

# Urinary incontinence and lower urinary tract symptoms among pregnant women and their affecting factors

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## Abstract

Pregnancy and childbirth are the main risk factors for pelvic floor dysfunction. The main manifestations of this disorder are lower urinary tract symptoms (LUTS) and urinary incontinence (UI). Studies on the prevalence and risk factors of these conditions are essential for early diagnosis and comprehensive management. However, until now, there has been no comprehensive study of the prevalence and risk factors for pregnant women in Jakarta. Therefore, this observational cross-sectional analytic study was carried out to determine the prevalence of UI and LUTS and the factors that influence them. The subjects (n=236) of this study were pregnant women who came for routine check-ups at the Jakarta area Health Center from April 2021 to March 2022. Patients with a history of incontinence, multiple pregnancies, uncontrolled diabetes, neurological disorders, or a history of previous surgery were excluded from the study. The risk factors assessed were maternal age, gestational age, parity, body mass index, and previous obstetric history. We found that 8.5% had stress UI, 14% had urgency UI, and 1.6% had mixed UI. Urinary complaints were found in the form of frequency (59.3%), nocturia (87.3%), urgency (33.1%), hesitancy (8.9%), and straining (0.8%). There were only 5.1% of subjects who did not have any urinary complaints. The risk factors for LUTS and UI were advanced maternal age and trimester of pregnancy.

## Introduction

Pregnancy and childbirth are the major risk factors for pelvic floor dysfunction. One of the most common manifestations of pelvic floor dysfunction in women is lower urinary tract symptoms (LUTS).<sup>1</sup> Some of these symptoms include nocturia, urgency, frequency, and urinary incontinence (UI).<sup>2</sup>

Anatomical and physiological changes during pregnancy affect various organ systems, including the urinary system. Increased production of the hormones progesterone and relaxin causes relaxation of the musculoskeletal system, including the pelvic floor muscles and the connective tissue that supports the pelvic organs. These conditions can cause changes in the anatomy, function, and mechanism of the urinary tract. In addition to the effects of these hormonal distortions, the uterus and fetal growth also cause changes in the position and distortion of the bladder.<sup>1,3,4</sup>

Weight gain during pregnancy increases the pressure on the pelvic floor muscles and bladder. Increased body weight causes impaired blood flow and innervation to the urethra and bladder.<sup>5</sup> The imbalance between increased pressure in the blood vessels and decreased closing pressure due to anatomical and hormonal changes during pregnancy will cause UI.<sup>6</sup>

Several factors have occurred with the incidence of UI during

pregnancy, including maternal age, number of parities, gestational age, previous history of incontinence and UI, family history, body mass index (BMI), and weight gain during pregnancy.<sup>1,7,8</sup>

Until now, there has been no study regarding the prevalence of UI and LUTS in pregnancy and various factors related to its occurrence in Indonesia. Therefore, this study aims to determine the prevalence and risk factors for UI and urinary tract symptoms in pregnancy in Indonesia.

## Materials and Methods

This is an observational cross-sectional study performed on pregnant women in Jakarta, Indonesia, from April 2021 to March 2022. All of the pregnant mothers with singleton pregnancies visiting one of the eight primary healthcare facilities included in the study were included in this study. Pregnant women with a history of UI, uncontrolled diabetes, pelvic dysfunction surgery, preeclampsia, sepsis, neurologic abnormalities, or spine trauma were excluded from the study.

This study used a 5% error bound and a 95% confidence interval limit, with the power of the test considered to be 90%. Variables analyzed in this were age, gestational age, parity, BMI, and previous birth history. UI was measured using the Indonesian version of the Bristol Female Lower Urinary Tract Questionnaire,<sup>9</sup> and categorized as either stress UI, pressure UI, or mixed UI.

Frequency symptoms were defined as voiding  $\geq 8$  times per day. Nocturia was defined as the need to void  $\geq 1$  time per night during sleep.<sup>10</sup> Urgency symptom was defined as the sensation of voiding, which was unable to be resisted.<sup>10</sup> Hesitancy was defined as the lateness during the start of voiding while straining symptom was defined as the need for straining (either by increasing abdominal pressure, Valsava maneuver, or suprapubic pressure) to void.<sup>10</sup>

All human studies had been approved by the Research Ethics Committee of the Faculty of Medicine, University of Indonesia. All patients who were included in this study had given informed consent before the study. Collected data were then analyzed using SPSS for Macintosh ver. 20 (IBM, Armonk, NY, USA). Characteristics of subjects and the symptoms experienced were analyzed descriptively. Multivariable analysis was done to determine factors associated with UI and LUTS.

## Results

A total of 236 subjects were included in this study, 224 (94.9%) of whom had a minimum of one LUTS and 12 (5.1%) did not have any LUTS. Baseline characteristics of subjects can be found in Table 1. Following the analysis of the baseline characteristics of subjects, the distribution of LUTS in each variable is described in Table 2. As seen in Table 2, the LUTS tend to be more prevalent in pregnant women with advanced age, gestational age in the third trimester,

**Table 1.** Characteristics of the subjects.

Variables	Frequency	Percentage
Age (years), median (min-max)	28 (16-43)	
<30	144	61.1
$\geq 30$	92	38.9
Gestational age (trimester)		
Trimester 1	42	17.8
Trimester 2	90	38.1
Trimester 3	104	44.1
Body mass index (kg/m <sup>2</sup> ), median (min-max)	24.5 (14.8-39.6)	
Underweight	28	11.9
Normoweight	94	39.8
Overweight	76	32.2
Obese	38	16.1
Parity, median (min-max)	1 (0-4)	
Nuliparous	87	36.9
Primiparous	88	37.3
Multiparaous	61	25.8
Previous birth history		
None	87	36.9
Vaginal	90	38.1
Vaginal and abdominal	16	6.8
Abdominal	43	18.2
LUTS	224	94.9
Storage symptoms		
Frequency	140	59.3
Nocturia	206	87.3
Urgency	78	33.1
Voiding symptoms		
Hesitancy	21	8.9
Straining	2	0.8
Urinary incontinence		
Stress UI	20	8.5
Pressure UI	14	5.9
Mixed UI	4	1.6

BMI, body mass index; LUTS, lower urinary tract symptoms; UI, urinary incontinence.

higher BMI, and nuliparous. Meanwhile, the risk factors of LUTS were analyzed using multivariate analysis. The multivariate analysis can be found in Table 3. It was found that higher age and gestational age were the risk factors of stress UI, frequency symptoms, nocturia, and urgency symptoms occurrence in pregnant women. However, the risk factors of other LUTS were not significant.

## Discussion

Based on the characteristics, it was found that most of the research subjects were aged 25-29 years, with a median of 28 years. This is similar to other studies on the prevalence of urinary disorders in pregnancy, with a median age of 25-30 years.<sup>2,11,12</sup> Based on research by Groutz *et al.*, the age of pregnant women over 30 years old in the first pregnancy was an independent risk factor for the occurrence of UI.<sup>13</sup> This phenomenon indicates that the results of this study are comparable to similar studies.

The median BMI was 24.5 kg/m<sup>2</sup>. This value is similar to other

studies regarding urinary disorders in pregnancy.<sup>12,14</sup> In this study, 94 subjects had a normal BMI (39.8%), and 76 were overweight (32.2%). There are different opinions and research results regarding the significance of BMI on urinary disorders in pregnancy. It is suspected that the increased BMI and the increased risk of urinary disorders are due to intra-abdominal pressure on the bladder. Weight gain and obesity can cause pelvic tissue weakness, chronic muscle stretching, and bladder weakening.<sup>12,15</sup>

In this study, it was found that as many as 94.9% of the subjects experienced some type of LUTS, while only 5.1% did not experience urinary complaints at all. Although this figure is considered very high, these results are similar to other studies conducted in developed countries (the Netherlands) and developing countries (Nigeria).<sup>12,16</sup> This indicates that urinary disorders in pregnancy are a problem with a very high prevalence and impair the quality of life of pregnant women around the world. Unfortunately, the prevalence found in studies and surveys that are conducted often does not describe the true prevalence because symptoms of the disorder are often considered "normal", so the patients do not complain about the symptoms.<sup>16</sup> Therefore, it is important to increase

**Table 2.** Distribution of lower urinary tract symptoms in each characteristic.

	Stress UI (n=20)	Pressure UI (n=14)	Mixed UI (n=4)	Frequency (n=140)	Nocturia (n=206)	Urgency (n=78)	Hesitancy (n=21)	Straining (n=2)
Age (years), n (%)								
<30 (n=144)	8 (8.6)	2 (2.1)	4 (4.3)	62 (67)	88 (95)	29 (31)	8 (8)	1 (1)
≥30 (n=92)	12 (8.3)	12 (8.3)	0	78 (54)	118 (81)	49 (34)	13 (9)	1 (0.6)
Gestational age (trimester), n (%)								
Trimester 1 (n=42)	7 (8)	9 (10.3)	3 (3.4)	51 (58.6)	71 (81.6)	28 (32.2)	8 (9.2)	0
Trimester 2 (n=90)	8 (9.1)	4 (4.5)	1 (1.1)	48 (54.5)	80 (90.9)	27 (30.7)	8 (9.1)	1 (1.1)
Trimester 3 (n=104)	5 (8.2)	1 (1.6)	0	41 (67.2)	55 (90.2)	23 (37.7)	5 (8.2)	1 (1.6)
BMI (kg/m <sup>2</sup> ), n (%)								
Underweight (n=28)	1 (3.6)	3 (10.7)	1 (3.6)	14 (50)	17 (60.7)	9 (32.1)	4 (14.3)	0
Normoweight (n=94)	10 (10.6)	5 (5.3)	1 (1.1)	50 (53.2)	85 (90.4)	31 (33)	10 (10.6)	0
Overweight (n=76)	6 (7.9)	3 (3.9)	1 (1.3)	54 (71.1)	68 (89.5)	25 (32.9)	4 (5.3)	2 (2.6)
Obese (n=38)	3 (7.9)	3 (7.9)	1 (2.6)	22 (57.9)	36 (94.7)	13 (34.2)	3 (7.9)	0
Parity, n (%)								
Nuliparous (n=87)	9 (8.4)	5 (4.8)	2 (1.9)	67 (64.4)	95 (91.3)	41 (39.4)	12 (11.5)	1 (0.9)
Primiparous (n=88)	9 (10)	7 (7.7)	2 (2.2)	48 (53.3)	75 (83.3)	24 (26.6)	8 (8.8)	1 (1.1)
Multiparous (n=61)	2 (4.7)	2 (4.7)	0	25 (59.5)	36 (85.7)	13 (30.9)	1 (2.3)	0
Previous birth history, n (%)								
None (n=87)	7 (8)	9 (10.3)	3 (3.4)	51 (58.6)	71 (81.6)	28 (32.2)	8 (9.2)	0
Vaginal (n=90)	8 (8.9)	3 (3.3)	1 (1.1)	50 (55.6)	79 (87.8)	33 (36.7)	7 (7.8)	1 (1.1)
Vaginal and abdominal (n=16)	0	0	0	11 (68.7)	16 (100)	5 (31.25)	1 (6.25)	0
Abdominal (n=43)	5 (11.6)	2 (4.6)	0	28 (65.1)	40 (93)	17 (28.8)	5 (11.6)	1 (2.3)

BMI, body mass index; UI, urinary incontinence.

**Table 3.** Risk factors of lower urinary tract symptoms in pregnant women.

Variables	B	p	OR (CI 95%)
Stress urinary incontinence			
Age ≥30	21.61	<0.001	2×10 <sup>9</sup> (0.001-∞)
Frequency symptoms			
Age ≥30	19.41	0.000	2×10 <sup>8</sup> (0.001-∞)
Trimester 3	1.71	0.034	5.54 (1.14-26.95)
Nocturia			
Age ≥30	18.95	0.000	1×10 <sup>8</sup> (0.001-∞)
Trimester 3	0.84	0.037	2.32 (1.05-5.14)
Urgency symptoms			
Age ≥30	19.99	0.000	4×10 <sup>8</sup> (0.001-∞)
Trimester 3	1.08	0.018	2.94 (1.20-7.19)

OR, odds ratio; CI, confidence interval.

the awareness of urinary problems in pregnancy, both in clinicians and pregnant women. The most common urinary complaints were nocturia (87.3%), followed by frequency disturbances (59.3%) and urgency (33.1%). The results are similar to those of a previous study conducted in Nigeria with a prevalence rate of nocturia of 94.1%.<sup>11</sup> In this study, as well as in previous studies, nocturia was defined as waking up at night due to the urge to urinate. This definition conforms to the terminology of nocturia by the International Continence Society. In that terminology, nocturia must be preceded by sleep activity or a desire for sleep that cannot occur until the voiding process.<sup>10</sup> The prevalence rate of frequency and urgency in this study was higher than in a similar study in Nigeria (59.3% vs. 17.6%, urgency 33.1% vs. 31.4%).<sup>11</sup> This can be caused by various factors, such as different definitions of urinary disorders, different gestational ages between study subjects, different obstetric status of subjects, and different instruments used by each study. The higher prevalence of various urinary symptoms in this study compared to previous studies can be explained by many patients who have a higher gestational age, a history of previous childbirth, and a higher BMI. Similar to other risk factors, BMI is associated with greater pressure on the bladder and more severe impairment of integrity and innervation during pregnancy and childbirth.<sup>12</sup> However, other studies show no significant relationship between BMI and the prevalence of urinary disorders during pregnancy.<sup>17</sup> In addition, other studies have also shown that pre-pregnancy BMI, weight gain, BMI during pregnancy, and postpartum affect the incidence of UI.<sup>15,17</sup> Thus, it is important for health workers to provide education to start pregnancy and, during pregnancy, maintain the condition of normal BMI and weight gain as recommended. Assessing that the risk factors obtained in this study are related to the level of damage that occurs due to the process of pregnancy and childbirth, various preventive efforts can be made to reduce the damage that occurs. One of the methods suggested in previous research is pelvic floor muscle training ("Kegel exercise") to strengthen the pelvic floor muscles and prevent damage during pregnancy and childbirth.<sup>18,19</sup>

### Limitations

The limitations of this study were the following. Firstly, the data collection method is based on the memory of the research subject, thus allowing for recall bias. In addition, the validity of the data is influenced by the patient's response to the questionnaire. Secondly, there was no confirmation of the occurrence of urinary tract symptoms and no objective assessment of the severity of the disorder such as the use of a urinary diary, cough test, measurement of residual urine volume, and pad test. Lastly, there was no information about fluid intake owned by each research subject.

### Conclusions

It is concluded in this study that there is a high prevalence of UI and LUTS in pregnant women in Indonesia. Risk factors for urinary tract disorders and UI in pregnant women are advanced maternal age and gestational age in the third trimester.

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