Systematic Review of Psychological Nursing on Internal Hormone Distribution in Women with Postpartum Depression

Mingshuo Zhang*

Department of clinical medicine, Hebei Medical University, Shijiazhuang, China

*Corresponding author: 13001810602@163.com

Keywords: Postpartum depression (PPD), E2, P, 5-HT, OFQ, thyroid function, psychological care.

Abstract: Postpartum depression affects women's physical and mental health, and gradually tends to be younger. It has caused a serious impact on pregnant women and their families, while endangering the public order of the society. After women give birth, hormone levels change sharply, and endocrine environment is disordered, mainly the E2 and P, as well as lead to changes in 5-HT and OFQ in the nervous system, which is one of the important mechanisms leading to postpartum depression. Pregnant women need to complete a huge psychological transformation from an independent individual to being a mother, so psychological care has its unique advantages in the treatment of postpartum depression. Psychological care can affect E2, P, 5-HT and OFQ levels and relieve maternal anxiety and depression, improve their quality of life and family relations and then to promote the better development of the society. This review analyzed that how psychological care can improve postpartum depression by regulating the level of endocrine hormones.

1. Introduction

Postpartum depression (PPD) is one of the most common medical complications after pregnancy. The global prevalence is 10%~15%. In China, the prevalence is 9.2%~15.0% .The clinical manifestations of PPD are disappointed, pessimistic, low self-evaluation, even suicide and infanticide and so on. From the symptoms, it starts about 4 weeks after delivery and May last 12 months. PPD seriously affects the maternal interpersonal relationship, maternal and child relationship, normal work, reduce the quality of life. Studies show that the average age of PPD is 28.97 [1], suggesting that this is a common problem in many young women, and must arouse our attention to these clinical symptoms [2-6].

Multiple factors can affect the pathogenesis of PPD, and endocrine factors are one of the important causes of affecting PPD. Both estradiol (E2) and progesterone (P) are neuroprotective. Also, the monoamine neurotransmitter serotonin (5-HT) is an important neurotransmitter in the hypothalamic-pituitary-adrenal axis (HPA) and mood disorder interaction systems. Orphanin-FQ (OFQ) reduces the metabolic activity of neuronal cells, leading to neurological or psychiatric disorders.5-HT and OFQ have interactions that can affect the nervous system. During pregnancy and delivery, estrogen and progesterone levels changed dynamically [7], this drastic change affects the content of 5-HT, maternal 5-HT concentration decreased. OFQ can inhibit 5-HT, maternal emotional status is very sensitive to drastic fluctuations in perinatal endocrine hormones [8]. Thyroid function was also associated with abnormal maternal neurological response [9]. And the body was unable to effectively respond to the stress state at delivery and then, PPD appears.

At present, PPD treatment includes drug treatment and psychological intervention. Drug treatment compliance is poor and the effect is not lasting. It will have side effects on the maternal physical condition, which also has a certain difficulty and limitations. Psychological care changed the estrogen and progesterone levels in PPD patients, regulated maternal mood, reduced maternal depression, anxiety, and improved quality of life [10, 11]. Therefore, from the endocrine point of view, this paper explores the influence of hormones on PPD and how psychological care affects hormone levels and improve PPD.

2. Endocrine influencing factors of postnatal depression

2.1 E2 and P

Estrogen plays a role in the signaling pathways of the central nervous system through transcription of estrogen receptors αin target tissue, participating in normal brain function, nutrition and nerve protection. Progesterone (P) can play a neuroprotum and anti-inflammatory role in the central nervous system by raising the brain-derived neurotrophic factor (BDNF) in motor neurons [3]. Studies have shown that E2 and P levels in PPD patients are lower than normal. In the later stages of pregnancy, the placenta is removed from the matrix to ensure normal fetal development, and the maternal serum of E2 and P drops significantly in a short period of time. A decrease in E2 can lead to a decrease in the synthesis of phosphate modification process disorders at the end of dopamine carbacamine and a metabolic disorder of cortisol hormones, resulting in a decrease in the physiological activity of dopamine, leading to postpartum depression.

2.2 5-HT and OFQ

At the same time, this drastic change lowers the level of the hippochorma BDNF, impairs the occurrence of the hippocular nerve and triggers depression and anxiety-like behavior, affecting the neurotransmitters of brain tissue and the normal number of 5-HT causes the maternal concentration of 5-HT to decrease, affecting the concentration of 5-HT in the synapses gap, Inhibits the formation of potentials after synapses, thus affecting neuroelectric excitement in the cerebral cortex tissue and promoting the occurrence of depression[12]. Studies showed that the 5-HT in the observed group (72 patients with PPD) was significantly lower than in the control group (50 healthy mothers) (0.92vs.2.47 μmol/L), with a significantly higher OFQ than the (27.42vs.10.38ng/L) [13, 14].519 patients with PDD and 737 healthy individuals were selected for comparison. In PPD patients, the frequency of the 5-HTTLPR polymorphism allele (OR=0.72) and the dominant model (OR=0.57) was significantly reduced, with this change affecting the expression of 5-HTT and the maternal mood [6].

OFQ is a new regulatory peptide discovered in 1994, and leads to neurological or psychiatric diseases. The increased expression of OFQ can lead to depolarization disorder of the nerve potential of the central nerve fibers, while the excessive rise of plasma OFQ can exacerbate damage to neuronal cells, leading to the destruction of nerve fiber membrane tissue. Studies have shown that the mid-stitch nucleus refers to several nuclei located in a narrow area near the middle seam of the brain stem. OFQ and 5-HT are both high in the medium seam core group. This overlapping cross distribution provides a material basis for the interaction between the two substances. OFQ inhibits 5-HT in the brain by inhibiting neuronal discharge activity, and the higher of OFQ, the lower the 5-HT. People with PPD generally have higher function of OFQ than healthy women (28.44 vs. 12.01 ng/L) and lower of 5-HT (189.12 vs. 458.21 pg/ml) [15].

2.3 Thyroid function

Abnormal thyroid function can also affect the onset of PPD. On the one hand, abnormal thyroid function can have direct effects on the brain tissue itself, and simulation functions with β-norepinephrine (β-NE) and 5-HT. On the other hand, it can also function on PPD symptoms through indirect effects of the 5-HT system.

Maternal body is under continuous stress before and after delivery, this stress state has two effects: 1 inhibit the function of the hypothalamic-pituitary-thyroid axis (HPT), reduce serum total thyroxine (TT4) synthesis and secretion, 80% TT3 is from TT4 conversion in peripheral tissue, TT3 levels decline, while serum free triiodogenine (FT3) and FT4) levels, reduce quasi-NE and quasi-5-HT function, inhibit the release of norepinephrine (TSH), leading to PPD.2 In hibition of the function of the hypothalamic-pituitary-adrenal axis (HPA), neurons with stress signals reaching from the central nerve to the hypothalamic paraventricular nucleus can promote the release of corticotropin releasing hormone (CHR), stimulate pituitary secretion of corticotropin (ACTH), and then reach the adrenal gland through the body circulation and stimulate cortisol secretion (CORT).Endogenous CORT can act on CORT receptors in the adrenal and pituitary glands to inhibit ACTH release, but also on CORT

receptors in the hippocampus to inhibit CHR, ACTH release, further causing abnormal thyroid hormone secretion and exacerbating PPD[16,17,18]. PPD is also associated with other factors associated with thyroid function.

2.4 Psychological care

Psychological care is superior to traditional care [19]. In contrast to traditional care, psychological care can promote self-monitoring and attentional distribution of cognitive resources, allowing women with depression and anxiety to adapt positively according to their situation, reduce depression (Hedge g: -0.48), anxiety (-0.47), and effectively to the general loss of emotional automation. Psychological care-mediated enhanced cognitive resources enable patients to translate negative thoughts into objective prospects to achieve breakthroughs in the vicious depression-anxiety cycle. Psychological care reduces the behavioral incidence of fatigue, pain, and insomnia, improves physical function, and ultimately improves quality of life (+ 0.19). Psychological care is maternal-centered and brings the mother a sense of happiness, security, a sense of dependence[20-24].It is effective in improving maternal depression, anxiety, and stress (Cohen's d = 52; 95% CI 29 ~ 74) [25].Some studies shows that with psychological intervention, the maternal Hamilton Anxiety Scale (HAMA), Hamilton Depression Scale (HAMD), Edinburgh Postpartum Depression Scale (EPDS), and Pittsburgh Sleep Quality Index (PSQI) scores were all significantly below the baseline score ($p=0.034$, $p=0.038$, $p=0.004$, $p=0.014$)[22].

Psychological care can reduce the depression of patients and reduce the risk of PPD (13.8% vs16.6%) by regulating E2 and P levels [26].

Withdrawal of E2 is considered as the core pathological mechanism of PPD [27]. Psychological care improves E2 levels and reduces maternal depression [16]. A randomized controlled study included 142 patients with postpartum depression and randomly divided into psychological care group (71) and routine care group (71). Following intervention, depression self-assessment scale (SDS) and anxiety self-assessment scale (SAS) of decreases in the psychological care group, which was greater than that in the routine care group (21.47 vs.16.33,19.43 vs. 12.91 score) and an increase in E2 was greater (4.39 vs.0.96 pg/mL) [28].

Another study yielded similar results, 68 patients with PPD were selected and randomized into psychological care and routine care groups. After 8 weeks of intervention, P levels were higher in both the psychological and conventional care groups than in preintervention (2.73>2.12, 2.47>2.03nmol/L), and the results were superior in the psychological care group than in the conventional care group (2.73>2.47, 2.12>2.03nmol/L) [29], further explaining that psychological care can improve the P level and relieve the rapid decline of P levels, of pregnant women, relieving the negative emotions.

Meanwhile, psychological care can also improve the 5-HT and OFQ, effectively improveing 5-HT levels (1.78 vs 1.34 μmol/L) [30]. OFQ was negatively correlated with 5-HT ($P < 0.05$), so psychological care can reduce OFQ levels [31].

How psychological care affects thyroid hormone level is still under further exploration. Currently known, negative correlation with thyroid antibody-positive women (47%) were more depressed than antibody-negative women (32%) [7]. Women with PPD have higher EPDS scores (P value =0.008) [32].

2.5 Methods of psychological care

Currently psychological care can take short psychological interventions (BIND-P intervention), which is based on psychological interventions from health care workers, including psychological education, relaxation and breathing exercises, visual image techniques and progressive muscle relaxation exercises, etc. BIND-P intervention is short, pragmatic, and generalizable and culturally based [33], adding cultural factors to psychological care for intervention gives better effective [34].

During the current COVID-19 pandemic, social isolation limits the current treatment of the disease, especially for PPD patients, women sustained more stress during delivery ($U = 2652.50$; $P = 0.040$), increased risk of postpartum depression ($2 = 4.31$, $P = 0.038$) and worse evaluation of the quality of

care received (U = 2703.50; P = 0.041) [35],so that the psychological care is more advantageous by Internet-based psychosocial points, together with face-to-face treatment[36,37] .

3. Discussion

PPD is considered to be a major health problem for women from different cultures, classified as a psychiatric disorder [38], affecting 13~19% of maternal women. The International Classification of Disease Statistics defines PPD as onset within 6 weeks after delivery, while World Health Organization (WHO) and Centers for Disease Control (CDC) extended the risk period to 12 months after birth [8]. These clinical symptoms have adverse effects on maternal quality of life, relationships, maternal and infant relationships, and normal work [3, 4, 6, 39, and 40].

The influencing factors of PPD mainly include psychological and biological factors. Endocrine factors are now recognized as the mechanism of postpartum depression, because In the process of pregnancy and delivery, the maternal level of hormones changed, such as estrogen, other hormones, progesterone and thyroid hormones ,and within 24h postpartum, due to the delivery of the fetus, the change of the maximum. The consequence is that it may have an impact on emotion or cognition. In the serum of patients with depression, estrogen expression concentration can decrease by more than 35% on average, and progesterone concentration can also decrease significantly, further affected 5-HT and OFQ, affects endocrine level, damage neuronal cells, abnormal mitochondrial metabolism, central nervous system damage, and finally induce postpartum depression. Meanwhile, hypothyroidism is the most common abnormal thyroid disorder during pregnancy. Compared with pregnant women with normal thyroid function, PPD during pregnancy is more likely. Abnormal thyroid function can have direct effects on brain tissue itself or on postpartum depressive symptoms through indirect effects of the 5-HT system. For one hand, suppresses the hypothalamic-pituitary-thyroid axis (HPT) function, leading to PPD. for the other hand, inhibiting the hypothalamic–pituitary-adrenal axis (HPA) function and aggravating PPD.

Psychological care can improve postpartum depression, the mechanism may be regulation 5-HT, and OFQ, to reduce the damage of neurons, protect neurons, so that E2 and P (endocrine) are in balance. Especially during the COVID-19 pandemic, it is particularly important. However, there is not much research on how psychological nursing affects the level of sex hormone and thyroid, which needs to be further discussed.

References

[1] Saleh El-Sayed et al. Predictors of postpartum depression in a sample of Egyptian women. [J]. Neuropsychiatric disease and treatment, 2013, 9: 15-24.

[2] Liu Misai. Relationship between postnatal depression and thyroid function [J]. Maternal and Child Health Care in China, 2017, 32 (18): 4370-4372.

[3] Li D, Li Y, Chen Y, Li H, She Y, Zhang X, Chen S, Chen W, Qiu G, Huang H, Zhang S. Neuroprotection of reduced thyroid hormone with increased estrogen and progestogen in postpartum depression. Biosci Rep. 2019 Sep 3; 39(9):BSR20182382.

[4] Li H, Wang T, Shi C, Yang Y, Li X, Wu Y, Xu ZD. Inhibition of GALR1 in PFC Alleviates Depressive-Like Behaviors in Postpartum Depression Rat Model by Upregulating CREB-BNDF and 5-HT Levels. Front Psychiatry. 2018 Nov 14; 9:588.

[5] Deligiannidis KM, Meltzer-Brody S, Gunduz-Bruce H, Doherty J, Jonas J, Li S, Sankoh AJ, Silber C, Campbell AD, Werneburg B, Kanes SJ, Lasser R. Effect of Zuranolone vs Placebo in Postpartum Depression: A Randomized Clinical Trial. JAMA Psychiatry. 2021 Sep 1; 78(9):951-959.

[6] Li J, Chen Y, Xiang Q, Xiang J, Tang Y, Tang L. 5HTTLPR polymorphism and postpartum depression risk: A meta-analysis. Medicine (Baltimore). 2020 Sep 25; 99(39):e22319.

[7] Zhu Ying, Chen Yidan, Han Yiwen, Wang Xing, Li Mengqian.Advances in the relationship between postnatal depression and thyroid function [J].The Modern Chinese Doctor, 2019,57 (35): 165-168.

[8] Postpartum Depression: Action towards Causes and Treatment (PACT) Consortium. Heterogeneity of postpartum depression: a latent class analysis. Lancet Psychiatry. 2015 Jan; 2(1):59-67.

[9] Trifu S and Vladuti A and Popescu A. THE NEUROENDOCRINOLOGICAL ASPECTS OF PREGNANCY AND POSTPARTUM DEPRESSION [J]. Acta endocrinologica (Bucharest, Romania: 2005), 2019, 15(3): 410-415.

[10] Schwank SE, Chung HF, Hsu M, Fu SC, Du L, Zhu L, Huang HY, Andersson E, Acharya G. Mental health of Urban Mothers (MUM) study: a multicentre randomised controlled trial, study protocol. BMJ Open. 2020 Nov 27; 10(11):e041133.

[11] Branquinho M, Canavarro MC, Fonseca A. A Blended Cognitive-Behavioral Intervention for the Treatment of Postpartum Depression: Study Protocol for a Randomized Controlled Trial. Int J Environ Res Public Health. 2020 Nov 20; 17(22):8631.

[12] Gong Ying, Bao Cui, Rao Yuxia, Zhao Ji, Wang Juan, Kong Lingphosphorus, Zhao Mengjia.Effect of body mass index, weight gain during pregnancy and serum biochemical effects on postpartum depression [J].Chinese Journal of Health Psychology, 2020,28 (10): 1455

[13] Guan Hong, Wang Jian.Machine study of modern etiology of postpartum depression and the progress of acupuncture treatment [J].Journal of TCM, 2020,48 (12): 74-78.

[14] Pan Xiujuan, Huang Yangqin. Correlation between sex hormones and neurotransmitter indicators and depression status in postpartum depression patients [J].Maternal and Child Health Care in China, 2021, 36 (12): 2750-2752.

[15] Yun Wang et al. Orphanin FQ antagonizes the analgesic effect of 5-HT in rat brain [J]. Chinese Science Bulletin, 1999, 44(9): 793-795.

[16] Le Donne M, Settineri S, Benvenga S. Early pospartum alexithymia and risk for depression: relationship with serum thyrotropin, free thyroid hormones and thyroid autoantibodies. Psychoneuroendocrinology. 2012 Apr; 37(4):519-33.

[17] Ma Shuzhen, Meng Baoli, Wang Hongfeng. Analysis of the levels of HPA axis hormones, thyroid function and sex hormones in postpartum depression [J].International Journal of Psychiatry, 2020, 47 (03): 504-506 + 513.

[18] Harris B et al. Association between postpartum thyroid dysfunction and thyroid antibodies and depression [J]. BMJ (Clinical research ed.), 1992, 305(6846): 152-6.

[19] Bortolotti B, Menchetti M, Bellini F, Montaguti MB, Berardi D. Psychological interventions for major depression in primary care: a meta-analytic review of randomized controlled trials. Gen Hosp Psychiatry. 2008 Jul-Aug; 30(4):293-302.

[20] Huang Chunxia. Effects of Personalized Psychological Care on the Prevention of Postpartum Depression (J. Systemic Medicine, 2021, 6 (06): 156-158.

[21] Chen Miao, Wu Wendan. Study on the Effects of Personalized Psychological Care on the Prevention of Postpartum Depression. Journal of Psychology, 2020, 15 (10): 83.

[22] Liu, H., Yang, Y. Effects of a psychological nursing intervention on prevention of anxiety and depression in the postpartum period: a randomized controlled trial. Ann Gen Psychiatry 20, 2 (2021).

[23] Li C, Sun X, Li Q, et.al.e of psychotherapy on antenatal depression, anxiety, and maternal quality of life: A meta-analysis. Medicine (Baltimore). 2020 Jul 2; 99 (27):e20947.

[24] Jaarsma T, Hill L, Bayes-Genis A, et.al. Self-care of heart failure patients: practical management recommendations from the Heart Failure Association of the European Society of Cardiology. Eur J Heart Fail. 2021 Jan; 23(1):157-174.

[25] Missler M, Donker T, Beijers R, Ciharova M, Moyse C, de Vries R, Denissen J, van Straten A. Universal prevention of distress aimed at pregnant women: a systematic review and meta-analysis of psychological interventions. BMC Pregnancy Childbirth. 2021 Apr 1; 21(1):276.

[26] Stewart DE, Vigod S. Postpartum Depression. N Engl J Med. 2016 Dec 1; 375(22):2177-2186.

[27] Ma Shuzhen, Meng Baoli, Wang Hongfeng.Analysis of the levels of HPA axis hormones, thyroid function and sex hormones in postpartum depression [J].International Journal of Psychiatry, 2020,47 (03): 504-506 + 513.

[28] Zhao Li, Miu Qing. To explore the improvement effect of psychological care and health education on patients with postpartum depression. Journal of Psychology, 2021, 16 (02): 141-142.

[29] Shen Yangwen, Shen Xiaohua, Tong Qiaowei, et.al. Observation of the effects and efficacy of psychological care on sex hormone levels in patients with postpartum depression. China Medicine Guide, 2013, 10 (28): 131-133.

[30] Zhuang CY, Lin SY, Cheng CJ, Chen XJ, Shi HL, Sun H, Zhang HY, Fu MA. Home-based nursing for improvement of quality of life and depression in patients with postpartum depression. World J Clin Cases. 2020 Oct 26; 8(20):4785-4792.

[31] Hu dian, Gu Hang, Hong Xinru, Jin Zhijun, Liang Yong, Xiong Ying.Correlation between solomorphine levels and monoamine transmitters in PDD (English) [J].China Organizational Engineering Research and Clinical Rehabilitation, 2007 (30): 6103-6105.

[32] Farahnaz Keshavarzi MD et al. Post-Partum Depression and Thyroid Function [J]. Iranian Journal of Psychiatry, 2011, 6(3): 117-120.

[33] Raghuveer P, Ransing R, Kukreti P, Mahadevaiah M, Elbahaey WA, Iyengar S, Pemde H, Deshpande SN. Effectiveness of a Brief Psychological Intervention Delivered by Nurse for Depression in Pregnancy: Study Protocol for a Multicentric Randomized Controlled Trial from India. Indian J Psychol Med. 2020 Dec; 42(6 Suppl):S23-S30.

[34] Jidong DE, Husain N, Roche A, Lourie G, Ike TJ, Murshed M, Park MS, Karick H, Dagona ZK, Pwajok JY, Gumber A, Francis C, Nyam PP, Mwankon SB. Psychological interventions for maternal depression among women of African and Caribbean origin: a systematic review. BMC Womens Health. 2021 Feb 26; 21(1):83.

[35] Mariño-Narvaez C, Puertas-Gonzalez JA, Romero-Gonzalez B, Peralta-Ramirez MI. Giving birth during the COVID-19 pandemic: The impact on birth satisfaction and postpartum depression. Int J Gynaecol Obstet. 2021 Apr; 153(1):83-88.

[36] Schwank SE, Chung HF, Hsu M, Fu SC, Du L, Zhu L, Huang HY, Andersson E, Acharya G. Mental health of Urban Mothers (MUM) study: a multicentre randomised controlled trial, study protocol. BMJ Open. 2020 Nov 27; 10(11):e041133.

[37] Branquinho M, Canavarro MC, Fonseca A. A Blended Cognitive-Behavioral Intervention for the Treatment of Postpartum Depression: Study Protocol for a Randomized Controlled Trial. Int J Environ Res Public Health. 2020 Nov 20; 17(22):8631.

[38] Zhuang CY, Lin SY, Cheng CJ, Chen XJ, Shi HL, Sun H, Zhang HY, Fu MA. Home-based nursing for improvement of quality of life and depression in patients with postpartum depression. World J Clin Cases. 2020 Oct 26; 8(20):4785-4792.

[39] Liu Misai. MRelationship between postnatal depression and thyroid function [J].Maternal and Child Health Care in China, 2017, 32 (18): 4370-4372.

[40] Deligiannidis KM, Meltzer-Brody S, Gunduz-Bruce H, Doherty J, Jonas J, Li S, Sankoh AJ, Silber C, Campbell AD, Werneburg B, Kanes SJ, Lasser R. Effect of Zuranolone vs Placebo in Postpartum Depression: A Randomized Clinical Trial. JAMA Psychiatry. 2021 Sep 1; 78(9):951-959.