Roles of alexithymia and sleep disturbance in postpartum maternal separation anxiety

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Introduction. This study aims to understand whether alexithymia play a predictive role on postpartum maternal separation anxiety (PPA) among new mothers, who had experience of worry and concern about leaving her child to neonatal intensive care unit (NICU).

Methods. One hundred and ninety individuals were enrolled and separated to 2 groups in accordance with the Diagnostic and Statistical Manual of Mental Disorders: case group (n=95), new mothers whose newborns were admitted to the NICU because of severe jaundice and control group (n=95), new mothers with healthy newborns in general routine wards.

Results. Results showed that maternal separation events could seriously affect the psychological state of new mothers during the early postpartum stage. Alexithymia and sleep disturbance play a crucial role in PPA.

Conclusion. A multidimensional assessment is essential to identify risk factors of PPA, especially among new mothers experiencing stressful life events.

Keywords. alexithymia, sleep disturbance, postpartum anxiety, maternal separation

INTRODUCTION

The postpartum stage is a period of heightened vulnerability to the onset of psychiatric disorders. Mothers at the postpartum stage are confronted with many challenges, such as hormonal changes, endocrine system changes, increasing in body weight, and sleep disturbance (Ajslev et al.,2010). The physical changes at this stage could affect the mood and feelings of distressed mothers and decrease their psychological well-being, leading to postpartum depression (PPD) and postpartum anxiety (PPA) (Yelland et al.,2010). Clinical research revealed that the incidence of PPD in the general population is approximately 13%–19% (O'Hara & McCabe.,2013). In fact, the study of PPA is relatively rare comparing to PPD. Recent studies have shown that maternal PPD and PPA jointly occur (Walker et al.,2020). Mothers experiencing a comorbidity of anxiety symptoms show weak mother–infant interactions, psychosocial dysfunction, and poor family functioning (van der Zee-van den Berg et al.,2021). The early attachment of mother and child is crucial for the overall development and psychological healthy of the child (Farr et al.,2014). Therefore, the risk factors leading to PPA must be identified to help clinicians provide intervention.

Accumulating evidence suggests that experiencing maternal separation life events during the postpartum period could cause or promote maternal psychiatric symptoms (Booth et al.,2021). Leaving newborns to NICU is a maternal separation stressful event for mothers, and it can increase maternal risk for psychiatric disorders (Muzik & Rosenblum,2018). The prevalence of PPD in new mothers can reach 39% when their infant is admitted to the NICU at birth (Laudi & Peeples,2020). Mothers not only associate NICU admission with financial pressure but also with separation from their infants and inability to care for them while excessively worrying about their survival (Laudi & Peeples,2020). NICU admission is a risk factor for PPD, but whether NICU admission also contributes to the development PPA during the postpartum period is unclear. From a clinical perspective, most research on NICU admission PPA has shortcomings (Yelland et al.,2010;Khanlari et al.,2019). First, they were easily biased because the emotional assessment was performed by the patients, and there were no professional diagnosis and evaluation by psychiatrists. Second, focusing on PPA with stress may neglect the social, psychological, and somatic comprehensive forms of PPA. Thus, contextual features of somatic responses, emotion regulation, and expression in new mothers with a comorbidity of PPA need to be assessed multi-dimensionally, namely, sleep quality, symptoms of depression and anxiety, emotional regulation and alexithymia function etc.

In recent years, several studies explored the role of personality psychological features of newborn mothers in the onset of PPD and PPA, especially difficulties in identifying, describing, and regulating emotions. The twenty Toronto scale (TAS-20)

(Karukivi et al.,2015) and emotion regulation questionnaire (ERQ) have been widely used as self-reported instruments to identify individuals with alexithymia and emotion regulation strategies (Pines et al.,2018). The multifaceted structures of TAS-20 and ERQ were composed to detect emotional dysregulation, difficulty identifying feeling, inability to describe emotions verbally, and having an externally oriented way of thinking. In other words, these deficiencies could exert detrimental effects on psychological and physical health. To our knowledge, research on alexithymia in postpartum periods is rare, and it is unclear whether alexithymia can interpret problems related with postpartum maternal separation anxiety (PPA) among new mothers (Karukivi et al.,2015). Thus, we aim to elucidate whether alexithymic features and impaired emotional regulation measured new mothers to depressive and anxiety symptoms postpartum, whose newborns were diagnosed with serious medical conditions and admitted to the NICU.

MATERIALS AND METHODS

Participants

Two hundred and thirty individuals were screened, 28 did not sign informed consents, and 12 did not finish the assessment. Hence, 40 people were not included. The remaining was separated to Case group (new mothers whose newborns were admitted to the NICU because of severe jaundice, *n*=95) and control group (new mothers with healthy newborns in general routine wards, *n*=95). The study got approval from the Medical Ethics Committee and had a registration number of chiCTR2000029917(see

Research ethics).

Procedures

This observational study was conducted at the hospital from January 2019 to December 2021. Two professional psychiatrists used the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) to evaluate all participants according to designed standards. Participants of case group were patients from the neonatal department , and participants in the control group was from the obstetrics department. Participants in case group met these inclusion criteria: (1) new mothers whose newborns were admitted to the NICU because of severe jaundice. (2) 18-50 years old; and (3) no history of any neurological disease or traumatic brain injury (screening by a psychiatrist). Participants of health control met these inclusion criteria: (1) new mothers with healthy newborns in general routine wards. (2) meet the second and third criteria of the case group. In order to avoid the confounding variable on this study, participants will be excluded from the study if they have the following conditions: (1) history of craniocerebral trauma or organic cerebral diseases; (2) alcohol/other substance use/mental disorders; and (3) diabetes, hypertension, or endocrine disease.

Demographic characteristics

Demographic information was collected via a questionnaire, including age, gender, personality traits, educational level attained, marital status, income status, and fertility methods etc. .

Beck Depression Inventory (BDI)-II

BDI is a 21-item questionnaire to evaluate depression severity present over a 2-week period. It ranges from 0 to 63, with high scores means severer depressive. BDI has good internal consistency (Cronbach's alpha=0.83), excellent sensitivity (0.94) and specificity (0.98) compared with other depression measures (Lee et al.,2018).

Beck Anxiety Inventory (BAI)

BAI is a 21-item instrument to evaluate anxiety. Each item ranges from 0 to 3, so total score will be 0 to 63 with 0-9, normal or no anxiety; 10-18, mild to moderate anxiety; 19-29, moderate to severe anxiety; and 30-63, severe anxiety. BAI shows excellent internal consistency (Cronbach's alpha=0.94) and good excellent validity for anxiety disorders (Thomas et al.,1992; Julian,2011).

Hamilton Depression Rating Scale (HAMD)-24

HAMD-24 is commonly used to estimate depressive symptoms worldwide. It has satisfactory reliability and validity to assess depressive symptoms, and high scores indicate great severity of depression (Dong et al.,2021).

Hamilton Anxiety Rating Scale (HAMA)-14

HAMA-14 is a reliable instrument to evaluate anxiety (Clark & Donovan,1994). It ranges from 0 to 4. HAMA14 <7 points, normal or no anxiety; ≥7 points, anxiety. The items also include somatic and autonomic symptoms, as well as emotional anxiety, including fear/worry (Zimmerman et al.,2017).

Emotion Regulation Questionnaire (ERQ)

ERQ is used to evaluate two domains of emotion strategies on cognitive reappraisal and expressive suppression(Gross & John,2003). It has good reliability on both subscales of reappraisal and suppression (Suksasilp et al.,2021).

Toronto Alexithymia Scale-20 (TAS-20)

TAS-20 is a 20-item scale for evaluating alexithymia. It is composed of 3 subscales: difficulty identifying feelings, difficulty describing feelings, and externally oriented thinking. It ranges between 20–100, the higher the score, the severer the alexithymia. It has been proved good intra class correlation coefficients alpha ranging from 0.80 to 0 .87 for the total scores and subscale scores. (Bagby et al.,1994;Besharat et al,2006).

Pittsburgh Sleep Quality Index (PSQI)

The PSQI scale was used to measure sleep quality. It has 19 items and ranges between 1 and 4, with excellent consistency. PSQI evaluates sleep problems by assessing subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, use of sleep medication, and daytime dysfunction. High sleep scores show poor sleep quality (Huang & Zhu,2020).

Statistical analysis

Data were analyzed by SPSS 24.0 (IBM). Continuous and categorical variables of demographic characteristics in the study were analyzed using Chi-square test or t-test. t-test was used to compare numbers of BDI, BAI, HAMD, HAMA, ERQ, TAS-20, and PSQI. Spearman correlation was performed to measure how risk factors were correlated with BAI. Logistic regression was used to test the relationship among TAS-20, PSQI, and BAI. $\alpha < 0.05$ was defined as significant.

RESULTS

Comparisons of demographics, depressive symptoms, anxiety symptoms, sleep quality, ability of emotion regulation, and alexithymia between the two groups

Overall, no difference was shown in 2 groups' demographic characteristics, including age, personality characteristics, education, family income, family type, condition of bearing child, and way of bearing child ($p \geq 0.05$). We investigated the characteristics of depressive symptoms, anxiety symptoms, sleep quality, emotion regulation, and alexithymia between the two groups, the results shown proportion of people with depressive symptoms no significant difference between two groups, no matter assessment self-reported scale or professional psychiatrists ($p \geq 0.05$). The proportion of people with anxious symptoms was drastically higher in case group than health control, whether it was assessed by the self-report or professional psychiatrist ($p = 0.049$, $p \leq 0.001$, Table 1).

Table 1 demographic characteristic of the case group and control group

Factors	Case group	Control group	t/χ2	*p*
Age	30.11±4.409	29.19±3.384	1.606	0.110
Personality traits				
introvert or neutral	73(76.8)	82(86.3)	2.837	0.092
extrovert	22(23.2)	13(13.7)		
Degree of education				
bachelor degree and below	86(90.5)	86(90.5)	0	1.000
master's degree or above	9(9.5)	9(9.5)		
Only child				
yes	39(41.1)	34(35.8)	0.556	0.456
no	56(58.9)	61(64.2)		
Family type				
core type and intermediate	84(88.4)	81(85.3)	0.415	0.520
large family	11(11.6)	14(14.7)		
Household income (yuan)				
＜10000	70(73.7)	78(82.1)	1.956	0.162
≥ 10000	25(26.3)	17(17.9)		
Mode of production				
natural labor	64(67.4)	55(57.9)	1.822	0.177
cesarean section	31(32.6)	40(42.1)		
BDI-II				
≤ 4	50(52.6)	63(66.3)	3.690	0.055
> 4	45(47.4)	32(33.7)		
HAMD-24				
≤ 8	74(77.9)	84(88.4)	3.758	0.053
> 8	21(22.1)	11(11.6)		
BAI				
< 9	0	0	6.046	0.049*
10-18	67(70.5)	81(85.3)		
19-29	21(22.1)	10(10.5)		
≥30	7(7.4)	4(4.2)		
HAMA-14				
≤ 7	28(29.5)	56(58.9)	16.730	≤0.001**
> 7	67(70.5)	39(41.1)		

Note: BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory, HAMD: Hamilton Depression Rating Scale, HAMA: Hamilton Anxiety Rating Scale, *$p \leq 0.05$，**$p \leq 0.001$.

From the perspective of clinical symptoms contents, circadian change score and sleep disorder score in HAMD were drastically higher in case group than controls (p=0.016, p=0.006). Case group showed a higher total scores of anxious symptoms (p=0.004), a bigger mental anxiety score in HAMA (p=0.029), higher sleep quality, somnipathy and daytime dysfunction scores in PSQI (p=0.003, p=0.004, p=0.001), compared to that of controls. Further, we found that case group showed higher total or subscale scores of TAS-20 than controls (p=0.001, p=0.038, p=0.017, p<0.001, respectively). Additionally, differential emotional expression was not found between two groups (Table 2).

Table 2 Different symptoms of PPD, PPA, emotional regulation, alexithymia and sleep between the case group and the control group

Scale	Case group (*N*=95)	Control group (*N*=95)	*t*	*p*
BDI Total	6.64±6.933	4.98±6.831	1.666	0.097
HAMD Total	30.64±7.638	28.81±6.777	1.792	0.075
anxiety/somatization	7.21±1.810	6.73±1.647	1.929	0.055
body weight	1.18±0.461	1.11±0.309	1.295	0.197
cognitive impairment	6.79±1.821	6.43±1.088	1.644	0.102
circadian change	2.49±1.040	2.19±0.641	2.435	0.016**
sluggish	5.14±1.575	4.91±1.377	1.079	0.282
sleep disorder	4.40±1.722	3.76±1.449	2.780	0.006**
sense of despair	3.67±1.447	3.35±0.908	1.861	0.064
BAI Total	29.60±7.400	26.81±5.725	2.906	0.004**
HAMA Total	17.26±4.437	16.25±4.486	1.561	0.120
physical anxiety	7.75±1.631	7.73±1.932	0.081	0.935
mental anxiety	9.52±3.319	8.53±2.850	2.204	0.029*
ERQ Total	43.89±8.123	43.63±9.425	0.206	0.837
emotion suppression	14.57±4.392	15.80±4.252	-1.964	0.051
cognitive reappraisal	29.33±6.189	27.83±6.717	1.595	0.112
TAS-20 Total	57.61±6.570	53.09±10.069	3.504	0.001**
difficulty identifying feeling	17.61±3.452	16.40±4.150	2.086	0.038*
difficulty describing feeling	14.15±1.950	13.29±2.689	2.421	0.017*
externally-oriented thinking	25.85±3.364	23.40±5.299	3.638	≤ 0.001**
PSQI Total	5.43±3.187	4.68±3.067	1.576	0.117
sleep quality	0.99±0.690	0.66±0.790	2.964	0.003**
sleep latency	1.01±0.909	1.02±0.849	-0.086	0.931
sleep time	0.92±0.8661	1.20±0.986	-1.961	0.052
sleep efficiency	0.31±0.687	0.38±0.686	-0.662	0.509
somnipathy	0.91±0.523	0.66±0.607	2.925	0.004**
hypnotic drug	0.00±0.100	0.01±0.107	-1.000	0.319
daytime dysfunction	1.30±1.013	0.76±0.862	3.788	≤0.001**

Note:BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory, HAMD: Hamilton Depression Rating Scale, HAMA: Hamilton Anxiety Rating Scale, ERQ: Emotion Regulation Questionnaire, TAS-20: Toronto Alexithymia Scale-20, PSQI: Pittsburgh Sleep Quality Index. *$p \leq 0.05$，**$p \leq 0.001$.

Correlation analysis between emotional expression, alexithymia, sleep quality and PPA

The correlation of emotional expression, alexithymia, and sleep quality with BAI was evaluated using Spearman correlation analysis. Remarkable or significant correlations were found between total score of TAS-20 and BAI (r=0.226, p=0.028). Particularly, difficulty in identifying feelings subscale of TAS-20, somnipathy, and daytime dysfunction were correlated to BAI (Table 3).

Table 3 Analysis of the correlation between the score of Baker anxiety scale and emotion regulation, alexithymia and sleep in case group

Factors	BAI total	
	r	*p*
age(years)	-1.109	0.295
personality traits	0.063	0.547
education (years)	-0.084	0.418
only child	-0.047	0.650
family type	0.041	0.691
household income	-0.155	0.133
umbilical cord, placenta, amniotic fluid	0.067	0.516
mode of production	0.004	0.970
TAS-20 Total	0.226	0.028*
difficulty identifying feeling	0.336	≤0.001**
difficulty describing feeling	0.175	0.089
externally-oriented thinking	-0.161	0.118
PSQI Total	0.130	0.208
sleep quality	0.127	0.221
sleep latency	-0.034	0.742
sleep time	-0.033	0.750
sleep efficiency	0.184	0.074
somnipathy	0.219	0.034**
hypnotic drug	-0.131	0.195
daytime dysfunction	0.223	0.030**

Note: TAS-20: Toronto Alexithymia Scale-20, PSQI: Pittsburgh Sleep Quality Index. *$p \leq 0.05$，**$p \leq 0.001$.

Independent predictors of alexithymia and sleep quality with PPA

Binary logistic regression models were fitted to the data with baseline BAI subset scale scores as response status (0=total score<45, 1=total score≥45). Firstly, we took

BAI more than 45 points as the dependent variable, took age, personality characteristics, education, income of family, family type, condition of bearing child, way of bearing child, alexithymia, and sleep quality index were analyzed as independent variables. Logistic regression results are presented in Table 4. It was demonstrated that case group showed higher odds [*OR*=1.483, 95%*CI*=(1.130–1.948), *p*=0.005] in difficulty identifying feeling [*OR*=1.483, 95%*CI*=(1.130–1.948), *p*=0.005], somnipathy relational BAI [*OR*=7.253, 95%*CI*=(1.580-33.288), *p*=0.011], and daytime dysfunction relational BAI [*OR*=2.553, 95%*CI*= (1.009-6.457), *p*= 0.048].

Table 4 The results of binary logistic regression analysis of the total score of BAI in the case group

Independent variables	*OR*	*95% CI*	*p*
Age(years)			
< 30	1.0		
≥30	0.613	0.107-3.518	0.583
Personality traits			
introvert or neutral	1.00		
extrovert	1.725	0.294-10.116	0.546
Only child			
yes	1.00		
no	0.679	0.130-3.556	0.647
Family typed			
core type and intermediate type	1.00		
large family	1.580	0.167-14.924	0.690
Mode of productione			
natural labor	1.00		
cesarean section	1.034	0.179-5.979	0.970
TAS-20			
no difficulty identifying feeling	1.00		
difficulty identifying feeling	1.483	1.130-1.948	0.005**
PSQI			
somnipathy	7.253	1.580-33.288	0.011*
daytime dysfunction	2.553	1.009-6.457	0.048*

Note: Variable binaria dependiente: 0 = no anxity (BAI total < 45); 1 = anxity (BAI ≥ 45). BAI: Beck Anxiety Inventory, TAS-20: Toronto Alexithymia Scale-20, PSQI: Pittsburgh Sleep Quality Index. B = regression coefficient, OR=odds ratio, *CI* = Confidence Interval; *$p \leq 0.05$，**$p \leq 0.001$.

DISCUSSION

Emotion regulation and alexithymia affect PPA and PPD. We studied the relationship of emotion regulation and alexithymia with PPA. Results revealed that case group suffered higher PPA. Specifically, case group showed mental anxiety, poor sleep quality, and impaired daytime function. Furthermore, severity of alexithymia,

difficulty identifying feelings, somnipathy and daytime dysfunction were positively correlated with PPA. Meanwhile, difficulty identifying feelings, somnipathy, and daytime dysfunction were explored as risk predictive factors of PPA.

Over the last few decades, extensive research has focused on PPD (Marques et al.,2018), but anxiety during the postpartum period has been relatively neglected (van der Zee-van den Berg et al.,2021). Data on anxiety state during the postpartum period are inconsistent because of methodological heterogeneity. A 15%-20% of anxiety disorders during the postpartum period has been reported (Coates et al.,2004). When the general anxiety symptoms were considered, 17%-22% or 15%–33% of anxiety symptoms were present in early (Nakić Radoš et al.,2018) or late postpartum period (Farr et al.,2014). However, some scholars found that only 6% of ladies experienced high anxiety at 14, 60, or 180 days post childbirth (Nakić Radoš et al.,2018). These differential results may be caused by the diversity of experimental samples, discrepancy of evaluation criteria, and the lack of professional psychiatrists according to the strict diagnostic criteria to evaluate PPA (Farr et al.,2014). Therefore, in order to comprehensively understand the symptoms of PPA, the participants were assessed by self-reported and professional psychiatrists in the present study, we found that case group showed a higher PPA rate, no matter assessment of patient's self-reported symptoms or a psychiatrist's evaluation. In particular, our results verfied that anxiety symptom was particularly severe in the case group, it is suggested that maternal separation had a negative impact on their mothers' emotions.

As yet, increased sleep disturbances are tightly related to depression/anxiety, which is not surprising and daily insomnia or somnipathy is one of the DSM-5 diagnostic criteria of depressive or anxious disorders (Difrancesco et al.,2019). The evidence also suggests causal linkages between sleep quality and daytime dysfunctions, as well as regarded somnipathy is associated with attention deficit, poor memory and poor life quality (Hartescu et al.,2015).. Furthermore, recent studies proclaim a relationship between sleep disorder and anxiety among postpartum ladies (Okun et al.,2018; Gueron-Sela et al.,2021). Consistent to published findings, we demonstrated that the occurrence of sleep disturbance in the case group was 7 times and the daytime dysfunctions were 2 times higher than that in the normal control group, these results indicate that sleep disturbance is one of the hallmarks of PPA.

Emotion regulation difficulty predicts an increase in anxiety symptoms (Fábián et al.,2020). It encompasses a set of mechanisms to attempt manage, modification, sustainability, enhancement, or suppress the intensity or duration of an emotional state (Marques et al.,2018). It has been reported that suppression strategy is related to mental disability and depression (Cutuli,2014). However, in this study, there was not a significant association between emotion regulation strategy and PPA. The reason for this discrepancy could be that the questionnaire requires respondents to be more precise. Therefore, future study should focus on a reliable emotion regulation-related tool created by professional psychiatrists or clinical Psychologists. Alexithymic individuals also have poor emotion-related regulation strategies (Fábián et al.,2020). Having that impairment may have difficulty in regulating emotion, leading to

enhanced negative affectivity and worsening symptomatology (Gilanifar & Delavar,2017). Similarly, case group showed a higher incidence of alexithymia. The failure to correctly identify emotions was positively correlated with PPA. In specifically, difficulty distinguish feelings may be a predictive risk factor for PPA.

Our results have several advantages. First, all participants were screened by professional psychiatrists, self-rating scale and professional psychiatrist assessment were also adopted in the symptom evaluation to comprehensively understand the symptoms of the patients. Second, new mothers experiencing stress because of their newborns' admission to the NICU due to severe jaundice were evaluated and compared with new mothers with healthy newborns in general routine wards. From this perspective, we can better assess the effect of stressful events on these mothers during the early postpartum period. However, it is worth to note limitations. First, causal conclusions cannot be made because of the cross-sectional design. Longitudinal studies should be considered to better understand networks among emotion, alexithymia, and related clinical factors. Second, the sample size relatively small. Thus, larger-sized cohorts of PPA should be required in the further investigation.

CONCLUSION

In conclusion, new mothers whose newborns were in the NICU admission suffered higher PPA than those new mothers whose newborns were healthy. Somnipathy, daytime dysfunction, and alexithymia were positively correlated with PPA. However,

no correlation was found between emotion regulation and PPA. Difficulty identifying feelings, somnipathy, and daytime dysfunction were explored as risk predictive factors in the sample of new mothers suffering PPA. These findings of present study remind clinicians and family members not only to pay attention to PPD, but also to increase the assessment of risk factors for PPA, especially for new mothers who experience stressful life events.

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Data Availability

Available upon request.

Conflicts of Interest

None.

Reference

None.

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