

Mediating role of prenatal depression in attachment and maternal-fetal attachment in women who receive prenatal education

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Abstract

Background

Prenatal depression and attachment are factors that affect the establishment of an intimate relationship between a mother and fetus, and prenatal education plays an important role in helping pregnant women adapt to a maternal role and changes during pregnancy. The study explored differences in prenatal depression and maternal-fetal attachment (MFA) scores between a prenatal education group and no prenatal education group, as well as the effects of maternal depression scores and attachment dimensions on maternal intimacy with the fetus.

Methods

The Edinburgh Postnatal Depression Scale (EPDS), Experience of Close Relationship (ECR) scale, Maternal Antenatal Attachment Scale (MAAS) and a general data scale were used to investigate 222 pregnant women who received prenatal education and 118 pregnant women who did not receive prenatal education in the third trimester of pregnancy. An exploratory analysis was performed to analyze the effects of depression score and attachment on MFA in pregnant women who received prenatal education.

Results

The results showed that pregnant women who received prenatal education had higher MFA and lower depression scores than those who did not receive prenatal education, and prenatal depression partially mediated the relationship between attachment avoidance and MFA quality.

Conclusions

Women who received prenatal education had low prenatal depression scores and high MFA. Maternal depression and attachment avoidance may affect the emotional bond between mother and fetus and should be taken seriously; they can be prevented by prenatal education and early intervention.

Background

Pregnancy is a significant and arduous process that can be extremely challenging for a woman physiologically and psychologically. Currently, an increasing number of scientists are turning their attention to the mental health of pregnant women, especially with regard to prenatal depression. According to a recent multisite cross-sectional study, 28.4% of pregnant women suffered from depression during pregnancy [1]. Prenatal depression affects not only the mood of the pregnant women and the intimate bond with her unborn fetus [2] but also the neurodevelopment of the newborn after birth; moreover, it can increase the risk of mental health issues in the child [3]. Perry et al showed that

depressive symptoms in pregnant women during the third trimester were important risk factors for weak maternal attachment to the fetus [4]. A woman's antenatal depression level can significantly predict the degree of attachment to the fetus [5, 6]. In addition, a previous study also showed that depression during pregnancy was negatively correlated with maternal attachment to the fetus [7].

Maternal-fetal attachment (MFA) is the mother's emotional connection to the fetus and is an important indication of whether the pregnant mother can adapt to changes in pregnancy and assume maternal responsibility [8]. In addition, MFA can predict the postpartum mental status of mothers, such as the presence of anxiety and depression, and affect postpartum mother-infant attachment quality [9]. Pregnant women with weak MFA are less likely to engage in health promotion activities and more likely to have an unhealthy newborn than those with strong MFA [3]. MFA can be affected by factors other than prenatal depression. Personality characteristics of pregnant women, such as adult attachment, can also affect MFA.

Attachment is defined as an emotional connection between an individual and their primary caregiver in the earliest stage of life. Attachment behavior forms an internal working model during individual development, and when people encounter difficulties or significant changes in life, such as pregnancy, the internal working model is activated and manifested in different ways, eliciting emotional and behavioral responses. Catherine's quality-stress model showed that relationship templates dominated by fear or lack of security, such as insecure attachment, may become a personality trait, making women more vulnerable to perinatal depression than those without this trait [10]. The level of prenatal attachment affects maternal-infant attachment after delivery [11]. A study of 165 pregnant women in Poland found that a pregnant woman's type of attachment affects her image as a mother and her connection with her fetus [12].

To assist pregnant women in adapting to these new physiological and psychological changes, proper prenatal education is very important and necessary. There is a wide variety of prenatal education available for pregnant women. The compliance of pregnant women could be improved by flexible antenatal health education [13]. Prenatal education could reduce complaints during pregnancy and improve the quality of life of pregnant women [14]. In addition, pregnant women who receive prenatal education have a greater sense of well-being and satisfaction in terms of overall quality of life and health than those who do not [15]. However, a study in a Chinese population found that the rate of participation in prenatal education was very low due to lack of time and sufficient resources [16].

Previous studies have indicated connections among prenatal depression, attachment and MFA. Depression partially mediated the connection between insecure attachment and mother-infant attachment after birth [17]. Additionally, a few studies focused on the effects of prenatal depression on dimensions of attachment (avoidance and anxiety) and the relationship between the pregnant mother and the unborn fetus (MFA), especially among women who received prenatal education.

Therefore, in the current study, we aimed to identify the prevalence of depression in the trimester, the influence of prenatal education on women's prenatal depression score and MFA score, and whether

prenatal depression mediates the attachment dimension and MFA.

Methods

Participants

Data were collected at the antenatal clinic of Chaohu Hospital of Anhui Medical University from September to November 2019. The inclusion criteria were as follows: 1) pregnant women in their third trimester who were between 18-45 years old and who were willing to take part in the study; 2) women with a gestational age of 28-40 weeks; and 3) women with singleton gestation. The exclusion criteria were as follows: 1) women with a previous history of mental illness; 2) women with a high-risk pregnancy (gestational diabetes, hypertension and preeclampsia). We administered 360 questionnaires, and finally analyzed 340 questionnaires after excluding incomplete and invalid questionnaires. The sample recovery rate was 94.4%.

Procedures

The ethics committee of Chaohu Hospital of Anhui Medical University approved the study protocol. The procedures used in this study adhered to the principles of the Declaration of Helsinki. All the women signed informed consent forms. The evaluation and screening of all scales were completed by two nurses and three uniformly trained graduate students, and standardized instructions were given to all participants.

Measures

Demographic characteristics

We used a self-designed questionnaire to collect demographic characteristic data, including age, gestational age, working status, prenatal education, planned or unplanned pregnancy, and so on, of pregnant women enrolled in our study.

MFA

The Maternal Antenatal Attachment Scale (MAAS) was used to assess the MFA of the participants [18]. The MAAS is a self-reported scale that includes 19 questions with a 5-point scoring system. The scale includes two dimensions: the "quality of attachment" dimension and the "intensity of attachment" dimension. Attachment quality indicates the emotional experience with regard to the fetus, and attachment intensity indicates the time and energy devoted to the fetus by the pregnant women.

Attachment

Attachment in all pregnant women was assessed with the Experience of Close Relationship (ECR) scale. The Chinese version of the ECR scale has excellent reliability and validity [19]. The scale has two dimensions: anxiety and avoidance. The avoidance subscale includes 18 items, indicating the avoidance

of intimacy and interdependence. The anxiety subscale also includes 18 items and indicates concerns about exclusion and abandonment.

Prenatal depression

The Edinburgh Postpartum Depression Scale (EPDS) was chosen to assess the participants' severity of depression [20]. The EPDS can be used to screen for not only postpartum depression but also depression during pregnancy. The EPDS contains a total of 10 items. The total score ranges from 0 to 30, and the higher the score is, the more serious the degree of depression. The content validity ratio is 0.93. The α coefficient is 0.76. Nine points was considered the critical cutoff for diagnosing maternal depression.

Data analysis

We used the Statistical Package for Social Sciences (IBM SPSS 22.0) for all analyses conducted in this study. If the two groups were consistent, a t test was selected. If not, the Mann-Whitney U test was selected. Before the mediation analysis, Pearson's correlation was calculated to determine the correlations between attachment anxiety or avoidance, the maternal depression score, and the MFA score. Finally, we found pairwise correlations between avoidance, the depression score, and attachment quality. Subsequently, SPSS process script was used to analyze the mediating effect. A p value of 0.05 was considered to be statistically significant.

Results

Demographic characteristics of the participants

Three hundred forty pregnant women were enrolled in our study. The mean age of the pregnant women was 28.26 (SD = 4.38) years, and the mean gestational age was 35.42 (SD = 4.67) weeks. The majority had a high school or junior college diploma (51.77%), and those with a junior high school or bachelor's degree or higher accounted for 22.35% and 25.88% of the total, respectively. In addition, 58.24% of the pregnant women were not employed. The majority of pregnant women were pregnant for the first time (61.76%). The majority of women had planned their pregnancy (61.47%). Additionally, 82.06% of the participants reported that they were satisfied with their marriage. When asked whether they had participated in prenatal education during the pregnancy period, 65.29% of pregnant women said yes. Only 19.12% of the participants reported that they could not accept the body shape change due to pregnancy. Our results also showed that regarding attachment, 185 (54.41%) participants were insecure, and 155 (45.59%) participants were secure. A total of 209 (61.47%) pregnant women had an EPDS score of less than 9, and a total of 38.53% of the pregnant women had a score of 9 or higher, indicating prenatal depression.

Differences in the prenatal depression score and MFA score between the prenatal education and no prenatal education groups

As shown in Table 1, compared with the no prenatal education group, the prenatal depression score was lower in the prenatal education group (6.67 ± 4.12 vs 8.55 ± 5.11 , $p < 0.01$). In addition, the score of each MFA dimension was higher in the prenatal education group than in the no prenatal education group (74.25 ± 6.99 vs 71.63 ± 7.68 , $p < 0.01$; 27.87 ± 4.36 vs 26.80 ± 5.15 , $p < 0.05$; 46.39 ± 4.19 vs 45.01 ± 5.66 , $p < 0.05$).

Table 1 Comparison of prenatal depression s and MFA between the prenatal education and no prenatal education groups

Variable	Prenatal education group	No prenatal education group	t/Z	p
EPDS score	6.67±4.12	8.55±5.11	-3.291	0.001
Total score of MFA	74.25±6.99	71.63±7.68	3.063	0.006
MFA intensity	27.87±4.36	26.80±5.15	-2.236	0.025
MFA quality	46.39±4.19	45.01±5.66	-1.967	0.049

Legend: 1. EPDS, Edinburgh Postpartum Depression Scale.

2. MFA, Maternal-fetal attachment.

As seen in Table 2, the score of MFA quality was significantly negatively correlated with the score of attachment avoidance and prenatal depression ($p < 0.05$; $p < 0.01$), while the score of attachment avoidance was positively correlated with the score of prenatal depression ($p < 0.05$).

Correlation analysis results for each variable

Table 2 Correlation analysis results of each variable

Variable	Avoidance	Anxiety	EPDS score	Total score of MFA	MFA intensity	MFA quality
Avoidance	1.000					
Anxiety	0.209**	1				
EPDS score	0.210*	0.407*	1			
Total score of MFA	-0.154	0.059	-0.047	1		
MFA intensity	-0.091	0.134*	0.119	0.837*	1	
MFA quality	-0.204*	-0.052	-0.202**	0.830*	0.446*	1

Legend: * $p < 0.05$, ** $p < 0.01$

Exploratory analysis

The mother's prenatal depression score played an intermediary role between the mother's attachment avoidance and MFA quality. Mother attachment avoidance had an indirect effect on MFA quality ($b = -0.2268$, 95% CI = $[-0.5171-00676]$). Figure 1 shows the coefficients of the relationships among the independent, mediating, and outcome variables.

Discussion

To the best of our knowledge, this is the first study on the effects of attachment and prenatal depression on MFA in pregnant women who received antenatal education. These results are helpful for understanding the influence of attachment and depression on MFA.

In our study, a total of 38.53% of the participants suffered from prenatal depression, which is higher than that reported in the existing literature [21]. A possible explanation is that the pregnant women we included were in their third trimester and, the fear of delivery during this time was accompanied by increased fatigue, physical pain, poor sleep, and frequent urination. Another explanation is that the EPDS diagnostic criteria for depression may be different in foreign studies. Nevertheless, the results showed that prenatal depression was very common in the third trimester of pregnancy and should be given adequate attention.

According to whether the participants received prenatal education in the hospital during their latest pregnancy, our research results showed that the pregnant mothers who had received prenatal education had higher MFA and lower prenatal depression scores than those who had not received prenatal education. Our results were consistent with the results obtained in a previous study [22]. Prenatal education not only increased the rates of prenatal examinations and promoted communication with doctors but also improved women's attitudes towards delivery [16]. In addition, prenatal education can help pregnant women accept and adapt to the role of mother[23].

Further analysis revealed that maternal attachment avoidance was negatively related to MFA quality, which is consistent with previous research results [24]. People with secure attachment are more likely to assume the role of a parent [25]. Self-reported romantic attachment predicts high avoidance scores on the parental role scale in pregnant women, and they may face difficulties in developing their maternal identity [12]. Those who attached great importance to attachment avoidance felt uncomfortable with intimacy and invalidated the attachment system [26]. In fact, when perceiving positive emotional information, people with high attachment avoidance are unable to experience positive emotions; to avoid the activation of the attachment system, they tend to deactivate their emotional channels and hide their feelings [27]. Thus, we can infer that in the third trimester, pregnant women with high avoidance may not respond to fetal movement, and as a result, the emotional experience with regard to the fetus may be relatively low.

The exploratory mediation analysis showed that low maternal attachment avoidance directly and indirectly reduced the MFA quality score through the prenatal depression score. The results suggested

that an avoidance attitude toward the attachment subjects rendered them susceptible to the interference of depression symptoms, reducing emotional investment in the fetus. The possible mechanism is that the internal working model of attachment has an important impact on an individual's cognition, emotion, and behavior with regard to interpersonal communication, and the avoidance attachment model formed in childhood leads to a sense of mistrust of others in pregnant women. This internal working model is triggered by stressful events such as pregnancy and leads to depression during pregnancy, further reducing the emotional investment and energy devoted to the fetus, that is, poor MFA. Condon indicated that parental psychological variables could affect MFA quality. Moreover, attachment avoidance-related deactivation strategies are associated with depression maintenance [18]. In a recent study by Huang and colleagues, the prenatal maternal depression score affected the MFA score [28]. It seems that attachment avoidance and the prenatal depression score both affect the mother's intimate connection to the unborn fetus. However, no mediating role of the prenatal depression score was observed in attachment anxiety and attachment intensity, and a previous study showed that caregivers with a higher degree of avoidance are less responsive than those with a lower degree of avoidance [29]. Attachment quality is related to the mental health of mothers, while the intensity of attachment has nothing to do with mental health [30]. Our results revealed the relationship between attachment avoidance and the prenatal depression score and their effects on the degree of emotional communication and interaction between the mother and the fetus, further providing a basis for understanding the development of maternal-fetal relationships. In addition, prenatal depression symptoms were found to be negatively correlated with prenatal MFA [31, 32].

In prenatal screening, the timely detection of low-quality MFA and the application of effective interventions on the basis of the prenatal depression score or the type of mother attachment can help pregnant women adapt to their changing role in a timely manner. This can prevent incidents such as domestic child violence and allow women to better care for their newborn to ensure healthy and balanced development [33].

Our study has two limitations. First, this study was restricted by its cross-sectional design, and we did not track postpartum maternal and infant attachment, which should be evaluated in the next step of our work. In addition, data collection was based on a convenience sampling, so our participants may not represent the general pregnant population. However, despite these limitations of our research, our findings provide new ways insights into antenatal education and interventions.

Conclusions

The study revealed the importance of adult attachment and maternal depression in improving MFA, especially in pregnant women who receive prenatal education. Our results suggest that prenatal education should be highly promoted. Moreover, reducing the prenatal depression score may have the potential to improve MFA. For example, to improve pregnant women's understanding of these psychological conditions during the pregnancy period, their depression tendency should be considered in the prenatal education course, and corresponding nursing measures should be implemented. In addition,

the personality characteristics of pregnant women, such as attachment, should also be seriously considered. Institutions should help people with different attachment dimensions and offer them appropriate guidance to better adapt the role of mother. Early assessment of mothers' mental health, including attachment during pregnancy, is necessary to identify high-risk mothers [18], and preventive interventions to improve attachment quality and early evaluations are more cost-effective.

Abbreviations

EPDS: Edinburgh Postpartum Depression Scale.

ECR: Experience of Close Relationship

MAAS: Maternal Antenatal Attachment Scale

MFA: Maternal-fetal attachment

CI Confidence interval

Declarations

Ethics approval and consent to participate

The ethics committee of Chaohu Hospital of Anhui Medical University approved the study protocol. All participating pregnant women signed an informed consent form.

Consent for publication

All participants agreed to record and publish anonymous data.

Availability of data and materials

All the data supporting our findings have been presented in the manuscript; the datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The author did not report potential conflicts of interest.

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Authors' contributions

The manuscript was designed by written by authors LZ and KZ. Data was collected by LZ and LW, analysed by LZ, QY, SC, CH , and verified by XZ. All authors read and approved the final manuscript.

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