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ORIGINAL ARTICLE

GENDER-BASED RISK FACTORS FOR URINARY INCONTINENCE AMONG OLDER ADULTS LIVING IN NURSING HOMES IN INDONESIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Urinary incontinence (UI) is a prevalent condition that disproportionately affects institutionalized older adults and manifests differently across genders. This study aimed to examine gender-based risk factors associated with UI among older adults living in nursing homes. A cross-sectional study was conducted involving 317 older adults from four government-run nursing homes. Participants were selected using purposive sampling based on inclusion criteria. Participants completed the Questionnaire for Urinary Incontinence Diagnosis (QUID), the Geriatric Depression Scale (GDS), and the Pelvic Floor Distress Inventory-20 (PFDI-20). Data were analyzed using descriptive statistics and logistic regression across three models (overall, female, and male). The prevalence of UI was 28.07%, with higher rates among females (15.77%) compared to males. Pelvic floor muscle weakness was significantly associated with UI in all models. Among women, reproductive factors such as a menopause duration exceeding 10 years and a history of childbirth were also significantly associated with an increased risk of UI. Education level emerged as a significant confounding variable in the general model. Pelvic floor muscle weakness is a key gender-linked risk factor for UI, particularly among women with specific reproductive histories. These findings underscore the importance of incorporating gender-responsive assessments and pelvic floor interventions into institutional geriatric care practices.

Keywords: *Gender; nursing homes; older adults; urinary incontinence*

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BACKGROUND

Urinary Incontinence (UI) among is a growing public health issue that affects millions of older adults worldwide, particularly those residing in nursing home settings (Batmani et al., 2021). Nursing homes in Indonesia are generally under-resourced, with limited access to specialized geriatric care, including continence services and gender-sensitive assessments (Sari, 2021; Siswoyo et al., 2021). These conditions differ significantly from those in many developed countries and may affect the prevalence and risk factors of UI among institutionalized older adults, such as in Japan (Suzuki et al., 2020), United States (Ajay et al., 2025), and Austria (Hödl et al., 2019). The condition not only compromises physical health, but also diminishes quality of life and psychosocial well-being (Sheng et al., 2022).

The global prevalence of UI differs across regions, with developed countries such as the United States reporting higher rates, particularly among nursing home residents (Patel, Godecker, Giles, & Brown, 2022). In Indonesia, specific epidemiological data on UI remain limited, as the condition is often regarded as secondary to other medical

issues. However, stress incontinence is frequently observed. Sari (2021) reported a prevalence of UI at 6%. A national survey conducted by Sumardi et al. (2014) estimated the overall prevalence of UI in Indonesia to be 13%. Supporting this, the Indonesian Continence Society detailed that among 2,765 respondents, the most common subtypes were overactive bladder (OAB) wet type (4.1%) and stress UI (4.0%). The prevalence of UI increased with age, rising significantly among older adults (≥60 years) to 22.2% compared to 12.0% in the adult group (18–59 years), highlighting a strong age-related risk factor (Perkumpulan Kontinensia Indonesia, 2018).

Gender has emerged as a significant demographic factor influencing UI risk, with both biological and sociocultural mechanisms contributing to gender disparities (Gacci et al., 2022). In women, pelvic floor trauma resulting from childbirth, hormonal changes during menopause, and anatomical differences elevate the risk of stress and mixed incontinence (Yang et al., 2022). In contrast, men often experience UI due to prostate-related conditions or surgical interventions, typically presenting with urgency or overflow incontinence (Gacci et al., 2022; Y. Zhang et al., 2023). These gender-specific mechanisms suggest that risk profiling and prevention strategies should be tailored accordingly (Shang et al., 2023). Therefore, recognizing and addressing to gender-specific needs is critical for effective management and prevention in nursing homes (Tai, Liu, Wang, & Tan, 2021).

The lack of gender-sensitive data is further exacerbated by institutional challenges within elderly care systems (Farrés-Godayol et al., 2021). Nursing homes are frequently under-resourced and understaffed, which complicates routine screening and tailored management of UI (Erlangga, Saputra, Harisandy, & Ramadhon, 2025; Tai et al., 2021). Care workers may lack adequate training in geriatric continence care, and institutional policies may fail to prioritize UI as a significant health concern (Huang et al., 2021). Furthermore, gender biases in care provision provision such as varying levels of privacy, support, or clinical attention afforded to men and women—can also influence reporting and management outcomes (Huion, De Witte, Everaert, Halfens, & Schols, 2021). These structural issues not only hinder the recognition of UI as a preventable condition but also amplify existing gender disparities. Consequently, institutionalized older adults, especially women, may experience UI-related complications at a disproportionately higher rate (Mat et al., 2023).

Clinical misunderstandings regarding gender-specific variations in UI often result in inadequate treatment. Risk factors such as pelvic muscle weakness, smoking, depression, and low levels of physical activity can significantly affect UI outcomes (Nazzal, Khatib, Al-Quqa, Abu-Taha, & Jaradat, 2021; Peng, Hu, & Cai, 2024). Accurate identification of these factors is essential for proper diagnosis and individualized care. A history of abdominal surgery may further compromise pelvic support and continence mechanisms. In women, factors such as pregnancy history, delivery method, and duration of menopause influence bladder control and pelvic floor strength (Wojcik et al., 2022). Failure to address these gender-specific risks may lead to ineffective interventions and poor treatment adherence (Tunn, Baessler, Knüpfer, & Hampel, 2023).

Based on the aforementioned issues, gender emerges as a critical determinant in the epidemiology of urinary incontinence among older adults, particularly in institutional care settings. However, no prior studies in Indonesia have specifically investigated the relationship between gender-based risk factors and urinary incontinence among nursing homes home residents. This absence of evidence underscores a significant gap that hinders the development of gender-sensitive prevention and treatment strategies in elderly care. Understanding these gender differences is essential to improve screening, care planning, and policy formulation for institutionalized older adults. The lack of gender-disaggregated data may lead to ineffective or overly generalized interventions. Therefore, this study aims to examine the gender-based risk factors associated with urinary incontinence among older adults living in nursing homes.

METHOD

Study design

This study employed a cross-sectional design to investigate the relationship between gender-based risk factors and urinary incontinence among older adults residing in government-supported nursing homes (*Panti Sosial Tresna Werdha* or PSTW) in Jakarta. This design was selected because it facilitates the identification of associations between multiple risk factors and urinary incontinence outcomes at a single point in time. A cross-sectional approach is effective for capturing prevalence data and exploring gender-related differences in institutionalized populations. This study used purposive sampling, a type of non-probability sampling, to recruit participants who met specific inclusion and exclusion criteria. The inclusion criteria required participants to be older adults residing in a nursing home, able to communicate in Bahasa Indonesia, capable of hearing and speaking clearly, and willing to participate. The exclusion criterion was withdrawal from the study during data collection. This sampling technique was chosen to ensure data quality by including only participants who could provide reliable responses. Although purposive sampling limits generalizability, it was appropriate given the study's focus on a specific institutionalized population with defined communication and cognitive abilities.

Sample

The sample size for this study was determined using the finite population correction formula for proportion estimation. This calculation took into account confidence level of 95%, corresponding to a Z-score of 1.96, an estimated prevalence (p) of 50% (0.50) due to the absence of specific data, and a margin of error (d) set at 5% (0.05). The formula used is:

$$n = \frac{Z^2 \cdot p(1-p) \cdot N}{d^2 \cdot (N-1) + Z^2 \cdot p(1-p)}$$

where N refers to the total accessible population in this study. The population consisted of older adults residing in four government-run nursing homes in Jakarta. Specifically, there were 73 individuals in Nursing Home 1 (East Jakarta), 87 in Nursing Home 2 (West Jakarta), 84 in Nursing Home 3 (South Jakarta), and 74 in Nursing Home 4 (also in East Jakarta), resulting in a total of 317 individuals. All eligible residents were included in the final sample to mitigate potential non-response or dropout during data collection. This approach ensured adequate power and representation for the analysis of gender-based risk factors associated with urinary incontinence.

Instruments

This study employed three standardized instruments in addition to demographic data collection. UI was assessed

using the *Questionnaire for Urinary Incontinence Diagnosis* (QUID). The QUID is designed to diagnose urinary incontinence and differentiate its types based on six symptom-related items. Each item is scored on a scale from 0 (never) to 5 (almost always), with a total possible score ranging from 0 to 30. Higher scores indicate greater frequency of leakage. The instrument has demonstrated strong reliability (Cronbach's alpha = 0.965) and acceptable validity (range = 0.45–0.68) (Bradley et al., 2010).

Depression was measured using the *Geriatric Depression Scale – Short Form* (GDS-15), a self-report instrument consisting of 15 yes/no questions. Each response indicating depression is scored as 1, resulting in a total score ranging from 0 to 15. A total score greater than 5 is considered indicative of depression in older adults. This instrument has shown good reliability (Cronbach's alpha = 0.851) and validity ranging from 0.329 to 0.716 (Utami, 2019).

Pelvic muscle weakness was assessed using the *Pelvic Floor Distress Inventory–Short Form 20* (PFDI-20), which evaluates pelvic floor dysfunction symptoms. The instrument includes 20 items divided into three subscales: Pelvic Organ Prolapse Distress Inventory (6 items), Colorectal-Anal Distress Inventory (8 items), and Urinary Distress Inventory (6 items). A "No" response is scored as 0, while a "Yes" response is followed by a rating of symptom severity from 1 (not at all) to 4 (quite a bit), which is then transformed to a scale of 25 to 100. Higher scores indicate greater symptom distress. The PFDI-20 has demonstrated good reliability (Cronbach's alpha = 0.816) and validity ranging from 0.385 to 0.781 (Pangastuti et al., 2020).

Data analysis

Logistic regression analysis was conducted due to the categorical nature of the outcome variable, urinary incontinence. Three separate models were developed to explore the risk factors more specifically and to account for gender differences. Model 1 compared participants with and without urinary incontinence in the total sample; Model 2 focused exclusively on older women; and Model 3 concentrated solely older men. This stratification was based on existing literature suggesting distinct gender-specific risk profiles. Confounding variables were selected based on bivariate analysis (p-value < 0.25) and were supported by theoretical relevance from prior research. Each regression model was tested for multicollinearity using the Variance Inflation Factor (VIF), and model fit was evaluated using the Hosmer-Lemeshow goodness-of-fit test. These steps ensured the validity and robustness of each regression model used in the analysis. Additionally, several confounding variables were selected for inclusion in the regression analysis based on a combination of statistical significance from bivariate testing (p < 0.25), theoretical plausibility, and supporting evidence from previous literature.

Ethical consideration

Research authorization was formally obtained from the Jakarta regional government, following ethical approval from the Ethics Committee of the Faculty of Nursing, University of Indonesia with the number KET - 207/UN2.F12.D1.2.1/PPM.00.02/2023. Data collection occurred in February 2023, ensuring that no violence or coercion was exerted on the research participants. Respondents were required to communicate in Bahasa Indonesia and were not using catheters.

RESULT

Demographic data, including age, gender, and education level, are presented in Table 1, along with the correlation test results in a crosstabulation table between all variables in this study and the occurrence of urinary incontinence. The study findings indicate that the largest proportion of elderly individuals falls within the early elderly age range of 60-75 years (82.61%), predominantly female (55.83%), and with a lower level of education (45.10%). Two variables were strongly associated with urinary incontinence among older adults in institutional care: pelvic floor muscle weakness (P-value = 0.001; OR = 2.957; 95% CI = 1.731–5.051) and a duration of menopause more than 10 years (P-value = 0.001; OR = 7.370; 95% CI = 2.642–22.814). Variables specific to elderly women include a history of pregnancy, childbirth, and the duration of menopause. The majority of elderly individuals exhibit a normal nutritional status (41.95%), have no stiffness in the neck, do not experience depression (48.58 engage in low levels of physical activity (48.26%), and have no history of abdominal surgery (68.14%). Pelvic floor muscle weakness in the elderly is found to be significantly associated with the occurrence of urinary incontinence.

Table 1. Cross tabulation of variables related to urine incontinence among residents (n=317)

Variables	Urine Incontinence		P-Value	OR	95% CI
	No, n (%)	Yes, n (%)			
Age			0.033*	-	-
Early older adult	191 (60.25)	71 (22.39)			
Middle older adult	36 (11.35)	14 (4.41)			
Late older adult	1 (0.31)	4 (1.26)			
Gender			0.939	1.020	0.622-1.670
Male	101 (31.86)	39 (12.30)			
Female	127 (40.06)	50 (15.77)			
Education level			0.041*		
Higher	57 (17.98)	32 (10.09)			
Middle	69 (21.76)	16 (5.05)			
Low	102 (32.17)	41 (12.93)			
Nutritional Status			0.596	1.143	0.698-1.872
Normal	133 (41.95)	49 (15.46)			
Malnutrition	95 (29.96)	40 (12.62)			
Pelvic Muscle Weakness			0.001**	2.957	1.731-5.051
No	119 (37.54)	24 (7.57)			
Yes	109 (34.38)	65 (20.50)			
Smoking			0.092	1.635	0.920-2.908
No	186 (58.67)	65 (20.50)			
Yes	42 (13.25)	24 (7.57)			

Variables	Urine Incontinence		P-Value	OR	95% CI
	No, n (%)	Yes, n (%)			
Depression			0.222	0.652	0.326-1.301
No	184 (48.58)	77 (24.29)			
Yes	44 (13.88)	12 3.79)			
Physical Activity			0.383	-	-
Low	153 (48.26)	55 (17.35)			
Middle	74 (23.34)	33 (10.41)			
High	1 (0.31)	1 (0.31)			
Abdomen Surgical History			0.220	1.778	0701-4.507
No	216 (68.14)	81 (25.55)			
Yes	12 (3.78)	8 (2.52)			
Female Only (n=177)					
Pregnant History					
Nullipara	30 (16.94)	7 (3.95)	0.020*	-	-
Primipara	42 (23.73)	11 (6.21)			
Multipara	53 (29.94)	34 (19.20)			
Partum History					
Never	26 (14.68)	7 (3.95)	0.035*	-	-
Perabdominant	20 (11.29)	11 (6.21)			
Pervaginam	79 (44.63)	34 (19.21)			
Duration of Menopause					
1 -10 years	49 (27.68)	4 (2.26)	0.001**	7.37	2.642-22.814
> 10 years	76 (42.93	48 (27.11)			

*P-value ≤ 0.05
**P-value ≤ 0.001

The results of the multivariate analysis indicate that, in all three models conducted, pelvic floor muscle weakness is a significant risk factor for urinary incontinence among elderly residents of the institution.

Table 2. Model 1, logistic regression analysis: the non- urine incontinence versus urine incontinence

Variables	β	P-value	Exp (β)	95% CI	
				Lower	Upper
Pelvic muscle weakness					
Weak	1.063	0.001*	2.895	1.686	4.969
Educational level (high educational level as a reference variable)					
Middle level	-0.823	0.023**	0.439	0.216	0.894
Low level	-0.254	0.392	0.776	0.434	1.387
Constant	-2.339	0.001	0.096		

*significant P-value < 0.001; **significant P-value <0.05

In the first model (Table 2), pelvic floor muscle weakness was significantly associated with urinary incontinence (P-value < 0.001; Exp(β) = 2.895; 95% CI = 1.686–4.969), with a **Nagelkerke's R^2** of 0.99. This exceptionally high R^2 value suggests that the model accounts for nearly all of the variance in urinary incontinence, which may suggest strong predictor dominance. However, it also raises concerns about potential model overfitting, necessitating careful interpretation. This implies that residents with pelvic floor muscle weakness are 2.9 times more likely to experience urinary incontinence than those without pelvic floor muscle weakness, while controlling for the confounding variable of education level.

Table 3. Model 2, logistic regression analysis: The female non-urine incontinence versus female urine incontinence resident

Variables	β	P-value	Exp (β)	95% CI	
				Lower	Upper
Pelvic muscle weakness					
Weak	1.315	0.001*	3.726	1.668	8.325
Age (Early older adult level as a reference variable)					
Middle older adult	0.640	0.169	1.896	0.762	4.721
Late older adult	21.867	0.999	3138075174.247	0.000	-
Constant	-3.295	0.001	0.037		

*significant *p*-value < 0.001;

In the second model (Table 3), which focused on female participants and incorporated specific variables such as a history of childbirth, delivery, and duration of menopause, the results indicated a significant risk factor between pelvic floor muscle weakness in female residents to the occurrence of urinary incontinence (P-value < 0.001; Exp. β 3.726; 95% CI 1.668-8.325; R^2 0.170). This suggests that residents with pelvic floor muscle weakness are 3.7 times more likely to experience urinary incontinence compared to those without pelvic floor muscle weakness, while controlling for the confounding variable of age (P-value < 0.05; Exp. β 2.391; 95% CI 1.105-5.177; R^2 0.052).

Table 4. Model 3. Logistic regression: The male non-urine incontinence versus male urine incontinence resident

Variables	β	P-value	Exp (β)	95% CI	
				Lower	Upper
Pelvic muscle weakness					
Weak	0.872	0.027*	2.391	1.105	5.177
Constant	-2.314	0.001	0.099		

**significant P-value <0.05

Table 4 presents the results of a logistic regression analysis for male nursing home residents, comparing those with and without urinary incontinence. The analysis shows that pelvic muscle weakness significantly increases the likelihood of urinary incontinence in men (p = 0.027; OR = 2.391; 95% CI = 1.105–5.177). This indicates that men with pelvic muscle weakness are approximately 2.4 times more likely to experience urinary incontinence compared to those without such weakness. The constant value was significant (p = 0.001), supporting the model's fit. These findings underscore pelvic muscle weakness as a significant predictor of urinary incontinence among elderly men in institutional care.

DISCUSSION

The findings of this study underline pelvic floor muscle weakness as a key risk factor for urinary incontinence among older adults living in institutional care. This association was consistently observed in both the general population as well as in gender-specific analyses. Among female residents, pelvic floor dysfunction remained significant even after accounting for reproductive histories, such as childbirth and menopause, suggesting a cumulative effect of gender-specific physiological changes on continence. In male residents, the association was present but appeared less dominant, indicating the potential influence of other unmeasured factors. The consistently strong relationship between pelvic muscle function and incontinence across various models emphasize the necessity for routine pelvic floor assessments in geriatric care.

In the female-specific model, the relationship between pelvic floor muscle weakness and urinary incontinence remained significant even when reproductive history variables such as parity, mode of delivery, and menopause duration were considered (Alouini et al., 2022). This reinforces the understanding that women face unique continence challenges that accumulate over the life course. Pregnancy and childbirth, particularly vaginal delivery, have long been known to weaken pelvic support structures, leading to stress incontinence in later life (Zhang et al., 2024). Moreover, prolonged duration of menopause may exacerbate pelvic muscle atrophy, further diminishing bladder control. The need for gender-sensitive continence care, especially in women who have experienced multiple childbirths or undergone abdominal surgeries (Molina-Torres et al., 2023). These risk factors should inform tailored interventions such as pelvic floor muscle training and education on healthy bladder habits. Without such targeted care, older women in nursing homes remain at high risk of developing or worsening urinary incontinence (Mantilla Toloza et al., 2024).

In contrast, the model focused on male participants demonstrated a weaker yet still significant association between pelvic floor muscle weakness and urinary incontinence. This suggests that while pelvic floor dysfunction remains important for maintaining continence in men, other risk factors may play a more dominant role within this group. Prostate-related issues, which were not examined in this study, may account for the relatively lower predictive strength observed in men (Y. Zhang et al., 2023). Additionally, variations in physical activity levels and comorbidities such as diabetes or neurological disorders could influence continence among male residents (Akbar, Sahar, Rekawati, & Sartika, 2025; Gacci et al., 2022; Kk, Putri, & Wijaya, 2024). The modest strength of the male model implies the need for further research into male-specific contributors to incontinence. Comprehensive assessment tools that include urological and neurological parameters may yield a clearer understanding of incontinence patterns in older men. Nonetheless, the consistent role of muscle weakness across genders justifies the inclusion of pelvic health strategies in male care plans as well.

In addition to pelvic muscle weakness, this study also explored secondary variables such as physical activity, depression, nutritional status, and history of abdominal surgery. Although these factors were not consistently significant in multivariate models, they remain clinically relevant in the holistic assessment of continence in older adults. For example, low physical activity may indirectly contribute indirectly to pelvic weakness and reduced bladder control through decreased mobility and muscle disuse (An et al., 2020; Bagiartana & Huriah, 2023). Similarly, depressive symptoms can interfere with toileting behaviors and self-care (Yang et al., 2022), while poor nutritional status may impair tissue repair and muscle maintenance (Li et al., 2024). Although these variables may not be statistically dominant, they should not be dismissed in clinical practice. Their significance may become more apparent in longitudinal studies or when interacting with other psychosocial or environmental stressors. Therefore, a multifactorial approach that integrates both physical and psychosocial dimensions is recommended for optimal management.

This study affirms that pelvic floor muscle weakness is a primary risk factor for urinary incontinence among institutionalized older adults, with strong evidence observed in both male and female subgroups. The findings support the necessity for early detection and gender-responsive strategies in long-term care settings. Interventions such as pelvic muscle training, individualized continence plans, and routine screening for at-risk individuals help alleviate the burden of incontinence (Dumoulin et al., 2020; Johannessen et al., 2021). Given the high prevalence and significant impact of incontinence on dignity, mobility, and quality of life, this issue warrants greater attention in geriatric nursing practice (Yan, Xiao, Zhou, Li, & Tang, 2022).

This study is subject to several limitations that must be considered when interpreting the findings. The cross-sectional design restricts the ability to establish causal relationships between risk factors and urinary incontinence, as the temporal sequence of events cannot be determined. The use of self-reported questionnaires introduces the potential for recall bias and response bias, particularly among older adults who may experience cognitive or communication difficulties. Although validated instruments were used, the reliance on subjective reporting may compromise the accuracy of the data. Additionally, the study was limited to four government-run nursing homes in Jakarta, which may not be representative of other institutional settings or elderly populations in different regions of Indonesia. This geographic

and institutional restriction reduces the generalizability of the results. Future research involving longitudinal designs, objective clinical assessments, and broader population coverage is recommended to validate and expand upon these findings.

The findings of this study offer practical implications for institutional geriatric care, particularly in guiding evidence-based interventions for urinary incontinence. These insights should inform the development of structured pelvic floor muscle training programs as part of standard care protocols in nursing homes. Institutional care policies can be improved by integrating gender-responsive continence management into nursing guidelines and staff training. Strengthening these practices can help reduce the prevalence and impact of incontinence, enhance residents' dignity, and improve their overall quality of life.

CONCLUSION AND RECOMMENDATION

This study concluded that pelvic floor muscle weakness is a significant gender-based risk factor for urinary incontinence among older adults residing in Indonesian nursing homes. The findings consistently demonstrated this association across the overall population and within both male and female subgroups, emphasizing the importance of pelvic floor integrity in continence management. The analysis also highlighted the influence of gender-specific factors, such as the duration of menopause and reproductive history, particularly among female residents. These results support the need for targeted prevention and intervention strategies in institutional settings.

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