



Original Article

Pelvic Floor Training and Nursing Education in Women with Urinary Incontinence

Zhino Raouf Ali *¹, Abid Salih Kumait ²

¹ Department of Adult Nursing, College of Nursing, University of Raparin, Rania 46012, Kurdistan Reign, Iraq.

² Department of Adult Nursing, College of Nursing, University of Kirkuk, Kirkuk 36001, Iraq.

Received 28 March 2026; revised 15 May 2026;
accepted 18 May 2026; available online 06 July 2026

DOI: 10.24271/PSR.2026.579102.2707

ABSTRACT

Urinary incontinence is a common condition in women, with a considerable knowledge gap and great psychological suffering, especially in the Middle East and Iraqi Kurdistan region, where systematic education interventions are minimal. The study employed a quasi-experimental pre-test/ post-test study design at the Surgical Teaching Hospital in Sulaimani City, Iraqi Kurdistan, with 100 women diagnosed with urinary incontinence, distributed equally as an intervention group (n = 50) and a control group (n = 50). The twelve-week structured nursing educational intervention, conducted over twenty-four sessions, included pelvic floor muscle training, teaching aids, and behavior change methods. Knowledge was assessed using a researcher-appropriated Urinary Incontinence knowledge Scale (UIKS), and psychological Problems was measured on seven domains with a five-point Likert-type psychological problems scale. There was no significant difference between baseline knowledge scores in groups (p = 0.566). Post-intervention, the mean UIKS score in the intervention group improved statistically significantly (1.38 ± 0.22 to 1.91 ± 0.12 , respectively, $p < 0.001$), whereas no statistically significant change was observed in the control group (p 0.134). The intervention group showed a significant improvement in the score of psychological problems (0.97 ± 0.62 to 3.9 ± 30.10) with large effect sizes ($d = 0.77-0.90$). On the contrary, there was no significant difference in the control group (p = 0.82). The research study shows that an educational program based on nursing and supplemented by pelvic floor muscle training significantly increases patient education about urinary incontinence and, at the same time, reduces the psychological load that women endure in Iraqi Kurdistan, which supports the inclusion of this study in routine outpatient care practices.

<https://creativecommons.org/licenses/by-nc/4.0/>

Keywords: Urinary incontinence, educational program, pelvic floor muscle training, psychological problems, knowledge.

1 Introduction

Urinary incontinence (UI), or involuntary urine discharge, is one of the most common and least reported disorders that afflict females across the globe. UI occurs in approximately 1 out of every 3 women across the world^[1,2]. Surprisingly, an association was reported with physical, psychological, and social burdens to those affected, and it is of various types, such as stress, urgency, mixed, and overflow incontinence, each with a different etiology and clinical presentation^[3,4].

In the Middle East and in the Iraqi Kurdistan region, the burden of UI is high. The study conducted on a population basis in Erbil Governorate found an overall UI prevalence of 51.7%, with the most common type being mixed incontinence^[3]. In Baghdad, 67.3% of patients with UI were females, and urge incontinence was 43%^[4]. In Sulaimani City, where the present study was carried out, over half of menopausal women were found to have

moderate to severe UI, and a direct relationship was noticed between severity of UI and age, parity, and the number of vaginal deliveries^[5]. Across Gulf countries, the prevalence of UI ranges from 20.3 to 54.5%, with major interference in daily activities such as prayers and sexual relationships^[6].

A number of risk factors have been repeatedly found in the literature, such as advanced age, obesity, multiparity, menopause, diabetes mellitus, chronic cough, and constipation^[3,5,7]. Beyond its physical effects, UI brings with it important psychological effects. Women with UI often experience depression, anxiety, embarrassment, and social withdrawal, with many not seeking medical care because of stigma or the misconception that UI is a normal outcome of ageing^[6,8]. These factors combined cause impaired quality of life and restricted participation in everyday life^[2,8,9].

Pelvic floor muscle training (PFMT) is a conservative intervention for UI that is used in the first line. Critical meta-analyses have proven that systematic PFMT is an effective intervention, which can reduce episodes of incontinence and enhance quality of life when it is monitored and used with patient

* Corresponding author

E-mail address zhino.hdtc24@gmail.com (Instructor).

Peer-reviewed under the responsibility of the University of Garmian.

education^[1,9,10]. PFMT demonstrated superior results compared to unsupervised exercise, and improvements of pelvic floor muscle function and quality of life^[10]. Nursing education programs play a significant role in enhancing knowledge of women regarding UI, risk factors, and self-management techniques such as PFMT^[11]. Despite there is growing evidence on nurse-led educational intervention in the management of UI, structured programs combining educational and pelvic floor muscle training are limited in low to middle-income countries, including the Middle East and Kurdistan region, where population-based research involving validated tools and awareness of the population about the self-management of UI does not exist.^[4,6]

This study evaluated a nursing education program combined with pelvic floor training on knowledge and psychological problems among women with urinary incontinence at Sulaimani's Surgical Teaching Hospital, Kurdistan.

2 Materials and methods

2.1 Study Design

A quantitative design, quasi-experimental pre-test/post-test was employed to evaluate the effectiveness of a nursing educational program combined with pelvic floor muscle training on knowledge and psychological problems among women with urinary incontinence. A follow-up evaluation point was done three months after the program completion to evaluate the intervention and the control group.

2.2 Setting and Study Period

The research was carried out in the Urodynamic Unit of the Surgical Teaching Hospital in Sulaimani City, Iraqi Kurdistan Region. The data collection period was between 26th January 2024 and 26th April 2024, and the post-intervention assessment was conducted three months afterwards, serving as the follow-up evaluation point for both intervention and control groups.

2.3 Sample and Sampling Method

A non-probability purposive sampling method was used. All the participants were officially diagnosed with urinary incontinence by the urologists and gynaecologists of the Urodynamic Unit of Surgical Teaching Hospital, before enrolment. The sample size was calculated using the standard formula: $n = z^2 \cdot p \cdot (1-p) / e^2$, based on a population size of 320, a z-score of 1.78, and a margin of error of 5%, confirmed to offer sufficient statistical power to identify between-group differences in a quasi-experimental design. Out of 140 patients selected during the study period, 13 did not meet the inclusion criteria, 17 refused participation, and 10 participants used for the pilot study and excluded from the study sample. Finally, remained 100 women that enrolled and allocated equally into an intervention group ($n = 50$) and a control group ($n = 50$).

2.4 Inclusion and exclusion criteria

Participants were included adult females aged 18–65 years, diagnosed by urologists and gynaecologists with any type of

urinary incontinence (stress, urgency, mixed, or overflow), with or without prior surgical history, and with or without comorbidity, including diabetes mellitus and hypertension. While pregnant women and those with cerebrovascular accident, pelvic trauma, reconstructive surgery, and mental disorders were excluded.

2.5 Ethical Considerations

This study, conducted by the College of Nursing, University of Raparin (approval number: 13), on 15 August 2024, approved the study protocol. A formal invitation letter was sent to the Directorate of Health, Surgical Teaching Hospital. All the participants were informed about their right to withdraw at any time and handed an oral informed consent. All personal data is kept confidential with anonymity guaranteed.

2.6 Study Tools

The study tool was constructed based on an extensive review of related literature and studies to assess nursing educational programs regarding pelvic floor muscle training on knowledge and psychological problems in women with UI. The study instrument is composed of three parts. Part one consists of 7 items addressing sociodemographic and clinical variables such as age, education, occupation, residential location, obstetric history, menstrual status, and types of delivery. Part two is composed of knowledge regarding UI between both the intervention and control groups before and after the nursing educational program and scored on a three-point scale (0 = False, 1 = I don't know, 2 = True), with mean score ranges interpreted as: 0–0.66 = False, 0.67–1.33 = I don't know, and 1.34–2.00 = True

Part three focused on changes in both groups after the nursing educational program concerning psychological problems related to UI. This part consists of 7 items assessing UI-related psychological distress, not clinical diagnosis, across the following domains: depression, interference with religious or spiritual activities, feelings of being unhealthy, inability to enjoy family gatherings, impact on sexual desire, worry about embarrassment, and concern about worsening incontinence with age. Each item measured the degree to which UI affected a specific psychological domain of daily life, rated on a five-point Likert scale (0 = Very much; 4 = Not at all), with mean scores interpreted as: 0–0.80 = Very much, 0.81–1.60 = Much, 1.61–2.40 = Moderately, 2.41–3.20 = A little, 3.21–4.00 = Not at all.

2.7 Validity and Reliability

The content validity of the program and study instrument is determined by a panel of 11 experts, with an average of 15.7 years of experience in their different specialist fields of urology, gynecology, medicine, and adult nursing. A stability (test-retest) approach was performed for the determination of the study instrument reliability. The psychometric properties of the UIKS and Psychological Problems scales were assessed using Cronbach's alpha and exploratory factor analysis. The results indicated acceptable to good internal consistency for both scales, with Cronbach's alpha values of 0.744 for UIKS and 0.764 for the Psychological Problems scale. For construct validity, the

UIKS demonstrated acceptable sampling adequacy ($KMO = 0.615$) and a significant Bartlett's test of sphericity ($\chi^2 = 255.19$, $p < 0.001$), with a total variance explained of 68.45%. The Psychological Problems scale showed good sampling adequacy ($KMO = 0.712$) and a significant Bartlett's test ($\chi^2 = 232.51$, $p < 0.001$), with a higher total variance explained of 77.41%, indicating a stronger and more stable factor structure. In Rotated Component Matrix all items showed acceptable factor loadings (> 0.40), ranging from moderate to high values, confirming an appropriate factor structure for the scale. Overall, both instruments demonstrated acceptable reliability and validity, with the Psychological Problems scale showing stronger psychometric properties compared to the UIKS.

2. 8 Pilot study

The pilot study was carried out at the Surgical Teaching Hospital, Sulaimani City. The period of 3rd January to 18th January, 2024 (two weeks) involved 10 participants who were chosen based on the same inclusion criteria as the main study. These samples were not included in the final sample; the time required for each interview ranged from 15 to 20 minutes for each participant.

2. 9 Intervention group

The intervention group was enrolled in a 12-week structured nursing educational program that included 24 sessions, each session took around 180 minutes, and the sessions were conducted twice a week. The respondents were split into 25 respondents. Topics included anatomy and physiology of the urinary system, risk factors, clinical manifestation of UI, fluid management, bladder training, sexual problems, and effectiveness of delivery. The complete session content, learning objectives, and delivery methods are detailed in Supplementary Table S1. A simplified Kurdish-language educational booklet was distributed to all intervention participants. The sessions were conducted in the form of lectures, pictures, videos, and role plays in Mersi Private Hospital, Sulaimani City. Those who were able to respond to the call were contacted by phone and via the Viber

group communication. The control group was not provided educational intervention.

2. 10 Statistical Analysis

Shapiro-Wilk and Kolmogorov-Smirnov tests were used to test normality. Non-parametric tests were used as results revealed non-normality. Boxplot inspection and z-score were used to determine outliers; no drastic outliers that needed to be excluded were found. Version 26 of the Statistical Package of Social Science (SPSS) was used to analyse the data. Descriptive statistics involved frequency distributions, percentages, means, and standard deviations [13]. The inferential statistical tests employed the Chi-square test, Fisher's exact test, Mann-Whitney U test, Wilcoxon signed rank test, McNemar-Bowker test, and Kruskal-Wallis test. Cramer's V Effect size and Cohen's d Effect size were used to report effect sizes. The statistical significance was established at $p < 0.05$. Mean and standard deviation were reported to interpret the findings, while the Wilcoxon signed-rank test was utilized for inferential analysis of within-group changes.

3 Results and Discussion

3. 1 Baseline Characteristics and Group Comparability

Table 1 demonstrates that both groups were similar with respect to mean age (control: 48.66 ± 6.07 years; intervention: 49.36 ± 6.97 years; $p = 0.594$), level of education ($p = 0.717$), and work status ($p = 1.0$). A p-value of 1.0 of occupational status implies the identical distribution among groups (Employee: 38.0% vs. 38.0%; Housewife: 62.0% vs. 62.0%), which proves perfect baseline equivalence with the exact test of Fisher. The residential area showed a significant difference, with all intervention participants living in urban areas compared to 72.0% controls ($p < 0.001$), which was identified as a limitation. Table 2 confirms comparable gynecological histories (gravida $p = 0.398$; menstrual state $p = 0.823$; delivery type $p = 0.824$) and symptom duration ($p = 0.503$), supporting baseline group equivalence.

Table 1: Baseline Sociodemographic Characteristics of Participants in Control and Intervention Groups.

Variables	Control (n=50)	Intervention (n=50)	P-value
Age	48.66 ± 6.07	49.36 ± 6.974	0.594 ^a
Level of Education			
Illiterate	1 (2.0%)	3 (6.0%)	0.717 ^b
Primary & Secondary school graduate	32 (64.0%)	31 (62.0%)	
Institute & College graduate	15 (30.0%)	15 (30.0%)	
MSc. & PhD	2 (4.0%)	1 (2.0%)	
Residential Area			
Suburban	14 (28.0%)	0 (0.0%)	<0.001 ^c
Urban	36 (72.0%)	50 (100.0%)	
Occupation			
Employee	19 (38.0%)	19 (38.0%)	1 ^c
Housewife	31 (62.0%)	31 (62.0%)	

a: Mann-Whitney U Test; b: Chi-Square Test; c: Fisher's Exact Test. A p-value of 1.0 indicates identical occupational distribution between groups, confirming perfect baseline equivalence.

Table 2: Gynecological history among participants in control and intervention groups.

Variables	Groups		P-value*
	Control (n=50)	Intervention (n=50)	
Gravida			
1	1 (2%)	6 (12%)	0.398
2	6 (12%)	7 (14%)	
3	11 (22%)	5 (10%)	
4	13 (26%)	9 (18%)	
5	9 (18%)	9 (18%)	
6	5 (10%)	7 (14%)	
7	3 (6%)	4 (8%)	
≥8	2 (4%)	3 (6%)	
Menstrual State			
Menopause	29 (58%)	32 (64%)	0.823
Pre-menopause	1 (2%)	1 (2%)	
Still having regular periods	20 (40%)	17 (34%)	
Type of Delivery			
Both C/S & NVD	22 (44%)	22 (44%)	0.824
Cesarean Section	5 (10%)	8 (16%)	
Normal vaginal delivery with episiotomy	14 (28%)	12 (24%)	
Normal vaginal delivery without episiotomy	9 (18%)	8 (16%)	

* chi-square test used for all comparisons

Table 3 regarding the changes in knowledge among the control group and intervention group before and after the study period. The questions used in this section dealt with risk factors, symptoms, and management of urinary incontinence. For most knowledge items, the distribution of responses (“True,” “False,” “I don’t know”) did not show statistically significant changes, as reflected by P-values greater than 0.05. This indicates that knowledge levels among the control group remained largely unchanged in the absence of an educational intervention. However, a few items demonstrated significant differences between pre- and post-measurements. Knowledge improved significantly for the item stating that urinary incontinence can occur when a person experiences a sudden, strong urge to void ($P = 0.019$). Similarly, awareness increased regarding the role of avoiding constipation in promoting urinary continence ($P = 0.048$). Two additional items limiting fluid intake to reduce urinary frequency ($P = 0.018$) and scheduled toileting as a management strategy ($P = 0.024$) also showed significant change, suggesting a spontaneous or external improvement in understanding of behavioral strategies among some participants. Despite these isolated improvements, the majority of knowledge

indicators did not significantly change, confirming that the control group did not gain substantial knowledge without targeted educational intervention. Furthermore, regarding the participants in the intervention group, there is a substantial improvement in the knowledge of following the implementation of the educational program and pelvic floor muscle exercise training. Across nearly all items, there was a marked shift from incorrect or uncertain responses at baseline to correct responses in the post-intervention assessment. Regarding risk factors, knowledge significantly improved for items such as the effect of anti-hypertensive medications on urinary incontinence, where correct responses increased from 32% at baseline to 98% post-intervention. Overall, Table 3 shows pre- and post-intervention scores on UIKS. The mean knowledge scores were not significantly different at baseline, in the control (1.39 ± 0.24) and the intervention (1.38 ± 0.22) groups ($p = 0.566$). Further, post-program, the intervention group had more improvement (1.38 ± 0.22 to 1.91 ± 0.12 , $p < 0.001$), with the number of correct responses of 95.25%. There was no significant change in the control group (1.39 ± 0.24 to 1.45 ± 0.24 , $p = 0.134$).

Table 3: Pre- and post-intervention comparison of urinary incontinence knowledge scale scores between control and intervention groups

UIKS	Control (n=50)			Intervention (n=50)			P-value ^a
	FALSE	I don't know	TRUE	FALSE	I don't know	TRUE	
	Count (%)			Count (%)			
	Mean ± SD			Mean ± SD			
Pre	150 (18.75%)	184 (23%)	466 (58.25%)	172 (21.5%)	155 (19.38%)	473 (59.12%)	0.566
	1.39 ± 0.24			1.38 ± 0.22			
Post	152 (19%)	134 (16.75%)	514 (64.25%)	34 (4.25%)	4 (0.5%)	762 (95.25%)	<0.001
	1.45 ± 0.24			1.91 ± 0.12			
P-value ^b	0.134			<0.001			0.4

a: Mann-Whitney U Test (between-group); b: Wilcoxon Signed-Rank Test (within-group).

Table 4 presents the pre- and post-intervention changes in psychological problems associated with urinary incontinence among women in the control and intervention groups. In the control group, no statistically significant differences were observed between pre- and post-intervention scores across all items, including feelings of depression, interference with religious or spiritual activities, feelings of being unhealthy, inability to enjoy family gatherings, impact on sexual desire, worry about embarrassment, and concern about worsening incontinence with age (all $p > 0.05$). These findings indicate that psychological problems related to urinary incontinence remained largely unchanged in the absence of the intervention. Conversely, the intervention group demonstrated statistically significant

improvements across all psychological outcomes following the intervention (all $p < 0.001$). Post-intervention means scores increased to values corresponding to the not at all category, reflecting substantial reductions in psychological distress related to urinary incontinence. Effect sizes were large for most items, ranging from 0.77 to 0.90, indicating strong intervention effects. The greatest improvements were observed for feelings of depression ($d = 0.90$), feeling unhealthy ($d = 0.89$), and worry about incontinence worsening with age ($d = 0.88$). Overall, these results indicate that the educational program was highly effective in alleviating psychological problems associated with urinary incontinence, while no meaningful changes were observed in the control group.

Table 4: Pre- and Post-Intervention Changes in Psychological Problems Related to Urinary Incontinence in Control and Intervention Groups.

Items	Control (n=50)		P- valu e ^a	Intervention (n=50)		P- value ^a	Effect Size ^b
	Pre	Post		Pre	Post		
	Mean ± SD			Mean ± SD			
Feeling Depressed Because of Incontinence	0.40 ± 0.67	0.44 ± 1.07	0.621	0.36 ± 0.53	3.98 ± 0.14	<0.001	0.9
Leaks Interfering with Religious/Spiritual Activities	2.34 ± 1.17	2.34 ± 1.10	0.358	1.32 ± 1.27	3.96 ± 0.20	<0.001	0.84
Feeling Unhealthy Due to Urinary Incontinence	0.54 ± 0.76	0.54 ± 1.03	0.358	0.54 ± 0.71	4.00 ± 0.00	<0.001	0.89
Feeling Unable to Enjoy Family Meetings	2.34 ± 1.15	2.42 ± 1.13	0.68	1.54 ± 1.01	4.00 ± 0.00	<0.001	0.86
Urinary Incontinence and Sexual Desire/Interest	3.42 ± 1.11	3.56 ± 0.93	0.197	1.80 ± 1.48	3.88 ± 0.33	<0.001	0.77
Worry About Embarrassment/Humiliation from Incontinence	1.06 ± 0.98	0.94 ± 1.15	0.095	0.78 ± 1.06	3.98 ± 0.14	<0.001	0.87
Worry About Incontinence Getting Worse with Age	0.20 ± 0.40	0.24 ± 0.74	0.861	0.42 ± 0.78	3.68 ± 0.47	<0.001	0.88

a: Wilcoxon Signed-Rank Test; b: Cohen's d.

Table 5 shows the association between selected sociodemographic characteristics (age group, education level, and occupation) with the UIKS and psychological problems in both control and intervention groups before and after the intervention. Regarding age groups, no statistically significant differences were found in UIKS or psychological problems in either the control or intervention groups at pre- or post-intervention ($p > 0.05$), indicating that age did not significantly influence knowledge or psychological outcomes. For education level, a significant association with UIKS was observed in the control group at pre-intervention ($p = 0.002$), while in the intervention group, a significant association was found with psychological problems at post-intervention ($p = 0.012$),

suggesting that participants with higher education demonstrated better outcomes after the intervention. Concerning occupation, significant differences were observed in the control group for UIKS at both pre- and post-intervention ($p = 0.000$ and $p = 0.008$, respectively). In the study group, occupation showed a significant association with psychological problems at both pre- and post-intervention ($p = 0.008$ and $p = 0.009$), indicating that employment status may influence psychological responses to urinary incontinence and its management. Overall, the findings suggest that while age had no significant impact, education level and occupation were associated with certain knowledge and psychological outcomes related to urinary incontinence.

Table 5: Association between Sociodemographic Characteristics and urinary incontinence knowledge scale and Psychological Problem Scores in control and intervention groups (Pre- and Post-Intervention).

			UIIS *		Psycho. Problems **	
			Pre	Post	Pre	Post
Age group	Control	30–39 (5)	1.40 $\pm$ 0.13	1.40 $\pm$ 0.16	1.77 $\pm$ 0.52	1.71 $\pm$ 0.52
		40–49 (22)	1.35 $\pm$ 0.23	1.43 $\pm$ 0.23	1.44 $\pm$ 0.60	1.47 $\pm$ 0.76
		50–59 (23)	1.43 $\pm$ 0.27	1.49 $\pm$ 0.27	1.44 $\pm$ 0.70	1.47 $\pm$ 0.81

Education level	Intervention	P-value ^a	0.498	0.702	0.611	0.481
		30–39 (5)	1.40 ± 0.16	1.90 ± 0.11	1.00 ± 0.65	3.97 ± 0.06
		40–49 (18)	1.40 ± 0.22	1.91 ± 0.12	0.80 ± 0.44	3.94 ± 0.09
		50–59 (27)	1.35 ± 0.24	1.91 ± 0.12	1.07 ± 0.72	3.91 ± 0.11
		P-value ^a	0.596	0.904	0.553	0.19
	Control	Primary & Secondary School (33)	1.314 ± 0.214	1.402 ± 0.233	1.368 ± 0.605	1.446 ± 0.794
		Institute & College (17)	1.552 ± 0.215	1.552 ± 0.237	1.672 ± 0.673	1.597 ± 0.691
		P-value ^b	0.002	0.051	0.258	0.339
	Intervention	Primary & Secondary School (34)	1.333 ± 0.190	1.900 ± 0.127	0.878 ± 0.631	3.903 ± 0.104
		Institute & College (16)	1.469 ± 0.268	1.930 ± 0.102	1.152 ± 0.584	3.973 ± 0.058
		P-value ^b	0.074	0.484	0.089	0.012
Occupation	Control	Employee	1.553 ± 0.192	1.566 ± 0.238	1.594 ± 0.716	1.489 ± 0.715
		Housewife	1.298 ± 0.216	1.383 ± 0.222	1.396 ± 0.586	1.502 ± 0.793
		P-value ^b	0.000	0.008	0.54	0.864
	Intervention	Employee	1.418 ± 0.273	1.941 ± 0.097	1.263 ± 0.662	3.970 ± 0.060
		Housewife	1.351 ± 0.189	1.891 ± 0.129	0.783 ± 0.532	3.899 ± 0.106
		P-value ^b	0.457	0.167	0.008	0.009

a: Kruskal-Wallis Test; b: Mann-Whitney U Test.

3. 2 Discussion

Effects of the educational program regarding the urinary incontinence knowledge scale (UIKS) scores of participants, the present study revealed that there was not significantly different at baseline, in the control and the intervention groups ($p = 0.566$). Further, post-program, the intervention group had more improvement (1.38 ± 0.22 to 1.91 ± 0.12 , $p < 0.001$), with the number of correct responses of 95.25%. There was no significant change in the control group (1.39 ± 0.24 to 1.45 ± 0.24 , $p = 0.134$). These results are in line with Mohamed *et al.*, (2022) [12], who found that there was significant knowledge improvement with the intervention group of 24.3 to 70.5 percent post-intervention ($p < 0.001$), Mohammed *et al.*, (2021) [13], who established that the severity of incontinence improved significantly after educational intervention ($p = 0.001$), and Abu Raddaha and Nasr, (2022) [1], who established that there was quality of life improvement after the intervention of a Kegel exercise training program ($p = 0.000$).

Significant interventions in the intervention group were demonstrated in psychological problems with urinary incontinence (UI) at the post-intervention stage ($p < 0.001$), and the effect size (Cohen's d) exceeded one with all items of the questionnaire (i.e., feeling depressed, interference with religious activities, feeling unhealthy, enjoying family meetings, sexual desire, embarrassment, and worry about worsening incontinence). Conversely, the control group has shown no noteworthy changes ($p > 0.05$) (Table 4). It was shown in sociodemographic analysis that there was no significant

association between age and UI scores or psychological problem scores in the two groups ($p > 0.05$). The level of education was also significantly related to the UI scores in the control group before the intervention ($p = 0.002$) and not after. Occupation had a great impact on UI scores after intervention and before intervention in the control group ($p \leq 0.008$), and the employees had higher scores compared to the housewives. Psychological problem scores before and after intervention were significantly correlated in the intervention group ($p 0.009$), with employees in the intervention group having higher scores on psychological problems (Table 5). as indicated by the Iraqi and regional literatures [3,5,7].

The observed high knowledge gains are consistent with the quasi-experimental data in similar contexts [1,13] and are further supported by the systematic reviews, which have shown that supervised PFMT with structured education has better effects than unsupervised methods [10,11]. The lack of compliance with unsupervised training, as pointed out by Luo *et al.*, (2021) [14], supports the importance of delivery by nurses. These results validate the claim that routine care is not a sufficient measure to eliminate the knowledge gap in the UI that has been reported throughout the Middle East and Iraqi Kurdistan [4,6].

In terms of psychological outcomes, the high effect sizes ($d = 0.77$ - 0.90) are consistent with several studies that have found substantial psychological burden (UI-related) reductions with structured programs [13]. Abdelwahab Mohamed *et al.*, (2025) [15] and Zhu *et al.*, (2025) [16] discovered that the quality of life domains showed significant improvements after PFMT-based

programs ($p = 0.001$ and $p < 0.001$). Further, Meta-analysis data corroborate the notion that PFMT can be linked to quality-of-life improvement (pooled MD = -3.19, $p = 0.03$; SMD = 0.56) [17]. The religious activities and social relationships affected by this UI in a regional scenario are well-reported [18], and any gains in these sectors can reinforce the importance of psychological well-being intervention when dealing with UI. There are some limitations: there could have been some selection bias due to differences in baseline psychological scores between groups ($p < 0.001$) and imbalance in residential area ($p < 0.001$). The generalizability is restricted due to the non-probability sampling and single-centered design, as they are observed in similar studies [10,11]. Nursing education and intervention play a crucial role in enhancing patient's knowledge and improving daily life which is demonstrated by the current finding, such as reported in the results of Muhammed *et al.* (2024) [19], who established that the intervention group had a better, had better chronic disease control, physical activity, and weight reduction compared to the control group. Also, the current study showed a significant change in knowledge, which comes along with the study of Sadiq and Aziz (2026) [20], which indicated that education and support from healthcare providers can enhance disease understanding, improve self-management, and promote a healthier lifestyle.

Limitations

short implementation period of only three months. Ideally, a longer timeframe would have been more appropriate to fully capture the intended outcomes or observe meaningful trends.

Recommendation

The findings of the study highlight the need for further studies using rigorous designs and longer follow-up periods to strengthen the evidence base.

Implications

The findings indicate that nurse-led educational intervention combined with pelvic floor muscle training is effective in improving knowledge and reducing psychological burden in women with urinary incontinence. This supports its integration into routine urology and gynecology outpatient services as a non-pharmacological approach.

Conclusion

The Nursing educational intervention plus pelvic floor muscle training proved to be supportively effective in improving knowledge about urinary incontinence-related knowledge and psychological burden significantly in all the domains assessed in the intervention group, and no such changes were observed in the control group. These results support the clinical efficacy of nurse-led educational intervention in structured programs to overcome the knowledge gap and psychological distress of urinary incontinence in women in the Iraqi Kurdistan region. It is highly recommended that such programs be incorporated into regular urology and gynaecology outpatient services. Randomised controlled studies using a stratified sampling method, longer

follow-ups, subgroups based on severity, and validated psychometric tools should be used in future studies

Funding: This article is based on an independent investigation and has not received funding from any external sources.

Acknowledgement

The authors would like to express their special thanks to the Directorate of Health, Surgical Teaching Hospital, staff of the Urodynamic unit, Mersi Private Hospital, for their support, and all women who participated in this study.

Author Contributions

Authors contributed to the study's conceptualization, design, data collection, data analysis, drafting of the manuscript, and methodology. supervision of the research process, critical revision of the manuscript, and final approval of the submitted version. Both authors carefully reviewed and agreed to the published version of the manuscript.

Conflict of interest: None.

References

- [1] Abu Raddaha, A. H. & Nasr, E. H. Kegel Exercise Training Program among Women with Urinary Incontinence. *Healthcare* **10**, 2359, doi: 10.3390/healthcare10122359 (2022).
- [2] Krzysztozek, K. & Truszczyńska-Basak, A. Physical therapy in stress urinary incontinence among women – a review of the literature and a suggested treatment protocol. *Med Rehabil* **21**, 60-67, doi: 10.5604/01.3001.0011.8078 (2018).
- [3] Ahmed, H. M., Osman, V. A., Al-Alaf, S. K. & Al-Tawil, N. G. Prevalence of urinary incontinence and probable risk factors in a sample of Kurdish women. *Sultan Qaboos Univ Med J* **13**, 269-274, doi: 10.12816/0003233 (2013).
- [4] Ahmed, W. A. R., Zeidan, M. A. K. & Kamil, A. M. AN EPIDEMIOLOGICAL STUDY OF URINARY INCONTINENCE AMONG A SAMPLE OF ADULTS IN BAGHDAD CITY. *Journal of Scientific Research in Medical and Biological Sciences* **5**, 54-68 doi: 10.47631/jsrmb.v5i2.778 (2024).
- [5] Karem, N. A. Risk Factors and Impact of Urinary Incontinence Among Menopausal Women in Sulaimani City: A Cross-Sectional Study. *Journal of Neonatal Surgery* **14**, 6289-6297 (2025).
- [6] Hammad, F. T. Prevalence, social impact and help-seeking behaviour among women with urinary incontinence in the Gulf countries: A systematic review. *European Journal of Obstetrics & Gynecology and Reproductive Biology* **266**, 150-156, doi: 10.1016/j.ejogrb.2021.10.005 (2021).
- [7] Alhamoud, M. A. S., Julaih, F. A., Al-Aqil, H. D. H., Almalki, N. A. S., Alharthi, F. A. G., Alghamdi, A. A., Alshehri, S. A. K., Alqhtani, A. S., Alasiri, M. A., Alaqil, A. S., Alhumaidi, B. N., Saraiva, A., Carrascosa, C. & Raposo, A. The Prevalence and Risk Factors of Stress Urinary Incontinence Among Women in Saudi Arabia: A Systematic Review and Meta-Analysis. *Healthcare* **12**, 2440, doi: 10.3390/healthcare12232440 (2024).
- [8] Curillo-Aguirre, C. A. & Gea-Izquierdo, E. Effectiveness of Pelvic Floor Muscle Training on Quality of Life in Women with Urinary

- Incontinence: A Systematic Review and Meta-Analysis. *Medicina* **59**, 1004, doi: 10.3390/medicina59061004 (2023).
- [9] Mishra, D. G., Vaishnav, S. B. & Phatak, A. G. Comparison of Effectiveness of Home-Based Verses Supervised Pelvic Floor Muscle Exercise in Women with Urinary Incontinence. *Journal of Mid-life Health* **13**, 74, doi: 10.4103/jmh.jmh_83_21 (2022).
- [10] Kharaji, G., ShahAli, S., Ebrahimi-Takamjani, I., Sarrafzadeh, J., Sanaei, F. & Shanbehzadeh, S. Supervised versus unsupervised pelvic floor muscle training in the treatment of women with urinary incontinence — a systematic review and meta-analysis. *Int Urogynecol J* **34**, 1339-1349, doi: 10.1007/s00192-023-05489-2 (2023).
- [11] Piernicka, M., Duda-Biernacka, B., Błudnicka, M. & Szumilewicz, A. The Characteristics of the Pelvic Floor Muscle Training Programs Used in Experimental Studies with Surface Electromyography in Non-Pregnant Women: A Systematic Review. *ijph* doi: 10.18502/ijph.v49i6.3353 (2020).
- [12] Mohamed, W. E. M., Abd-Allah, E. S., Abd-Elmohsen, A. S. & Saad, A. M. intervention program for women complaining from urinary incontinence at Aga city. *International journal of health sciences* **6**, 5921-5941, doi: 10.53730/ijhs.v6nS6.11144 (2022).
- [13] Mohammed, A., Mohamed, M., Taha, S. & Mohammed, R. Educational Interventions on Reducing Stress Urinary Incontinence Episodes among elderly Women. *Minia Scientific Nursing Journal* **009**, 26-32, doi: 10.21608/msnj.2021.188064 (2021).
- [14] Luo, L., Li, L., Chen, X. & Zeng, F. Research Progress on Compliance of Pelvic Floor Muscle Training in Patients with Urinary Incontinence. *OJU* **11**, 187-199, doi: 10.4236/oju.2021.116017 (2021).
- [15] Abdelwahab Mohamed, W., Mamdouh Yahia, M., Gamal Noaman Malek, M., Ibrahim Touni Ibrahim, M. & Elham. Mohammed, H. Evaluating the Effect of Pelvic Floor Muscle Training on Bladder Symptoms Severity and Quality of life among Patients with Overactive Bladder. *Egyptian Journal of Health Care* **16**, 969-987, doi: 10.21608/ejhc.2025.437669 (2025).
- [16] Zhu, Y., Cai, W., Liu, S., Zhang, D., Luo, D., Huang, S., Shi, W., Yang, L., Zhang, S., Fang, H. & Chen, L. Mobile App-Based Self-Management of Urinary Incontinence in Pregnant Women: Multicenter Pragmatic Randomized Controlled Trial. *Journal of Medical Internet Research* **27**, e72883-e72883, doi: 10.2196/72883 (2025).
- [17] Addini, R. A. F., Pamungkasari, E. P., Faculty of Medicine, U. S. M., Murti, B. & Masters Program in Public Health, U. S. M. Meta-Analysis of the Effect of Pelvic Floor Muscle Training in Reducing Urinary Incontinence and Elevating Quality of Life in Women. *INDONES J MED* **6**, 258-270, doi: 10.26911/theijmed.2021.06.03.03 (2021).
- [18] Elshatby, N. M., Imam, M. H., Shoukry, M. S., Hassan, M. M. & Saba, E. K. A. Pelvic floor rehabilitation in the treatment of mixed urinary incontinence among women. *Egypt Rheumatol Rehabil* **48**, 41, doi: 1186/s43166-021-00087-w (2021).
- [19] Sharif, B. O., Muhammed, M. O., Ibrahim, H. A., Rahim, T. J., Salih, P. A., Karim, S. A. & Şerifoğlu, V. Effectiveness of nursing educational program on self-care heart failure index in patients with heart failure. *Passer J Basic Appl Sci* **7**(1), 100–107, doi: 10.24271/PSR.2025.473356.1698 (2025).
- [20] Sadiq, C. H. & Aziz, P. M. Assessment of patients' education and lifestyle factors in ulcerative colitis: a cross-sectional study. *Passer*

J Basic Appl Sci **8**(1), 364–373, doi: 10.24271/PSR.2025.449298.1543 (2026).