

# Prevalence of Urinary Incontinence, Risk Factors and Its Impact: Multivariate Analysis from Indonesian Nationwide Survey

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## ABSTRAK

**Tujuan:** untuk menggambarkan profil IU, menganalisis faktor resiko serta dampaknya. **Metode:** subyek didapatkan secara konsekutif dari poliklinik anak, urologi, kebidanan & kandungan, dan geriatri pada enam rumah sakit pendidikan di berbagai daerah Indonesia. Pasien dengan infeksi saluran kemih dan diabetes mellitus dieksklusi dari penelitian. Kuesioner IU diadaptasi dari the 3 Incontinence Questions (3IQ). Informed consent tertulis dimintakan sebelum wawancara dilakukan. **Hasil:** sebanyak 2765 kuesioner lengkap didapat pada penelitian ini. Prevalensi IU secara keseluruhan adalah sebesar 13,0% yang terdiri dari IU tipe tekanan (4,0%), IU desakan / OAB basah (4,1%), OAB kering 1,8%, IU campuran (1,6%), IU luapan (0,4%), enuresis (0,4%), IU lainnya (0,7%). Prevalensi IU secara signifikan ( $p < 0,001$ ) didapatkan lebih tinggi pada populasi usia lanjut (22,2%), dibandingkan dengan orang dewasa (12,0%), dan anak (6,8%). Tidak ada perbedaan prevalensi ( $p > 0,05$ ) antara laki-laki dan perempuan. Enuresis dan IU desakan/OAB basah adalah IU yang paling umum pada anak dengan prevalensi masing-masing sebesar 2,3% dan 2,1%. IU desakan dan IU tekanan adalah dua tipe yang paling umum pada populasi orang dewasa serta usia lanjut. Analisis multivariat menunjukkan prevalensi IU meningkat dengan adanya LUTS (RP 4,22, 95% IK 2,98-5,97), batuk kronis (RP 2,08, 95% IK 1,32-3,28), dan inkontinensia alvi (RP 1,85, 95% IK 1,03-3,32). IU didapatkan memberikan dampak terhadap kehidupan berkeluarga (25,3%), hubungan seksual (13,6%), dan pekerjaan / prestasi sekolah (23,7%). Sering pergi ke toilet dan mengurangi asupan cairan adalah dua perubahan perilaku yang paling umum ditemukan pada penderita. **Kesimpulan:** prevalensi IU di Indonesia menyerupai hasil penelitian pada negara-negara Asia lainnya. Prevalensi meningkat seiring pertambahan usia, dan tidak dipengaruhi jenis kelamin. LUTS, batuk kronis, dan inkontinensia alvi memiliki efek paling besar meningkatkan prevalensi. IU memberikan dampak pada kehidupan dan perilaku sehari-hari penderitanya.

**Kata kunci:** inkontinensia urin, kehidupan, LUTS, prevalensi, usia.

## ABSTRACT

**Aim:** to describe the profile of urinary infection (UI) and to analyze its risk factors and impacts. **Methods:** subjects were enrolled consecutively from pediatric, urology, obstetrics & gynecology, and geriatric outpatient clinics at six teaching hospitals in various regions of Indonesia. Those with urinary tract infection and diabetes mellitus were excluded. The UI questionnaire was adapted from the 3 Incontinence Questions (3IQ). Written informed consent was obtained prior to the interview. **Results:** about 2765 completed questionnaires were obtained. The overall UI prevalence was 13.0%, which consisted of prevalence of stress UI (4.0%), urgency UI/wet OAB (4.1%), dry OAB (1.6%), mixed UI (1.6%), overflow UI (0.4%), enuresis (0.4%), other UI (0.7%). The prevalence of UI was significantly higher ( $p < 0.001$ ) in geriatric population (22.2%) compared to the adult (12.0%), and pediatric population (6.8%). There was no prevalence difference ( $p > 0.05$ ) between male and female subjects. Enuresis and urgency UI/wet OAB were the most common UI in pediatric population. The prevalence was 2.3% and 2.1% respectively. Urgency UI and stress UI were the two most common type in adult and geriatric population. Both have an equal prevalence of 4.6%. The multivariate analysis showed that the prevalence of UI increased with LUTS (PR 4.22, 95%CI 2.98-5.97), chronic cough (PR 2.08, 95% CI 1.32-3.28), and fecal incontinence (PR 1.85, 95% CI 1.03-3.32). We found that UI impaired family life (25.3%), sexual relationship (13.6%), and job/school performance (23.7%). Frequent toilet use and reducing fluid intake were the two most common behavior changes. **Conclusion:** the prevalence of UI in Indonesia is nearly similar to other Asian countries. It increases with age and is not affected by gender. LUTS, chronic cough, and fecal incontinence may have significant effects on the prevalence. UI seems to impact daily life and behavior.

**Key words:** urinary incontinence, daily life, LUTS, prevalence, age.

## INTRODUCTION

Urinary incontinence (UI) is a common health problem, particularly in females and the elderly population.<sup>1</sup> Not only causing physical problems, UI also causes psychological, social, economic problems as well as impairs quality of life of the patients.<sup>2</sup> Therefore, patients with UI should have a holistic management of treatment and multidisciplinary approach.

In 2008, there were about 348 million people (8.2%) worldwide with UI. It is estimated that the prevalence will be increasing to 8.5% by 2018.<sup>3</sup> Although the prevalence of UI is relatively high, but less than half of the patients seek treatment.<sup>4</sup> Some studies show that the female to male ratio of UI prevalence is 2:1.<sup>3,5</sup> European studies demonstrate varied prevalence of UI in female subjects, which is 23% in Spain, 41% in Germany, 42% in UK and 44% in France.<sup>4</sup> Meanwhile, the prevalence in male subjects is 7% in France, 16% in Netherlands and 14% in UK.<sup>6</sup>

Different definitions of UI between one and other studies have caused highly varied data of UI prevalence. The International Continence Society provides a simpler definition of IU, which is 'the complaint of any involuntary leakage of urine'.<sup>4</sup> With such definition,

questionnaire-based epidemiological studies on UI have been carried out in a more practical way.

The prevalence of UI increases with age. The elderly population is the largest group of UI patients, both in male and female subjects.<sup>1</sup> A study in Malaysia demonstrates a higher prevalence UI in elderly male subjects compared to the female.<sup>7</sup> An UI survey of elderly population in Jakarta found that the prevalence of stress UI is 32.2%.<sup>8</sup> Various factors may increase the risk of UI development including multiparity, obesity, pelvic trauma, constipation, chronic disease (diabetes) and history of gynecological/pelvic surgery.<sup>9</sup>

The magnitude of the UI problem in Indonesia, either in pediatric, adult or elderly population, has not been known. The available data is the results of a survey conducted by Division of Geriatrics, Department of Internal Medicine, National Central General Hospital Cipto Mangunkusumo Hospital (RSCM) in 208 subjects of elderly population in Jakarta, which found that the prevalence of stress UI was 32.2%.<sup>8</sup> It is estimated that the national prevalence of UI in Indonesia is relatively high. The aim of this study was to obtain the profile of UI on pediatric, adult and elderly population

in Indonesia and to identify risk factors and impacts of UI.

## METHODS

A cross-sectional study was conducted at six hospitals in Indonesia between 2008 and 2011, i.e. at Cipto Mangunkusumo Hospital (Jakarta), Dr. Kariadi Hospital (Semarang), Wahidin Sudirohusodo Hospital (Makassar), Adam Malik Hospital (Medan), Dr. Soetomo Hospital (Surabaya) and Hasan Sadikin Hospital (Bandung). The population of study was all patients including children, adult and elderly patients who had treatment at the pediatric, urology, obstetrics and gynecology, and geriatric outpatient clinics of those six hospitals. The inclusion criteria were patients aged 10 years or more and willing to fill in the given questionnaires. Those who had urinary tract infection and diabetes mellitus were excluded. Consecutive sampling was carried out. The consent to participate in the study was obtained by signing the written informed consent.

Eligible subjects were interviewed by a doctor according to guidelines for filling up questionnaire. The questionnaire consisted of five sections. The first section is about subject characteristics. The second section includes questions to identify the prevalence of UI, which is an adaptation from The 3 Incontinence Questions (3IQ) by Brown JS, et al.<sup>10</sup> The third part evaluates the risk factors of UI in adults and elderly. The fourth section identifies the risk factors of UI in children. The fifth section evaluates the impacts of UI on the patients.

Urinary incontinence was defined when the patients complained about involuntary leakage of urine during the last 3 months.<sup>11</sup> UI was classified into: 1) stress type (stress UI) when the occurrence was associated with physical activities such as sneezing, coughing or physical exercise; 2) urge type (urgency UI/wet overactive bladder - OAB) when it was preceded by the urge of micturition and accompanied by urgency, frequency and nocturia. In this study, subjects with symptoms of urgency, frequency and nocturia without having UI were classified as subjects with dry OAB; 3) mixed type (mixed UI) when there were components of stress and urgency; 4) overflow

type (overflow UI) when it was associated with a great amount of residual urine due to infravesical obstruction (enlarged prostate) or weak detrusor muscle of the bladder; 5) other types. The subjects in this study were divided into three age categories, i.e. 1) pediatric (10-17 years); 2) adult (18-59 years) and 3) elderly ( $\geq 60$  years).

Data was analyzed using statistical program. The data analysis included univariate, bivariate and multivariate analysis. Univariate analysis was performed on subject characteristics and each variable of the study to observe the distribution and percentage of variables. Bivariate analysis was carried out to observe the correlation between two variables using chi square test. Multivariate analysis was performed to identify risk factors that might have the greatest effect on the development of UI. Statistical test used in the study was logistic regression test. The level of significance used in the bivariate analysis was  $p < 0.05$ . Variables with  $p < 0.25$  were further analyzed using multivariate analysis.

## RESULTS

From six hospitals, 2765 questionnaires were collected. The majority of patients were categorized in adult age group (**Table 1**) with the mean age of  $37.7 \pm 20.7$  years. Most subjects were female (62.2%), had last education level of Senior High School (25.2%) and had been married (50.1%). Of 1720 female subjects, 47.7% had history of normal delivery and 2.9% had undergone Caesarean section.

**Table 1.** Profile of study subjects

| Profile                      | Number (%)  |
|------------------------------|-------------|
| Gender                       |             |
| - Female                     | 1720 (62.2) |
| - Male                       | 1045 (37.8) |
| Age                          |             |
| - Children (<18 years)       | 512 (18.5)  |
| - Adult (18-59 years)        | 1730 (62.6) |
| - Elderly ( $\geq 60$ years) | 523 (18.9)  |

The overall UI prevalence was 13.0%, which consisted of prevalence of urgency UI/wet OAB (4.1%), stress UI (4.0%), dry OAB (1.6%), mixed UI (1.6%), overflow UI (0.4%), enuresis

(0.4%), other UI (0.7%) as shown in **Table 2**. The prevalence of UI in male subjects was 11.5%; while in female subjects was 13.5%. There was no significant difference of UI prevalence in male and female subjects. The prevalence of UI in elderly was 22.2%, which was significantly higher ( $p < 0.001$ ) compared to the non-elderly group (age  $< 60$  years), i.e. 10.8%. The most common type of UI in children was enuresis and urge UI/wet OAB with the prevalence of 2.3% and 2.1%, respectively. While the most common type of UI in adult age group were stress UI (4.5%) and urge IU/wet OAB (3.1%). In elderly, the two most common types were urge UI/wet OAB (9.4%) and stress IU (4.8%).

Based on multivariate analysis (**Table 3**), the prevalence of IU increased with lower urinary tract symptoms (LUTS) (PR 4.22, 95% CI 2.98-5.97), chronic cough (PR 2.08, 95% CI 1.32-3.28), and fecal incontinence (PR 1.85, 95% CI 1.03-3.32). For stress UI, the prevalence increased with LUTS (PR 4.10, 95% CI 2.30-7.29), chronic cough (PR 3.82, 95% CI 2.04-7.15) and female gender (PR 2.40, 95% CI 1.11 - 5.18). While for urge UI/wet OAB, LUTS was the only factor that increased the prevalence (PR 6.99, 95% CI 3.88-12.62).

UI impaired family life (25.3%), sexual relationship (13.6%), and job/school performance (23.7%). The most common behavior changes

**Table 2.** Prevalence of UI based on age and gender

|                     | Children, n (%) |               |               | Adult, n (%)  |                |                | Elderly, n (%) |               |                | Overall, n (%) |                |                |
|---------------------|-----------------|---------------|---------------|---------------|----------------|----------------|----------------|---------------|----------------|----------------|----------------|----------------|
|                     | M               | F             | T             | M             | F              | T              | M              | F             | T              | M              | F              | T              |
| Normal              | 265<br>(93.0)   | 212<br>(93.4) | 477<br>(93.2) | 460<br>(90.2) | 1062<br>(87.0) | 1522<br>(88.0) | 200<br>(80.0)  | 207<br>(75.8) | 407<br>(77.8)  | 925<br>(88.5)  | 1481<br>(86.1) | 2406<br>(87.0) |
| UI                  | 20<br>(7.0)     | 15<br>(6.6)   | 35<br>(6.8)   | 50<br>(9.8)   | 158<br>(13.0)  | 208<br>(12.0)  | 50<br>(20.0)   | 66<br>(24.2)  | 116<br>(22.2)* | 120<br>(11.5)  | 239<br>(13.9)  | 359<br>(13.0)  |
| Urge UI/<br>wet OAB | 6<br>(2.1)      | 5<br>(2.2)    | 11<br>(2.1)   | 12<br>(2.4)   | 42<br>(3.4)    | 54<br>(3.1)    | 28<br>(11.2)   | 21<br>(7.7)   | 49<br>(9.4)    | 46<br>(1.6)    | 68<br>(2.4)    | 114<br>(4.1)   |
| Stress UI           | 4<br>(1.4)      | 4<br>(1.8)    | 8<br>(1.6)    | 16<br>(3.1)   | 62<br>(5.1)    | 78<br>(4.5)    | 3<br>(1.2)     | 22<br>(8.1)   | 25<br>(4.8)    | 23<br>(0.8)    | 88<br>(3.2)    | 111<br>(4.0)   |
| Overflow<br>UI      | -               | -             | -             | 1<br>(0.2)    | 8<br>(0.7)     | 9<br>(0.5)     | 2<br>(0.8)     | 0<br>(0.0)    | 2<br>(0.4)     | 3<br>(0.1)     | 8<br>(0.3)     | 11<br>(0.4)    |
| Mixed UI            | 1<br>(0.4)      | -             | 1<br>(0.2)    | 5<br>(1.0)    | 16<br>(1.3)    | 21<br>(1.2)    | 7<br>(2.8)     | 14<br>(5.1)   | 21<br>(4.0)    | 13<br>(0.4)    | 30<br>(1.1)    | 43<br>(1.5)    |
| Dry OAB             | 2<br>(0.7)      | -             | 2<br>(0.4)    | 13<br>(2.5)   | 26<br>(2.1)    | 39<br>(2.3)    | 4<br>(1.6)     | 5<br>(1.8)    | 9<br>(1.7)     | 19<br>(0.7)    | 31<br>(1.1)    | 50<br>(1.8)    |
| Enuresis            | 6<br>(2.1)      | 6<br>(2.6)    | 12<br>(2.3)   | -             | -              | -              | -              | -             | -              | 6<br>(0.2)     | 6<br>(0.2)     | 12<br>(0.4)    |
| Other UI            | 1<br>(0.4)      | -             | 1<br>(0.2)    | 3<br>(0.6)    | 4<br>(0.3)     | 7<br>(0.4)     | 6<br>(2.4)     | 4<br>(1.5)    | 10<br>(1.9)    | 10<br>(0.3)    | 8<br>(0.3)     | 18<br>(0.6)    |

\* $p < 0.001$  compared to the non-elderly, M = Male, F = Female, T = Total

**Table 3.** Risk factors for UI

| Risk Factors                 | Mixed UI<br>PR (95% CI) | Stress UI<br>PR (95% CI) | Urge UI /wet OAB<br>PR (95% CI) |
|------------------------------|-------------------------|--------------------------|---------------------------------|
| LUTS                         | 4.22 (2.98-5.97)        | 4.10 (2.30-7.29)         | 6.99 (3.88-12.62)               |
| Chronic cough                | 2.08 (1.32-3.28)        | 3.82 (2.04-7.15)         | 0.99 (0.42-2.36)                |
| Fecal incontinence           | 1.85 (1.03-3.32)        | 1.61 (0.62-4.23)         | 1.64 (0.59-4.51)                |
| Neurological disorder        | 2.62 (0.68-10.10)       | -                        | 1.79 (0.18-17.36)               |
| History of abdominal surgery | 1.40 (0.96-2.05)        | 1.19 (0.63-2.22)         | 0.85 (0.42-1.71)                |
| Constipation                 | 1.31 (0.88-1.94)        | 1.72 (0.94-3.13)         | 1.13 (0.59-2.18)                |
| Gender                       | 1.15 (0.79-1.69)        | 2.40 (1.11-5.18)         | 0.81 (0.46-1.42)                |
| Stroke                       | 0.85 (0.25-2.91)        | 0.82 (0.09-7.22)         | 0.80 (0.10-6.67)                |

due to UI were frequent toilet use and reducing fluid intake.

## DISCUSSION

Overall, the prevalence of UI in this study was 13.0%, which is similar to the prevalence in Asia with a range of 19.7–24.4%.<sup>3</sup> The prevalence of UI in female population (13.5%) was not as high as the findings in European studies that range between 25–45%.<sup>4</sup> Singh et al<sup>12</sup> found that UI prevalence of female population in India is 21.8%. The lower prevalence in this study could be caused by culture in Indonesia and most Asian countries, in which UI is often regarded as a shameful condition; therefore, the patients did not complain about UI that they had experienced. However, it is estimated that there will be a higher surge of UI patients in Asia (22%) compared to patients in America (18%) and Europe (5%).<sup>3</sup> It indicates that the magnitude of UI problems in Asian regions is similar to the iceberg phenomenon.

In the female population of this study, the most prevalent UI was the stress type UI. Similar results are also found by Singh et al,<sup>12</sup> and Kinchen KS et al.<sup>13</sup> In women, there are many possible risk factors for stress UI, such as pelvic floor muscle, nerve and connective tissue damages that occur during pregnancy to labor, history of gynecological surgery and reduced level of estrogen hormone in menopause phase. Those various factors may cause defects on intrinsic structure of urethral sphincter, urethral hypermobility and damages on urethral supporting tissue (anterior vaginal wall, levator ani, extrinsic structure of the urethra), which manifest as symptoms of stress UI.<sup>14</sup>

Unlike the overseas data, this study did not find significant difference of UI prevalence between male and female subject. It might be due to different population of the subjects, which the majority of population in the overseas studies is a community;<sup>1</sup> while this study had subjects of patients who visited the hospitals. The same result has also been found by Zurcher S, et al in their study on elderly population who had been hospitalized.<sup>15</sup>

In male subjects, the prevalence of UI was 11.5% with the three most often types of urge UI/

wet OAB, stress UI and dry OAB, respectively. Similar result is also found in the worldwide data, which indicates that the most frequent type of UI is urge type/wet OAB followed by the mixed type.<sup>1</sup> It could be explained as in men there are risk factors of LUTS that may be caused by abnormalities of bladder, bladder outlet (internal urethral sphincter, prostate and external urethral sphincter) or combination of both components. Moreover, the most often etiology is prostate enlargement and its therapeutic intervention such as transurethral resection of the prostate (TURP), open prostatectomy, or radical prostatectomy, which may also be the risk factors of UI.<sup>16,17</sup>

The elderly group was the most group which had the greatest prevalence of UI, i.e. 22.2%. The number is higher compared to a study in Selangor, Malaysia, which is 9.9%.<sup>7</sup> While another study in Hong Kong had a result similar to the Indonesian study that found the prevalence of UI in elderly of 24.5%.<sup>18</sup> In elderly, there are numerous risk factors that can be found, which are depression,<sup>7</sup> delirium,<sup>19</sup> functional dependency,<sup>7</sup> comorbidity such as diabetes mellitus,<sup>7</sup> infection,<sup>19</sup> history of vaginal delivery,<sup>20</sup> high body mass index,<sup>20</sup> medications,<sup>19</sup> and the absence of hormone replacement therapy.<sup>20</sup> There is a hypotheses that the domination of elderly patients in most of all UI types is associated with geriatric syndrome, which is a multifactorial condition causing disorders of various organs. Elderly age is not an etiology of UI; instead, it is only one of predisposition factors. Senility may result in anatomical and physiological changes of lower urogenital system such as degeneration of muscles and axons, reduced bladder capacity, increased detrusor activity, reduced detrusor contractility and increased residual urine.<sup>19</sup>

In the pediatric age group, the prevalence of UI was 6.8% with enuresis as the majority of types (2.3%). Some studies in Asia showed that enuresis is common in children with a prevalence ranging between 9.3–16.4%.<sup>21</sup> Another study in Iran found that the prevalence of enuresis in children aged 5–18 years is 6.8%.<sup>22</sup> Prevalence of UI in pediatric age group in Indonesia is lower compared to other countries. In general, UI in children may be caused by congenital anatomical defect (ectopic ureter, bladder extrophia and

mielomeningocele), or functional defects.<sup>23</sup> The pathophysiology of nocturnal enuresis in children includes delay in maturation in the form of disharmony between functional capacity of the bladder and increased excretion of urine as well as the inability to be aware of the sensations of a full bladder during sleep. The evidence of this issue is provided by reduced prevalence of enuresis in teenager age (9-19%) compared to age 3-5 years (1-2%).<sup>23</sup>

Nocturnal enuresis in children is also strongly associated with the history of enuresis in parents and constipation.<sup>22,24-26</sup> Other factors associated with the development of enuresis are the level of education of the parents, the number of family member, the method of parenthood, home conflict, stress due to enuresis and bad school performance.<sup>22,27</sup>

A retrospective study in Japanese female patients found that multiparity and urodynamic parameter are the main risk factors of the development of UI in LUTS. Maximum free flow rate, maximal urethral closure pressure and functional profile length, which are the parameters of LUTS in urodynamic are associated with increased incidence of UI in female patients.<sup>28</sup> Another study in Chinese female population found that elderly age, poor sanitation, spontaneous delivery, metabolic syndrome and urinary tract infection are the risk factors of urinary incontinence.<sup>29</sup> A study in male population also found similar risk factors of UI, i.e. elderly age, metabolic disease, neurological disease, urinary tract infection, prostate enlargement and diabetes.<sup>30</sup>

In the present study, we found that UI impaired various aspects of life: family life (25.3%), sexual relationship (13.6%), and job/school performance (23.7%). It is consistent with the study conducted by Elbiss et al that found impaired social life aspects, physical activity, sexual relationship and religious duties due to UI.<sup>31</sup> Another study also concluded that UI may result in impaired quality of life of the patients.<sup>32</sup> Factors that affect the quality of life of UI patients are age, the severity of UI, the type of UI, the number of episode of UI, body weight, psychological factors and the pattern of seeking medical treatment.<sup>32</sup> UI also causes impaired

sexual life in the patients and their spouses.<sup>33</sup>

Various studies mostly studied about the impact of UI in women; while little studies have been done on the impacts of UI in men. In elderly female patients group, factor that affects the quality of life is the severity of UI.<sup>34</sup> The type of UI has also been proven to affect the impact of UI. Patients with mixed type of UI tend to have more severe incontinence and it causes greater impairment on quality of life compared to urge UI and stress UI.<sup>35</sup> Although UI may cause various problems and impairment, only half of the patients seek for medical help.<sup>31</sup>

The limitation of study is that the data was only based on questionnaire and there was no confirmed diagnosis on urodynamic examination. This study shows that UI is generally found in Indonesian population. The results are expected to be the most recent epidemiological data in association with the prevalence of UI in Indonesia.

## CONCLUSION

The prevalence of UI in Indonesia is nearly similar to other Asian countries. It increases with age and is not affected by gender. LUTS, chronic cough, and fecal incontinence may become the main risk factors on the development of UI. The magnitude of UI problems may bring impacts on daily life and habit of the patients.

## REFERENCES

1. Buckley BS, Lapitan MC. Prevalence of urinary incontinence in men, women, and children--current evidence: findings of the Fourth International Consultation on Incontinence. *Urology*. 2010;76:265-70.
2. Hunskaar S, Burgio K, Diokno A, et al. Epidemiology and natural history of urinary incontinence (UI). In: Abrams P, Cardozo L, Khoury S, Wein A, eds. *Incontinence*. 2nd ed. Plymouth: Health Publication Ltd; 2002. p.165-201.
3. Irwin DE, Kopp ZS, Agatep B, Milsom I, Abrams P. Worldwide prevalence estimates of lower urinary tract symptoms, overactive bladder, urinary incontinence and bladder outlet obstruction. *BJU Int*. 2011;108:1132-8.
4. Hunskaar S, Lose G, Sykes D, Voss S. The prevalence of urinary incontinence in women in four European countries. *BJU Int*. 2004;93:324-30.
5. Milsom I, Altman D, Cartwright R, et al. Epidemiology

- of urinary incontinence (UI) and other lower urinary tract symptoms (LUTS), pelvic organ prolapse (POP) and anal incontinence (AI). In: Abrams P, Cardozo L, Khoury S, Wein A, eds. *Incontinence*. Paris: International Consultation on Incontinence; 2013. p. 15-108.
6. Boyle P, Robertson C, Mazzetta C, et al. The prevalence of male urinary incontinence in four centres: the UREPIK study. *BJU Int*. 2003;92:943-7.
  7. Sidik S. The prevalence of urinary incontinence among the elderly in a rural community in Selangor. *Malaysian J Med Sci*. 2010;17:18-23.
  8. Setiati S, Istanti R. Survei inkontinensia urin (mengompol) pada usia lanjut di lingkungan Pusat Santunan Keluarga (PUSAKA). *Maj Kedokt Indon*;53(4):1369.
  9. Nojomi M, Armin E, Rad R. Urinary incontinence: hospital-based prevalence and risk factors. *JRMS*. 2008;13:22-8.
  10. Brown JS, Bradley CS, Subak LL, et al. The sensitivity and specificity of a simple test to distinguish between urge and stress urinary incontinence. *Ann Intern Med*. 2006;144:715-23.
  11. Abrams P, Cardozo L, Fall M, et al. The standardisation of terminology in lower urinary tract function: report from the standardisation sub-committee of the International Continence Society. *Urology*. 2003;61:37-49.
  12. Singh U, Agarwal P, Verma ML, Dalela D, Singh N, Shankwar P. Prevalence and risk factors of urinary incontinence in Indian women: A hospital-based survey. *Indian J Urol*. 2013;29:31-6.
  13. Kinchen KS, Burgio K, Diokno AC, Fultz NH, Bump R, Obenchain R. Factors associated with women's decisions to seek treatment for urinary incontinence. *J Womens Health (Larchmt)*. 2003;12:687-98.
  14. Koelbl H, Igawa T, Salvatore S, et al. Pathophysiology of Urinary Incontinence, Faecal Incontinence and Pelvic Organ Prolapse. In: Abrams P, Cardozo L, Khoury S, Wein A, eds. *Incontinence*. Paris: International Consultation on Incontinence; 2013:261-301.
  15. Zurcher S, Saxer S, Schwendimann R. Urinary incontinence in hospitalised elderly patients: do nurses recognise and manage the problem? *Nurs Res Pract*. 2011;2011:671302.
  16. Oelke M, Baard J, Wijkstra H, de la Rosette JJ, Jonas U, Hofner K. Age and bladder outlet obstruction are independently associated with detrusor overactivity in patients with benign prostatic hyperplasia. *Eur Urol*. 2008;54:419-26.
  17. Sadananda P, Vahabi B, Drake MJ. Bladder outlet physiology in the context of lower urinary tract dysfunction. *Neurourol Urodyn*. 2011;30:708-13.
  18. Leung E. The prevalence of urinary incontinence among the elderly in institutions. *Hong Kong J Gerontol*. 1992;3:35-8.
  19. Wagg A, Chen LK, Kirschner-Hermanns R, et al. Incontinence in the frail elderly. In: Abrams P, Cardozo L, Khoury S, Wein A, eds. *Incontinence*. 5th ed. Paris: International Consultation on Incontinence; 2013. p. 1001-76.
  20. Senturk S, Kara M. Risk factors and prevalence of urinary incontinence in postmenopausal women living in Turkey. *Clin Exp Obstet Gynecol*. 2012;39:69-71.
  21. Tekgul S, Nijman R, Hoebeke P, Canning D, Bower W, Gontard A. Diagnosis and management of urinary incontinence in childhood. In: Abrams P, Cardozo L, Khoury S, Wein A, eds. *Incontinence*. 4th ed. Paris: Health Publication; 2009. p. 701-92.
  22. Safarinejad MR. Prevalence of nocturnal enuresis, risk factors, associated familial factors and urinary pathology among school children in Iran. *J Pediatr Urol*. 2007;3:443-52.
  23. Nijman R, Tekgul S, Chase J, Bael A, Austin P, Gontard A. Diagnosis and management of urinary incontinence in childhood. In: Abrams P, Cardozo L, Khoury S, Wein A, eds. *Incontinence*. 5th ed. Paris: International Consultation on Incontinence; 2013. p. 729-826.
  24. Dolgun G, Savaser S, Balci S, Yazici S. Prevalence of nocturnal enuresis and related factors in children aged 5-13 in istanbul. *Iran J Pediatr*. 2012;22:205-12.
  25. Fockema MW, Candy GP, Kruger D, Haffjee M. Enuresis in South African children: prevalence, associated factors and parental perception of treatment. *BJU Int*. 2012;110:E1114-20.
  26. Yazici CM, Nalbantoglu B, Topcu B, Dogan C. Prevalence of nocturnal enuresis and associated factors in schoolchildren in Western Turkey. *Can J Urol*. 2012;19:6383-8.
  27. Srivastava S, Srivastava KL, Shingla S. Prevalence of monosymptomatic nocturnal enuresis and its correlates in school going children of lucknow. *Indian J Pediatr*. 2013;80:488-91.
  28. Tseng LH, Liang CC, Lo HP, Lo TS, Lee SJ, Wang AC. The prevalence of urinary incontinence and associated risk factors in Taiwanese women with lower urinary tract symptoms. *Chang Gung Med J*. 2006;29:596-602.
  29. Liu B, Wang L, Huang S-S, Wu Q, Wu D-L. Prevalence and risk factors of urinary incontinence among Chinese women in Shanghai. *Int J Clin Exp Med*. 2014;7:686-96.
  30. Shamliyan TA, Wyman JF, Ping R, Wilt TJ, Kane RL. Male urinary incontinence: prevalence, risk factors, and preventive interventions. *Rev Urol*. 2009;11:145-65.
  31. Elbiss HM, Osman N, Hammad FT. Social impact and healthcare-seeking behavior among women with urinary incontinence in the United Arab Emirates. *Int J Gynaecol Obstet*. 2013;122:136-9.
  32. Kwon BE, Kim GY, Son YJ, Roh YS, You MA. Quality of life of women with urinary incontinence: a systematic literature review. *Int Neurourol J*. 2010;14:133-8.

33. Hayder D. The effects of urinary incontinence on sexuality: seeking an intimate partnership. *J Wound Ostomy Continence Nurs.* 2012;39:539-44.
34. Barentsen JA, Visser E, Hofstetter H, Maris AM, Dekker JH, de Bock GH. Severity, not type, is the main predictor of decreased quality of life in elderly women with urinary incontinence: a population-based study as part of a randomized controlled trial in primary care. *Health Qual Life Outcomes.* 2012;10:153.
35. Minassian VA, Devore E, Hagan K, Grodstein F. Severity of urinary incontinence and effect on quality of life in women by incontinence type. *Obstet Gynecol.* 2013;121:1083-90.