Health Problems of Civilization
eISSN: 2354-0265, ISSN: 2353-6942

ORIGINAL PAPER

Iranian women's physical activity and knowledge of urinary incontinence and pelvic organ prolapse: a cross-sectional study

Sara Nasirimoghadam[1(A,B,C,D,E,F)], **Zahra Nasirimoghadam**[2(B,D)], **Heeda Sanadi**[1(B)], **Shreeya Mhatre**[1(B)], **Bence Cselik**[1(E)], **Marta Hock**[1(E)], **Viktória Prémusz**[1(A,D,G)]

[1]Faculty of Health Sciences, University of Pécs, Pécs, Hungary

[2]Graduate Faculty of Environment, University of Tehran, Teheran, Iran

Nasirimoghadam S, Nasirimoghadam Z, Sanadi H, Mhatre S, Cselik B, Hock M, et al. Iranian women's physical activity and knowledge of urinary incontinence and pelvic organ prolapse: a cross-sectional study. Health Prob Civil. https://doi.org/10.29316/hpc/226637

Tables: 15
Figures: 0
References: 27
Submitted: 2026 Feb 5
Accepted: 2026 Jul 30

Address for the correspondence: Sara Nasirimoghadam, Faculty of Health Sciences, University of Pécs, Vörösmarty str. 4, H-7621 Pécs, Hungary, e-mail: saranasirimoghadam@gmail.com
ORCID: Bence Cselik https://orcid.org/0000-0002-3741-5395, Marta Hock https://orcid.org/0000-0001-6068-6858, Viktória Prémusz https://orcid.org/0000-0002-4059-104X

Abstract

Background. Urinary incontinence (UI) and pelvic floor distress are common among women and may be influenced by physical activity, body mass index (BMI), education, and knowledge. This study examined these factors among Iranian women.

Material and methods. This cross-sectional study included 150 Iranian women aged 30-85 years. Data were collected using demographic questionnaires, the International Physical Activity Questionnaire-Long Form (IPAQ-LF), the Pelvic Floor Distress Inventory-20 (PFDI-20), the International Consultation on Incontinence Questionnaire Urinary Incontinence Short Form (ICIQ-UI SF), and a self-reported knowledge scale. Analyses included descriptive statistics, Kruskal-Wallis tests, ANOVA, and Spearman correlations, with significance set at $p<0.05$.

Results. Most participants had moderate physical activity (90.7%), were overweight (70%), and reported medium to high knowledge levels (68.7%). BMI was significantly associated with pelvic floor distress ($p=0.010$) and UI ($p<0.001$), with overweight women showing the highest PFDI-20 and ICIQ-UI scores. Physical activity was not significantly associated with symptoms ($p>0.05$). Education was associated only with the Urinary Distress Inventory subscale ($p=0.034$). Knowledge level showed significant differences in the PFDI-20 subscales and total scores, with medium knowledge linked to the lowest symptoms, while differences in UI severity were statistically significant ($p=0.024$).

Conclusions. BMI was the strongest factor associated with pelvic floor distress and UI, while physical activity and education showed limited associations, highlighting the importance of weight management and targeted educational interventions.

Keywords: pelvic organ prolapse, urinary incontinence, physical activity, knowledge, women

Introduction

Urinary incontinence (UI) and pelvic floor disorders (PFDs), including pelvic organ prolapse (POP), are highly prevalent conditions affecting women throughout their lifespan and are associated with significant physical, psychological, and social burdens [1,2]. Pelvic floor muscle training (PFMT) has been investigated as a conservative approach for women with UI and POP, with the potential to improve pelvic floor muscle function and quality of life [1]. UI can present as stress UI, urgency UI, or mixed UI, often coexisting with POP, and may lead to embarrassment,

reduced social participation, and impaired quality of life [2]. UI is common among older women and represents an important clinical and public health concern [3]. PFMT with feedback or biofeedback has also been evaluated for managing UI in women [4].

Exercise-based interventions, including PFMT, have been investigated for postpartum UI [5]. The prevalence of POP is substantial worldwide, with estimates varying by population and diagnostic methods [6]. Among the factors that may influence pelvic floor health, physical activity has received increasing attention. Its relationship with pelvic floor function is complex, particularly during activities involving high mechanical demands [7]. Exercise interventions have also been studied in older women with UI, indicating that exercise characteristics may influence conservative management [8]. Among high-performance female athletes, physiotherapy interventions targeting pelvic floor function have been associated with improved UI outcomes [9]. In addition, the relationship between physical activity and POP remains an area requiring further research, emphasizing the importance of considering the type, intensity, and context of activity rather than activity level alone [10]

Another important determinant is knowledge and education regarding pelvic floor health. Evidence from women's health-care-seeking research suggests that knowledge and awareness of UI and POP may influence symptom recognition and care-seeking decisions [11]. Similarly, research among physically active women suggests that adequate UI knowledge may support more appropriate preventive and therapeutic practices [12]. However, formal educational attainment alone may not accurately reflect condition-specific knowledge or the ability to implement preventive strategies effectively. Structured pelvic floor health education has been investigated to improve knowledge and awareness among women with UI [13].

PFMT is recognized as an important conservative intervention for UI and POP. Research has examined PFMT in women with POP, including its potential effects on pelvic floor muscle characteristics [14]. Postpartum training interventions have also shown beneficial effects on UI, supporting targeted exercise during the postpartum period [15]. However, general physical activity should be distinguished from targeted PFMT because they may have different relationships with pelvic floor symptoms.

In Iran, previous research has documented pelvic floor disorders and associated factors among Iranian women, highlighting the importance of examining pelvic floor health within the Iranian cultural and healthcare context [16]. Understanding how modifiable factors such as BMI,

physical activity, and knowledge influence pelvic floor distress and UI in Iranian women can inform culturally appropriate interventions and guide public health strategies.

Aim of the work

The aim of the present study is to evaluate Iranian women's knowledge of PFDs in comparison with their physical activity levels.

Material and methods

Research design and setting

The research was a cross-sectional study. The research took place in Kerman, a prominent city situated in southeastern Iran.

Participants

The target group was Iranian adult women aged 30 years or older without any major physical or mental impairments. Data were collected between June 2025 and October 2025, and data analysis was carried out between September and December 2025.

Sampling technique

A cross-sectional study with consecutive sampling was conducted on adult women aged 30 years or older and without any major physical and mental impairments who could sign the consent form and understand the questionnaire in Persian language. A total of 150 participants were included in the study. A non-random, consecutive sampling was applied as a sampling method.

Data collection tools

The questionnaire utilized in this study comprised several sections aimed at eliciting comprehensive sociodemographic information, pelvic floor distress, UI, and physical activity levels of the participants.

The first section, focusing on sociodemographic characteristics and short anamnesis, provided detailed insights into the participants' backgrounds. Key demographic variables such as age, gender, marital status, education level, current occupation, type of pregnancy, knowledge level, last physical activity, special diseases, and medication were collected. Additionally, the participants were queried about their height and weight to facilitate the calculation of BMI, which is a commonly used indicator of weight status and health.

Marital status was recorded by asking the participants whether they were single, married, or divorced, and each response was coded numerically to support data analysis. Educational level was assessed by asking the participants to identify the highest degree or qualification they had completed, ranging from below high school diploma to diploma, associate's degree, bachelor's degree, master's degree, or PhD. Employment status was recorded by asking the participants to select the category that best described their job, including without a job, housewife, employee, teacher, engineer, painter, self-employed, kindergarten teacher, or tailor.

Knowledge level was measured using a 10-point scale, and for analysis, these scores were grouped into three categories: low knowledge for scores between 1 and 3, medium knowledge for scores between 4 and 6, and high knowledge for scores between 7 and 10. The participants were also asked about their pregnancy type, and their responses were categorized as natural, Cesarean, or both. These categories allowed the information to be organized clearly and consistently for use in the study's statistical analysis.

The second section of the questionnaire, the Pelvic Floor Distress Inventory-20 (PFDI-SF20), is a widely used self-administered questionnaire designed to evaluate the presence and severity of pelvic floor dysfunction symptoms in women. The questionnaire consists of 20 items distributed across three subscales: the Pelvic Organ Prolapse Distress Inventory-6 (POPDI-6), the Colorectal-Anal Distress Inventory-8 (CRADI-8), and the Urinary Distress Inventory-6 (UDI-6). Participants are asked to indicate the degree to which each symptom bothers them, using a scale ranging from 0 (not at all) to 4 (quite a bit). Subscale scores are calculated by summing item

responses, with higher scores indicating greater symptom distress. The total PFDI-SF20 score is obtained by summing the three subscale scores, providing an overall measure of pelvic floor-related symptom burden [17,18].

The third section employed the International Consultation on Incontinence Questionnaire Urinary Incontinence Short Form (ICIQ-UI SF), which is a brief, validated questionnaire designed to assess the frequency, severity, and impact of UI on quality of life. The instrument contains four core items, including the frequency of urine leakage, the amount of leakage, overall impact on daily life, and self-diagnostic information regarding the type of incontinence. Responses are scored and summed to generate a total score ranging from 0 to 21 (slight 1-5, moderate 6-12, severe 13-18, very severe 19-21), with higher scores indicating more severe incontinence symptoms and greater impact on daily functioning. The questionnaire is widely used in both clinical and research settings due to its simplicity, reliability, and sensitivity to changes in urinary symptoms [19].

Finally, the fourth section utilized the International Physical Activity Questionnaire-Long Form (IPAQ-LF), which is a standardized tool used to evaluate physical activity levels across different domains, including occupational, transportation, domestic and chores, and leisure-time activity. Participants reported the frequency (days per week) and duration (minutes per day) of vigorous, moderate, and walking activities over the previous seven days. Total physical activity is expressed in metabolic equivalent minutes per week (MET-min/week), calculated by multiplying activity duration by frequency and standardized MET values for each intensity level. Based on total MET-min/week, participants are categorized into three activity levels: low <600, moderate 600-3000, or high >3000, reflecting insufficient, adequate, or extensive physical activity, respectively [20].

Collectively, these instruments provided a multidimensional assessment of the participants' pelvic floor function, UI severity, and physical activity patterns, thereby contributing to a holistic understanding of their health status.

Data analysis

Statistical analyses were conducted to examine the study variables. The normality of data distribution was assessed using the Kolmogorov-Smirnov test. Based on the distribution of the data, differences in outcome scores across groups were assessed using either the Kruskal-Wallis

test or one-way analysis of variance (ANOVA). Spearman's rank correlation coefficient was used to assess the associations between BMI and PFDI-20 subscale and total scores. A p-value <0.05 was considered statistically significant.

Results

Health and lifestyle

Regarding delivery type, 24.7% of women had a natural delivery, 30.7% had a Cesarean delivery, and 26.7% had experienced both delivery types. In terms of medication use, 40.0% of the women reported not taking any medication, while 15.3% were using sulfinazine, 17.3% were using oxybutynin, 18.0% were taking tolterodine, 8.7% used herbal medicines, and 0.7% reported using UI medication. Concerning disease history (N=150), 35.3% of women reported no disease, while 14.0% had UI, 8.7% had POP, 9.3% had diabetes, 22.0% had hypertension, and 10.0% had constipation. With respect to the last physical activity, 10.0% of the participants could not remember when they last exercised, 4.0% had exercised on the same day, 28.0% the day before, 34.7% a week ago, 20.7% three weeks ago, 0.7% four weeks ago, and 2.0% five weeks ago (Table 1).

Table 1. Health characteristics of the study sample (N=150)

Conditions/habits	Categories	Frequency (n)	Percent (%)
Delivery type	**1 Natural**	37	24.7
	2 Cesarean	46	30.7
	3 Both	40	26.7
Medication	**0 Nothing**	60	40.0
	1 Sulfinazine	23	15.3
	2 Oxybutynin	26	17.3
	3 Tolterodine	27	18.0
	4 Herbal medicine	13	8.7
	5 UI medication	1	0.7
Disease	**0 Nothing**	53	35.3
	1 UI	21	14.0
	2 POP	13	8.7
	3 Diabetes	14	9.3
	4 Blood pressure	33	22.0
	5 Constipation	15	10.0

Last physical activity	**0 I don't remember**	15	10.0
	1 Today	6	4.0
	2 Yesterday	42	28.0
	3 A week ago	52	34.7
	4 Three weeks ago	31	20.7
	1 Four weeks ago	1	0.7
	2 Five weeks ago	3	2.0

BMI category

Table 2 presents the BMI classification of the respondents and reveals a substantial concentration in the overweight category. Out of the 150 participants, 70.0% were identified as overweight, representing the dominant group in the sample. Meanwhile, 26.7% of the respondents had a BMI within the normal range, and only 3.3% were underweight. This distribution suggests a significant deviation from recommended BMI standards, with overweight status emerging as a prominent characteristic of the study cohort (Table 2).

Table 2. BMI category (N=150)

BMI	Frequency (n)	Percent (%)
Underweight	5	3.3
Normal	40	26.7
Overweight	105	70.0

Note**:** BMI – body mass index.

Age category

Table 3 presents the distribution of the respondents according to their age category. The largest proportion of the participants were aged 70-85 years, representing 52.7% (n=79) of the sample. This was followed by those in the 60-69-year age group, who comprised 22.0% (n=33). Meanwhile, 17.3% (n=26) of the respondents were between 50-59 years old. A smaller percentage fell within the younger age brackets, with 4.7% (n=7) aged 40-49 years, and only 3.3% (n=5) belonging to the 30-39-year category. These findings indicate that the study population is predominantly composed of older adults (Table 3).

Table 3. Description of age categories (N=150)

Age categories	Frequency (n)	Percent (%)
30-39	5	3.3%
40-49	7	4.7%
50-59	26	17.3%
60-69	33	22.0%
70-85	79	52.7%

Physical activity

Table 4 presents the distribution of the respondents' physical activity levels as assessed using the IPAQ-LF. Most of the participants were categorized as having a moderate level of physical activity, comprising 90.7% (n=136) of the sample. In contrast, 6.7% (n=10) of the respondents were classified under the low physical activity category, while only 2.7% (n=4) achieved a high level of physical activity. Overall, the results indicate that moderate-intensity physical activity is predominant among the respondents, with relatively few engaging in low or high levels of activity (Table 4).

Table 4. Categorical results based on the IPAQ (N=150)

IPAQ-LF		Frequency (n)	Percent (%)
Categories	**1 Low**	10	6.7
	2 Moderate	136	90.7
	3 High	4	2.7
	Total	150	100.0

Pelvic floor

The descriptive statistics for the PFDI-20 are presented in Table 5. All 150 participants had complete data for the subscales: the POPDI-6, CRADI-8, UDI-6, and the total PFDI-20 score. The mean scores were 58.61 (POPDI-6), 59.63 (CRADI-8), and 60.81 (UDI-6), yielding a total mean PFDI-20 score of 179.04. Standard deviations ranged from 12.23 to 12.65, indicating moderate variability among the participants. Scores on the subscales ranged from 25.00 to 87.50, while total

scores ranged from 75.00 to 227.08, reflecting a broad spectrum of pelvic floor distress within the sample.

Table 5. Categorical results based on the PFDI-20 (N=150)

PFDI-20	POPDI-6	CRADI-8	UDI-6	TOTAL
Mean	58.61	59.63	60.80	179.04
Std. Deviation	12.48	12.22	12.65	28.50
Minimum	25.00	25.00	25.00	75.00
Maximum	87.50	87.50	87.50	227.08

Notes: POPDI-6 – Pelvic Organ Prolapse Distress Inventory-6, CRADI-8 – Colorectal-Anal Distress Inventory-8, UDI-6 – Urinary Distress Inventory-6.

Urinary incontinence

Among the 150 respondents, the highest proportion reported severe UI, accounting for 41.3% (n=62) of the sample. This was closely followed by those classified as having moderate UI at 40.7% (n=61). A smaller percentage of the participants experienced very severe symptoms (7.3%, n=11) or slight UI (6.0%, n=9). Meanwhile, 4.7% (n=7) of the respondents reported no UI. Overall, the results indicate that the majority of the sample experienced moderate to severe UI (Table 6).

Table 6. Categorical results based on the ICIQ-UI SF (N=150)

ICIQ-UI SF	Frequency (n)	Percent (%)
0 No UI	7	4.7
1 Slight	9	6.0
2 Moderate	61	40.7
3 Severe	62	41.3
4 Very severe	11	7.3
Total	150	100.0

Self-knowledge

Table 7 presents the categorical distribution of the respondents' self-reported knowledge regarding UI and POP. Among the 150 participants, the largest proportion demonstrated a medium level of knowledge, accounting for 34.7% (n=52) of the sample. This was followed closely by those with a high level of knowledge (34.0%, n=51). Meanwhile, 31.3% (n=47) of the respondents reported a low level of knowledge. Overall, these results suggest that although knowledge levels vary, most participants fall within the medium to high knowledge categories (Table 7).

Table 7. Categorical results based on self-reported knowledge about UI and POP (N=150)

Knowledge	Frequency (n)	Percent (%)
Low (1-3 points)	47	31.3
Medium (4-6 points)	52	34.7
High (7-10 points)	51	34.0
Total	150	100.0

Women with overweight BMI were hypothesized to experience greater pelvic floor distress than those with normal BMI. Using the PFDI-20 questionnaire (including the POPDI-6, CRADI-8, and UDI-6 subscales), results from the Kruskal-Wallis test showed significant differences across the BMI groups for the POPDI-6, UDI-6, and the total PFDI-20 scores (p<0.05), with overweight women reporting the highest symptom levels. No significant difference was found for the CRADI-8 subscale. Spearman's correlation analysis showed positive correlations between BMI and the POPDI-6 (ρ=0.187, p=0.022), UDI-6 (ρ=0.180, p=0.028), and the total PFDI-20 scores (ρ=0.219, p=0.007), whereas the correlation with the CRADI-8 was not statistically significant (ρ=0.138, p=0.093) (Table 8).

Table 8. Between group differences based on BMI in pelvic floor distress (N=150)

PFDI-20	BMI	N	Mean	SD	Kruskal-Wallis H	df	*p*
PFDI POPDI-6	**1 Underweight**	5	41.67	19.98	9.857	2	**0.007**
	2 Normal	40	55.10	12.03			
	3 Overweight	105	60.75	11.42			

	Total	150	58.61	12.48	-	-	-
PFDI CRADI-8	**1 Underweight**	5	40.00	18.93	5.401	2	0.067
	2 Normal	40	59.45	12.77			
	3 Overweight	105	60.63	10.94			
	Total	150	59.63	12.23	-	-	-
PFDI UDI-6	**1 Underweight**	5	40.83	18.49	9.546	2	**0.008**
	2 Normal	40	58.33	13.61			
	3 Overweigh	105	62.70	11.03			
	Total	150	60.81	12.65	-	-	-
PFDI TOTAL	**1 Underweight**	5	122.50	57.34	9.217	2	**0.010**
	2 Normal	40	172.89	27.37			
	3 Overweigh	105	184.08	23.73			
	Total	150	179.04	28.51	-	-	-

Notes: SD – Standard Deviation, POPDI-6 – Pelvic Organ Prolapse Distress Inventory, CRADI-8 – Colorectal-Anal Distress Inventory, UDI-6 – Urinary Distress Inventory,df – degrees of freedom; *p* – *p*-value.

It was hypothesized that women who engage in regular physical activity would report fewer pelvic floor distress symptoms. Pelvic floor symptoms were assessed using the PFDI-20 (POPDI-6, CRADI-8, UDI-6, and the total score). ANOVA results showed no statistically significant differences across physical activity levels (low, moderate, high) for the CRADI-8, UDI-6, or the total PFDI-20 scores ($p>0.05$). Although POPDI-6 approached significance, it did not meet the conventional threshold. Descriptively, women with moderate physical activity reported lower symptom scores, but these differences were not statistically significant. Overall, physical activity was not significantly associated with pelvic floor distress symptoms, though a potential trend suggests moderate activity may be linked to fewer symptoms (Table 9).

Table 9. Between group differences based on physical activity in pelvic floor distress (N=150)

PFDI-20	IPAQ-LF	1 Low	2 Moderate	3 High	Sum of Squares	df	Mean Square	F	*p*
PFDI CRADI-8	**Mean**	61.67	58.36	59.38	104.005	2	52.002	0.331	0.719
	SD	8.29	12.84	8.59					
PFDI POPDI-6	**Mean**	66.56	58.89	67.19	783.034	2	391.517	2.678	0.072
	SD	9.09	12.32	9.38					
PFDI UDI-6	**Mean**	63.75	60.54	62.50	107.830	2	53.915	0.334	0.717
	SD	9.63	13.03	0.00					
PFDI TOTAL	**Mean**	191.98	177.80	189.06	2286.605	2	1143.303	1.415	0.246
	SD	17.11	29.33	1.04					

Notes: POPDI-6 – Pelvic Organ Prolapse Distress Inventory, CRADI-8 – Colorectal-Anal Distress Inventory, UDI-6 – Urinary Distress Inventory, F – F-statistic; df – degrees of freedom; *p* – *p*-value , SD – Standard Deviation.

It was hypothesized that higher educational attainment would be associated with lower pelvic floor distress. Pelvic floor symptoms were assessed using the PFDI-20 (POPDI-6, CRADI-8, UDI-6, and the total score). One-way ANOVA results showed a significant difference across education levels only for the UDI subscale (p=0.034), indicating variation in urinary distress symptoms. No significant differences were found for the POPDI-6, CRADI-8, or the total PFDI-20 scores (p>0.05). Descriptively, women with higher education, particularly those with a master's degree, tended to report lower symptom levels across measures. Overall, the findings partially support the hypothesis, suggesting that higher education may be associated with reduced pelvic floor distress, especially in urinary symptoms (Table 10).

Table 10. Between group differences based on education in pelvic floor distress (N=150)

Education	PFDI-20							
	POPDI-6		CRADI-8		UDI-6		TOTAL	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
0 UHSD (n=1)	58.33	0.00	53.13	0.00	70.83	0.00	182.29	0.00
1 Diploma	59.87	11.60	59.70	10.27	60.31	9.82	179.88	20.94
2 AD	59.80	10.09	61.58	10.58	63.97	12.67	185.36	17.88
3 Bachelor's	56.25	12.60	60.94	13.82	61.50	13.15	178.69	32.61
2 Master's	56.45	15.02	57.96	14.68	55.1075	14.34164	169.52	36.24
5 PhD	64.95	9.78	57.35	8.55	66.6667	10.82532	188.97	21.35
Sum of Squares	1168.643		360.077		1893.201		5205.319	
Df	5		5		5		5	
Mean Square	233.729		72.015		378.640		1041.064	
F	1.526		0.473		2.482		1.294	
P	0.185		0.796		**0.034**		0.270	

Notes: POPDI-6 – Pelvic Organ Prolapse Distress Inventory, CRADI-8 – Colorectal-Anal Distress Inventory, UDI-6 – Urinary Distress Inventory,F – F-statistic; df – degrees of freedom,p – p-value , UHSD – Under high school diploma, AD – Associate Degree.

It was hypothesized that women engaging in regular physical activity would have lower UI severity compared to sedentary women. A one-way ANOVA revealed no significant differences in the UI scores across physical activity levels (low, moderate, high; p=0.399). Although women with moderate activity showed slightly lower mean scores, the differences were not statistically significant. Overall, physical activity level was not associated with UI severity, and the hypothesis was not supported (Table 11).

Table 11. Between group differences based on physical activity in UI (N=150)

ICIQ-UI SF	IPAQ-LF			Sum of Squares	df	Mean Square	F	*p*
	1 Low	2 Moderate	3 High					
Mean	2.70	2.38	2.75	1.468	2	0.734	0.925	0.399
SD	0.48	0.92	0.50					

Notes: SD – Standard Deviation, F – F-statistic; df – degrees of freedom; *p* – *p*-value.

It was hypothesized that women with higher BMI would report greater UI severity. A one-way ANOVA showed a significant difference in the UI scores across the BMI groups (p<0.001). Women in the overweight category reported the highest scores, followed by those with normal BMI, while underweight women had substantially lower scores. These findings support the hypothesis, indicating that higher BMI is strongly associated with increased UI symptoms (Table 12).

Table 12. Between group differences based on BMI in UI (N=150)

ICIQ-UI SF	BMI			Sum of Squares	df	Mean Square	F	*p*
	1 Underweight	2 Normal	3 Overweight					
Mean	0.60	2.35	2.51	17.665	2	8.832	12.915	**<0.001**
SD	0.89	0.80	0.83					

Notes: BMI – body mass index ,SD – Standard Deviation, F – F-statistic; df – degrees of freedom; *p* – *p*-value.

It was hypothesized that higher educational attainment would be associated with lower UI severity. However, a one-way ANOVA showed no significant differences in the UI scores across the education levels (p=0.547). Although descriptively lower scores were observed among women

with higher education, these differences were not statistically significant. Overall, the findings do not support the hypothesis, indicating no meaningful association between the education level and UI severity in this sample (Table 13).

Table 13. Between group differences based on education in UI (N=150)

ICIQ-UI SF	Education						Sum of Squares	df	Mean Square	F	*p*
	0 UHSD	1 Diploma	2 AD	3 Bachelor's	2 Master's	5 PhD					
Mean	3.00	2.53	2.59	2.28	2.45	2.35	3.216	5	0.643	0.806	0.547
SD	0.00	0.86	0.62	0.99	1.02	0.61					

Notes: SD – Standard Deviation, F, F-statistic; df, degrees of freedom; *p* – *p*-value , UHSD – Under High School, AD – Associate Degree.

It was hypothesized that higher knowledge levels would be associated with lower pelvic floor distress. A one-way ANOVA revealed significant differences across knowledge groups for the POPDI-6, CRADI-8, and the total PFDI-20 scores ($p<0.05$) but not for UDI-6. Contrary to expectations, women with medium knowledge consistently reported the lowest symptom levels, while those with high knowledge often had the highest scores. Overall, the findings do not support the hypothesis and may suggest the possibility of reverse causality, where women with greater symptoms acquire more knowledge about pelvic floor health (Table 14).

Table 14. Between group differences based on the level on knowledge in pelvic floor distress (N=150)

PFDI-20		Knowledge			Sum of Squares	df	Mean Square	F	*p*
		1 Low (1-3)	2 Medium (4-6)	3 High (7-10)					
PFDI POPDI-6	**Mean**	60.20	54.17	61.68	1626.338	2	813.169	5.536	**0.005**
	SD	11.35	13.81	10.90					
PFDI CRADI-8	**Mean**	58.31	57.45	63.05	925.462	2	462.731	3.186	**0.044**
	SD	12.02	14.22	9.37					
PFDI UDI-6	**Mean**	62.94	58.81	60.87	421.193	2	210.596	1.321	0.270
	SD	12.23	14.21	11.18					
PFDI TOTAL	**Mean**	181.45	170.43	185.60	23857.523	2	3160.180	4.048	**0.019**
	SD	28.16	34.21	19.28					

Notes: POPDI-6 – Pelvic Organ Prolapse Distress Inventory, CRAD-8 – Colorectal-Anal Distress Inventory, UDI-6 – Urinary Distress Inventory, F – F-statistic; df – degrees of freedom; *p* – *p*-value.

It was hypothesized that higher knowledge levels would be associated with lower UI symptoms. A one-way ANOVA indicated a statistically significant difference across the knowledge groups (p=0.024). However, the differences in the mean UI scores across low, medium, and high knowledge levels were relatively small, indicating limited practical differences. Therefore, despite statistical significance, the findings do not support the hypothesis, as the knowledge level does not appear to meaningfully influence UI symptom severity (Table 15).

Table 15. Between group differences based on knowledge in UI (N=150)

ICIQ-UI SF	Knowledge			Sum of Squares	df	Mean Square	F	*p*
	1 Low (1-3)	2 Medium (4-6)	3 High (7-10)					
Mean	2.1277	2.4615	2.6078	5.879	2	2.940	3.848	**0.024**
SD	0.87519	1.01868	0.69508					

Notes: SD – Standard Deviation, F – F-statistic; df – degrees of freedom; p – p-value.

Discussion

In this study of 150 Iranian women aged 30-85 years, BMI emerged as the strongest factor associated with pelvic floor distress and UI. The overweight participants demonstrated the highest PFDI-20 and ICIQ-UI SF scores. This finding is consistent with evidence indicating that UI is common among adults aged 50 years and older [21]. Research on POP risk factors in an Iranian clinical population also highlights the importance of potentially modifiable factors in preventive strategies [22]. Excess body weight may contribute to increased mechanical loading and intra-abdominal pressure on the pelvic floor, potentially contributing to pelvic floor symptoms. These results highlight the importance of weight management as a potentially modifiable component of prevention and management strategies for PFDs [23].

Contrary to expectations, physical activity did not show a significant association with pelvic floor symptoms. While the majority of the participants engaged in moderate activity (90.7%), overall activity level alone may not confer protective benefits for pelvic floor function. This finding is consistent with evidence that the relationship between physical activity and pelvic floor symptoms is complex and may depend on activity characteristics, individual factors, and symptom-related barriers [24]. Research on POP and physical activity also highlights the need to

investigate how activity type and level relate to pelvic floor health [10]. In contrast, targeted PFMT and structured exercise interventions have been investigated as conservative approaches to improving urinary symptoms and pelvic floor-related outcomes [1,4,5,8,14,15]. Interestingly, some high-impact sports have even been linked to increased risk of pelvic floor dysfunction, suggesting that the type, intensity, and frequency of physical activity are critical determinants of pelvic health outcomes [7,9]. These findings underscore the need to distinguish between general physical activity for cardiovascular health and pelvic floor-specific exercise interventions designed to enhance muscle support and function.

Education level in this cohort was only associated with the UDI subscale, indicating that formal education may not fully capture women's knowledge, awareness, or engagement with preventive behaviors. In contrast, self-reported knowledge demonstrated clearer associations with pelvic floor symptom severity, with women reporting medium knowledge showing the lowest distress scores. This finding should be interpreted cautiously, as the cross-sectional design cannot determine whether knowledge influences symptoms or whether symptoms prompt women to seek information. Nevertheless, previous research suggests that condition-specific knowledge is relevant to preventive and therapeutic practices among women with UI [11,12], while structured pelvic floor education may improve knowledge and awareness [13]

The study also reinforces the multifactorial nature of PFDs, with a combination of physiological, behavioral, and sociocultural factors contributing to symptom prevalence and severity. BMI, physical activity, education, and knowledge interact in complex ways, with weight and knowledge emerging as the most actionable factors in this population. Cultural context appears particularly relevant: Iranian women reported moderate to high knowledge levels (68.7%), yet UI and pelvic floor distress remained prevalent, suggesting a gap between awareness and implementation of preventive or therapeutic strategies [16]. Previous Iranian research also indicates that pelvic floor disorders are influenced by multiple sociodemographic and obstetric factors [16].

In older women, additional age-related factors may also contribute to pelvic floor dysfunction; for example, sarcopenia risk has been associated with UI, while frailty has been associated with POP [25,26]. These findings suggest that assessment of pelvic floor symptoms in older women may benefit from consideration of broader physical function and vulnerability. Health education programs that combine knowledge dissemination with practical guidance, such

as supervised PFMT, dietary counseling for weight management, and structured exercise interventions, may be more effective in reducing symptom burden [13,23].

Comparisons with international literature reveal similar trends. Exercise-based interventions have shown beneficial effects on UI among older women, although the effects may vary according to the type and characteristics of the exercise program [3,8]. Among high-performance female athletes, physiotherapy interventions targeting pelvic floor function have been associated with improvements in UI [9]. UI may also act as a barrier to physical activity because of concerns about symptoms, disclosure, or exercise participation [24]. These observations further support the importance of distinguishing between general physical activity and targeted pelvic floor rehabilitation.

These findings collectively suggest that BMI management and pelvic floor-focused education may represent important components of preventive strategies and clinical care. While general physical activity contributes to overall health, targeted interventions remain for pelvic floor rehabilitation [1,5,8,14,15]. Lifestyle modification has also been proposed as a component of conservative strategies for POP prevention and management [23]. Furthermore, a clinical case report has described PFMT in the conservative management of severe POP; however, such evidence is hypothesis-generating and should not be generalized as evidence of treatment efficacy [27]. Implementing culturally sensitive, evidence-based programs in community and clinical settings could empower women to adopt effective strategies, potentially improving physical function and quality of life.

Limitations

Several limitations should be considered when interpreting these findings. The cross-sectional design precludes causal inference between BMI, physical activity, education, and pelvic floor outcomes. Reliance on self-reported data may have introduced recall and social desirability bias, and BMI based on self-reported height and weight may not accurately reflect objective measurements. Although a validated questionnaire was used, cultural or contextual differences may have influenced responses.

The study's geographically and demographically specific sample limits generalizability, and unmeasured confounding factors, such as parity and hormonal status, may have affected the

observed associations. Another limitation of this study is that menopausal status was not assessed, and the participants were not categorized into premenopausal and postmenopausal groups, which may influence PFDs.

Conclusions

The findings demonstrate that BMI is a significant determinant of pelvic floor distress and UI among Iranian women. Higher BMI levels were associated with increased symptom severity, suggesting that excess body weight may exacerbate pelvic floor dysfunction through increased intra-abdominal pressure. In contrast, physical activity and educational level showed limited influence on pelvic floor symptoms in the studied population. These results underscore the importance of targeted preventive strategies, particularly weight management, as a modifiable risk factor for PFDs. Additionally, education-based interventions aimed at increasing awareness of pelvic floor health, early symptom recognition, and preventive behaviors may contribute to improved urinary continence and overall quality of life among women.

Disclosures and acknowledgements

The authors declare no conflicts of interest with respect to the research, authorship, and/or publication of this article.

The project no. TKP-2021-EGA-10 has been implemented with the support provided by the National Research Development and Innovation Fund of Hungary, financed under the TKP-2021-EGA funding scheme.

The ethical integrity of the study was meticulously upheld throughout its execution. Prior to their involvement, the participants were fully briefed on the research objectives and methodologies, with explicit details provided in the informed consent form, which they subsequently signed. Adherence to the ethical guidelines set forth in the Declaration of Helsinki was paramount. The participants were assured of their voluntary participation, with the autonomy to withdraw from or discontinue their involvement in the study at any stage, without the need for justification and without any pressure to continue. Moreover, stringent measures were implemented to safeguard the anonymity and confidentiality of the participants. Every effort was

made to identify and mitigate potential sources of harm, ensuring the well-being and safety of all individuals involved in the study. The study was approved by the Medical Research Council's Scientific and Research Ethics Committee (ETT TUKEB; approval number: BM/1683-3/2025, 28/01/2025).

Artificial intelligence (AI) was not used in the creation of the manuscript.

References:

1. de Carvalho MLAS, Bezerra LO, Oliveira JMP, Oliveira MCE, Micussi MTABC. Pelvic floor muscle training in women with urinary incontinence and pelvic organ prolapse: a protocol study. PLoS One. 2024; 19(8): e0308701. https://doi.org/10.1371/journal.pone.0308701
2. Moris L, Heesakkers J, Nitti V, O'Connell HE, Peyronnet B, Serati M, et al. Prevalence, diagnosis, and management of stress urinary incontinence in women: a collaborative review. Eur Urol. 2025; 87(3): 292-301. https://doi.org/10.1016/j.eururo.2024.12.017
3. Vesentini G, O'Connor N, Le Berre M, Nabhan AF, Wagg A, Wallace SA, et al. Interventions for treating urinary incontinence in older women: a network meta-analysis. Cochrane Database Syst Rev. 2025; 11: CD015376. https://doi.org/10.1002/14651858.CD015376.pub2
4. Fernandes ACNL, Jorge CH, Weatherall M, Ribeiro IV, Wallace SA, Hay-Smith EJC. Pelvic floor muscle training with feedback or biofeedback for urinary incontinence in women. Cochrane Database Syst Rev. 2025; 3: CD009252. https://doi.org/10.1002/14651858.CD009252.pub2
5. Cuesta-Paredes M, Labata-Lezaun N, Orts-Ruiz C, López-de-Celis C, Estébanez-de-Miguel E. Effectiveness of exercise therapy for postpartum urinary incontinence—systematic review. J Clin Med. 2026; 15(2): 810. https://doi.org/10.3390/jcm15020810
6. Hadizadeh-Talasaz Z, Khadivzadeh T, Mohajeri T, Sadeghi M. Worldwide prevalence of pelvic organ prolapse: a systematic review and meta-analysis. Iran J Public Health. 2024; 53(3): 524. https://doi.org/10.18502/ijph.v53i3.15134

7. Bortolami A, Rossettini G. Optimizing women's health: pelvic floor considerations in sports and physical activity. Front Sports Act Living. 2026; 8: 1707274. https://doi.org/10.3389/fspor.2026.1707274
8. da Rocha WS, Reis-Silva A, Coelho-Oliveira AC, Moura-Fernandes MC, da Silva Alves Cunha R, Alhammad A, et al. Impact of different types of physical exercises for the management of older women with urinary incontinence: a systematic review of randomized clinical trials. J Clin Med. 2025; 14(10): 3425. https://doi.org/10.3390/jcm14103425
9. Sorrigueta-Hernández A, Padilla-Fernandez BY, Marquez-Sanchez MT, Flores-Fraile MC, Flores-Fraile J, Moreno-Pascual C, et al. Benefits of physiotherapy on urinary incontinence in high-performance female athletes: meta-analysis. J Clin Med. 2020; 9(10): 3240. https://doi.org/10.3390/jcm9103240
10. Elliott MT, Delanerolle G, Elneil S. Pelvic organ prolapse and physical activity: directions for future research. Br J Sports Med. 2025; 59: 1183-1185. https://doi.org/10.1136/bjsports-2024-109257
11. Szatmári É, Makai A, Prémusz V, Balla BJ, Ambrus E, Boros-Balint I, et al. Hungarian women's health care seeking behavior and knowledge of urinary incontinence and pelvic organ prolapse: a cross-sectional study. Urogynecology. 2023; 29(11): 907-913. https://doi.org/10.1097/SPV.0000000000001367
12. da Silva Coelho J, Vasconcelos Neto JA, Vasconcelos CTM, do Nascimento SL, Mendes Alves F. Knowledge, attitude, and practice toward urinary incontinence among physically active women. Int Urogynecol J. 2025; 36: 1415-1424. https://doi.org/10.1007/s00192-025-06093-2
13. Koçyiğit K, Ortancıl Ö, Tezel N, Şefik SÖ, Sarıkaya F, Kolomuç Gayretli T. The effect of pelvic floor health education on knowledge and awareness levels in patients with urinary incontinence. Int Urogynecol J. 2025; 37: 597-604. https://doi.org/10.1007/s00192-025-06350-4
14. ShahAli S, Bø K, Hejazi A, Hashemi H, Kharaji G. Effect of pelvic floor muscle training on pelvic floor muscle morphometry in subjects with pelvic organ prolapse: a systematic review and meta-analysis. BMC Women's Health. 2025; 25: 542. https://doi.org/10.1186/s12905-025-04095-2

15. Gallego-Gómez C, Núñez de Arenas-Arroyo S, Torres-Costoso A, Rodríguez-Gutiérrez E, Martínez-Vizcaíno V, Martínez-Bustelo S, et al. Effects of training interventions to treat postpartum urinary incontinence: a meta-analysis. BJOG. 2026; 133(2): 243-252. https://doi.org/10.1111/1471-0528.70014
16. Rashidi F, Mirghafourvand M. Pelvic floor disorder and relevant factors in Iranian women of reproductive age: a cross-sectional study. BMC Women's Health. 2023; 23: 71. https://doi.org/10.1186/s12905-023-02226-1
17. Barber MD, Walters MD, Bump RC. Short forms of two condition-specific quality-of-life questionnaires for women with pelvic floor disorders (PFDI-20 and PFIQ-7). Am J Obstet Gynecol. 2005; 193(1): 103–113. https://doi.org/10.1016/j.ajog.2004.12.025
18. Mashayekh-Amiri S, Asghari Jafarabadi M, Rashidi F, Mirghafourvand M. Translation and measurement properties of the pelvic floor distress inventory-short form (PFDI-20) in Iranian reproductive age women. BMC Women's Health. 2023; 23: 333. https://doi.org/10.1186/s12905-023-02493-y
19. Avery K, Donovan J, Peters TJ, Shaw C, Gotoh M, Abrams P. ICIQ: a brief and robust measure for evaluating the symptoms and impact of urinary incontinence. Neurourol Urodyn. 2004; 23(4): 322-330. https://doi.org/10.1002/nau.20041
20. Craig CL, Marshall AL, Sjöström M, Bauman AE, Booth ML, Ainsworth BE, et al. International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc. 2003; 35(8): 1381-1395. https://doi.org/10.1249/01.MSS.0000078924.61453.FB
21. Alharkan KS, Aldossary MA, Alshablan RA, Bajameel EK, Alosaimi SM, Alabdullah BW, et al. Urinary incontinence and its impact on the quality of life of adults 50 years or older: a study from a tertiary care teaching hospital in Al-Khobar, Eastern Province, Saudi Arabia. J Fam Community Med. 2026; 33(1): 1-11. https://doi.org/10.4103/jfcm.jfcm_304_25
22. Sharifiaghdas F, Narouie B, Hanafi Bojd H, Dadpour M, Rostaminejad N, Motevalli Amini SK, et al. Risk factors for pelvic organ prolapse, a case-control study in a tertiary hospital in Iran. Urologia J. 2025; 92(3): 517-524. https://doi.org/10.1177/03915603251316701
23. Jeppson PC, Balgobin S, Wheeler T, Forner L, Caagbay D, Thompson J, et al. Impact of lifestyle modifications on the prevention and treatment of pelvic organ prolapse. Int Urogynecol J. 2025; 36: 59-69. https://doi.org/10.1007/s00192-024-05992-0

24. Gard AJM, Lavallee D. Examining the relationship between urinary incontinence and women's physical activity engagement: barriers and disclosure patterns. InHealthcare. 2025; 13(8): 856. https://doi.org/10.3390/healthcare13080856
25. Debes WA, Sadaqa M, Ács P, Kovács K, Prémusz V, Hock M. Sarcopenia risk as a predictor of urinary incontinence in women aged 50 and older: a cross-sectional analysis. Sci Rep. 2025; 15: 27288. https://doi.org/10.1038/s41598-025-11963-2
26. Obinata D, Hara M, Hashimoto S, Nakahara K, Yoshizawa T, Mochida J, et al. Association between frailty and pelvic organ prolapse in elderly women: a retrospective study. Int Urogynecol J. 2024; 35: 1889-1898. https://doi.org/10.1007/s00192-024-05898-x
27. Ide Y, Shimizu N, Ninomiya R, Ogawa T, Fukumoto T, Hyodo S, et al. Severe pelvic organ prolapse managed without surgery: pessary discontinued after pelvic floor muscle training with M-mode ultrasound. IJU Case Rep. 2026; 9(1): e70138. https://doi.org/10.1002/iju5.70138