

## A Systematic Review of the Prevalence of Mental Health Disorders in Pregnant Women during the COVID-19 Pandemic

Rahele Rahimi<sup>1</sup>, Zari Dolatabadi<sup>2</sup>, Somayeh Moeendarbary<sup>3</sup>, Sara Behzadfar<sup>4</sup>, Neda Fakhr Ghasemi<sup>5</sup>, Rana Tafrishi<sup>5</sup>, \*Malihe Kamali<sup>6</sup>

<sup>1</sup>Fellowship of Pediatric Intensive Care, Department of Pediatrics, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran. <sup>2</sup>Department of Reproductive Health and Midwifery, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran. <sup>3</sup>Assistant Professor, Department of Obstetrics and Gynecology, Neonatal and Maternal Research Center, Mashhad University of Medical Sciences, Mashhad, Iran. <sup>4</sup>General Physician, Iran University of Medical Sciences, Tehran, Iran. <sup>5</sup>Pediatrician, Department of Pediatrics, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran. <sup>6</sup>Department of Midwifery, Firoozabad Branch, Islamic Azad University, Firoozabad, Iran.

### Abstract

#### Background

There is not enough evidence to estimate the prevalence of depression and anxiety in pregnant women during the COVID-19 outbreak. This study aimed to investigate the prevalence of mental health disorders among pregnant women during the COVID-19 pandemic.

**Materials and Methods:** In the present systematic review, a search process was conducted to screen the databases of ProQuest, Scopus, EMBASE, Web of Science, and MEDLINE for the relevant articles published between 2019 and 2020. The quality of the articles was assessed by the STROBE checklist.

**Results:** From the relevant studies, 15 were selected for review. The results showed the prevalence of anxiety was between 3.8 to 17.5% in Asian countries, with the lowest in Iran (3.8%) and the highest in Sri Lanka (17.5%). The prevalence of anxiety was from 23.9 to 72% in Western countries, with the lowest in the USA (23%) and the highest in Canada (72%). In two of the studies in China, the prevalence of anxiety was from 3.09 to 29.6% and of depression from 5.2 to 40%. The incidence rate of self-harm thoughts as a result of the epidemic was significantly high (RR=2.85, 95% CI= 1.70, 8.85, P=0.005).

**Conclusion:** The prevalence of anxiety was from 3.8 to 17.5% in Asian countries and from 23.9 to 72% in Western countries. The prevalence of depression was from 5.2 to 40%. Moderate levels of anxiety and depression were reported in Western countries compared with Asian countries. Depression and anxiety should be regularly screened in obstetrics and gynecology wards following the current epidemic to ensure optimal mental health during pregnancy and infancy.

**Key Words:** COVID-19, Mental Health, Pregnant Women, Prevalence.

\*Please cite this article as: Rahele Rahimi, Zari Dolatabadi, Somayeh Moeendarbary, Sara Behzadfar, Neda Fakhr Ghasemi, Rana Tafrishi, et al. A Systematic Review of the Prevalence of Mental Health Disorders in Pregnant Women during the COVID-19 Pandemic. *Int J Pediatr* 2020; 8(11): 12397-407. DOI: **10.22038/ijp.2020.52315.4155**

---

#### \*Corresponding Author:

Malihe Kamali, Department of midwifery, Firoozabad Branch, Islamic Azad University, Firoozabad, Iran.

Email: malihe\_kamali@yahoo.com

Received date: Jun.27, 2020; Accepted date: Aug.22, 2020

## 1- INTRODUCTION

Several cases of acute respiratory syndrome caused by a virus of the Corona family were identified in December 2019. The virus was named COVID-19 soon afterwards (1). The symptoms included diarrhea, vomiting, nausea, myalgia, difficulty breathing, sore throat, cough, and chills. No pathognomonic symptom was observed (2). Physical and social (family, friends, community, schools, and even daycares) isolation and quarantine were globally set in place. The effect of COVID-19 on mental health should be investigated with urgency to prevent the spread of serious mental illnesses as a secondary outcome (3). The social health of the community has been severely affected by the sudden outbreak of COVID-19 due to factors such as overflowing misinformation about the epidemic on social media, unlimited quarantine periods, unpredictability of the situation, and unavailability of a vaccine which in turn have led to extreme behaviors and even suicidal tendencies (4). The psychological impact of COVID-19 and consequent quarantine measures are a concern for pregnant women and new mothers because prenatal and postpartum depression and anxiety may lead to adverse effects on both mother and baby (5). Some of the unintended complications due to psychological disorders during pregnancy include miscarriage, premature birth, and low birth weight (6). The clinical presentations of COVID-19 pneumonia in pregnant women were similar to non-pregnant adult patients with COVID-19 pneumonia (7). Perinatal depression and anxiety may lead to premature birth, reduced maternal-infant bonding, and delayed neonatal cognitive/emotional development, probably persisting into childhood (8). The literature review found no evidence to estimate the prevalence of depression and anxiety in pregnant women during the

COVID-19 outbreak. Therefore, this study aimed to investigate the prevalence of mental health disorders among pregnant women during the COVID-19 pandemic.

## 2- MATERIALS AND METHODS

### 2-1. Study participants

The research subjects of this systematic review were pregnant and postpartum women.

### 2-2. Study outcomes

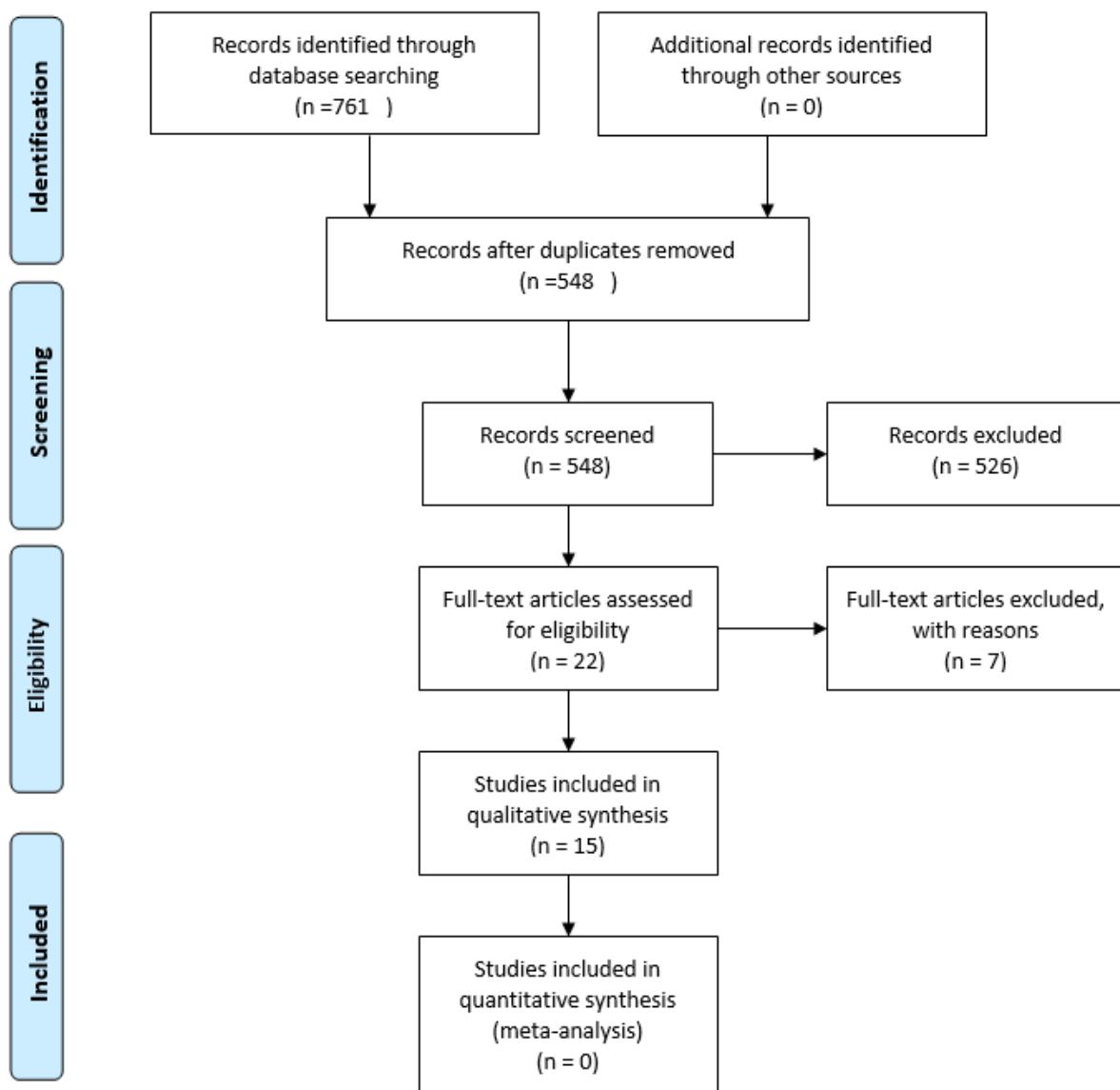
The outcome in this systematic review was the prevalence of mental health disorders among pregnant women during the COVID-19 pandemic.

### 2-3. Eligible studies

The final number of eligible articles for this systematic review after deleting non-relevant articles and duplicates was 15 (**Figure. 1**).

### 2-4. Study databases

The electronic bibliographic databases to select the relevant articles in the present systematic review included ProQuest, Scopus, EMBASE, ISI Web of Science, and MEDLINE published between 2019 and 2020. Other databases searched for gray literature included conference articles and related journals from inception until August, 2020. The main keywords used were: (pregnant OR pregnancy OR partum OR prepartum OR prenatal OR gestation maternal) AND (epidemic OR pandemic OR COVID-19 OR SARS-COV 2) AND (anxiety OR mental). In the present systematic review, the abstract of the searched articles was first reviewed to identify the eligible studies. The full-text of the eligible articles was then downloaded and examined to prepare the final list of included studies. Two reviewers performed this process, once jointly and once independently, and any discrepancy was resolved by a third reviewer.

**Fig1:** PRISMA flowchart.

## 2-5. Data collection process

Data from the selected studies (authors, year of publication, location, sample population, and main outcomes) were collected by two independent reviewers who then combined and compared the data for accuracy. Any discrepancy was resolved by a third reviewer (**Table.1**).

## 2-6. Quality assessment

The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist was used for quality assessment (9) in three categories of low, moderate and high quality by two independent reviewers. Any disagreements between raters were resolved through discussions with a third reviewer. **Table. 1** shows the results of Risk of bias (quality assessment).

**Table-1:** General characteristics of included studies and quality assessment with *STROBE* statement.

Author, Year, Reference	Country	Design	Sample Size	Main finding	STROBE score total
Ceulemans et al., 2020, (5)	Belgium	Cross-Sectional	5866	25.3% of Belgium pregnant women had depression.	16
Saadati et al., 2020, (1)	Iran	Cross-Sectional	300	In this study, 9%, 13% and 21% of the women reported severe anxiety with scores of $\geq 35$ in the first, second and third trimester of pregnancy, respectively.	17
Hossain et al. 2020, (16)	Pakistan	Cross-Sectional	286	14.3% women had anxiety and depression.	20
Dagklis et al., 2020, (18)	Greece	Cross-Sectional	146	The prevalence rate of Anxiety was 53.4%.	22
Saccone et al., 2020, (19)	Italy	Cross-Sectional	1883	68% of women had anxiety according to STAI >36.	20
Wu, et al., 2020, (48)	China	Cross-Sectional	4124	The results showed that significantly higher depression scores than pre-COVID-19 epidemic (26.0% versus 29.6%, P=0.02).	20
Lebel et al., 2020, (3)	Canada	Cross-Sectional	1987	High levels of anxiety (57%), and depression (37%) among Canadian pregnant women were reported.	19
Gharagozloo et al., 2020, (17)	Iran	Cross-Sectional	403	3.8% of Iranian pregnant women reported severe anxiety	15
Mappa et al., 2020, (15)	Italy	Cross-Sectional	178	38.2% of women had a STAI-T score of $\geq 40$ .	18
Patabendige et al., 2020, (11)	Sri Lanka	Cross-Sectional	1500	The prevalence of depression was 19.5%, and prevalence of the anxiety was 17.5%.	15
Moyer et al., 2020, (20)	China	Cross-Sectional	1232	The mean PRAS score of 20.6 before the COVID-19 pandemic (95% CI=20.5-20.7), and the mean PRAS score of 23.9 after the COVID-19 pandemic (95% CI=23.8-24.0).	19
Farewell et al., 2020, (12)	China	Cross-Sectional	27	56% of the USA pregnant women reported anxiety on the GAD-7 score $\geq 10$ .	15
Mei et al., 2020, (13)	China	Cross-Sectional	2448	23.09% and 4.72% mild and moderate-to-severe levels of anxiety during the COVID-19 pandemic.	19
Durankuş et al. 2020, (14)	Turkey	Cross-Sectional	260	35.4% of Turkish pregnant women had depression based on the EPDS score of >13.	17
Davenport et al., 2020, (8)	Canada	Cross-Sectional	900	29% had anxiety before the pandemic and 72% of women after the pandemic.	19

STROBE score range: 0-22, STROBE: STrengthening the Reporting of OBservational studies in Epidemiology.

### 3- RESULTS

Finally, 15 studies were selected for the systematic review.

#### 3-1. The prevalence of depression

##### Studies conducted in Asian countries:

Wu et al. studied Chinese pregnant women (n=4124) after the emergence of COVID-19 epidemic. The results showed significantly higher depression scores than pre-COVID-19 epidemic (26.0% versus 29.6%, P=0.02). Pre-pregnancy

underweight, primiparity, age of less than 35 years, working full-time, moderate income, and poor living conditions were risk factors for depression and anxiety during the outbreak (10). In Sri Lanka, Patabendige et al. studied pregnant women (n=257), and reported an overall prevalence of depression of 19.5% (11). In a study in China, the moderate-to-severe depression rate was 11.35% and 0.51% after and before the COVID-19 pandemic, respectively (12).

**Studies conducted in Western countries:** Davenport et al., reported a self-identified Edinburgh Postpartum Depression Scale (EPDS) score of >13 (symptoms of depression) among 40.7% of respondents compared to 15% before the pandemic (8). Lebel et al. reported an increase in symptoms of anxiety and depression in Canadian pregnant women (n=1987) compared to similar pre-epidemic pregnancy groups, with 37% clinical signs of depression and 57% clinical signs of anxiety (3). In Farewell's study, North American pregnant women (n=27) reported a 12% depression score in PHQ-2 (13). In a study by Durankuş et al., 35.4% of Turkish pregnant women had depression according to the score of >13 on the EPDS. The social isolation significantly affects the EPDS scores (14). In a study by Ceulemans et al., 25.3% of Belgian pregnant women had an EPDS score of  $\geq 13$ , with 8.4% moderate, and 5.2% severe depression. Their findings during the social isolation indicated higher levels of generalized anxiety disorder, reported in >40% of the surveyed women who scored  $\geq 5$  based on the Ehlers-Danlos Syndrome (EDS) anxiety subscale (5).

### 3-2. The prevalence of anxiety

**Studies conducted in Western countries:** Lebel et al. found high levels of anxiety (57%), and depression (37%) among Canadian pregnant women compared to the same pre-pandemic population. A relationship was found between fewer psychological symptoms and higher levels of perceived social support, support effectiveness, and more physical activity (3, 15). Dagklis et al., studied Greek pregnant women (n=146) for anxiety and found a prevalence rate of 53.4%. They showed that the main independent risk factors for anxiety were the number of weeks after the lockdown and smoking during pregnancy (16). Davenport et al., examined Canadian pregnant women and found moderate to high anxiety rates

(State-Trait Anxiety inventory scores of >40) in 29% of women before the pandemic (mean STAI =  $34.5 \pm 11.4$ ) compared to 72% after the pandemic (mean STAI =  $48.1 \pm 13.6$ ) (8). Saccone et al., in Italy reported a mean STAI score of 45.21, and a total STAI >36 of 68% (17). Moyer et al., studied North American pregnant women and reported a mean Pregnancy-Related Anxiety Scale (PRAS) score of 20.6 before the COVID-19 pandemic (95% CI=20.5-20.7) compared to a mean PRAS score of 23.9 after the COVID-19 pandemic (95% CI=23.8-24.0) (18). Mappa et al. in Italy evaluated pregnant women (n=200), and obtained a median trait anxiety score (STAI-T) of 37 (IQR20–43) and found that 38.2% of women (95% CI=31.3–45.5) had a STAI-T score of  $\geq 40$ . They also found a relationship between higher educational levels and high prevalence rates of STAI-S  $\geq 40$  (19). In a study by Farewell et al., 56% of the North American pregnant women had anxiety on the GAD-7 score  $\geq 10$  (13).

**Studies conducted in Asian countries:** Patabendige et al., examined pregnant women in Sri Lanka and found a 17.5% prevalence of anxiety (11). Hossain et al., examined Pakistani pregnant women (n=286) and reported 41 (14.3%) women with a score of  $\geq 7$ , which denotes the degree of anxiety and depression (20). Gharagozloo et al., studied Iranian pregnant women (n=200), and reported a 3.8% prevalence of severe anxiety. In another study, 9%, 13%, and 21% of the women suffered from severe anxiety with scores of  $\geq 35$  in the first, second, and third trimester of pregnancy, respectively (1). Mei et al., studied the Chinese pregnant woman and reported 23.09%, and 4.72% mild and moderate-to-severe levels of anxiety during the COVID-19 pandemic (12). The incidence rate of self-harm thoughts as a result of the COVID-19 epidemic was significantly high (RR=2.85,

95% CI= 1.70, 8.85, P=0.005). In a study in Iran, 9%, 13%, and, 21% of women reported severe anxiety scores of  $\geq 35$  in the first, second, and third trimester of pregnancy, respectively (1).

#### 4- DISCUSSION

This study aimed to investigate the prevalence of mental health disorders among pregnant women during the COVID-19 epidemic. The prevalence of anxiety was 3.8 to 17.5% in Asian countries and 23.9 to 72% in Western countries. The prevalence of depression was 5.2 to 40%. Pre-pregnancy underweight, primiparity, age of less than 35 years, working full-time, moderate income, and poor living conditions were risk factors for depression and anxiety during the outbreak. The lockdown and social isolation significantly affects the depression scores. Lower social support and higher educational level were associated with a higher prevalence. Most pregnant women and new mothers could not leave the house, often had other children to care for, and had no help at home (5). It should also be noted that some women took advantage of this opportunity to do housework or benefited from having their partners staying at home (21).

A meta-analysis examined 221974 women from 34 countries. The self-reported anxiety symptoms had a prevalence of 18.2%, 19.1%, and 24.6% in the first, second, and third trimesters, respectively (22). Fakari et al., found some of the reasons for the concerns of pregnant women, including commute issues during the COVID-19 epidemic, and suggested tele-counseling for pregnancy care, and tele-triage to reduce the anxiety and depression symptoms as well as to provide safe home birth services (23). All the studies reported a high prevalence of mental distress and disorders, including depression, stress, irritability, and insomnia in individuals under quarantine.

Although the STAI scores can be used to assess the presence of anxiety, the lack of previous data on anxiety in the same group of women before the onset of the epidemic makes it difficult to evaluate the true impact of the COVID-19 epidemic (24). The intensity of the symptoms range from mild to severe in different individuals (24, 25). Mild health anxiety may spur an individual to seek clinical care if that clinical observation is certified (25). Severe health anxiety is defined by various cognitive, physical, and behavioral aspects that usually appear in following cycles when an individual is stressed, significantly ill, or experiences the loss of a family member (24). The typical behaviors of patients diagnosed with HA are often accompanied with substantial costs because these patients frequently visit doctors, request additional tests, and search textbooks or the Internet for more information (26). These individuals also experience higher levels of concern when seeking routine medical care (27). According to the evaluations, 9%, 13%, and 21% of the women had severe anxiety in the first, second and third trimester of pregnancy, respectively (1).

Pregnancy is one of the most stressful periods in a woman's life. Changes happening during this period lead to an increased vulnerability and a higher risk of depression and anxiety (28, 29). The COVID-19 epidemic has doubled the levels of anxiety (30). Pregnant women and infants are more vulnerable to COVID-19 than the non-pregnant population (31). Vulnerability to a disease increases the perception of the risk of disease in pregnant women, leading to increased levels of anxiety (32). The highest levels of anxiety experienced by pregnant women occur when leaving home, using public transportation, or being in public places. Consequently, the risk of COVID-19 and the concerns about the health of the fetus and family members

increase the level of anxiety more than ever (33). Lockdown is often the first response for protection against infectious diseases (34). However, it strongly affects people's mental state. Longer periods of lockdown are associated with more severe symptoms (35). Social isolation following quarantine is one of the effective factors in increasing the level of anxiety and depression in pregnant women (36). Another consequence of staying at home during the lockdown is increasing levels of domestic violence (37). Domestic violence during pregnancy is one of the most important and influential factors in inducing postpartum anxiety and depression (38). Measures taken to control the virus may also disrupt the supporting services for pregnant women and increase financial problems (39). Adequate social support during pregnancy is a known protective factor against postpartum depression (40) which can also minimize stress and anxiety levels during pregnancy (41). Pregnant women need emotional support more than any other time in their lives. Due to the restrictions and limited communication with their relatives and friends, pregnant women do not receive sufficient social support (23).

With the prevalence of COVID-19 epidemic in the world, the access of pregnant women to prenatal care has decreased, which has a significant effect on increasing maternal and neonatal complications (8). Pregnant women who did not receive prenatal care due to the epidemic had the highest levels of anxiety (3). Lack of access to health systems due to the COVID-19 epidemic may cause more complications for pregnant women (42). With the outbreak of Coronavirus, many hospitals have banned the presence of families and even spouses during childbirth. This factor increases the psychological vulnerability of mothers and heightens the risk of postpartum depression (43). By creating appropriate

social distancing measures in hospitals, it may be possible to alleviate depressive symptoms in mothers (44). Another factor in increasing the prevalence of anxiety and depression in pregnant women is the focus of the media on the news about the epidemic. Higher levels of depression and anxiety were observed in women who spent more time watching television (11). Prenatal anxiety and depression are associated with an increased risk of miscarriage, preterm delivery, low birth weight, and low Apgar scores at birth. Children of mothers who had high stress levels during pregnancy are more likely to have cognitive and behavioral problems and are more vulnerable to subsequent psychological problems as well (3). The COVID-19 epidemic has also reduced the access to psychotherapy and medication, which in turn leads to deterioration in maternal mental health (45).

The potentially serious consequences of untreated anxiety and depressive symptoms in pregnancy on maternal and infant outcomes and their reversibility necessitate urgent action to address the symptoms.

The psychological consequences of the COVID-19 epidemic can be as dangerous as the physical effects of the disease (46). Psychological interventions are generally very effective in preventing and treating depression and anxiety during pregnancy. As a primary treatment, Cognitive-behavioral therapy helps reduce depression as well as increase the social support (3). Health education has undergone many changes in recent years, particularly progressed with extended access to information and communication technology through the Internet networks (47). Online education and psychological counseling during pregnancy are approaches that can greatly improve preparation for childbirth, reduce the risk of infection, and benefit the economic and health systems and the women themselves. Reducing unnecessary

hospital visits can minimize the potential risk of infection in this vulnerable groups (48). Studies show that, even in times of disaster, online mental health care has beneficial effects, especially during the lockdown. On the other hand, it is difficult for people in lower socio-economic strata to access online tools. For these people, using telephone lines can be useful to receive mental health interventions (49). Online education for spouses of pregnant women is also suggested as a strategy to reduce the levels of depression and anxiety (50). Encouraging women to engage in physical activity and exercise can be another way to alleviate the level of anxiety and depression (3).

#### **4-1. Study Limitations**

This review had some limitations that need to be addressed in the future studies. The prevalence rates were assessed in different times during the epidemic; for example, some studies were conducted in the heart of the outbreak. Also, different tools were used to measure anxiety and depression. Finally, the sample size was relatively small in some studies.

#### **5- CONCLUSION**

The prevalence of anxiety was 3.8 to 17.5% in Asian countries and 23.9 to 72% in Western countries. The prevalence of depression was 5.2 to 40%. Pre-pregnancy underweight, primiparity, age of less than 35 years, working full-time, moderate income, and poor living conditions were risk factors for depression and anxiety during the outbreak. The lockdown and social isolation significantly affects the depression scores. Lower social support and higher educational levels were associated with higher prevalence rates. Moderate levels of anxiety and depression were reported in western countries compared with Asian countries. Depression and anxiety should be screened regularly in obstetrics and gynecology wards following the current epidemic to

ensure optimal mental health during pregnancy and infancy.

#### **6- CONFLICT OF INTEREST:** None.

#### **7- REFERENCES**

1. Saadati N, Afshari P, Boostani H, Beheshtinasab M, Abedi P, Maraghi E. Health Anxiety of Pregnant Women and Its Related Factors During the Pandemic of Corona Virus. 2020. DOI: 10.21203/rs.3.rs-26840/v1.
2. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *The Lancet*. 2020;395(10223):507-13.
3. Lebel C, MacKinnon A, Bagshawe M, Tomfohr-Madsen L, Giesbrecht G. Elevated depression and anxiety among pregnant individuals during the COVID-19 pandemic. *J Affect Disord*. 2020; 277: 5–13.
4. Sade S, Sheiner E, Wainstock T, Hermon N, Yaniv Salem S, Kosef T, et al. Risk for depressive symptoms among hospitalized women in high-risk pregnancy units during the CoViD-19 pandemic. *Journal of clinical medicine*. 2020;9(8):2449.
5. Ceulemans M, Hompes T, Foulon V. Mental health status of pregnant and breastfeeding women during the COVID- 19 pandemic: A call for action. *International Journal of Gynecology & Obstetrics*. <https://doi.org/10.1002/ijgo.13295>.
6. Mirzadeh M, Khedmat L. Pregnant women in the exposure to COVID-19 infection outbreak: the unseen risk factors and preventive healthcare patterns. *J Matern Fetal Neonatal Med*. 2020 Apr 7:1-2. doi: 10.1080/14767058.2020.1749257. Epub ahead of print. PMID: 32223477.
7. Mimouni F, Lakshminrusimha S, Pearlman SA, Raju T, Gallagher PG, Mendlovic J. Perinatal aspects on the covid-19 pandemic: a practical resource for perinatal-neonatal specialists. *J Perinatol*. 2020 May;40(5):820-826. doi: 10.1038/s41372-020-0665-6. Epub 2020 Apr 10. PMID: 32277162; PMCID: PMC7147357.

8. Davenport MH, Meyer S, Meah VL, Strynadka MC, Khurana R. Moms are not ok: COVID-19 and maternal mental health. *Frontiers in Global Women's Health*. 2020;1:1.
9. Knottnerus A, Tugwell P. STROBE--a checklist to Strengthen the Reporting of Observational Studies in Epidemiology. *Journal of clinical epidemiology*. 2008;61(4):323.
10. Wu Y, Zhang C, Liu H, Duan C, Li C, Fan J, et al. Perinatal depressive and anxiety symptoms of pregnant women along with COVID-19 outbreak in China. *American Journal of Obstetrics and Gynecology*. 2020.
11. Patabendige M, Gamage MM, Weerasinghe M, Jayawardane A. Psychological impact of the COVID-19 pandemic among pregnant women in Sri Lanka. *International Journal of Gynecology & Obstetrics*. 2020.
12. Farewell CV, Jewell J, Walls J, Leiferman JA. A mixed-methods pilot study of perinatal risk and resilience during COVID-19. *Journal of Primary Care & Community Health*. 2020;11:2150132720944074.
13. Mei H, Li N, Li J, Zhang D, Cao Z, Zhou Y, et al. Impact of the COVID-19 pandemic on mental health in pregnancy women: results from two cohort studies in China. 2020.
14. Durankuş F, Aksu E. Effects of the COVID-19 pandemic on anxiety and depressive symptoms in pregnant women: a preliminary study. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2020;1-7.
15. Mappa I, Distefano FA, Rizzo G. Effects of coronavirus 19 pandemic on maternal anxiety during pregnancy: a prospective observational study. *Journal of Perinatal Medicine*. 2020;48(6):545-50.
16. Hossain N, Samuel M, Sandeep R, Imtiaz S, Zaheer S. Perceptions, Generalized Anxiety and Fears of Pregnant women about Corona Virus infection in the heart of Pandemic. 2020.
17. Gharagozloo M, Sadatmahalleh SJ, Khomami MB, Moini A, Kazemnejad A. Mental Health and Marital Satisfaction Changes of Pregnant and Lactating Women During the COVID-19 Pandemic. 2020.
18. Dagklis T, Tsakiridis I, Mamopoulos A, Athanasiadis A, Papazisis G. Anxiety During Pregnancy in the Era of the COVID-19 Pandemic. Available at SSRN 3588542. 2020.
19. Saccone G, Florio A, Aiello F, Venturella R, De Angelis MC, Locci M, et al. Psychological impact of coronavirus disease 2019 in pregnant women. *American Journal of Obstetrics & Gynecology*. 2020.
20. Moyer CA, Compton SD, Kaselitz E, Muzik M. Pregnancy-related anxiety during COVID-19: A nationwide survey of 2,740 pregnant women. 2020.
21. Stampini V, Monzani A, Caristia S, Ferrante G, Gerbino M, Amadori R, et al. A Survey Among Italian Pregnant Women and New-mothers During the COVID-19 Pandemic Lockdown. 2020.
22. Dennis C-L, Falah-Hassani K, Shiri R. Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. *The British Journal of Psychiatry*. 2017;210(5):315-23.
23. Fakari FR, Simbar M. Coronavirus Pandemic and Worries during Pregnancy; a Letter to Editor. *Archives of Academic Emergency Medicine*. 2020;8(1).
24. Asmundson GJ, Abramowitz JS, Richter AA, Whedon M. Health anxiety: current perspectives and future directions. *Current psychiatry reports*. 2010;12(4):306-12.
25. Taylor S, Asmundson GJ. Treating health anxiety: A cognitive-behavioral approach: Guilford Press; 2004.
26. Neto MLR, Almeida HG, Esmeraldo JDa, Nobre CB, Pinheiro WR, de Oliveira CRT, et al. When health professionals look death in the eye: the mental health of professionals who deal daily with the 2019 coronavirus outbreak. *Psychiatry Research*. 2020;112972.
27. Lagoe C, Atkin D. Health anxiety in the digital age: An exploration of psychological determinants of online health information seeking. *Computers in Human Behavior*. 2015;52:484-91.

28. Cunningham, leveno, Bloom, Hauth, Gilstrap, Wenstrom. *Williams Obstetrics*. 25nd ed. New York: Mcgraw Hill ;2018: 1241-12442018.
29. Gourounti K, Anagnostopoulos F, Lykeridou K, Griva F, Vaslamatzis G. Prevalence of women's worries, anxiety, and depression during pregnancy in a public hospital setting in Greece. *Clin Exp Obstet Gynecol*. 2013;40(4):581-3.
30. Zanardo V, Manghina V, Giliberti L, Vettore M, Severino L, Straface G. Psychological impact of COVID- 19 quarantine measures in northeastern Italy on mothers in the immediate postpartum period. *International Journal of Gynecology & Obstetrics*. 2020.
31. Dashraath P, Jeslyn WJL, Karen LMX, Min LL, Sarah L, Biswas A, et al. Coronavirus disease 2019 (COVID-19) pandemic and pregnancy. *American journal of obstetrics and gynecology*. 2020.
32. Lennon SL. Risk perception in pregnancy: a concept analysis. *Journal of advanced nursing*. 2016;72(9):2016-29.
33. Taubman-Ben-Ari O, Chasson M, Abu Sharkia S, Weiss E. Distress and anxiety associated with COVID-19 among Jewish and Arab pregnant women in Israel. *Journal of reproductive and infant psychology*. 2020;38(3):340-8.
34. Parmet WE, Sinha MS. Covid-19—the law and limits of quarantine. *New England Journal of Medicine*. 2020;382(15):e28.
35. Hawryluck L, Gold WL, Robinson S, Pogorski S, Galea S, Styra R. SARS control and psychological effects of quarantine, Toronto, Canada. *Emerging infectious diseases*. 2004;10(7):1206.
36. Ortiz EI, Herrera E, De La Torre A. Coronavirus (COVID 19) Infection in Pregnancy. *Colombia Médica*. 2020;51(2).
37. Campbell AM. An increasing risk of family violence during the Covid-19 pandemic: Strengthening community collaborations to save lives. *Forensic Science International: Reports*. 2020:100089.
38. Koirala P, Chuemchit M. Depression and domestic violence experiences among Asian women: a systematic review. *International journal of women's health*. 2020;12:21.
39. Caparros-Gonzalez RA, Alderdice F. The COVID-19 pandemic and perinatal mental health. *Journal of Reproductive and Infant Psychology*. 2020;38(3):223-5.
40. Nakamura A, Lesueur FE-K, Sutter-Dallay A-L, Franck J-E, Thierry X, Melchior M, et al. The role of prenatal social support in social inequalities with regard to maternal postpartum depression according to migrant status. *Journal of Affective Disorders*. 2020.
41. Yue C, Liu C, Wang J, Zhang M, Wu H, Li C, et al. Association between social support and anxiety among pregnant women in the third trimester during the coronavirus disease 2019 (COVID-19) epidemic in Qingdao, China: The mediating effect of risk perception. *The International Journal of Social Psychiatry*. 2020.
42. Hasnain M, Pasha MF, Ghani I, Budiarso R. Protection challenges of pregnant women against vertical transmission during COVID-19 epidemic: a narrative review. *American journal of infection control*. 2020.
43. Viaux S, Maurice P, Cohen D, Jouannic J. Giving birth under lockdown during the COVID-19 epidemic. *Journal of Gynecology Obstetrics and Human Reproduction*. 2020.
44. Oskovi-Kaplan ZA, Buyuk GN, Ozgu-Erdinc AS, Keskin HL, Ozbas A, Tekin OM. The Effect of COVID-19 Pandemic and Social Restrictions on Depression Rates and Maternal Attachment in Immediate Postpartum Women: a Preliminary Study. *Psychiatric Quarterly*. 2020:1-8.
45. Patabendige M, Gamage MM, Weerasinghe M, Jayawardane A. Psychological impact of the COVID- 19 pandemic among pregnant women in Sri Lanka. *International Journal of Gynecology & Obstetrics*. 2020;151(1):150-3.
46. Pfefferbaum B, North CS. Mental health and the Covid-19 pandemic. *New England Journal of Medicine*. 2020.
47. Cullen W, Gulati G, Kelly B. Mental health in the Covid-19 pandemic. *QJM: An*

- International Journal of Medicine. 2020;113(5):311-2.
48. Ghaffari M, Rakhshanderou S, Mehrabi Y, Tizvir A. Using social network of telegram for education on continued breastfeeding and complementary feeding of children among mothers: a successful experience from Iran. International Journal of Pediatrics. 2017;5(7):5275-86.
49. Wu H, Sun W, Huang X, Yu S, Wang H, Bi X, et al. Online Antenatal Care During the COVID-19 Pandemic: Opportunities and Challenges. Journal of Medical Internet Research. 2020;22(7):e19916.
50. Doss BD, Knopp K, Roddy MK, Rothman K, Hatch SG, Rhoades GK. Online programs improve relationship functioning for distressed low-income couples: Results from a nationwide randomized controlled trial. Journal of Consulting and Clinical Psychology. 2020;88(4):283.