applied to Thai population, the information from this study would help in better understanding of various aspects of oral health issues during pregnancy and awareness and concerns could be raised among health care providers. In addition, this could also help in providing better care of the pregnant women in the future.

Materials and Methods

This cross-sectional study was conducted after approval from Siriraj Institutional Review Board. Eligible pregnant women were those who had singleton pregnancy, were ≥ 18 years, and less than 20 weeks of gestation. Exclusion criteria included multiple pregnancy, women with fetal anomalies or fetal deaths, and those who were considered having high-risk pregnancies. High-risk pregnancies were those with underlying medical diseases such as diabetes, hypertension, autoimmune disease, etc., or those who developed complications during pregnancy, such as gestational diabetes, preeclampsia, etc. During January to June 2021, a total of 304 pregnant women who met inclusion were randomly selected and asked to participate in the study during their first visit at antenatal care clinic.

After informed consent, the women were asked to complete a self-administered questionnaire confidentially in a private room. The questionnaire consisted of 4 parts as follows. 1) Baseline characteristics, including age, parity, occupation, education, and family income. 2) Knowledge about oral and dental health during pregnancy which consisted of 15 items regarding oral and dental health care during pregnancy (5 items), relationship between oral and dental health and pregnancy (5 items), and dental procedures during pregnancy (5 items). 3) Questions about attitude towards oral health during pregnancy which consisted of 10 statements that the women were asked to report if they agreed with each statement. 4) Questions about practice, advice and information received regarding oral and dental health care during pregnancy. After the questionnaire was returned, a brief counseling regarding oral and dental health during pregnancy were provided to all women. Further appointments at antenatal care clinic and dental department were scheduled as appropriate.

The questionnaire was developed by the investigators and was initially verified for content validity by experts in obstetrics and dentistry. All items were developed from discussion between experts in both fields. For knowledge items, basic knowledge pregnant women should know were selected. For attitude statement, common attitude and perception of pregnant women on oral health during pregnancy were discussed and chosen based on expert opinions and experiences. For practice questions, items were chosen based on expert opinions. For knowledge part of the questionnaire, there were 3 possible answers for each question sentence (correct, incorrect, and not sure) and a score of 1 was given if the women answered "correct" for positive (true) or "incorrect" for negative (false) sentences. Total possible scores were 15. For the attitude part, there were 2 possible answers for each sentence, i.e., agree, and disagree. The reliability of the questionnaire was tested and the results showed Chronbach's alpha of 0.89, 0.84, and 0.8 for knowledge, attitude, and practice part. A sample size was calculated from an estimated 60% of pregnant women had good knowledge on oral and dental health during pregnancy. At 95% significance level and 6% acceptable error, at least 285 women were required, including 10% loss[18].

Various characteristics, including responses from the questionnaire were described using descriptive statistics, such as mean, standard deviation, number, and percentage. The women were further classified into 3 groups by knowledge score tertiles, i.e., having lower, medium, and higher knowledge. Various characteristics and responses on attitude and practice were compared between these 3 subgroups. One-way analysis of variance (ANOVA) and chi square were used in comparisons of various characteristics, attitude, and practice as appropriate. IBM SPSS Statistics for Windows®, Version 24.0 (IBM Corp., Armonk, N.Y., USA) was used for statistical analyses. A p value of < 0.05 was considered statistically significant.

Results

A total of 304 pregnant women were included in this study. Mean age was 30.7 years, mean gestational age was 14.2 weeks of gestation, and 37.5% were nulliparous. Majority (56.3%) of the women were employee, 49.7% graduated bachelor degree or higher, and almost 60% had family income of > 30,000 Baht.

Knowledge about oral health during pregnancy was evaluated and the results are shown in Table 1. In terms of oral health care during pregnancy, the mean knowledge score was 3.9 of 5. For relationship between oral and dental health and pregnancy, fewer women reported correct answers, especially regarding effects of oral and dental health on pregnancy. Mean score for this domain was 2.1 of 5. With regard to dental procedures during pregnancy, the mean score was only 1.4 of 5. While 56.6% reported scaling is safe, less than 40% reported that other procedures were safe. Only 14.1% and 15.5% reported that oral and dental surgeries and local anesthetics were safe, respectively. Mean overall knowledge score was 7.5 out of 15 possible scores.

Table 1. Knowledge about oral health during pregnancy of pregnant women in the study (N = 304).

Knowledge about oral health during pregnancy questions	Correct answer n (%)
1. Oral health care during pregnancy	
During pregnancy, you should	
Brush your teeth at least twice a day	299 (98.4)
Use fluoride-based toothpaste	265 (87.2)
Use dental floss or interdental brush regularly	189 (62.2)
Avoid sugary and sweet food	263 (86.5)
You can receive dental care and treatment as usual, similar to non-pregnant women	179 (58.9)
Mean score ± SD (total score = 5)	3.9 ± 1.0
2. Relationship between oral health and pregnancy	
The followings are oral and dental changes during pregnancy	
Increase risk of dental caries	201 (66.1)
Increase risk of gingivitis and periodontitis	140 (46.1)
Increase risk of tooth loss	130 (42.8)
The followings are the effects of oral health on pregnancy	
Poor oral health, especially periodontitis, may be related to adverse pregnancy outcomes, such as preterm birth and low birth weight.	95 (31.3)
Poor oral health in the mothers is associated with increased risk of poor oral health of the children	81 (26.6)
Mean score ± SD (total score = 5)	2.1 ± 1.0
3. Dental procedures during pregnancy	
The followings are safe during pregnancy	
Scaling	172 (56.6)
Tooth extraction	92 (30.3)
Oral and dental surgery, such as gingival surgery, wisdom teeth removal, etc.	43 (14.1)
Dental X-ray	88 (28.9)
Local anesthetics	47 (15.5)
Mean score ± SD (total score = 5)	1.4 ± 1.6
Overall mean score ± SD (total score = 15)	7.5 ± 3.2

SD: standard deviation

Attitudes towards oral health during pregnancy are shown in Table 2. While swollen gum and loose tooth were thought to be normal during pregnancy in 16.8% and 12.8%, respectively, 30.9% thought that gum bleeding during tooth brushing is also normal. The women reported that dental treatment is contraindicated in 28.9%. And 38.2% and 41.4% reported that X-ray and local anesthetics are contraindicated. Majority of the women (69.4%) reported that dental caries or loose tooth are caused by maternal transfer of calcium to the

baby. As many as 77.6% agreed that women should have dental visit before pregnancy and 60.5% agreed that women should have a dental visit at least once during pregnancy. However, 59.9% thought that pregnant women should visit a dentist only when there is a problem.

Table 2. Attitude towards oral health during pregnancy of pregnant women in the study (N = 304).

Attitude towards oral health during pregnancy questions	Agree n (%)
1. Swollen and reddened gum are normal during pregnancy	51 (16.8)
2. Gum bleeding during tooth brushing is normal during pregnancy	94 (30.9)
3. Loose tooth is normal during pregnancy	39 (12.8)
4. Dental treatment is contraindicated during pregnancy	88 (28.9)
5. Dental X-ray is contraindicated during pregnancy	116 (38.2)
6. Local anesthetics is contraindicated during pregnancy	126 (41.4)
7. Dental caries or loose tooth are caused by transfer of maternal calcium to the baby	211 (69.4)
8. Women should visit a dentist for oral health evaluation before pregnancy	236 (77.6)
9. Women should visit a dentist at least once during pregnancy	184 (60.5)
10. Pregnant women should visit a dentist only when there is a problem	182 (59.9)

Negative items: 1-7, 10

Results on practice, advice, and information regarding oral health care during pregnancy are displayed in Table 3. Before pregnancy, majority of the women had last dental visit in the past year (57.8%) and 53.3% were regular check up. Most of the women (64.1%) reported they did not have any dental problems and 26.3% reported to have dental caries. More than half of the women (56.3%) had ever received information on oral and dental health during pregnancy and 54.9% reported to receive information from medical personnel.

Table 3. Practice, advice, and information regarding oral health care during pregnancy of pregnant women in the study (N = 304).

Questions	n (%)
Time of last dental visit	
< 6 months	94 (30.8)
6 months – 1 year	82 (27.0)
> 1 year	128 (42.2)
Reasons of last dental visit	
Check up	162 (53.3)
Dental problems	90 (29.6)
Not remembered	52 (17.1)
Current dental problems*	
Caries	80 (26.3)
Pain	12 (3.9)
Swollen gum	20 (6.6)
Others	6 (2.0)
Report no problem	195 (64.1)
Received any advice or information	171 (56.3)
Sources of advice or information*	
Medical personnel	167 (54.9)
Family and friends	32 (10.5)
Internet	74 (24.3)
Others	36 (11.8)

* Multiple answers

All the women were further categorized into 3 subgroups according to knowledge score tertiles. Women with scores in 1st, 2nd, and 3rd tertile were those with knowledge score of < 6, 6-8, and > 9. They were considered as having lower, medium, and higher knowledge, respectively. General characteristics, attitude towards oral health during pregnancy, and practice, advice, and information regarding oral and dental health care during pregnancy were compared between women with different knowledge levels and the results are shown in Table 4.

Table 4. Comparison of various characteristics, attitude, and practice between different knowledge scores regarding oral health during pregnancy of pregnant women in the study.

Characteristics	Knowledge scores			p value
	Lower (n = 88)	Medium (n = 109)	Higher (n = 107)	
Age	30.0 + 5.7	30.9 + 5.8	31.0 + 5.1	0.438
Nulliparous	32 (34.1%)	43 (39.4%)	39 (36.4%)	0.884
Occupation				0.004
Civil service	8 (9.1%)	23 (21.1%)	30 (28.0%)	
Employee	56 (63.6%)	67 (61.5%)	48 (44.9%)	
Others	24 (27.3%)	19 (17.4%)	29 (27.1%)	
Education				0.012
Less than Bachelor degree	56 (63.6%)	49 (44.9%)	48 (44.9%)	
Bachelor degree or higher	32 (36.3%)	60 (55.1%)	59 (55.1%)	
Family income				0.014
< 30,000 Baht	47 (53.4%)	36 (33.0%)	42 (39.3%)	
> 30,000 Baht	41 (46.6%)	73 (67.0%)	65 (60.7%)	
Attitude questions		**Agree with the statement**		
Swollen and reddened gum are normal during pregnancy	30 (34.1%)	12 (11%)	9 (8.4%)	< 0.001
Gum bleeding during tooth brushing is normal during pregnancy	35 (39.8%)	34 (31.2%)	25 (23.4%)	0.048
Loose tooth is normal during pregnancy	17 (19.3%)	12 (11%)	10 (9.3%)	0.091
Dental treatment is contraindicated during pregnancy	22 (25%)	37 (33.9%)	29 (27.2%)	0.338
Dental X-ray is contraindicated during pregnancy	24 (27.3%)	47 (43.1%)	45 (42.1%)	0.001
Local anesthetics is contraindicated during pregnancy	27 (30.7%)	55 (50.5%)	44 (41.1%)	0.020
Dental caries or loose tooth are caused by transfer of maternal calcium to the baby	41 (46.6%)	82 (75.2%)	88 (82.2%)	< 0.001
Women should visit a dentist for oral and dental health evaluation before pregnancy	53 (60.2%)	87 (79.8%)	96 (89.7%)	< 0.001
Women should visit a dentist at least once during pregnancy	33 (37.5%)	69 (63.3%)	82 (76.6%)	< 0.001
Pregnant women should visit a dentist only when there is a problem	37 (42%)	72 (66.1%)	73 (68.2%)	< 0.001
Practice questions				
Time of last dental visit before pregnancy				0.04
< 6 months	16 (18.2%)	37 (33.9%)	41 (38.3%)	
6 months – 1 year	28 (31.8%)	29 (26.6%)	25 (23.4%)	
> 1 year	44 (50.0%)	43 (39.5%)	41 (38.3%)	
Reasons of last dental visit				0.04
Check up	36 (40.9%)	61 (56%)	65 (60.8%)	
Dental problems	30 (34.1%)	30 (27.5%)	30 (28%)	
Not remembered	22 (25.0%)	18 (16.5%)	12 (11.2%)	
Received any advice or information	43 (48.9%)	51 (46.8%)	77 (72%)	< 0.001
Sources of advice or information				
Medical personnel	36 (40.9%)	55 (50.5%)	76 (71%)	< 0.001
Family and friends	7 (8.0%)	7 (6.4%)	18 (16.8%)	0.029
Internet	14 (15.9%)	27 (24.8%)	33 (30.8%)	0.053
Others	6 (6.8%)	9 (8.3%)	21 (19.6%)	0.008

Women with lower knowledge level were significantly less likely to work as civil service (p = 0.004), more likely to graduate less than bachelor degree (p = 0.012), and more likely to have family income of < 30,000 Baht (p = 0.014). Women with lower knowledge level were significantly more likely to agree with incorrect statements. These include swollen gum and bleeding during tooth brush are normal during pregnancy, dental X-ray and local anesthetics are contraindicated, caries and loose tooth are from calcium depletion, and dental visit schedule. Women with low knowledge level were significantly more likely to have last dental visit of > 1 year and less likely to visit for regular check up. On the other hand, women with high knowledge level were significantly more likely to receive any advice or information regarding oral health during pregnancy and more likely to receive such information from medical personnel.

Discussion

The results of this study showed that, from knowledge scores, pregnant women had relatively inadequate knowledge on oral health during pregnancy. The knowledge score was lowest in the domain of dental procedures during pregnancy. Only 15% of the women correctly knew that, during pregnancy, local anesthetics and dental surgeries are safe and only 30% stated that dental X-ray and tooth extraction are safe. In terms of the relationship between oral health and pregnancy, approximately 30% correctly knew about adverse effects of oral health on pregnancy. Almost 70% believed that dental caries or loos tooth are caused by maternal calcium transfer to the fetus. Moreover, approximately 30-40% of the women perceived that dental treatments are unsafe. This was similar to the results of previous studies that pregnant women still had inadequate knowledge on oral health during pregnancy and some misconceptions regarding oral care and dental treatments[14-16]. Although routine dental care and treatments are safe, pregnant women often voluntarily avoid or postpone them for the duration of pregnancy, which might be due to limited knowledge and such misconceptions.

The results also revealed that lower socio-economic status was related to having lower level of knowledge as shown by lower educational level and family income compared to those with higher level of knowledge. This was similar to other studies that lower educational level was among important factors for having inadequate knowledge and inappropriate practice regarding oral health during pregnancy[14, 15, 19]. A Thai study also reported that, in addition to inadequate oral health care and poor oral hygiene, lower educational status and lack of knowledge were significant factors for oral health problems during pregnancy[10]. A study in Muslim Thai pregnant women reported that gingival inflammation was found to be decrease as educational level increased[17]. It was also found that the majority of pregnant women had fair oral hygiene, improper self-oral hygiene care, and inadequate knowledge.

In this study, women with higher level of knowledge were more likely to receive advice and information on oral health from medical personnel. Dental visits when not pregnant has been reported to be an important determinant of receiving dental care during pregnancy[15, 20]. Having regular dental visits could help improving knowledge on oral health in various aspects possibly from receiving regular oral health education and counseling by dentists and related health care providers.

Despite the importance of oral health during pregnancy is well-established, many health care providers in many settings rarely address it during antenatal care. Large public hospitals usually have relatively busy obstetric and dental services in terms of large number of general and complicated cases that might not be easy to integrate appropriate dental care into routine service for pregnant women. This might also possibly due to the unawareness of recommended guidelines, their reluctance on assessing oral health due to lack of skills, misconceptions about safety issue of dental procedures, and even their lack of knowledge to

address the issue with the women[21]. A previous study reported that more than half of the obstetricians did not ask about oral health issues and did not provide information on oral health during antenatal care visits, even though majority of them aware of its importance[22]. Another study found that obstetricians had high degree of knowledge with respect to the adverse pregnancy outcomes related to periodontal disease and majority recommended dental visits during pregnancy. However, they still had some misconceptions regarding dental treatment during pregnancy, especially on dental X-ray and the use of local anesthetics[23].

The strengths of this study might include that current study is among a few studies regarding this important issue in Thailand. The questionnaire was not only developed based on scientific knowledge, but also from common beliefs among Thai population which should be suitable for the study population. Pregnant women were randomly selected and enrolled during antenatal care visit that they were naïve from routine advice and counseling before completion of the questionnaire. This could help in minimizing bias in assessing baseline knowledge and attitude of the women. However, some limitations should be mentioned. Oral and dental health examinations were not performed and prevalence of actual abnormalities were not evaluated. In addition, knowledge and attitude of obstetricians and related health care providers were not evaluated. In addition to differences in cultural contexts, characteristics of the population also differed between studies, even among Thai studies, that generalization of the results might be limited.

Adequate knowledge about oral health during pregnancy could lead to better oral hygiene practice and awareness of the importance of oral health care during pregnancy. These results of this study reflect that knowledge on oral health during pregnancy is probably still inadequate and more oral health educations are needed among pregnant women in Thailand. Further studies are needed to elucidate how to improve oral health education among pregnant women as well as its barriers. In the midst of some misconceptions of both health care providers and pregnant women especially on dental procedures during pregnancy, dental evaluation visits before pregnancy should be strongly encouraged. Due to variations in background characteristics and cultural differences, a context-specific health promotion program related to oral health during pregnancy should be developed and implemented in each setting, including oral health education and appropriate preconception and antenatal oral health care. Appropriate interventions could help improve knowledge, attitude, and practice on oral health during pregnancy among Thai pregnant women. Pregnancy should be considered as an opportune time to offer preventive oral health services to improve maternal and neonatal health in the future.

Future researches are needed especially on care improvement process on appropriate oral health care during pregnancy, evaluation of future interventions of preventive oral health services, and other related issues. In addition, whether or not the improvement in oral health care could further improve pregnancy outcomes is also to be evaluated in the future as well.

Conclusion

In conclusion, knowledge on oral health was relatively inadequate in some specific issues among pregnant women. Incorrect understandings regarding many dental procedures were common. Women with higher level of knowledge on oral health during pregnancy were more likely to be in higher socio-economic status, have regular dental visits before pregnancy, and receive advice and information from health care personnel.

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Potential conflicts of interest

The authors declare no conflicts of interest.

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