

# Association of Low Back and Pelvic Pain with Mental Health Condition during Pregnancy and Postpartum

Yuko Uemura<sup>1\*</sup>, Toshiyuki Yasui<sup>2</sup>, Kimiyo Horike<sup>3</sup>, Kazuhisa Maeda<sup>3</sup>, Hirokazu Uemura<sup>4</sup>, Mari Haku<sup>5</sup>, Reiko Sakae<sup>1</sup>, Keiko Matsumura<sup>1</sup>

<sup>1</sup>Department of Nursing, Kagawa Prefectural University of Health Sciences, Kagawa, Japan

<sup>2</sup>Department of Reproductive and Menopausal Medicine, Institute of Biomedical Sciences, Tokushima University Graduate School, Tokushima, Japan

<sup>3</sup>Shikoku Medical Center for Children and Adults, Kagawa, Japan

<sup>4</sup>Department of Preventive Medicine, Institute of Biomedical Sciences, Tokushima University Graduate School, Tokushima, Japan

<sup>5</sup>Department of Midwifery, Institute of Biomedical Sciences, Tokushima University Graduate School, Tokushima, Japan

Email: [uemura@chs.pref.kagawa.jp](mailto:uemura@chs.pref.kagawa.jp)

**How to cite this paper:** Uemura, Y., Yasui, T., Horike, K., Maeda, K., Uemura, H., Haku, M., Sakae, R. and Matsumura, K. (2018) Association of Low Back and Pelvic Pain with Mental Health Condition during Pregnancy and Postpartum. *Health*, 10, 1650-1660.

<https://doi.org/10.4236/health.2018.1012124>

**Received:** November 5, 2018

**Accepted:** November 30, 2018

**Published:** December 3, 2018

Copyright © 2018 by authors and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

---

## Abstract

**Background:** Low back and pelvic pain (LBPP) as a physical symptom may cause psychological symptoms during pregnancy and the postpartum period. We examined the association of LBPP with mental health condition in women from pregnancy to puerperium in a prospective study. **Methods:** This study was conducted from March 2015 to December 2016 in a birth center in Kagawa Prefecture in Japan. We recruited 89 pregnant women who responded to questionnaires in all four stages (first, second and third trimesters and one week postpartum). We designed a self-administered questionnaire including a visual analog scale (VAS) of LBPP and Edinburgh postnatal depression scale (EPDS). **Results:** There were significant differences in EPDS scores and VAS scores among the 4 stages. The EPDS score at the first trimester showed significant positive correlations with VAS scores at the second and third trimesters, and the EPDS score at the second trimester showed a significant positive correlation with VAS score at the third trimester. The VAS scores at the second trimester showed significant positive correlations with EPDS scores at the third trimester and at one week postpartum. **Conclusion:** It was shown that the mental health condition at early pregnancy was related to an increase in LBPP at mid-pregnancy and that LBPP at mid-pregnancy was associated with the mental health condition thereafter.

## Keywords

Low Back Pain, Mental Health, Pregnancy, Prospective Study

---

## 1. Introduction

Low back and pelvic pain (LBPP) during pregnancy has a great influence on daily life thereafter. We reported that LBPP at the early stage of pregnant was associated with limitation of mobility and difficulty in performing daily activities during pregnancy [1]. Olsson *et al.* reported that 40% of women at 6 months postpartum had LBPP and that continuation of LBPP in the postpartum period might have an influence on child rearing [2]. It has been reported that pelvic girdle pain during late pregnancy prevented return to work after childbirth in working women at 12 weeks postpartum [3] [4]. Recently, it was reported that one in 10 women with pelvic girdle pain during pregnancy had severe consequences for up to 11 years, and that women with pelvic girdle pain had significantly decreased ability to perform daily activities, a lower level of self-efficacy, and higher levels of anxiety and depression and that they worked significantly fewer hours/week compared to women without pain [5].

With regard to mental disorders in pregnancy and puerperium, it has been reported that a depressive mood observed in early pregnancy decreased at late pregnancy but increased during the postpartum period [6]. Mental disorders in the postpartum period are important social issues in Japan. Death of children due to child abuse has been increasing in Japan, and psychological disease, anxiety about child rearing and burden of childcare are considered to be factors related to child abuse [7]. Also, 60% of pregnant women who committed suicide had postpartum depression, and efforts have been made to improve management of postpartum depression in Japan [8]. Physical symptoms such as LBPP may be linked to psychological symptoms. Regarding the association between low back pain in late pregnancy and depression, Chang *et al.* reported that initial depression scores predicted increases in pain interference and that depression was associated with an increase in pregnancy-related low back pain interference [9]. Pregnant women with physical health problems such as exhaustion, morning sickness, back pain, constipation and severe headaches or migraines are at increased risk of having depressive symptoms in early pregnancy [10]. It has also reported that postpartum depressive symptoms were 3-times more prevalent in women with lumbopelvic pain than in women without lumbopelvic pain [11]. We hypothesized that LBPP from pregnancy to the postpartum period is related to psychological symptoms and that an increase in LBPP is correlated with levels of psychological symptoms. There has been no longitudinal study on the association between LBPP and mental condition during pregnancy and the postpartum period. In the present prospective study, we investigated longitudinal changes in LBPP in the first trimester, second trimester, third trimester and one week postpartum in order to determine correlations of LBPP in these stages with mental health.

## 2. Methods

### 2.1. Subjects and Methods

This study was conducted from March 2015 to December 2016 in a birth center

in Kagawa Prefecture in Japan. We distributed questionnaires regarding LBPP to 300 pregnant women at the first trimester. Number of delivery was approximately 500 per year in the hospital that we examined, and sample size was 246 by using permissible errors (5%), reliability (95%) and a ratio of a population (20%). We determined that sample size was 300 considering the number of uncollected sample. The numbers of collected questionnaires were 231 in the first trimester (mean period: 14.8 weeks; 10 - 19 weeks), 171 in the second trimester (mean period: 25.8 weeks; 25 - 28 weeks), 151 in the third trimester (mean period: 35.7 weeks; 35 - 38 weeks), and 89 at one week postpartum. Eighty-nine pregnant women who responded to questionnaires in all four stages were used as subjects for this study (Figure 1). Participants were informed of the purposes and procedure of the study.

Low back pain during pregnancy is said to be “low back pain”, “back pain”, “low back pain and pelvic pain”, “pelvic girdle pain”, “back or pelvic pain” “lumbopelvic pain”, “peripartum pelvic pain”, “pelvic girdle syndrome”, “puregnancy-related lumbopelvic pain (PRLPP)” in various terms. In this study, low back pain caused by pregnancy is defined as including back pain and pelvic pain (LBPP) during pregnancy.

## 2.2. Questionnaire

We designed a self-administered questionnaire consisting of three parts that required about 20 minutes to complete. Uemura *et al.* [12] designed the questionnaire for this study. The contents of the questionnaire were shown in detail in our previous report [12]. Briefly, the first part of the questionnaire consisted of questions regarding baseline characteristics such as age, marital status, education and week of pregnancy. The second part of the questionnaire consisted of

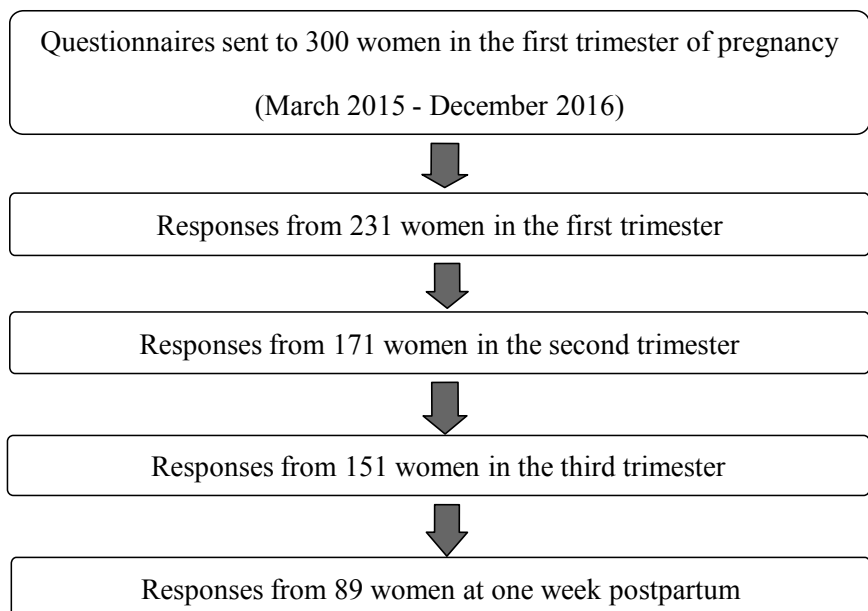


Figure 1. Recruitment of subjects.

questions regarding the presence of LBPP, location of pain, and 10 cm visual analog scale (VAS). Maternal mental health problems in pregnancy and in the postpartum period were assessed by using the Edinburgh Postnatal Depression Scale (EPDS). The EPDS questionnaire is a self-reported questionnaire consisting of ten items scored on a four-point Likert scale (0 - 3) that is designed to assess pregnancy and postpartum depression [13]. The EPDS Japanese version showed good internal consistency (Cronbach alpha = 0.78) and test-retest reliability (Spearman correlation = 0.92) [14]. A score equal to or higher than 9 was designated to screen for minor and major depressive episodes, with sensitivities of 75% and 82% and with specificities of 93% and 95%, respectively [14] [15].

### 2.3. Data Analysis

The correlation of VAS score in one period with that in another period and the correlation of VAS score with EPDS score were analyzed by using Spearman's correlation. The change in the proportions of women with LBPP during the 4 stages of pregnancy and postpartum was evaluated by using Cochran's Q test, and changes in the VAS and EPDS scores during the 4 stages were analyzed by using Friedman's test. The VAS scores as well as the EPDS scores between the different 2 stages were compared by paired t-test, and their p values less than 0.0083 (0.05/6) were considered to be statistically significant according to the Bonferroni's method. P values were two-tailed, and those less than 0.05 were considered to be statistically significant. Statistical analyses of the data were carried out using SPSS version 24 for Windows (IBM Corp., Armonk, NY).

### 3. Results

Baseline characteristics of the subjects are shown in **Table 1**. Mean age  $\pm$  standard deviation (SD) of the subjects was  $32.7 \pm 5.0$  years. The subjects included 37.1% primiparous women and 62.9% multiparous women. The proportion of unemployed women was 21.3% at the first trimester. The proportion of women with a past history of LBPP before pregnancy was 47.2%, and the proportion of women with a past history of LBPP in the previous pregnancy was 62.5%.

The proportions of women who complained of LBPP were 66.3% at the first trimester, 79.8% at the second trimester, 86.5% at the third trimester, and 76.4% at one week postpartum. There was a significant difference in the proportion of women with LBPP among the 4 stages ( $p = 0.003$ ) (**Table 2**).

The median (25 - 75 percentiles) VAS scores were 1.8 (0.0 - 4.1) at the first trimester, 3.0 (0.7 - 5.6) at the second trimester, 5.1 (2.7 - 6.3) at the third trimester and 2.7 (0.5 - 5.0) at one week postpartum. There were significant differences in VAS scores among the 4 stages ( $p < 0.001$ ) (**Table 2**). Significant differences were found in VAS scores between first trimester and third trimester ( $p < 0.001$ ), second trimester and third trimester ( $p < 0.001$ ), and third trimester and one week postpartum ( $p < 0.001$ ). There were significant correlations between VAS scores at the first trimester and second trimester ( $r = 0.334$ ,  $p = 0.001$ ),

**Table 1.** Characteristics of the subjects (n = 89).

	Age (years)	32.7 ± 5.0
Marital status	Married	86 (96.6)
	Not married	3 (3.4)
Working	Yes	70 (78.7)
	No	19 (21.3)
Parity	Primiparous	33 (37.1)
	Multiparous	56 (62.9)
Presence of LBPP before pregnancy	Yes	42 (47.2)
	No	47 (52.8)
Past history of LBPP in previous pregnancy (n = 56)	Yes	35 (62.5)
	No	21 (37.5)

The numbers in parenthesis indicate the proportion. Age is shown as mean ± standard deviation. LBPP: low back and pelvic pain.

**Table 2.** Proportion of women with LBPP, VAS score and EPDS score during the 4 stages.

	first trimester	second trimester	third trimester	one week postpartum	p values
Number	59	71	77	68	
Proportion of women with LBPP (%)	66.3	79.8	86.5	76.4	0.003
VAS score	1.8 (0.0 - 4.1)	3.0 (0.7 - 5.6)	5.1 (2.7 - 6.3)	2.7 (0.5 - 5.0)	<0.001
EPDS score	5.0 (4.0 - 8.0)	4.0 (2.0 - 7.0)	5.0 (2.5 - 7.0)	6.0 (2.0 - 9.0)	<0.001

VAS: visual analog scale; EPDS: Edinburgh Postnatal Depression Scale; VAS score and EPDS score are shown as median (25 - 75 percentiles).

between VAS scores at the first trimester and one week postpartum ( $r = 0.286$ ,  $p = 0.007$ ), and between VAS scores at the second trimester and third trimester ( $r = 0.485$ ,  $p < 0.001$ ).

The median (25-75 percentiles) EPDS scores were 5.0 (4.0 - 8.0) at the first trimester, 4.0 (2.0 - 7.0) at the second trimester, 5.0 (2.5 - 7.0) at the third trimester and 6.0 (2.0 - 9.0) at one week postpartum. There were significant differences in EPDS scores among the 4 stages ( $p < 0.001$ ) (Table 2). There were significant differences between EPDS scores at the first trimester and second trimester ( $p = 0.001$ ) and between EPDS scores at the first trimester and third trimester ( $p = 0.001$ ). The EPDS score at the first trimester showed significant positive correlations with the EPDS scores at the second trimester ( $r = 0.625$ ,  $p < 0.001$ ), at the third trimester ( $r = 0.498$ ,  $p < 0.001$ ), and at one week postpartum ( $r = 0.339$ ,  $p = 0.001$ ). The EPDS score at the second trimester showed significant positive correlations with the EPDS scores at the third trimester ( $r = 0.645$ ,  $p < 0.001$ ) and at one week postpartum ( $r = 0.544$ ,  $p < 0.001$ ). The EPDS score at the third trimester showed a significant positive correlation with the EPDS score

at one week postpartum ( $r = 0.581$ ,  $p < 0.001$ ). The proportions of women for whom the EPDS score was more than 9 were 20.2% at the first trimester, 16.9% at the second trimester, 16.9% at the third trimester and 32.6% at the one week postpartum. There were significant differences in the proportions of women with a high EPDS score between the first trimester and second trimester ( $p = 0.002$ ), first trimester and third trimester ( $p = 0.011$ ), second trimester and third trimester ( $p = 0.003$ ), second trimester and one week postpartum ( $p = 0.016$ ), and third trimester and one week postpartum ( $p = 0.003$ ).

The EPDS score at the second trimester was significantly associated with the VAS score at the second trimester ( $r = 0.346$ ,  $p = 0.001$ ), and the EPDS score at the third trimester was significantly associated with the VAS score at the third trimester ( $r = 0.216$ ,  $p = 0.042$ ). The EPDS score at the first trimester showed significant positive correlations with VAS scores at the second trimester ( $r = 0.285$ ,  $p = 0.007$ ) and at the third trimester ( $r = 0.268$ ,  $p = 0.011$ ), and the EPDS score at the second trimester showed a significant positive correlation with the VAS score at the third trimester ( $r = 0.380$ ,  $p < 0.001$ ). The VAS score at the second trimester showed significant positive correlations with EPDS scores at the third trimester ( $r = 0.212$ ,  $p = 0.046$ ) and at the one week postpartum ( $r = 0.219$ ,  $p = 0.039$ ) (Table 3). VAS scores at the first trimester and one week postpartum did not show significant correlations with EPDS scores at any stages.

#### 4. Discussion

In the present study, we showed that the EPDS score at the first trimester was decreased at the second and third trimesters followed by an increase at one week postpartum. Recently, EPDS has been used as an indicator of postpartum depression in pregnant women [6] [10] [16]. Cut-off values of EPDS vary in different countries [10] [17]. It was reported that the proportions of women with depression for whom the EPDS score was more than 10 were 20.0% at the first trimester, 19.6% at the second trimester, 17.4% at the third trimester, 17.6% at childbirth and 11.1% at 3 months postpartum [16]. It has been shown that the unadjusted prevalence of depression in women for whom the EPDS score was more than 12 were 14.1% in early pregnancy, 10.4% in late pregnancy and 8.1% in the postpartum period [18]. It has been reported that a high EPDS score in

**Table 3.** Correlations between VAS scores and EPDS scores among the 4 stages.

		VAS score			
		first trimester	second trimester	third trimester	one week postpartum
EPDS score	first trimester	-0.100	0.285**	0.268*	0.067
	second trimester	0.095	0.346**	0.380**	0.108
	third trimester	0.039	0.212*	0.216*	0.132
	one week postpartum	0.030	0.219*	0.059	0.197

\* $p < 0.05$ , \*\* $p < 0.01$ ; VAS: Visual Analog Scale; EPDS: Edinburgh Postnatal Depression Scale.

women with depression in early pregnancy continued to increase over the perinatal period, indicating a worsening of mood over that time, although women for whom the EPDS score was less than 12 in early pregnancy experienced an improvement of mood along with a decrease in EPDS scores throughout pregnancy and the postpartum period [19]. Women in early pregnancy are likely to be physically and psychologically unstable and depressive. Since the physical condition of pregnant women becomes stable with advance of gestation and since a stable physical condition leads to a stable mental condition, the EPDS score in early pregnancy decreases in mid- and late pregnancy. Although the EPDS score has been reported to decrease in the postpartum period in other countries, an increase in the EPDS score in postpartum women has been reported in Japan. A score of 9 points is used as a cut-off value of EPDS in Japan [14]. Ishikawa *et al.* reported that the mean EPDS scores (proportions of women for whom the EPDS score was more than 9) were 4.5 (14.3%) in early pregnancy, 3.7 (11.8%) in late pregnancy and 4.5 (16.4%) at 5 days postpartum, indicating that the EPDS score increases in the postpartum period [6]. Our results are in line with the results of that study. The reason for increase in women with a high EPDS score at postpartum may be an isolated child-rearing environment since support and care for postpartum women are insufficient due to an increase in women of advanced maternal age [20].

We showed that the EPDS score in early pregnancy was correlated with EPDS scores in mid- and late pregnancy and at one week postpartum, suggesting that the mental health condition in early pregnancy is associated with the mental health condition thereafter. It has been reported that 83% of women with persistent depressive symptoms were identified by EPDS assessment at 12 weeks of gestation [21]. Given that the mental health condition during pregnancy has an influence on the mental health condition after delivery, it is important to evaluate the EPDS score in early pregnancy as a predictive indicator of the EPDS score after delivery. Continuous support throughout pregnancy and in the postpartum period may be needed for women for whom the EPDS score in early pregnancy is more than 9.

On the other hand, we showed that the VAS score in early pregnancy increased toward late pregnancy, followed by a decrease in the postpartum period. The change in the VAS score in the present study is consistent with changes found in previous studies [22] [23] [24]. Support for LBPP should be given to women from mid-pregnancy to the postpartum period, during which the VAS score is increasing.

Interestingly, we found significant mutual correlations between VAS and EPDS at the second and third trimesters. It has been reported that patients with chronic lumbar pain who had a high depression scale score had a high VAS score of pain and that there was an association between depressive level and intensity of pain [25]. Apter *et al.* reported that women with a large number of somatic complaints including back pain during pregnancy have a high risk of



depression [26]. The association of LBPP with mental health condition found in the present study is consistent with the results in previous studies. During the period from mid-pregnancy to late pregnancy, in which there is an increase in VAS score, pregnant women with a depressive mood are likely to have LBPP and pregnant women with a high VAS score are likely to have a depressive mood. Thus, evaluation of mental status is needed for pregnant women with a high VAS score for LBPP to provide health guidance during the mid- and late periods of pregnancy. The reason for no significant association being found between EPDS and VAS scores at the first trimester may be the low VAS score at the first trimester, and the reason for no significant association being found between EPDS score at one week postpartum and VAS might be that various factors other than LBPP affect EPDS score at one week postpartum.

Also, EPDS scores during early and mid-pregnancy were correlated with VAS score at mid-pregnancy, and VAS score at mid-pregnancy was correlated with EPDS scores at late pregnancy and in the postpartum period. Mental health conditions at early and mid-pregnancy are associated with LBPP at mid-pregnancy, and LBPP at mid-pregnancy is associated with mental health conditions thereafter. Thus, there is a close mutual relationship between mental symptoms and LBPP as a physical symptom during pregnancy and in the early postpartum period. Women with depression are likely to have chronic pain. It has been reported that preoperative depression before Cesarean section was associated with chronic post-surgical pain at 3 months postpartum [27]. Also, Borges *et al.* reported that preoperative anxiety increases the risk of moderate-severe postoperative pain in women who received Cesarean section [28]. Based on these results, an unstable mental condition is considered to be a factor enhancing subsequent pain. An unstable mental state at early pregnancy may be a factor enhancing LBPP at a later stage of pregnancy. Stability of mental health at early pregnancy may prevent exacerbation of LBPP at mid and late pregnancy. On the other hand, it has been reported that perineal pain at 3 - 5 days postpartum predicted depressive symptoms at 3 months postpartum [29], suggesting that physical pain influences the mental health condition thereafter. Exacerbation of pain may be involved in psychological instability. It is important to evaluate mental health by the EPDS score as well as the VAS score for LBPP in early pregnancy and to prevent LBPP in pregnancy and in the postpartum period.

This study has a strength since the study is a prospective design. However, a limitation of this study is that the sample size is relatively small. The characteristics of women without LBPP should be clarified by an increase in the sample size. Further prospective study from the first trimester to three months postpartum may be needed.

## 5. Conclusion

In conclusion, the mental health condition in early pregnancy is related to an increase in LBPP at mid-pregnancy, and LBPP at mid-pregnancy is associated



with the mental health condition thereafter. Stability of mental health in early pregnancy may be important for the management of LBPP during pregnancy and in the postpartum period.

### Acknowledgements

The authors are grateful to doctors, midwives and medical assistants in Shikoku Medical Center for Children and Adults for supporting this research. We also thank the women who participated in this study.

### Ethics Approval and Consent to Participate

The study protocol was reviewed and approved by the ethics Review Board of Tokushima University Hospital (approval no. 2201). This study was reviewed by the Ethics Review Board of a birth center in Kagawa Prefecture in Japan.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper. This study is a part of “Prospective study on back pain and its related factors during pregnancy to postpartum” (16K12104) which has been conducted under Grant-in-Aid for Scientific Research (c) Japan Society for the Promotion of Science.

### References

- [1] Uemura, Y., Yasui, T., Horike, K., Maeda, K., Uemura, H., Haku, M., Sakae, R. and Matsumura, K. (2017) Association of Low Back and Pelvic Pain at the Second Trimester with That at the Third Trimester and Puerperium in Japanese Pregnant Women. *Journal of Pregnancy Child Health*, **4**.  
<http://doi.org/10.4172/2376-127X.1000351>
- [2] Olsson, C.B., Nilsson-Wikmar, L. and Grooten, W.J. (2012) Determinants for Lumbopelvic Pain 6 Months Postpartum. *Disability and Rehabilitation*, **34**, 416-422.  
<https://doi.org/10.3109/09638288.2011.607212>
- [3] Stomp-van den Berg, S.G., van Poppel, M.N., Hendriksen, I.J., Bruinvels, D.J., Uegaki K., de Bruijne, M.C. and van Mechelen, W. (2007) Improving Return-to-Work after Childbirth: Design of the Mom@Work Study, a Randomised Controlled Trial and Cohort Study. *BMC Public Health*, **7**, 1-10.  
<https://doi.org/10.1186/1471-2458-7-43>
- [4] Stomp-van den Berg, S.G., Hendriksen, I.J., Bruinvels, D.J., Twisk, J.W., van Mechelen, W. and van Poppel, M.N. (2012) Predictors for Postpartum Pelvic Girdle Pain in Working Women: The Mom @ Work Cohort Study. *Pain*, **153**, 2370-2379.  
<https://doi.org/10.1016/j.pain.2012.08.003>
- [5] Elden, H., Gutke, A., Kjellby-Wendt, G., Fagevik-Olsen, M. and Ostgaard, H.C. (2016) Predictors and Consequences of Long-Term Pregnancy-Related Pelvic Girdle Pain: A Longitudinal Follow-Up Study. *BMC Musculoskeletal Disorders*, **17**, 1-13. <https://doi.org/10.1186/s12891-016-1154-0>
- [6] Ishikawa, N., Goto, S., Murase, S., Kanai, A., Masuda, T., Aleksic, B., Usui, H. and Ozaki, N. (2011) Prospective Study of Maternal Depressive Symptomatology among Japanese Women. *Journal of Psychosomatic Research*, **71**, 264-269.

- <https://doi.org/10.1016/j.jpsychores.2011.02.001>
- [7] Ministry of Health, Labor and Welfare (2017) Release of Results of the 13th Report on Verification of Child Abuse Cases Which Resulted in Deaths. <http://www.mhlw.go.jp/stf/houdou/0000173365.html>
- [8] Ministry of Health, Labor and Welfare (2016) The Materials of the Study Meeting on the 6th Perinatal Medical System. (In Japanese) <http://www.mhlw.go.jp/stf/shingi2/0000134653.html>
- [9] Chang, H.Y., Lai, Y.H., Jensen, M.P., Shun, S.C., Hsiao, F.H., Lee, C.N. and Yang, Y.L. (2013) Factors Associated with Low Back Pain Changes during the Third Trimester of Pregnancy. *Journal of Advanced Nursing*, **70**, 1054-1064. <https://doi.org/10.1111/jan.12258>
- [10] Perlen, S., Woolhouse, H., Gartland, D. and Brown, S.J. (2013) Maternal Depression and Physical Health Problems in Early Pregnancy: Findings of an Australian Nulliparous Pregnancy Cohort Study. *Midwifery*, **29**, 233-239. <https://doi.org/10.1016/j.midw.2012.01.005>
- [11] Gutke, A., Josefsson, A. and Oberg, B. (2007) Pelvic Girdle Pain and Lumbar Pain in Relation to Postpartum Depressive Symptoms. *Spine*, **32**, 1430-1436. <https://doi.org/10.1097/BRS.0b013e318060a673>
- [12] Uemura, Y., Yasui, T., Horike, K., Maeda, K., Uemura, H., Haku, M., Sakae, R. and Matsumura, K. (2017) Factors Related with Low Back Pain and Pelvic Pain at the Early Stage of Pregnancy in Japanese Women. *International Journal of Nursing and Midwifery*, **9**, 1-9. <https://doi.org/10.5897/IJNM2016.0249>
- [13] Cox, J.L., Holden, J.M. and Sagovsky, R. (1987) Detection of Postnatal Depression. Development of the 10-Item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry*, **150**, 782-786. <https://doi.org/10.1192/bjp.150.6.782>
- [14] Okano, T., Murata, M., Masuji, F., Tamaki, R., Nomura, J. and Miyaoka, H. (1996) Validation and Reliability of Japanese Version of EPDS (Edinburgh Postnatal Depression Scale). *Archives of Psychiatric Diagnosis and Clinical Evaluation*, **7**, 525-533.
- [15] Yamashita, H., Yoshida, K., Nakano, H. and Tashiro, N. (2000) Postnatal Depression in Japanese Women. Detecting the Early Onset of Postnatal Depression by Closely Monitoring the Postpartum Mood. *Journal of Affective Disorders*, **58**, 145-154. [https://doi.org/10.1016/S0165-0327\(99\)00108-1](https://doi.org/10.1016/S0165-0327(99)00108-1)
- [16] Figueiredo, B. and Conde, A. (2011) Anxiety and Depression in Women and Men from Early Pregnancy to 3-Months Postpartum. *Archives of Women's Mental Health*, **14**, 247-255. <https://doi.org/10.1007/s00737-011-0217-3>
- [17] Shakeel, N., Eberhard-Gran, M., Sletner, L., Slinning, K., Martinsen, E.W., Holme, I. and Jennum, A.K. (2015) A Prospective Cohort Study of Depression in Pregnancy, Prevalence and Risk Factors in a Multi-Ethnic Population. *BMC Pregnancy Childbirth*, **15**, 5. <https://doi.org/10.1186/s12884-014-0420-0>
- [18] Lydsdottir, L.B., Howard, L.M., Olafsdottir, H., Thome, M., Tyrfinngsson, P. and Sigurdsson, J.F. (2014) The Mental Health Characteristics of Pregnant Women with Depressive Symptoms Identified by the Edinburgh Postnatal Depression Scale. *Journal of Clinical Psychiatry*, **75**, 393-398. <https://doi.org/10.4088/JCP.13m08646>
- [19] Bowen, A., Bowen, R., Butt, P., Rahman, K. and Muhajarine, N. (2012) Patterns of Depression and Treatment in Pregnant and Postpartum Women. *The Canadian Journal of Psychiatry*, **57**, 161-167. <https://doi.org/10.1177/070674371205700305>
- [20] Iwata, H., Mori, E., Tsuchiya, M., Sakajo, A., Maehara, K., Ozawa, H., Morita, A., Maekawa, T., Aoki, K. and Tamakoshi, K. (2016) Predictors of Depressive Symp-

- toms in Older Japanese Primiparas at 1 Month Post-Partum: A Risk-Stratified Analysis. *Japan Journal of Nursing Science*, **13**, 147-155.  
<https://doi.org/10.1111/jjns.12099>
- [21] Truijens, S.E.M., Spek, V., van Son, M.J.M., GuidOei, S. and Pop, V.J.M. (2017) Different Patterns of Depressive Symptoms during Pregnancy. *Archives of Women's Mental Health*, **20**, 539-546. <https://doi.org/10.1007/s00737-017-0738-5>
- [22] Mohseni-Bandpei, M.A., Fakhri, M., Ahmad-Shirvani, M., Bagheri-Nessami, M., Khalilian, A.R., Shayesteh-Azar, M. and Mohseni-Bandpei, H. (2009) Low Back Pain in 1,100 Iranian Pregnant Women: Prevalence and Risk Factors. *The Spine Journal*, **9**, 795-801. <https://doi.org/10.1016/j.spinee.2009.05.012>
- [23] Thorell, E. and Kristiansson, P. (2012) Pregnancy Related Back Pain, Is It Related to Aerobic Fitness? A Longitudinal Cohort Study. *BMC Pregnancy Childbirth*, **12**, 30. <https://doi.org/10.1186/1471-2393-12-30>
- [24] Ostgaard, H.C., Roos-Hansson, E. and Zetherström, G. (1996) Regression of Back and Posterior Pelvic Pain after Pregnancy. *Spine*, **21**, 2777-2780. <https://doi.org/10.1097/00007632-199612010-00013>
- [25] Tetsunaga, T., Misawa, H., Tanaka, M., Sugimoto, Y., Tetsunaga, T., Takigawa, T. and Ozaki, T. (2013) The Clinical Manifestations of Lumbar Disease Are Correlated with Self-Rating Depression Scale Scores. *Journal of Orthopaedic Science*, **18**, 374-379. <https://doi.org/10.1007/s00776-013-0363-8>
- [26] Apter, G., Devouche, E., Garez, V., Valente, M., Genet, M.C., Gratier, M. and Belaisch-Allart, J. (2013) Pregnancy, Somatic Complaints and Depression: A French Population-Based Study. *The European Journal of Obstetrics & Gynecology and Reproductive Biology*, **71**, 35-39. <https://doi.org/10.1016/j.ejogrb.2013.08.013>
- [27] Jin, J., Peng, L., Chen, Q., Zhang, D., Ren, L., Qin, P. and Min, S. (2016) Prevalence and Risk Factors for Chronic Pain Following Cesarean Section: A Prospective Study. *BMC Anesthesiology*, **16**, 99. <https://doi.org/10.1186/s12871-016-0270-6>
- [28] Borges, N.C., Pereira, L.V., de Moura, L.A., Silva, T.C. and Pedrosa, C.F. (2016) Predictors for Moderate to Severe Acute Postoperative Pain after Cesarean Section. *Pain Research and Management*, **2016**, Article ID: 5783817. <https://doi.org/10.1155/2016/5783817>
- [29] Chang, S.R., Chen, K.H., Lee, C.N., Shyu, M.K., Lin, M.I. and Lin, W.A. (2016) Relationships between Perineal Pain and Postpartum Depressive Symptoms: A Prospective Cohort Study. *International Journal of Nursing Studies*, **59**, 68-78. <https://doi.org/10.1016/j.ijnurstu.2016.02.012>