**Prevalence and its determinants of perinatal anxiety in mainland China: a systematic review and meta-analysis**

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**Abstract**

**Background:** Perinatal anxiety is among the most common mental health conditions that have a huge negative impact both on mothers and their children. This study aimed to establish summary estimates of the prevalence of perinatal anxiety and its influencing factors in Mainland China.

**Methods:** A systematic search was carried out from nine major English and Chinese electronic databases to identify studies published up to 15th, Feb. 2020 with data on the prevalence of perinatal anxiety. Two reviewers conducted data extraction and quality assessment. Meta-analysis was performed using a random-effects model. Subgroup and meta-regression analyses were performed when possible.

**Results:** 177 studies representing 206,190 women were included in the study. Pooled prevalence of perinatal anxiety was 16.7% (95% CI: 15.1% to 18.3%), with prenatal anxiety 16.8% (95%CI: 15.2% to 18.6%) and postpartum anxiety 14.5% (95%CI 10.4% to 19.7%). However, the overall estimates presented substantial heterogeneity (I2 = 98.84%). Qualitative summaries demonstrated some main risk factors of perinatal anxiety such as women with abnormal pregnancy-labor history, poor health status, pregnancy complications, and unplanned pregnancy, and some main protective factors such as high family income, good social support, good interpersonal relationship, and multiple delivery history.

**Limitation:** This reviewonly included studies with a sample size of more than 250, and narratively summarized the risk and protective factors of perinatal anxiety without meta-analysis.

**Conclusion:** Varying degrees of perinatal anxiety is prevalent among Chinese women. Screening and evidence-based interventions are urgent and necessary to address this public concern and promote their health and well-being.

**Keywords:** Perinatal anxiety; Prevalence; Influencing factors; China; Systematic review

**1. Introduction**

Maternal perianal mental health has always been a major public health issue because of its certain adverse impact on the well-being of the mother, her baby, and the family (Howard et al., 2014; Stein et al., 2014). Pregnancy brings along numerous changes including physical, social, and psychological aspects, which increase women's risk of mental problems, especially in low- and middle-income (LAMICs) countries (Fisher et al., 2012). Anxiety is among the most common mental health conditions in women during the perinatal period from pregnancy to 12 months postpartum (Kendig et al., 2017). Some studies have found that anxiety is often comorbid with, or even more common than depression during pregnancy, and is associated with postpartum depression in many countries (Heron et al., 2004; Kessler et al., 2002; Nasreen et al., 2010). However, perinatal anxiety has received relatively limited attention.

Perinatal anxiety can have a huge negative impact both on women and their children. Women with prenatal anxiety have been associated with a greater tendency for caesarean section (Rubertsson et al., 2014), a higher fear of childbirth (Hall et al., 2009), eating disorders (Micali et al., 2011), reduced effective coping strategies (George et al., 2013), and even an increased risk of suicide (Farias et al., 2013). Simultaneously, prenatal anxiety has been considered to be related to adverse birth outcomes including intrauterine growth restriction (Lobel et al., 2008; Schetter, 2011), premature labor (Hasanjanzadeh and Faramarzi, 2017; Lobel et al., 2008; Staneva et al., 2015), and low birth weight (Hasanjanzadeh and Faramarzi, 2017). Anxiety during pregnancy may also adversely affect the mother-infant bond (Tietz et al., 2014). Moreover, maternal perinatal anxiety has a far-reaching impact on children. Offspring of pregnant women with perinatal anxiety had an increased risk of hyperactivity disorder/attention deficit (Glover et al., 2009; O'Connor et al., 2002a; O'Connor et al., 2002b; Rice et al., 2010), depressive symptoms, impulsivity, and adolescent cognitive impairment (Pawlby et al., 2009; Van den Bergh et al., 2005).

A recent study estimated the prevalence of perinatal depression was 16.3% in China, which was similar to LAMICs but higher than that in high-income countries (Nisar et al., 2020). Many studies have demonstrated numerous influencing factors of perinatal mental problems including psychological, social, and biological exposures. In China, the first generation of the post-one-child policy has reached childbearing age in the past decade, most of which are the first pregnancy and delivery (Ding, 2015a). Some studies from China showed that primiparas are more likely to suffer from perinatal anxiety and depression, which requires more effective prevention and treatment(Cui, 2013). In addition, some traditional cultures like gender preference for the male child were found to be associated with anxiety and depression among Chinese mothers (Kang et al., 2016; Nisar et al., 2020). These characteristics suggest the need to study the mental health of perinatal women in the current historical context of China.

The prevalence of self-reported anxiety symptoms in each trimester of pregnancy was estimated to be 18.2%−24.6% in international studies (Dennis et al., 2017). Many studies have focused on perinatal anxiety in Chinese women but there may be great differences among regions in China. So far as we know, there is no systematic review of the prevalence of perinatal anxiety in mainland China. We conducted a systematic review and meta-analysis of the prevalence of perinatal anxiety and its determinants in mainland China, helping us better understand the perinatal anxiety of pregnant women, and providing a basis for the formulation of maternal health policies and guidelines to improve the welfare of women and their children.

**2. Methods**

This systematic review and meta-analysis was based on PRISMA guidelines (Stewart et al., 2015). The registration number of the protocol of this review on PROSPERO is CRD42020170093 (Yang et al., 2020).

**2.1. Search procedure and selection of studies**

The pre-test search strategy was used to conduct a bilingual system search on nine electronic bibliographic databases: Pubmed, Embase, Web of Science, PsycINFO, CINAHL Plus, China National Knowledge Infrastructure (CNKI), Wanfang Database, VIP Database, and China Biology Medicine disc (CBMdisc). The search strategy in Embase is shown in Appendix Table S1. Hand searches were also performed. Unpublished studies will not be included. According to the study in PICOS format, the inclusion criteria are as follows: Participants: studies focusing on women aged 18 years or older, who were pregnant or in the postpartum period (defined as ≤12 months after childbirth) were included. Intervention: studies reporting the prevalence of perinatal anxiety were included. Control: none. Outcomes: measurement and reporting of perinatal anxiety scores using a validated self-report scale or clinician-administered measure. Study design: studies with cross-sectional and cohort designs (only baseline data) were included.

All databases were searched from inception to 15th, Feb. 2020. We didn’t restrict the language and the date of publication of the studies. EndNote was used to remove duplicate articles, followed by two researchers working independently to screen the titles and abstracts of the included articles and then full-text screening. Finally, the bibliography of all the included articles was searched by hand. Two researchers discussed differences to reach a consensus, with a third researcher involved when necessary.

The cross-sectional or cohort studies (only baseline data) published in peer-reviewed journals that reported the estimated prevalence of anxiety of women in the pregnant or postpartum period were included. In addition, we included studies using effective psychological scales such as the Self-Rating Anxiety Scale (SAS) and Hamilton Anxiety Scale (HAMA). We only included studies published in English and Chinese. We also included only studies with a sample size of at least 250 people to obtain accurate prevalence estimates and to ensure that the studies have a representative study sample, high confidence level (95 to 99%), precise prevalence estimates, and low margin of error (Saha et al., 2008). We excluded the reviews (narrative and systematic, conference proceedings, case reports, qualitative studies, editorials, opinion papers, and letters), the studies from the Hong Kong and Macau, and studies focusing on a very specific sub-population (e.g., people with a specific disease or disability/condition or specific occupational groups).

**2.2. Data extraction and study quality assessment**

The study information was extracted using a piloted data extraction form by the first reviewer, and the second reviewer crosschecked all extracted data for accuracy. We extracted the study parameters including first author and year of publication, study design, geographical location, sample size, sampling procedures (e.g., randomized vs. convenience sampling), response rate, perinatal time points (i.e., prenatal of first, second or third trimester, or postnatal), the instrument/measurement of anxiety and cut-off scores, type of instrument/measurement (i.e., standardized measurement or self-developed), evidence of reliability and/or validity of the measurement instrument, reported prevalence of anxiety. Any discrepancies in data extraction are resolved through discussions between the reviewers. To determine the influencing factors of perinatal anxiety in China, we listed specific risk and protective factors for narrative synthesis.

Two reviewers independently completed the quality assessment of the included studies, using an adapted version of the Newcastle-Ottawa risk of bias tool (Stang, 2010), including the following parts: the representativeness of the sample, the adequacy of the sample size, the comparability between the respondents and non-respondents and the satisfactory response rate, the use of common psychological measurement scales and effective cut-off scores, the quality of the descriptive statistics report, the state of informed consent, the ethical approval adopted and the reliability and validity of the scale used in the research.

**2.3. Quantitative data synthesis**

Meta-analysis was performed using Comprehensive Meta-Analysis Software (V.3, Biostat Inc. NJ, USA). Data on the proportion of women with perinatal anxiety and total sample size were extracted from individual studies, to generate pooled estimates with exact binomial and associated 95% confidence intervals. These data were transformed to their logits before meta-analysis to stabilize variances (Doi and Williams, 2013) . Due to expected heterogeneity in the data, a random-effects model was employed to yield pooled prevalence estimates of perinatal anxiety (Borenstein et al., 2010). Heterogeneity across the studies was estimated using the Cochran’s Q statistic. The I2 statistic was used to quantify the percentage of the variability in effect estimates due to heterogeneity across the studies. Sensitivity analyses were performed to identify any outliers in the meta-analysis. Egger’s regression statistic and funnel plot were used to assess the presence of any publication bias (Sutton et al., 2000). In case of significant publication bias, the trim & fill method was used to both identify and correct the asymmetry of the funnel plot, to yield corrected pooled prevalence. Subgroup analyses were used to identify moderators of perinatal depression: study design (cross-sectional vs. cohort), measurement scales, parity (primipara vs. multipara), geographical location (provinces, south vs. north) and publication date (<2010 vs. ≥2010). Meta-regression analysis with random effects and maximum likelihood method was performed by regressing logit event rates in each study with variables including average age, gross domestic product (GDP) of province, and study quality assessment score (Borenstein et al., 2009).

**3. Results**

**3.1. Study selection**

The search process and exclusion of studies are shown in Fig. 1. A total of 20,136 records were retrieved from nine databases. After deleting 6,369 duplicate records using Endnotes, the title and abstract were screened, and another 13,224 records were deleted, that is, 543 studies met the full-text screening conditions. The final data analysis included 177 studies which were from 29 provinces in mainland China with a sample size of 206,190 perinatal Chinese women (Fig. 2).

**3.2. Characteristics of included studies**

The characteristics of the included studies are presented in Appendix Table S2. Most of them were cross-sectional studies (n = 154), and there were only 23 longitudinal studies. A total of 117 studies used reliable and validated scales as measurement, while 57 studies did not report the reliability and 60 studies did not report the effectiveness of measurements. There were 21 studies on primipara, 9 studies on postmenopausal women, and the other studies did not specify the parity of the participants. The most commonly used scale for assessing perinatal anxiety is Self-Rating Anxiety Scale (SAS) (n = 107), followed by the Hospital Anxiety and Depression Scale (HADS) (n = 22), State-Trait Anxiety Inventory (STAI) (n = 13), Pregnancy-related Anxiety Questionnaire (PAQ) (n = 12), Hamilton Anxiety Scale (HAMA) (n = 9), Generalized Anxiety Disorder-7 (GAD-7) (n = 4), the Symptom Checklist-90 (SCL-90) (n = 4), Beck Anxiety Inventory (BAI) (n = 3) and SAI subscales in STAI (n = 3).

The study samples of 177 studies were representative. Response rates were reported in 62 studies and not reported in 115 studies. 139 studies reported descriptive statistics and 38 did not. 134 studies reported the informed consent process, while 43 studies did not. 25 studies reported on the ethical review process, while 152 did not. Most studies reported prenatal anxiety (n = 156), 17 studies reported postpartum anxiety, and 4 studies reported both. The majority of studies used convenience sampling (n = 159) rather than random sampling.

**3.3. Pooled prevalence of perianal anxiety**

Using the random effect model, the pooled prevalence of perinatal anxiety was 17.4% (95% CI 16.2% to 18.7%) (Appendix Fig. S1). There was substantial heterogeneity in studies (Q=25265.11, *P* < 0.001), with an I2 value of 98.93%. Sensitivity analysis by removing individual studies sequentially did not show any substantial change to the conclusion. Visualization of Begg’s funnel plot and Egger's regression statistic (intercept = -4.53, S.E=1.04, *P* < 0.001) revealed significant publication bias (Fig. 3). Using trim-and-fill procedures with random effects model suggested imputation of 53 studies to the right of the mean, yielding an adjusted pooled prevalence of 22.10% (95% CI: 20.60% to 23.68%).

A total of 237 studies (n=325232) reported the prevalence of prenatal anxiety, with a pooled prevalence of 17.4% (95% CI: 16.1% to 18.8%, I2= 98.96%). After adjusting for significant publication bias (Egger’s regression p < 0.001), pooled prevalence for prenatal anxiety was estimated to be 22.42% (95% CI: 20.76% to 24.17%).

Prevalence of postpartum anxiety was reported in 25 studies (n = 20,066), with a pooled prevalence of 17.5% (95% CI: 13.5% to 22.4%, I2= 98.93%). There was no evidence of publication bias (Egger’s regression p = 0.32). Only nine studies reported the prevalence of anxiety among a sample of both prenatal and postpartum women, yielding a pooled prevalence of 17.1% (95% CI: 11.0% to 25.5%, I2= 98.61%).).

Subgroup analysis of anxiety assessments showed that there were significant differences in the prevalence of perinatal anxiety measured by different outcome measurements (Q=65.34, *P* < 0.001). The prevalence reported using the SAI was the highest at 34.2% (95% CI: 19.7% to 52.5%), and HADS the lowest (7.6%, 95% CI: 5.8% to 9.7%) (Fig. 5). Subgroup analysis of provinces also showed great heterogeneity, and the difference was statistically significant (p=0.001). Ningxia reported the highest prevalence of perinatal anxiety (48.9%, 95% CI: 27.0%% to 71.2%), and Hainan reported the lowest (6.5%, 95% CI: 2.5% to 15.8%) (Fig. 6). However, these subgroup analyses should be interpreted with caution due to imprecise effect sizes.

The North-South boundary of China is the Qinling- Huaihe River area. According to this boundary, the provinces are divided into two groups: the south and the north. The subgroup analysis results show that the prevalence of perinatal anxiety among women in the north (19.7%, 95% CI: 17.6% to 22.0%) was significantly higher than that in the south (15.8%, 95% CI: 14.3% to 17.3%), and the difference was statistically significant (Q=10.13, *P* < 0.01). In order to understand the impact of the one-child policy enacted in 1980 in China, we conducted a subgroup analysis of studies that were published before and after the year 2010. The choice of this cut-off was based on the assumption that the majority of respondents in studies reporting data prior to 2010 reached childbearing age and gave birth during the enactment (1980) and relaxation (2013) of the one-child policy. Our result showed that the prevalence of perinatal anxiety was not significantly different from studies published before and after the year 2010 (Q=2.73, *P* = 0.09). The details of the above results of subgroup analyses are shown in Appendix Table S3. Prevalence also differed by study design where cross-sectional studies yielded higher estimates of prevalence of perinatal anxiety (18.3%, 95% CI: 16.9% to 19.7%) than prospective ones (13.3%, 95% CI: 11.0% to 16.0%). Prevalence of perinatal anxiety during the COVID period was significantly higher (22.3%, 95% CI: 18.5% to 26.6%) than before (16.8%, 95% CI: 15.5% to 18.1%).

Meta-regression analysis showed that provincial GDP, the average age of mothers, and quality of studies were not significantly associated with the prevalence of perinatal anxiety in mainland China (Fig. 7 and Table 2).

**3.4. Risk and protective factors of perinatal anxiety**

This study qualitatively summarized the main risk and protective factors of the prevalence of perinatal anxiety (Table 3). The most-reported risk factors are maternal related factors including an abnormal pregnancy-labor history (such as abortion or giving birth to an abnormal child), poor health status, pregnancy complications, severe pregnancy reaction, worrying about their health or the safety of their children, lack of related knowledge, higher pressure, multiple pregnancies, and unplanned pregnancy. Moreover, some social environment factors including poor marital relationships, pregnant women dissatisfied with living conditions, and poor family economic status were also suggested as risk factors for the prevalence of perinatal anxiety.

In addition, studies have demonstrated some main protective factors for the prevalence of perinatal anxiety, which include high family income, high maternal age, pregnant women with high educational background and good social support, good interpersonal relationships, and multiple delivery history.

**4. Discussion**

**4.1. Main findings**

Perinatal anxiety is one of the priorities of public health. In recent years, it has attracted more and more attention from all walks of life around the world. To our knowledge, this is the first systematic review of perinatal anxiety for Chinese mainland women including studies published in both English and Chinese. 177 studies involving 206,190 women from 29 provinces were included. The main findings are that the prevalence of prenatal anxiety was 16.8%, and the prevalence of postpartum anxiety dropped to 14.5%. Overall, the pooled prevalence of perinatal anxiety among Chinese women was 16.7%. As we all know, anxiety and depression usually exist at the same time. A recent systematic review pointed out that 19.7% and 14.8% of Chinese women suffer from depression before and after childbirth (Nisar et al., 2020). This may explain the decline in the prevalence of postpartum anxiety. The overall estimated prevalence of anxiety in the prenatal period in Mainland China was similar to that in high-income countries but lower than that in LMICs (Dennis et al., 2017). In general, our results indicate that anxiety is a common mental health problem among Chinese perinatal women, and the prevalence of anxiety in the maternal population is significantly higher than that in the general adult population (Alonso et al., 2007; Wittchen and Jacobi, 2005).

The definition of perinatal anxiety in all included studies was based on self-reported scales rather than using common diagnostic interviews for various anxiety disorders such as the Mini-International Neuropsychiatric Interview or the Structural Clinical Interview for DSM. We found that the most commonly used measurement scale in this study is SAS rather than STAI, which was inconsistent with a previous study (Meades and Ayers, 2011). Self-reported measurements do have some limitations such as they may overestimate the prevalence. However, they are of high value in the assessment and management of perinatal mental health in the fields of gynecology, obstetrics, and public health. In order to reflect the heterogeneity of the measurement scales included in this meta-analysis, we performed a subgroup analysis to show the pooled prevalence measured by each instrument. The results also showed significant heterogeneities based on scales except for the BAI.

Subgroup analysis based on region showed that the prevalence of perinatal anxiety among women in the north was significantly higher than that in the south. A possible explanation is the relative lack of mental health resources in the north compared to the south of China (Patel et al., 2016). A study pointed out that the socio-economic gap between different regions in China was a vital factor leading to the inequality of maternal health among different provinces in China (Guo and Huang, 2019). In order to explore whether the prevalence of anxiety was associated with economic development level, meta-regression analysis did not reveal a significant association between provincial GDP and the prevalence of perinatal anxiety. However, a significant inverse association between provincial GDP and depression rates was found among Chinese mothers (Nisar et al., 2020).

**4.2. Influencing factors of perinatal anxiety**

Our study found that most risk factors for perinatal anxiety were maternal or fetal related. Pregnant women with pregnancy complications or a history of adverse pregnancy and childbirth are more likely to suffer from anxiety disorders because they are worried about whether they can safely survive this pregnancy and give birth smoothly, and whether their physical condition will affect the baby's health. Poor physical health status of pregnant women, such as illness during pregnancy and the need to take medicine, is another risk factor for perinatal anxiety. Medication during pregnancy may lead to accidental abortion or fetal malformation. Therefore, pregnant women who need medication during pregnancy often worry too much about fetal health and causing anxiety. More serious pregnancy reactions, such as heartburn or severe vomiting will make pregnant women worry about their insufficient or unbalanced nutritional intake which will lead to fetal nutritional problems. Pregnant women often experience greater mental pressure due to the uncertainty of the pregnancy process and delivery outcome, such as fear of fetal health, delivery pain, and delivery safety (Kong, 2019), which is easy to produce anxiety.

Lack of knowledge of pregnancy, childbirth, and parenting is another risk factor. If pregnant women have a low education level, lack of health awareness, or childbirth experience, they can not deal with abnormal conditions independently and take effective coping strategies, which is easy to lead to anxiety (Wu, 2016). The current study also found that unplanned pregnancy is a risk factor for perinatal anxiety, because these pregnant women usually do not adjust their diet, medication, and other living habits before pregnancy, and will worry about the health of themselves and the fetus. At the same time, the sudden pregnancy disrupted their life, resulting in greater emotional fluctuations, thus causing anxiety.

Husband is the most important source of social support for pregnant women. This study found that marital discord is associated with a high risk of perinatal anxiety. Consistent with a previous study (Hu et al., 2014), the relationship between husband and wife can greatly affect the mood of pregnant women during pregnancy and after delivery. Pregnant women who are dissatisfied with their living conditions and have a lower family economic level are more likely to be anxious. Crowded housing conditions or poor family finances can increase pregnant women's worries about their future life and the financial burden of raising a new baby.

In addition, the current study summarized the main protective factors for perinatal anxiety. A high family economic level is a protective factor for perinatal anxiety. Studies have shown that subjective well-being, psychological well-being, social well-being, and comprehensive well-being increase with the growth of family economic income (Li and Chen, 2016). Pregnant women with a higher family economic level will have less burden on life and childcare, fewer worries about their future life, and therefore less anxiety. Interestingly, we found that high maternal age is a protective factor for perinatal anxiety, although it can lead to many adverse pregnancy outcomes (Attali and Yogev, 2021). Pregnant women of higher age have a relatively rich social experience, and high psychological and physiological tolerance, so they can well coordinate the impact of pregnancy on themselves and are less likely to suffer from anxiety.

Pregnant women with good interpersonal relationships and high levels of social support are less likely to have anxiety. Social support refers to the intimate relationship, community belonging, self-worth, materials, information, and emotional support that individuals feel they have been provided by others (Li and Zhou, 2014). Therefore, good social support can effectively relieve the anxiety of pregnant women during pregnancy. The higher educational background of pregnant women is also one of the protective factors. These pregnant women usually have more health knowledge or more ways to obtain health knowledge and are more fully prepared for pregnancy, delivery, and childcare, so they have a less psychological burden. Another protective factor was multiple delivery history. Pregnant women with childbirth experience have a lower prevalence of anxiety disorders, because these women have a certain understanding of pregnancy and childbirth, and therefore have a reduced risk of anxiety.

**5. Limitations**

There are some limitations in this systematic review, such as only including studies with a sample size of more than 250 individuals, and only a narrative summary of the risk and protective factors of perinatal anxiety without meta-analysis. Another limitation is very large heterogeneity among studies was observed in meta-synthesis, which may be caused by several factors, including different study designs, pregnant women in different trimesters, studies from various regions, and different measurement scales. It should be noted that the sensitivity and specificity of self-reported instruments vary greatly. Therefore, a combination of screening scales and diagnostic clinical interviews are used to assess anxiety in future studies.

**6. Conclusion**

 In conclusion, our systematic review and meta-analysis indicate that varying degrees of perinatal anxiety is prevalent among Chinese women. Several risk and protective factors are associated with the prevalence of perinatal anxiety. China has made great strides in improving the health of its citizens in recent decades, and we believe that maternal mental health is a very important public health priority and that perinatal anxiety deserves the same attention as perinatal depression. Screening and evidence-based interventions are therefore needed to reduce the exposure of Chinese women and children to mental health problems such as perinatal anxiety and promote their health and well-being.

**Declaration of Competing Interest**

None.

**Funding**

This study was supported by the Chinese Medical Association Publishing House (CMAPH-NRP2019005) and China Medical Board (21-419).

**Role of the funding source**

The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit it for publication.

**Acknowledgments**

The authors acknowledge the funding from the Chinese Medical Association Publishing House and China Medical Board.

**Author contributions**

LY, AR and XL conceived and designed the study. LY, JS and YN searched, screened and did the data extraction. JS, AN conducted the data analysis with supervision from AW. JS and LY first drafted the paper and all the authors revised and approved it.

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**Figure legends**

**Fig. 1.** Flow chart illustrating the identification of included studies.

**Fig. 2.** Distribution of perinatal anxiety across the provinces of Mainland China.

**Fig. 3.** Publication bias funnel plot of studies.

**Fig. 4.** Forest plot of the prevalence of perinatal anxiety based on the timing of assessment.

**Fig. 5.** Forest plot of the prevalence of perinatal anxiety based on measurements

**Fig. 6.** Forest plot of the prevalence of perinatal anxiety based on provinces

**Fig. 7.** Meta-regression of the prevalence and provincial GDP, average age of mothers, year of publication

**Fig. S1.** Forest plot of the overall prevalence of perinatal anxiety

**Table 1** Pooled prevalence of anxiety based on the timing of assessment.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Time | Study No. | Prevalence (%) | 95% CI (%) | I2 (%) | Q | *P*-value |
| Lower | Higher |
| Antenatal  | 156 | 16.8 | 15.2 | 18.6 | 98.83 | 1.08 | 0.58 |
| Postpartum | 17 | 14.5 | 10.4 | 19.7 | 98.66 |
| Both | 4 | 19.6 | 10.2 | 34.3 | 99.52 |

**Table 2** Multivariate meta regression model analysis results.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Covariate | Coef. | S.E. | Z | *P* |
| Intercept | -89.27 | 56.04 | -1.59 | 0.11 |
| Age | 0 | 0.01 | -0.25 | 0.8 |
| GDP | 0 | 0 | -0.03 | 0.97 |
| Antenatal | Reference |  |  |  |
| Both periods | 0.06 | 0.46 | 0.13 | 0.89 |
| Postnatal | -0.14 | 0.24 | -0.56 | 0.57 |
| Year | 0.04 | 0.03 | 1.57 | 0.12 |
| Before and after 2010 | 0.26 | 0.29 | 0.9 | 0.37 |

**Table 3** Risk and protective factors of perinatal anxiety in mainland China.

|  |  |  |
| --- | --- | --- |
|  | Reported Odds Ratio(Minimum-Maximum) | Studies |
| **Risk factors** |  |  |
| Abnormal pregnancy-labor history | 1.653-19.243 | 14 studies (Cui, 2013; Ding, 2015b; He et al., 2007; Huang et al., 2016; Jiang et al., 2013; Li et al., 2013; Li et al., 2016c; Li. et al., 2012; Wang, 2011; Wang et al., 2017; Wei et al., 2015; Xia et al., 2019; Zeng et al., 2017; Zhang, 2008) |
| Poor health status  | 1.120-3.591 | 7 studies (Li et al., 2016d; Qian et al., 2019; Wang et al., 2017; Wei et al., 2015; Xu and Liu, 2015; Zhang, 2008; Zhang et al., 2011) |
| Pregnancy complications | 2.669-6.610 | 7 studies (Huang et al., 2016; Kang et al., 2016; Li, 2015; Li et al., 2016d; Wu et al., 2018; Zha et al., 2017; Zhang, 2008) |
| Severe pregnancy reaction | 1.270-7.990 | 8 studies (Chen, 2016; Ding, 2015b; Gao et al., 2014; He et al., 2014; Hu, 2011; Jiang et al., 2013; Wei et al., 2017; Zhang et al., 2011) |
| Being worried | 1.518-6.851 | 8 studies (Chen, 2016; Jiang et al., 2013; Liang et al., 2007; Qian et al., 2019; Wang, 2011; Wei et al., 2017; Yu and Zhu, 2010; Zeng et al., 2017) |
| Lack relevant knowledge | 1.758-26.354 | 7 studies (Hu et al., 2014; Li et al., 2016a; Li et al., 2016c; Li. et al., 2012; Ma et al., 2020; Wu, 2016; Yan et al., 2011) |
| Presence of pressure | 1.153-3.121 | 7 studies (Kong, 2019; Mao et al., 2014; Tang et al., 2019; Wang et al., 2015; Wei et al., 2017; Xu and Liu, 2015; Zhang et al., 2011) |
| Multiple pregnancies | 1.176-50.289 | 6 studies (He et al., 2007; Hu et al., 2017; Jia et al., 2016; Liang et al., 2007; Lu et al., 2020; Zheng, 2015) |
| Unplanned pregnancy | 1.330-2.971 | 8 studies (Chen, 2016; Ding, 2015b; Hu et al., 2017; Jia et al., 2016; Kong, 2019; Yang et al., 2015; Zeng et al., 2017; Zhang et al., 2011) |
| Poor marital relationship | 1.993-6.489 | 6 studies (Hu et al., 2014; Mei and Wang, 2015; Yan et al., 2011; Yang et al., 2015; Yu and Zhu, 2010; Zeng et al., 2017) |
| Dissatisfied with living conditions | 1.220-14.669 | 7 studies (He et al., 2014; Hu et al., 2017; Hu, 2011; Qian et al., 2019; Yang et al., 2015; Zha et al., 2017; Zhang et al., 2011) |
| Poor family economic status | 1.160-18.670 | 6 studies (Jiang et al., 2013; Liu et al., 2018; Wang et al., 2017; Wu, 2016; Zhang et al., 2011; Zhou et al., 2019) |
| **Protective factors** |  |  |
| Good family economic status | 0.242-0.833 | 7 studies (Cui, 2006; Jia et al., 2016; Kong, 2019; Wu et al., 2018; Yan et al., 2011; Yu and Zhu, 2010; Zhan, 2019) |
| High maternal age | 0.544-0.946 | 6 studies (Jia et al., 2016; Jiang et al., 2013; Li et al., 2016a; Li et al., 2016b; Li, 2017; Zhang et al., 2011) |
| Good interpersonal relationship | 0.223-0.391 | 4 studies (Kang et al., 2016; Li et al., 2013; Liang et al., 2007; Xu and Liu, 2015) |
| High education background | 0.349-0.792 | 7 studies (Kang et al., 2016; Shao et al., 2009; Tang, 2016; Wang et al., 2019; Wei et al., 2017; Wu et al., 2018; Yan et al., 2011) |
| Good social support | 0.534-0.968 | 5 studies (Gao et al., 2014; He et al., 2007; Hu, 2011; Kong, 2019; Mei and Wang, 2015) |
| Multiple delivery history | 0.215-0.748 | 4 studies (Gao et al., 2014; He et al., 2007; Kong, 2019; Xia et al., 2019) |