



Research Article

Prevalence and Correlated Factors of Urinary Incontinence in Geriatrics

Adriel John Junior Purba^{*1}, Syah Mirsya Warli², Dhirajaya Dharma Kadar², Putri Chairani Eyanoe³

¹Undergraduate Program of Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan, 20155, Indonesia

²Department of Urology, Faculty of Medicine, Universitas Sumatera Utara, Medan, 20155, Indonesia

³Department of Community Health, Faculty of Medicine, Universitas Sumatera Utara, Medan, 20155, Indonesia

Abstract

Background: Urinary incontinence is involuntary or uncontrollable urine passing. This is very disruptive, it causes a lot of problems and is often seen as an embarrassing thing. The prevalence of urinary incontinence was found to increase with age. **Objective:** This research aimed to determine the prevalence and factors associated with the incidence of urinary incontinence in geriatric patients at the Haji Adam Malik General Central Hospital and the University of North Sumatera Hospital. **Methods:** This type of research is an analytic observational study with a cross-sectional design. The research sample is determined by consecutive sampling technique using a questionnaire as primary data. **Results:** Out of 100 respondents, 22 geriatric patients experienced urinary incontinence, with the majority experiencing moderate severity and stress urinary incontinence. Based on bivariate analysis using chi-square found gender ($p=0.617$), age ($p=0.617$), overweight ($p<0.01$), diabetes mellitus ($p<0.01$), hypertension ($p=0.01$), history of chronic cough ($p<0.01$), history of pelvic surgery ($p<0.01$), and history of vaginal delivery ($p=0.055$). **Conclusion:** In this study, the risk factors associated with urinary incontinence are overweight, diabetes mellitus, hypertension, and a history of chronic cough while risk factors that are not found to be associated in this study are age, sex, and history of vaginal delivery.

Keywords: geriatrics, prevalence, risk factors, urinary incontinence

Received: 20 January 2023 | Revised: 04 May 2023 | Accepted: 15 May 2023

1. Introduction

Urinary incontinence according to the International Continence Society, is complaint of involuntary loss of urine [1]. This condition is causing an inconvenience for the suffers and induces many problems, not only in terms of health but also has a negative impact on psychological, hygiene, economic, social, work and daily activities. The medical impact of urinary incontinence is associated with urinary tract infections, urosepsis, kidney failure and others. Meanwhile, the psychosocial impacts include loss of self-confidence, depression and decreased social activity [2]. From an economic standpoint, the costs associated with the consequences of urinary incontinence are estimated at \$16.3 billion per year [2].

Urinary incontinence is a common health problem in society, both from a national and international perspective. According to data from the World Health Organization, 200 million people in the world experience urinary incontinence. This number is actually insufficient from the actual condition, because there are still many unreported cases. Incontinence is rarely reported because it is often seen as a humiliating condition [3].

* Corresponding author at: Undergraduate Program of Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan, 20155, Indonesia
E-mail address: adrielpurbaz@gmail.com

Whereas, the last epidemiological study in Indonesia was published in 2014 and involved six educational hospitals in metropolis. From a total of 2,765 respondents who complied the criteria, the total prevalence of urinary incontinence was 13%, of which 4.1% were urge type incontinence, 4.0% were pressure types, 1.6% were mixed types, 0.4% were overflow types. and other types as much as 0.7% [4]. Aging, pregnancy, postpartum, diabetes mellitus, obesity, heredity, parity, parkinson's, history of pelvic surgery, neurological disease, dementia, urinary tract infections and physical activity are predisposing factors for urinary incontinence [5]. The aging process is a major predisposing factor for urinary incontinence because urinary incontinence is often found in elderly [5]. In the same study, uttered that the incidence of urinary incontinence is often considered normal in the elderly. Urinary incontinence is a common complaint in the elderly, the causes is structural degenerative changes in the bladder muscle as well as impaired nerve control and age-related changes in the lower urinary tract [6]. According to Worldometer, there were 7.9 billion world population in March 2022. The number of elderly people between 2015 and 2020 increased from 12% to 22% of the total world population. WHO (2021) predicts that in 2030 1 from 6 person will be classified as elderly [7].

With the enormous growth number of elderly populations, it is necessary to look after the welfare and health of the elderly so that the elderly is healthy and able to work and be productive so that they can cope well with changes in the population structure [7]. According to WHO, the elderly is someone who has entered the age of 60 years and over. Groups categorized as elderly will experience an aging process. Geriatric patients are elderly patients with multiple diseases and/or disorders due to decreased organ function, psychological, social, economic and environmental who require integrated health services [8].

A common health problem experienced by the elderly is geriatric syndrome. Geriatric syndrome is a non-disease clinical condition experienced by the elderly with the characteristics of several causes that produce integrated manifestations [9]. Urinary incontinence is one of the geriatric syndromes. In a study conducted by Rinita Amelia in 2018, the most common severity of urinary incontinence in geriatrics was moderate, namely 50% [10]. As already written in the previous paragraph, the prevalence of urinary incontinence was found to increase with age. As stated above, the prevalence of urinary incontinence was found to increase with age. The number in the geriatric population (≥ 60 years) is 22.2%, more significant when compared to the adult population (18-59 years) of 12.0% [11].

Based on the many adverse effects that can cause a decrease in the quality of life of the elderly caused by urinary incontinence, whereas today and in the future there will be a significant increase in the number of elderly people, this researchers wanted to see the prevalence and factors associated with urinary incontinence in geriatric patients at Haji Adam Malik General Central Hospital and the Universitas Sumatera Utara Hospital.

2. Methods

This research is an observational analytic study with a cross-sectional approach which was carried out at the Outpatient Clinic of the Haji Adam Malik General Central Hospital and the University of North Sumatera Hospital from June to November 2022. This research was conducted on 100 geriatric patients who had been calculated using the correlation formula. Using The 31Q questionnaire and ICIQ-UI-SF questionnaire that has passed validity and validity test, this study combines primary data from direct face-to-face patient interviews with secondary data from medical records.

The data that has been obtained from the questionnaire will later be collected and processed descriptively using a data processing program through a computerized system, namely the Statistical Product and Service Solution (SPSS) program, and then analyzed descriptively to determine the frequency distribution of research subjects based on characteristics.

3. Results

In this study, the UI prevalence of geriatric patients was 22%. Most of the respondents in this study are women, 65 patients (65%), the age group 60-69 years, 65 patients (65%) (Table 1).

Table 1. Frequency distribution of characteristics research respondents

Characteristics	Frequency n (%)	Total (%)
Urinary Incontinence		
Yes	22 (22)	100 (100)
No	78 (78)	
Gender		
Male	35 (35)	100 (100)
Female	65 (65)	
Age		
60-69 years old	65 (65)	100 (100)
≥ 70 years old	35 (35)	
Overweight		
Yes	40 (40)	100 (100)
No	60 (60)	
Hypertension		
Yes	51 (51)	100 (100)
No	49 (49)	
Diabetes Mellitus		
Yes	35 (35)	100 (100)
No	65 (65)	
History of Pelvic Surgery		
Yes	13 (13)	100 (100)
No	87 (87)	
Chronic Cough		
Yes	12 (12)	100 (100)
No	88 (88)	
Vaginal Delivery		
Yes	52 (80)	65 (100)
No	13 (20)	

Based on body mass index, 60 patients (60%) were overweight. 51% of patients had hypertension, 13% of patients had history of pelvic surgery, 12% of patients had history of chronic cough and 80% of patients had history of vaginal delivery.

Table 2. The Constituent Ratio of Different UI among 22 Patients

Characteristics	Frequency n (%)	Total (%)
Type of Urinary Incontinence		
SUI	7 (31.80)	100 (100)
UUI	8 (36.40)	
MUI	4 (18.20)	
Other UI	22(100)	
	3 (13.60)	
Severity of Urinary Incontinence		
Mild UI	6 (27.30)	100 (100)
Moderate UI	8 (36.40)	
Severe UI	6 (27.30)	
Extremely Severe UI	2 (9.10)	

We found 22 UI in all 100 patients in this study, with UI prevalence rate of 22%. Of which UUI accounted to 36.40%; SUI 31.80%; MUI 18.20%; and other types 13.60%. 36.40% of patients had moderate UI, either mild UI or Severe UI were 27.30%; and 9.10% of the patients had extremely severe UI (Table 2).

Table 3. Prevalence Rate of UI in Different Risk Factors

Characteristics	N/total (%)	<i>p</i> -value
Gender		
Male	9/35 (25.7)	0.511
Female	13/65 (20)	
Age		
60-69 years old	13/65 (20)	0.511
≥ 70 years old	9/35 (25.70)	
Overweight		
Yes	17/40 (42.50)	<0.01
No	5/60 (8,30)	
Hypertension		
Yes	22/51 (43.90)	<0.01
No	0/49 (0)	
Diabetes Mellitus		
Yes	15/35 (42.90)	<0.01
No	7/65 (10.80)	
History of Pelvic Surgery		
Yes	8/13 (61.50)	0.01
No	12/87 (16.10)	
Chronic Cough		
Yes	9/12 (75)	<0.01
No	13/88 (14.80)	
Vaginal Delivery		
Yes	13/52 (25)	0.055
No	0/13 (0)	

Bivariate analysis showed that there were no significant correlation between age with the incidence of urinary incontinence in this study with a *p*-value = 0.511; gender with the incidence of urinary incontinence with a *p*-value = 0.511; and history of vaginal delivery with the incidence of urinary incontinence with a *p*-value = 0.055. There were a significant correlation between overweight, hypertension, diabetes mellitus, history of pelvic surgery and chronic cough with the incidence of urinary incontinence with *p*-value in sequence were <0.01; <0.01; <0.01; 0.01; and <0.01 (Table 3).

Table 4. Multivariate Logistic Regression Model

Characteristics	Exp(B)	95% CI
Overweight	5.67	1.33-24.16
Diabetes Mellitus	5.11	1.24-20.99
Chronic Cough	12.69	2.32-69.49
History of Pelvic Surgery	11.12	2.08-59.52

Based on multivariate analysis, the prevalence of UI increased with overweight (Exp(B) 5.67; 95% CI 1.33-24.16); diabetes mellitus (Exp(B) 5.11; 95% CI 1.24-20.99); Chronic Cough (Exp(B) 5.11; 95% CI 1.24-20.99), and History of Pelvic Surgery (Exp(B) 11.12; 95% CI 2.08-59.52) (Table 4).

4. Discussion

Out of the 100 respondents in this study, there were 22 patients (22%) who experienced urinary incontinence. The percentage in this study is almost the same as the study conducted by Sumardi et al. (2014) which involved 523 elderly respondents from 6 big city hospitals in Indonesia, namely 22.20%. This is also slightly different from the research conducted by Rinita Amelia (2018) at the West Sumatera Werdha

Social Institution, namely 23.73%. In the study in China by Tai et al. (2018), which involved 551 respondents aged 75 years and over, obtained 24.30% and previous research reported that is equal to 20.70%. The value does not have a significant difference from this study [3-6].

However, there is a significant difference compared to a study conducted at Cairo Hospital on female geriatric patients by Aly (2020), where 80% of the 130 patients who were respondents experienced urinary incontinence [11-13]. In the previous research, argued that the lower prevalence in research could be due to culture in Indonesia and most Asian countries, where UI is often seen as an embarrassing condition; so that patients do not complain about the UI they experience. However, it is estimated that there will be a higher spike in UI patients in Asia (22%) than patients in America (18%) and Europe (5%) [12]. This shows that the magnitude of the problem of urinary incontinence in the Asian region is similar to the iceberg phenomenon. The most dominating severity of urinary incontinence in this study was moderate, namely 36.40% (8 people). This study has similar results to research conducted by Amelia (2018), Tai et al. (2018) and Aly et al. (2020) where the moderate degree is the dominating severity [10-13].

In this study, the most common type of urinary incontinence was the urge type 36.40% (8 patients) and the stress type 31.80% (7 patients). Sumardi et al. (2014) in their research also found that the urge type and the stress type were the most common types of urinary incontinence in the elderly. However, the results of this study are showing differences from the research conducted by Tai et al. (2018), where the mixed type of 38.10% and the urgency type of 35.10% were the most common types of urinary incontinence in the elderly. Likewise with research by Aly et al. (2020) who found the mixed type as the most common type of urinary incontinence with a percentage of 91% [15-17].

There was no correlation between gender and the incidence of urinary incontinence in this study, with a p value = 0.511. The results of this study contradict research conducted by Sidik (2018) in Selangor where a gender correlation was found with the incidence of urinary incontinence. Research conducted by Junquire et al. (2017) and Kessler et al. (2008) also found a significant correlation between gender and the incidence of urinary incontinence. However, this research is in line with research conducted by Sumardi et al. (2014) and Tai et al. (2021) in which the study also did not prove a significant correlation between gender and urinary incontinence.

This study is not in accordance with the theory that urinary incontinence is more common in women in the middle age population due to many factors such as pregnancy and vaginal delivery. Whereas in old age, the incidence of urinary incontinence will increase in male sex because risk factors for urinary incontinence in men appear after touching old age, for example such as LUTS, prostate disorders and others [13].

According to Sumardi et al. (2014) there is no correlation between gender and urinary incontinence due to population differences. Where in other studies using study populations in the community while in his research he used research subjects who came to the hospital, this is the same as this study. The same thing was found by Zurcher S, et al. where no correlation was found between gender and urinary incontinence in the elderly population who came to the hospital [11].

Statistical tests on age and the incidence of urinary incontinence showed a value of $p = 0.511$ which could be concluded that there was no significant correlation between age and the incidence of urinary incontinence. The results of this study contradict the results of a study conducted by Shi Lu et al. (2016) in China which obtained $p = 0.041$.

Likewise with research conducted by Pedersen et al. (2017), Kyungjin Sohn et al. (2018), Sanae Ninomiya et al. (2017) and Larissa Pruner Marques et al. (2015), where in these studies there was a very significant correlation between age and the incidence of urinary incontinence with a value of $p \leq 0.01$. The results of this study also contradict the theory which says that urinary incontinence goes hand in hand with aging, because with age there will be a weakening of function or structural degenerative changes in the urinary bladder muscles as well as impaired nerve control and age-related changes in the lower urinary tract, Goepel et al. (2010).

The results of this study are in accordance with research conducted by Sahin-Onat et al. (2013) in which the study also found no association between age and the incidence of urinary incontinence. According to research conducted by Swanson et al. (2005) also found no significant correlation between age and the incidence of urinary incontinence. This study conducted studies on the geriatric age group only, in contrast to other studies that examined all age groups or a wider age range than this study. Differences in the groups and conditions of the study population may mean that there is no correlation between age and the incidence of urinary incontinence [14].

There was a significant correlation between being overweight and the incidence of urinary incontinence in this study with a p -value = <0.01 . The results of this study are in accordance with research conducted in Taiwan by Chang et al. (2014) in women aged 60 years and over, where a correlation was found between

obesity and the incidence of urinary incontinence. Likewise with the research conducted by Ninomiya et al. (2017), Ebbesen et al. (2013), Ge et al. (2015), Minassian et al. (2020), and Altintas et al. (2013), where in these studies it was proven that there was a correlation between Body Mass Index and the incidence of urinary incontinence, with a p -value ≤ 0.01 .

These studies also prove that an increase in BMI will increase the incidence of urinary incontinence. However, this research contradicts the research conducted by Aly et al. (2020) where obesity is said to have no significant correlation with urinary incontinence with a p -value = 0.247. Tai et al. (2021) also obtained results where obesity was not a significant risk factor for urinary incontinence. The results of this study are in accordance with the theory that the incidence of urinary incontinence increases with the presence of comorbidities, one of which is obesity [14]. This is because an increase in abdominal fat will increase intra-abdominal pressure which can increase pressure and strain on the nerves and muscles of the pelvic floor as it does during pregnancy [15].

There was a significant correlation between hypertension and the incidence of urinary incontinence in this study, $p = <0.01$. The results of this study are in accordance with research conducted by Tai et al. (2021) in the geriatric population in nursing homes who found a correlation between hypertension and the incidence of urinary incontinence with a p -value = 0.012. Likewise with the research conducted by Marques et al. (2015), Park et al. (2015), Burti et al. (2012), and Altintas et al. (2013). The results of this study are in accordance with the theory that there is a correlation between hypertension and the incidence of urinary incontinence.

This is because patients with hypertension will usually use drugs such as alpha blockers, diuretics, and calcium channel blockers. These classes of drugs can cause urinary incontinence through different mechanisms. Calcium channel blockers block L-type calcium channels in the detrusor muscle, thereby interfering with contractions of the bladder and causing reduced external sphincter tone so that urinary incontinence can occur [16]. The use of diuretic drugs will cause an increase in urination due to more urine production so that the pressure on the bladder is greater, which can trigger urinary incontinence.¹⁶ Alpha-blockers lower blood pressure by relaxing the walls of blood vessels. Not only blood vessels, but the bladder can also be affected by this drug [17].

There was a significant correlation between the history of pelvic surgery and the incidence of urinary incontinence in this study, it was found that $p=0.01$. The results of this study are in accordance with research conducted by Tai et al. (2021) in an elderly population in nursing homes who found that a history of pelvic surgery was proven to be a risk factor for urinary incontinence with a p -value=0.06. Research by Ge et al. (2015), Altintas et al. (2013) and Linde et al. (2017) also showed a significant correlation between history of pelvic surgery and the incidence of urinary incontinence with a p -value ≤ 0.01 .

However, this study is not in line with research conducted on women aged 60 years and over in Taiwan by Chang et al. (2014), in which the study found no association between hysterectomy and gynecological surgery with the incidence of urinary incontinence. Likewise with the research conducted by Aly et al. (2020), where in geriatric women there is no correlation between hysterectomy, spinal surgery, and hernia repair on the incidence of urinary incontinence.

This study is in accordance with the theory that postoperative urinary incontinence can occur. This occurs due to various mechanisms. Surgery can cause pelvic floor muscle weakness and cause interference with the muscles that work to close the urinary tract, resulting in urinary incontinence. Therefore, in performing pelvic surgery, such as surgery to relieve bladder outlet obstruction, you have to be careful, because it can cause permanent urinary incontinence [16].

There was a significant correlation between chronic cough and urinary incontinence in this study, with $p=<0.01$. The results of this study are in accordance with research conducted by Sari (2021) on elderly subjects in Pekanbaru, where it was found that chronic cough has a statistically significant correlation with the incidence of urinary incontinence with a p -value ≤ 0.01 . In that study, of all the risk factor variables associated with the incidence of urinary incontinence, only chronic cough was shown to have a correlation.

The results of this study are also in line with Sohn et al. (2018), Pedersen et al. (2017), Liu et al. (2014) and Ge et al. (2015), where a significant association was found between respiratory disease and the incidence of urinary incontinence. Chronic lung disease is associated with symptoms of chronic cough which can cause urinary incontinence [16]. The results of this study are in accordance with the theory that cough has an influence on the occurrence of urinary incontinence. This happens because when you cough, intra-abdominal pressure will increase and exceed the resistance capacity of the urethra, causing urine to leak, which is usually small in amount. Usually this is more common in stress urinary incontinence [16]. However, this study is not in accordance with research conducted by Kasikci et al. (2015) and Suhr et al. (2017).

Obtained a p -value = 0.055 in the bivariate test between history of vaginal delivery and the incidence of urinary incontinence, which can be concluded that there is no significant correlation between history of

vaginal delivery and the incidence of urinary incontinence. The results of this study are contradicting with the research conducted by Pedersen et al. (2017), where in that study there was a correlation between vaginal delivery and the incidence of urinary incontinence with a p -value ≤ 0.01 .

Other studies such as by Ninomiya et al. (2017), Ge et al. (2015), Liu et al. (2014) and Lu et al. (2016) also got different results from this study. Where in these studies there was a correlation between the mode of delivery and urinary incontinence, which in further tests proved that vaginal delivery had a greater effect on the occurrence of urinary incontinence. The results of this study are not in accordance with the theory which says that vaginal delivery will cause intra-abdominal pressure on the bladder during labor [16]. According to research conducted by Saadia (2015) women who give birth five or more times have a high probability of experiencing urinary incontinence. However, there was no significant difference between those who delivered less than five times vaginally [15-18].

In this study, the highest Exp(B) value was obtained for the chronic cough variable with Exp (B) = 12.69, which means that patients who have a history of chronic cough 12.69 times will experience urinary incontinence. It was also concluded that in this study chronic cough was the most significant risk factor influencing the incidence of urinary incontinence. The results of this study are in accordance with research conducted by Sari et al. (2021) where this study examined factors related to urinary incontinence in the elderly located in Pekanbaru, Indonesia.

In that study it was said that chronic cough was the most influential risk factor for the incidence of urinary incontinence, with an OR = 17.66 meaning that the elderly who had a history of chronic cough 17.66 times would experience a history of chronic cough. Likewise with research conducted by Sumardi et al. (2014) in which the study also found that one of the risk factors that had the highest significance in influencing the incidence of urinary incontinence was chronic cough.

5. Conclusion

In conclusion, urinary incontinence is a widespread health issue that significantly affects individuals' quality of life and poses challenges to public health systems. It influences not only physical and psychological well-being but also hygiene, social interactions, and daily functioning, while contributing to a considerable economic burden. Although underreported, its global impact is substantial, and prevalence increases with age. This study highlights a notable occurrence of urinary incontinence among geriatric patients, with urge and stress incontinence being the most common forms. Key associated factors such as overweight, hypertension, diabetes, chronic cough, and a history of pelvic surgery underscore the importance of early detection and tailored healthcare strategies. Addressing these risk factors through targeted interventions is essential for improving care and outcomes for elderly individuals living with urinary incontinence.

6. Data Availability Statement

The datasets generated and analyzed during the current study are not publicly available due to privacy and ethical considerations but are available from the corresponding author upon reasonable request.

7. Ethical Statement

This study was approved by the Ethics Committee for Health Research at Universitas Sumatera Utara. The research was conducted at the Outpatient Clinic of Haji Adam Malik General Central Hospital and the University of North Sumatera Hospital from June to November 2022.

8. Author Contributions

All authors contributed to the design and implementation of the research, data analysis, and finalizing the manuscript.

9. Funding

No funding.

10. Conflict of Interest

Authors declares no conflict of interest.

References

- [1] D'Ancona C, Haylen B, Oelke M, Abranches-Monteiro L, Arnold E, et al. The International Continence Society (ICS) report on the terminology for adult male lower urinary tract and pelvic floor symptoms and dysfunction. *Neurourol Urodyn.* 2019;38:433–77.

- [2] Martono HH, Darmojo RB. Buku ajar geriatrik (Ilmu kesehatan usia lanjut). Jakarta: Balai Penerbit Fakultas Kedokteran Universitas Indonesia; 2006.
- [3] Seipei T, Schauss AG. Lower urinary tract symptoms, overactive bladder syndrome, and urinary incontinence (LUTS, OAB, and UI). In: Pizzorno JE, Murray MT, editors. *Textbook of natural medicine*. 5th ed. St. Louis: Elsevier; 2020. p. 1533–44.
- [4] Perkumpulan Kontinensia Indonesia (PERKINA). Panduan tata laksana inkontinensia urin pada dewasa. 2nd ed. Jakarta: Ikatan Ahli Urologi Indonesia; 2018.
- [5] Chapple CR, Milsom I. Urinary incontinence and pelvic prolapse: Epidemiology and pathophysiology. In: Wein AJ, Kavoussi LR, Novick AC, Partin AW, Peters CA, editors. *Campbell-Walsh urology*. 10th ed. Philadelphia: Elsevier-Saunders; 2012.
- [6] Goepel M, Kirschner-Hermanns R, Welz-Barth RA, Steinwachs KC, et al. Urinary incontinence in the elderly: Part 3 of a series of articles on incontinence. *Dtsch Arztebl Int*. 2010.
- [7] World Health Organization. Ageing and health. 2021. Available from: <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>.
- [8] Badan Pusat Statistik. Statistik penduduk lanjut usia. Jakarta: Badan Pusat Statistik; 2019.
- [9] Cesari M, Calvani R, Marzetti E. Frailty in older persons. *Clin Geriatr Med*. 2017;33:293–303.
- [10] Amelia R. Prevalensi dan faktor risiko inkontinensia urin pada lansia di Panti Sosial Tuna Werdha (PSTW) Sabai Nan Aluih Sicincin Pariaman. *Health Med J*. 2020;2:39–44.
- [11] Sumardi R, Mochtar CA, Junizaf, Budi I, et al. Prevalence of urinary incontinence, risk factors and its impact: Multivariate analysis from Indonesian nationwide survey. *Acta Med Indones*. 2014;46:175–82.
- [12] Irwin DE, Kopp ZS, Agatep B, Milsom I, et al. Worldwide prevalence estimate of lower urinary tract symptoms, overactive bladder, urinary incontinence and bladder outlet obstruction. *BJU Int*. 2011.
- [13] Yates A. Urinary continence care for older people in the acute setting. *Br J Nurs*. 2017;26(9):28–30.
- [14] Schreiber Pedersen L, Lose G, Høybye MT, Elsner S, Waldmann A, Rudnicki M. Prevalence of urinary incontinence among women and analysis of potential risk factors in Germany and Denmark. *Acta Obstet Gynecol Scand*. 2017;96(8):939–48.
- [15] Griebing TL. Urinary incontinence in the elderly. *Clin Geriatr Med*. 2009.
- [16] Wein AJ, Kavoussi LR, Novick AC. *Campbell-Walsh urology*. Vol. 148. Philadelphia: Elsevier; [year not defined].
- [17] Ninomiya S, Naito K, Nakanishi K, Okayama H. Prevalence and risk factors of urinary incontinence and overactive bladder in Japanese women. *Low Urin Tract Symptoms*. 2018;10(3):308–14.