ปัจจัยที่มีอิทธิพลต่อความวิตกกังวลของหญิงตั้งครรภ์ในสถานการณ์การแพร่ระบาดของโควิด 19
Factors Influencing Anxiety among Pregnant Women during the Covid-19 Pandemic

นิพนธ์ต้นฉบับ **Original Article**

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วารสารไทยเภสัชศาสตร์และวิทยาการสุขภาพ 2566;18(1):60-69.

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บทคัดย่อ

วัตถุประสงค์: เพื่อศึกษาระดับความวิตกกังวลและปัจจัยที่มีอิทธิพลต่อความวิตกกังวลของหญิงตั้งครรภ์ในสถานการณ์การแพร่ระบาดของโรคติดเชื้อโควิด 19 **วิธีการศึกษา:** กลุ่มตัวอย่างเป็นหญิงตั้งครรภ์ที่มีอายุครรภ์ 12 สัปดาห์ขึ้นไปที่รับบริการแผนกฝากครรภ์ ณ โรงพยาบาลสมุทรปราการและโรงพยาบาลบางพลี จังหวัดสมุทรปราการ ช่วงมกราคมถึงกรกฎาคม พ.ศ. 2565 จำนวน 126 ราย คัดเลือกโดยการสุ่มอย่างง่าย รวบรวมข้อมูลโดยใช้แบบสอบถามความวิตกกังวล การสนับสนุนทางสังคม ความกลัวเชื้อโควิด 19 และความยืดหยุ่นทางจิตใจ ทดสอบความสัมพันธ์โดยทดสอบความถดถอยพหุคูณแบบขั้นตอน **ผลการศึกษา:** หญิงตั้งครรภ์ความวิตกกังวลระดับปานกลาง (mean = 44.8 คะแนน) โดยการสนับสนุนทางสังคม (β = -0.343, *P*-value < 0.001) ความกลัวต่อโควิด-19 (β = 0.320, *P*-value < 0.001) และความยืดหยุ่นทางจิตใจ (β = -0.235, *P*-value = 0.003) สามารถร่วมทำนายความแปรปรวนของความวิตกกังวล ได้ร้อยละ 42.8 (R^2 = 0.428, $F_{3,122}$ = 30.49, *P*-value < 0.001) **สรุป:** หญิงตั้งครรภ์มีระดับความวิตกกังวลในช่วงการระบาดของโควิด-19 ระดับปานกลาง และสัมพันธ์กับการสนับสนุนทางสังคม ความกลัวต่อโควิด-19 และความยืดหยุ่นทางจิตใจ

คำสำคัญ: ความวิตกกังวล, การสนับสนุนทางสังคม, ความกลัวต่อโรคโควิด-19, ความยืดหยุ่นทางจิตใจ, หญิงตั้งครรภ์

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Abstract

Objective: To determine level of anxiety and its influencing factors in pregnant women during the Covid-19 pandemic. **Method:** 126 pregnant women with a gestational age of 12 weeks or more receiving antenatal services at Samutprakarn Hospital and Bangpli Hospital, Samutprakarn province between January to July 2022 were recruited by simple random sampling. The questionnaire questions assessing anxiety, social support, fear of Covid-19, and resilience. Associations were tested using stepwise multiple regression analysis. **Results:** Pregnant women had a moderate level of anxiety (mean = 44.82 points). Anxiety was significantly associated with social support (β = -0.343, *P*-value < 0.001), fear of Covid-19 (β = 0.320, *P*-value < 0.001), and resilience (β = -0.235, *P*-value = 0.003). These three factors together explained 42.8% of variance of anxiety (R^2 = 0.428, $F_{3,122}$ = 30.49, *P*-value < 0.001). **Results:** Anxiety of pregnant women during the Covid-19 pandemic was a moderate level and was significantly associated with social support, fear of Covid-19, and resilience.

Keywords: anxiety, social support, fear of Covid-19, resilience, pregnant women

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Introduction

The worldwide pandemic of coronavirus–19 (Covid-19) starting from December 2019 from China has put a large number of patients in severe respiratory interstitial damage resulting in acute respiratory inflammation, abnormal gas exchange, and death.[1] In Thailand, the fifth wave of the pandemic with the B.1.1.529 variant or omicron has been found to be more contagious and invasive to human body than previous variants. Patients with a history of covid-19 infection have a higher chance of reinfection with Omicron.[2] Based on the report of the Ministry of Public Health on November 6, 2022, there were 4,695,207 cumulative number of covid-19 cases with 32,995 deaths.[3] In Samutprakarn province, cumulative number of covid-19 cases was at the second highest area after the Bangkok Metropolitan. The cumulative number of cases since November 6, 2022, was 246,149 cases with an increasing trend. Among a diverse group of population with covid-19 infection, pregnant women were also the prominent group infected individuals.[4]

Covid-19 infection among pregnant women has been an alarming concern. Based on the report of the Pan American Health Organization (PAHO) and the World Health Organization (WHO), rate of pregnant women in the US infected with covid-19 was the highest in the world. From January 22, 2020, to July 25, 2023, there were 225,656 covid-19 infected cases and 306 deaths of pregnant women.[5] Covid-19 infection in pregnant women and infants has become a worldwide health threat. In

Thailand, the Department of Health, 7,210 pregnant women got infected with covid-19 and 110 died of the infection from April 1, 2021, to March 5, 2022. Of 4,013 infants of these infected pregnant women, 319 were infected and 67 were dead.[6] The death of the mothers was mostly caused by covid-19 infection, followed by bleeding.[7] The Department of Health and related network alliances have put effort on providing covid-19 vaccine for women with at least 12-week gestation and those breast-feeding to help reduce the burden on pregnant women and infants.[8] At 12 weeks of pregnancy, most hormones return to almost normal levels, hence less morning sickness. With an obvious enlarged stomach and less disturbance by morning sickness, the women's mind shift to worry and later anxiety about threat from the surroundings on themselves and their fetus.

In pregnant women, covid-19 poses a more severe form of infection. They are three-time more likely to have a severe case and have a 2.5 times of death rate compared with general population. Most of death cases were of respiratory failure. The fetus lung dilation is limited by the mother's dilated uterus leading to atelectasis of the fetus. Covid-19 also causes abnormality in vascular circulatory system including inadequate placental circulation. Complications include eclampsia, abnormal bleeding, pulmonary embolism, and placental abruption.[9] Regarding economics, covid-19 pandemic affected job hiring and adjustment, and had pregnant women laid off. For mental health, with an increasing infection in pregnant women but a limited availability of the vaccine, inequal access to health care was widen. These situations affected mental health pregnant women. During the covid-19 pandemic, pregnant women faced anxiety with varied rates, of which 35.6% with slight anxiety, 20.5% with moderate anxiety, 12.3% with high anxiety, and 3.4% with the extreme anxiety.[10] Anxiety causes heightened heart rate in pregnant women[11], increased risk of premature delivery, and detrimental nervous system development in the fetus.[12]

Previous studies reveal that anxiety in pregnant women during covid-19 pandemic was influenced by various factors. Demographic factors include education and religion[13,14], type of job and income.[15] pregnancy factors are gestational age[13], high-risk pregnancy[14], primigravidarum or first pregnancy[16], and history of abortion.[15] For psychosociological factors, these include the fear of covid-19 infection[17], resileince[18,19] and social support.[20-22] Fear of covid-19 infection was found to rise among pregnant women.[23]

Fear of covid-19 infection is a response toward the pandemic perceived as a threat and danger to individuals and those surrounding them. With fear, pregnant women feel nervous, fearful, and uneased about the looming covid-19 pandemic. The fear poses detrimental effect on physical and mental health.[24] With the serious and life-threatening effects of covid-19 on the pregnant women, and their fetus and family., pregnant women have been fearful of covid-19. This fear of covid-19 was found to influence anxiety. The study of Salehi and colleagues revealed that the fear of covid-19 was positively associated with anxiety while pregnant (r = 0.60, P-value< 0.001).[17] The fear of covid-19 among pregnant women could be in three folds namely the fear of infection, uncertainty of the situation's severity and protocol, and unsafe activities during the pandemic. Fear of instability to the unpredictable COVID-19 situation was highly associated with anxiety scores (r = 0.426, P -value < 0.01)[25]. The fear and anxiety during pregnancy could directly, negatively affect physical and menta health.[26] In facing the pandemic, enhancing resilience could help pregnant women survive the crisis.

Resilience as a mental rehabilitating factor is an internal defense mechanism. Resilient individuals can adjust, endure, and be confident in confronting problems. They use resilience to survive the hardship in life till they could adequately develop cognitive process, acquire desirable behavior, and properly manage their emotional status.[27] Pregnant women encountering covid-19 pandemic especially those with infected family members were more likely to face anxiety and suffering; while those with a high resilience could have their anxiety alleviated. A study of Song and colleagues revealed that resilience was negatively associated with stress, anxiety, and depression; with r of -0.343 (P-value < 0.001) for anxiety.[19] A study of Ma and co-workers showed that resilience could explain 12% of variance of anxiety (R^2 = 0.12, P-value < 0.001).[18] Resilience could help pregnant women to adjust and encounter anxiety associated with covid-19 pandemic. In addition to resilience, positive influence of support from society, family and significant others could help pregnant women to overcome the crisis.

Social support is an interactive process among individuals in a social network which could maintain and enhance the members' physical and mental health. Social support consists of four components. For emotional support, individuals close to pregnant women express affection and care and keep them companied. For appraisal support, pregnant women use

feedback information from significant others to properly evaluate themselves. For example, pregnant women evaluate their own behavior risky for covid-19 infection based on the feedback information from significant others. For informational support, healthcare providers and significant others provide information and advice regarding appropriate behavior during pregnancy and covid-19 pandemic. For material support, significant others could provide resources necessary during covid-19 pandemic for pregnant women.[28] All aspects of social support point to the need of social support for pregnant women facing covid-19 pandemic to help alleviate anxiety. A study shows that social support was negatively associated with anxiety while facing covid-19 pandemic in Thai pregnant women (r = -0.22, P-value < 0.05).[20] Social support and support effectiveness during the covid-19 pandemic were negatively associated with psychological symptoms (r = -0.31, P-value < 0.001).[22] In addition, social support also explained 23% of variance of anxiety in American pregnant women (R^2 = 0.23, P-value < 0.01).[21] Pregnant women with adequate social support have good mental health, adequate management for various matters, and proper adjustment to difficult situations.[28]

This covid-19 pandemic was a new pandemic incidence to Thailand as well as other parts of the world. Various psychological problems among pregnant women during the pandemic emerged with limited understanding. The infection of covid-19 poses a serious and/or life-threatening effect on pregnant women and their fetus. With the concern on anxiety in pregnant women during the covid-19 pandemic but a limited number of the body of the research in Thai counterparts, more understanding on the issue among Thai pregnant women is needed. The authors aimed to investigate level of anxiety and its selected influencing factors among Thai pregnant women during covid-19 pandemic. These adjustable factors were as follows. First, fear of covid-19 infection was the basic instinct to express negatively toward the threat. The less fear of covid-19 infection, the less anxiety the pregnant women face. Second, resilience was the individual's capability to recover emotionally and psychologically from being defeated in the difficult situation. The more resilience, the less anxiety for the pregnant women. Third, social support was the support pregnant women perceived. With more perceived social support, pregnant women would feel safer, more confident, and less anxious. Findings from this study could be used for healthcare providers to plan protocol, activities and program to relieve anxiety for pregnant women in the unfamiliar pandemic like the covid-19. Such programs could help pregnant women adjust to the crisis and live a daily life effectively so quality of life of the mothers and their infants could be maintained.

Specifically, the present study aimed to determine level of anxiety and associations with its influencing factors including fear of covid-19 infection, resilience, and social support among Thai pregnant women during the covid-19 pandemic. Consequently, it was hypothesized that anxiety in pregnant women during covid-19 pandemic could be predicted by fear of covid-19 infection, resilience, and social support.

Methods

In this predictive correlation research, study population was pregnant women aged 18 years old or older receiving antenatal care clinic at 10 public hospitals in Samutprakarn province in the year of 2022. Sample was 126 individuals of study population who met inclusion criteria. To be eligible, they had to be at least 12-week pregnant, have no history of covid-19 infection and not in covid quarantine period, be able to communicate in Thai language, and have electronic communication device using QR code to complete the online questionnaire, have no obstetric or medical complications such as placenta previa, multifetal pregnancy, preterm labor, hypertension in pregnancy, and have no history of psychiatric disorders, or severe anxiety or stress. They also needed to be willing to participate in the study.

The sample size was estimated based on the power analysis using the software program G*power 3.1.9.7.[29] The model was based on the multiple regression with fixed model of R^2 deviation from zero to estimate predicting power of three independent variables. With an estimated population R^2 of 12%[18] and the equation of $f^2 = r^2 / (1 - r^2)$[30], the effect size was 0.136. With a type I error of 5% and a type II error of 10%, a sample size of 109 participants was needed. To compensate for incompletely filled questionnaires or outlier answers, a total number of 126 participants were needed for a 15% incompletion rate.

From the ten public hospitals in Samutprakarn province, two hospitals with the highest number of women receiving antenatal care, i.e., Samutprakarn General Hospital and Bangpli Community Hospital. These two hospitals were both secondary level healthcare providing obstetric care for women of diverse nationalities, races, and cultures which could be a good representative of the target population. Participants were

selected using simple random sampling without replacement from pregnant women registered with antenatal clinic of each of the two hospitals who met the inclusion criteria. A total number of 66 and 60 participants were selected from Samutprakarn Hospital and Bangpli Hospital, respectively.

Research instruments

The questionnaire consisted of five parts as follows. The first part collected demographic and health status characteristics including age, education level, income, history of illnesses, gravidity, gestational age, history of pregnancy, pregnancy complications, history of vaccination, and familu history of Covid-19 infection.

The second part evaluated anxiety using the Thai version of the State Anxiety Inventory [STAI] Form Y.[31] The questions asked pregnant women about emotional stress, agitation, uneasiness, and fear toward emerging situations which are life-threating when perceived as beyond their capability to handle. This Thai version of STAI was translated[32-33] and further found to have a good internal consistency reliability among 102 post-delivery women (Cronbach's alpha coefficient of 0.85).30 The response was a 4-point *rating* scale ranging from 1-almost never, to 2-sometimes, 3-often, and 4-almost always. Of the total 20 items, there were 10 items of positive and negative statements equally. With the total score of 20 – 80 points, higher scores indicate high level of anxiety. Anxiety is categorized as low, moderate, high, and highest (20 – 40, 41 – 60, 61 – 70, and 71 – 80 points, respectively).

In third part assessed the fear of covid-19 infection. Pregnant women rated how they were nervous, feared, and uncomfortable toward covid-positive result, having contact, conversation, residing and staying closely with unknown individuals, not masking, forgetting to wash hands, and receiving donated blood or donating blood. The researcher modified the existing Thai language questions of fear of covid-19.[34] The scale had a high internal *consistency* reliability with a Cronbach's alpha coefficient of 0.93.[34] The response was a 5-point rating scale ranging from 1-not at all feared, to 2-slightly feared, 3-somewhate feared, 4-highly feared, and 5-the most feared. With 9 questions, a total score of 9 – 45 points were expected where higher scores indicated higher level of fear of covid-19.

The fourth part evaluated resilience. Pregnant women rated their opinion toward situations or events difficult, obstructive, life-threatening to their living and adjustment, and the need to endure and be confident in encountering and overcoming the situation. The Thai language Resilience Inventory (RI-9) was developed based on the concept of the Ten perfections.[35] The original RI-9 had a high internal consistency reliability with a Cronbach's alpha coefficient of 0.90.[35] The RI-9 has a 5-point Likert-type rating scale ranging 1-not at all true, to 2-mostly not true, 3-slightly true, 4-somewhat true, and 5-almost always true. With 9 questions and a total score of 9 – 45 points, higher score indicated higher level of resilience.

The fifth part evaluated social support. Pregnant women were asked to rate their opinion on response or help given by significant others about health-related feedback and information during their pregnancy. Four aspects of social support including emotional, appraisal, informational, and material supports were rated. Twelve questions were developed in Thai language[28] based on the concept of social support of House (1981) [36]. The 12-item scale had a high internal consistency reliability with a Cronbach's alpha coefficient of 0.89. The response was a 4-point rating scale ranging from 1-not at all, to 2-low, 3-moderate, and 4-high. With a total score of 12 – 48 points, higher score indicated higher social support.

Instrument quality assurance

For content validity, the researcher had three experts to examine the fear of covid-19 questionnaire. These three experts were one psychiatrist and two nursing school instructors specialized in maternal and obstetric nursing and community and obstetric nursing. Content validity index of fear of covid-19 questions was calculated and found to indicate an acceptable content with an index of 0.96. Questionnaire was also revised according to recommendations from the three exert. For questionnaires of anxiety, resilience and social support, since they were permitted for use with no modifications, content validity of these scales was not examined.

For internal consistency reliability, 30 individuals with characteristics comparable to the participants were tested. It was found that questions on anxiety, fear of covid-19, resilience, and social support had acceptable internal consistency reliability with Cronbach's alpha coefficients of 0.87, 0.90, 0.96 and 0.92, respectively.

Participants' ethical protection

The study was approved by the Ethics Committee for Human Study of Burapha University (approval number: G-HS094/2564; approval date: January 21, 2012), and the Ethics Committee for Human Study of Samutprakarn Hospital (approval number: Gq00465; approval date: February 11, 2012). Participants were informed about voluntary and anonymity nature of the study. Written informed consent was obtained. Should the participants feel uneased or negatively affected by the questionnaire, they were able to withdraw from the study at any time with no consequences on the care they received. Information from all participants was secured and presented as summary results, not individual participants.

Data collection procedure

The researcher requested hospital directors for survey permission. Once permitted, the researcher approached head of the antenatal clinic of each hospital to obtain a list of scheduled, registered pregnant women. A simple random sampling was used to select prospective participants.

In conducting the survey, the researcher followed the strict covid-19 prevention protocol. The researcher approached the potential participants to provide objective, detailed process, and voluntary and anonymity nature of the study. Those who provided written informed consent were given QR code for the online survey. The researcher explained all steps of questionnaire complete. The participants used their own smartphone or tablet to complete the online questionnaire which took about 15 – 30 minutes.

Data analysis

Descriptive statistics including mean with standard deviation (SD) and frequency with percentage were used to summary demographic and clinical status characteristics, and study factors. The associations between anxiety and its predicting factors, i.e., fear of covid-19, resilience and social support were preliminary tested using Pearson's product moment correlation analysis or Spearman's correlation analysis where appropriate. With all study factors normally distributed, it was found that anxiety was significantly, positively correlated with fear of Covid-19 (r = 0.435, *P*-value = 0.01), and negatively correlated with resilience (r = -0.452 , *P*-value = 0.01) and social support (r = -0.533 , *P*-value = 0.01) . As a result, all three predictive factors were further tested in stepwise multiple regression analysis. The assumption of normal distribution of the dependent variable was met. Multicollinearity of the independent variables were at acceptable level with variance inflation factors of 1.06 - 1.37 which were lower than 4 and tolerance values of 0.73 – 0.97 which were not lower than 0.25.[37] Statistical significance was set at a type I error of 5%. All statistical analyses were performed using the software program SPSS version 25.0.

Results

Of the 126 pregnant women participants, majority were in their 20 – 34 years of age (69.05%), followed by those older than 34 years old (23.81%) (Table 1). Most women finished high school or vocational school education (67.46%), followed by primary education (15.08%). The majority had a monthly income of 10,001 - 15,000 Baht (38.89%), had no chronic illnesses (84.92%) followed by hypertension (7.94%) and diabetes (2.38%).

Most number of pregnancy was five times. Most participants had two pregnancies (46.03%) followed by the first pregnancy (15.87%). For those with previous pregnancy, no complications were found (69.84%) followed by a history of preterm labor (7.14%) and threatened abortion (4.76%). For gestational age, the earliest age was 12 weeks and latest one was 41 weeks and 3 days with a mean of 27.11 weeks (*SD* = 7.46) of which 54.76% were in their second trimester.

In terms of vaccination, most participants had two covid-19 shots (61.11%) followed by three shots (24.60%). A small proportion had no covid-19 vaccinations (5.56%). The majority had family members infected with covid-19 and cured (48.41%) followed by and no family members infected with covid-19 (41.27%). Finally, 2.38% has family members died of covid-19 (Table 1).

Based on mean scores, fear of Covid-19, resilience and anxiety were at a moderate level; while social support was at a high level. For anxiety, most participants were at a moderate level (53.97%) followed by a low level (38.89%). Only 7.14% were at a high level (Table 2).

The three predictive factors together could predict 42.8% of the variance of anxiety (R^2 = 0.428, *P*-value < 0.001) (Table 3). The most predicting factor was social support (β = -0.343, *P*-value < 0.001), followed by fear of Covid-19 (β = 0.320, *P*-value < 0.001), and resilience (β = -0.235, *P*-value = 0.003).

Table 1 Demographic and clinical status characteristics (N = 126).

Characteristics	N	%
Age (years), range: 18 – 46; mean 29.13 ± 6.07.		
< 20	9	7.14
20 - 34	87	69.05
≥ 35	30	23.81
Education level		
No formal education	1	0.79
Primary school	19	15.08
High school / vocational school	85	67.46
Senior vocational school	12	9.52
Bachelor's degree	9	7.15
Monthly income (Baht), range: 0 - 25,000; mean 10,444.68 ± 6,651.38.		
None	29	23.02
< 5,000	1	0.79
5,000 - 10,000	26	20.63
10,001 - 15,000	49	38.89
> 15,000	21	16.67
Chronic diseases		
None	107	84.92
Hypertension	10	7.94
Diabetes	3	2.38
Hyperthyroidism	2	1.59
Asthma	2	1.59
Hepatitis B	1	0.79
Thalassemia	1	0.79
Number of pregnancy, range: 1 – 5; mean = 2.35 ± 0.91.		
First pregnancy	20	15.87
Second pregnancy	58	46.03
Third pregnancy	34	26.98
More than three pregnancies	14	11.12
Gestational age, range: 12 – 41; mean = 27.11 ± 7.46.		
First trimester	2	1.59
Second trimester	69	54.76
Third trimester	55	43.65
History of pregnancy complications (only women with at least two pregnancies)		
First pregnancy	20	15.87
No complications	88	69.84
Preterm labor	9	7.14
Threatened abortion	6	4.76
Still birth	3	2.38
History of covid-19 vaccinations		
No vaccinations	7	5.56
One shot	11	8.73
Two shots	77	61.11
Three shots	31	24.60
History of covid-19 infection in family members		
No infection	52	41.27
Having infected and cured	61	48.41
Having infected and being treated	10	7.94
Death of the infection	3	2.38

Table 2 Levels of study factors (N = 126).

Factors	Range		Mean	SD	Level
	Possible	Actual			
Social support	12 - 48	19 - 48	36.69	7.09	High
Fear of Covid-19	9 - 45	12 - 45	29.88	8.70	Moderate
Resilience	9 - 45	16 - 45	31.41	7.18	Moderate
Anxiety	20 - 80	22-68	44.82	10.49	Moderate
Anxiety level	**N**	**%**			
Low (20 – 40)	49	38.89			
Moderate (41 – 60)	68	53.97			
High (61 – 70)	9	7.14			

Table 3 Associations between anxiety and its predictive factors (N = 126).*

Factors	β	SE	*t*	*P*-value
Constant		5.364	11.69	< 0.001
Social support	-0.343	0.118	-4.29	< 0.001
Fear of Covid-19	0.320	0.085	4.55	< 0.001
Resilience	-0.235	0.115	-2.99	0.003
R^2 = 0.428, adjusted R^2 = 0.414, $F_{3, 122}$ = 30.49, *P*-value < 0.001.				

* Stepwise multiple regression analysis.

Discussions and Conclusion

As a response in stress, anxiety is temporary and specific to a given situation. The expression of the autonomic nervous system in response to the stimuli is abnormal. Its severity and duration depend on the individuals' emotional stability, personality and past experience.[38] In our study, with a mean anxiety score of 44.82 points, overall anxiety was considered at a moderate level. Most participants had a moderate anxiety level (53.97%) while 38.89% had a low anxiety level and 7.14% had a high level. Our finding is consistent with the work of Ilska and colleagues which revealed that pregnant women during the Covid-19 pandemic has a higher risk of anxiety at moderate to high level.[39] In addition, most participants in our study were in their 20 – 34 years of age which were with a relatively low risk of pregnancy complications compared with other age ranges. Among those with 35 years old, risk of preeclampsia, gestational diabetes, and preterm labor.[40] These pregnant women with a high risk of pregnancy complication especially threatened abortion had a significantly higher anxiety than those with no such complications (*P*-value = 0.01).[41]

Individuals manage anxiety using learning ability, proper adjustment, and access to knowledge and information. With low education, individuals might lack thinking and decision-making skill. In this present study, most participants had a fair

education level, i.e., at least with high school education. A previous study indicates that during Covid-19 pandemic, pregnant women with less than high school education were more likely to have anxiety.[14] In addition, participants in this study were not with the first pregnancy, hence they had a certain level of experience and knowledge about pregnancy complications. A study of Hamzehgardeshi and colleagues revealed that first pregnancy was a predictive factor of pregnancy anxiety (*P*-value = 0.007).[16] However, only 15.87% of participants in our study had the first pregnancy, and as high as 69.84% had no history of pregnancy complications and 84.92% had no chronic illnesses. This is consistent with Biaggi and colleagues revealing that pregnant women with no chronic illnesses had a lower anxiety than those who did. [42] Such heightened anxiety was prominent in the first trimester because there were a vast physiological change and a higher likelihood of bleeding which could result in a miscarriage.[43] Most of our participants were in their 2nd to 3rd trimester; hence a moderate level of anxiety. The study of s He and colleagues also found that women with a history of miscarriage would have a high chance of anxiety in their next pregnancy.[15] In our study, only 7.14% of the participants had a history of threatened abortion and miscarriage and 94.44% had Covid-19 vaccinations, hence a moderate, not high level of anxiety.

Regarding factors influencing anxiety, it was found that social support, fear of Covid-19 and resilience together explained 42.8% of variance of anxiety (R^2 = 0.428, $F_{3,122}$ = 30.49, *P*-value < 0.001) . Social support was the most predictive factor on anxiety during the Covid-19 pandemic (β = -0.343, *P*-value < 0.001). The more social support, the less anxiety. The information support was at the highest level (mean = 9.28 $\pm$ 2.01); while emotional support was at the lowest level (mean = 9.10 $\pm$ 2.05). Overall social support was at a moderate level (mean = 36.69 $\pm$ 7.09) which was 76.44% of the total score of 48 points. During the pandemic, there was a limitation of the number of women waiting for the antenatal care service and laboratory works. Therefore, family had a limited support for the pregnant women. There perceived a lack of emotional support as seen for the statement “my significant others always accompany me to the antenatal care” with the lowest mean score of 2.75 points (data not shown).

Social support acts as a shirled from difficulties. With perceived social support, individuals see their social network, source of needed information, helping hands, and solutions. As a result, they are less likely to be obsessed, and more likely to feel safe, positive, and self-confident. A lack of social support could result in a mental health problem.[44] During the pandemic, information support was essential for updating the current situation and providing learning sources and knowledge. In our study, information support was the highest component of social support with the highest mean score of 9.28 points. Social support was negatively influencing anxiety. This is consistent with the work of Wang and colleagues showing that social support in pregnant women during the Covid-19 pandemic was negatively associated with anxiety (r = - 0.111, *P*-value < 0.001)[45] This negative association between social support and anxiety was among pregnant women during the pandemic was also found in the studies of Lebel and colleagues (r = - 0.31 , *P*-value < 0.001)[23] and Taonoi and colleagues (r = -.22, *P*-value < 0.05).[20] Social support was predictive of anxiety which is consistent with the study of Hopkins et al revealing that social support explained 23% of variance of anxiety (R^2 = 0.23, *P*-value < 0.01).[21] Hence, social support is a factor alleviating anxiety in pregnant women during the Covid-19 pandemic.

For fear of Covid-19, it was predictive of anxiety. It was positively associated with anxiety with the extent less than that of social support (β = 0.320, *P*-value < 0.001). The more fear of Covid-19, the more anxiety. Fear of Covid-19 was at a relatively low with a mean of 29.88 $\pm$ 8.70 points which was 66.40% of the total score of 45 points. This low fear could be because as high as 94.44% of them had at least one Covid-19 vaccine shot. The trust on the approved efficacy of the vaccine to reduce the chance of severe infection and death and to prevent the infection could have lessened their fear of Covid-19. Such efficacy has been proved as downward or steady trend of infect in various countries.[46]

Fear is an instinct response toward stimuli or threat both physically and mentally with the neurological transmission in the brain.[26] The fear of Covid-19 was positively associated with anxiety. Such positive association of fear of Covid-19 with anxiety in the pandemic was also found in the study of Salehi and co-workers (r = 0.60, *P*-value < 0.001)[17], Alnazly and co-workers (r = 0.657, *P*-value = 0.01)[47], and Lee and colleagues (r = 0.35, *P*-value < 0.001).[48] Fear of Covid-19 could also explain variance of anxiety which is also found in a previous study of Feng et al showing a 24% variance explained (R^2 = 0.24, *P*-value < 0.001)[49] and a study of Nimitwat.[24] The fear and anxiety of pregnant women during Covid-19 pandemic, even though were at a moderate, not high level, could pose

detrimental effects on physical and mental health of the mother and the child, if sustained.

The survey study among Thai pregnant women during the Civud-19 pandemic revealed a moderate level of anxiety. Anxiety was significantly, positively associated with fear of Covid-19, and negatively correlated with resilience and social support.

Regarding resilience, we found that resilience together with social support and fear of Covid-19 could predict anxiety among pregnant women during the pandemic. Resilience had the least effect on anxiety after social support and fear of Covid-19 (β = -0.235, *P*-value = 0.003). The more resilience, the less anxiety. Participants in our study had a moderate level of resilience with a mean score of 31.41 $\pm$ 7.18 points which was 69.80% of the total score of 45 points. Individuals with resilience have positive attributes in physical, psychological, emotional, cognitive, and spiritual aspects that expressed as good physical health, stable emotion, self-esteem, goal-oriented mind, enthusiasm, problem solving skill, and co-existence with others.[50]

Resilience enhances cognitive development, desirable behaviors, and proper self-perception that they are worthy and capable in adjusting in difficult situations. Individuals with resilience could endure difficulties and manage their negative feeling and emotion out of the situation.[27,51] Our finding of resilience negatively associated with anxiety is consistent with studies of Song and colleagues (r = -0.343, *P*-value < 0.001)[19], Ma and colleagues (r = -0.21, *P*-value < 0.001)[18], McCleskey and Gruda (r = -0.62, *P*-value < 0.001)[52], and Setiawati and colleagues (r = - 0.519, *P*-value < 0.001).[53]

In addition to anxiety toward the Covid-19 pandemic, pregnant women were also anxious of other matters such image changes, new role, marital relationship, and laboring.[54] To reduce anxiety, ones need time to be self-satisfied, understand, respect, build self-esteem, solve problem using cognitive thinking, and prepare to face adversaries.

Our findings could be applied in certain settings. Nurses and healthcare providers could help reduce anxiety for pregnant women by promoting social support with family members participating in activities. Pregnant women should be applauded for proper practice for pregnancy. Resilience could be enhanced by promoting proper practice in stressful situations. Fear could be reduced by providing information and knowledge to women with a high risk of complications. These activities should also be planned and supported at the nursing administration and planning level. In nursing education, such concept and related nursing activities should be taught and trained in nursing students.

For the implications, findings could be useful in developing a program to promote anxiety alleviation and resilience using simulated critical situations. Resilience in pregnant women in other situations should be studied including child loss, pregnancy complications, and resilience of the pregnant women's family.

In conclusion, anxiety in Thai pregnant women during the Covid-19 pandemic was at a moderate level. Anxiety was significantly influenced by social support, fear of Covid-19 and resilience.

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