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## OBSTETRICS

# Acceptance of Influenza Vaccination among Pregnant Women attending the Antenatal Care Clinic, King Chulalongkorn Memorial Hospital

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### ABSTRACT

**Objectives:** To determine the acceptance rate and associated factors of influenza vaccination among Thai pregnant women.

**Materials and Methods:** A cross-sectional descriptive study was conducted at King Chulalongkorn Memorial Hospital from November 2014 to March 2015. Pregnant women were asked to complete self-administered questionnaires that collected data on acceptance of vaccination, knowledge, attitude and practice regarding to influenza vaccination during pregnancy. The associated factors were determined by logistic regression analysis.

**Results:** A total of 412 women completed the questionnaires. Acceptance rate of influenza vaccination among the participants was 40.5% (95% CI 35.9-45.3). Most participants (320 women, 77.7%) had good knowledge about influenza and the vaccine. Factors positively associated with the acceptance were 'advice from physicians' (adjusted OR 2.61, 95% CI 1.55-4.39), 'notification about vaccination in current pregnancy' (adjusted OR 1.84, 95% CI 1.17-2.89), 'protection of newborn' (adjusted OR 2.83, 95% CI 1.74-4.62) and 'cost of vaccination' (adjusted OR 2.36, 95% CI 1.46-3.82). Negatively associated factors included 'experience of side effects following past vaccination' (adjusted OR 0.19, 95% CI 0.05-0.74), 'belief that vaccination is unnecessary' (adjusted OR 0.42, 95% CI 0.21-0.86), and 'unsafe during the first trimester' (adjusted OR 0.55, 95% CI 0.34-0.90).

**Conclusion:** Acceptance rate of influenza vaccination during pregnancy among women in King Chulalongkorn Memorial Hospital was 40.5%. To increase vaccination rate, health care providers should advise or mention on influenza vaccination and provide information to support that the immunization can protect their newborns and is safe at any trimester.

**Keywords:** acceptance, influenza, pregnancy, vaccination

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# การยอมรับวัคซีนไข้หวัดใหญ่ในหญิงตั้งครรภ์ที่มาตรวจในคลินิกฝากครรภ์ที่โรงพยาบาลจุฬาลงกรณ์

**ทีรนุช ลิ้วงศ์ตระกูล, ญดา คุนผลิน, ธรรมสินธ์ อิงวิยะ, สุรสิทธิ์ ชัยทองวงศ์วัฒนา**

**บทคัดย่อ**

***วัตถุประสงค์:*** *เพื่อศึกษาอัตราและปัจจัยที่สัมพันธ์กับการยอมรับการฉีดวัคซีนไข้หวัดใหญ่ในหญิงตั้งครรภ์ไทย*

***วิธีการวิจัย:*** *เป็นการศึกษาเชิงพรรณนาที่โรงพยาบาลจุฬาลงกรณ์ ตั้งแต่เดือนพฤศจิกายน 2557 ถึงเดือนมีนาคม 2558 หญิงตั้งครรภ์ได้ตอบแบบสอบถามด้วยตนเอง ซึ่งเก็บข้อมูลเกี่ยวกับการยอมรับของการฉีดวัคซีน ความรู้ ทัศนคติ และการปฏิบัติเกี่ยวกับการฉีดวัคซีนไข้หวัดใหญ่ในระหว่างตั้งครรภ์ และวิเคราะห์ปัจจัยที่สัมพันธ์โดยการวิเคราะห์ถดถอยโลจิสติก*

***ผลการวิจัย:*** *หญิงตั้งครรภ์รวม 412 ราย ที่ตอบแบบสอบถามครบ พบอัตราการยอมรับการฉีดวัคซีนไข้หวัดใหญ่ของผู้เข้าร่วมวิจัยเท่ากับร้อยละ 40.5 (95% CI 35.9-45.3) ผู้เข้าร่วมวิจัยส่วนใหญ่ (320 ราย หรือร้อยละ 77.7) มีความรู้ที่ดีเกี่ยวกับไข้หวัดใหญ่และวัคซีน ปัจจัยที่มีความสัมพันธ์กับการเพิ่มการยอมรับ ได้แก่ 'คำแนะนำจากแพทย์' (adjusted OR 2.61, 95% CI 1.55-4.39) 'การกล่าวถึงการฉีดวัคซีนในการตั้งครรภ์ปัจจุบัน' (adjusted OR 1.84, 95% CI 1.17-2.89) 'การป้องกันทารกแรกเกิด' (adjusted OR 2.83, 95% CI 1.74-4.62) และ 'ค่าใช้จ่ายของการฉีดวัคซีน' (adjusted OR 2.36, 95% CI 1.46-3.82) ปัจจัยที่มีความสัมพันธ์กับการลดการยอมรับ ได้แก่ 'ประสบการณ์ของผลข้างเคียงของการฉีดวัคซีนในอดีต' (adjusted OR 0.19, 95% CI 0.05-0.74), 'ความเชื่อที่ว่าไม่จำเป็นต้องฉีดวัคซีน' (adjusted OR 0.42, 95% CI 0.21-0.86) และ 'วัคซีนไม่ปลอดภัยในไตรมาสแรกของการตั้งครรภ์' (adjusted OR 0.55, 95% CI 0.34-0.90)*

***สรุป:*** *อัตราการยอมรับการฉีดวัคซีนไข้หวัดใหญ่ของหญิงตั้งครรภ์ในโรงพยาบาลจุฬาลงกรณ์ เท่ากับร้อยละ 40.5 การเพิ่มอัตราการฉีดวัคซีนทำได้โดยบุคลากรด้านสุขภาพ ควรให้คำแนะนำ หรือกล่าวถึงการฉีดวัคซีนไข้หวัดใหญ่ และให้ข้อมูลเพื่อสนับสนุนว่าการฉีดวัคซีนดังกล่าว สามารถป้องกันทารกแรกเกิด และมีความปลอดภัยในทุกไตรมาสของการตั้งครรภ์*

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## Introduction

Influenza is a highly contagious viral disease across all age groups. In healthy adults, symptoms are usually mild and resolved spontaneously. On the contrary, serious illnesses and hospitalization are more common in pregnant women and younger than 6 month-old infants. Hospitalization rate increased four-to-five fold in pregnant women comparing to non-pregnant women[1]. Influenza infection during pregnancy can cause serious complications such as preterm delivery[2], intrauterine fetal demise and fetal distress[3]. During 2008-2013, a total number of 597 adult patients were hospitalized due to influenza-like illness at King Chulalongkorn Memorial Hospital (KCMH), including 40 pregnant women (6.7%). Obstetrics complications, such as preterm labor and preterm premature rupture of membranes, were found in 27.5% of these women.

The Advisory Committee on Immunization Practices (ACIP) and the American College of Obstetricians and Gynecologists (ACOG) recommend introduction of inactivated influenza vaccine to women during pregnancy regardless of trimesters[4]. Influenza vaccine is considered safe during pregnancy and breastfeeding. Notably, there is no evidence of adverse obstetrics or fetal events[5,6]. Influenza vaccination during pregnancy was associated with the reduction of laboratory confirmed influenza infection and maternal hospitalizations due to influenza-like illness[7]. More importantly, maternal vaccination during pregnancy or breastfeeding can transfer antibodies to her baby[8], protecting them against flu infection for the first 6 months of life when they are too young for vaccination. Maternal vaccination is associated with 91% reduction of hospitalizations, related to influenza illness among infants aged less than 6 months[9]. Therefore, maternal vaccination benefits not only the mother herself but also her infant.

Although KCMH has a policy to promote the use of influenza vaccine in the high-risk groups including pregnant women, the proportion of pregnant women attending antenatal care clinic at KCMH during 2008-2013 that received influenza vaccination was less than 1%. Non-acceptance of the vaccine may be one of the main reasons that contributed to this low vaccination rate. Therefore, this cross-sectional descriptive study was conducted to determine rate and factors associated with acceptance of influenza vaccination among pregnant women attending antenatal care clinic at KCMH.

## Materials and Methods

This cross-sectional descriptive study was approved by the Institutional Review Board of the Faculty of Medicine, Chulalongkorn University. From November 2014 to March 2015, Thai pregnant women aged 18 years and older at any trimester and attending the antenatal care clinic at KCMH were asked to participate into the study. Women were excluded from the study if having psychiatric conditions incapacitating completion of the questionnaire, not able to read, speak or understand Thai, having Guillain-barré syndrome or history of egg allergy. After giving informed consent, self-administered questionnaires were filled out by the participants under the supervision of well-trained medical staffs.

To determine the factors associated with influenza vaccination acceptance of pregnant women, a questionnaire was developed from literatures, based on the Health Belief Model[10]. The Health Belief Model is derived from psychological and behavioral theories to explain maternal decision to receive or not to receive vaccination during current pregnancy. The decision is based on an individual perception regards to disease susceptibility, severity, benefits and barriers of vaccination, cues to vaccine activation and health motivations. The developed questionnaire was divided into 3 major parts, which were 1) baseline characteristic; 2) experiences, believes, attitudes and knowledge regarding influenza virus and influenza vaccination in general or during pregnancy; and 3) patients' preference on influenza vaccination during current pregnancy.

Content validity of the developed questionnaire was determined by three experts in maternal-fetal medicine, clinical epidemiology and infectious diseases in obstetrics and gynecology, Faculty of Medicine, Chulalongkorn University. After validation, a pilot study

was performed among 20 pregnant women to determine the questionnaire reliability. Cronbach's alpha reliable estimation was 0.7.

The primary outcome of this study was the acceptance rate of influenza vaccination among pregnant women attending the antenatal clinic at KCMH. The secondary outcome was to determine factors associated with influenza vaccination acceptance. Acceptance rate of influenza vaccination during pregnancy was determined by pregnant women's decision to receive or not to receive influenza vaccination during current pregnancy. Knowledge regarding influenza virus and vaccine was assessed by 15 dichotomous questions. Each correct answer scored 1 point. A score of at least 8 points was considered as a cutoff for a good knowledge of influenza virus and vaccination. Attitude towards influenza vaccine and immunization was evaluated by questions regarding reasons to accept or decline the vaccine. Administration rate of influenza vaccine was determined by number of the actual participants who were vaccinated during their current pregnancy.

Sample size was calculated based on the primary objective to estimate an acceptance rate of influenza vaccination which expected of around 50%. When confidence level was 0.95 ($\alpha$ = 0.05) and the desired precision was 0.05, a total number including an extra 10% for incomplete questionnaires of 424 participants were necessitated.

SPSS version 22 was used for data analysis. Mean, standard deviation, range and percentage were used to describe the data. The acceptance rate of influenza vaccination among pregnant women was presented as percentage with the corresponding 95% confidence interval. Chi-square or Fisher Exact test was used to test of association between factors and acceptance of influenza vaccination. Adjusted odds ratios of the associated factors were determined using logistic regression model adjusted for covariates that found significant association from univariate analysis. These included: being hypertension, knowledge regarding to influenza and the vaccine, notification about vaccination in current pregnancy, advice from physicians or health care workers, fear of needle, experience of side effects following past vaccination, belief that vaccination is unnecessary during pregnancy, belief that vaccine is unsafe during the first trimester, cost of vaccination, protection of newborn. P-value of less than 0.05 was considered statistically significant.

## Results

A total of 480 pregnant women were enrolled into the study. Of them, 412 participants (85.8%) completed the questionnaires. Acceptance rate of influenza vaccination during pregnancy among the participants was 40.5% (95% CI; 35.9-45.3).

Participants' characteristics and demographic data were shown in Table 1. The mean age of participants was 30 years. Fifty-one percent of the participants (n=208) was nulliparous. The mean gestational age at the enrollment was 29 weeks and 61.9% (n=255) of them was enrolled during the third trimester. Ninety-five percent of participants (n=390) planned to give breastfeeding. Eight percent (n=33) of participants had a history of smoking.

High-risk population according to Centers for Disease Control and Prevention (CDC) was pregnant women who had a history of medical condition including asthma, chronic obstructive pulmonary disease, heart diseases, renal diseases, endocrine disorders, hematological diseases, neurological disorders, liver diseases, immunocompromised status and morbid obesity. From our study, 11.5% of the participants (n=47) were categorized as a high-risk population; diabetes mellitus 5.6% (n=23), hypertension 3.2% (n=13), heart disease 1.5% (n=6), lung disease 1% (n=4) and morbid obesity 0.2% (n=1).

Of the 412 participants, 7.5% (n=30) had a history of influenza infection prior to current pregnancy. Another 27.9% (n=175) had a history of respiratory tract infection during current pregnancy. Almost six percent (n=23) had a family history of influenza infection. In regard to influenza vaccination, 13.1% (n=54) of the participants received influenza vaccine during 1 year prior to pregnancy. Almost half (47%, n=195) of the participants was notified on influenza vaccination

during their current pregnancy. Seventeen percent (n=69) of their family had a history of influenza vaccination. According to these factors, notification on influenza vaccination during current pregnancy was the only factor affected the vaccination acceptance rate ($p<0.001$). Other factors were not significantly associated with the vaccination acceptance; history of influenza infection prior to current pregnancy ($p=0.22$), history of respiratory tract infection during current pregnancy ($p=0.76$), family history of influenza infection ($p=0.46$), history of vaccination during 1 year prior to pregnancy ($p=0.74$), family history of influenza vaccination ($p=0.59$).

Regarding knowledge of influenza virus and vaccine, we have found that 77.7% of the participants (n=320) had a good knowledge. The mean score was 8.8 points and ranged from 4 points to 13 points.

Overall the administration rate of influenza vaccine during pregnancy was 6% (n = 25). Six women (24%) received vaccination during the first trimester, 7 women (28%) received vaccination during the second trimester, 2 women (8%) received vaccination during third trimester while another 10 women (40%) were unable to recall the precise gestational age when vaccination was prescribed. Of the immunized participants, 13 (52%) received their vaccines at KCMH and another 12 (48%) received the vaccines at the other hospitals.

**Table 1.** Demographic characteristics of the participants (N=412).

| Participants' characteristics | Number | % |
|---|---|---|
| Age (years) | | |
| < 20 | 16 | 3.9 |
| 20 - 34 | 303 | 73.5 |
| ≥ 35 | 93 | 22.6 |
| Parity | | |
| 0 | 208 | 50.5 |
| 1 | 130 | 31.5 |
| ≥ 2 | 74 | 18.0 |
| Gestational age at enrollment | | |
| First trimester (≤ 14 weeks) | 53 | 12.9 |
| Second trimester (15 - 28 weeks) | 104 | 25.2 |
| Third trimester (≥ 29 weeks) | 255 | 61.9 |
| Education level | | |
| No education/ elementary school | 22 | 5.3 |
| Junior-high school/ vocational certificate | 172 | 41.8 |
| High vocational certificate/ diploma | 40 | 9.7 |
| Bachelor's degree/ master's degree | 178 | 43.2 |
| Family incomes (Baht/months) | | |
| ≤ 20000 | 160 | 38.8 |
| 20,001 - 40,000 | 153 | 37.1 |
| 40,001 - 60,000 | 60 | 14.6 |
| ≥ 60,001 | 28 | 6.8 |
| Unknown | 12 | 2.7 |

From univariate analysis (Table 2), good knowledge regarding to influenza and the vaccine was associated with the higher vaccination acceptance rate (p=0.034). If physicians or healthcare workers advised women on influenza vaccination or the vaccine was mentioned during pregnancy, participants' acceptance rate will be higher (p<0.001). Information regarding to protection of newborn from transferred maternal antibody had a significantly positive effect on the acceptance rate (p<0.001). Considering high-risk pregnancy, only women with underlying hypertension had a significant higher rate of vaccination acceptance rate (p =0.043). Interestingly, cost of vaccination found to increase the women acceptance of vaccine (p=0.009).

Most participants had positive attitudes towards influenza vaccination, but the data disclosed some of the factors associated with the refusal of influenza vaccination. Some participants considered pregnancy as an immunocompromised state, thus vaccination was not appropriate during the time (p=0.17). Influenza infection was not concerned during pregnancy (p=0.29) or vaccination protection against influenza was doubt by some (p=0.29). Moreover, influenza vaccination was considered unnecessary during pregnancy (p<0.001), especially during low influenza season. Others had a misunderstanding of vaccination safety: vaccination is considered either being harmful to the mother (p=0.13) or to the fetus (p=0.19). Injection of vaccine during first trimester was thought to be harmful by some. This was significantly associated with vaccination refusal (p=0.007). Other negative factors were experience of adverse effects during previous vaccination (p=0.047) and fear of needle (p=0.009).

**Table 2.** Significant factors associated with vaccination acceptance by univariate analysis.

| Factors | Acceptance (n=167) | Non-acceptance (n=245) | p value |
|---|---|---|---|
| Being hypertension | 9 (5.4%) | 4 (1.6%) | 0.043 |
| Good knowledge regarding to influenza and vaccine | 139 (83.2%) | 181 (73.9%) | 0.034 |
| Notification about vaccination in current pregnancy | 100 (59.9%) | 95 (38.8%) | < 0.001 |
| Advice from physicians or health care providers | 141 (84.4%) | 153 (62.4%) | < 0.001 |
| Experience of side effects following past vaccination | 3 (1.8%) | 15 (6.1%) | 0.047 |
| Belief that vaccine is unnecessary during pregnancy | 14 (8.4%) | 55 (22.4%) | < 0.001 |
| Belief that vaccine is unsafe during the first trimester | 68 (40.7%) | 134 (54.7%) | 0.007 |
| Fear of needle | 34 (20.4%) | 80 (32.7%) | 0.009 |
| Cost of vaccination | 78 (46.7%) | 82 (33.5%) | 0.009 |
| Protection of newborn | 128 (76.6%) | 126 (51.4%) | < 0.001 |

**Table 3.** Significant factors associated with vaccination acceptance by multivariable analysis.

| Factors | Adjusted OR | 95%CI |
|---|---|---|
| Notification about vaccination during current pregnancy | 1.84 | 1.17 - 2.89 |
| Advice from physicians or health care providers | 2.61 | 1.55 - 4.39 |
| Experience of side effects following past vaccination | 0.19 | 0.05 - 0.74 |
| Belief that vaccine is unnecessary during pregnancy | 0.42 | 0.21 - 0.86 |
| Belief that vaccine is unsafe during the first trimester | 0.55 | 0.34 - 0.90 |
| Cost of vaccination | 2.36 | 1.46 - 3.82 |
| Protection of newborn | 2.83 | 1.74 - 4.62 |

According to the regression analysis (Table 3), factors that positively associated with influenza vaccination acceptance rate during pregnancy were advice from physicians or health care providers (OR 2.61, 95% CI 1.55-4.39), notification about vaccination during current pregnancy (OR 1.84, 95% CI 1.17-2.89), protection of newborn (OR 2.83, 95% CI 1.74-4.62) and cost of vaccination (OR 2.36, 95% CI 1.46-3.82). Factors that negatively affected the vaccination acceptance rate were side effects of the previous vaccination (OR 0.19, 95% CI 0.05-0.74), belief that vaccination is unnecessary (OR 0.42, 95% CI 0.21-0.86) and belief that the vaccine is unsafe during the first trimester (OR 0.55, 95% CI 0.34-0.90).

## Discussion

Our study revealed that the acceptance rate of influenza vaccination during pregnancy was 40.5% (95% CI 35.9-45.3). This was slightly, but significant, lower than the acceptance rate (51.6%) among women in the United States of America[11]. At KCMH, influenza vaccine administration to pregnant women was only 6.1%. This number was similar to data from study in Hong Kong (4.9%)[12]. On the contrary, percentage of vaccine administration in the United States of America (50.5%) was extremely higher[13]. However, the vaccine administration rate among pregnant women in the present study was significantly increased when compared with those in the past. From the record during 2008-2013, less than 1% of the pregnant women attending antenatal care clinic at KCMH received influenza vaccination.

The present study showed that two of the significant factors associated with acceptance of vaccination were related to benefit or risk of the newborns. Information that maternal vaccination can protect the newborn infection increased the acceptance while belief that vaccine is unsafe during the first trimester decreased the acceptance. It is consistent with results from the previous studies. Believing that vaccine protects infant and influenza vaccination is safe for unborn were significant predictors of an uptake of influenza vaccination[14] while the most common reason for rejecting the vaccine were fear of harm to the fetus[12].

It is emphasize that influenza vaccination counseling from physicians and healthcare providers is the key for the increment of acceptance rate. In the present study, advice or notification from the physicians and health care providers could increase the acceptance rate of influenza vaccination. Similar to a survey of pregnant women in Western Australia[14], recommendation on vaccination from antenatal care provider was significant associated with having influenza vaccination during pregnancy. To provide information on the benefit of vaccination may change the belief that vaccine is unnecessary during pregnancy and improve women acceptance. Trust in the recommended guidelines about influenza vaccination during pregnancy was reported to be associated with getting vaccinated in pregnant women[15].

The strength of the present study is that there was a high response rate (85.8%) from the participants. However, there are limitations in the study. One potential limitation of the present study is that women participated into study were from the tertiary care hospital that may not be represent for the general population. Furthermore, the study conducted only 5 month duration that may affect the results because influenza infection is a seasonal disease.

To improve acceptance and administration of influenza vaccination during pregnancy, indirect education can be provided to the women by immunization brochures or simple charts prompt at the antenatal care clinics. Influenza vaccination counseling should focus on both maternal and newborn protection, which was found to be a positive factor towards the acceptance. The counseling should correct misunderstandings about influenza vaccination, which found to be safe for women and fetus, even administered during the first trimester. More importantly, government health sector can promote the vaccine administration by emphasizing physicians and healthcare providers during influenza season, advertising the benefit of influenza vaccination during pregnancy and adequately supplying the vaccine. In conclusion, the acceptance and administration rate of influenza vaccine among pregnant women attending antenatal care clinic at KCMH was still low. Physicians and healthcare providers could increase the acceptance

by providing influenza discussion and advice. Influenza vaccination can protect them and their newborns and is safe at any trimester should be included in information provided to pregnant women.

## Potential conflcts of interest

The authors declare no conflict of interest.

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