

Prevalence of Urinary Incontinence, Its Risk Factors and Effect on the Quality of Life in Women after Their First Delivery

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ABSTRACT

Introduction: Although urinary incontinence is commonly associated with increasing parity, there is however a lack of published data on urinary incontinence among primiparous women. This study aims to determine its prevalence among primiparous women at 6-8 weeks postpartum, its risk factors and effects to their quality of life. **Methods:** This is a cross-sectional study involving primiparous women at 6-8 weeks postpartum. Women in their third trimester were recruited using convenience sampling. Data were obtained using a study proforma, and International Consultation on Incontinence Questionnaire – Short Form (ICIQ-SF) over a face-to-face interview. The same questionnaire with additional enquiries on delivery was completed over a telephone interview at 6-8 week postpartum. Data were analysed using chi-square and simple logistic regression tests contained in the Statistical Package for Social Science version 20.0. **Results:** Three hundred and six women participated in this study. The prevalence of urinary incontinence in the third trimester of pregnancy was 34.3% (95%CI: 29.0, 39.7) and dropped to 5.2% (95% CI: 2.7, 7.7) at 6-8 weeks postpartum. Childhood enuresis and postpartum body mass index were the two factors that showed significant association with postpartum urinary incontinence. Urinary incontinence in 95 (31%) women had resolved by 6-8 weeks postpartum, whereas 10 (3.3%) women still had persistent symptom. A small proportion of women (2.0%) developed urinary incontinence in the postpartum period. Majority of women with urinary incontinence did not feel it significantly affected their quality of life. The ICIQ- SF mean score was 6.13 (range 2-12). **Conclusions:** Postpartum urinary incontinence is rather uncommon among primiparous women and does not seem to affect their quality of life. Childhood enuresis and postpartum BMI were risk factors associated with postpartum urinary incontinence.

KEYWORDS: urinary incontinence, postpartum, primiparous

INTRODUCTION

Urinary incontinence is defined by the International Urogynecological Association and International Continence Society (ICS) as a 'complaint of involuntary loss of urine' [1]. It is a problem that has often been underestimated but can be potentially devastating to a woman. The association of urinary incontinence with increasing parity has been well established, but studies of its prevalence in women after the first delivery are limited or scarce. The reported incidence of postpartum urinary incontinence among this group of women has ranged from 9 to 18% [2-5]. However, most of these studies had involved women from 6 weeks up to 2 years following their first delivery.

Although the aetiology of urinary incontinence is still unclear, the development of urinary incontinence during postpartum period is however believed to be multifactorial. It has been suggested that the development of stress incontinence may be related to damage to the innervation of the pelvic floor, as well as direct trauma to the levator ani muscle and endo-pelvic fascia during vaginal delivery [4]. However, this might not be the only mechanism, as not all patients develop stress incontinence following vaginal delivery despite being associated with a certain degree of trauma. Therefore, there might be some pre-existing connective tissue and hereditary factors [6] that could lead to stress incontinence. Some have even postulated that it is partly due to low or decreased

urethral resistance caused by use of drugs, such as intravaginal prostaglandins [7].

Various risk factors associated with increased risk of postpartum urinary incontinence have been studied, such as body mass index, weight gain, mode of vaginal delivery, episiotomy, presence of urinary incontinence during the antenatal period, and the practice of pelvic floor exercises. Unfortunately, most of the published results were inconsistent, except for the practice of pelvic floor exercise, which has been shown to reduce the risk of urinary incontinence [4, 8, 9].

Further studies to look at the relationship between socio-demographic variables and urinary incontinence are therefore needed. This may help in predicting women who are at higher risk of developing this problem following delivery. Therefore, the aim of this study was to determine the prevalence of urinary incontinence among Malaysian primiparous women in the 6 to 8 weeks postpartum period, identify some potential risk factors, and its effects to the quality of life.

METHODS

The methodology used in this has been described in our earlier publication focusing on the urinary incontinence during the third trimester [10]. In brief, however, this is a cross-sectional study involving primiparous women at 6-8 weeks postpartum, who had delivered in one of the tertiary referral hospital in Malaysia. The minimum sample size required was 245 (calculated using OpenEpi software, with $\alpha=0.05$ and 80% power of study). This was based on the prevalence of urinary incontinence of 24.1% reported by Hvidman et al., 2002 [19]. However, in consideration of a possible 20% drop out and non-responders, the final minimum sample size required was estimated as 295.

Pregnant women were recruited during their third trimester, when they attended the hospital from the month of July 2012 to June 2013. They were chosen arbitrarily using the convenience sampling technique. Study information sheet was provided and an informed consent was obtained.

Trained interviewers conducted face-to-face interviews using a questionnaire, attached in our earlier publication [10]. They also reviewed their antenatal home-based pregnancy records to fill in the information gaps. Socio-demographic details and information on some of the known risk factors were collected in the first part of the questionnaire, which included details about their age, race, religion, educational level, occupation, pre-pregnancy booking weight, height, previous miscarriages and previous history of dilatation and curettage. History of childhood enuresis, smoking status and alcohol intake were also obtained. Presence of any history of involuntary leak of urine prior to the third trimester of pregnancy, either before or during pregnancy was also recorded.

The second part of the study was the assessment of urinary incontinence using the International Consultation on Incontinence Questionnaire – Short Form (ICIQ-SF) [11]. Women were asked to rank their frequency of urinary leakage (Question 1) and their own perception of the amount of urinary leakage (Question 2). Further questions included the possible effect of urinary leakage on their lifestyle, such as ability to do household chores, participation in physical activities, like walking, swimming or other forms of exercises; ability to travel by car or bus for more than 30 minutes; participation in social activities outside their home; emotional health (nervousness, depression, etc); and sense of feeling frustrated. The assessments were ranked using a 4-point Likert scale, ranging from not at all, slightly, moderately and greatly. The overall effect of urinary leakage to their lifestyle was also enquired (Question 3).

The effect on the quality of life was assessed by the sum of scores of the results of Questions 1, 2 and 3. The quality of life score ranged from 0-21; the higher the score, the worse the quality of life. The last part of the questionnaire listed situations associated with their urinary incontinence, which indirectly suggested the type of incontinence they were likely to be suffering from. The same questionnaire with additional delivery details was completed over a telephone interview at 6-8 weeks postpartum.

Ethical consideration

The study and its design were approved by Universiti Teknologi MARA's (UiTM) Ethics Committee (Reference no. 600-RMI/DANA 5/3/RIF (34/2012)).

Statistical Analysis

The data was entered and analysed using chi-square and simple logistic regression (SLogR) tests contained in the Statistical Package for Social Science (SPSS) version 20.0 (SPSS Inc, Chicago, IL). The significant level was preset at $\alpha=0.05$. Chi-square and SLogR were used to determine the possible associated factors for urinary incontinence by determining the Odds Ratio (OR) and 95% Confidence intervals. All the significant factors following SLogR analysis were further analyzed using backward, forward and stepwise methods of multiple logistic regression (MlogR) to determine the associated factors adjusted for confounding factors.

RESULTS

Three hundred and six primiparous participated in this study. The prevalence of urinary incontinence in the

third trimester was 34.3% (95%CI: 29.0, 39.7; n=105 women). This was reported in our earlier publication for this study, which included risk factors and impact on quality of life among women during the third trimester of their first pregnancy [10]. The prevalence dropped dramatically to 5.2% (95% CI: 2.7, 7.7; n= 16 women) in the postpartum period. Six (2.0%) women with no incontinence problem in the antenatal period, developed symptoms of urinary incontinence in the postpartum period, and ten (3.3%) women had persistent urinary incontinence from the third trimester until the postpartum period. There were ninety-five (31%) women with urinary incontinence in the third trimester who reported that their symptoms had resolved in the postpartum period. The rest of the respondents, (195; 63.7%) women did not experience any urinary incontinence either in the third trimester of their pregnancy or during the postpartum period.

Table 1 demonstrated the background of the participants and studied risk factors. There were 269 women who were analysed for history of childhood enuresis (37 of them were unsure whether they had the problem as a child).

Table 1 Sociodemographic profile and risk factors for urinary incontinence

Variables	UI (N=16), Frequency (%)	No UI (N=290), Frequency (%)	Total (N=306), Frequency (%)	Chi-square (df)	p-value
<i>Race</i>					
Malay	11 (4.2)	251 (95.8)	262 (100.0)	3.903	0.063
Non-Malay	4 (11.4)	39 (88.6)	44 (100.0)	(1)	
<i>Religion</i>					
Islam	11(4.1)	259 (95.9)	270 (100.0)	6.175	0.013*
Non-Muslim	5 (13.9)	31(86.1)	36 (100.0)	(1)	
<i>Educational level</i>					
Primary, Secondary	8 (5.1)	150 (94.9)	158 (100.0)	0.018	0.893
Tertiary	8 (5.4)	140 (94.6)	148 (100.0)	(1)	
<i>Occupation</i>					
Professional	4 (4.2)	91 (95.8)	95 (100.0)	1.916	0.590
Non-professional	7 (7.4)	87 (92.6)	94 (100.0)	(3)	
Housewife	4 (3.8)	102 (96.2)	106 (100.0)		
Student	1 (9.1)	10(90.9)	11 (100.0)		
<i>Body Mass Index</i>					
Normal	(n=16) 8 (3.8)	(n=281) 200 (96.2)	(n=297) 208 (100.0)	5.525	0.104
Overweight, Obese	8 (9.0)	81 (91.0)	89 (100.0)	(2)	
<i>Previous miscarriage</i>					
Yes	1(6.3)	15 (93.7)	16 (100.0)	0.036	0.072
No	15(5.2)	275 (94.8)	290 (100.0)	(1)	
<i>Previous D&C</i>					
Yes	1 (14.3)	6 (85.7)	7 (100.0)	1.186	0.316
No	15 (5.2)	284 (95.0)	299 (100.0)	(1)	

<i>Smoking status</i>					
Previous /Current smoker	2 (11.1)	16 (88.9)	18 (100.0)	1.335	0.248
Never smoke	14 (4.9)	274 (95.1)	288 (100.0)	(1)	
<i>Childhood Enuresis</i>					
	(n=12)	(n=257)	(n=269)		
Yes	8(13.8)	51(86.2)	58 (100.0)	15.11	<0.001*
No	4(1.9)	207(98.1)	211 (100.0)	(1)	
<i>History of Urinary Incontinence</i>					
Yes	8(9.5)	76(90.5)	84 (100.0)	4.310	0.047
No	8(3.6)	214(96.4)	222 (100.0)	(1)	
<i>Mode of delivery</i>					
SVD	10 (62.5)	200 (69.0)	210 (100.0)	0.575	0.750
Ventouse delivery	2 (12.5)	22(7.6)	24 (100.0)	(2)	
LSCS	4 (25.0)	68 (23.4)	72 (100.0)		
<i>Episiotomy</i>					
Yes	11(5.0)	209 (95.0)	220 (100.0)	0.083	0.778
No	5 (5.8)	81 (94.2)	86 (100.0)	(1)	
<i>Pelvic Floor Exercise</i>					
Never practise	10 (4.5)	209 (95.0)	220 (100.0)	0.738	0.399
Had practise	6 (7.0)	80 (93.0)	86 (100.0)	(1)	
<i>BMI postpartum</i>					
Underweight	2 (3.5)	55 (96.5)	57 (100.0)	2.669	0.445
Normal	6 (4.6)	124 (94.5)	130 (100.0)	(3)	
Overweight	4 (5.7)	66 (94.3)	70 (100.0)		
Obese	4 (10.8)	33 (89.2)	37 (100.0)		

* Statistically significant at $p < 0.05$

Table 2 provides on data on the effect of urinary incontinence on daily activities. Most of the women did not feel that it affected their daily activities at all. Based on the total score of the ICIQ- SF, the scores ranged from 2 to 12 with a mean of 6.13.

Table 2 The questionnaire on assessment of severity of the effect of urinary continence to their daily life

	Not at all (%)	Slightly (%)	Moderately (%)	Greatly (%)
Has incontinence affected your house chores?	11 (68.8)	1(6.3)	3(18.8)	1(6.3)
Has incontinence affected your participation in physical activities?	13 (81.3)	2(12.5)	0	1(6.3)
Has incontinence affected your ability to travel by car or bus more than 30 minutes from home?	13 (81.3)	1(6.3)	1(6.3)	1(6.3)

Has incontinence affected your participation in social activities outside? 13 (81.3) 2(12.5) 0 1(6.3)

Has incontinence affected you emotionally? 15 (93.8) 0 1(6.3) 0

Has incontinence made you feel frustrated? 14 (87.5) 1(6.3) 1(6.3) 0

This study demonstrated that stress urinary incontinence is the most prevalent (62.5%) with 10 women leaking urine when they coughed or sneezed and 2 women leaked urine when they were physically active. One woman had urged urinary incontinence and another 3 women (18.8%) had mixed urinary incontinence.

By using simple logistic regression analysis, our study found that factors associated with urinary incontinence in the postpartum period were race ($p=0.058$), religion ($p=0.049$), childhood enuresis ($p=0.001$), history of urinary incontinence ($p=0.045$),

body mass index ($p=0.08$) and presence of urinary incontinence in the 3rd trimester ($p=0.015$). However, after adjusting for confounding factors, only childhood enuresis ($p<0.001$, OR: 9.69 95%CI 2.7, 34.63) and body mass index ($p=0.020$, OR: 4.34 95%CI 1.25,14.99) showed significant association (Table 3). The overall sensitivity and specificity of childhood enuresis and postpartum BMI was 95.4%.

Table 3 The related factors for urinary incontinence

	Adj. Beta	Wald (df)	Adj. OR (95%CI)	p-value
Childhood Enuresis	2.271 (0.650)	12.203 (1)	9.69 (2.71,34.63)	<0.001*
Body mass index (BMI)	1.467 (0.633)	5.373 (1)	4.34 (1.25,14.99)	0.020*

The receiver operative characteristic (ROC) is shown in Figure 1. The area under the curve was 76.8% (95%CI 59.6,94.5).

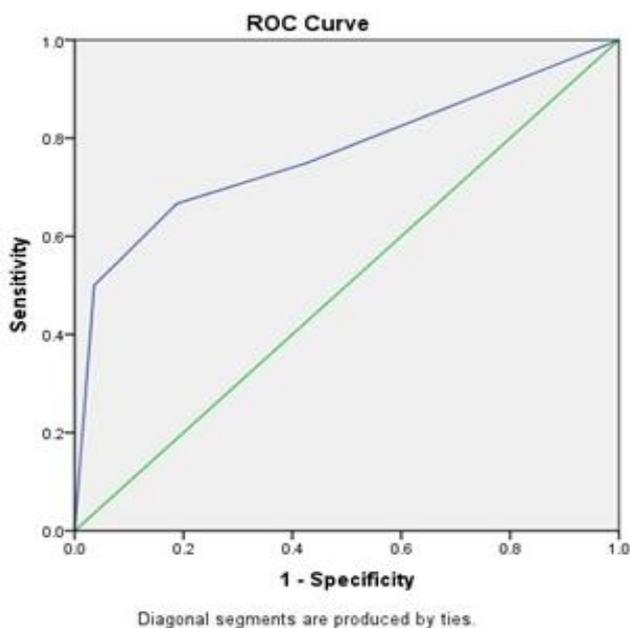


Figure 1 The receiver operative characteristics (ROC) curve of the prediction model of factors associated with urinary incontinence

DISCUSSION

Urinary incontinence is a common complaint among women. Women in the reproductive age have increased incidence of urinary incontinence during pregnancy, with documented prevalence ranging from 21.1 to as high as 71% [12-17]. However, the prevalence seems to decrease in the puerperium [18].

This study looked at a specific group of postpartum women 6-8 weeks following their first vaginal deliveries.

The prevalence of urinary incontinence in the third trimester was 34.4%. Previous published studies on primigravida have reported prevalences ranging from 19.9 to 39.1 %. However, these studies had involved pregnant women without particular reference to their stage of gestation or pregnancy [19-21]. Another study had reported a prevalence of 55.9% in the third trimester of pregnancy, but 10.8% of these women already had urinary incontinence prior to their pregnancy [22]. The incidence of urinary incontinence in this study population dropped to 5.2% in the postpartum period. This is quite low compared to the figures from the literature, where the prevalences reportedly vary from 7 - 29% at various intervals post-delivery (14, 23, 24). In addition, only 2% (6) of women developed urinary incontinence postpartum and 3.3% [10] women had persistent urinary incontinence from the third trimester until the postpartum period.

Our study also found that stress incontinence was the commonest (62.5%) type of urinary incontinence, which is in keeping with the reported findings in the literature [14, 25]. However, 18.8% of women in our study group had mixed urinary incontinence. This is in contrast to the finding by Tanawattanacharoen et al (2013) that found all the women in their study had only stress incontinence at 3 months postpartum [14].

In our study, postpartum body mass index (BMI) was shown to be significantly associated with postpartum urinary incontinence. We used a lower cut off point of body mass index as recommended by World Health Organisation (WHO) for Asian women [26]. This finding was consistent with previous published reports that showed that higher BMI was associated with higher chances of developing urinary incontinence, both in non-pregnant and pregnant women (13, 14, 27-29). Arrue et al (2011) found that the only significant risk factor associated with persistent stress urinary incontinence was higher BMI at term [30].

History of childhood enuresis has been reported to be associated with increased incidence of

urinary incontinence in adulthood [31] and also during pregnancy [22]. A significant association between history of childhood enuresis and postpartum urinary incontinence was found in this study ($p < 0.001$). To the best of our knowledge, this has never been reported in any of the other studies before. Despite the established association, its mechanism is still unclear and it has been suggested that childhood enuresis is associated with overactive bladder syndrome but not with stress urinary incontinence [32].

No significant association was observed between the presence of urinary incontinence during the third trimester of pregnancy and postpartum urinary incontinence. There are conflicting results on whether urinary incontinence during pregnancy is a significant risk factor for postpartum urinary incontinence. It has been reported that women who suffered postpartum urinary incontinence were different from women who had urinary incontinence before delivery and vice versa [33]. In contrast, another study reported that the only risk factor independently associated with the presence of stress incontinence six months after the first vaginal delivery was the presence of urinary incontinence during pregnancy [3]. The reason for this discrepancy remains unclear.

Among those who had postpartum urinary incontinence, most felt that it did not significantly influence their daily life activities. Similar finding has also been established in other studies where the severity of urinary incontinence was either slight or moderate with low impact to the quality of life of the affected women [3, 30].

The drawback of this study is the lack of an objective assessment of the urinary incontinence and using the women's self-reported symptoms instead. Despite difficulty to perform an objective assessment it is a well-known challenge for those studying this research area. However, one could argue that the patients' perceptions towards their own symptoms are a valid assessment, and potentially superior than any diagnostic tools.

CONCLUSIONS

In conclusion, postpartum urinary incontinence among women in the 6-8 weeks postpartum period is rather

uncommon and minimally affects their quality of life. Nonetheless, it is crucial to emphasize on screening for risk factors of urinary incontinence and educate women on preventive strategies during the antenatal reviews.

Personalised dietary advice and exercise regime, based on individual needs to prevent weight reduction postpartum might potentially have a significant impact on decreasing the risk of urinary incontinence [29]. Emphasis on the practise of pelvic floor exercise, preferably under the supervision of a physiotherapist, during the antenatal period until postpartum is very important as it has been shown to reduce the problems of urinary incontinence [4, 9, 34-36].

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Conflicts of Interest

Authors declare none.

REFERENCES

1. Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, van Kerrebroeck P, Victor A, Wein A. The standardisation of terminology of lower urinary tract function: report from the Standardisation Subcommittee of the International Continence Society. *Neurourol Urodyn.* 2002; 21(2): 167-78.
2. Arrue M, Diez-Itza I, Ibañez L, Paredes J, Murgiondo A, Sarasqueta C. Factors involved in the persistence of stress urinary incontinence from pregnancy to 2 years post partum. *Int J of Gynecol & Obstet.* 2011; 115(3): 256-9.
3. Arrue M, Ibañez L, Paredes J, Murgiondo A, Belar M, Sarasqueta C, Diez-Itza I. Stress urinary incontinence six months after first vaginal delivery. *Eur J Obstet Gyn R B.* 2010; 150(2): 210-4.

4. Chou PL, Chen FP, Teng LF. Factors associated with urinary stress incontinence in primiparas. *Taiwan J Obstet Gyne*. 2005; 44(1): 42-7.
5. Eftekhari T, Hajibaratani B, Ramezanzadeh F, Shariat M. Postpartum evaluation of stress urinary incontinence among primiparas. *Int J Gynecol & Obstet*. 2006; 94(2): 114-8.
6. Robb K, Toozs-Hobson P. Postpartum stress incontinence. *Women's Health Medicine*. 2005; 2(6): 38-41.
7. Pregazzi R, Sartore A, Troiano L, Grimaldi E, Bortoli P, Siracusano S, Guaschino S. Postpartum urinary symptoms: prevalence and risk factors. *Eur J Obstet Gyn R B*. 2002; 103(2): 179-82.
8. Mørkved S, Bø K, Schei B, Salvesen KÅ. Pelvic floor muscle training during pregnancy to prevent urinary incontinence: a single-blind randomized controlled trial. *Obstet Gynecol*. 2003; 101(2): 313-9.
9. Assis LC, Dias A, Santini ACM, Vianna LS. O187 Incidence of urinary incontinence at 12, 18 and 24 months postpartum in women who underwent perineal exercises during pregnancy. *Int J Gynecol & Obstet*. 2012; 119, Supplement 3(0):S326.
10. Abdullah B, Ayub SH, Mohd Zahid AZ, Noorneza AR, Isa MR, Ng PY. Urinary incontinence in primigravida: the neglected pregnancy predicament. *Eur J Obstet Gyn R B*. 2016; 198: 110-5.
11. Avery K, Donovan J, Peters TJ, Shaw C, Gotoh M, Abrams P. ICIQ: a brief and robust measure for evaluating the symptoms and impact of urinary incontinence. *Neurourol Urodynam*. 2004; 23(4): 322-30.
12. Kocaoz S, Talas MS, Atabekoglu CS. Urinary incontinence in pregnant women and their quality of life. *J Clin Nurs*. 2010; 19(23-24): 3314-23.
13. de Oliveira C, Seleme M, Cansi PF, Consentino RF, Kumakura FY, Moreira GA, Berghmans B. Urinary incontinence in pregnant women and its relation with socio-demographic variables and quality of life. *Rev Assoc Med Bras*. 2013; 59(5): 460-6.
14. Tanawattanacharoen S, Thongtawee S. Prevalence of urinary incontinence during the late third trimester and three months postpartum period in King Chulalongkorn Memorial Hospital. *J Med Assoc Thai*. 2013; 96(2): 144-9.
15. Bo K, Pauck Oglund G, Sletner L, Morkrid K, Jennum AK. The prevalence of urinary incontinence in pregnancy among a multi-ethnic population resident in Norway. *BJOG*. 2012; 119(11): 1354-60.
16. Valetton CT, do Amaral VF. Evaluation of urinary incontinence in pregnancy and postpartum in Curitiba Mothers Program: a prospective study. *Int Urogynecol J*. 2011; 22(7): 813-8.
17. Adaji SE, Shittu OS, Bature SB, Nasir S, Olatunji O. Botherome lower urinary symptoms during pregnancy: a preliminary study using the International Consultation on Incontinence Questionnaire. *Afr Health Sci*. 2011; 11 Suppl 1:S46-52.
18. Thorp Jr JM, Norton PA, Wall LL, Kuller JA, Eucker B, Wells E. Urinary incontinence in pregnancy and the puerperium: A prospective study. *Am J Obstet Gynecol*. 1999; 181(2): 266-73.
19. Hvidman L, Foldspang A, Mommsen S, Bugge Nielsen J. Correlates of urinary incontinence in pregnancy. *Int Urogynecol J Pelvic Floor Dysfunct*. 2002; 13(5): 278-83.
20. Hansen BB, Svare J, Viktrup L, Jorgensen T, Lose G. Urinary incontinence during pregnancy and 1 year after delivery in primiparous women compared with a control group of nulliparous women. *Neurourol Urodynam*. 2012; 31(4): 475-80.
21. Solans-Domenech M, Sanchez E, Espuna-Pons M. Urinary and anal incontinence during pregnancy and postpartum: incidence, severity, and risk factors. *Obstet Gynecol*. 2010; 115(3): 618-28.
22. Brown SJ, Donath S, MacArthur C, McDonald EA, Krastev AH. Urinary incontinence in

- nulliparous women before and during pregnancy: prevalence, incidence, and associated risk factors. *Int Urogynecol J.* 2010; 21(2): 193-202.
23. Woolhouse H, Gartland D, Perlen S, Donath S, Brown SJ. Physical health after childbirth and maternal depression in the first 12 months post partum: results of an Australian nulliparous pregnancy cohort study. *Midwifery.* 2013.
 24. Torrisi G, Minini G, Bernasconi F, Perrone A, Trezza G, Guardabasso V, Ettore G. A prospective study of pelvic floor dysfunctions related to delivery. *Eur J Obstet Gynecol Reprod Biol.* 2012; 160(1): 110-5.
 25. Zhu L, Li L, Lang JH, Xu T. Prevalence and risk factors for peri- and postpartum urinary incontinence in primiparous women in China: a prospective longitudinal study. *Int Urogynecol J.* 2012; 23(5): 563-72.
 26. Barba C, Cavalli-Sforza T, Cutter J, Darnton-Hill I. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet.* 2004; 363(9403): 157-63.
 27. Wesnes SL, Rortveit G, Bo K, Hunskaar S. Urinary incontinence during pregnancy. *Obstet Gynecol.* 2007; 109(4): 922-8.
 28. Hermansen IL, O'Connell B, Gaskin CJ. Are postpartum women in Denmark being given helpful information about urinary incontinence and pelvic floor exercises? *J Midwifery Wom Heal.* 2010; 55(2): 171-4.
 29. Ruiz de Vinaspre Hernandez R, Rubio Aranda E, Tomas Aznar C. Urinary incontinence and weight changes during pregnancy and post partum: a pending challenge. *Midwifery.* 2013; 29(12): e123-9.
 30. Arrue M, Diez-Itza I, Ibanez L, Paredes J, Murgiondo A, Sarasqueta C. Factors involved in the persistence of stress urinary incontinence from pregnancy to 2 years post partum. *Int J Gynaecol Obstet: the official organ of the International Federation of Gynaecology and Obstetrics.* 2011; 115(3): 256-9.
 31. Gurbuz A, Karateke A, Kabaca C. Enuresis in childhood, and urinary and fecal incontinence in adult life: do they share a common cause? *BJU Int.* 2005; 95(7): 1058-62.
 32. Fitzgerald MP, Thom DH, Wassel-Fyr C, Subak L, Brubaker L, Van Den Eeden SK, Brown JS. Childhood urinary symptoms predict adult overactive bladder symptoms. *The J Urology.* 2006; 175(3): 989-93.
 33. Huebner M, Antolic A, Tunn R. The impact of pregnancy and vaginal delivery on urinary incontinence. *Int J Gynecol Obstet.* 2010; 110(3): 249-51.
 34. Pelaez M, Gonzalez-Cerron S, Montejo R, Barakat R. Pelvic floor muscle training included in a pregnancy exercise program is effective in primary prevention of urinary incontinence: a randomized controlled trial. *Neurourol Urodynam.* 2014; 33(1): 67-71.
 35. Kocaoz S, Eroglu K, Sivaslioglu AA. Role of pelvic floor muscle exercises in the prevention of stress urinary incontinence during pregnancy and the postpartum period. *Gynecol Obstet Inves.* 2013; 75(1): 34-40.
 36. Stafne SN, Salvesen KA, Romundstad PR, Torjusen IH, Morkved S. Does regular exercise including pelvic floor muscle training prevent urinary and anal incontinence during pregnancy? A randomised controlled trial. *BJOG.* 2012; 119(10): 1270-80.