Literature Review

Anxiety in Pregnant Women During the Covid-19 Pandemic

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Abstract

Objective: This study systematically reviewed and meta-analysis the prevalence and factors associated with anxiety in pregnant women during the pandemic.

Methods: We searched PubMed MEDLINE, Web of Science, Scopus, ProQuest, EBSCO, Science Direct, and Garuda journal databases in July 2021 and updated them in October 2021. All articles from December 2019 and the English and Bahasa Journal articles were included in the search. We included studies that investigate factors affecting anxiety exclusively in pregnant women. The primary outcome was the prevalence ratio. The secondary outcome was the risk and protective factors as the independent variable. Joanna Briggs Institute Critical Appraisal Tools and RevMan 5.4 were used for the analysis.

Results: After screening 2082 articles, we included 21 studies with 42.177 pregnant women. The pooled prevalence of anxiety was estimated at 28% (95% CI, 23-33.3). We found that 12 of the 21 studies contributed to 8 risks and one protective factor in the meta-analysis. Not married/divorced/widowed, monthly income < 780 USD, screen time > 3 hours/day, history of exposure to COVID-19, complications in the current pregnancy, sleep less than 7 hours per day, subjective poor sleep quality, and high perception of vulnerability were risk factors. Meanwhile, the protective factor was trust in the government's official media.

Conclusion: There is a significant increase in the prevalence of maternal anxiety during the pandemic. Mental health screening during the antenatal visit must be carried out, and interventions to lower the anxiety level must be planned to prevent further harm.

Keywords: anxiety, COVID-19, mental health, pandemics, pregnancy.

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INTRODUCTION

The COVID-19 pandemic causes psychological distress and fear in some individuals due to periods of isolation, quarantine, and hospitalization[1]. As one of the vulnerable populations, pregnant women experience increased anxiety, which has been reported in various countries[2–4]. Anxiety is a normal response to threats and is an attempt to save oneself [5]. However, there will be interference if the response is excessive.

In pregnant women, anxiety is associated with an increased risk of obstetrics problems, cesarean delivery, increased chances of preterm birth, small for gestational age, and smaller infant head circumference[6], including premature rupture of the membrane[7] If not prevented, anxiety during pregnancy could lead to more extensive harm. Therefore, knowing the risk and protective factors for anxiety during pregnancy is essential, especially during a pandemic.

Several systematic literature reviews discussed the psychological impact of COVID-19 on pregnant and postpartum women during the pandemic[8,9]. However, none specifically discusses the prevalence of anxiety during pregnancy and its determinants using a systematic review accompanied by a meta-analysis method. Therefore, this study aims to systematically review risk and protective factors, estimate the

pooled effect size of risk and protective factors, and estimate the pooled prevalence of anxiety in pregnant women during the COVID-19 pandemic.

METHODS

The organization of this manuscript followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) guidelines[10], and the research protocol was registered in PROSPERO CRD42021270107. The literature search was carried out in July – August 2021 and updated in October 2021. We used PUBMED Medline, Web of Science, Scopus, Science Direct, ProQuest, EBSCOhost, and the Garuda journal database to conduct our search.

The search for titles and abstracts was carried out systematically using the thesaurus and MeSH. Combination of keywords: pregnant*, antenatal, prenatal, perinatal, maternal, gravid, prepartum, peripartum, antepartum, expectant mother, anxiety, worry, mental health, stress, distress, COVID, Coronavirus, Wuhan virus, Wuhan Pneumonia, SARS-CoV-2, 2019-nCOV, and pandemic both in English and Bahasa were used. All English and Bahasa journal articles from December 2019 to July 2021 were included in the search.

The Population, Intervention/Exposure, Comparison, Outcome, and Study design frameworks were used to clarify the inclusion and exclusion criteria (see Table 1).

Table 1. PICOS Design Frameworks

	Inclusion	Exclusion
Population	Studies on pregnant women only or pregnant and postpartum women	Studies that did not dissociate pregnant and postpartum women in the analysis.
Intervention/ Exsposure	COVID-19 pandemic	
Comparator		
Outcome	The primary outcome was the prevalence of anxiety among pregnant women. The secondary outcome was the risk and protective factors as the independent variable and anxiety as the dependent variable with Odds Ratio/ Prevalence Odds Ratio, p <0.05, and 95% CI.	Studies only mention descriptive analysis for the outcome and studies that combine anxiety and other mental health problems as the dependent variable.
Study Design	Cross-sectional, case-control. cohort	Reviews, editorials, letters, opinions, purely qualitative studies, conferences, and proceedings.

The articles obtained from the initial search were then imported into Rayyan[11], checked for duplication and screened. Preliminary screening through titles and abstracts was carried out independently by CPP. After selecting the title and abstract, the full text of potential articles was screened based on the data extraction compared to inclusion and exclusion criteria. Articles that did not meet the requirements were removed with a description of the reason. In case of doubt, CPP consulted with other reviewers (BAT, MS). Articles that did not provide access to the full text were excluded.

According to the study design, articles passed the title, abstract, and full-text screening process, then assessed for quality using the Joanna Briggs Institute (JBI) Critical Appraisal Tools[12] and scored. Articles that did not meet the minimum cut-off value of included studies (50%) were excluded to prevent bias due to study quality.

Th data extraction process is carried out by CPP independently. Studies containing statistical data were synthesized quantitatively during the meta-analysis. The combined prevalence was calculated using the proportion formula for pregnant women with anxiety disorders based on the cut-off score of the anxiety measurement instrument provided in the article. Because one article can contain more than one risk factor, each risk factor was analyzed separately. Articles that did not report odds ratio but had 2x2 table data were included in the meta-analysis.

Revman 5.4 software was used to analyze the data. The heterogeneity assessment used the I2 test (I2 > 50%) and the Q test.[13] The random-effects model was used in heterogeneous study conditions otherwise, the fix-effects model was used. The prevalence and 95% confidence intervals for each study were presented in a forest plot. Jamovi 2.0 software was used to assess publication bias by using the Egger and Begg test and the Fail Safe-N test result.[14] The significance of publication bias was obtained when the $P < .05$.

RESULTS

In the initial search, 2802 articles were obtained from 7 journal databases, leaving 21 articles to synthesize the narrative quantitatively after screening. All 21 articles were cross-sectional, with China being the most studied country (66.67%). The two most widely used measuring instruments were GAD-7 (Generalized Anxiety Disorder-7) and SAS (Zung Self-rating Anxiety Scale), with 38.09% each. There were nine articles with a sample size of >1000 pregnant women. Based on the JBI assessment, two studies scored 100%, and five scored 62.5%. The summary of the characteristics of the study is provided in Table 2.

Table 2. Summary of Study Characteristics of 21 Articles Included in the Analysis

Characteristics	n (%)
Study design	
Cross-Sectional	21 (100)
Country of origin	
China	14 (66.67)
Turkey	2 (9.52)
Poland	1 (4.76)
Canada	1 (4.76)
United States	1 (4.76)
Iran	2 (9.52)
Publication year	
2020	2 (9.52)
2021	19 (90.48)
Time of data collection	
The first 6 months of pandemic	19 (90.48)
After 6 months of pandemic	2 (9.52)
Methods of data collection	
Online questionnaire	16 (76.19)
Physical questionnaire	5 (23.81)
Anxiety measurement instruments	
GAD-7	8 (38.09)
SAS	8 (38.09)
HADS-A	1 (4.76)
PROMIS	1 (4.76)
PRAQ	1 (4.76)
DASS-A	2 (9.52)
Sample size	
< 500	5 (23.81)
501 – 1000	7 (33.33)
> 1000	9 (42.86)

Abbreviations: DASS-A, The Depression Anxiety and Stress Scale-Anxiety subscale; GAD-7, Generalized Anxiety Disorder-7; HADS-A, Hospital Anxiety and Depression Scale-Anxiety subscale; PRAQ, Pregnancy Related Anxiety Questionnaire; PROMIS, Patient Reported Outcomes Measurement System; SAS, Self-report Anxiety Scale

Narrative Synthesis

Sociodemographic factors

There were four modifiable sociodemographic factors associated with anxiety. The first was a residential area. Living in a pandemic epicentre location[15,16] or experiencing a lockdown in the place of residence[17] was associated with increased anxiety. The second was socioeconomic status. During the pandemic, the decline in income was associated with anxiety, with higher declines leading to higher anxiety.[18] Lower income (< 780 USD/ month or 7000 USD/ year) was associated with increased anxiety.[19,20]

On the other hand, higher income and a better economic level were protective factors for anxiety.[15,21] The third factor was education, but this study's findings indicate inconsistencies in the variables and outcomes of the effect of education on anxiety. The fourth factor related to anxiety was marital status. Unmarried/divorced/ widowed had a higher risk of anxiety.[18] Age was positively correlated with anxiety in some studies, but the results were inconsistent across studies.

Environmental Exposure Factors

The time spent watching television and cell phones, more than 3 hours per day, was associated with high anxiety in pregnant women. The longer the time spent, the higher the risk of anxiety,[20] especially when watching the news about COVID-19.[22] Increased use of social media was also associated with anxiety.[23] On the other hand, less than 2 hours of screen time was a protective factor even when accompanied by lack of sleep.[20] The presence of COVID-19 infection in close relatives was associated with anxiety.[17] The presence of suspected or confirmed cases around[22], family members who died from COVID-19,[15] and COVID-19 infection during pregnancy was associated with increased anxiety.[2,23]

Occupational Factor

Not working or losing a job during the pandemic was associated with increased anxiety in 4 studies[18,21,23,24] but not in one study.[25] Working as farmers[26] and civil servants[20] was a protective factor for anxiety.

Lifestyle Factor

Physical inactivity was associated with anxiety.[24] On the other hand, being physically active was a protective factor.[20,22,27] In particular, [22]

the interaction between lack of time for physical exercise (< 30 minutes per day) and sleep (< 7 hours per day), and spending more than one hour per day on social media increased the prevalence of anxiety in pregnant women. Sitting more than 10 hours per day and drinking alcohol were also associated with increased anxiety.[18]

Physiological Factors

Nine articles discussed pregnancy complications and comorbidities and their association with anxiety. The result was consistent. Pregnancy complications and comorbidities were associated with increased anxiety in pregnant women.[2,15–18,20,21,25,26,28,29] Planning for vaginal delivery is a protective factor for anxiety.[18]

Sleep time of more than 6 hours per day was a protective factor for anxiety. The longer sleep time, the lower the anxiety,[20] and the lower the sleep time (< 7 hours per day), the higher the anxiety.[30] Further, inconsistent time to sleep, sleep after 00:00, and difficulty initiating sleep was associated with anxiety.[30] Subjective poor sleep quality was also associated with anxiety.[30,31] Research[29] stated that obesity was protective against anxiety. However, this finding was not consistent with [15] research, which stated that obesity and overweight were risk factors for anxiety.

Psychological Factor

Three articles consistently stated that a previous history of anxiety and depression was associated with high anxiety in pregnant women during the pandemic.[23,32,33] Good knowledge of COVID-19[28,34] and its prevention,[15] the simplicity of mothers accessing antenatal information from hospitals,[28] and trust in official government media as sources of information were protective factors for anxiety.[2,34]

On the other hand, mothers who did not receive information about the impact of COVID-19 on pregnancy and mothers who did not receive information from doctors/nurses/midwives about the impact of COVID-19 on the baby's health experienced increased anxiety.[24]

Response to Trauma

The perception of COVID-19's severe impact on their lives [17,26,27,30] or their psychological well-being[30] was associated with increased anxiety. In addition, the perceived susceptibility was also associated with anxiety, both concern for oneself[22,34] and the baby.[31,35]

Mothers who felt uncomfortable during antenatal visits and mothers who did not delay/reduce the number of antenatal visits were associated with higher anxiety.[24,34] In addition, worrying about pandemic control and being afraid to leave the house were also associated with increased anxiety.[2] In contrast, self-efficacy was associated with lower anxiety.[26]

High levels of stress during the pandemic and its relationship with high anxiety levels in pregnant women were described in three articles.[16,31,32] Worrying about the baby, family, friends, and financial adequacy was also associated with higher anxiety levels.[15,26,27] Conversely, not worrying about contracting COVID-19 was associated with less anxiety in pregnant women.[34]

Relational Factor

Social restrictions due to the pandemic increased the anxiety level of pregnant women.[23,35] Family dysfunction, tension with partners, and lack of support from others during the pandemic were associated with increased anxiety.[16,18] On the other hand, high support from a spouse,[30,35] family,[22,33] and generally, was associated with lower anxiety levels.[17,21,35]

Quantitative Synthesis

Anxiety Prevalence

The range of anxiety prevalence was 10 to 65% (k=21), and the pooled prevalence of anxiety was 28% (95%CI; 23-33; N=42,177). There was a significant study heterogeneity (Q = 3150.66; P < .001 and I2 = 99.62%); hence, the most appropriate model used to analyze was a random-effect model. The meta-regression results showed that the country of origin variable significantly moderated the existing heterogeneity (P < .001). There were significant differences in anxiety prevalence between groups from China, Turkey, Iran, and others. The prevalence of anxiety was higher in Turkiye (63%, 95% CI, 60-66), followed by other countries (39%, 95% CI, 15-62), China (22%, 95% CI, 17-27), and finally Iran (20%, 95% CI, 17-23). The forest plot of prevalence is presented in Figure 1.

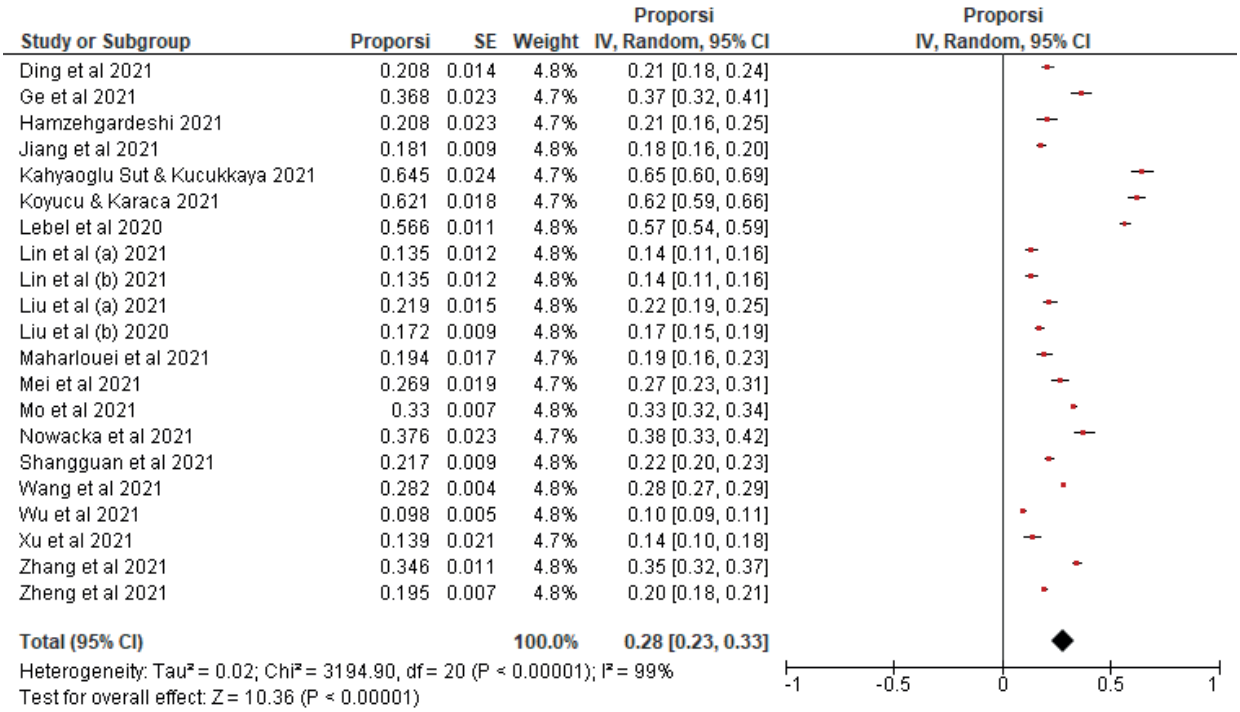

Figure 1. Forest Plot of Prevalence of the Anxiety

In this study, the pooled prevalence of anxiety in pregnant women during the pandemic from 21 studies was 28%. This result is higher than the systematic review of antenatal anxiety before the pandemic (1950 - 2016) [36], which is 22.9% (95% CI; 20.25-25.2; N = 142,833) but not much different from the prevalence of anxiety in the general population during the COVID-19 pandemic of 27.3% (95% CI: 23.7-31.2; N = 140.732)[37] and 31.9% (95%CI; 27.5-36.7; N = 63.439).[38]

However, the prevalence of anxiety in pregnant women in this study was lower than other systematic reviews during the pandemic [8] (37%, 95%CI; 25-49; N = 20.569). One of the possible causes was the origin of the study. In this study, most studies came from China (k = 14, 67%). Cross-cultural aspects influence this difference in anxiety levels. Contextual factors, how one perceives one's body, and dependence on others influence anxiety. Considering this condition, people in Asia generally have lower anxiety levels than other races in the world.[39] This finding is consistent with data from WHO which shows that the prevalence of anxiety in the Asian region is relatively low compared to other countries in the world.[40]

Factors Associated with Anxiety

Twelve studies contribute to 18 factors of anxiety in pregnant women during the pandemic. Of the 18 factors, only nine gave significant results (8 risk factors and one protective factor). They were marital status, monthly income, screen time, history of COVID-19 exposure, pregnancy complications, sleep duration, sleep quality, perceived susceptibility, and trust in the official government social media. Heterogeneity in each study varied, ranging from 0% to 93%. A summary of the combined effects can be seen in Table 3.

Table 3. Summary of 18 Articles Included in the Meta-Analysis of Risk and Protective Factors

Factors	No of studies (k)	Combined sample size	Pooled OR (95% CI)	*P-value*	I^2 (%)
High school education/ lower	6	9107	1.18 (0.82-1.69)	.37	89
Not married/ divorced/ widowed	2	4185	2,20 (1.59-3.04)	<.001	0
Age > 35 y.o	4	5717	1.11 (0.64-1.94)	.70	77
Monthly income < 5000 CNY (~780 USD)	2	2545	1.31 (1.09-1.57)	.004	0
Screen time > 3 hours/ day	2	2545	1.89 (1.43-2.51)	<.001	0
History of exposure to COVID-19	3	3137	1.96 (1.39-2.76)	<.001	0
Not working during pandemic	6	9260	1.20 (0.97-1.50)	.10	58
Work as civil servant	2	2160	1.67 (0.75-3.75)	.21	90
Daily physical exercise	2	4185	0.59 (0.23-1.53)	.28	93
3rd Trimester	9	10,960	1.14 (0.93-1.40)	.22	68
Multipara	7	9924	0.92 (0.74-1.14)	.45	73
Complications and Comorbidities	8	11,394	1.77 (1.39-2.24)	<.001	66
Sleep duration <7 hours/ day	2	2545	1.51 (1.12-2.02)	.007	27
Subjective poor sleep quality	2	1025	7.35 (2.11-25.57)	.002	87
Prepregnancy Overweight/ obesity	2	3509	1.71 (0.59-5.01)	.33	93
Official media trust	2	2764	0.65 (0.52-0.81)	<.001	0
High risk of susceptibility	3	1842	3.91 (2.37-6.45)	<.001	0
Live in the city	2	2081	0.89 (0.40-1.99)	.78	84

Abbreviations: CNY, Chinese Yuan; OR, Odds Ratio; USD, United States Dollar.

The risk of cross-study bias was assessed using an Egger and Begg regression test and the Fail-Safe N value. The p-value in the regression test is .14, which means that there was no bias in the publication of the meta-analysis study. The Fail Safe-N score in this study was 92,340 with P < .001. Because the value of 5k+10 (115) is less than the Fail Safe-N value, it can be concluded that there was no publication bias problem in this study.

DISCUSSION

In this study, the pooled prevalence of anxiety in pregnant women during the pandemic from 21 studies was 28%. This result is higher than the systematic review of antenatal anxiety before the pandemic (1950 - 2016)[36], which is 22.9% (95% CI; 20.25-25.2; N = 142.833) but not much different from the prevalence of anxiety in the general population during the COVID-19 pandemic of 27.3% (95% CI: 23.7-31.2; N = 140,732) [37] and 31.9% (95%CI; 27.5-36.7; N = 63,439) [38].

However, the prevalence of anxiety in pregnant women in this study was lower than other systematic reviews during the pandemic.[8], (37%, 95%CI; 25-49; N = 20,569). One of the possible causes was the origin of the study. In this study, most studies came from China (k = 14, 67%). The results of the sub-group analysis showed that in the group of studies from China, the prevalence of anxiety tended to be lower (22%), while in the study by Yan et al., only four studies were from China. Another nine studies were from Canada, Italy, and other countries. Consistently, the results of studies [8], also show that the prevalence of anxiety in China is lower (33%) than in other countries (Canada 37%, Italy 49%). Cross-cultural aspects influence this difference in anxiety levels. Contextual factors, how one perceives one's body, and dependence on others influence anxiety. Considering this condition, people in Asia generally have lower anxiety levels than other races in the world [39]. This finding is consistent with data from WHO, which shows that the prevalence of anxiety in the Asian region is relatively low compared to other countries in the world [40].

Based on the results of the narrative synthesis, sociodemographic factors that are consistently associated with increased anxiety are living near the pandemic's epicentre, experiencing lockdown, low income, poor economic level, and unmarried/divorced/widow status. However, only marital status and low-income factors are supported by data from the meta-analysis. This can happen because not all studies use the same variables to assess anxiety risk factors, and not all studies provide sociodemographic data.

From the narrative and quantitative synthesis results, the protective factor for pregnant women's anxiety is public trust in the official government media. It was explained before that obtaining too much information from various media during the

pandemic led to increased anxiety.[22,23,41] However, if the duration can be controlled and social media is used to get information about COVID-19 from the government and hospitals, it could reduce anxiety.[2,28,34] Public trust in the national media has a protective effect on anxiety.[42] On the other hand, the perception of COVID-19 politicization and the number of confusing news sources related to COVID-19 are related to anxiety.[43] Hence, it is hoped that public health messages announced by the government must also provide solutions with one consistent message and from one source to increase trust.

Strengths and Limitations of the Study

This study involved quite a lot of articles (k=21). However, there is high heterogeneity between studies. In addition, the definition of a variable as a risk factor is also inconsistent between studies. These differences make it challenging to compare age, education level, parity, and trimester from one study to another.

Another limitation of this study is the use of various measuring instruments and differences in the cut-off value of anxiety even with the same measuring instrument. Almost all studies use a self-report questionnaire that can increase the possibility of bias in answering and is not a standard in determining the diagnosis of anxiety. However, this method is still acceptable for use as an initial screening. Another limitation of this study lies in the design of the articles included in the study. All studies used a cross-sectional design, so we can not conclude the causal relationship.

Most studies use online questionnaires with potential selection bias that limits the possibility of subjects with no internet connection being involved in the study. As a result, we must not generalize the findings without caution.[44,45] However, several authors have described the methods used to reduce bias in using this online questionnaire, including telephone contact for willingness to fill out a questionnaire and the use of previously validated questionnaires. However, given that in the context of a pandemic and physical contact restrictions, online questionnaires are the best option to collect data without the risk of contracting the disease.

The strength of this study lies in the size of the combined sample and the comprehensive discussion of anxiety during pregnancy exclusively, which, to the best of our knowledge, is the first systematic review to address anxiety and specific risk factors during pregnancy with a meta-analysis. In addition, the exclusion of low-quality articles also minimizes the possibility of bias towards the study results.

CONCLUSIONS

Our findings from this research can emphasize that pregnant women's services at Public Health Centers, Hospitals, Clinics, Private Practice Midwives, and other service places must consider the anxiety factor. This research can also serve as a guideline to identify pregnant women at risk of experiencing anxiety, which is essential during this pandemic, given the high level of anxiety and the magnitude of the impact. Screening for anxiety is recommended when the mother has an antenatal visit as it was shown a good result in a previous study.46 This study's limited source of articles with only a cross-sectional design indicates the need for a better design, such as a cohort or case-control, to better assess anxiety and conclude causality. Future research designs should also pay attention to and minimize bias when forced to use online questionnaires.

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