Thai Journal of Obstetrics and Gynaecology
July 2022, Vol. 30, No. 4, pp. 244-250

OBSTETRICS

Knowledge, Attitudes, and Intention to Receive Pertussis Vaccine in Pregnant Women Attending the Antenatal Care Clinic, King Chulalongkorn Memorial Hospital

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ABSTRACT

Objectives: Although pertussis vaccination in pregnancy to protect young infants is recommended, the vaccine coverage among Thai pregnant women remains suboptimal. This study aimed to determine the proportion of women intending to receive the pertussis vaccine during the current pregnancy.

Materials and Methods: A cross-sectional descriptive study was conducted in Thai pregnant women attending the antenatal care clinic at King Chulalongkorn Memorial Hospital from March to August 2020. A self-administered questionnaire was used to obtain information from participants regarding knowledge, attitudes, and intention to receive pertussis vaccine during pregnancy. Logistic regression analysis was used to determine factors associated with maternal intention.

Results: A total of 387 pregnant women completed the questionnaire. The mean score of knowledge about pertussis and the vaccine was 11.8 ± 2.1 out of 20. Most of the participants had favorable attitudes on pertussis vaccination during pregnancy period. Intention to receive pertussis vaccination during pregnancy was reported in 45.5% (95% confidence interval 40.5% to 50.4%) of women. This proportion would be improved to be 81.9% if their doctors had recommended the vaccine and reassured them about fetal safety. The important influencers on the decision to vaccinate during pregnancy included their doctors (51.0%) and husbands (20.3%). Intention to receive pertussis vaccination during pregnancy would have increased if the participants had known the disease (adjusted odds ratio (OR) 1.74, 95% confidence interval (CI) 1.08 to 2.79) and belived that pertussis vaccination during pregnancy was safe (adjusted OR 2.03, 95% CI 1.20 to 3.43).

Conclusion: Almost half of the pregnant women intended to receive the pertussis vaccine during pregnancy. To improve vaccination coverage among pregnant women, the disease and safety of pertussis vaccine should be emphasized.

Keywords: pertussis, vaccine, intention to receive vaccine, pregnant women.

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Received: 26 November 2020, **Revised:** 5 April 2021, **Accepted:** 11 June 2021

ความรู้ ทัศนคติ และความประสงค์ต่อการได้รับวัคซีนไอกรนของหญิงตั้งครรภ์ที่มาคลินิกฝากครรภ์โรงพยาบาลจุฬาลงกรณ์

อธิศ รัตนแสงสรวง, วิราภรณ์ ธีระวุฒิ, สุรสิทธิ์ ชัยทองวงศ์วัฒนา

บทคัดย่อ

วัตถุประสงค์: *แม้มีคำแนะนำของการให้วัคซีนไอกรนแก่หญิงตั้งครรภ์เพื่อการปกป้องทารก แต่ความครอบคลุมของการได้รับวัคซีนในหญิงตั้งครรภ์ไทยยังไม่เพียงพอ การศึกษานี้มีวัตถุประสงค์เพื่อสำรวจอัตราของหญิงตั้งครรภ์ที่มีความประสงค์ในการรับวัคซีนไอกรนในขณะตั้งครรภ์*

วัสดุและวิธีการ: *การศึกษาเชิงพรรณนาในหญิงตั้งครรภ์ที่มาคลินิกฝากครรภ์ โรงพยาบาลจุฬาลงกรณ์ ตั้งแต่เดือนมีนาคมถึงเดือนสิงหาคม พ.ศ.2563 โดยใช้การตอบแบบสอบถามด้วยตนเองเพื่อรวบรวมข้อมูลเกี่ยวกับความรู้ ทัศนคติ และความประสงค์ต่อการได้รับวัคซีนไอกรนขณะตั้งครรภ์ และวิเคราะห์หาปัจจัยที่สัมพันธ์กับความประสงค์ดังกล่าวของหญิงตั้งครรภ์ด้วยการวิเคราะห์ถดถอยโลจิสติกส์*

ผลการศึกษา: *หญิงตั้งครรภ์ที่ตอบแบบสอบถามครบรวมทั้งสิ้น 387 ราย มีคะแนนเฉลี่ยของความรู้เกี่ยวกับโรคไอกรนและวัคซีนเท่ากับ 11.8 ± 2.1 จากคะแนนเต็ม 20 อาสาสมัครส่วนใหญ่มีทัศนคติที่ดีต่อการได้รับวัคซีนไอกรนในขณะตั้งครรภ์ และร้อยละ 45.5 (ความเชื่อมั่นร้อยละ 95 เท่ากับ 40.5 - 50.4) มีความประสงค์ในการรับวัคซีนไอกรนขณะตั้งครรภ์ โดยสัดส่วนดังกล่าวจะเพิ่มขึ้นเป็นร้อยละ 81.9 หากแพทย์ให้คำแนะนำในการฉีดวัคซีนและยืนยันเรื่องความปลอดภัยต่อทารกในครรภ์ ทั้งนี้บุคคลที่มีความสำคัญต่อการตัดสินใจในการรับวัคซีนมากที่สุด ได้แก่ แพทย์ (ร้อยละ 51) และสามี (ร้อยละ 20.3) ปัจจัยที่มีความสัมพันธ์ในการเพิ่มความประสงค์ในการรับวัคซีน ได้แก่ รู้จักโรคไอกรน (adjusted odds ratio (OR) 1.74, ความเชื่อมั่นร้อยละ 95 เท่ากับ 1.08 - 2.79) และ ความเชื่อว่าการได้รับวัคซีนไอกรนขณะตั้งครรภ์มีความปลอดภัย (adjusted OR 2.03, ความเชื่อมั่นร้อยละ 95 เท่ากับ 1.20 - 3.43)*

สรุป: *เกือบครึ่งหนึ่งของหญิงตั้งครรภ์มีความประสงค์ในการรับวัคซีนไอกรนขณะตั้งครรภ์ การเพิ่มความครอบคลุมของการได้รับวัคซีนในหญิงตั้งครรภ์ อาจทำได้โดยการให้ความรู้เกี่ยวกับโรคไอกรนและความปลอดภัยของวัคซีน*

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Introduction

Pertussis, or whooping cough, is one of the serious respiratory diseases that cause morbidities or even life-threatening complications in infants[1,2]. But since 1950, cases of pertussis have been gradually decreased after the implementation of DTP (diphtheria toxoid, tetanus toxoid, and whole-cell pertussis vaccine) to infants by Expanded Programme of Immunization (EPI). However, a resurgence of pertussis was noted in the United States of America and some European countries in the early 20th century[3,4]. There are many causes to describe this reemergence such as the advancing technology of disease diagnosis, the increased disease awareness, and more rapidly waning of immunity that induced by acellular pertussis vaccines[5].

After DTP or DTaP (diphtheria toxoid, tetanus toxoid and acellular pertussis vaccine) vaccines have been given to young infants, the immunity for pertussis will take effect at the age of 6 months to the first year, which opens a wide window of significant vulnerability[6]. Nevertheless, there are several pertussis strategic preventions for infants such as the cocooning vaccination, or newborns' early vaccination. The Center for Disease Control and Prevention (CDC) has initiated a pertussis prevention guideline for infants since 2005. They somehow concluded in 2012 that the pregnancy-period immunization is the most efficient approach to prevent pertussis in infants[7]. The process starts with pertussis vaccination of pregnant women. Mothers then will develop anti-pertussis antibodies that will be transferred to fetuses through the placenta. As such, newborn babies will be protected by preborn pertussis immunity before they get the DTP or DTaP vaccines[7].

Although vaccination against pertussis during pregnancy has been recommended in many countries, immunization coverage is still low. One of the factors increasing maternal immunization is the advice or recommendation by doctors or health care providers. The study in Canada[8] found that 89% of the pregnant women would receive Tdap vaccination if the vaccine were recommended by their physician. However, the study in Italy[9] portrayed different results. Merely 34% of women, slightly improved from 21%, would receive the vaccine after advised by their healthcare providers.

After the introduction of the DTP in EPI of Thailand in 1977, pertussis cases in Thai people have been progressively decreased from 6-12 per 100,000 persons between the years 1975-1985 to only 0.12 per 100,000 persons in 2019[10]. However, there are still pertussis outbreaks in Thailand, which might be underreported. One study demonstrated that almost 18% of Thai adults with prolonging coughs, were diagnosed with serologically positive for pertussis[11]. Besides, 19.6% of Thai children with persistent coughs, followed by symptoms such as paroxysm, inspiratory whooping, or post-tussive emesis, had Bordetella pertussis infection confirmed by reverse transcription polymerase chain reaction (RT-PCR)[12]. Furthermore, 75% of pertussis cases found in the study were that infants too young to complete with primary series of pertussis vaccination at the age of 6 months[12]. This implies that pertussis in Thailand is still an under-detected disease, exclusively the most vulnerable category such as infants.

In 2018, the Infectious Disease Association of Thailand pushed forward their pertussis vaccination recommendation for Thai pregnant women[13]. Thus far, the number of pertussis vaccination during the period of pregnancy at King Chulalongkorn Memorial Hospital (KCMH) in Bangkok of Thailand is considered still suboptimal. The present study was carried out to determine a proportion of pregnant women having the intention to receive pertussis vaccination. The secondary objectives were to explore levels of knowledge and attitudes toward the pertussis vaccination and identify factors associated with the intention to receive pertussis vaccination.

Materials and Methods

This cross-sectional, descriptive study was conducted between February and August 2020. The study was approved by the Institutional Review Board of the Faculty of Medicine, Chulalongkorn University (IRB No. 360/62). Pregnant women attending the antenatal care clinic at the KCMH were approached to participate in the study by convenient sampling. Women aged 18 years old or older attending the clinic for the first visit, having gestational age before 20 weeks, and giving consents were recruited. They were excluded from the study if incapable to complete the questionnaire or allergic to the pertussis vaccine.

The eligible women were asked to complete a self-administered questionnaire before attending the prenatal class. The developed and validated questionnaire comprised of 4 parts where the first part collected demographic information. The second part of the questionaire aimed to determine a level of knowledge of the participants regarding pertussis and the vaccine. There were 20 yes-no questions with a total score of 20 and the women having more than 10 corrected answers were defined as having enough knowledge. The third part of the questionaire was about attitudes toward pertussis vaccination during pregnancy, which consisted of 15 statements with five-level Likert scales for each statement. Favorable attitudes toward pertussis vaccination during pregnancy defined as score 4 (agree) or 5 (strongly agree) for positive attitude questions and 1 (strongly disagree) or 2 (disagree) for negative attitude questions. The last part of the questionaire aimed to evaluate intention to receive pertussis vaccination of the participants as well as the important influencers on decision to vaccinate during pregnancy. Test-retest reliability of the questionaire showed a Pearson correlation of 0.72 for part of knowledge, Cronbach's alpha of 0.91 for part of attitudes, and 0.71 for part of intention to receive vaccination.

After eligible participants completed the questionnaire, the informative brochures about pertussis and pertussis vaccination were provided. The prenatal class also emphasized topic of maternal immunization including influenza, tetanus and pertussis vaccination.

A sample size of 385 was needed for estimating the infinite population proportion of pregnant women intending to receive the pertussis vaccination of 0.5 with the alpha of 0.05 and error of 0.05. IBM SPSS Statistics for Windows, version 22 (IBM Corp., Armonk, N.Y., USA) was used for data analysis. Mean and standard deviation for quantitative data and percentage for qualitative data were reported. The primary outcome was demonstrated in percentage with a 95% confidence interval (CI). Chi square or Fisher exact test was used to identify factors associated to receive the vaccination. The significant associated factors from the univariate analysis were included in the logistic regression model to determine the adjusted odds ratio (OR) of each variable. A p value of less than 0.05 was considered statistically significant.

Results

Of a total of 429 women who participated in the study, there were 13 irresponsive data and 29 incomplete data. Consequently, data from 387 participants were analyzed. Demographic and baseline characteristics are demonstrated in Table 1. The mean age was 31.2 ± 5.5 years and the mean gestational age was 8.8 ± 3.6 weeks. Most participants were primigravida (53.1%), graduated (59.9%), and had a family income higher than 20,000 Baht per month (64.1%). One hundred and twenty participants (31.0%) had known about pertussis and 26 of 180 multigravidas (14.4%) received the pertussis vaccination in their previous pregnancies.

Table 1. Demographic and baseline characteristics of participants (n = 387).

Characteristics	
- Age (years)	31.2 ± 5.5
- Gestational age (weeks)	8.8 ± 3.6
- Primigravida	207 (53.5%)
- Education	
Primary	10 (2.6%)
Secondary	145 (37.5%)
Bachelor	201 (51.9%)
Master	31 (8.0%)
- Knowing pertussis	120 (31.0%)
- Feeling that pertussis is very harmful to children	105 (27.1%)
- Feeling that pertussis is very harmful to adults	73 (18.9%)
- Knowing that pertussis vaccination during pregnancy used for the prevention of the newborn	73 (18.9%)
- Received pertussis vaccine in a previous pregnancy	26/180 (14.4%)

The mean score of knowledge about pertussis and the vaccine among participants was 11.8 ± 2.1 and 259 women (66.9%) had correct answers of more than 10 from 20 questions (Table 2). Most of the participants showed favorable attitudes towards pertussis vaccination during the pregnancy period. Of all, 284 participants (73.4%) believed that maternal vaccination would protect their babies from pertussis and 261 women (67.4%) firmly believed that vaccination during pregnancy was safe. In contrast, only a small number of participants held negative attitudes towards pertussis vaccination during pregnancy. Forty-six women (11.9%) believed that unnecessary to have pertussis vaccination during pregnancy because of the low incidence of pertussis while 38 women (9.8%) suspected that vaccination could affect fetal growth.

Table 2. The participant's knowledge score regarding pertussis and attitude toward pertussis vaccination during pregnancy (n = 387).

Variables	
- Knowledge score (total = 20)	11.8 ± 2.1
- Knowledge score > 10	259 (66.9%)
- No need for pertussis vaccination during pregnancy because of the low incidence of pertussis in Thailand	46 (11.9%)
- No need for pertussis vaccination during pregnancy because newborn will get the vaccine at 2 months	124 (32.0%)
- Pertussis vaccination during pregnancy could prevent pertussis in newborn	284 (73.4%)
- Pertussis can cause severe disease and neonatal death	236 (60.9%)
- Pertussis vaccination during pregnancy is safe	261 (67.4%)
- Pertussis vaccination during pregnancy may affect the fetal growth	38 (9.8%)
- Maternal immunization may induce autoimmune disease in the woman	31 (8.0%)
- Maternal immunization increases the risk of abortion	21 (5.4%)

Intention to receive pertussis vaccination during pregnancy was found in 176 pregnant women (45.5%, 95%CI 40.5% to 50.4%) (Table 3). The proportion of participants having the intention to receive pertussis vaccination improved dramatically to 81.9% if the vaccination had been recommended by their doctors with fetal safety assurance. The influencers on the decision to receive vaccination during pregnancy included doctors, husbands, parents, and online information.

Table 3. Intention to receive pertussis vaccination during pregnancy of the participants.

Variables	n = 387
- Intention to receive pertussis vaccination during pregnancy	
Yes	176 (45.5%)
Uncertain	202 (52.2%)
No	9 (2.3%)
- Intention to receive pertussis vaccination during pregnancy if the doctor recommends the vaccine and reassure fetal safety	317 (81.9%)
- Most required additional information	
Effects of vaccine to the fetus	150 (38.8%)
Risk of pertussis in newborn	91 (23.5%)
Risk of pertussis in a pregnant woman	71 (18.3%)
Side effects of the vaccine	50 (12.9%)
- The most important factor influencing the decision to vaccinate during pregnancy	
Doctor	197 (51.0%)
Husband	79 (20.3%)
Parent	54 (13.9%)
Internet	38 (9.8%)
Others	19 (5.0%)

Factors associated to receive the pertussis vaccination during the pregnancy period are shown in Table 4. After the multivariable analysis, the significant associated factors that would improve intention to receive the pertussis vaccination during pregnancy were 'knowing the disease' (adjusted OR 1.74, 95%CI 1.08 to 2.79) and 'believing that pertussis vaccination during pregnancy being safe' (adjusted OR 2.03, 95%CI 1.20 to 3.43).

Table 4. Factors associated with intention to receive pertussis vaccination during pregnancy of participants.

Factors	OR	95% CI	Adjusted OR	95% CI
- Income > 20,000 Baht/months	1.79	1.16 to 2.80	1.48	0.92 to 2.39
- Knowing pertussis	2.14	1.37 to 3.35	1.74	1.08 to 2.79
- Believed that vaccine during pregnant is unneccesarry because newborn will get the vaccine at 2 months of age	0.64	0.40 to 0.99	0.67	0.41 to 1.09
- Believed that pertussis vaccination during pregnancy could prevent pertussis in the newborn	2.19	1.34 to 3.61	1.33	0.74 to 2.39
- Believed that pertussis can cause severe disease and death in the newborn	1.97	1.28 to 3.04	1.47	0.90 to 2.39
- Believed that pertussis vaccination during pregnancy is safe	2.46	1.55 to 3.90	2.03	1.20 to 3.43

OR: odds ratio, CI: confidence interval

Discussion

The intention of receiving pertussis vaccination during pregnancy varies across countries worldwide. The study revealed that 45.5% of Thai pregnant women would receive the pertussis vaccination during the pregnancy period. To improve vaccine coverage among pregnant women, the doctor's recommendations extremely played the role of increasing the intention of Thai pregnant women to receive the vaccination (45.5% to 81.9%). This result was inconsistent with the study in Italy where physician's recommendation showed a little effect on acceptance rate of maternal immunization (increased from 21% to 34%)[9]. The difference may be explained by various factors including study population, cultures and health systems. Doctors were yet the most crucial factor that influences on decisions of Thai pregnant women to receive the pertussis vaccination while husbands, parents, and online information were less important respectively.

The study found that awareness of pertussis was associated with increasing participants' intention to receive pertussis vaccine during pregnancy, and not directly related to their knowledge. Although 66.9% of the pregnant women had enough knowledge regarding to pertussis, less than half of the women intended to receive the vaccine. Before participants started to complete knowledge question, 31% mentioned that they had known pertussis and 25.7% were uncertained about this. Increasing Thai pregnant women's awareness of pertussis and benefit of the vaccine should be emphasized in the antenatal care to improve coverage of pertussis vaccination during the pregnancy.

Low case report rate, or no pertussis emergence, was one among many factors that Italian pregnant women grew low vaccine acceptance[9]. The aforementioned idea only held in 11.9% of Thai pregnant women. There was 32.0% of participants believed that the vaccination during the pregnancy period be unnecessary since newborn babies would receive the pertussis vaccine at 2 months after birth. This belief can be corrected by giving information regarding disease vulnerability during the early infancy period.

The large sample size as well as validated questionnaire were strengths of the present study. The study was conducted on only Thai pregnant women in the tertiary hospital. This was considered to be one of the limitations. The participants comprised those of higher education (59.9% graduated) and having more income than the average[14] (64.2% have family income more than 20,000 baht per month). The study results may not be generalized to the setting of general or smaller hospitals where women have lower education

or income. However, most of studies regarding maternal immunization showed that doctor's recommendation were the most important factor to improve vaccine acceptance.

The present study was conducted during the period of the coronavirus disease 2019 (COVID-19) pandemic, which would affect the concerning issue of infectious diseases in pregnant women. The present situation of the COVID-19 pandemic might influence the new normal behaviors further. Possibly, this study can be the first to study the knowledge, attitudes, and intentions of pregnant women to receive the pertussis vaccination during the COVID-19 pandemic.

Conclusions

In conclusion, almost half of Thai pregnant women in the study intended to receive the pertussis vaccination. Campaign promotion to increase women's awareness are ways to improve pertussis vaccine coverage among Thai pregnant women. Moreover, providing information about fetus benefit and safety would improve greatly vaccine acceptance. Doctor's recommendations were the most crucial factor on decision to receive the vaccine.

Potential conflicts of interest

The authors declare no conflicts of interest.

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