

Research Article

A Study on the Association Between Dietary Behaviors, Sleep Quality, and Prenatal Depression During Pregnancy

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Abstract

Objective To explore the association among dietary behaviors, sleep quality, and prenatal depression during pregnancy, as well as the mediating effect of sleep quality between dietary behaviors and prenatal depression. **Methods** A total of 371 pregnant women who underwent outpatient examinations at a tertiary general hospital and a maternal and child health specialist hospital in Taiyuan City, Shanxi Province, from March 2024 to August 2024 were selected as study subjects. Questionnaires including the Pregnancy Dietary Behavior Scale, the Pittsburgh Sleep Quality Index (PSQI), and the Patient Health Questionnaire-9 (PHQ-9) were administered. SPSS 26.0 software was used for descriptive analysis, t-tests, one-way ANOVA, and Pearson correlation analysis. **Results** The overall dietary behaviors of pregnant women in Taiyuan City were poor, their sleep quality was acceptable, and they experienced mild depression, with specific scores of (86.13 ± 12.44) , (6.84 ± 3.02) , and (4.63 ± 4.54) , respectively. Correlation analysis revealed that the total score and all dimension scores of the dietary behavior scale during pregnancy were positively correlated with the total score of prenatal depression ($P < 0.01$). Sleep quality played a mediating role between dietary behaviors during pregnancy and prenatal depression, with an effect value of 0.178, accounting for 22.82% of the total effect. **Conclusion** Dietary behaviors during pregnancy, sleep quality, and prenatal depression are interrelated. Sleep quality mediates the relationship between dietary behaviors and prenatal depression. Improving dietary behaviors and sleep quality during pregnancy can help reduce the risk of prenatal depression and promote maternal and infant health.

Keywords

Dietary Behaviors During Pregnancy, Sleep Quality, Prenatal Depression, Mediating Effect

1. Introduction

In the female life cycle, pregnancy is a critical stage characterized by significant physiological, psychological, and social changes. The health status during this period not only affects the well-being of the pregnant woman herself but also profoundly influences fetal development and long-term health

outcomes. Antenatal depression, a common psychological issue during pregnancy, has become a major public health concern. It not only impairs maternal mood and quality of life but may also have long-term adverse effects on the fetal nervous system development, postnatal behavior, and the mother-child

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relationship. Among the various factors affecting maternal mental health, dietary behavior and sleep quality are particularly important. Unhealthy eating habits (such as nutritional imbalance, binge eating, or excessive dieting) may lead to malnutrition or abnormal weight changes [1], and may increase the risk of antenatal depression by affecting the synthesis and metabolism of neurotransmitters [2]. Meanwhile, due to increased physical burden and hormonal changes during pregnancy, sleep quality often declines. Chronic sleep deprivation or poor sleep quality may raise the risk of antenatal depression by disrupting the neuroendocrine system [3]. This paper analyzes the effects of dietary behavior and sleep quality on antenatal depression based on data, aiming to identify potential risk and protective factors, and to provide a reference for research and practice in the field of maternal mental health.

2. Subjects and Methods

2.1. Study Subjects

Using the convenience sampling method, pregnant women who needed prenatal check-ups were selected from the obstetrics outpatient departments of one tertiary general hospital and one specialized hospital in Taiyuan City from March to August 2024. Those who met the inclusion criteria were selected as study subjects.

Inclusion criteria:

- 1) At least 20 years old;
- 2) Have basic reading and comprehension skills;
- 3) Voluntarily participate in this study and sign an informed consent form.

Exclusion criteria:

- 1) Those who withdrew from the study due to interruption of the survey for examination;
- 2) Those with severe cognitive impairment. This study was approved by the Ethics Committee of Shanxi Medical University (2024024).

2.2. Research Methods

General Information Questionnaire. Designed by the researchers, the age, gestational age, pregnancy history, education level, place of residence, family income status, pre-pregnancy weight, current weight, height, smoking history, alcohol consumption history, family history of depression, and patient's own history of depression. Pregnancy Dietary Behavior Scale [4]. Developed by Huang Yanping in 2023, it has 31 items and 6 dimensions: nutritional factors, dietary content, emotional factors, food appearance, weight factors, and special dietary factors. Pittsburgh Sleep Quality Index (PSQI) [5]. This is a widely used sleep quality assessment tool for measuring sleep quality and sleep disorders over the past month. Patient Health Questionnaire-9 (PHQ-9) [6]. This is a self-rating scale assessing the frequency of depressive symptoms over the past two weeks.

2.3. Survey Methods

During the survey process, professionals distributed the questionnaires and explained the purpose, methods, and significance of this study during the questionnaire process. It was confirmed that the study subjects voluntarily agreed to participate in this survey. After the subjects agreed, they signed informed consent forms according to ethical requirements. After completing the questionnaires, they were collected and numbered. The electronic questionnaire system aggregated the data, while paper questionnaires were double-entered into Excel spreadsheets and carefully verified. A total of 400 questionnaires were distributed in this study. After excluding 29 invalid questionnaires, 371 valid responses were finally obtained, with an effective response rate of 92.75%.

2.4. Statistical Analysis

SPSS 26.0 statistical software was used for data analysis. Measurement data were expressed as mean $\pm$ standard deviation ($\bar{x} \pm s$). Independent sample t-tests were used for comparisons between two groups, and analysis of variance (ANOVA) was used for comparisons among multiple groups. Count data were expressed as rates (%). Correlation analysis was performed using bivariate Pearson correlation. $P < 0.05$ was considered statistically significant, accepting the hypothesis of association between the variables.

3. Results

3.1. General Information of Pregnant Women

A total of 371 pregnant women were included in this study, with an average age of 30.5 years. There were 220 primiparas (59.3%) and 151 multiparas (40.7%); 27 in the first trimester (7.3%), 127 in the second trimester (34.2%), and 217 in the third trimester (58.5%); 69 were pre-pregnancy overweight (18.6%), and 28 were pre-pregnancy obese (7.5%); 171 had excessive gestational weight gain (46.1%); regarding education level, the largest group was those with associate or bachelor's degrees, 258 cases (69.5%); the number of people living in cities far exceeded those living in rural areas; the number of people with a monthly per capita household income of 3000-5000 yuan was similar to those with an income >5000 yuan; few had a smoking or alcohol consumption history; 7 had a family history of depression (1.9%), and 13 had a personal history of depression (3.5%); 159 had prenatal depression, with a depression detection rate of 42.9%.

3.2. Scores of Dietary Behaviors, Sleep Quality, and Prenatal Depression

The total score for dietary behaviors among pregnant women attending outpatient clinics at a tertiary general

hospital and a maternal and child health specialist hospital in Taiyuan City was (86.13 ± 12.44). The scores for the six dimensions, from highest to lowest, were weight factors, emotional factors, special dietary factors, food appearance, nutritional factors, and dietary content, indicating overall poor

dietary behaviors. The total sleep quality score was (6.84 ± 3.02), indicating acceptable overall sleep quality. The total score for prenatal depression was (4.63 ± 4.54), indicating an overall mild level of depression. (See [Table 1](#))

Table 1. Scores of Dietary Behaviors, Sleep Quality, and Prenatal Depression ($n=371$).

Variable	Number of Items	Score Range	Score (Mean $\pm$ SD)
Dietary Behaviors	31	31-155	86.13 ± 12.44
Nutritional Factors	5	5-25	11.70 ± 3.65
Dietary Content	4	4-20	10.84 ± 3.49
Emotional Factors	5	5-25	16.28 ± 1.94
Food Appearance	5	5-25	13.24 ± 4.53
Weight Factors	6	6-30	18.02 ± 3.61
Special Dietary Factors	6	6-30	16.07 ± 3.88
Sleep Quality	7	0-21	6.84 ± 3.02
Prenatal Depression	9	0-27	4.63 ± 4.54

3.3. Differences in Scores of Dietary Behaviors, Sleep Quality, and Prenatal Depression

Differences in dietary behavior scores based on gestational weight gain, education level, alcohol history, and family

history of depression were statistically significant ($P < 0.05$). Differences in sleep quality scores based on trimester, pre-pregnancy BMI, smoking history, alcohol history, and personal history of depression were statistically significant ($P < 0.05$). Differences in depression scores based on trimester, smoking history, alcohol history, and personal history of depression were statistically significant ($P < 0.05$). (See [Table 2](#))

Table 2. Differences in Scores of Dietary Behaviors, Sleep Quality, and Prenatal Depression ($n=371$).

Variable	n (%)	Dietary Behaviors	Sleep Quality	Prenatal Depression
Age				
≤ 30	200 (53.9)	86.45 ± 13.12	6.73 ± 3.10	4.64 ± 4.64
> 30	171 (46.1)	85.79 ± 11.61	6.96 ± 2.95	4.61 ± 4.43
t		0.506	-0.761	0.055
P		> 0.05	> 0.05	> 0.05
Parity				
Primipara	220 (59.3)	86.63 ± 11.85	6.82 ± 3.03	4.63 ± 4.37
Multipara	151 (40.7)	85.44 ± 13.26	6.86 ± 3.02	4.62 ± 4.83
t		0.905	-0.134	0.19
P		> 0.05	> 0.05	> 0.05
Trimester				
First	27 (7.3)	90.52 ± 12.74	6.19 ± 2.41	5.89 ± 5.01

Variable	n (%)	Dietary Behaviors	Sleep Quality	Prenatal Depression
Second	127 (34.2)	86.22±12.36	6.52±2.46	4.42±3.94
Third	217 (58.5)	85.55±12.40	7.10±3.35	4.59±4.80
<i>F</i>		1.927	2.270	2.286
<i>P</i>		>0.05	<0.05	<0.05
Pre-pregnancy BMI				
Underweight	41 (11.1)	87.54±11.63	7.54±3.49	5.27±4.88
Normal	233 (62.8)	85.88±12.62	6.48±2.80	4.50±4.32
Overweight	69 (18.6)	86.32±12.81	7.46±3.02	4.71±4.78
Obese	28 (7.5)	85.89±11.58	7.18±3.74	4.54±5.30
<i>F</i>		0.215	2.937	0.341
<i>P</i>		>0.05	<0.05	>0.05
Gestational Weight Gain				
Normal	173 (46.6)	85.43±12.70	6.83±3.07	4.77±4.42
Insufficient	27 (7.3)	82.63±13.50	5.85±2.70	3.41±3.54
Excessive	171 (46.1)	87.42±11.90	7.00±3.01	4.67±4.78
<i>F</i>		2.269	1.689	1.075
<i>P</i>		<0.05	>0.05	>0.05
Education Level				
Primary school or below	2 (0.5)	76.00±4.24	11.00±1.41	4.50±4.95
Junior high school	9 (2.4)	80.22±17.68	6.44±3.20	4.00±4.39
High school/Vocational	21 (5.7)	81.76±14.44	6.62±2.43	4.76±4.30
Associate/Bachelor's	258 (69.5)	86.61±11.83	6.91±3.01	4.86±4.77
Graduate or above	81 (21.8)	86.69±13.01	6.60±3.16	3.91±3.84
<i>F</i>		2.636	1.169	0.723
<i>P</i>		<0.05	>0.05	>0.05
Residence				
Rural	45 (12.1)	86.29±13.36	6.62±3.57	4.51±4.54
Urban	326 (87.9)	86.12±12.33	6.87±2.95	4.64±4.55
<i>t</i>		0.084	-0.504	-0.184
<i>P</i>		>0.05	>0.05	>0.05
Monthly Per Capita Income				
<3000	28 (7.5)	83.54±14.62	7.11±2.87	5.82±4.35
3000-5000	170 (45.8)	86.05±12.33	6.51±2.81	4.12±4.18
>5000	173 (46.6)	86.65±12.19	7.11±3.23	4.94±4.86
<i>F</i>		0.764	1.807	2.462
<i>P</i>		>0.05	>0.05	>0.05
Smoking History				
No	363 (97.8)	85.99±12.43	6.77±2.98	4.53±4.49
Yes	8 (2.2)	92.88±11.28	10.00±3.70	9.25±4.87

Variable	n (%)	Dietary Behaviors	Sleep Quality	Prenatal Depression
<i>t</i>		-1.551	-3.025	-2.942
<i>P</i>		>0.05	<0.01	<0.01
Alcohol History				
No	340 (91.6)	85.53±12.43	6.67±2.98	4.45±4.39
Yes	31 (8.4)	92.84±10.51	8.61±2.99	6.61±5.67
<i>t</i>		-3.169	-3.469	-2.563
<i>P</i>		<0.01	<0.01	<0.05
Family History of Depression				
No	364 (98.1)	85.94±12.40	6.82±3.02	4.61±4.54
Yes	7 (1.9)	96.57±9.98	7.86±2.91	5.57±4.58
<i>t</i>		-2.252	-0.902	-0.555
<i>P</i>		<0.05	>0.05	>0.05
Personal History of Depression				
No	358 (96.5)	86.00±12.20	6.75±2.95	4.53±4.50
Yes	13 (3.5)	90.08±17.81	9.08±4.13	7.46±4.68
<i>t</i>		-1.162	-2.745	-2.305
<i>P</i>		>0.05	<0.01	<0.05

3.4. Correlation Analysis of Dietary Behaviors, Sleep Quality, and Prenatal Depression Scores

The results showed that the total scores for dietary

behaviors and sleep quality were positively correlated with the total score for prenatal depression among women attending outpatient clinics at a tertiary general hospital and a maternal and child health specialist hospital in Taiyuan City ($r=0.225$, 0.519 , both $P < 0.01$). (See Table 3)

Table 3. Correlation Analysis of Scores for Dietary Behaviors, Sleep Quality, and Prenatal Depression ($n=371$).

Variable	Total Dietary Behaviors Score	Total Sleep Quality Score	Total Prenatal Depression Score
Total Dietary Behaviors Score	1		
Total Sleep Quality Score	0.498**	1	
Total Prenatal Depression Score	0.225**	0.519**	1

Note: $P < 0.05$, $*P < 0.01$

3.5. Mediating Effect Analysis of Dietary Behaviors, Sleep Quality, and Prenatal Depression

Based on the theory of planned behavior, with dietary

behaviors during pregnancy as the independent variable (X), sleep quality as the mediating variable (M), and prenatal depression as the dependent variable (Y), the SPSS macro PROCESS was used. The bias-corrected percentile Bootstrap method was employed, selecting model 4 and resampling 5000 times, to test the mediating effect of sleep quality

between dietary behaviors during pregnancy and prenatal depression. The upper and lower limits of the 95% confidence intervals for the direct effect of dietary behaviors during

pregnancy on prenatal depression and the mediating effect of sleep quality did not include 0. (See Table 4)

Table 4. Mediating Effect Analysis of Dietary Behaviors, Sleep Quality, and Prenatal Depression.

Effect	Effect (B)	BootSE	BootLLCI	BootULCI	Proportion of Relative Effect (%)
Total Effect	0.780	0.069	0.908	0.643	
Direct Effect	0.602	0.069	0.848	0.623	77.18%
Indirect Effect	0.178	0.015	0.004	0.054	22.82%

It was concluded that dietary behaviors during pregnancy have a direct predictive effect on prenatal depression and can also predict prenatal depression through the mediating effect of sleep quality. The direct effect was 0.602, and the mediating

effect was 0.178. The mediating effect of sleep quality between dietary behaviors during pregnancy and prenatal depression accounted for 22.82% of the total effect. The variable relationships are shown in Figure 1.

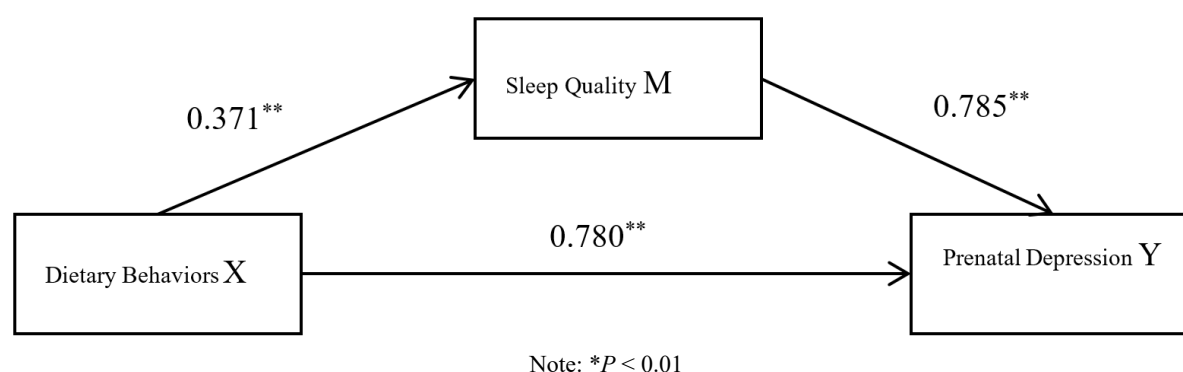


Figure 1. Mediating Effect Model of Sleep Quality between Dietary Behaviors and Prenatal Depression.

4. Discussion

4.1. Status and Influencing Factors of Dietary Behaviors, Sleep Quality, and Prenatal Depression

The results of this study show that the total score for dietary behaviors among pregnant women was (86.14 ± 12.44) , indicating overall poor dietary behaviors. Among the dimensions, emotional factors scored the highest, suggesting that most pregnant women exhibit characteristics of emotional eating. Research shows that when pregnant women experience stress or anxiety, such as having a family history of depression, they tend to choose high-sugar, high-fat foods, leading to unhealthy dietary patterns [7]. The next highest was weight factors. Most pregnant women choose not to eat after dinner to control their weight, indicating that the degree of gestational weight gain does cause a psychological burden on pregnant women. It is

necessary to disseminate relevant knowledge to improve pregnant women's attitudes towards the degree of gestational weight gain and modify their dietary behaviors of dieting or overeating based on their daily eating habits. Nutritional factors scored the lowest. A study on the nutrition of 600 pregnant women showed that the education level of pregnant women was positively correlated with nutritional knowledge, attitudes, and behaviors [8]. The results of this study show that the sleep quality score of pregnant women was (6.84 ± 3.02) , indicating acceptable overall sleep quality. Factors affecting sleep quality in this study included trimester, pre-pregnancy BMI, smoking history, alcohol consumption history, and personal history of depression. The sleep quality score in the third trimester (7.10 ± 3.35) was higher than that in the first (6.19 ± 2.41) and second (6.52 ± 2.46) trimesters, with significance ($P < 0.05$). As pregnancy progresses, the sleep quality of pregnant women significantly decreases in the late stage, reflecting that sleep problems are more severe in the third trimester. A longitudinal study also reached the same conclusion, with sleep quality decreasing by 1.68 points from the second trimester ($M = 5.31$) to the third trimester ($M = 7.03$)

[9]. Pre-pregnancy BMI is closely related to sleep quality during pregnancy. Studies have found that overweight or obese pregnant women typically score lower on sleep quality assessments, which may be related to the physical burden, respiratory problems, and physical discomfort caused by excessive weight, factors that are exacerbated during pregnancy, thereby affecting the overall sleep experience [10]. Smoking may be related to the stimulating effect of nicotine on the central nervous system and respiratory problems caused by smoking [11]. The impact of alcohol consumption may be related to its interference with neurotransmitters and its influence on physiological mechanisms [9]. A personal history of depression may affect psychological changes during pregnancy. The physiological and psychological changes during pregnancy make pregnant women more prone to sleep disorders. Physiological factors, endocrine factors, and psychosocial factors all affect sleep [3]. The results of this study show that the score on the self-rated depression scale for pregnant women was (4.63 ± 4.54) , proving that the pregnant women population is at a mild level of depression. The trimester of pregnancy is associated with an increased risk of prenatal depression. According to the 10th edition of Obstetrics and Gynecology, the gestational period is divided into three trimesters. It was found that the detection rate of depression in the first trimester (58.6%) was higher than that in the second and third trimesters (44.3%, 42.3%). A survey of 649 women in an urban area of South Africa found that the prevalence of thoughts of self-harm in early pregnancy (12.5%) was slightly higher than in late pregnancy (11.6%) [12]. This is related to the impact of facing pregnancy reactions and adapting to the psychological pressure of pregnancy in the first trimester. Pregnant women with a smoking history, alcohol consumption history, or personal history of depression have higher levels of depression. Unhealthy lifestyle habits can cause pregnant women to feel anxious and guilty or face more social criticism and pressure [13]. This psychological pressure further exacerbates depressive moods and may also increase the risk of depression through physiological mechanisms, such as affecting the balance of neurotransmitters (e.g., dopamine, serotonin). Zeng Guoying believes that the emotional state of pregnant women, pre-pregnancy mental health history, and stressful events during pregnancy are all important predictors of prenatal depression [14].

4.2. Correlation Analysis of Dietary Behaviors, Sleep Quality, and Prenatal Depression Among Pregnant Women in Taiyuan City

The results of this study show that the total scores for dietary behaviors, sleep quality, and prenatal depression are positively correlated. Regarding the influence of diet on sleep, studies have shown that a high-fat diet may be related to changes in CR and sleep quality. A logistic regression model showed that people with a higher cholesterol/saturated fat index (CSI) unit had a 1.6% increased probability of experiencing sleep problems [15]. Regarding the influence of sleep on diet, studies have shown that staying up late, especially eating

before bed, may increase an individual's total calorie intake and weight. Carbohydrates and protein consumed after 8 pm or within 4 hours before bed are associated with higher total calories [16]. Unhealthy dietary behaviors [17] include skipping breakfast or poor breakfast quality, irregular meals, picky eating, snacking, beverage intake, inflammatory diets, not paying attention to food expiration dates, etc. Physiologically, these behaviors increase the risk of depression [18]. International research suggests that emotional eating is a coping strategy, but its long-term effectiveness is poor. For example, emotional eating may worsen depressive symptoms in pregnant women, forming a vicious cycle [19]. Most studies still emphasize the importance of dietary nutrition interventions during pregnancy. However, in past studies, most anticipated nutritional interventions involved dietitians preparing fixed meals, regular dietary follow-ups, or nutritional supplements. Few studies have focused on the motivation and changes in pregnant women's own dietary behaviors. In practice, monitoring and cultivating healthy dietary behaviors are equally as important as nutritional intervention strategies during pregnancy. A cross-sectional study found that the prevalence of poor sleep quality and prenatal depression among 898 pregnant women was 44.3% and 24.4%, respectively [20]. Research has found that sleep disorders in the third trimester are also important factors predicting depression 2-4 weeks postpartum. About 82.76% of pregnant women with prenatal depression could develop postpartum depression (PPD), suggesting that prenatal depression increases the risk of PPD [21]. An in-depth understanding of the current status of sleep quality during pregnancy and identifying the multiple factors affecting sleep quality is crucial for effectively preventing poor sleep and prenatal depression during pregnancy. This understanding not only helps improve the overall health level of pregnant women but also provides an important basis for formulating targeted pregnancy health care strategies.

4.3. Mediating Effect of Sleep Quality between Dietary Behaviors and Prenatal Depression

This study found that sleep quality plays a partial mediating role between dietary behaviors and prenatal depression. Dietary behaviors during pregnancy not only directly predict prenatal depression (direct effect of 0.602) but also indirectly affect prenatal depression by influencing sleep quality (mediating effect of 0.178). Path 1: Unhealthy dietary behaviors can lead to decreased sleep quality, thereby increasing the risk of prenatal depression. For example, high dietary intake of sugar, fat, and low fiber may be associated with decreased sleep quality [22]. A survey found that the incidence of depression in pregnant women with sleep disorders was 31.1% higher than in those without sleep disorders [23]. Path 2: Healthy dietary behaviors can improve sleep quality, thereby reducing the risk of prenatal depression. For example, a diet rich in fruits, vegetables, and olive oil, such as the Mediterranean diet, can help improve sleep quality during pregnancy [24] and further

improve depressive moods. Multiple regression analyses indicate that developing an overall strategy to promote healthy eating, starting from motivation, can alleviate the combined effects of depression and anxiety on the human body [25]. Dietary behaviors during pregnancy were positively correlated with sleep quality ($r=0.106$), indicating that sleep quality and dietary behaviors during pregnancy can influence each other. Sleep deprivation may lead pregnant women to choose high-calorie, high-sugar foods in their daily diet, thereby affecting their overall dietary quality and mood during pregnancy. Intervention measures should focus on both diet and sleep issues, helping pregnant women establish healthy lifestyle habits to break the vicious cycle of diet-sleep-depression.

5. Conclusion

In summary, pregnant women are generally at a mild level of depression. Prenatal depression is influenced by gestational week, smoking history, alcohol consumption history, and personal history of depression. Pregnant women with smoking and drinking habits should be advised to quit. The overall dietary behavior of pregnant women is poor, especially in the dimension of emotional factors. Pregnant women's education level, alcohol consumption history, and family history of depression are correlated with dietary behaviors during pregnancy. Improving the dietary behaviors of pregnant women requires comprehensive consideration of multiple factors such as emotional management, cultural background, and family health history. The sleep quality of pregnant women is generally acceptable, but sleep latency is long. Gestational week, pre-pregnancy BMI, smoking history, alcohol consumption history, and personal history of depression are correlated with sleep quality during pregnancy. For the problem of long sleep latency, interventions such as relaxation training, adjusting the sleep environment, or consulting a doctor can be attempted, and sleep quality can be improved by controlling pre-pregnancy BMI and avoiding smoking and alcohol consumption. Dietary behaviors and sleep quality during pregnancy are positively correlated, indicating that dietary behaviors during pregnancy are not only a guarantee of nutrient intake but also a promoting factor for good sleep. A balanced diet and regular eating are recommended. Dietary behaviors during pregnancy have a significant predictive effect on prenatal depression, indicating that dietary management during pregnancy should be one of the important intervention measures to prevent prenatal depression. Sleep quality plays a mediating role in this relationship and is a key link. The relationship among the three factors should be comprehensively considered, combining diet, sleep, and psychological support to provide comprehensive health guidance.

Abbreviations

BMI Body Mass Index

CR Cortisol
CSI Cholesterol/Saturated Fat Index
PHQ-9 Patient Health Questionnaire-9
PPD Postpartum Depression
PSQI Pittsburgh Sleep Quality Index

Author Contributions

Yu-zhu Pang: Writing – original draft
Meng-qi Wang: Methodology
Jin Wang: Formal Analysis
Hao Feng: Data curation
Guo-dian Liang: Validation
Jing-min Cheng: Writing – review & editing

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Conflicts of Interest

The authors declare no actual or potential conflicts of interest.

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