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What do women know? The first systematic review on pelvic floor muscle exercises: awareness, knowledge, and practice gaps

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Abstract

This systematic review identifies gaps in women's awareness, knowledge, and practice of pelvic floor muscle exercises, informing better health initiatives, clinical guidance, and counseling. The review was conducted following PRISMA 2020 guidelines, prospectively registered with PROSPERO Registration ID CRD420251167618. A comprehensive literature search across multiple electronic databases (PubMed, MEDLINE, ScienceDirect, Google Scholar, and MDPI) till June 15, 2025, was performed. The search strategy utilized a combination of keywords and MeSH terms related to "Kegel exercises", "pelvic floor muscle exercise", "awareness", "knowledge" and "female". Inclusion criteria included studies published in English within the last 5 years and involving female participants aged 19 years and older. Study quality was assessed using the Joanna Briggs Institute and the Agency for Healthcare Research and Quality appraisal checklist. A total of 11 cross-sectional studies with 2936 participants, predominantly pregnant women from Asia and the Middle East, were included; some studies also included women of childbearing age from gynecological clinics. A significant knowledge-practice gap was observed: knowledge varied widely, but practice rates were low, 3.6-43%, mostly less than 10%. Key barriers were lack of awareness, misconceptions, preference for medications, insufficient provider guidance, and practical obstacles like forgetting, fatigue, and time constraints. Awareness and knowledge of pelvic floor muscle exercise (PFME) vary, but practice is extremely low. Barriers are modifiable, from systemic gaps in patient education to lack of proactive provider guidance. Bridging this requires structured, hands-on PFME education and counseling in routine antenatal care by obstetricians, midwives, and physiotherapists, alongside public health campaigns to emphasize prevention, correct misconceptions, and destigmatize pelvic floor disorders.

Key words: pelvic floor, exercise therapy, Kegel exercises, health knowledge, attitudes, practice, women's health.

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Introduction

Pelvic floor disorders, including urine incontinence, anal incontinence, sexual dysfunction, and pelvic organ prolapse, constitute a serious public health concern. The adverse implications affect women worldwide, physically and psychologically. Quality of life and functional abilities are significantly impacted.[1] The cause of these disorders is anatomical and functional weakness in the levator ani muscle group, resulting in failure of adequate support provision to underlying structures. Inadequate urethral support and closure during increased intra-abdominal pressure result in stress urinary incontinence (UI).[2]

The efficacy of pelvic floor muscle training (PFMT) as an effective treatment modality is well-documented in the literature, since Dr. Arnold Kegel's seminal work in the mid-20th century, which reported that certain South African communities practiced postpartum vaginal muscle training. These indigenous women would regularly contract their vaginal muscles around their midwives' fingers during the weeks following childbirth. They continued these exercises until they achieved optimal muscle tone.[3] A considerable number of systematic reviews and meta-analyses have reinforced its status as a first-line intervention. The mechanism is sound: PFMT targeted exercises aim to strengthen the pelvic diaphragm. Muscular support is enhanced, and urethral closure pressure is increased. And so voluntary neuromuscular control is improved.[2,4,5]

Does it work? The question has already been answered, resoundingly, in the affirmative. Numerous systematic reviews and meta-analyses confirmed that PFMT, like antenatal training, significantly reduces the UI relative risk (RR=0.72) and severe perineal tears (RR=0.50).[6] Postpartum training is highly effective in reducing incontinence and improving muscle function.[7,8] However, the benefits extend beyond continence, with PFMT demonstrating significant positive effects on prolapse symptoms,[9] sexual function,[10,11] and overall quality of life.[1] PFMT is effective both as a standalone treatment and as an adjunct to structured exercise programs,[12] whereas the programs that are supervised and last more than three months show the greatest efficacy.[8,13]

Yet, a puzzling and critically important disconnect persists despite well-established effectiveness and inclusion in clinical guidelines.[14-17] PFMT is significantly underused because its implementation faces many barriers. Research like the APPEAL study shows that a key problem is a lack of knowledge and poor communication between women and their midwives. However, the same study confirms that when good support is provided, women are much more likely to do the exercises, improving their health out-

comes.[18] This disconnect is observed despite high prevalence rates: approximately one-third of first-time mothers and nearly half of multiparous women experience UI. Antenatal UI is a strong predictor of postpartum symptoms (adjusted RR 2.3).[19]

This contradiction reveals the central problem this review addresses: the challenge is no longer proving that PFMT works, but understanding why there remains a vast gulf between its proven efficacy and its practical application. While countless reviews have reaffirmed its therapeutic value, the literature lacks a comprehensive synthesis examining what women truly know about their pelvic floor and whether they understand how to train it properly. Another aspect addressed by this review is what factors prevent women from practicing these exercises consistently.

This systematic review is the first to address the gap in women's knowledge and practice of PFMT. By identifying what women know and where gaps exist, it provides a foundation for improved health initiatives, refined clinical counseling, and better clinical guidance.

Methods

This systematic review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) 2020 guidelines,[20] and was prospectively registered in the PROSPERO international prospective register (Registration ID CRD420251167618).

Search sources and strategy

A systematic literature search was conducted to identify all relevant studies on electronic research databases and engines, including PubMed, PMC, Medical Literature Analysis and Retrieval System Online (MEDLINE), Science Direct, Google Scholar, and the Multidisciplinary Digital Publishing Institute (MDPI). Additionally, relevant articles were searched on ResearchGate and the snowball technique *via* Citation searching was employed as well. The search strategy employed a combination of keywords: Kegel exercises OR pelvic floor muscle exercise AND awareness OR knowledge AND female OR pregnant. For MEDLINE, PubMed, and PubMed Central, the integrated Mesh (Medical Subject Headings) approach applied was ((“Exercise Therapy/education”[Mesh] OR “Exercise Therapy/methods”[Mesh])) OR (“Pelvic Floor Disorders/physiopathology”[Mesh] OR “Pelvic Floor Disorders/prevention and control”[Mesh] OR “Pelvic Floor Disorders/therapy”[Mesh]); and for PubMed Advanced the search was ((((kegel[Text Word]) OR (pelvic floor muscle exercises[Text Word])) AND (awareness[Title/Abstract])) OR (knowledge[Title/Abstract])) AND (female[Title/Abstract]) strategy was used. The date of completion of the search strategy was 15 June 2025.

The initial search returned a total of 1,125,216 records. To manage the large volume of results, automation filters were applied to exclude records not meeting the pre-defined inclusion criteria: studies were limited to those published in the English language within the last 5 years, with free full text available, and designed as observational human studies involving female participants aged 19 years and above. Preprints and grey literature were excluded. After removing duplicates and applying these filters, 4519 records were screened by title and abstract. We followed the PRISMA flow chart shown in Figure 1. Grey literature and preprints were excluded from the review.

Quality analysis

A 10-item checklist, adapted from the Joanna Briggs Institute and the Agency for Healthcare Research and Quality, was used to appraise the quality of the cross-sectional studies.[21,22] Each item was scored as “Yes” (1 point), “Partial” (0.5), or “No” (0 points). Total scores were categorized as follows: 9-10 (high quality), 7-8.5 (good), 5-6.5 (fair), and <5 (poor), as shown in Table 1.

Characteristics of the included studies

A total of 11 cross-sectional studies met the inclusion criteria. Their publication dates ranged from 2020 to 2025. In all cases, structured or online questionnaires served as the primary data collection tool. The combined sample size across all studies was 2936 participants. The study populations consisted of pregnant women attending antenatal care, primary health care, or hospital clinics. Three studies expanded their criteria to include non-pregnant women of childbearing age and those attending gynecology clinics. Geographically, the research was conducted in Asia and the Middle East. Four studies were from Pakistan, two each from Saudi Arabia, Malaysia, and Nigeria, and one from Thailand. The settings ranged from primary health centers and rural clinics to major tertiary care public and private hospitals, as shown in Table 2. Knowledge and practice levels across the included studies are summarized in Table 3, while the identified barriers are presented in Table 4.

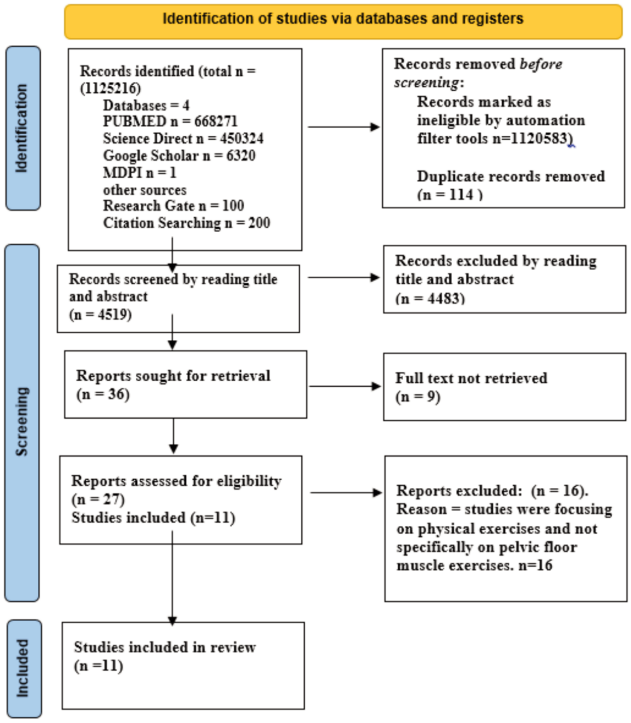


Figure 1. PRISMA flow chart.

Table 1. 10-item checklist, adapted from the Joanna Briggs Institute and the Agency for Healthcare Research and Quality for appraising the quality of the cross-sectional studies.

Appraisal criteria	Bin Othman *et al.*[27]	Ismail *et al.*[28]	Fauzey *et al.*[29]	Gul *et al.*[30]	Saeed *et al.*[31]	Derrar *et al.*[36]	Ihegihu *et al.*[34]	Jarni *et al.*[35]	Okeke *et al.*[37]	Temtanakitpaisan *et al.*[32]	Habib *et al.*[33]
Clear aim and objective	1	1	1	1	1	1	1	1	1	1	1
Appropriate study design	1	1	1	1	1	1	1	1	1	1	1
Clearly defined sample and recruitment	1	0.5	1	0.5	0.5	0.5	1	0.5	1	1	0
Adequate sample size	1	0	1	0.5	1	0	0.5	1	1	1	0.5
Validated data collection tool	0	0	0.5	0	0.5	1	1	1	1	1	0
Statistical analysis appropriate	1	0.5	1	0.5	1	1	1	1	1	1	0.5
Results clearly reported	1	1	1	1	1	1	1	1	1	1	1
Discussion addresses limitations	1	0	0	1	0.5	1	1	0	1	0.5	0
Generalizability	0.5	0	0.5	0	0.5	0.5	1	0.5	0.5	0.5	0.5
Ethical approval	1	1	1	1	1	1	1	1	1	1	1
Total score	8.5 (good)	5 (fair)	7 (good)	6.5 (fair)	7 (good)	8 (good)	9.5 (high-quality)	8 (good)	9.5 (high-quality)	9 (high-quality)	5.5 (fair)

Table 2. Characteristics of included studies.

Study, year, country	Design and method	Sample size	Study population and setting
Bin Othman *et al.*, 2025, Saudi Arabia[27]	Cross-sectional, structured questionnaire	370	Pregnant women in primary health care in Abha City
Ismail *et al.*, 2024, Pakistan[28]	Cross-sectional, structured questionnaire	158	Women of childbearing age (20-50 years) at a rural health center in Haripur, Pakistan
Fauzey *et al.*, 2023, Malaysia[29]	Cross-sectional, questionnaire	896	Childbearing women attending maternal and child health clinics
Gul *et al.*, 2022, Pakistan[30]	Cross-sectional, questionnaire	150	Pregnant women attending a private hospital in Lahore
Saeed *et al.*, 2022, Pakistan[31]	Cross-sectional, questionnaire	385	Pregnant women (aged 18-40, in 2nd/3rd trimester) visiting major tertiary care public hospitals in Lahore
Derrar *et al.*, 2022, Saudi Arabia[36]	Cross-sectional, questionnaire	183	Pregnant women in Jazan region
Ihegihu *et al.*, 2022, Nigeria[34]	Cross-sectional, questionnaire	151	Pregnant women attending four randomly selected antenatal clinics in Nnewi
Jarni *et al.*, 2021, Malaysia[35]	Cross-sectional, online questionnaire	112	Female population attending the obstetrics and gynaecology clinic
Okeke *et al.*, 2020, Nigeria[37]	Cross-sectional, questionnaire	252	Pregnant women attending antenatal care clinics in Enugu Metropolis
Temtanakitpaisan *et al.*, 2020, Thailand[32]	Cross-sectional, questionnaire	110	Thai pregnant women attending the antenatal clinic of a tertiary care hospital.
Habib *et al.*, 2020, Pakistan[33]	Cross-sectional, questionnaire	169	Pregnant women attending the outpatient department of Obstetrics/Gynaecology at Kahuta Research Laboratories hospital in Islamabad

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Discussion

The identified hindering factors for PFMT compliance in our review are similar to those reported in earlier studies, specifically forgetfulness and the need for ongoing support. However, these barriers can be overcome by successful interventions *via* active structured support mechanisms. These include regular clinician contact, whether by phone or in person, and the use of multimodal reminders, *e.g.*, apps, videos, and leaflets. The consistent application of these strategies in experimental groups in contrast to the standard care provided to controls clearly demonstrates that active, patient-centered support is important for translating exercise knowledge into sustained practice.[23] When we listen to the voices of women themselves, as in the qualitative work by Sawettikamporn *et al*., the dramatic gap between knowing about pelvic floor exercises and actually doing them starts to make profound sense. Women reported that from recommendation to initial motivation and persistent performance of exercises, the healthcare provider plays the most significant role. But again, without continuous support, that ignited spark by a health practitioner often flickers and dies. This explains why knowledge and awareness alone are simply not enough to sustain the daily practice required to achieve effective results. The interviewed women described a familiar internal struggle: a battle with failing to remember, tiredness, and a lack of confidence in performing the exercises correctly, then a nagging doubt about whether it would even work. The same echoes are demonstrated in our data. Therefore, persistent practice is hindered by consideration of these exercises as non-effective, non-yielding, and unimportant. Consequently, healthcare must evolve from simply providing information to actively walking alongside women who are rebuilding their confidence and providing the ongoing encouragement needed to turn a fleeting intention into a lasting healthy habit.[24]

On the other hand, some women were willing to perform pelvic floor muscle exercises, but the system failed to support them. Similar to this comprehensive review, the gynecologic cancer patients in the Araya-Castro study reported feeling disoriented, obtaining unclear information, lacking continuous direction, and lacking persistent caring assistance.[25] The solution that worked was not complicated but a simple audio guide and a trusted therapist who made them feel capable. This proves that the knowledge-practice gap can be addressed by supportive healthcare systems.[25]

It is important to report that limited public knowledge is not a challenge exclusive to reproductive health. The systematic review conducted by Boateng et al. identified a concerning trend in Sub-Saharan Africa regarding cardiovascular disease, where low levels of awareness were obscured by cultural misconceptions. This parallel suggests that findings about poor knowledge of pelvic floor exercises are part of a broader, global issue in preventive health education. Just as the cardiovascular review concluded that damaging myths about cardiovascular disease must be actively addressed, this research points to the same need in women's health to directly confront the misconception that issues like incontinence are an inevitable norm. The resonance between these two distinct fields is a powerful reminder that, whether for the heart or the

Table 3. Included studies demonstrated knowledge and practice levels.

Study (year), country	Knowledge	Practice
Bin Othman *et al.* (2025), Saudi Arabia[27]	Mean score: 35.6% Identified strengthening muscles as benefit: 70.8% PFMT prevents preterm labor: 24.3%	Practice rate: 43.0% Mean practice score: 53.1%
Ismail *et al.* (2024), Saudi Arabia[28]	Aware of PFMT: 54.8% Believed PFMT produces positive change: 79.1% Self-reported UI prevalence: 29.1%	Overall practice: 20.5% Weekly practice: 6.3% Received prior instruction: 3.8%
Fauzey *et al.* (2023), Malaysia[29]	Adequate knowledge = 80.1%	Poor practice: 87.2% Good practice: 3.6%
Gul *et al.* (2022), Pakistan[30]	No prior knowledge: 67.3% Source among aware: Gynecologist 49.0%, Physiotherapist 26.5%	Did not perform: 84.0% No pre-pregnancy exercise: 91.3%
Saeed *et al.* (2022), Pakistan[31]	Familiar with term: 51.7% Poor knowledge: 64.2% Knew correct technique: 18.4%	Currently performing: 6.8% Among performers, practiced once daily: 61.5%
Derrar *et al.* (2022), Saudi Arabia[36]	Mean score 5/12 Knew correct technique: 9.8% MISCONCEPTION = PFMT causes preterm labor: 24.6%	No practice: 50.8% Irregular practice: 42.6% Regular practice: 6.6%
Ihegihu *et al.* (2022), Nigeria[34]	Any information about PFMT: <50% Source: Nurses 38.5%, Books 21.5%	Regular practice: 4.0%
Jarni *et al.* (2021), Malaysia[35]	Good knowledge: 52.0% Knew PFMT controls bladder function: 94.6% Knew correct technique: 52.7%	Poor practice: 70.0% Good practice: 4.0%
Okeke *et al.* (2020), Nigeria[37]	Heard of PFMT: 74.3%	Practice rate: 38.4% Among performers, frequency 2–3×/day: 56.4%
Temtanakitpaisan *et al.* (2020), Thailand[32]	Awareness: 55.5% Accurate knowledge: 27.9%	Regular practice: 0.0% Irregular practice among aware: 10.7%
Habib *et al.* (2020), Pakistan[33]	Never heard of PFMT: 91.1% MISCONCEPTION = believed UI is normal during pregnancy: 45.0%	Ever practiced: 3.6% Currently practicing: 1.8%

pelvic floor, effective prevention cannot happen without first building a foundation of clear, accessible, and culturally sensitive public awareness.[26]

Recommendations

1. Counseling and motivating women during antenatal visits on performing pelvic floor muscle exercises by healthcare providers, including obstetricians, midwives, and physiotherapists.[27-33]
2. Provision of targeted and tailored support to women with chronic disease, language barriers, lower socioeconomic class, or region-specific barriers.[27,31,32]
3. Guiding women on practical strategies that help them incorporate exercises into their daily routine and busy schedule.[27,31-33]
4. Correction of misconceptions and myths about UI as normal, PFMT as harmful, and the superior role of medication safety.[28,30,32,33]
5. Planning and implementation of formal, structured practical exercise programs for guiding women.[29-31,33]
6. Reassuring women on PFMT safety and effectiveness and building their confidence via sharing positive evidence.[31-33]
7. Conducting large-scale public awareness campaigns for the destigmatization of pelvic floor dysfunction.[28,34]
8. Expanding expert care through interprofessional collaboration by training midwives and nurses by physiotherapists in pelvic floor muscle exercises.[34]
9. Providing women with individualized and clear guidance on pelvic floor muscle exercises, correct technique, intensity, duration, and progression.[32,35]
10. Establishing regular follow-up systems to monitor PFMT progress and for their persistent motivation.[32-35]
11. Nationwide relevant PFMT educational model expansion.[35]
12. Utilization of digital and social media platforms for widespread, appropriate, and accurate dissemination of information.[27,36]
13. Conduction of research to identify region-specific barriers and develop interventions accordingly, as well as research on the relationship between sociodemographic characteristics, knowledge, and practice of pelvic floor muscle exercises.[30,36,37]
14. Physiotherapists and healthcare practitioners should go beyond teaching PFME at antenatal clinics and help each woman individually identify personal reminders that enhance performance and adherence. This approach addresses the key barriers of forgetting, tiredness and busy schedules. And eventually translates and turns knowledge into real practice.[37]

Conclusions

This systematic review reveals that there is a significant gap between knowledge, awareness, and practice of pelvic floor muscle exercises that needs to be addressed. The systematic failure of women's health education is highlighted by the reported consistently lower adherence rate to pelvic exercises. The ignorance is driven by barriers like fatigue, forgetfulness, and failure to spare time from a busy routine schedule, compounded by reduced healthcare provider guidance and motivation. Moving forward, empowering women requires a shift. From simply providing information to building supportive, proactive healthcare systems. And integration of practical, tailored counseling, reminders, and public awareness campaigns to bridge this know-do gap effectively.

Table 4. Barriers to performing pelvic floor muscle exercises.

Author (year)	Knowledge and awareness deficits	Healthcare system and guidance issues	Practical and motivational barriers	Attitudinal and cultural beliefs
Bin Othman *et al.* (2025)[27]	Lack of knowledge (54.1%)	Lack of access to facilities (68.9%)	Forgetting (70.8%) No time (57%) Feeling tired (49.7%)	-
Ismail *et al.* (2024)[28]	Lack of awareness and education	Low healthcare engagement (few received instructions)	Time constraints and exhaustion	Cultural normalization of UI preference for medication over exercise
Fauzey *et al.* (2023)[29]	-	Lack of guidance from HCPs	-	No symptom-driven motivation
Gul *et al.* (2022)[30]	Did not understand instructions (12.2%)	-	Too busy (34.7%) Forgot (32.7%)	Believed it was not important (10.2%)
Saeed *et al.* (2022)[31]	Lack of information (only 5.2% felt informed)	-	Too busy (46.2%) Would feel tired (42.3%) Childcare activities (50.4%)	Fear of performing exercises (48.6%)
Derrar *et al.* (2022)[36]	-	-	-	-
Ihegihu *et al.* (2022)[34]	Lack of awareness and poor knowledge	Underutilization of experts (physiotherapists not integrated)	Forgetting, not prioritizing, daily activities, too tired	Good sexual satisfaction reduced perceived need
Jarni *et al.* (2021)[35]	Knowledge-practice gap	-	-	Boredom (41.1% found it boring/neutral)
Okeke *et al.* (2020)[37]	Lack of awareness (25.7%)	-	Forgetting (40.4%) Too tired (35.9%) Too busy (18%)	Did not think it was important (11.4%)
Temtanakitpaisan *et al.* (2020)[32]	Profound knowledge-practice gap Lack of detailed knowledge	Lack of physician involvement (none received info directly)	Low adherence	Lack of awareness of benefits
Habib *et al.* (2020)[33]	Lack of awareness (91.1%) Lack of formal HCP education	No formal antenatal education system	Lack of motivation (no reassurance on efficacy/safety)	Misconceptions (UI is normal)

HCP, Health Care Practitioner; UI, urinary incontinence.

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Limitations

There are several limitations of this systematic review, despite its rigorous methodology. The inclusion criteria were restricted to studies published in English due to the absence of translation services. This potentiates the omission of significant studies published in other languages. Furthermore, the generalizability of the findings is constrained by the geographical concentration of the included studies in Asia and the Middle East. This limits applicability to other cultural and healthcare contexts. The reliance on self-reported data in primary studies is susceptible to social desirability and recall bias. Notably, none of the included studies employed urodynamic testing to objectively determine whether incontinence was stress- or detrusor-related, nor did they use urodynamic or cystography to functionally evaluate participants. Incontinence status was ascertained primarily through self-reported questionnaires. Only one study (Fouzey *et al*.) attempted to distinguish incontinence type, using a validated questionnaire-based classification using the Michigan Incontinence Symptom Index rather than urodynamics. Consequently, the findings pertain to self-reported incontinence and knowledge, attitude, and practice outcomes rather than to urodynamically confirmed diagnoses. Finally, while quality assessment was conducted, the significant heterogeneity in measurement tools and outcome definitions across the studies precluded a meta-analysis. This limits the ability to pool the results quantitatively. Future studies should incorporate urodynamic and imaging assessment to objectively classify incontinence type and evaluate pelvic floor function.

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