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The Relationship between Neonatal Birth Weight and Urinary Incontinence during the Late Third Trimester of Pregnancy

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ABSTRACT

Objectives: To determine the association between neonatal birth weight and urinary incontinence (UI) during the late third trimester of pregnancy in Thai women.

Materials and Methods: A cross-sectional study was conducted. One hundred termed singleton pregnancies delivered at Her Royal Highness Princess Maha Chakri Sirindhorn Medical Centre were enrolled. The data about UI was collected by using the Questionnaire for Urinary Incontinence Diagnosis-THAI version (QUID-THAI version), asking the symptoms before pregnancy and last 1 month before delivery. Prevalence rate ratio and chi-square test were used to evaluate the association between UI and neonatal birth weight, as well as attributable risks.

Results: Eighty and twenty delivered newborns weight less than 4000 grams and more than 4,000 grams, respectively, 35 women (35%) had symptoms of UI during pregnancy; 24 women (30%) delivered neonatal weight less than 4,000 grams (group A) and 11 women (55%) delivered neonatal weight more than 4,000 grams (group B). The prevalence of stress UI, urge UI and mix UI were 17%, 4% and 14%, respectively. The prevalence of UI in group B was also more than group A (prevalence rate ratio = 1.833, 95%CI 1.091-3.080, p = 0.036). The neonatal birth weight was the only risk factor that was statistically significant with overall UI in pregnancy. However, pre-pregnancy maternal BMI, caffeine intake, occupation, previous route of delivery and pelvic floor muscle exercise were not shown to be significant.

Conclusion: Neonatal birth weight was the only risk factor that associated with UI during the third trimester of pregnancy. The prevalence of UI during pregnancy was 35%.

Keywords: pregnancy, urinary incontinence, neonatal birth weight.

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ความสัมพันธ์ระหว่างน้ำหนักทารกแรกเกิดกับการกลั้นปัสสาวะไม่ได้ในระยะท้ายของไตรมาสที่สาม

ศรุตยา โต๊ะถม, นพพร โรจน์เพ็ญเพียร, พริษฐ์ วาจาสิทธิศิลป์

บทคัดย่อ

วัตถุประสงค์: *เพื่อศึกษาหาความสัมพันธ์ระหว่างน้ำหนักแรกเกิดของทารกและภาวะกลั้นปัสสาวะไม่ได้ในช่วงไตรมาสที่สามของการตั้งครรภ์ และอุบัติการณ์ของภาวะกลั้นปัสสาวะไม่ได้ในหญิงตั้งครรภ์ชาวไทย*

วัสดุและวิธีการ: *เป็นการศึกษาแบบ Cross sectional study เก็บข้อมูลจากหญิงตั้งครรภ์ 100 คน ที่คลอดบุตรที่ศูนย์การแพทย์สมเด็จพระเทพรัตนราชสุดาฯ สยามบรมราชกุมารี เก็บข้อมูลเกี่ยวกับภาวะกลั้นปัสสาวะไม่ได้ โดยใช้แบบสอบถามสำหรับการวินิจฉัยภาวะกลั้นปัสสาวะไม่ได้ ฉบับ ภาษาไทย (QUID-THAI version) โดยถามอาการก่อนตั้งครรภ์ และ 1 เดือนก่อนคลอด จากนั้นนำมาคำนวณหาอุบัติการณ์ของภาวะกลั้นปัสสาวะไม่ได้ในหญิงตั้งครรภ์ชาวไทยและหาความสัมพันธ์ระหว่างน้ำหนักแรกเกิดของทารกภาวะกลั้นปัสสาวะไม่ได้ในช่วงไตรมาสที่สามของการตั้งครรภ์*

ผลการศึกษา: *จากหญิงตั้งครรภ์ 100 คน โดยแบ่งเป็นหญิงที่คลอดบุตรน้ำหนักทารกน้อยกว่า 4,000 กรัม 80 คน มากกว่า 4,000 กรัม 20 คน พบว่าหญิงตั้งครรภ์จำนวน 35 คน (35%) เกิดภาวะกลั้นปัสสาวะไม่ได้ในระหว่างตั้งครรภ์ โดย 24 คน (30%) อยู่ในกลุ่มหญิงที่คลอดบุตรน้ำหนักทารกแรกเกิดน้อยกว่า 4,000 กรัม (กลุ่ม A) และ 11 คน (55%) อยู่ในกลุ่มหญิงที่คลอดบุตรน้ำหนักทารกแรกเกิดมากกว่า 4,000 กรัม (กลุ่ม B) อุบัติการณ์ของภาวะกลั้นปัสสาวะไม่ได้แบบ stress, ภาวะกลั้นปัสสาวะไม่ได้แบบ Urge และภาวะกลั้นปัสสาวะไม่ได้แบบผสม คือ 17%, 4% และ 14% ตามลำดับ อุบัติการณ์ของภาวะกลั้นปัสสาวะไม่ได้ ในกลุ่ม B มากกว่ากลุ่ม A (prevalence rate ratio = 1.833, 95%CI 1.091-3.080, p = 0.036) น้ำหนักแรกเกิดของทารกเป็นเพียงปัจจัยเสี่ยงเดียวที่มีนัยสำคัญทางสถิติที่เกี่ยวข้องกับภาวะกลั้นปัสสาวะไม่ได้ในการหญิงตั้งครรภ์ แต่ค่าดัชนีมวลกายของมารดาก่อนตั้งครรภ์, การบริโภคคาเฟอีน, อาชีพ, วิธีการการคลอดก่อนและการออกกำลังกายกล้ามเนื้ออุ้งเชิงกรานนัยสำคัญทางสถิติ*

สรุป: *น้ำหนักแรกเกิดของทารกเป็นปัจจัยเสี่ยงเพียงอย่างเดียวที่เกี่ยวข้องกับภาวะกลั้นปัสสาวะไม่ได้ในหญิงตั้งครรภ์ในช่วงไตรมาสที่สาม อุบัติการณ์ของภาวะกลั้นปัสสาวะ ในระหว่างตั้งครรภ์คือ 35%*

คำสำคัญ: *การตั้งครรภ์, ภาวะกลั้นปัสสาวะไม่ได้, น้ำหนักทารกแรกเกิด*

Introduction

Urinary incontinence (UI) is defined by the International Continence Society as the complaint of involuntary loss of urine[1, 2]. UI is a common problem, that has large impact on one's quality of life, hygienic and social wellbeing[3, 4]. The incidence is as high as 34 - 50% in pregnant women[5, 6]. The incidence and severity of this condition also increase throughout pregnancy due to body's physiologic change. According to the knowledge of the concept of UI, the normal anatomy, pelvic floor musculature complex, and its normal physiology play an important role in the background of the continence mechanism. Pregnancy has a significant effect on lower urinary tract function[7]. During pregnancy progress, the uterus enlarges and hyperemia occurs in pelvic organs. Hyperplasia of bladder muscle is then occurred and further expanded the depth and width of bladder trigone[8]. In the theory, growing uterus and fetus weight solely on the pelvic floor also increases pressure which contributes to stress on pelvic floor muscle and results in pelvic floor muscle weakness and leads to symptoms of UI in pregnancy[7]. There had studies of other risk factors regarding UI during pregnancy as well. For instance, UI during pregnancy has been found in up to 49% of women with gestational diabetes[9]. High body mass index (BMI) before pregnancy also increases the risk of UI and high strength of pelvic floor muscles reduces the occurrence of it[10, 11].

In Thai pregnant women, the anatomical change and the final size of the fetus were different from the Caucasian due to racial differences as Asians tend to weigh less than foreign babies[12]. In spite of this, there was a single center study conducted in Thailand regarding pregnant woman experience UI. They found the prevalence could go up to 50% in Thai popular[13]. However, the data was not specific to the proportion of Thai pregnant who experienced the condition and no study has ever investigated the association between neonatal birth weights and urinary incontinence during pregnancy. Therefore, the objective of this study was to determine the association between neonatal birth weight and urinary incontinence during late third trimester of pregnancy, and the prevalence of UI during late third trimester of pregnancy in Thai pregnant women.

Materials and methods

This cross-sectional study was performed at HRH Princess Maha Chakri Sirindhorn Medical Center (MSMC), Nakhon Nayok, Thailand. The study was conducted between July 2018 and January 2019 after approval from the ethics committee of Srinakharinwirot University (SWEC/E-002/2561). A singleton pregnant woman who delivered after 37 completed weeks of gestation at MSMC and agreed to participate were enrolled. Exclusion criteria were women who had twin pregnancy, had language barrier, were disabled or intellectually challenged, had previous urinary system surgery and had urinary conditions such as current urinary tract infection or UI before pregnancy.

After informed consent, the data were collected using the questionnaires. All the participants were informed the objective of study. Questionnaires were self-administered. Some additional data were form doctor's medical record were also used in data collection. The questionnaire was divided into 3 parts: 1) basic information neonatal birth weight, maternal age, pre-pregnancy BMI, caffeine intake, occupation, parity, and previous route of delivery. The birth weight was measured after the baby received basic cleaning care by the same digital weighing machine. 2) questionnaire for diagnosing one's UI. We evaluated by using the Questionnaire for Urinary Incontinence Diagnosis-THAI version (QUID-THAI version) by asking the symptoms before pregnancy and 1 month before delivery. 3) frequency of pelvic floor muscle exercise during pregnancy.

The QUID-Thai version[14] was distributed by Srisukho S. The study translated the QUID into

Thai language for the evaluation and diagnosis of female UI in Thai population. The QUID-Thai version had a satisfactory validity and reliability similar to the original QUID. The QUID is a self-administered, 6-item questionnaire designed to distinguish between stress urinary incontinence (SUI) and urgency urinary incontinence (UUI)[15, 16]. Questions 1 to 3 were used to evaluate for SUI, while questions 4 to 6 were used to evaluate for UUI. In each question, a scale 1-5 scoring system was used to assess symptoms severity. When the result of the score included both SUI and UUI, the diagnosis was mixed urinary incontinent (MUI). For the validity of QUID, the sensitivity and specificity for SUI, UUI and MUI were 73% and 82%, 69% and 87%, and 70% and 86%, respectively[14]. The QUID-THAI version is available in Appendix 1.

We divided the participants into 2 groups; women whose neonatal birth weight was less than 4,000 grams (group A) and those greater with than 4,000 grams (group B). We calculated the prevalence of UI in the late third trimester pregnant women (overall UI, SUI, UUI and MUI). Furthermore, the association of other risk factors that might affect the UI during pregnancy was evaluated. It includes pre-pregnancy maternal BMI, caffeine intake, occupations that increase intra-abdominal pressure, previous route of delivery and frequency of pelvic floor muscle exercise.

Sample size calculation was based on Tanawattanacharoen et al study[13]. They reported the prevalence of urinary incontinence in the third trimester of Thai pregnant women in Chulalongkorn Hospital was 29 from 380 women in neonatal birth weight less than 4,000 grams (7.63%) and one-third of women with neonatal birth weight greater than 4,000 grams (33.3%). We assigned α error 0.05 and β error 0.2. The sample size was calculated by using the formula from Bernard R[17]. It showed that 80 participants in women with neonatal birth weigh less than 4,000 grams and 20 participants in women with baby birth weight greater than 4,000 grams were needed. Therefore, this study required at least 100 participants.

The statistical analysis was performed using STATA version 13 (StataCorp, College Station, TX, USA). Chi-square test was used to compare the prevalence of UI in pregnant women at the end of the third trimester between two groups. The prevalence rate ratio was expressed for each factor. Other statistical methods used include percentage, mean, and standard deviation. The statistical significance was considered when p value < 0.05.

Results

From 114 pregnant women enrolled, 14 women were excluded: 2 women had twin pregnancy, 8 women could not well-communicate with Thai language, 3 women had current urinary tract infection and 1 woman was diagnosed with UI before pregnancy. Maternal characteristics are shown in Table 1. The mean age was 28.8 ± 6.2 years in group A and 29.6 ± 4.5 years in group B and 70% had normal BMI before pregnant in group A, and 40% in group B. The intake of caffeinated beverage during pregnancy was 57.5% and 45% of group A and B, respectively. 78.75% in group A and 65% in group B had occupation that did not increase intra-abdominal pressure. About 86.25% of group A and 80% of group B did not perform the pelvic floor muscle exercise during pregnancy. The nearly half of group A was primigravida (48.78%) and 35% of group B was parity 1 and most of the previous route of delivery was vaginal delivery in both groups.

The results showed 35 women (35%) had symptom of UI during late third trimester of pregnancy; 24 women (30%) was in group of neonatal weight less than 4,000 grams (group A) and 11 women (55%) was in group of neonatal weight more than 4,000 grams (group B). The prevalence of SUI, UUI and MUI were 17 %, 4% and 14%, respectively. The UUI was not found in group B.

The risk factors affecting the overall UI during pregnant from our study are shown in Table 2. The

only statistically significant factor was neonatal birth weight more than 4,000 grams which increases risk of UI 1.833 times higher than neonatal birth weight less than 4,000 grams group (prevalence rate ratio = 1.833, 95%CI 1.091-3.080, p = 0.036). The other factors such as caffeine intake, high pre-pregnancy BMI, increase abdominal pressure occupation, pelvic floor muscle exercise, and a previous history vaginal delivery or cesarean delivery were not significant.

Table 1. Demographic characteristics.

Characteristic	Neonatal birth weight < 4,000 gm	Neonatal birth weight > 4,000 gm
Maternal age (mean ± SD)	28.6 ± 6.2	29.6 ± 4.5
Pre-pregnancy maternal BMI, n (%)		
Underweight	11 (13.75)	0 (0)
Normal	56 (70)	8 (40)
Overweight	4 (5)	7 (35)
Obesity	9 (11.25)	5 (25)
Caffeine intake, n (%)		
No	34 (42.5)	11 (55)
Yes	46 (57.5)	9 (45)
Occupation, n (%)		
Increase intra-abdominal pressure	17 (21.25)	7 (35)
No increase intra-abdominal pressure	63 (78.75)	13 (65)
Pelvic floor muscle exercise, n (%)		
No	69 (86.25)	16 (80)
Yes	11 (13.75)	4 (20)
Parity, n (%)		
0	39 (48.75)	6 (30)
1	28 (35)	7 (35)
2	9 (11.25)	4 (20)
3	2 (2.5)	2 (10)
4	2 (2.5)	1 (5)
Previous route of delivery n (%)		
Vaginal delivery	30 (37.5)	8 (40)
Previous c/s	11 (13.75)	6 (30)
Primiparous	39 (48.75)	6 (30)

SD: standard deviation, BMI: body mass index

Table 2. The association between risk factor and overall urinary incontinence.

Risk factor	urinary incontinence		Prevalence rate ratio	95% CI	p value*
	UI n (%)	No UI n (%)			
Neonatal birth weight					
≥ 4000 g (%)	11 (55)	9 (45)	1.833	1.091-3.080	0.036
< 4000 g (%)	24 (30)	56 (70)	1	-	-
Pre-pregnancy maternal BMI					
Underweight (%)	5 (41.67)	7 (58.33)	1	-	-
Normal (%)	23 (36.51)	40 (63.49)	0.768	0.416-1.844	0.734
Overweight (%)	4 (36.36)	7 (63.64)	0.872	0.311-2.442	0.794
Obese (%)	3 (21.43)	11 (78.57)	0.514	0.153-1.717	0.265
Caffeine intake					
Yes (%)	21 (38.18)	34 (61.82)	1.266	0.7148-2.244	0.432
No (%)	14 (31.11)	31 (68.89)	1	-	-
Occupation					
Increase abdominal pressure (%)	9 (37.50)	15 (62.50)	1.096	0.599-2.003	0.768
No increase abdominal pressure (%)	26 (34.21)	50 (65.79)	1	-	-
Previous route of delivery					
Primigravida (%)	14 (31.11)	31 (68.89)	1	-	-
Vaginal delivery (%)	15 (39.47)	23 (60.53)	1.268	0.705-2.280	0.426
Cesareans section (%)	6 (64.71)	11 (35.29)	1.134	0.521-2.466	0.753
Pelvic floor muscle exercise					
Yes (%)	6 (40)	9 (60)	1.172	0.590-2.329	0.659
No (%)	29 (34.12)	56 (65.88)	1	-	-

* chi-square test, CI = confidence interval, UI: urinary incontinence, BMI: body mass index

The type of urinary incontinence was also evaluated the association with the above factors. Table 3. shows the statistically significant factor associated with SUI in pregnancy was neonatal birth weight more than 4,000 grams (prevalence rate ratio = 4.5, 95%CI 1.988-10.183, p = 0.0002) and history of previous vaginal delivery (prevalence rate ratio = 2.960, 95%CI 1.009-8.684, p = 0.034). For the MUI, while the neonatal birth weight was not found to be statically significant, caffeine intake instead showed statistically significant result, which increases risk 2.96 time (prevalence rate ratio = 2.960, 95%CI 1.158-20.806, p = 0.013) (Table 4).

Table 3. The association between risk factor and stress urinary incontinence.

Risk factor	Stress urinary incontinence		Prevalence rate ratio	95% CI	p value*
	UI n (%)	No UI n (%)			
Neonatal birth weight					
≥ 4,000 g (%)	9 (45)	11 (55)	4.5	1.988-10.183	0.0002
< 4,000 g (%)	8 (10)	72 (90)	1	-	-
Pre-pregnancy maternal BMI					
Underweight (%)	1 (8.33)	11 (91.67)	1	-	-
Normal (%)	10 (15.87)	53 (84.13)	1.904	0.268-13.532	0.498
Overweight (%)	4 (36.36)	7 (63.64)	4.363	0.571-33.319	0.103
Obese (%)	2 (14.29)	12 (85.71)	1.714	0.176-16.647	0.635
Caffeine intake					
Yes (%)	7 (12.73)	48 (87.27)	0.572	0.237-1.383	0.208
No (%)	10 (22.22)	35 (77.78)	1	-	-
Occupation					
Increase abdominal pressure (%)	7 (29.17)	17 (70.83)	2.216	0.947-5.185	0.068
No increase abdominal pressure (%)	10 (13.16)	66 (86.64)	1	-	-
Previous route of delivery					
Primigravida (%)	4 (8.89)	41 (91.11)	1	-	-
Vaginal delivery (%)	10 (26.32)	28 (73.68)	2.960	1.009-8.684	0.034
Cesareans section (%)	3 (17.65)	14 (82.35)	1.985	0.494-7.963	0.331
Pelvic floor muscle exercise					
Yes (%)	2 (13.33)	13 (86.67)	0.755	0.192-2.971	0.681
No (%)	15 (17.65)	70 (82.35)	1	-	-

* chi-square test, CI = confidence interval, UI: urinary incontinence, BMI: body mass index

Table 4. The association between risk factor and mixed urinary incontinence.

Risk factor	Mixed urinary incontinence		Prevalence rate ratio	95% CI	p value*
	UI n (%)	No UI n (%)			
Neonatal birth weight					
≥ 4,000 g (%)	2 (10)	18 (90)	0.667	0.162-2.742	0.564
< 4,000 g (%)	12 (15)	68 (85)	1	-	-
Pre-pregnancy maternal BMI					
Underweight (%)	4 (33.330	8 (66.67)	1	-	-
Normal (%)	9 (14.29)	54 (85.71)	0.428	0.157-1.168	0.110
Overweight (%)	0 (0)	11 (100)	0	-	-
Obese (%)	1 (7.14)	13 (92.86)	0.214	0.027-1.666	0.091
Caffeine intake					
Yes (%)	12 (21.82)	43 (78.18)	4.909	1.158-20.806	0.013
No (%)	2 (4.4)	43 (95.56)	1	-	-
Occupation					
Increase abdominal pressure (%)	2 (8.33)	22 (91.67)	0.527	0.126-2.194	0.358
No increase abdominal pressure (%)	12 (15.79)	64 (84.21)	1	-	-
Previous route of delivery					
Primigravida (%)	9 (20)	36 (80)	1	-	-
Vaginal delivery (%)	3 (7.89)	35 (92.11)	0.394	0.115-1.354	0.118
Cesareans section (%)	2 (11.76)	15 (88.24)	0.118	0.141-2.450	0.448
Pelvic floor muscle exercise					
Yes (%)	3 (20)	12 (80)	1.545	0.488-4.893	0.467
No (%)	11 (12.94)	74 (87.06)	1	-	-

* chi-square test, CI = confidence interval, UI: urinary incontinence, BMI: body mass index

Discussion

Urinary incontinent is an important symptom from physiologic change during pregnancy that affect the quality of life, physical, psychological and social[3, 4]. There have been studies of other risk factors that may cause UI during pregnancy, but there has not been studied the association between neonatal birth weight and urinary incontinence during pregnancy. The aim of this study was to identify association between UI and several risk factors though conducting a study at HRH Princess Maha Chakri Sirindhorn Medical Center as a sample population of Thai people, using the Urinary Incontinence Diagnosis-Thai Version questionnaires [QUID-Thai]. This study revealed that neonatal birth weight was the only risk factor that associated with overall UI and SUI during the third trimester of pregnancy. The study also found the overall prevalence of UI in pregnancy was 35%.

The SUI is a common type of UI during pregnancy because of increasing pressure of the growing uterus and fetal weight. These push direct pressure on the urinary bladder. It ultimately changes bladder-neck positioning and reduces bladder capacity that causes the bladder pressure exceeds urethral pressure, contributing to UI[7]. In this study, the prevalence of SUI was the most common symptom during pregnancy (48.57% among UI). Wesnes, et al[18] used a questionnaire that indicated a prevalence of SUI in 19,981 pregnant women with 30 weeks of gestational age was 30.9% (UUI and MUI were 5.4% and 11.7%, respectively) and their study supported our finding. In addition, Brown, et al[19] also reported a prevalence of SUI was 36.9% (UUI and MUI were 5.9% and 13.1%, respectively) in pregnant women in the third trimester. Therefore, many studies were consistent with this study.

In our study, another risk factor that affects SUI was a previous vaginal delivery. This may be explained by vaginal deliveries lead to perineal damage. This was further supported by the results of previous study by El-Sokkary[20], which was a case-series study. They found a significant positive correlation between SUI and vaginal delivery. In addition, the study also showed vaginal deliveries with a higher proportion and cesarean section with a lower proportion among women who had SUI, when compared to the control group.

Although MUI was not associated with neonatal birth weight, we found the association with caffeine intake to be a risk factor for MUI. The previous report provided results on the association between caffeine consumption and risk of specific types of UI was varies. Ying et al study[21] revealed high caffeine intake was associated with an increase in prevalence of urgency incontinence but not in stress or mixed incontinence. A meta-analysis of observational studies[22] found no evidence for an association between caffeine consumption as the risk of UI. However, we found significant association between caffeine consumption and MUI.

By theory, high body weight is a risk factor for UI[23] but pre-pregnancy BMI was not always the risk factor for UI during pregnancy in many studies. Some studies showed high BMI was a risk factor for UI during pregnancy[19, 24] but in some such as Nigam et al and Scarpa, et al[25, 26] could not find any significant association between the UI during pregnancy and pre-pregnancy BMI. They stated that pre-pregnancy BMI was not a risk factor of UI even enough, overweight women by BMI were more in women whose neonatal birth weight was greater than 4,000 grams than women whose neonatal birth less than 4,000 grams. However, the BMI during the third trimester of pregnancy may be a risk factor for UI during pregnancy but no study has not yet reported this assumption.

In the past, there had never been a study of the association between neonatal birth weight and UI during pregnancy. There was only one study about the prevalence of UI in women after delivery and the result was controversial. According to Thom, et al[27] and Hojberg, et al[24], the neonatal birth weight more than 4,000 grams increased the risk of UI in the postpartum period. However, Kılıç[28] reported UI after delivery did not have a correlation with neonatal birth weight more than 4,000 grams.

In Thailand, Tanawattanacharoen et al reported

the prevalence of UI during pregnancy at King Chulalongkorn Memorial Hospital was 53.8% and SUI was the most common (53%). They found that the only risk factor associated with UI in pregnancy was pre-pregnancy BMI[12]. In our study, the SUI was also the most common symptom in third trimester pregnancy, but the pre-pregnancy BMI was not a significant factor. We also evaluated the association of neonatal birth weight, which found a significant risk and it was not being taken to account in Tanawattanacharoen study. The risk factors which they assessed in the multivariate analysis were age, parity, pre-pregnancy BMI that there could be other risks affecting development of UI.

The previous study showed the pregnant women who developed UI during pregnancy could continue to experience the symptoms after the postpartum period or the condition could last life-long[29-31]. Therefore, from the result of this study, women who delivered the baby weight more than 4,000 gm should be aware the possibilities and should participate in the intensive program to prevent UI or to decrease its severity after child delivery.

The strength of this study was that it was the first to investigate the association between neonatal birth weight and UI during pregnancy. The questionnaires used had satisfactory validity and reliability.

However, there were some limitations to this study. First, the UI was diagnosed based on self-reported questionnaires in which recall bias might have occurred. Second, the severity and prevalence of UI were not evaluated in the postpartum period when the severity might have improved, persisted or disappeared. Third, the sample size in this study was calculated base on the association of the neonatal birth weight (less than 4,000 grams vs greater than 4,000 grams) and prevalence of UI in pregnant women, which might not have enough power to conclude the effect of other factors to UI.

Conclusion

The neonatal birth weight was the only risk factor that associated with overall UI and SUI during the third trimester of pregnancy. The prevalence of UI in pregnancy was 35%.

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Potential conflicts of interest

The authors declare no conflict of interest.

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