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The Covid-19 outbreak: Maternal Mental Health and Associated Factors

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ABSTRACT

Objective: Evaluation of the mental health of pregnant women during the early and peak stages of the Covid-19 outbreak

Design: Online survey

Participants: Pregnant women over the age of 18 years with no mental disorder during the pre-pregnancy period (N = 729).

Measurements and Findings: Mental disorders were assessed using the “Depression Anxiety Stress Scale” and social support was determined using the “Multidimensional Perceived Social Support Scale.” Pregnant women had moderate levels of anxiety and depression and mild levels of stress. Anxiety, depression, and stress of moderate or high severity were reported in 62.2%, 44.6%, and 32.2% of the women, respectively. Pregnant women who lost their jobs during the pandemic period showed a 3-fold increase in the risk of anxiety, a 6-fold increase in the risk of depression, and a 4.8-fold increase in the risk of stress. An increase in the perception of social support has protective effects against all three mental disorders during pregnancy. In pregnant women with at least one obstetric risk, the risk of antenatal anxiety is 2 times higher than that in women with no risk. Similarly, women with a chronic physical illness before pregnancy have a higher risk of anxiety during pregnancy than healthy women. Financial strain has predictive value for anxiety and depression, and advanced age is a predictor for depression.

Key Conclusions: The incidence of mental disorders in pregnant women during the pandemic period was much higher than that during the pre-pandemic period. The high frequency of antenatal mental disorders can lead to an increase in the frequency of obstetric and maternal complications in the short and long term.

Implications for practice: Early detection of inadequate social support and economic difficulties of pregnant women during the pandemic period is recommended for protecting their mental health. Pregnant women should have easy access to psychosocial support, and they should be provided obstetric counseling during the pandemic conditions.

Introduction

Since early 2020, one of the most important health-related problems across the world has been the outbreak of the novel coronavirus (Covid-19). To prevent an increase in the number of patients with Covid-19 infection, since the beginning of the pandemic, Turkey imposed various and comprehensive measures, including city quarantines, travel bans, curfews, home isolations, restrictions in crowded public places, closure of schools, and implementing alternate working arrangements. The number and extent of these measures are increased or decreased depending on the trend of the number of cases in Turkey. The concerns surrounding the epidemic and implementation of the measures for preventing the infection have imposed sudden restrictions and have disrupted the daily routines of people during the pre-pandemic times. Additionally, various organizations have warned of the potential increase in mental disorders since the beginning of the epidemic (American Psychological Association, 2020; Black Dog Institute, 2020; World Health Organization, 2020a). One of the earliest studies conducted in China,

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which was the origin of the epidemic started, showed the importance of this warning (Wang et al., 2020). The relationship between social isolation, which is one of the effective methods of prevention of pandemics, and depression is well known (Matthews et al., 2016); in addition, individuals in social isolation showed symptoms of anger and anxiety several months after isolation (Cameron et al., 2020).

Pregnancy is a period of unique physiological and psychosocial changes. In addition, it is a stressful period with obvious and potential challenges. Therefore, women are more vulnerable to mental problems during pregnancy, and the frequency of mental disorders increases during pregnancy. The most common mental disorders in the antenatal period are depression and anxiety (Allpour et al., 2012; Biaggi et al., 2016; World Health Organization, 2008). A stressful event increases the risk of expectant mothers developing psychological difficulties or mental disorders (Biaggi et al., 2016). In this context, the Covid-19 outbreak is a global disaster that can increase this risk because of both the fear of developing the infection and the measures implemented to curb the pandemic. Pregnant women may be stressed because of the fear of contracting the infection, the fear of passing on the infection to their baby, and the concerns regarding the potential side effects on the fetus of antiseptics commonly used during the epidemic. Further, the fear of infection may lead to an overuse of antiseptics and detergents containing substances such as alcohol and hydrochloric acid, and they may avoid antenatal visits because of the fear of contamination. With a change in hospital policies and procedures to reduce transmission, the schedules of the women’s antenatal visits may be impacted and may result in changes in their delivery plans (Rashidi Fakari and Simbar, 2020). Lack of control over decisions about childbirth is traumatic for women (Patterson et al., 2019). Further, absence of family support during pregnancy and childbirth is difficult to deal with for women (Brooks et al., 2020). In addition, during the postpartum period, they may experience problems with breastfeeding because of the concern of infection (Rashidi Fakari and Simbar, 2020). Other factors responsible for affecting mental health include changes in working life, decreased household income, and social isolation (Biaggi et al., 2016; Cameron et al., 2020). The newly coined term infodemic refers to direct access to a large amount of content regarding the epidemic on the Internet and social media (World Health Organization, 2020b; Zarocostas, 2020). This content includes both true and false information, and some studies indicate that fake news and false information can spread faster and wider than factual news (Vosoughi et al., 2018). Therefore, continuous and intense exposure to news about the epidemic on the Internet and social media can also increase the anxiety in mothers.

Antenatal mental disorders are of great importance due to the potential maternal and fetal/childhood complications. Maternal depression has been associated with low birth weight, preterm delivery, and other adverse pregnancy outcomes. Eating disorders and antenatal stress can lead to abnormalities in fetal birth weight (Gold and Marcus, 2008). Thornton et al. (2010) showed that the frequency of “any obstetric complications” in labor and delivery in women diagnosed with mental illness is higher than that in the general population. The strongest risk factor for developing psychopathological disorders in the postnatal period is the presence of psychopathological disorders during the prenatal period. Moreover, antenatal mental disorders are associated with postpartum emotional abuse and parental neglect, and they increase the risk of development of psychopathological disorders in children. Additionally, psychopathological disorders in children may be passed on to their next generation in the future (Aktar et al., 2019).

Although considerable literature regarding the Covid-19 pandemic and pandemics in the past is available, the number of studies on the effects of these pandemics on antenatal mental health is limited. In this study, we aimed to identify the rates of prevalence of maternal depression, anxiety, and stress during the mandatory social isolation period and to investigate factors affecting the risk for clinically significant symptoms.

Methods

This cross-sectional study was conducted online. Questions of the study were uploaded to “Google Forms,” and announcements were made for the study on a social media page called “Sağlıklı Yaşyorum” (“We live in healthy” in English). This social media page posts about healthy lifestyle recommendations based on current scientific evidence. The content on this page was controlled by 19 physicians belonging to different branches. The three main reasons for choosing this method for reaching out to women were as follows: 1) Providing access to pregnant women who cannot leave their homes because of the epidemic 2) Providing access to women from different cities, and 3) Increasing the reach by using a social media platform with a high number of followers (about 1 million on Instagram, about 400 thousand on Facebook) and is managed by healthcare professionals.

The survey was filled out online from 5/6/2020-12/6/2020. All pregnant women between the ages of 18 and 45 and at any gestational week were included in the study. Women submitting an incomplete questionnaire, women with inconsistent answers in their questionnaires (inconsistent answers related to obstetric and gynecological characteristics such as last date of menstruation), and women who indicated that they had a psychiatric disorder in the past were excluded. Three different forms of data collection tools were used in the study.

Study form: This form was developed by the investigators, and it included questions about the baseline characteristics, overall health status of the women, their knowledge about the pandemic, and presence of obstetric risk factors. Four of the questions were open-ended. The open-ended questions required women to write down the actions and situations they perceived as challenging and supporting during the epidemic period, and the reasons that caused anxiety regarding their pregnancy. The answers were collected under the main headings they are related to (economic, social, birth, etc). The presence of systemic diseases such as diabetes, hypertension, asthma, and thyroid dysfunction in women during the pre-pregnancy period were classified as “presence of chronic disease” variable with “present” and “none” subgroups. The term “term pregnancy” in the study refers to pregnancies at and above 37 weeks of gestation. The average length of time women remained isolated at home during the epidemic period was evaluated under the “duration at home isolation” variable.

Depression anxiety stress scale (DASS): The DASS is a Likert type scale of 4 with 3 sub-dimensions of 7 questions each, used for the detection of depression, anxiety, and stress levels (Lovibond and Lovibond, 1995). High scores indicate a related mental disorder. The DASS has cut-off scores, indicating mild, moderate, and severe levels of the related disorder.

Multidimensional scale of perceived social support (MSPSS): The MSPSS is a scale that subjectively evaluates the adequacy of social support from three different sources (family, friend, and significant others). A high score on the scale indicates a high level of perceived social support. Per recommendation from a previous study, women in this study were divided into low (12-35), medium (36-60), and high (61-84) social support groups (Zimet et al., 1990).

The study was approved by the Ethics Committee of a university (date: 4/6/2020, protocol no: 50). The online survey was preceded by a written disclosure section about the study. The participants were transitioned to the survey once approval was obtained. The data were collected anonymously.

To determine the statistical significance of the results, the degree statistical significance was set as p = 0.05. Results were reported as means, medians, or as values (%). Normality of distribution was tested using the Kolmogorov–Smirnov normality test. On the basis of the type of variables and the pattern of distribution, we performed the Mann–Whitney U-test, independent sample t test, Kruskal Wallis test, and one-way analysis of variance (ANOVA). Multivariate binomial logistic regression was performed to examine whether binary categorical and continuous variables affect maternal depression and anxiety risk.
Table 1
Sociodemographic and obstetric characteristics of women.

| Characteristic          | % (n) | Mean±SD |
|-------------------------|-------|---------|
| City                    |       |         |
| Istanbul                | 32.7% (237) |        |
| Ankara                  | 16.2% (117) |        |
| Bursa                   | 7.9% (57) |         |
| Izmir                   | 6.7% (56) |         |
| Others                  | 35.5% (257) |       |
| Age                     |       |         |
| 1st trimester           | 22.1% (160) |       |
| 2nd trimester           | 48.8% (353) |       |
| 3rd trimester           | 29.1% (211) |       |
| Parity                  |       |         |
| Nulliparous             | 46.1% (334) |       |
| Primiparous             | 29% (210) |         |
| Multiparous             | 28.8% (180) |       |
| Number of family members (except herself) |       |         |
| ≤3                      | 73.6% (533) | 24.81 ± 4.1 |
| >3                      | 26.4% (191) |         |
| Economic condition      |       |         |
| Poor                    | 9.8% (71) |         |
| Moderate                | 49.2% (356) |       |
| Good                    | 41% (297) |         |
| Employment              |       |         |
| Housewife               | 75.3% (545) |       |
| Employee                | 24.7% (179) |       |

SD: Standard deviation.

Findings

A total of 989 women participated in the study. Women who submitted an incomplete questionnaire (n = 166), women with inconsistent answers in their questionnaires (n = 5), and women with a previous psychiatric disorder (n = 89) were excluded.

Sociodemographic and obstetric characteristics of women are shown in Table 1. Women from 56 different cities participated in the study. The percentage of women of advanced maternal age (≥35 years) was 17.8%. Approximately half of the women were in their second trimester. Term pregnancy was reported in 6.2% of the women. About half of the women were nulliparous.

Diabetes, hypertension, and thyroid disorders were the three most common chronic diseases reported in women in the pre-pregnancy period. At least one obstetric risk was reported in 20% of the women. About one-third of women who had not had antenatal visit for more than two months were term pregnancies. Ninety-five (13%) women had body mass index of ≥30 kg / m² (Table 2).

Findings related to daily life in home isolation and curfews, which were extensively implemented in the early phase of the Covid-19 epidemic, are shown in Table 3. The percentage of women who worked before the outbreak of the Covid-19 pandemic but were placed on paid leave during the outbreak was 6.5%, and that of women who experienced job loss was 0.8%.

Low levels of perceived social support were reported in 20.9% of women. According to the DASS 21 scores, the women had moderate anxiety, moderate depression, and mild stress. (Table 4).

Situations and actions that women perceive as challenging and supportive during curfew and home isolation period, and the factors causing concerns about their pregnancy are shown in Table 5. About half of the women wished that their pregnancy would end healthily as soon as possible. Cesarean delivery was the preferred method of delivery of 53% of women.

Anxiety and stress scores were significantly higher in women who were active smokers than those who were non-smokers (p < 0.005, p < 0.005, respectively). The scores of anxiety, depression, and stress were higher in single/widowed women than in married women (p = 0.028, p = 0.024, p = 0.02 respectively), and these scores were higher in women who smoked passively than in those who were not exposed to cigarette smoke (p < 0.005, p < 0.005, and p < 0.005). The average anxiety and stress scores were significantly higher in women in their third trimester than in those in their second trimester (p = 0.023 and p = 0.007, respectively). The average anxiety scores were significantly higher in multiparous women than in primiparous and nulliparous women (p < 0.005 and p < 0.005 respectively). In addition, the mean stress scores were higher in multiparous women than in nulliparous women (p = 0.035). A moderately negative correlation was observed between the MSPSS score and anxiety, depression, and stress scores (p < 0.005).

Binominal logistic regression analyses were performed to evaluate the factors affecting the presence of moderate or higher anxiety, depres-

Table 2
Obstetric and general risk factors of women

| Risk factors                              | % (n) |     |
|-------------------------------------------|-------|-----|
| Smoking                                   |       |     |
| Active smoker                             | 10.6% (77) |     |
| Passive smoker                            | 14.8% (107) |    |
| Chronic physical disease                  | 24.5% (177) |   |
| Obstetric risks (multiple choice question) |       |     |
| Vaginal bleeding during this pregnancy    | 11.2% (81) |   |
| Rh isoimmunization                        | 7.3% (51) |     |
| Assisted reproductive technology          | 10.6% (77) |     |
| Multiple pregnancy                        | 2.3% (17) |     |
| Gestational diabetes                      | 5.5% (40) |     |
| Pregnancy induced hypertension            | 2.8% (20) |     |
| History of hypertension/diabetes in previous pregnancies | 4.7% (34) |   |
| Placental and/or amniotic fluid pathologies | 2.9% (21) |     |
| Intrauterine fetal death in previous pregnancies | 3.6% (26) |   |
| History of preterm labor                  | 4.6% (33) |     |
| Two or more uterine incision              | 3.9% (28) |     |
| Fetal anomaly in previous pregnancies     | 0.7% (5) |     |
| Last antenatal visit                      |       |     |
| Last month                                | 42.5% (308) |   |
| Between 1-2 months                        | 30.2% (219) |   |
| More than 2 months                        | 21.5% (156) |   |
| Never                                    | 5.7% (41) |     |
| Vitamin and mineral deficiency            |       |     |
| Iron                                      | 36.7% (266) |   |
| B12                                       | 18.6% (135) |   |
| Vitamin D                                 | 33.1% (240) |   |

Table 3
Characteristics of home-isolation period

| Characteristic                          | Mean±SD / % (n) |
|-----------------------------------------|-----------------|
| Duration of home-isolation period (weeks) | 3.55 ± 1.99    |
| The possibility to reach a healthcare professional remotely in an emergency condition |     |
| No                                      | 47.7% (345)    |
| Obstetrician                            | 38% (275)      |
| My doctor’s secretary                   | 7.3% (51)      |
| My health worker friend/relative        | 3.7% (27)      |
| Family physician/midwife                | 3.3% (24)      |
| Daily food consumption                   |               |
| less than before                         | 18.6% (135)    |
| almost same                             | 56.4% (408)    |
| more than before                         | 25% (181)      |
| Most reliable source of information about the pandemic |     |
| Ministry of health                       | 64.9% (470)    |
| Social media                            | 13.5% (98)     |
| Other resources on the internet         | 12.6% (91)     |
| News and health-related programs on television | 9% (65) |
| Mode of work (for working women)        |                |
| remotely                                 | 71.5% (128)    |
| few days a week                          | 12.8% (23)     |
| every day                                | 15.6% (28)     |
| Regular weight monitoring                | 20.9% (151)    |
| Regular blood pressure monitoring        | 5.9% (43)      |

SD: standard derivation.
Table 4
Findings regarding perceived social support and mental disorders

| MSPSS scores | (Mean ± SD) |
|--------------|-------------|
| Family       | 16 ± 5.5    |
| Friend       | 16.5 ± 4.9  |
| Significant others | 16.5 ± 5.15 |
| Total        | 48.9 ± 14.9 |

| DASS 21 scores | (Mean ± SD) |
|----------------|-------------|
| Depression     | 13.19 ± 8.74 |
| Normal         | 33.7% (244)  |
| Mild           | 21.7% (157)  |
| Moderate       | 25.7% (186)  |
| Severe         | 9.8% (71)    |
| Extremely severe | 9.1% (66)  |
| Anxiety        | 12.5 ± 7.82  |
| Normal         | 29.7% (215)  |
| Mild           | 8.1% (59)    |
| Moderate       | 19.2% (139)  |
| Severe         | 28.5% (206)  |
| Extremely severe | 14.5% (105) |
| Stress         | 16.01 ± 8.82 |
| Normal         | 47.5% (344)  |
| Mild           | 20.3% (147)  |
| Moderate       | 15.3% (111)  |
| Severe         | 12.2% (88)   |
| Extremely severe | 4.7% (34)   |

MSPSS: Multidimensional Scale of Perceived Social Support. DASS: depression anxiety stress scale.

Discussion

The results of this study showed the pregnant women had high levels of moderate and severe depression, anxiety, and stress disorders during the Covid-19 outbreak. Social, economic, obstetric, and demographic factors and the general health status of women can affect the frequency of these mental disorders. In addition to these factors, pregnant women have newer challenges, demands, and needs during the epidemic period compared to those in the pre-epidemic period.

Further, pregnant women showed moderate levels anxiety and depression and low levels of stress disorder during the Covid-19 outbreak. Job loss was a common predictive risk factor for all of these mental disorders in pregnant women. The other predictive factors included the presence of an obstetric risk or a chronic physical disease, poor economic status, and advanced maternal age. In addition, an increased perception of social support had a protective effect against mental disorders.

Pregnancy is a sensitive period for mental disorders in women (Cameron et al., 2020). The frequency of prenatal depression in the pre-pandemic period has been reported to be 15–65% in different populations. Anxiety disorder has been reported in one out of every 5 pregnant women (Fawcett et al., 2019; Glover et al., 2016). To date, a limited number of studies have investigated the incidence of perinatal mental disorders among Turkish women in the pre-pandemic period, and these studies are often single-centered and regional. In one of the more extensive studies, the frequency of antenatal depression was 27.9% (Karaçam and Ançel, 2009). During the early stage of the Covid-19 pandemic, the epidemic was predicted to further increase the tendency of developing mental disorders during pregnancy because of factors such as the fear of infection, mandatory changes in prenatal visits and birth plans, and social isolation (Brooks et al., 2020; Rashidi Fakari and Simbar, 2020). To date, a limited number of studies have investigated maternal mental health during previous outbreaks (Topalidou et al., 2020). Two previous studies reported a higher frequency of antenatal anxiety during the SARS outbreak than in the pre-SARS epidemic period (Lee et al., 2006; Ng et al., 2004). In one of the earliest studies in the Covid-19 pandemic, the frequencies of maternal depression and anxiety were 34.09% and 34.55% (Cameron et al., 2020). The results of our study showed that about 7 out of 10 pregnant women had mild or more severe anxiety and depression, and 5 out of 10 women had mild or severe stress disorder. The frequencies reported in our study are much higher than those during the pre-pandemic period and during the previ-
Table 6
Logistic regression analyses for moderate to severe mental disorders risk in pregnant women.

| Anxiety | Depression | Stress |
|---------|------------|--------|
| P value | Odds ratio | 95% CI for OR | P value | Odds ratio | 95% CI for OR | P value | Odds ratio | 95% CI for OR |
| Age     | 0.67 10.010 0.965 1.057 | 0.019 1.051 1.008 1.095 | 0.273 1.024 0.981 1.068 |
| Gestation weeks | 0.516 0.994 | 0.976 1.012 | 0.361 0.992 0.976 1.009 | 0.807 0.998 0.980 1.016 |
| MSPSS   | 0.900 0.919 0.904 0.934 | 0.909 0.943 0.931 0.955 | 0.009 0.950 0.937 0.962 |
| Economic | 0.017 0.164 0.037 0.725 | 0.011 2.245 1.202 4.194 | 0.446 1.269 0.688 2.344 |
| Job loss | 0.006 3.401 1.412 8.194 | 0.000 5.906 2.821 12.362 | 0.000 4.788 2.507 9.147 |
| Accessibility to healthcare professionals | 0.078 0.715 0.492 1.038 | 0.442 1.147 0.808 1.629 | 0.452 0.885 0.600 1.255 |
| Length of home-isolation | 0.436 1.038 0.945 1.142 | 0.194 0.945 0.868 1.029 | 0.764 0.986 0.902 1.078 |
| Obstetric risk | 0.001 2.098 1.416 3.106 | 0.007 0.615 0.433 0.875 | 0.227 1.248 0.871 1.787 |
| Chronic disease | 0.045 0.643 0.417 0.991 | 0.958 1.010 0.688 1.485 | 0.246 1.264 0.851 1.877 |
| Parity | 0.054 1.451 0.994 2.117 | 0.254 1.227 0.864 1.742 | 0.210 0.789 0.545 1.143 |
| Constant | 0.000 421.403 | 0.343 1.972 | 0.292 2.196 |

Model statistics

| 2(11) | 241.470 | 141.397 | 113.745 |
| p value | <0.005 | <0.005 | <0.005 |
| Nagelkerke R² | 38.6% | 23.7% | 20.3% |
| Correctly classified case frequency | 73.2% | 68.2% | 73.1% |
| Sensitivity | 80.5% | 57.6% | 73.7% |
| Specificity | 66.6% | 76.8% | 90% |
| Ppv | 77.1% | 66.6% | 63.9% |
| Npv | 65.8% | 69.2% | 75.1% |

Our SARS outbreak (Oadi et al., 2020; Fawcett et al., 2019; Karaçam and Ancel, 2009; Lee et al., 2006; Ng et al., 2004; Woody et al., 2017).

Job loss and unemployment are associated with high frequencies of depression and anxiety in the general population, regardless of the presence of epidemic conditions (Navarro-Abal et al., 2018). A study from the pre-pandemic period showed that socioeconomic deprivation increased the risk of depression, anxiety, and severe mental illness in pregnant women up to 2.5 times (Ban et al., 2012). Our results showed that job loss during the pandemic period is a common and strong risk factor for the development of anxiety, depression, and stress in pregnant women. The risks of anxiety, depression, and stress were 3, 6, and 4.8 times, respectively, higher in pregnant women who lost their jobs during the pandemic than in those who did not lose their jobs and those who did not work. The effects of job loss may be more severe, especially in countries with low- to middle-income levels and in women with critical economic balances. Furthermore, financial difficulties can have an impact on mental health, regardless of the presence of job loss. Cameron et al reported (2020) that low household income and financial difficulties were associated with perinatal anxiety and depression during the Covid-19 pandemic. The results of our study are similar to those reported by Cameron et al (2020) in that economic strain (with or without job loss) is a predictor for antenatal anxiety and depression. This relationship is particularly pronounced for depression. The risk of development of moderate to high level of depression in 2.2 times higher in women experiencing financial difficulties than in those in an economically stable condition. The anxiety and stress scores of pregnant women with poor economic status were significantly higher than those of women without financial problems.

Recent meta-analyses during the pre-pandemic have shown an increased risk of development of anxiety and depression in women with current/past pregnancy complications defined as high-risk pregnancies (Biaggi et al., 2016; Tsakirdis et al., 2019). Results of this study showed that the presence of at least one obstetric risk was a predictive factor for development of moderate to high anxiety and depression in pregnant women during the epidemic period. The increased risk was pronounced for anxiety disorder; women with an obstetric risk have a 2-fold higher chance of developing an anxiety disorder than women without any risk. Similarly, women with any chronic disease had an increased risk of anxiety during pregnancy. However, this increase in risk was not as pronounced as in the presence of an obstetric risk. Social support is one of the unique dimensions of well-being in high-risk pregnancies, and symptoms of depression and anxiety are higher in women with high-risk pregnancies who do not get adequate support (Mirzakhani et al., 2020). Turkey imposed periodic curfews to fight the epidemic. Many indoor public places such as cafeterias, restaurants, and cinemas are closed or have limited access. Further, face-to-face communication with family, close relatives, and friends decreased because of the fear of contamination. Thus, this decrease in social support reduces the ability to cope with anxiety and increases the susceptibility to mental disorders in women with high-risk pregnancies. Studies in the pre-pandemic period have shown that perinatal social support plays a protective role in overcoming the difficulties of motherhood, and perinatal depression and anxiety are common in women with low social support (Biaggi et al., 2016; Milgrom et al., 2019). Adequate social support reduces stress more than other factors in critical events and conditions such as epidemics (Alipour et al., 2019). A common cultural aspect of the Turkish population is being in close contact with and having face-to-face communication with family and friends. Further, crowded gatherings, greeting each other with a hug, frequent visits to homes of close relatives and friends are a part of the daily cultural routine of the Turkish people. Mandatory barriers to this socialization can reduce the capacity of pregnant women to cope with mental fears, especially in countries with similar cultural habits. Our results showed that 20.9% of the pregnant women had inadequate social support. This frequency was about two times more than the frequency reported in the pregnant women in different countries during the SARS pandemic (Ng et al., 2004). In addition to differences such as duration, impact, and severity between Covid-19 and SARS outbreaks, the previously mentioned cultural characteristics may also play a role in this difference. Our results were similar to those reported in a study conducted during the SARS outbreak in that a significantly negative correlation was observed between social support scores and depression scores (Ng et al., 2004). In addition, the results of our study showed a similar negative correlation between social support scores and anxiety and stress scores. Further, our results showed that advanced mater-
nal age increased the risk of depression in pregnant women during the epidemic period. Studies conducted in the pre-pandemic period have reported controversial findings between maternal age and mental disorders during pregnancy (Biaggi et al., 2016).

A majority of pregnant women in this study reported that they preferred the Internet and social media as their news source about the pandemic. A finding similar to that reported in our study was reported in another study conducted during a recent epidemic (Lynch et al., 2012). This finding is of great importance due to the erroneous and malicious posts that are present on the Internet and social media. In order to protect public health, specifically including women’s health, it is necessary to also continue the national and international fight against false information about the epidemic, which had been called infodemic by director of the World Health Organization (Zarocostas, 2020). Current and accurate health-related information was associated with lower levels of stress, anxiety, and depression in the community during the early stage of the Covid-19 pandemic (Wang et al., 2020). In this study, approximately 50% of the women perceived news regarding the pandemic as inadequate.

Further, our results showed that the scores of anxiety, depression, and stress differ among pregnant women according to the presence of some other characteristics (sociodemographic, obstetric, etc.) and conditions (working conditions, remote access to healthcare professionals, etc.). Clues about the reasons for these differences were obtained from the open-ended questions in the study. Multiparous women had higher stress and anxiety scores than nulliparous and primiparous women. Additionally, pregnant women reported that keeping children at home during the Covid-19 epidemic, especially during curfews, was a very challenging task. This factor may explain the higher stress and anxiety scores in the multiparous women. Economic strain, another challenging factor reported by these women, reflects increased household expenditure with increased parity. Previous studies conducted during the pre-pandemic period showed no relationship between parity and mental disorders in low- and low-middle-income countries (Dadi et al., 2020; Leach et al., 2017). Higher levels of stress and anxiety observed among women in their last trimester were attributed to the upcoming birth. The statements of the women in this study show that the concerns of women regarding childbirth included the anxiety related to Covid-19 transmission during labor in addition to the known anxiety associated with birth during the pre-pandemic period. In addition, they had the fear of being alone during the labor under pandemic conditions. High scores of anxiety, depression, and stress in single or widowed women have been attributed to their economic conditions and lack of social support. High scores of anxiety and stress in women who had to leave their homes during the peak of the Covid-19 epidemic may reflect the fear of being infected with the Covid-19 virus. Similar to the results observed during the pre-pandemic period, those observed in our study showed that pregnant women who actively smoked during the Covid-19 outbreak had higher anxiety scores (Biaggi et al., 2016). Moreover, the scores of anxiety, stress, and depression were higher in women who were exposed to passive cigarette smoke at home. Factors such as loneliness, anxiety, and depression during this period can cause former users to start again or increase the number of cigarettes smoked in day. An increase in smoking or an increase in the number of cigarettes smoked in a day or exposure may increase the anxiety related to Covid-19, as a respiratory disease, or cause a feeling of guilt. An increase in mental disorders may also lead to an increase in the inclination to smoke, especially with the additional factors such as a feeling of loneliness and lack of social support (Caponnetto et al., 2020). Thus, a vicious circle may develop between smoking and mental disorders.

Conclusion

Results of our study showed high levels of anxiety, stress, and depression among pregnant women during the Covid-19 outbreak. These levels were higher than those during the pre-pandemic period. Job loss, economic difficulty, presence of an obstetric risk and/or presence of chronic disease, advanced age, and lack of social support are predictive factors for antenatal maternal mental disorders in the pandemic. Pregnant women have additional unique concerns about their pregnancies and births, which emerged during the Covid-19 outbreak.

Economic strain, frequent exposure to the news about the epidemic, and challenges of keeping children at home were reported by women as the most critical reasons underlying stress and anxiety during the epidemic period. Economic and psychosocial support and remote obstetric counseling are the most common requirements reported women during the epidemic. Many pregnant women, especially those living in big cities, reported that they wished to be able to walk safely in the open air.

Governments, health managers, midwives, obstetricians, family physicians, and the close relatives of expectant mothers play various roles in protecting maternal mental health during the Covid-19 epidemic and in similar situations if they may arise in the future. On the basis of the results of our study, we have provided our recommendations for antenatal mental health. Therefore, the number of recommendations can be increased or decreased or the recommendations can be modified according to possibilities such as economic situation and infrastructure and various variables such as the local severity of the epidemic.

Recommendations for midwives and other healthcare professionals

• **Social support, obstetric counseling and support**
  Ø Free online platforms should be provided to remotely connect pregnant women, doctors, and midwives. Up-to-date and comprehensive information about the Covid-19 epidemic and pregnancy-birth should be provided to women using this platform. Continuous communication between pregnant women should be encouraged. Meetings between pregnant women and midwives and pregnant women and doctors should be arranged to address any questions that the pregnant women may have.
  Ø Women should be encouraged to express their concerns/questions during their antenatal visits and births, and the healthcare professionals should ensure that they are well-informed.
  Ø Posters with clear up-to-date information about pregnancy during the Covid-19 epidemic should be provided in the clinic.
  Ø Emergency support communication lines and teams should be provided to for pregnant women. Home visits should be arranged for pregnant women when necessary, provided that personal infection protection measures are provided.

• **Psychosocial screening-support**
  Ø Pregnant women can be screened face-to-face or online with valid and reliable scales for mental disorders. Professional psychological assistance can be provided to women with mental disorders.
  Ø Perceptions of social support should be investigated among pregnant women. Professional assistance can be provided to women with insufficient social support, and they can be encouraged to participate in social platforms specified in other suggestions.
  Ø Women who smoke can be provided with counseling and help to quit smoking. For passive smokers, information can be provided to household members.
  Ø Women with high-risk pregnancies should be followed up more frequently to examine mental problems and perceptions of social support.
  Ø Women with known chronic physical diseases should be followed up periodically for their diseases. Information and counseling can be provided on the relationship between their physical diseases and pregnancy and childbirth. Similarly, accurate and up-to-date information should be provided regarding the relationship between their chronic disease and the Covid-
American Psychological Association (APA). 2020. Pandemics [WWW Document] URL https://www.apa.org/practice/programs/dmhi/research-information/00apandemics

Ban, L., Gibson, J.E., West, J., Fischl, L., Oates, M.R., Tata, L.J., 2012. Impact of socioeconomic deprivation on maternal perinatal mental illness presenting to UK general practice. Br. J. Gen. Pract. 62, e671–e678. doi:10.3399/bjgp12X65801.

Biaggi, A., Conroy, S., Pawlyb, S., Pariente, C.M., 2016. Identifying the women at risk of antenatal anxiety and depression: A systematic review. J. Affect. Disord. 191, 62–77. doi:10.1016/j.jad.2015.11.014.

Black Dog Institute. 2020. Mental Health Ramifications of COVID-19: The Australian context [WWW Document]. Black Dog Inst URL https://blackdoginstitute.org.au/docs/default-source/default-document-library/2020019_covid19-evidence-and-recommendations.pdf.

Brooks, S.K., Weston, D., Greenberg, N., 2020. Psychological impact of infectious disease outbreaks on pregnant women: evidence in public health medRxiv 2020.10.1016/j.medrxiv.2020.10.003.

Cameron, E.E., Joyce, K.M., Delaquis, C.P., Reynolds, K., Protudjer, J.L.P., Roos, L.E., 2020. Maternal Psychological Distress & Mental Health Service Use During the COVID-19 Pandemic. J. Affect. Disord. doi:10.1016/j.jad.2020.07.081.

Caponeetto, P., Caponeetto, F., Caponetto, P., Inguscio, L., Saitta, C., Maglia, M., Maglia, M., Benfatto, F., Benfatto, F., Polosa, R., Polosa, R., 2020. Smoking behaviors and psychological dynamics during covid-19 social distancing and stay-at-home policies: A survey. Heal. Psychol. Res. 8, 68–73. doi:10.1016/j.jhpire.2020.9.219.

Dadi, A.F., Miller, E.R., Bisetegn, T.A., Meawri, L., 2020. Global burden of antenatal depression and its association with adverse birth outcomes: an umbrella review. BMC Public Health 20, 173. doi:10.1186/s12889-020-8293-9.

Fawcett, E.J., Fairbrother, N., Cox, M.L., White, L.R., Fawcett, J.M., 2019. The Prevalency of Anxiety Disorders During Pregnancy and the Postpartum Period: A Multivariate Bayesian Meta-Analysis. J. Clin. Psychiatry 80, 181r12527. doi:10.4088/JCP.18r12527.

Glover, V., Ahmed-Salim, Y., Capron, L., 2016. In: Reisland, N., Kuijlelovsky, B.S. (Eds.), Maternal Anxiety, Depression and Stress During Pregnancy: Effects on the Fetus and the Child, and Underlying Mechanisms BT - Fetal Development: Research on Brain and Behavior, Environmental Influences, and Emerging Technologies. Springer International Publishing, Cham, pp. 213–227. doi:10.1007/978-3-319-22092-9_12.

Gold, K.J., Marcus, S.M., 2008. Effect of maternal mental illness on pregnancy outcomes. Expert Rev Obstet. Gynecol. 3, 391–401. doi:10.1586/17474108.3.3.391.

Karacaç, Z., Angel, G., 2009. Depression, anxiety and influencing factors in pregnancy: a study in a Turkish population. Midwifery 25, 344–356. doi:10.1016/j.midw.2007.03.006.

Leach, L.S., Poyser, C., Fairweather-Schmidt, K., 2017. Maternal perinatal anxiety: A review of prevalence and correlates. Clin. Psychol. 21, 4–19. doi:10.1111/cp.12058.

Lee, D.T., Sahota, D., Leung, T.N., Vip, A.S.K., Lee, F.F.Y., Chung, T.K.H., 2006. Psychological responses of pregnant women to an infectious outbreak: a case-control study of the 2003 SARS outbreak in Hong Kong. J. Psychosom. Res. 61, 707–713. doi:10.1016/j.jpsychores.2006.08.005.

Lovibond, P.F., Lovibond, S.H., 1995. The structure of negative emotional state: comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. Behav. Res. Ther. 33, 335–345. doi:10.1016/0005-7967(94)00075-u.

Lynch, M.M., Mitchell, E.W., Williams, J.L., Brumbaugh, K., Jones-Bell, M., Pinkey, D.E., Layton, C.M., Meserence, P.W., Travis, L.B., P.W., Kendrick, J.S., Medina, P.E., Smith, L.B., 2019. Pregnant and recent pregnant women’s perceptions about influenza a pandemic (H1N1) 2009: implications for public health and provider communication. Matern. Child Health J 16, 1657–1664. doi:10.1007/s11986-011-0865-y.

Matthews, T., Danes, A., Wertz, J., Odgers, C.L., Ambler, A., Moffitt, T.E., Arseneault, L., 2016. Social isolation, loneliness and depression in young adulthood: a behavioural genetic analysis. Soc. Psychiatry Psychiatr. Epidemiol. 51, 339–348. doi:10.1007/s00127-016-1178-9.

Mifren, J., Hinrichy, V., Reece, J., Holt, C., Gemmill, A.W., 2019. Social Support-A Protective Factor for Depressed Perinatal Women? Int. J. Environ. Res. Public Health 16. doi:10.3390/ijerph16081426.

Mirzakhani, E., Ebadi, A., Faridhosseini, F., Khandivzadeh, T., 2020. Well-being in high-risk pregnancy: an integrative review. BMC Pregnancy Childbirth 20, 526. doi:10.1186/s12884-020-03190-6.

Navarro-Abal, Y., Climent-Rodriguez, J.A., López-López, M.J., Gómez-Salgado, J., 2018. Psychological Coping with Job Loss. Empirical Study to Contribute to the Development of Unemployed People. Int. J. Environ. Res. Public Health 15, 19787. doi:10.3390/ijerph151919787.

Ng, J., Sham, A., Tang, P.L., Fung, S., 2004. SARS: pregnant women’s fears and perceptions. Br. J. Midwifery 12, 698–702. doi:10.12968/bjms.2004.12.10.01058x.

Patterson, J., Hollins Martin, C., Karatzias, T., 2019. PTSD post-childbirth: a systematic review of women’s and midwives’ subjective experiences of care provider interaction. J. Reprod. Infant Psychol. 37, 56–83. doi:10.1080/02673843.2018.1504285.

Rashidi Hakari, F., Simbar, M., 2020. Coronavirus Pandemic and Worrying During Pregnancy,-a Letter to Editor. Arch. Acad. Emerg. Med. 8 e21-e21.

Thornton, D., Guendelman, S., Hosang, N., 2010. Obstetric complications in women with diagnosed mental illness: the relative success of California’s county mental health services. Psychiatr. Serv. 61, 246–264. doi:10.1176/ps.2009.01058x.

Topalidou, A., Thomson, G., Downe, S., 2020. COVID-19 and maternal mental health: Are we getting the balance right? medRxiv 2020.03.20.20047969 doi:10.1101/2020.03.20.20047969.

Tsakiris, J., Bousi, V., Dogeli, T., Sardelli, C., Nikolopoulos, V., Papazisis, G., 2019. Epidemiology of antenatal depression among women with high-risk pregnancies due to obstetric complications: a scoping review. Arch. Gynecol. Obstet. 300, 849–859. doi:10.1007/s00447-019-05270-1.
Vosoughi, S., Roy, D., Aral, S., 2018. The spread of true and false news online. Science 359, 1146–1151. doi:10.1126/science.aap9559.

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C.S., Ho, R.C., 2020. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. Int. J. Environ. Res. Public Health 17, 1729. doi:10.3390/ijerph17051729.

Woody, C.A., Ferrari, A.J., Siskind, D.J., Whiteford, H.A., Harris, M.G., 2017. A systematic review and meta-regression of the prevalence and incidence of perinatal depression. J. Affect. Disord. 219, 86–92. doi:10.1016/j.jad.2017.05.003.

World Health Organization, 2020a. Mental Health and Psychosocial Considerations During COVID-19 Outbreak [WWW Document]. World Heal. Organ. URL https://apps.who.int/iris/handle/10665/331490.

World Health Organization, 2020b. Novel Coronavirus (2019-nCoV) Situation Report - 13 [WWW Document]. URL https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200202-sitrep-13-ncov-v3.pdf?sfvrsn=195f4010_6.

World Health Organization, 2008. Maternal mental health and child health and development in low and middle income countries: report of the meeting, Geneva, Switzerland, 30 January - 1 February, 2008.

Zarocostas, J., 2020. How to fight an infodemic. Lancet 395, 676. doi:10.1016/S0140-6736(20)30461-X.

Zimet, G.D., Powell, S.S., Farley, G.K., Werkman, S., Berkoff, K.A., 1990. Psychometric characteristics of the Multidimensional Scale of Perceived Social Support. J. Pers. Assess. 55, 610–617. doi:10.1080/00223891.1990.9674095.