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EFFECTIVENESS AND COMPLIANCE OF KEGEL EXERCISES: A REVIEW OF CLINICAL AND COMMUNITY-BASED STUDIES

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Abstract

A well-known conservative treatment for pelvic floor diseases, such as urine incontinence and pelvic organ prolapse, is Kegel exercises, also known as pelvic floor muscle training (PFMT). This review synthesizes evidence from clinical and community-based studies conducted between 2001 and 2025, highlighting the efficacy of Kegel exercises in improving pelvic muscle strength, reducing urinary symptoms, accelerating postpartum healing, and enhancing quality of life across diverse populations. Despite proven benefits, patient compliance remains a significant challenge, often due to improper technique and motivation issues. Strategies including supervised training,

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biofeedback, and mobile health applications have demonstrated improved adherence and treatment outcomes. Additionally, combining Kegel exercises with adjunct therapies like abdominal strengthening and electrical stimulation yields superior results. The review underscores the importance of individualized exercise programs, patient education, and ongoing support to optimize therapeutic success. Future research should focus on standardized protocols and long-term adherence to maximize clinical benefits.

Keywords

Kegel exercises, urinary incontinence, pelvic floor muscle training, patient compliance, biofeedback

Introduction

A key component of the conservative treatment of pelvic floor diseases like fecal incontinence, pelvic organ prolapse, and urine incontinence (UI) is the use of Kegel exercises, commonly known as pelvic floor muscle training (PFMT) (1–5). In order to repair or preserve pelvic organ support and function, these exercises, which were initially outlined by Dr. Arnold Kegel in the 1940s, concentrate on strengthening the pelvic floor muscles. Over the decades, a substantial body of clinical and community-based research has demonstrated the efficacy of Kegel exercises in reducing symptoms of stress urinary incontinence (SUI) and urge urinary incontinence (UUI) among women of various age groups, including postpartum mothers and elderly populations(6–9).

For instance, systematic reviews have reported that PFMT can reduce urinary leakage episodes by up to 50% and improve pelvic floor muscle strength, leading to enhanced bladder control and quality of life(2,10–16). Studies in elderly women living in rest homes showed significant reductions in urgency, frequency, and nocturia after Kegel exercise interventions, with improvements sustained at follow-up assessments(17,18). Similarly, postpartum women practicing Kegel exercises exhibited accelerated healing of perineal wounds and a notable decrease in stress urinary incontinence symptoms, confirming the exercises' preventive and rehabilitative roles(3,4,19–22).

While the effectiveness of Kegel exercises is well established, patient compliance remains a

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major challenge limiting therapeutic success(3,6,21,23–25). Reports indicate that incorrect technique, poor motivation, and lack of continuous guidance lead to suboptimal adherence, with some studies citing compliance rates as low as 30–50%(26–29). This has prompted the development of various adherence-enhancing strategies, including supervised training, biofeedback devices, mobile applications, and structured educational programs(30–35).

For example, women receiving supervised Kegel training combined with visual feedback via transperineal ultrasound showed greater improvements in muscle strength and urinary symptoms compared to those performing unsupervised exercises(6,36–38). Additionally, interactive mobile apps gamifying Kegel exercises have increased patient engagement and adherence in younger populations(39–42). Moreover, combining Kegel exercises with other therapies such as abdominal strengthening, electrical stimulation, or behavioral modification has been shown to augment treatment outcomes(3,4,43–46).

Clinical trials demonstrated that Kegel exercises plus abdominal muscle training resulted in superior improvements in urinary incontinence severity and sleep quality than Kegel exercises alone in postmenopausal women(8,47–49). Similarly, adjunctive electrical stimulation paired with PFMT enhanced pelvic muscle function and quality of life post-delivery(12,21,50–53). Given the high global prevalence of pelvic floor dysfunction, which affects up to 50% of women at some point in life, and the substantial impact on physical, psychological, and social well-being, optimizing Kegel exercise programs is a public health priority(54–59).

This review synthesizes the evidence on the effectiveness of Kegel exercises across clinical and community settings and examines factors influencing patient compliance. The review also discusses interventions designed to improve adherence and explores combined therapeutic approaches, aiming to guide healthcare professionals in delivering patient-centered pelvic floor rehabilitation(3,37,60–62).

Methodology

To find primary research on the efficacy and compliance of Kegel exercises published between 2001 and 2025, a thorough literature search was carried out utilizing Google, Google Scholar, PubMed, and other pertinent scientific sources. Only articles written in English that specifically

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discussed Kegel exercises as an intervention in clinical or community-based settings were included, while reviews, commentaries, editorials, and short communications were excluded to ensure the review focused solely on original research evidence. Search terms such as "Kegel exercises," "pelvic floor muscle training," "effectiveness," "compliance," "adherence," and related keywords were combined using appropriate Boolean operators.

Following a relevancy screening of all discovered titles and abstracts, a full-text review was conducted using the established inclusion and exclusion criteria. Relevant data were extracted into a structured table summarizing details such as author, publication year, country, study design, sample size, population, setting, intervention characteristics, duration, and outcomes related to effectiveness and compliance. Finally, a qualitative analysis and synthesis were carried out to compare and interpret the findings, highlighting key trends, similarities, and gaps across the selected studies, and drawing conclusions on the practical implications for clinical and community practice.

Results

The results of this review are presented following a systematic and standardized process. Initially, all identified article titles were screened for relevance to the topic of Kegel exercises, focusing on their effectiveness and compliance among different populations. Duplicate records were removed to ensure data accuracy. Following this, the remaining titles and abstracts were assessed against the inclusion and exclusion criteria. After thorough screening, a total of 63 studies were included for final analysis. The eligible studies were then segregated as per the standardized review format, and key findings were synthesized to present clear and comprehensive results that reflect evidence from both clinical and community-based settings. The data is represented based on the following sections.

Aim

The studies widely support the effectiveness of Kegel exercises (KE) in managing urinary incontinence (UI) across populations, especially in elderly, postpartum, and postmenopausal women (63–66,66–78). Many studies compared KE with other methods such as abdominal exercises, aerobic training, biofeedback, electrical stimulation, and magnetic innervation, often finding superior or complementary effects when combined (6,65,69,79–85). KE also contributed

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to perineal wound healing, pelvic muscle strength, and quality of life improvements (86–91). Innovative approaches like visual feedback, vibration, and video teaching enhanced adherence and outcomes (36,92–94). Studies involving men showed benefits in erectile function, premature ejaculation, and continence during cancer treatment (95–100). Systematic reviews confirm KE's role as a safe, first-line intervention for pelvic floor dysfunctions (76,101,102)(Table 1).

Table 1: Kegel exercises conducted by authors and years from 2001 to 2025

Sl.No	Author	Year	Reference
1.	Bridgeman et al., Miller & Sand, Karimi et al.	Not specified	(92,103,104)
2.	Cammu et al.	2001	(105)
3.	Ergul Aslan et al., Puppo et al.	2008	(67,95)
4.	Sabah et al., Vickers et al.	2009	(102,106)
5.	Silva et al.	2011	(77)
6.	Taqdees et al.	2012	(107)
7.	Hafiz Muhammad Asim et al., Siva et al.	2013	(85,108)
8.	Eder et al.	2014	(79)
9.	Dönmez et al., Cavkaytar et al., Cha et al.	2015	(73,87,109)
10.	El Nahas et al.	2017	(80)
11.	Bae et al., Hoseinkhani et al., Nilsen et al., Rodas et al.	2018	(3,93,110,111)
12.	Khames et al., Nguyen et al., Kask et al., Karimzadeh et al., Uravylioglu et al.	2019	(75,83,99,112,113)
13.	Margarita Avramova	2020	(68)
14.	Mozhghan Goodarzi Nasab et al., Goodarzi Nasab et al., Mikuš et al., Mundet et al., Torgbenu et al., Urvaylıoğlu et al.	2021	(74,82,84,100,101,114)
15.	Cross et al., Garg et al., Vrbanić et al., Masnila et al., Sharma et al.	2022	(6,82,88,94,115)
16.	Anam Aftab et al., Samar Shaban Abdelazim Mohamed et al., Dadkhah et al., Chen et al., Nahid Radnia et al., Khalid et al., Özen et al., Rodríguez-Longobardo et al.,	2023	(43,66,71,72,90,116–119)

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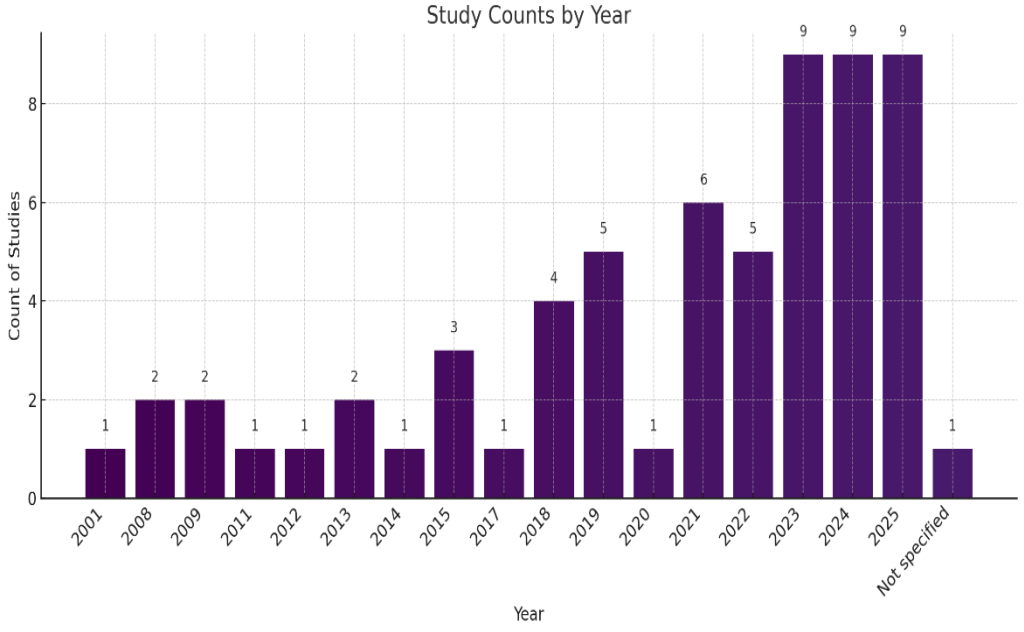
	Parantean et al.		
17.	A. Mohamed, Narges Ansari Chaharsoghi et al., Reni Yuli Astutik et al., Radnia et al., Pires et al., Özdelikara et al., Tunes De Paula et al., Sulala et al., Saumaningrum et al.	2024	(69,76,86,91,96,97,117,120,121)
18.	Esti Sri Ananingsih et al., Grenda Aprilyawan et al., Başgöl et al., Elsamra et al., Rahayu et al., Șerbănescu et al., Singh et al., Wang et al., Villalba et al.	2025	(36,65,70,78,89,98,122–124)

The table summarizes key studies on Kegel exercises and pelvic floor muscle training from 2001 to 2025, showing growing research interest over time. Foundational studies appeared in the early 2000s (67,95,105), with increasing publications through 2011–2015 (73,77,79,87,107,108). Research expanded further from 2017 to 2020 (3,68,74,75,83,84,93,112–114). Recent studies



(2021–2025) reflect diverse approaches and populations, emphasizing the ongoing development in pelvic floor rehabilitation (6,36,43,65,66,69–72,74,76,78,81,86,89–91,94,96–98,101,114–119,121,123,124). Some studies lack specified years but add important perspectives (**Figure 1**).

Figure 1: Kegel exercises studies conducted from 2001 to 2025 Countries

Studies on Kegel exercises were conducted worldwide, primarily in Egypt (7 studies) (68,78,81,111,114,120), Iran (7 studies) (43,71,74,87,103,108,113), Turkey (8 studies)

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(67,92,93,98,102,116,122), Indonesia (8 studies) (3,69,72,86,94,101,117,119), and Pakistan (4 studies) (70,77,79,82), across settings such as university hospitals, outpatient clinics, community health centers, and social homes. Research also came from Europe including Belgium (1) (109), Croatia (2) (80,112), France (1) (104), Spain (2) (76,83), and Norway (1) (84); North America—USA (1) (88); Australia (1) (105); South Korea (2) (65,73); India (3) (36,96,106); Brazil (2) (89,121); and Ecuador (1) (124). Several studies were systematic or literature reviews covering multiple countries (91,107,123). The diverse geographic and clinical settings highlight the global relevance of pelvic floor rehabilitation and Kegel exercises (Figure 2).

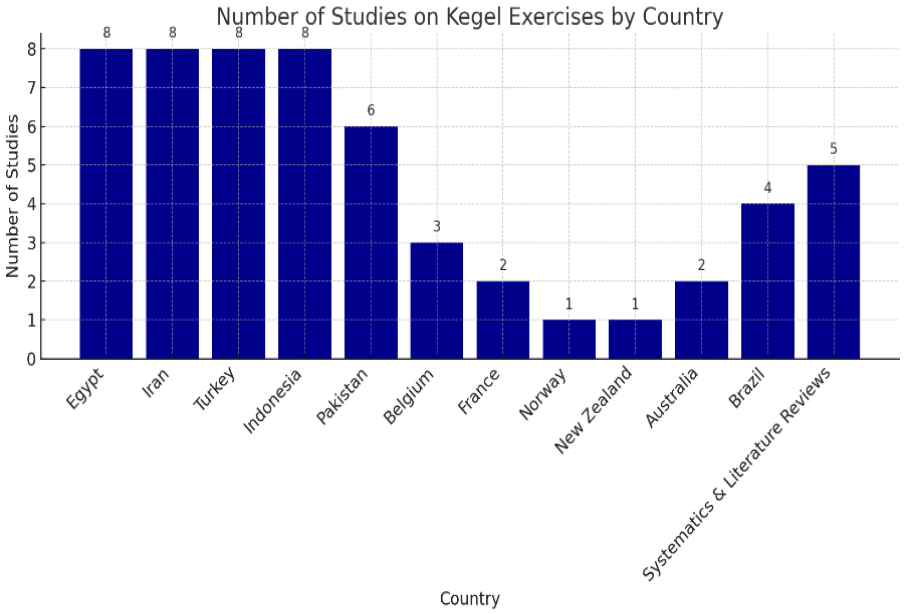

Figure 2: Kegel exercises studies conducted in countries from 2001-2025

Design

The included studies reflect diverse research designs. Several were Randomized controlled trials (RCTs), including single-blind or parallel-group designs, adhering to rigorous protocols such as the Consolidated Standards of Reporting Trials (CONSORT) guidelines (65,71,81,82,87,107,117,120,124). Many studies adopted quasi-experimental designs, including pre-test/post-test or post-test-only formats with purposive or convenience sampling (6,66,69,70,72,85,88,91,94,104,106,114,115,118). A few were pre-experimental with one-group pre/post-test methods (83,119,122). Various observational and descriptive designs were also

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reported, including cross-sectional, longitudinal, cohort, case studies, and retrospective comparisons (36,43,77,89,90,92,93,97–99,105,112). Additionally, several systematic, narrative, and integrative reviews followed standardized guidelines like Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (3,76,78,95,96,101). Other entries involved community projects, technological development, or non-randomized designs with unspecified sampling methods (74,80,86,100,102,108,109). The variety of methodologies reflects a mix of high to moderate levels of evidence across the reviewed literature (**Figure 3**).

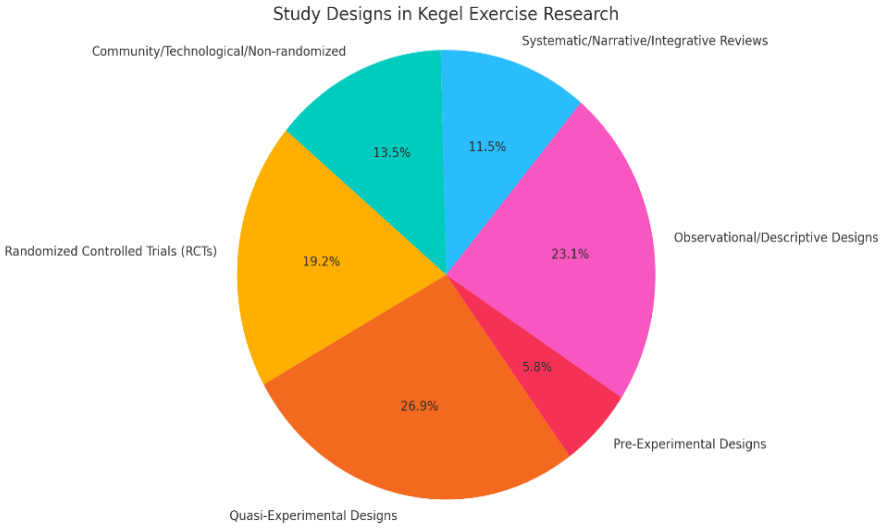

Figure 3: Kegel exercises studies applied study designs from 2001-2025

Population

Most studies focused on women with stress urinary incontinence, postpartum recovery, or pelvic floor dysfunction, with sample sizes typically ranging from 30 to 150 participants (65,68,71,72,78,88,93,108,117). Participants included postmenopausal, elderly, and postpartum women, as well as younger females with dysmenorrhea or athletic backgrounds (69,104,116,119). Some studies involved special populations such as women with multiple sclerosis, cystocele, fecal incontinence, or type 2 diabetes (84,97,107,118,121). A few trials included men, particularly in the context of erectile function or prostate cancer rehabilitation (92,95,100,124). While many studies were randomized and adequately powered, others were small-scale or case-based, including pilot studies and single-patient reports (77,89,94,113).

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Overall, the studies captured a diverse population with varied clinical conditions to evaluate the effectiveness of Kegel exercises across settings (1–64) (**Figure 4**).

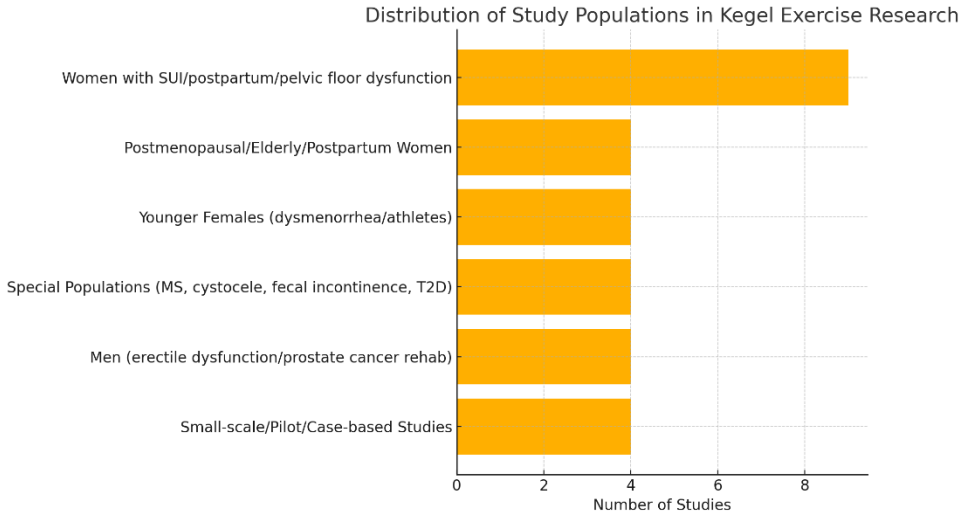

Figure 4: Kegel exercises studies utilised a study population from 2001-2025

Study interventions

The reviewed interventions commonly applied Kegel exercises (KE) 2–4 times daily over 6 to 12 weeks, often extended to several months (68,70,71,73,79,89,108,114,119). Many studies combined KE with abdominal, aerobic, or stabilization exercises (65,66,69,83,114,116), or with biofeedback, electrical stimulation, or neuromodulation to enhance pelvic floor outcomes (6,43,79–81,84,96,102). Several studies introduced innovative methods like mobile apps, vibration devices, and visual biofeedback to improve adherence (36,92,93,113). Interventions also targeted postpartum healing, urinary incontinence, erectile function, and pelvic floor strength in women and men (75,86,87,90,95,98,120,123). Educational strategies such as video teaching, booklets, and supervised training were also used to support proper KE performance (6,94,100,106,109,112). Overall, the studies support KE as a versatile and effective intervention across different populations and clinical outcomes (76,78,101)(**Figue5**).

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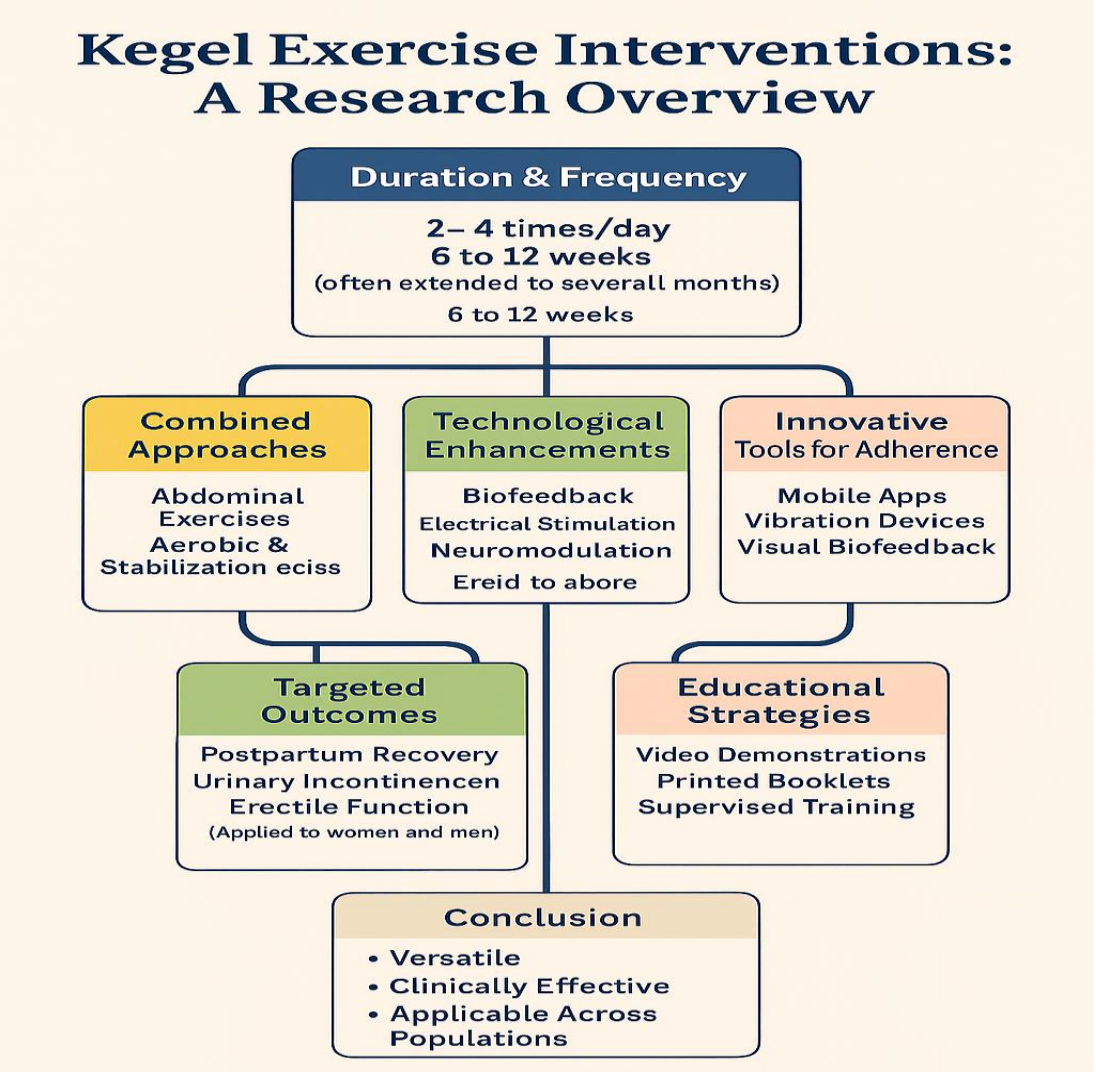

Figure 5: Research designs applied with Kegel exercises

The studies utilized a wide range of tools and instruments to evaluate outcomes related to urinary incontinence, pelvic floor muscle function, pain, wound healing, and quality of life. Commonly used questionnaires included the Incontinence Impact Questionnaire–Short Form (7 items) (IIQ-7), Urogenital Distress Inventory (UDI), International Consultation on Incontinence Questionnaire (ICIQ), and self-administered symptom assessments (43,68,71,72,82,121). Objective measurements employed perineometers, trans perineal ultrasound, pad tests, vaginal pressure sensors, and anal manometry to quantify pelvic floor muscle strength, muscle thickness, and urine leakage (6,36,77,79,80,84,85,114). Pain and dysmenorrhea were assessed using Visual Analogue Scales and specialized pain intensity sheets (69,74,83,104). Wound healing was measured with the Redness, Edema, Ecchymosis, Discharge, Approximation (used for perineal

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wound healing assessment (REEDA) score (86,89,91).

Psychological and quality of life outcomes were evaluated using validated instruments such as the Beck Depression Inventory, Short Form (36) Health Survey (SF-36), and King's Health Questionnaire (111,116,118). Novel tools included Kegel exercise devices, mobile app sensors, and biofeedback systems to enhance exercise compliance and effectiveness (102,109,113). Software like Statistical Package for the Social Sciences (SPSS) was used for statistical analysis, and tests like the Wilcoxon, Mann-Whitney, and T-tests were used to assess the data (66,68,107). Some studies incorporated specialized clinical scales like the Modified Oxford Grading Scale and Vaizey's incontinence score to standardize assessments (112,115)(Table 2).

Table 2: Research tools and instruments used with Kegel exercises

Category	Number of Studies	References
Symptom & QoL Questionnaires (IIQ-7, UDI, ICIQ, SF-36, KHQ)	7	(43,68,71,72,82,111,118,121)
Objective Physical Measures (perineometers, ultrasound, pad tests)	7	(6,36,77,79,80,84,85,114)
Pain & Healing Assessments (VAS, REEDA score)	5	(69,74,83,86,89,91,104)
Psychological Evaluation (BDI)	2	(111,116,118)
Innovative Tech Tools (apps, biofeedback, Kegel devices)	3	(102,109,113)
Statistical & Clinical Scales (SPSS, Oxford, Vaizey)	3	(66,68,107,112,115)

Key:

The tools and instruments used in the studies include several widely recognized abbreviations: IIQ-7 (Incontinence Impact Questionnaire-Short Form), UDI (Urogenital Distress Inventory), ICIQ (International Consultation on Incontinence Questionnaire), SF-36 (Short Form Health Survey-36), KHQ (King's Health Questionnaire), VAS (Visual Analogue Scale), REEDA (Redness, Edema, Ecchymosis, Discharge, Approximation), and BDI (Beck Depression Inventory).

Results

Studies consistently demonstrate that Kegel exercises and pelvic floor muscle training

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significantly improve pelvic dysfunction outcomes, including reductions in urinary incontinence episodes, frequency of urination, pain, and symptom distress, while enhancing quality of life and pelvic floor muscle strength (68,70–74,122). These exercises also accelerate perineal wound healing postpartum and improve defecation symptoms, making them effective adjunct therapies (86–88,101,120). Combined therapies, such as Kegel exercises with abdominal or electrical stimulation, often yield superior results in muscle strength and symptom control compared to Kegel exercises alone (43,65,80,81). Behavioral and supervised interventions, including biofeedback and ultrasound-guided exercises, improve compliance and treatment efficacy (6,36,67).

Additionally, Kegel exercises demonstrate benefits for specific populations such as elderly women, postpartum mothers, prostatectomy patients, and individuals with multiple sclerosis or erectile dysfunction, contributing to improved physical, psychological, and sexual health outcomes (69,75,93,95,110,116,124). Proper teaching, adherence, and individualized protocols are crucial for success, as is the integration of Kegel exercises into nursing education and clinical practice (92,94,106,109,112). Overall, these non-invasive, low-cost interventions are recommended as first-line treatments for pelvic floor disorders and urinary incontinence, with calls for further large-scale and long-term studies to confirm and expand these findings (68,81,99,100,123).

Discussion

This review affirms the well-established efficacy of Kegel exercises (KE) or pelvic floor muscle training (PFMT) as a first-line conservative intervention for managing pelvic floor disorders, especially urinary incontinence (UI). Consistent with earlier foundational studies (Cammu et al., 2001(105); Ergul Aslan et al., 2008)(67), contemporary research continues to demonstrate significant improvements in pelvic floor muscle strength, symptom reduction, and quality of life across diverse populations, including postpartum, elderly, and postmenopausal women (Sabah et al., 2009(106); Silva et al., 2011(77); Mozhghan Goodarzi Nasab et al., 2021)(74).

The reviewed literature corroborates systematic reviews and meta-analyses showing that PFMT can reduce urinary leakage episodes by up to 50%, which is clinically significant in improving patients' daily functioning (Rodriguez-Longobardo et al., 2023(119); Cross et al., 2022)(125).

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The consistent findings across randomized controlled trials (RCTs) and quasi-experimental studies reinforce the robustness of KE as an effective, non-invasive therapy (Khames et al., 2019(75); El Nahas et al., 2017)(80).

Patient compliance remains a key challenge limiting KE's maximal therapeutic benefits, with adherence rates reported as low as 30–50% due to factors such as incorrect technique, motivation deficits, and lack of ongoing supervision (Bae et al., 2018(110); Samar Shaban Abdelazim Mohamed et al., 2023)(72). Innovative strategies, including biofeedback, transperineal ultrasound-guided training, and interactive mobile applications, have shown promising results in improving compliance and exercise effectiveness (Dönmez et al., 2015(87); Hoseinkhani et al., 2018(111); Rahayu et al., 2025)(89).

For example, supervised training combined with visual feedback significantly enhanced muscle strength gains compared to unsupervised exercises, emphasizing the need for structured patient education and support (Cha et al., 2015(109); Khalid et al., 2023)(66). Moreover, the integration of KE with adjunctive therapies such as abdominal muscle strengthening, electrical stimulation, and behavioral modifications demonstrated superior outcomes in urinary incontinence severity, muscle function, and sleep quality compared to KE alone (Cammu et al., 2001(105); El Nahas et al., 2017(80); Dadkhah et al., 2023)(116).

These findings support a multimodal rehabilitation approach tailored to individual patient needs, which aligns with contemporary clinical guidelines advocating personalized pelvic floor rehabilitation (Mikuš et al., 2021(82); Villalba et al., 2025)(98). The application of KE has also expanded beyond female urinary incontinence to include men with pelvic floor dysfunction related to prostate cancer treatment and erectile dysfunction, with studies reporting improved continence and sexual health outcomes (Puppo et al., 2008(95); Khames et al., 2019(75); Sulala et al., 2024)(91).

This highlights the versatility of PFMT and its potential benefits across gender and clinical conditions. Despite the breadth of evidence, several limitations persist in the current body of literature. Many studies have relatively small sample sizes or short follow-up durations, limiting

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generalizability and assessment of long-term adherence and outcomes (Torgbenu et al., 2021(101); Sharma et al., 2022)(94).

Furthermore, methodological heterogeneity in exercise protocols, outcome measures, and compliance assessments complicates direct comparison and synthesis of findings (Nilsen et al., 2018(93); Anam Aftab et al., 2023)(71). In order to more clearly define the best exercise routines and adherence techniques, future studies should concentrate on extensive, long-term randomized trials with standardized KE protocols and objective compliance oversight.

Additionally, exploring technological innovations such as wearable sensors and artificial intelligence-guided coaching may further enhance patient engagement and outcomes (Goodarzi Nasab et al., 2021(114); Şerbănescu et al., 2025)(123). From a clinical and educational perspective, incorporating KE training into nursing curricula and routine pelvic floor assessment can empower healthcare providers to effectively teach and monitor patients, thereby improving adherence and clinical outcomes (Khames et al., 2019(75); Vrbanić et al., 2022)(81). Given the high global prevalence and profound physical, psychological, and social impact of pelvic floor dysfunction, advancing evidence-based, patient-centered KE programs is a critical public health priority (Bridgeman et al., 92); Esti Sri Ananingsih et al., 2025 (70).

Conclusion

Kegel exercises are an effective, safe, and low-cost treatment for pelvic floor disorders, improving muscle strength, symptoms, and quality of life. However, low patient compliance limits their success. Supervised training, biofeedback, and mobile apps help improve adherence. Combining Kegel exercises with other therapies enhances outcomes. Individualized protocols and patient education are key to maximizing benefits. Further research is needed to standardize approaches and improve long-term adherence.

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