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Original Research

Knowledge, self-perception and ability of pelvic floor muscle contraction among Nepalese women with urinary incontinence

B Khadgi [a], B Stuge [b], K Bø [c], R Acharya [a], C Brandt [d,*], A Stensdotter [e]

[a] Physiotherapy programme, Kathmandu University School of Medical Sciences, Kathmandu University Dhulikhel Hospital, Kavre, Nepal
[b] Division of Orthopaedic Surgery, Oslo University Hospital, Oslo, Norway
[c] Department of Sports Medicine, Norwegian School of Sport Sciences, Oslo, Norway and Akershus University Hospital, Lørenskog, Norway
[d] Department of Physiotherapy, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa
[e] Faculty of Medicine and Health Sciences, Department of Neuromedicine and Movement Science, Norwegian University of Science and Technology (NTNU), Trondheim, Norway

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ABSTRACT

Background and hypothesis: Pelvic floor muscle training (PFMT) should be the first-line treatment for women with urinary incontinence (UI). We assumed that Nepali women may have an unreliable perception of how to contract the pelvic floor muscles (PFM). This study aimed to (1) investigate knowledge of UI, PFM, and PFMT, (2) examine the self-perceived ability of PFM contraction compared to actual ability assessed by digital palpation, and (3) investigate the association between socio-demographic, background factors, and the ability to perform a correct PFM contraction, in Nepali women with UI.
Methods: This cross-sectional study included 72 women between 18-45 years with a UI score ≥ 3 (International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form). Background variables, knowledge regarding UI, PFM, PFMT, and self-perception of ability to contract the PFM were assessed through a questionnaire. Digital palpation examined the ability to perform a correct PFM contraction.
Results: Less than 30 % knew about UI, and 5 % reported that they knew about PFM and PFMT. Seventy-one percent perceived that they could contract the PFM, while only 24 % could perform a correct contraction. Seventeen percent were straining instead of performing a squeeze and lift of the PFM. Work responsibilities, including fetching water and working in a squatting position, were more common among women unable to perform a correct PFM contraction.
Conclusion: Nepali women showed low knowledge about UI, PFM, and PFMT. Despite most women perceiving they could contract the PFM, less than one-third were able to perform a correct contraction. PFMT should not rely solely on self-perception; instead, proper clinical assessment and supervised training are warranted.

Introduction

Urinary Incontinence (UI) occurs among women of all ages, negatively impacting work, social, and leisure participation, affecting sexual relationships, and creating embarrassment, which may lead to anxiety and depression.[1] In Nepal, few studies have examined the prevalence of UI. A community-based survey among 14,469 women found a prevalence of stress- and urgency UI at 24 % and 14 %, respectively[2] and one study among women with gynecological disorders reported the prevalence to be as high as 50 %.[3] Pelvic floor disorders, including UI, are a significant problem for women in Nepal,[2,3] calling for research in this field of women's health.

The majority of Nepali women live in a conservative and male-dominated society with a lack of autonomy in decision-making, where they are generally restricted to childbearing, household maintenance, and performing informal, unpaid work.[4] Thus, a high number of Nepali women are faced with physically strenuous work, little time for rest, and reduced family support, even during pregnancy.[4,5] Also, the literacy rate among Nepali women is low compared to the male population.[6]

A common misconception among women in Nepal is the belief that pelvic floor dysfunction, such as UI, is a normal and inevitable outcome of childbirth and ageing.[5] A recent study from Nepal concluded that only 21 % of women aged 40-65 years had good knowledge of UI.[7] Studies have shown that patients' beliefs, misconceptions about the causes and

* Corresponding author at: University of the Witwatersrand, 9 York Road, Johannesburg, South Africa.
E-mail address: corlia.brandt@wits.ac.za (C. Brandt).

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knowledge related to UI, and the availability of treatment can affect treatment-seeking behavior.[5,7]

There is Level 1 evidence and Grade A recommendation that pelvic floor muscle training (PFMT) should be the first-line treatment for women with UI, the efficacy of PFMT being well established in international guidelines.[8,9] To gain an effect in the treatment of UI, it is essential that the women can perform a correct contraction of the PFM.[9] Studies from different countries have shown that many women seem to be unable to perform a correct voluntary PFM contraction, and the belief of doing a correct PFM contraction is false in one of five women.[10,11] These findings point to an urgent need for comparing women's self-perceived ability of PFM contraction with clinically assessed digital palpation.[12] We believe that many Nepali women with UI lack sufficient knowledge about PFM and PFMT and do not have a reliable perception about their PFM contraction.

Hence, the aims of the current study were to: i. investigate knowledge of UI, PFM, and PFMT in Nepali women with UI, ii. examine their self-perceived ability of PFM contraction compared to actual ability assessed by digital palpation, and iii. investigate association between socio-demographic factors and the ability to perform a correct PFM contraction.

Materials and methods

Study design and setting

This cross-sectional study used baseline data from a parallel group randomized controlled trial (RCT) investigating the effectiveness of a PFMT intervention among Nepali women with UI. The study was conducted between April 2023 and April 2024 at Dhulikhel and Kirtipur hospitals located in Bagmati province. Both are non-government community teaching hospitals providing specialized healthcare and offering free or subsidized rates for the benefit of the poor and vulnerable.

The study was performed in accordance with relevant guidelines and regulations of the Helsinki Declaration. Ethical approval to conduct the study was obtained from the Nepal Health Research Council Ethical Review Board (3741/23). Verbal and written information was given and consent for participation was signed before participation in the study.

Participants

All the 75 women randomized to the intervention group in the RCT were invited to participate in the present study. The sample size for the RCT was based on the expected change in score of the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI-SF) between baseline and follow-up. No additional power calculation was performed for the present study. ICIQ-UI SF is the recommended patient's patient-reported measure of severity of urinary loss and influence on daily activities for those with UI.[5] Recently, a validated Nepali version of the ICIQ-UI SF was published and was used in the present study.[6] The participants volunteering for the RCT were recruited by advertisement through social media and across all outpatient departments of Dhulikhel and Kirtipur Hospitals.. Nepali women with UI who responded and agreed to participate were included if eligible according to the inclusion criteria: i. understanding the Nepali language and being available via own telephone, as data at follow-up for the RCT had to be collected by phone, ii. aged between 18-45 years, and iii. presenting with an ICIQ-UI SF total score $\geq$ 3 (0-21).[13,14] Exclusion criteria were pregnancy or planning for pregnancy within the following 6-month period, awaiting gynaecological surgery, history of bladder, renal, or uterine cancer, stage IV pelvic organ prolapse,[6] or menopausal status. As menopause may affect the prevalence and severity of UI, we chose to include a homogeneous group of adult women before menopause. Additionally, women with cognitive or mental disorders, illnesses, or injuries that prevented participation in a PFMT program were excluded.

Procedure

After recruitment, a research assistant (an undergraduate physiotherapist) informed the participants about the research procedure and assisted with the completion of the self-administered questionnaires. The following information was gathered: socio-demographic variables, questions related to parity, work and lifestyle, knowledge of UI, PFM, and PFMT. After completion of the questionnaires, the women received a 30-minute educational session about UI and PFMT led by a physiotherapist with 12 years of experience in women's health. It contained information on anatomy, location, and function of the PFM (demonstrating with an anatomical pelvic model and a video in Nepali language[15], UI symptoms, risks and lifestyle factors, and PFMT. At the end of the education session, the women's health physiotherapists instructed the women to perform PFMT as shown in the video. The women also received an illustrative leaflet. After the education session, the women were asked if they were willing to be clinically examined by digital palpation. The International Urogynecological Association (IUGA)/International Continence Society (ICS) terminology recommendations were used for reporting.[16,17]

Outcome measures

Sociodemographic, background factors, and UI

Age, marriage age, parity, ethnicity, education, occupation, work responsibilities, and conditions were assessed with a self-administered questionnaire. Height and weight were measured to calculate body mass index. UI was assessed with ICIQ-UI-SF.[6]

Knowledge of UI, PFM, and PFMT

Knowledge regarding UI, PFM, and PFMT was assessed through a self-compiled questionnaire containing the following questions, with yes/no responses: have you heard about UI; do you know what causes UI; are you aware of treatment options for UI; do you know the location of the PFM; do you know the function of the PFM, and are you aware of how to exercise the PFM?.[11,12]

Self-perception of correct PFM contraction

The self-perception of the ability to contract the PFM was assessed by the women's health physiotherapist after the educational session and before the digital palpation using the question: Do you think you are able to perform correct PFM contractions? The women were asked to score their perceived ability as unable, unsure, or able to contract the PFM.[11]

Ability to contract the PFM

Digital palpation was used to examine the ability to perform a correct PFM contraction. A correct PFM contraction was defined as a squeeze around the pelvic openings (urethra, vagina, and rectum) and an inward lift of the pelvic floor.[18] The digital palpation was performed by the experienced women's health physiotherapist trained in digital palpation, with the woman in a supine position with the knees and hips flexed, feet supported on the examination table, one knee resting against the wall, and the other against the assessing physiotherapist. The woman was instructed by the physiotherapist to perform voluntary contractions of the PFM with a standardized verbal command (squeeze, lift, hold for 10 sec, and relax).[17] All the women were instructed on how to contract the PFM with minimal or no use of abdominal, hip, or gluteal muscles during PFM contraction. The ability to perform a correct PFM contraction was confirmed by visual observation of an inward lift of the perineum and digital palpation. After three practice contractions, the fourth contraction was classified in accordance with Bø et al [19] and Frawley et al [17] as: no contraction, uncertain, straining, contraction only with help from other muscles, or correct contraction.

Statistical analysis

Statistical analysis was performed with IBM SPSS Statistics version 29 (Armonk, NY: IBM Corp). For the outcome variables, namely, knowledge and self-perception of PFM contraction, Chi-square tests were used for comparison between women able and unable to perform a correct contraction as assessed by digital palpation. Fisher's exact test for one-sided significance was used to determine the number in each group who said they had knowledge of UI, PFM, and PFMT, and who perceived that they could perform a correct PFM contraction. Background variables were compared between the group of women able to perform a correct PFM contraction and the group of women unable to correctly contract the PFM. Group differences were assessed with a Student T-test with equal variance assumed for continuous data and Chi-square tests for categorical data. All results were interpreted as statistically significant if $p < 0.05$.

Results

Seventy-two of 75 women consented to participate in the present study investigating the ability to contract the PFM. The three women not consenting to participate in this additional study did not want to be assessed by digital palpation. Table 1 shows the socio-demographic data of the participants. Most women were above 35 years of age and were overweight. All women were married, with 40% below the age of 20, and more than half were multiparous. The women represented a variety of ethnicities, but were dominated by Chettri. One third did not have any formal education and were housewives. Most women reported moderate UI.

Knowledge of UI, PFM, and PFMT

The knowledge about UI was low. One-third had heard about it, and very few claimed that they knew about the causes of, and treatment options for UI. Less than 5 % of the women were aware of the location and function of the PFM or reported that they knew about PFMT (Table 2).

Self-perception of correct PFM contraction

About two-thirds of the women perceived that they were able to contract the PFM, while one-third were unsure, and nobody said that they were unable to contract the PFM (Table 3).

Clinical examination of the ability to contract the PFM

The ability of PFM contraction by digital palpation showed that less than one-third of the women were able to perform a correct contraction of the PFM. A similar number of women showed the ability of PFM contraction only by means of accessory muscle contraction. Many were straining instead of performing a squeeze and lift, and in some, the presence of contraction was uncertain or not possible to palpate (Table 3).

Comparison between groups who were able and unable to perform a correct PFM contraction

Based on the clinical examination, the group able to perform a correct PFM contraction consisted of 17 women, and the group not able to perform a correct PFM contraction consisted of 55 women. Table 4 shows that there were no statistical differences between the groups, except for work responsibilities and conditions, where fetching water and working in a squatting position were more common in women in the group unable to perform a correct PFM contraction. Table 5 shows there were no differences in knowledge of UI, PFM, and PFMT between the two groups.

Table 1
Socio-demographics of the included women.

Characteristics	Category (N=72)	N (%)
Age (25-45)*, years	25-30	9 (12)
	31-35	16 (22)
	36-40	22 (31)
	41-45	25 (35)
BMI (18.5-37.37)*	18.5-24.9	17 (24)
	25.0-29.9	37 (51)
	>30	18 (25)
Marriage age (14-32)*	≤19	40 (55)
	≥20	32 (45)
Parity (1-4)*	1	18 (25)
	≥2	54 (75)
Ethnicity	Brahmin	11 (15)
	Chettri	49 (56)
	Newar	7 (10)
	Tamang	3 (4)
	Magar	6 (8)
	Dalit	5 (7)
Education	No education	22 (31)
	Primary school	27 (37)
	Secondary school	12 (17)
	University	11 (15)
Occupation	Business	21 (29)
	Employe	15 (21)
	Housewife	24 (33)
	Farmer	5 (7)
	Other	7 (10)
Work responsibilities	Cooking\cleaning	71 (99)
	Childcare	46 (64)
	Fetching water	37 (51)
	Animal care	11 (15)
Work conditions	Sitting	47 (65)
	Bending	40 (56)
	Standing	43 (60)
	Squatting	18 (25)
	Carrying loads	42 (58)
Medical conditions	Musculoskeletal problem	27 (38)
	Chronic cough	24 (33)
	Chronic constipation	8 (11)
ICIQ-UI-SF (score 1-21)*	Slight (1-5)**	14 (19)
	Moderate (6-12)	47 (65)
	Severe (13-18)	10 (14)
	Very severe (19-21)	1 (1)

*- range
BMI: Body mass Index
ICIQ-UI-SF: International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form
The percentage for some items exceed 100 as it was possible to answer yes to several questions.

Table 2
Number of participants who answered yes to questions on knowledge of urinary incontinence (UI), the pelvic floor muscles (PFM) and pelvic floor muscle training (PFMT) (N=72).

Questions	N* (%)
Have you heard about UI?	21 (29)
Do you know what causes UI?	14 (19)
Are you aware of treatment options for UI?	9 (12)
Are you aware of the PFM?	3 (4)
Do you know the location of the PFM?	3 (4)
Do you know the function of the PFM?	3 (4)
Are you aware of how to exercise the PFM?	4 (6)

UI: urinary incontinence. PFM: pelvic floor muscles.
*Yes / no questions. N= number of yes responses

Discussion

As hypothesized, this cross-sectional study found that most participating Nepali women did not have a reliable perception of their PFM contraction. Seventy-one percent of the women believed they could

Table 3
Self-perception and clinically examined ability to perform a correct pelvic floor muscle (PFM) contraction (N=72).

PFM contraction	Variables	N (%)
Self-perceived	Able to contract	51 (71)
	Uncertain	21 (29)
	Unable to contract	0
Clinically examined	Correct contraction	17 (24)
	Contraction with co-contraction of other muscles	19 (26)
	Straining	12 (17)
	Uncertain contraction	15 (21)
	No contraction	9 (12)

contract their PFM, while only 24 % could do so correctly. The women had poor knowledge about UI, PFM, and PFMT. The socio-demographic factors indicated that the women with physically demanding tasks, such as fetching water and working in a squatted position, were less likely to perform correct PFM contractions.

Our study revealed that few women had heard about UI, and even fewer knew its causes and treatment, corroborating previous findings in Nepal showing that only 21 % of middle-aged women had satisfying knowledge of UI.[7] Almost nobody had heard about PFM or PFMT. These results align with another study reporting low knowledge of PFM among Nepali women visiting gynecology departments.[12] Similarly, a systematic review on knowledge about pelvic floor dysfunction across ten countries, including Nepal, found low awareness about UI and PFM.[20] In contrast, a study conducted in Nigeria,[21] reported that 74.3 % of respondents knew about PFMT, and another study of Malaysian women of childbearing age reported good/moderate knowledge (80.1 %) and attitudes (77.3 %) towards PFMT, though 87.2 % did not report exercising or training of the pelvic floor.[22] A study from Belgium reported a similar level of satisfactory knowledge about PFMT (73.8 %), but in contrast, half of these women reported they had experience with PFMT.[11] Most of these studies suggested that knowledge could be affected by the level of education,[12,20,23], thus explaining low health literacy. A recent study from Nepal showed that health literacy was related to socioeconomic factors and health status.[24] In our study, 68 % of the women either had no education or had attended only primary school; many were housewives, and almost all reported health issues.

Even though a few participants in our study had knowledge about the PFM, over 70 % of the participants still believed they were able to contract, while the remaining were unsure, and no one thought they were unable to contract the PFM. Of those unable to correctly contract, almost 80 % were under the impression that they were doing a correct contraction. In total, less than one fourth of all women in our study were able to perform a correct contraction. Consistent with our findings, a comparable study from Brazil found that only one-third of women had a correct self-perception of their PFM contraction in relation to the physiotherapist's assessment.[10] Furthermore, a study from Belgium, including 500 women with knowledge of the PFM and experience with PFMT, revealed that only 50 %, in spite of having both knowledge and practice, were able to perform a correct contraction of inward motion of the perineum, while one third falsely believed that they were doing a correct contraction.[11] Their study was performed within one week after vaginal birth, which likely explains the result, and therefore is not directly comparable with our findings. It was, however, interesting to note that our study showed no significant difference in knowledge between the groups able and unable to contract their PFM. Our findings are similar to the findings of a study by De Freitas et al. (2019) in a low-mid income Brazilian population, including a sample of 133 women. Although they found a low level of PFM knowledge in their sample, no relationship was found with the ability to contract the PFM or the presence of UI.[23]

Lack of awareness and the subtle nature of the PFM might explain false perception of and difficulties in performing a correct contraction, and also the ability to isolate the PFM activation from other

Table 4
Comparison of socio-demographic background variables between women able and unable to perform a correct pelvic floor muscle (PFM) contraction, examined by digital palpation.

Characteristics	Correct contraction N=17		Not correct contraction N=55		95 % CI	Sig
	Means (SD)	N* (%)	Means (SD)	N* (%)		
Age	37.5 (6.25)		38.0 (5.23)		-2.525; 3.538	.740
BMI	28.5 (3.04)		27.6 (4.21)		-3.109; 1.292	.413
Marriage age	20.7 (3.67)		19.9 (3.98)		-2.925; 1.404	.486
Parity	1.9 (0.70)		1.9 (0.68)		-0.315; 0.441	.740
Ethnicity	2.1 (0.78)		2.7 (1.55)		-0.202; 1.349	.146
Brahmin (6)		0		5 (9.1)		
Chettri (5)		1 (5.9)		5 (9.1)		
Newar (4)		0		3 (5.5)		
Tamang (3)		0		7 (12.7)		
Magar (2)		15 (88.2)		25 (45.5)		
Dalit (1)		1 (5.9)		10 (18.2)		
Education	2.4 (1.23)		2.2 (1.33)		-0.917; 0.530	.595
No education (1)		4 (23.5)		19 (34.4)		
Primary school (2)		6 (35.3)		21 (38.2)		
Secondary school (3)		5 (29.4)		7 (12.7)		
University (4)		2 (11.8)		8 (14.5)		
Ocupation	2.9 (1.09)		3.0 (1.17)		-0.579; 0.697	.855
Other (1)		2 (11.8)		5 (9.1)		
Business (2)		4 (23.5)		17 (30.9)		
Employee (3)		4 (23.5)		11 (20.0)		
Housewife (4)		7 (41.2)		17 (30.9)		
Farmer (5)		0		5 (9.1)		
ICIQ-UI-SF	9.18 (4.39)		8.6 (3.39)		-2.924; 1.880	.238
Slight (1-5)		5 (29.4)		9 (16.4)		
Moderate (6-12)		9 (53.0)		38 (69.2)		
Severe (13-18)		3 (17.7)		7 (12.7)		
Very severe (19-21)		0		1 (1.8)		
Medical conditions						
Musculoskeletal		6 (35.3)		21 (38.2)		.534
Chronic cough		4 (23.5)		21 (38.2)		.209
Chronic constipation		2 (11.8)		5 (9.1)		.528
Work responsibilities						
Cooking \cleaning		17 (100)		54 (98.1)		.764
Childcare		12 (70.6)		33 (60.0)		.312

(*continued on next page*)

Table 4 (*continued*)

Characteristics	Correct contraction N=17		Not correct contraction N=55		95 % CI	Sig
	Means (SD)	N* (%)	Means (SD)	N* (%)		
Fetching water		5 (29.4)		32 (58.2)		**.036**
Animal care		1 (5.9)		10 (18.2)		.204
Work conditions						
Sitting		11 (64.7)		37 (67.3)		.532
Bending		9 (52.9)		30 (54.5)		.563
Standing		8 (47.1)		34 (61.8)		.212
Squatting		1 (5.9)		16 (21.9)		**.042**
Carrying loads		10 (58.8)		32 (58.2)		.596

Level of significance: p <0.05.
*Yes / no questions. N= number of yes responses
ICIQ-UI-SF (International Consultation on Incontinence Questionnaire–Urinary Incontinence Short Form)
ICIQ: N / UI category.

Table 5
Comparison of knowledge about urinary incontinence (UI), pelvic floor muscles (PFM) and pelvic floor muscle training (PFMT) and self-perception among women able to and unable to perform a correct pelvic floor muscle contraction.

Questions	Correct contraction (vaginal palpation) N=17 N* (%)	Not correct contraction (vaginal palpation) N=55 N* (%)	Sig.
Knowledge questions (yes)			
Have you heard about UI?	6 (35.3)	15 (27.3)	.363
Do you know what causes UI?	4 (23.5)	10 (18.2)	.431
Are you aware of treatment options for UI?	2 (11.8)	7 12.7)	.642
Are you aware of the PFM?	0	3 (5.5)	.440
Do you know the location of the PFM?	0	3 (5.5)	.440
Do you know the function of the PFM?	0	3 (5.5)	.440
Are you aware of how to exercise the PFM?	1 (5.9)	3 (5.5)	.669
Self-perception of PFM contraction (yes)			**.046**
Able to contract	9 (52.9)	43 (78.2)	
Uncertain	8 (47.1)	12 (21.8)	
Unable to contract	0	0	

Level of significance: p <0.05
*Yes / no questions. N= number of yes responses
UI: urinary incontinence. PFM: pelvic floor muscles.

muscles.[25,26] Several authors have found that women unable of correct PFM contraction were either unable of any contraction at all or displayed weak or uncertain contractions,[11] used other additional gluteal or abdominal muscles, or strained by pushing downward instead of lifting upward and inward.[25] The latter might exacerbate pelvic floor dysfunctions such as UI or pelvic organ prolapse (POP).

Our study showed that despite receiving a 30-minute education session on UI and PFMT, the participants' self-perceived ability did not align with actual PFM contractions. Another study from Nepal found that an illustrative leaflet was insufficient for teaching correct PFM contraction.[12] A systematic review highlighted that educational interventions and verbal cues improved PFM proprioception in women of all ages, including those without pelvic floor dysfunction.[27] Regular and repeated verbal instructions and guidance have been demonstrated to improve the ability of correct contraction.[28] It is interesting though, that more than 70 % of those unable to perform a correct contraction managed to do it correctly after instruction by a physiotherapist.[16]

Our findings further suggest that demanding working conditions, such as fetching water and working in a squatting position, might be linked to impaired PFM contraction. These results align with prior research in Nepal, where heavy physical labor (e.g., carrying water or firewood) was associated with increased POP and UI, likely due to sustained and repetitive intra-abdominal strain.[29] Similarly, it has been shown that women in agricultural roles exhibited reduced PFM awareness and higher UI rates compared to urban populations, underscoring occupational influences on pelvic health.[11] However, in our study, carrying heavy loads did not show any link with PFM contraction, which is also similar to a finding from another study in Nepal, which explained physically demanding risk factors for POP.[30] The generalizability of the associations found in our study remains uncertain due to the limited sample size, emphasizing the need for larger epidemiological investigations to confirm risk factors.

To our knowledge, this is the first study in Nepal to compare women's self-perception of their PFM contraction with clinically examined ability to contract the PFM. A strength of the study, supporting generalizability to the larger Nepali population, is that some sociodemographic variables, such as BMI and educational status, are comparable with the findings from a census study describing the sociodemographic profile and health status of Nepali women.[31] The sample also included women from rural and urban areas, and a range of parity. Generalizability beyond the Nepalese population should, however, be done cautiously. Limitations and recommendations to be considered for future research protocols may include investigation of larger sample sizes and validation of questionnaires to be used in a Nepali population.[32] Additionally, to verify the women's self-perception of PFM correct contraction, it ideally could have been assessed again after the digital palpation. Although the physical assessment of the PFM was performed by an experienced women's health physiotherapist in the present study, it could be recommended that the researcher in future studies should be blinded to the women's self-perception before the physical examination.

Conclusion

Nepali women showed low knowledge about UI, PFM, and PFMT. Despite most women perceiving they could contract the PFM, less than one-third were able to perform a correct contraction. PFMT should not rely solely on self-perception; instead, proper clinical assessment with feedback on the contraction and supervised training are warranted.

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Declaration of competing interest

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