Influence of kinesiophobia with pregnancy-related lumbopelvic pain at late pregnancy on postpartum depressive symptoms

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ABSTRACT. Objective: To investigate whether kinesiophobia with pregnancy-related lumbopelvic pain at late pregnancy influenced depressive symptoms at 1 month after delivery. Method: Final participants were 43 pregnant women who experienced pregnancy-related lumbopelvic pain at late pregnancy and completed self-reported questionnaires at late pregnancy and 1 month after delivery. The Tampa Scale for Kinesiophobia was used to evaluate kinesiophobia, and depressive symptoms were assessed using the Self-Rating Depression Scale. We divided participants into two groups (depression and no-depression) using the score of the Self-Rating Depression Scale at 1 month after delivery. Univariate analysis and multiple logistic regression analysis identified kinesiophobia at late pregnancy as an independent predictor of depression at 1 month after delivery. Results: In univariate analysis, kinesiophobia at late pregnancy was significantly higher in the depression group than in the no-depression group (P = .033). In multiple logistic regression analysis, kinesiophobia at late pregnancy were significantly associated with depression at 1 month after delivery even after adjusting for confounding factors (Odds Ratio, 1.25; 95% Confidence Interval, 1.03-1.52). Conclusion: Results found that kinesiophobia at late pregnancy negatively influenced depressive symptoms at 1 month after delivery, suggesting that approaches to treat kinesiophobia at late pregnancy might reduce the risk of onset of postpartum depressive symptoms.

Key words: postpartum depression, lumbopelvic pain, kinesiophobia, women’s health

The birth of a baby is a major source of stress for mothers, who require a number of adjustments to the new situation11. The perinatal phase also brings about physical as well as physiological changes in women, from changes in body shape and posture to imbalances in hormone secretions12, that tend to increase stress among women. Therefore, the postpartum phase is a particularly vulnerable time13. Women are at increased risk of developing depression dur-
ing the postpartum phase. A meta-analysis has shown that nearly 20% of women deal with major or minor depression within the first 3 months after delivery. Postpartum depressive symptoms negatively affect maternal health and behavior, child outcomes, mother-infant interactions, as well as the father’s mental health. A narrative review has reported that the risk factors of postpartum depressive symptoms are psychiatric factors such as previous history of depression and anxiety and mental health disorders, obstetric risk factors such as risky pregnancy, postpartum complications and low birth weight, biological factors such as young age and glucose metabolism disorders during pregnancy, social factors such as poor social support and smoking, and lifestyle such as exercise, physical activity and food intake patterns, etc.

One of the factors associated with postpartum depressive symptoms is lumbopelvic pain (LPP) during pregnancy. LPP is common during pregnancy; it encompasses low back pain (LBP), pelvic girdle pain (PGP), or a combination of the two. Approximately 50-70% of pregnant women experience LPP, which interferes with the activities of daily living (ADL) and work and sleep of the pregnant women. In addition, pregnancy-related LPP can evolve into chronic pain, making LPP during pregnancy a notable issue to be resolved.

The fear avoidance model (FAM) is the vicious circle wherein pain evolves into depressive symptoms. This model is often applied to patients with chronic pain, including LBP. According to FAM, during a musculoskeletal pain episode, catastrophizing brings on pain-related fear that leads to avoidance of activities, and the excessive caution might cause disability, disuse, and depressive symptoms. Pain-catastrophizing patients will maintain pain experiences, thereby fueling the vicious circle of increasing fear and avoidance. One element of this vicious circle is fear of movement called kinesiophobia, which is defined as avoidance behavior and hypervigilance to bodily sensations. In people with back, neck, or upper extremity pain, kinesiophobia has been reported to be a predictive factor of depressive symptoms at six months later from baseline.

Another study has shown that chronic LBP patients in a depression group had significantly greater fear of movement than those in a no-depression group. In the case of pregnant women, considering that LPP during pregnancy would negatively affect ADL, fear of movement could increase as pregnancy progresses. From this possibility and previous studies’ findings, we focused on fear of movement and considered that pregnant women with LPP and fear of movement might be at high risk of postpartum depressive symptoms. However, no study has investigated whether kinesiophobia during pregnancy influences depressive symptoms after delivery.

Therefore, this study investigated whether kinesiophobia with pregnancy-related LPP at late pregnancy influenced postpartum depressive symptoms among women. We hypothesized that kinesiophobia at late pregnancy negatively influences depressive symptoms at 1 month after delivery.

**Method**

**Participants**

Data were collected from the department of obstetrics in a local women’s hospital in Hyogo, Japan. Women who visited at late pregnancy were recruited by researchers or midwives from August 2013 to August 2014. Fig. 1 shows the flowchart of participant recruitment and screening. We recruited 255 women at late pregnancy. The inclusion criteria for this study were as follows: (1) having pregnancy-related LPP at late pregnancy and (2) answering the questionnaire at late pregnancy (28-40 week’s gestation). At the first assessment for this study, 121 women with late pregnancy LPP were enrolled. At the second assessment, participants answered a questionnaire at 1 month after delivery. Participants who did not answer the questionnaire at 1 month and those who did not complete all questions were excluded from the study (n = 78). Finally, 43 participants were included in the analysis. Data collection began after our proposal was approved by the Ethics Committee of Kobe City College of Nursing (approval number 2012-1-28). All women received written and verbal information about the study from researchers or midwives, and they signed written consent forms in accordance with the Declaration of Helsinki before participation.

**Data collection**

Participants answered the self-reported questionnaire during medical checkup at late pregnancy and at 1 month after delivery. After they finished answering the questionnaire, they handed it to researchers or midwives, or boxed it at the hospital. At the first assessment, the questionnaire was structured by demographic characteristics, obstetric data, LPP, depressive symptoms, and kinesiophobia. Demographic characteristics included age, height, and weight before pregnancy. Body mass index (BMI) was calculated as follows: BMI [kg/m²] = weight [kg]/(height [m])². Obstetric data included previous birth experience and gestational age. At the second assessment, participants were evaluated for depressive symptoms.

**Lumbopelvic pain (LPP)**

In this study, we define LPP as pain that includes LBP, PGP, or their combination (Fig. 2). The presence of LPP was assessed through the closed-ended question “Do you currently have pain in this gray area? Yes-No.” Next, for participants who answered “Yes”, whether the pain related to pregnancy was assessed through the following question: “Did this pain occur after you became preg-
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**Figure 1.** Flow chart of pregnant women recruited for and participating in this study

**Figure 2.** Pain in the gray area around the lower back considered to indicate LPP in participants

Depressive symptoms were assessed by the Japanese version of the Self-Rating Depression Scale (SDS)\(^3\). SDS is a 20-item, self-rating questionnaire and is a standard depression assessment instrument. Respondents choose the statement that most closely applies to them. Each item is ranked on a 4-point Likert scale (1 = never to 4 = very often). A total score, from 20 to 80, is derived by summing each item’s scores. A higher score indicates a higher level of depressive symptoms, and a score of more than 40 is defined as indicating depressive symptoms\(^3\). In this study, we divided participants into two groups (depression and no-depression) using the SDS score at 1 month after delivery. SDS has often been used by evaluating depressive symp-
Kinesiophobia

The Japanese version of the Tampa Scale for Kinesiophobia (TSK) was used to evaluate fear of movement\textsuperscript{33}. This scale consists of 17 items about pain for which respondents were supposed to mark how much they agreed or disagreed with each item, using a 4-point Likert scale\textsuperscript{33}. Total scores ranged between 17 and 68. The higher the score, the greater the degree of kinesiophobia, showing that the respondent fears moving because of pain.

Statistical analysis

Data were described as mean±standard deviation (SD) for continuous variables and percentages for categorical variables. To compare each variable at late pregnancy between the depression and no-depression groups, independent t-tests were used for continuous variables (age, pre-pregnancy BMI, and TSK score) and chi-square tests for categorical variables (previous birth experience and depressive symptoms at late pregnancy: presence or absence). Because gestational age and the VAS did not follow a normal distribution, comparisons were made through a Wilcoxon rank sum test. Next, we performed univariate and multiple logistic regression analysis to identify TSK scores at late pregnancy as an independent predictor of depressive symptoms at 1 month after delivery, adjusted for confounding factors. Odds ratio (OR) and 95% confidence intervals (CI) were calculated. Confounding factors were depressive symptoms at late pregnancy which were reported as predictive factor of postpartum depression\textsuperscript{36} and variables whose P value was less than 0.2 in independent t-tests and chi-square tests. We made three logistic regression analysis models as follows; model 1, univariate model; model 2, multivariate model adjusted for depressive symptoms at late pregnancy; model 3, multivariate model adjusted for all confounding factors. A P value of less than 0.05 was considered statistically significant. All analyses were performed with JMP11.2.0 (SAS Institute Japan, Tokyo, Japan).

Results

The depression group at 1 month after delivery consisted of 13 women (30.2%). All participants had not attended a hospital because of the lower back or spine injury. 24 participants reported LPP occurred only moving and 6 participants reported LPP continued over 1 week. Demographic characteristics, obstetric data, VAS, and TSK scores of all participants at late pregnancy and comparisons of each variable between depression group and no-depression group are presented in Table 1. There was not significant difference between the two groups as for the rate of primiparas. According to univariate analysis (P = .033), TSK score at late pregnancy was significantly higher in the depression than in the no-depression group. On the other hand, VAS at late pregnancy was not associated with depressive symptoms at 1 month after delivery.

The result of univariate and multiple logistic regression analysis is shown in Table 2. A confounding factor with P value of less than 0.2 in independent t-test was pre-pregnancy BMI. TSK scores at late pregnancy were significantly associated with depressive symptoms at 1 month after delivery, even after adjustment for confounding factors (OR, 1.25; 95% CI, 1.03-1.52).

Discussion

In this study, we found that kinesiophobia with pregnancy-related LPP at late pregnancy influenced the presence of depressive symptoms in women at 1 month after delivery. In other studies of patients with neck pain, back pain, and chronic LBP, kinesiophobia has been reported to affect depressive symptoms\textsuperscript{24,25}. Kinesiophobia is
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Table 2. Results of univariate and multiple logistic regression analysis to explore the factor affecting depressive symptoms at 1 month after delivery.

|                      | Model 1  | Model 2  | Model 3  |
|----------------------|----------|----------|----------|
|                      | OR       | 95%CI    | OR       | 95%CI    | OR       | 95%CI    |
| TSK                  | 1.19     | 1.01-1.41| 1.21     | 1.01-1.44| 1.25     | 1.03-1.52|
| Depressive symptoms at late pregnancy | 1.93     | 0.43-8.73| 3.45     | 0.60-19.8|          |          |
| Pre-pregnancy BMI    |          |          | 0.69     | 0.46-1.04|          |          |

Model 1, univariate logistic regression analysis
Model 2, multiple logistic regression analysis adjusted for depressive symptoms at late pregnancy
Model 3, multiple logistic regression analysis adjusted for depressive symptoms at late pregnancy and pre-pregnancy BMI

OR, odds ratio; CI, confidence interval; TSK, Tampa Scale for Kinesiophobia; BMI, body mass index

also an element of FAM.

Various factors can lead to postpartum depressive symptoms, and one such reported factor is LPP at late pregnancy. Recent studies have suggested that pregnancy-related LPP was associated not only with physical factors but also with psychological factors such as stress, catastrophizing, and fear-avoidance beliefs that result from fear of pain, (re)injury, and movement. In another study investigating the relation between PGP (included in LPP) and fear of movement, the latter was significantly higher in pregnant women with PGP than in healthy pregnant women. However, the influence of kinesiophobia at late pregnancy on postpartum depressive symptoms had not been investigated. Hence, this is the first study to reveal such an influence. Our result builds on previous studies’ findings and suggests that FAM might be adaptable for pregnant women. In addition, pregnant women with LPP have reported higher levels of catastrophizing than those without LPP. Considering this finding in addition to reports that women in the perinatal phase are more mentally frail than in other phases of their lives, fear avoidance might be stronger in pregnant women; thus, we should focus on pregnant women from the preventive perspective.

The present study suggests that approaches to treat kinesiophobia of pregnant women with pregnancy-related LPP reduce the risk of onset of postpartum depressive symptoms. Cognitive behavioral therapy and education have been implemented as specific approaches to kinesiophobia in adults. However, women in the perinatal phase would be vulnerable both physically and mentally. Therefore, medical staff should adopt both physical and mental approaches for treating kinesiophobia in pregnant women.

In this study, the depression group at 1 month after delivery consisted of 13 women (30.2%). This result was a little high rate in comparison to another Japanese investigation. We assessed depressive symptoms by SDS and considered women whose SDS score ≥ 40 indicating depressive symptoms. Therefore, our depression group contained women who were mild cases, and there might be high prevalence in this study.

This study has several limitations. First, the sample sizes were small. In this study, there was not significant difference between known factors such as VAS and depressive symptoms at late pregnancy and postpartum depressive symptoms. Thus, future studies with sufficient sample sizes are warranted. However, despite the low statistical power conditions, we found a significant difference in kinesiophobia between depression and no-depression groups. Second, this study used self-reported questionnaires, even though it is best to assess depression on the basis of clinical diagnostic criteria. For LPP, pain provocation tests should be performed and the pain site specified. We should especially investigate any site that influences an increased fear of movement and depression. Third, we could not analyze the association between postpartum depressive symptoms and social factors. In the future, we should consider social factors because social factors such as social supports and family relations might influence both depressive symptoms and kinesiophobia. Despite these limitations, to the best of our knowledge, this is the first time that the influence of kinesiophobia during pregnancy and on postpartum depressive symptoms has been investigated.

Conclusions

In this study, we investigated the influence of kinesiophobia with pregnancy-related LPP at late pregnancy on depressive symptoms at 1 month after delivery. Results found that kinesiophobia at late pregnancy negatively influenced postpartum depressive symptoms, and this result suggested that approaches to treat kinesiophobia at late pregnancy might reduce the risk of onset of postpartum depressive symptoms.

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