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Association between antenatal depression and quality of life in pregnant women with hypertensive disorders of pregnancy: Mediating effects of pregnancy stress and psychological resilience

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Abstract

Hypertensive disorders of pregnancy (HDP) are associated with an increased risk of antenatal depression (AD), but the pathways linking AD to quality of life (QoL) remain insufficiently understood. In this single-center retrospective study, 301 pregnant women with HDP completed the Edinburgh Postnatal Depression Scale (EPDS), Perceived Stress Scale, Resilience Scale, and 36-Item Short Form Health Survey (SF-36). Correlation and linear regression analyses were performed, and a chain mediation model (PROCESS Model 6; 5,000 bootstrap samples) was tested with adjustment for age, education, and adverse pregnancy history. The mean EPDS score was 7.17±3.48, and 26.25% exceeded the clinical cut-off (>9.5). AD was significantly associated with poorer QoL (total effect = −0.788, P<0.001). Pregnancy stress and psychological resilience jointly mediated this association, with indirect effects accounting for 53.7% of the total effect via stress (30.0%), resilience (17.1%), and the stress→resilience chain pathway (6.7%). In women with mild preeclampsia (n=123), the total indirect effect increased to 70.0%. We conclude that antenatal depression appears to impair quality of life in women with hypertensive disease of pregnancy largely through heightened pregnancy stress and reduced resilience, supporting integrated interventions that address depressive symptoms, stress management, and resilience enhancement. *(Afr J Reprod Health 2026; 30 [17]:126-138).*

Keywords : Hypertensive Disorders of Pregnancy; Antenatal Depression; Quality of Life; Chain Mediating Effect

Résumé

Les troubles hypertensifs de la grossesse (THG) sont associés à un risque accru de dépression anténatale (DA), mais les mécanismes reliant la DA à la qualité de vie (QV) demeurent insuffisamment élucidés. Dans cette étude rétrospective monocentrique, 301 femmes enceintes atteintes de THG ont complété l'Edinburgh Postnatal Depression Scale (EPDS), l'échelle de stress perçu, l'échelle de résilience et le Short Form Health Survey à 36 items (SF-36). Des analyses de corrélation et de régression linéaire ont été réalisées, et un modèle de médiation en chaîne (PROCESS Modèle 6 ; 5 000 échantillons bootstrap) a été testé après ajustement pour l'âge, le niveau d'instruction et les antécédents obstétricaux défavorables.Le score moyen à l'EPDS était de 7,17 ± 3,48, et 26,25 % des participantes dépassaient le seuil clinique (> 9,5). La DA était significativement associée à une diminution de la qualité de vie (effet total = −0,788 ; P < 0,001). Le stress lié à la grossesse et la résilience psychologique ont conjointement médié cette association, les effets indirects représentant 53,7 % de l'effet total, via le stress (30,0 %), la résilience (17,1 %) et la voie de médiation en chaîne stress → résilience (6,7 %). Chez les femmes présentant une prééclampsie légère (n = 123), l'effet indirect total augmentait à 70,0 %.Nous concluons que la dépression anténatale semble altérer la qualité de vie des femmes atteintes de troubles hypertensifs de la grossesse principalement par l'augmentation du stress lié à la grossesse et la diminution de la résilience psychologique. Ces résultats soutiennent la mise en œuvre d'interventions intégrées ciblant les symptômes dépressifs, la gestion du stress et le renforcement de la résilience. *(Afr J Reprod Health 2026; 30 [17]: 126-138).*

Keywords: Troubles hypertensifs de la grossesse ; Dépression anténatale ; Qualité de vie ; Effet de médiation en chaîne.

Introduction

Hypertensive disorders of pregnancy (HDP) is a common complication specific to pregnancy, characterized mainly by elevated blood pressure.[1] HDP affects approximately 5–10% of pregnancies worldwide and is one of the primary causes of adverse maternal and perinatal outcomes.[2,3] HDP not only increases the risk of severe complications such as placental abruption, eclampsia, and postpartum haemorrhage, but its protracted disease management process collectively constitutes a complex and persistent source of stress.[4,5] In recent years, clinical research has increasingly focused on

the long-term impact of HDP on the mental health of pregnant women, particularly its high comorbidity with antenatal depression (AD).[6,7] AD is no longer merely a perinatal psychological issue; it has become a significant public health concern. It not only directly impairs the emotional wellbeing and social functioning of expectant mothers, but is also closely associated with adverse pregnancy outcomes and the onset of postnatal depression.[8,9]

Quality of Life (QoL) serves as a core multidimensional indicator for assessing patients' overall health status and the efficacy of medical interventions, encompassing physiological, psychological, social relationships, and environmental domains.[10] For pregnant women with HDP, the assessment of QoL is particularly important, as it can comprehensively reflect the dynamic balance among disease burden, treatment response, and psychological and social adaptation.[11] Current research indicates that the QoL of pregnant women with HDP is generally lower than that of healthy pregnant women, and the co-occurrence of AD will further exacerbate the decline in their quality of life.[6,12] Pregnancy stress, as an individual's cognitive evaluation and emotional response to external stimuli during gestation, serves as a pivotal bridge linking objective disease with subjective psychological distress. It is likely a significant proximal factor influencing the QoL in AD. Psychological resilience, as an individual's adaptive capacity when confronting significant stress, may play a pivotal mediating role in this process.[13] It may either mitigate the adverse effects of pregnancy-related stress on depression or directly influence an individual's perception of quality of life.

Based on this, the present study employed a retrospective design, focusing on pregnant women with HDP. By extracting relevant data from medical records and nursing archives, it investigated the direct impact of AD levels on QoL and verified the chained mediating effects of pregnancy stress and psychological resilience between these two factors. The aim was to elucidate the associative mechanisms linking antenatal psychological states and QoL in women with HDP, thereby providing novel insights and references for optimising perinatal psychological care programmes and enhancing maternal and infant health outcomes. and enhance maternal and infant health outcomes.

Methods

Patient population

This study was a single-center retrospective study. The research subjects were selected from pregnant women who underwent regular prenatal examinations and delivered in the obstetrics department of Dazhou Central Hospital from January 2021 to December 2023, and were diagnosed with HDP. All data for the study were derived from existing routine records within the hospital's electronic medical records system and obstetric nursing archives, without involving any additional interventions or follow-up for patients.

Inclusion and exclusion criteria

The inclusion criteria for this study were as follows: (1) age ≥ 18 years old; (2) complies with the diagnostic criteria for HDP as stipulated in the "Diagnosis and Treatment Guidelines for Hypertensive Disorders in Pregnancy (2020 Edition)"[14]; (3) singleton pregnancy; (4) Gestation week ≥ 28 weeks; (5) clinical records and nursing documentation were complete, incorporating assessment data pertaining to antenatal depression, pregnancy-related stress, psychological resilience, and QoL.

Exclusion criteria were: (1) combined with other pregnancy-related complications (such as gestational diabetes, placenta praevia, etc.); (2) combined with severe organic diseases of the heart, liver, kidneys, and other vital organs; (3) patients with a history of mental illness or a family history of mental illness; (4) patients diagnosed with chronic hypertension prior to pregnancy; (5) termination of pregnancy midway or transfer to another hospital for treatment.

Data collection

All data were extracted from the hospital's electronic medical record system and obstetric nursing archives by researchers who received standardized training, with a dual-entry and cross-checking method adopted to ensure accuracy and completeness. Discrepancies were resolved by a third senior investigator. Additionally, data completeness was verified by cross-referencing nursing assessment records with physician-

documented clinical notes; any missing or ambiguous entries were excluded from analysis. The collected data included three parts: socio-demographic and obstetric clinical characteristics (age, pre-pregnancy body mass index, educational level, residence, marital status, employment status, smoking history, drinking history, gestational age, planned pregnancy status, parity, and history of adverse pregnancy, which was defined as a history of spontaneous abortion, induced abortion, ectopic pregnancy, stillbirth, fetal malformation, or other unfavorable pregnancy outcomes), scale assessment data completed under the guidance of obstetric nurses during routine antenatal check-ups in late pregnancy (≥28 weeks), and clinical diagnosis information.

Scale introduction and reliability and validity

All scales employed in this study were standardised instruments routinely used for nursing assessments within the department. Evaluations were completed under the guidance of nursing staff during antenatal appointments, ensuring both standardised completion and authenticity of responses.

(1) Edinburgh Postnatal Depression Scale (EPDS) [15]: A 10-item self-report scale designed to screen for perinatal depression. Each item was scored from 0 to 3, with total scores ranging from 0 to 30. Higher scores indicate more severe depressive symptoms. The EPDS has been proven to have good reliability and validity in the diagnosis of AD [16]. A cutoff score of > 9.5 is commonly used to indicate clinically relevant depressive symptoms in Chinese perinatal populations[16]. The Chinese version has demonstrated good reliability and validity, with a Cronbach's α of 0.87 in previous studies. The Cronbach's α of this study was 0.87.

(2) Perceived Stress Scale (PSS) [17]: The 10-item version was used to measure the degree to which situations in one's life are appraised as stressful. Items are rated on a 5-point Likert scale (1 = never to 5 = very often). Total scores range from 10 to 50, with higher scores indicating greater perceived stress. The Chinese version has shown satisfactory internal consistency [18]. In this study, the Cronbach's α of PSS was 0.88.

(3) Resilience Scale (RISC) [19]: The 10-item version of the Resilience Scale was administered. Each item is rated on a 4-point Likert scale from 1 (never) to 4 (always). Total scores range from 10 to 40, with higher scores reflecting greater psychological resilience. The Chinese RISC has been validated, demonstrating good reliability [20]. The Cronbach's α of RISC in this study was 0.79.

(4) 36-Item Short Form Health Survey (SF-36) (Chinese version) [21]: This 36-item instrument assesses health-related quality of life across eight domains: physical functioning, role limitations due to physical health, bodily pain, general health perceptions, vitality, social functioning, role limitations due to emotional problems, and mental health. Domain scores were transformed to a 0–100 scale, with higher scores indicating better health status. The overall score ranged from 0 to 100. The Cronbach's α of the SF-36 in this study was 0.85.

Statistical analysis

All statistical analyses were performed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as mean ± standard deviation (SD), median with interquartile range (P25–P75), or frequency (percentage) as appropriate. Group comparisons for continuous variables were conducted using independent t-tests or one-way ANOVA, and categorical variables were compared using chi-square tests. Univariable and multivariable linear regression models were applied to identify factors associated with EPDS scores. Pearson correlation analysis was used to examine associations among scale scores. To test the proposed chain mediation model, a series of regression analyses were conducted based on the approach recommended by Hayes (2013) [22], using the PROCESS macro (Model 6) with 5,000 bootstrap samples. The direct and indirect effects were estimated with bias-corrected 95% confidence intervals. Common method bias was assessed using Harman's single-factor test. All tests were two-tailed, and a P-value < 0.05 was considered statistically significant.

Ethical considerations

This study adhered to the Helsinki Declaration and was approved by the Medical Ethics Committee of Dazhou Central Hospital (Approval Date: November 17, 2025; Approval Number: 2025-165).

Results

Descriptive characteristics of scale scores

A total of 301 pregnant women with HDP were included in this study. Table 1 summarises the distribution of the four psychometric scales. The mean EPDS score was 7.2 ± 3.5, indicating a mild-to-moderate burden of antenatal depressive symptoms; 79 women (26.2 %) exceeded the conventional > 9.5 cut-off. The scores of the PSS, RISC, and SF-36 scales were 21.9 ± 5.8, 24.1 ± 6.3, and 64.7 ± 7.1, respectively. The interquartile ranges (P25–P75) for each scale are presented in Table 1.

Common method bias test

To evaluate the potential inflation of observed associations by single-source, self-report data, we performed Harman's single-factor test. All items from the EPDS, PSS, RISC, and SF-36 scales were included in an unrotated exploratory factor analysis using principal component extraction. The analysis yielded eight factors with eigenvalues greater than 1, collectively explaining 68.7% of the total variance. The first factor accounted for 19.5% of the variance, which is well below the critical threshold of 40.0%. These results indicate that no single factor dominated the covariance structure, and common method bias is unlikely to have substantially influenced the findings of this study.

Distribution of antenatal depression levels according to patient characteristics

The distribution of EPDS scores across different demographic and clinical characteristics is summarized in Table 2. Significant differences in EPDS scores were observed for age (P=0.034), education level (P=0.012), and history of adverse pregnancy (P=0.042). Women aged ≥35 years, those with education level of junior high school or below, and those with a history of adverse pregnancy showed higher EPDS scores. No statistically significant differences were found for other variables, including pre-pregnancy BMI, residence, marital status, employment status, smoking, alcohol consumption, gestational age, planned pregnancy, or parity.

Table 1: Scores of the scales in pregnant women with HDP (n=301)

Scale	Number	Mean±SD	Median	P25-P75
EPDS	301	7.2±3.2	7.0	5.0-10.0
PSS	301	21.9±5.8	22.0	18.0-26.0
RISC	301	24.1±6.3	24.0	20.0-29.0
SF-36	301	64.7±7.1	66.0	60.0-70.0

Abbreviations: HDP = Hypertensive Disorders of Pregnancy; EPDS = Edinburgh Postnatal Depression Scale; PSS = Perceived Stress Scale; RISC = Resilience Scale; SF-36 = 36-Item Short Form Health Survey.

Determinants of antenatal depressive symptoms: linear regression

Univariable and multivariable linear regression models with EPDS as the dependent variable are presented in Table 3. Univariate linear regression identified age ≥35 years (β=1.0, P=0.034), education level (high school: β=-1.5, P=0.008; college or above: β=-1.7, P=0.005), and history of adverse pregnancy (β=1.1, P=0.042) as significant factors associated with EPDS scores. In the multivariate model, age ≥35 years (β=1.0, P=0.041), education level (high school: β=-1.4, P=0.012; college or above: β=-1.6, P=0.006), and history of adverse pregnancy (β=1.0, P=0.048) remained independently associated with antenatal depression.

Correlation analysis among scales

Correlation analysis revealed that EPDS scores were positively correlated with PSS scores (r=0.3, P<0.001) and negatively correlated with RISC scores (r=-0.4, P<0.001) and SF-36 scores (r=-0.4, P<0.001). PSS scores were negatively correlated with RISC (r=-0.4, P<0.001) and SF-36 (r=-0.5, P<0.001), while RISC scores were positively correlated with SF-36 (r=0.5, P<0.001) (Table 4).

Regression analysis of the chain mediation model

The results of the regression analysis for the chain mediation model are presented in Table 5. After adjusting for age, education level, and history of adverse pregnancy, EPDS scores showed a significant positive association with PSS scores (β = 0.3, SE = 0.1, t = 5.5, P < 0.01) and a significant negative association with RISC scores (β = -0.3, SE

Table 2: Distribution of antenatal depression (EPDS score) by maternal characteristics

Variables	n (%)	EPDS Score, Mean ± SD	Statistic	*P*
Age			t=-2.1	0.034
<35	235 (78.1)	6.9 ± 3.4		
≥35	66 (21.9)	8.0 ± 3.5		
Pre-pregnancy BMI (Kg/m^2)			F=0.3	0.751
<18.5	23 (7.6)	6.7 ± 3.5		
18.5~<24.0	237 (78.7)	7.24 ± 3.5		
≥24.0	41 (13.6)	7.0 ± 3.4		
Education Level			F=4.5	0.012
Junior high or below	51 (16.9)	8.5 ± 3.5		
High school	137 (45.5)	7.0 ± 3.6		
College or above	113 (37.5)	6.8 ± 3.3		
Residence			t=-1.7	0.087
Urban	170 (56.5)	6.9 ± 3.5		
Rural	131 (43.5)	7.6 ± 3.5		
Marital Status			t=0.6	0.528
Married	284 (94.4)	7.2 ± 3.5		
Unmarried/Divorced	17 (5.6)	6.7 ± 4.0		
Employment Status			t=0.4	0.660
Employed	217 (72.1)	7.2 ± 3.6		
Unemployed	84 (27.9)	7.0 ± 3.3		
Smoking			t=-0.2	0.870
No	266 (88.4)	7.2 ± 3.6		
Yes	35 (11.6)	7.3 ± 3.0		
Alcohol Use			t=0.1	0.893
No	253 (84.1)	7.2 ± 3.5		
Yes	48 (16.0)	7.1 ± 3.5		
Gestational Age (weeks)			t=0.6	0.520
28~36	173 (57.5)	7.3 ± 3.5		
>36	128 (42.5)	7.0 ± 3.5		
Planned Pregnancy			t=0.2	0.862
No	54 (17.9)	7.2 ± 3.5		
Yes	247 (82.1)	7.2 ± 3.5		
Parity			t=-0.6	0.562
Primipara	192 (63.8)	7.1 ± 3.5		
Multipara	109 (36.2)	7.3 ± 3.5		
History of adverse pregnancy			t=-2.0	0.042
No	251 (83.4)	7.0 ± 3.4		
Yes	50 (16.6)	8.1 ± 3.6		

Abbreviations: EPDS = Edinburgh Postnatal Depression Scale; BMI = Body Mass Index.

= 0.1, t = -4.6, P < 0.01). Both PSS scores (β = -0.3, SE = 0.1, t = -5.8, P < 0.01) and RISC scores (β = -0.4, SE = 0.1, t = -7.3, P < 0.01 for PSS; β = 0.3, SE = 0.1, t = 5.0, P < 0.01 for RISC) were significantly associated with SF-36 scores in their respective models. In the final model incorporating all three predictors, the explained variance of SF-36 scores reached 39.0% (adjusted R^2 = 0.4, F(6, 294) = 31.4, P < 0.001).

Mediation path coefficients and effect decomposition

Bias-corrected bootstrapping (5 000 iterations) was used to quantify the indirect effects (Table 6). The total effect of EPDS on SF-36 was –0.8 (95 % CI –1.0 to –0.6). The direct effect accounted for 46.3 % (–0.4), whereas the total indirect effect represented 53.7 % (–0.4). Path 1 (EPDS → PSS → SF-36)

Table 3: Linear Regression Analysis of Factors Influencing Antenatal Depression

Variables	Univariate Analysis					Multivariate Analysis				
	β	S.E	t	*P*	β (95%CI)	B	S.E	t	*P*	β (95%CI)
Age										
<35					0.0 (Reference)					0.0(Reference)
≥35	1.0	0.5	2.1	0.034	1.0 (0.1 ~ 2.0)	1.0	0.5	2.0	0.041	1.0 (0.0 ~ 1.9)
Pre-pregnancy BMI (Kg/m^2)										
<18.5					0.00(Reference)					
18.5~<24.0	0.5	0.8	0.7	0.511	0.5 (-1.0 ~ 2.0)					
≥24.0	0.2	0.9	0.3	0.795	0.2 (-1.6 ~ 2.0)					
Education Level										
Junior high or below					0.0 (Reference)					0.0 (Reference)
High school	-1.5	0.6	-2.7	0.008	-1.5 (-2.6 ~ -0.4)	-1.4	0.6	-2.5	0.012	-1.41 (-2.5 ~ -0.3)
College or above	-1.7	0.6	-2.8	0.005	-1.7 (-2.8 ~ -0.5)	-1.6	0.6	-2.8	0.006	-1.6 (-2.7 ~ -0.5)
Residence										
Urban					0.0 (Reference)					
Rural	0.7	0.4	1.7	0.087	0.7 (-0.1 ~ 1.5)					
Marital Status										
Married					0.0 (Reference)					
Unmarried/Divorced	-0.6	0.9	-0.6	0.528	-0.6 (-2.3 ~ 1.2)					
Employment Status										
Employed					0.0 (Reference)					
Unemployed	-0.2	05	-0.4	0.660	-0.2 (-1.1 ~ 0.7)					
Smoking										
No					0.0 (Reference)					
Yes	0.1	0.6	0.2	0.870	0.1 (-1.1 ~ 1.3)					
Alcohol Use										
No					0.0 (Reference)					
Yes	-0.1	0.6	-0.1	0.893	-0.1 (-1.2 ~ 1.0)					
Gestational Age (weeks)										
28~36					0.0 (Reference)					
>36	-0.3	0.4	-0.6	0.520	-0.3 (-1.1 ~ 0.5)					
Planned Pregnancy										
No					0.0 (Reference)					
Yes	-0.1	0.5	-0.2	0.862	-0.1 (-1.1 ~ 0.9)					

Parity										
Primipara					0.0 (Reference)					
Multipara	0.2	0.4	0.6	0.562	0.2 (-0.6 ~ 1.1)					
History of adverse pregnancy										
No					0.0 (Reference)					0.0 (Reference)
Yes	1.1	0.5	2.0	0.042	1.1 (0.0 ~ 2.2)	1.0	0.5	2.0	0.048	1.1 (0.0 ~ 2.1)

Abbreviations: EPDS = Edinburgh Postnatal Depression Scale; β = regression coefficient; S.E = standard error; CI = confidence interval; BMI = Body Mass Index.

Table 4: Correlation matrix among the scale scores

Variable	Correlation coefficient（r value）			
	EPDS	PSS	RISC	SF36
EPDS	1.0	-	-	-
PSS	0.3[a]	1.0	-	-
RISC	-0.4[a]	-0.4[a]	1.0	-
SF36	-0.4[a]	-0.5[a]	0.5[a]	1.0

[a]P<0.001.
Abbreviations: EPDS = Edinburgh Postnatal Depression Scale; PSS = Perceived Stress Scale; RISC = Resilience Scale; SF-36 = 36-Item Short Form Health Survey.

Table 5: Regression analysis results of the chain mediation model

Variables	Model 1: PSS			Model 2: RISC			Model 3: SF36			Model 4: SF36		
	β	SE	t	β	SE	t	B	SE	t	β	SE	t
Constant	-	1.3	14.8	-	1.8	1.8	-	1.6	44.2	-	2.7	26.1
Age	-0.1	0.8	-1.1	0.0	0.8	0.8	-0.0	0.9	-0.6	-0.1	0.8	-1.3
Educational Level	-0.1	0.5	-1.1	0.0	0.5	0.5	0.0	0.5	0.6	-0.0	0.5	-0.0
History of Adverse Pregnancy	-0.1	0.9	-1.3	-0.0	0.9	0.9	0.0	1.0	0.6	0.0	0.9	0.2
EPDS score	0.3	0.1	5.5**	-0.3	0.1	0.1**	-0.4	0.1	-7.0**	-0.2	0.1	-3.5**
PSS score				-0.3	0.1	0.1**				-0.4	0.1	-7.3**
RISC score										0.3	0.6	5.0**
R^2	0.1			0.2			0.2			0.4		
Adjusted R^2	0.1			0.2			0.1			0.4		
F value	F (4,296)=8.7,p<0.001			F (5,295)=16.6,p<0.001			F (4,296)=13.6,p<0.001			F (6,294)=31.4,p<0.001		

Table 6: Results of chain mediation path analysis

Effect Type	Effect	95%CI	SE	Effect proportion (%)
Total Effect	-0.8	-1.0~-0.6	0.1	100.0
Direct Effect	-0.4	-0.6~-0.2	0.1	46.3
Total Indirect Effect	-0.4	-0.3~-0.2	0.0	53.7
Path 1	-0.2	-0.2~-0.1	0.0	30.0
Path 2	-0.1	-0.1~-0.0	0.0	17.1
Path 3	-0.1	-0.0~-0.0	0.0	6.7

Path 1: EPDS Score → PSS Score → SF-36 Score;
Path 2: EPDS Score → RISC Score → SF-36 Score;
Path 3: EPDS Score → PSS Score → RISC Score → SF-36 Score.
Adjusted for age, educational level, and history of adverse pregnancy.
Abbreviations: CI = confidence interval; SE = standard error; EPDS = Edinburgh Postnatal Depression Scale; PSS = Perceived Stress Scale; RISC = Resilience Scale; SF-36 = 36-Item Short Form Health Survey.

contributed 30.0 % (–0.2), Path 2 (EPDS → RISC → SF-36) 17.1 % (–0.1), and the chain Path 3 (EPDS → PSS → RISC → SF-36) 6.7 % (–0.1). All 95 % CIs excluded zero, confirming the significance of each pathway.

Sensitivity analysis in mild pre-eclampsia subgroup

To examine the stability of the mediation effects, we repeated the analysis in the 123 women with mild pre-eclampsia (Table 7). The pattern was consistent with the main analysis: the total indirect effect rose to 70.0 % of the total effect (–0.5), suggesting an even stronger mediational process in this stratum. Path-specific contributions were 35.6 %, 24.4 %, and 10.1 % for Paths 1, 2, and 3, respectively. The direct effect remained significant but accounted for only 30.0 % of the total effect, underscoring the prominence of stress and resilience mechanisms in mild pre-eclampsia.

Discussion

This study systematically examined the association between AD and QoL, as well as the chained mediating roles of pregnancy stress and psychological resilience, among 301 women with HDP. Additionally, it identified independent predictors of AD in this high-risk obstetric population. Results indicated that the mean EPDS score among HDP patients was 7.2 ± 3.5, with 26.3% exhibiting clinically relevant depressive symptoms (EPDS > 9.5). Independent risk factors for AD included age ≥35 years, low educational level, and history of adverse pregnancy. Correlation analysis confirmed positive associations between AD and pregnancy stress, and negative associations with psychological resilience and quality of life. Chain mediation analysis indicated AD influences quality of life via three pathways: direct effects accounted for 46.3%, total indirect effects for 53.7%, with mediation effects being more pronounced (70.0%) in the mild pre-eclampsia subgroup. These findings elucidate the complex psychological mechanisms through which antenatal depression impacts quality of life in patients with HDP, providing evidence-based support for collaborative psychiatric and obstetric interventions.

Table 7: Mediation effect analysis in the mild preeclampsia subgroup

Effect Type	Effect	95%CI	SE	Effect proportion (%)
Total Effect	-0.7	-1.0~-0.4	0.2	100.0
Direct Effect	-0.2	-0.5~-0.1	0.1	30.0
Total Indirect Effect	-0.5	-0.4~-0.1	0.4	70.0
Path 1	-0.2	-0.2~-0.1	0.0	35.6
Path 2	-0.2	-0.2~-0.0	0.0	24.4
Path 3	-0.1	-0.4~-0.0	0.0	10.1

Path 1: EPDS Score → PSS Score → SF-36 Score;
Path 2: EPDS Score → RISC Score → SF-36 Score;
Path 3: EPDS Score → PSS Score → RISC Score → SF-36 Score.
Adjusted for age, educational level, and history of adverse pregnancy.
Abbreviations: CI = confidence interval; SE = standard error; EPDS = Edinburgh Postnatal Depression Scale; PSS = Perceived Stress Scale; RISC = Resilience Scale; SF-36 = 36-Item Short Form Health Survey.

The prevalence of antenatal depression in our HDP cohort (26.25% exceeding the EPDS clinical cut-off) is consistent with international reports, although direct comparison is complicated by differing diagnostic thresholds and cultural contexts. Boadu *et al*. [23] conducted a cross-sectional study and reported that 46.5% of patients with HDP had scores exceeding the critical value of the EPDS. A study conducted by Chen *et al*.[24] among pregnant women with HDP in the pre-pregnancy stage revealed that even more than half of the patients exhibited symptoms of AD.[25], while continuous worry about disease prognosis and fetal safety generates chronic psychological stress that triggers or aggravates depressive symptoms. From the perspective of influencing factors, elderly pregnant women (aged 35 or above) face higher risks during childbirth. Previous studies have shown that elderly pregnant women experience more significant fluctuations in hormone levels, and are often under multiple pressures such as work and family, making them a high-risk group for AD.[26] These findings are consistent with the view in psychiatry regarding the relationship between age and stress response [27,28]. Patients with lower levels of education may struggle to effectively cope with the psychological impact of illness due to insufficient health literacy, further substantiating the view that ‘socioeconomic status is closely linked to mental health.[29] Patients with a

history of adverse pregnancy outcomes are prone to developing negative cognitive biases, leading to excessive anxiety and feelings of helplessness regarding their current pregnancy. This aligns with the pathophysiology of comorbid post-traumatic stress disorder and depression.[30]

This study also found that there was a significant negative correlation between AD levels and QoL, indicating that depressive symptoms are an important factor affecting the overall health perception of pregnant women. Previous studies have shown that depressive symptoms can affect the QoL of pregnant women, as reported by Sufeila et al. [31] and Huo et al [32]. To our knowledge, this is the first study to systematically verify the chain mediating effect of pregnancy stress and psychological resilience between AD and QoL specifically in the HDP population. This finding extends the existing stress-resilience framework, suggesting that the pathophysiological burden of HDP amplifies the psychological transmission from depression to impaired quality of life. AD, as a negative emotional state, amplifies pregnancy-related stress through cognitive distortions, causing patients to fixate excessively on the adverse effects of illness and become trapped in a vicious cycle of 'depressive mood – heightened stress perception'[33]. And the continuous high-pressure state will further damage the physiological functions and psychological adaptability, ultimately leading to a decline in the QoL. [31] Furthermore, previous studies have shown that depression is closely related to psychological resilience [34]. AD may weaken an individual's psychological resilience, and the decline in psychological resilience will reduce the patient's ability to regulate emotions, thereby exacerbating the deterioration of their QoL.[13] Notably, although the chain pathway (AD → pregnancy stress → psychological resilience → QoL) accounted for a modest proportion (6.73%), its clinical significance should not be underestimated: it reveals a sequential mechanism whereby depressive mood first heightens stress perception, which in turn erodes resilience resources, ultimately impairing quality of life. This multi-stage cascade suggests that interrupting any single node—whether through stress reduction or resilience enhancement—could attenuate the entire path, offering actionable targets for stepped care interventions. This provides precise targets for psychiatric intervention. It reminds us that interventions for AD should not only focus on alleviating emotional symptoms, but also on enhancing stress management skills and psychological resilience. It is particularly noteworthy that in patients with mild preeclampsia, the mediating effect is more pronounced. This may be related to the higher uncertainty of the disease and the complexity of the treatment faced by this group, making their psychological and social adaptation process more fragile. As a result, the role of the stress and resilience mechanisms becomes more prominent.

In terms of clinical practice, the results of this study suggest that a multi-target and integrated intervention strategy should be adopted for the psychological health care of pregnant women with HDP during pregnancy and postpartum. Firstly, routine AD screening should be conducted, with particular attention given to elderly, low-educated, and those with a history of adverse pregnancy and childbirth. These groups showed a higher risk of depression in this study. Secondly, the intervention measures should not be limited to drug treatment or psychological counseling for depressive symptoms, but should also include stress management training (such as mindfulness-based stress reduction, cognitive restructuring) and psychological resilience promotion programs (such as strength enhancement, coping skill training). Especially for patients with mild preeclampsia, the role of their psychological and social pathways is more prominent, so targeted psychological support may bring greater health benefits.

Strengths and limitations

This study has several strengths. It is the first to quantify the chain mediating effects of pregnancy stress and psychological resilience between antenatal depression and quality of life in women with HDP, and the subgroup analysis in mild pre-eclampsia provides novel insights into how these mechanisms intensify with disease complexity.

Several limitations should be acknowledged. First, the retrospective design precludes causal inferences; future prospective or interventional studies are needed to validate the directionality of the mediating pathways. Second, data were collected from a single centre, limiting generalisability. Third, reliance on self-reported scales may introduce common method bias,

although statistical tests suggested this was not a major concern. Fourth, potential moderators such as pharmacological treatment, social support, or partner relationships were not collected.

Regarding implications for practice, our findings suggest that routine screening for AD, stress, and resilience should be integrated into antenatal care for women with HDP. Given that indirect effects accounted for over half of the total effect, interventions should not only target depressive symptoms but also include stress management and resilience training, particularly for patients with mild pre-eclampsia

Conclusion

In summary, this study confirms that AD significantly diminishes QoL among women with HDP through a chain mechanism involving heightened stress perception and diminished psychological resilience. This finding deepens our understanding of psychopathological processes during pregnancy and childbirth, providing evidence-based support for developing multidimensional, individualised psychological intervention strategies. Future efforts should promote the routine integration of psychosocial assessment and support into the clinical management of HDP mothers, thereby fostering their overall physical and mental wellbeing and improving maternal and infant outcomes.

Contribution of authors

Yan-Gui designed and performed the research and wrote the paper; Liyi Zhang designed the research and supervised the report; Dai-Ya Liao ,Haiqing Huang designed the research and contributed to the analysis.

Conflict of interest

The authors declare no competing interests.

Ethical consideration

This study adhered to the Helsinki Declaration and was approved by the Medical Ethics Committee of Dazhou Central Hospital (Approval Number: 2026-165).

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Data availability

The datasets generated and analysed during this study are available from the corresponding author on reasonable request

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