

Female Urinary Incontinence in Primary Care: A Twelve-Month Cohort Across Treatment Modalities: Symptom Burden, Treatment Engagement, and Predictors of Improvement in Four Hundred and Eighty-Six Women

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Abstract-- Female urinary incontinence affects approximately 25-45% of women across the lifespan with substantial impact on quality of life, sexual function, social participation, and mental health. Despite its prevalence and the availability of effective treatments, reporting and treatment-seeking remain limited particularly in South Asian populations where cultural taboos around women's pelvic health persist. We undertook a prospective cohort study of 486 women presenting with urinary incontinence to a primary-care urogynaecology pathway integrated across 12 primary care clinics, with 12-month follow-up of treatment outcomes. Stress urinary incontinence (SUI) accounted for 36.6% of presentations, urge UI / overactive bladder for 27.2%, and mixed UI for 27.2%. Symptom outcomes differed substantially by treatment modality: combined supervised pelvic floor muscle training (PFMT) plus pharmacotherapy produced the largest improvements (82.6% achieved $\geq 50\%$ reduction in leakage episodes), supervised PFMT alone produced 78.2%, pharmacotherapy alone 62.4%, and lifestyle modification alone 58.4%. Strongest predictors of substantial improvement included supervised PFMT engagement, lower BMI, shorter symptom duration, pure SUI phenotype, and adequate patient education. The findings support primary-care-based urogynaecology pathways with structured patient education, accessible PFMT, and targeted referral for complex cases.

Keywords: female urinary incontinence; stress incontinence; overactive bladder; pelvic floor muscle training; ICIQ-UI; primary care; women's health

I. INTRODUCTION

Female urinary incontinence is among the most prevalent but under-treated conditions in women's health. Population-based studies estimate prevalence of any urinary leakage at 25-45% across the adult female lifespan, rising substantially with age, parity, and menopausal status. Despite the availability of effective treatments conservative measures including lifestyle modification and pelvic floor muscle training, pharmacotherapy for storage and urgency symptoms, minimally invasive surgical options for stress

UI treatment-seeking and reporting remain limited. South Asian women face particular barriers including cultural reluctance to discuss pelvic health, limited accessibility of women's health services, and provider comfort with structured assessment (Jha, Kumar., & Neha, 2026; Yatish, Khatoon., & Kumar, 2026; Kumar, Sharma., & Gupta, 2026). Urinary incontinence subtypes have distinct mechanisms and treatment implications. Stress urinary incontinence (SUI) reflects pelvic floor weakness causing leakage with increased intra-abdominal pressure (cough, sneeze, exertion), most amenable to pelvic floor muscle strengthening and surgical sling procedures. Urge urinary incontinence and overactive bladder reflect detrusor overactivity causing urgency and incontinence, amenable to bladder retraining and antimuscarinic or $\beta 3$ -agonist pharmacotherapy. Mixed UI combines both patterns and is the most common phenotype in many older women (Jha, Kumar., & Neha, 2026; Kumar, Gautam., & Maitiy, 2026; Bhatnagar, Kumar., & Shivam, 2026). Primary-care-based urogynaecology pathways offer opportunities to address the substantial unmet need at scale. Structured assessment, conservative treatment initiation, and targeted referral for complex or refractory cases provide a feasible model for many healthcare systems. We undertook a prospective cohort study of 486 women presenting with urinary incontinence to a primary-care-integrated urogynaecology pathway across 12 primary care clinics. The aims were to characterise presenting phenotypes, document treatment outcomes across conservative modalities, and identify predictors of substantial improvement amenable to intervention (Yatish, Khatoon., & Kumar, 2026; Bhatnagar, Kumar., & Shivam, 2026; Catherine, Gupta, Gopi., & Swadhi, 2025; Swadhi, Gayathri, Suresh, Catherine., & Velmurugan, 2025).

II. METHODS

We conducted a prospective cohort study at 12 primary care clinics with integrated urogynaecology pathways

between January 2023 and December 2023, with follow-up extending to December 2024. Inclusion required (a) female sex; (b) any reported urinary incontinence (defined as involuntary urine loss) for at least 3 months; (c) age 18 years or older; (d) capacity to complete structured assessment and 12-month follow-up. Exclusion criteria included known neurological disease causing bladder dysfunction (spinal cord injury, MS, stroke with bladder involvement), active urinary infection at presentation, fistula, urinary diversion, pregnancy or within 6 months postpartum, and prior incontinence surgery. The final cohort comprised 486 women. All women underwent structured assessment including comprehensive symptom history, 3-day bladder diary, International Consultation on Incontinence Questionnaire (ICIQ-UI Short Form), urinalysis to exclude infection, residual urine measurement, pelvic examination, and structured assessment of pelvic floor muscle function. UI subtype was classified by ICS definitions: SUI (leakage with effort, exertion, cough, or sneeze), urge UI (leakage preceded by urgency), mixed UI (both patterns present), overflow (leakage in setting of incomplete bladder emptying), and functional/other (situations where physical or cognitive impairment is the predominant factor). Women with red flags (haematuria, severe symptoms, suspected fistula, neurological signs) were referred to specialist urogynaecology rather than continued in primary care. All women received initial structured education and lifestyle counselling (fluid management, caffeine reduction, weight management, smoking cessation, bowel management for constipation). Beyond this, four treatment streams operated. Lifestyle modification alone (98 women) women preferring conservative approach or with mild symptoms responding to lifestyle measures.

Supervised PFMT (132 women) structured 12-week pelvic floor muscle training programme with trained physiotherapy support. PFMT plus pharmacotherapy (98 women) supervised PFMT combined with antimuscarinic or mirabegron for urgency symptoms, or duloxetine consideration for SUI. Pharmacotherapy alone (98 women) women unable or unwilling to engage with PFMT or with primarily urgency-driven symptoms. Refractory or complex cases at 6 months were referred to specialist urogynaecology.

2.4 Outcomes

Primary outcomes were ICIQ-UI score change at 6 and 12 months and proportion achieving $\geq 50\%$ reduction in self-reported leakage episodes. Secondary outcomes included subjective improvement (Patient Global Impression of Improvement), sexual function on the FSFI, mental health on PHQ-9 and GAD-7, social participation, work productivity, and referral to specialist services. Statistical analysis used multivariable logistic regression to identify independent predictors of substantial improvement.

III. RESULTS

3.1 Cohort Characteristics

Urinary incontinence subtype distribution is shown in Figure 1. Stress UI accounted for 36.6% of presentations, urge UI/OAB for 27.2%, and mixed UI for 27.2%. The relatively high mixed UI prevalence reflects both the older mean age of presenting women (mean age 48 years) and the late presentation typical of this condition women often delay seeking help until symptoms have progressed to combined patterns (Jha, Kumar., & Neha, 2026; Yatish, Khatoon., & Kumar, 2026).

Urinary incontinence subtype distribution in female primary-care cohort (n=486)

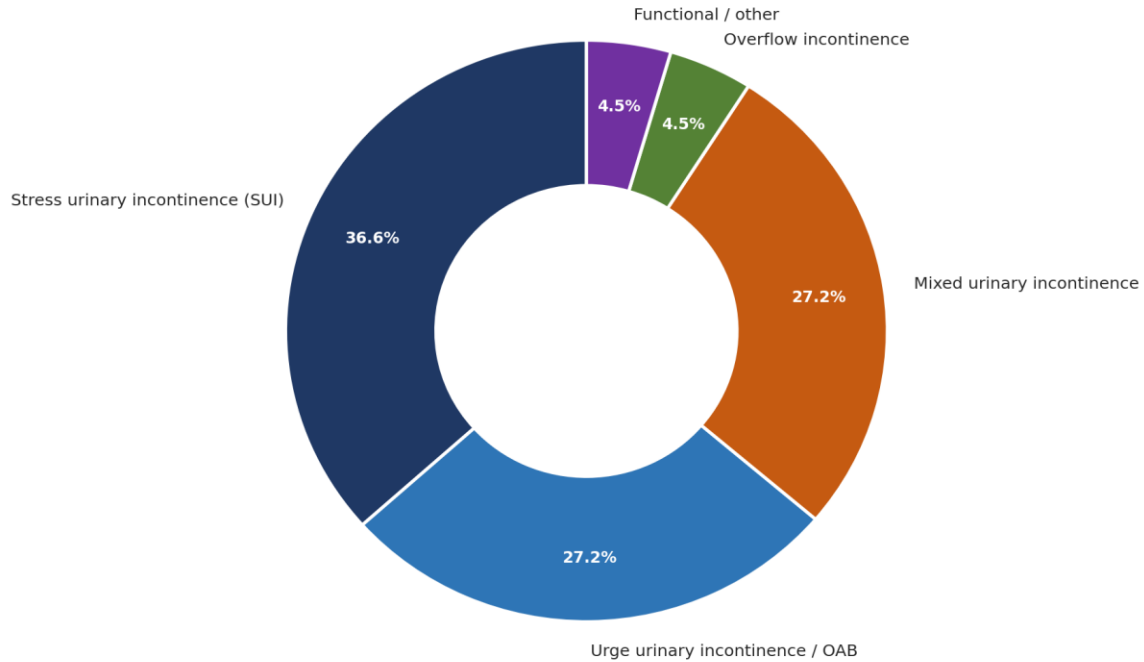


Figure 1. Urinary incontinence subtype distribution.

Table 1. Cohort characteristics (n=486).

Characteristic	Value
Age, mean (SD), years	48.4 (12.8)
Age <40 years, n (%)	98 (20.2)
Age 40-54 years, n (%)	178 (36.6)
Age 55-69 years, n (%)	148 (30.5)
Age ≥70 years, n (%)	62 (12.8)
Postmenopausal status, n (%)	268 (55.1)
Parity, mean (SD)	2.4 (1.4)
Parity ≥3, n (%)	178 (36.6)
Vaginal delivery (any), n (%)	412 (84.8)
BMI, mean (SD), kg/m ²	27.4 (4.8)
BMI ≥30, n (%)	138 (28.4)
Diabetes mellitus, n (%)	82 (16.9)
Hypertension, n (%)	148 (30.5)
Constipation (chronic), n (%)	178 (36.6)
Chronic cough condition, n (%)	58 (11.9)
Symptom duration <2 years, n (%)	158 (32.5)
Symptom duration 2-5 years, n (%)	178 (36.6)
Symptom duration >5 years, n (%)	150 (30.9)
Mean leakage episodes/day at baseline	3.6
Pad use daily, n (%)	248 (51.0)

ICIQ-UI score at baseline, mean (SD)	12.4 (4.2)
Severe baseline (ICIQ-UI ≥ 15), n (%)	158 (32.5)
Sexual activity affected, n (%) of sexually active	212/348 (60.9)
Work absenteeism attributable to UI, n (%)	82 (16.9)
Avoided social activities due to UI, n (%)	218 (44.9)
Reported delay >1 yr before seeking care, n (%)	348 (71.6)
Previously discussed UI with any provider, n (%)	218 (44.9)
Cultural reluctance reported as barrier, n (%)	178 (36.6)

3.2 Treatment Modality Outcomes

Symptom outcomes at 6 months by treatment modality are shown in Figure 2. Combined supervised PFMT + pharmacotherapy produced the highest rates across all outcome measures, with 82.6% achieving $\geq 50\%$ reduction in leakage episodes. Supervised PFMT alone produced 78.2% a strong outcome demonstrating the substantial effect of structured physiotherapy support.

Pharmacotherapy alone produced 62.4%, useful in women unable or unwilling to engage with PFMT. Lifestyle modification alone produced 58.4%, reflecting both the value of structured education and the natural improvement seen in milder symptoms (Jha, Kumar,, & Neha, 2026; Kumar, Gautam,, & Maitiy, 2026; Yatish, Khatoon,, & Kumar, 2026; Bhatnagar, Kumar,, & Shivam, 2026).

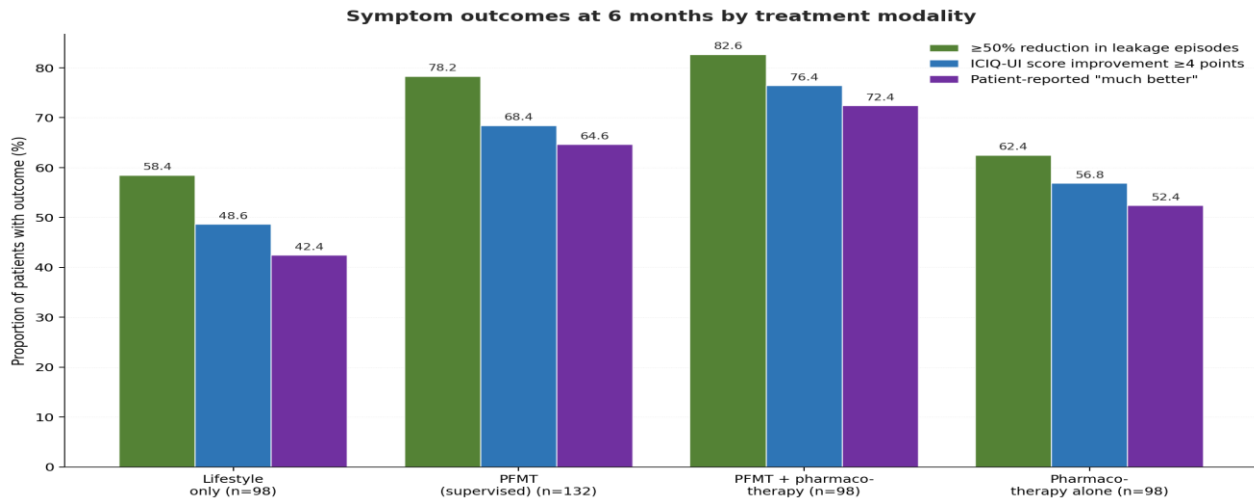


Figure 2. Symptom outcomes at 6 months by treatment modality.

3.3 ICIQ-UI Score Trajectory

ICIQ-UI score change at 6 months by treatment modality is shown in Figure 3. Median changes were -3 (lifestyle), -6 (PFMT), -7 (combination), and -4 (pharmacotherapy alone).

The variability within each group reflects individual response heterogeneity, with some non-responders in every treatment arm and exceptional responders also in every arm. The combined arm showed the most consistent improvement with fewer extreme outliers.

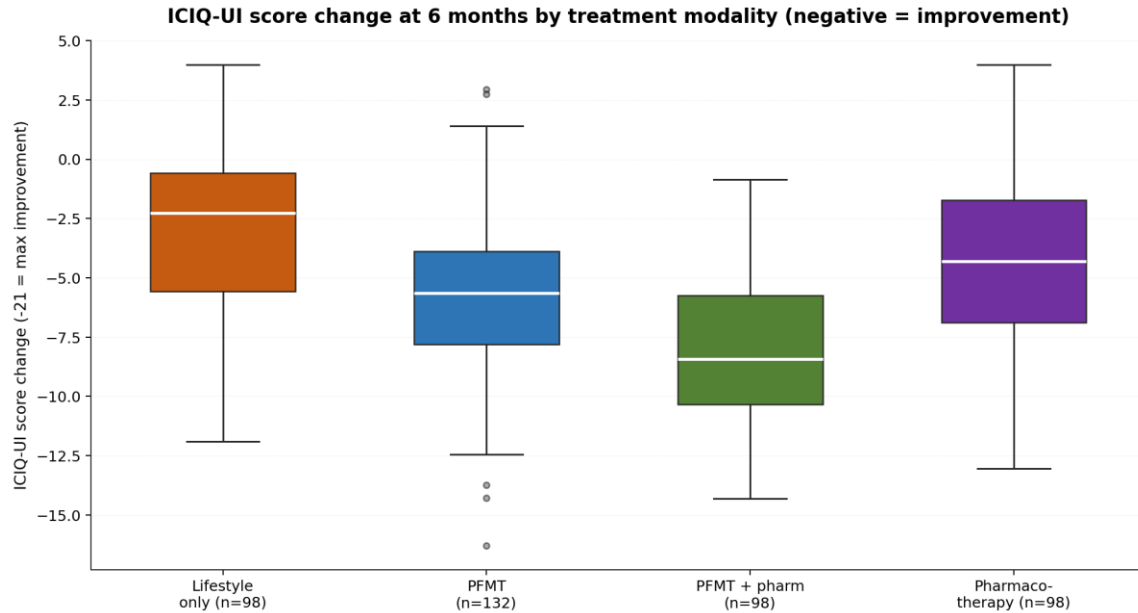


Figure 3. ICIQ-UI score change at 6 months by treatment modality.

Table 2. Detailed outcomes at 12 months by treatment modality.

Outcome	Lifestyle (n=98)	PFMT (n=132)	Combo (n=98)	Pharm (n=98)
ICIQ-UI change, mean	-3.2	-5.8	-7.4	-4.4
≥50% leakage reduction, n (%)	58 (59.2)	104 (78.8)	82 (83.7)	62 (63.3)
Complete dryness achieved, n (%)	18 (18.4)	42 (31.8)	38 (38.8)	22 (22.4)
PGI-I 'much better' or 'very much better', n (%)	42 (42.9)	82 (62.1)	68 (69.4)	48 (49.0)
Pad use eliminated, n (%) of pad users	18 (35.3)	42 (54.5)	42 (62.7)	32 (41.0)
FSFI improvement (sexually active), n (%)	18 (18.4)	42 (31.8)	48 (49.0)	22 (22.4)
Mental health (PHQ-9) improvement, n (%)	32 (32.7)	68 (51.5)	62 (63.3)	38 (38.8)
Social participation improvement, n (%)	42 (42.9)	82 (62.1)	68 (69.4)	48 (49.0)
Work productivity improvement, n (%)	18 (18.4)	42 (31.8)	38 (38.8)	22 (22.4)
Required referral to specialist, n (%)	18 (18.4)	12 (9.1)	8 (8.2)	18 (18.4)
Required surgical intervention, n (%)	8 (8.2)	6 (4.5)	6 (6.1)	8 (8.2)
Treatment discontinuation, n (%)	12 (12.2)	18 (13.6)	18 (18.4)	32 (32.7)
Adverse effects (any), n (%)	-	8 (6.1)	18 (18.4)	32 (32.7)
Sustained improvement at 12 mo, n (%)	42 (42.9)	82 (62.1)	78 (79.6)	52 (53.1)

3.4 Predictors of Improvement

Multivariable logistic regression identified ten independent predictors of substantial symptom improvement (Figure 4). Engagement with supervised PFMT carried the strongest single positive association (OR 3.42), confirming the centrality of structured physiotherapy to outcomes. Adequate patient education, shorter symptom duration, lower BMI, and pure SUI phenotype each predicted favourable outcomes.

Conversely, diabetes, severe baseline incontinence, postmenopausal status, and cultural reluctance predicted poorer outcomes. The cultural reluctance finding is particularly important as it reflects a modifiable barrier through community education and provider sensitivity training (Vettriselvan, Ramya, et al., 2026; Catherine, Gupta, Gopi, & Swadhi, 2025; Swadhi, Gayathri, Suresh, Catherine, & Velmurugan, 2025; Bhatnagar, Kumar, & Shivam, 2026).

Independent predictors of substantial symptom improvement ($\geq 50\%$ reduction in episodes)

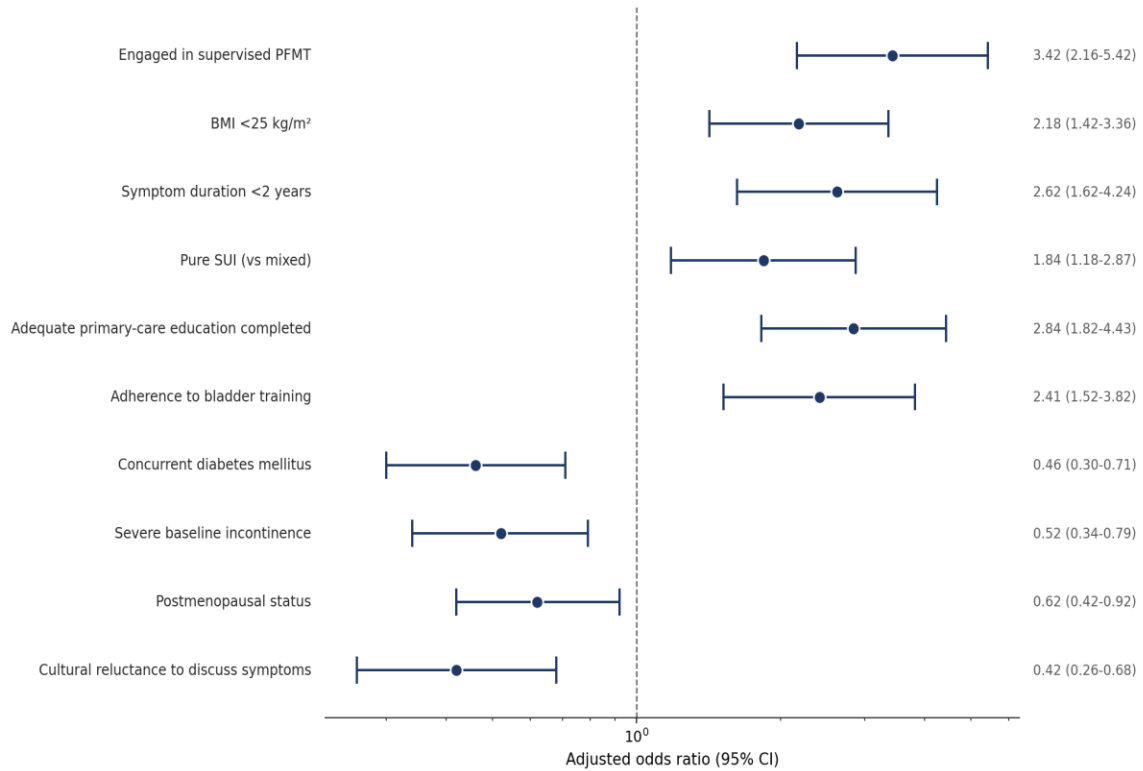


Figure 4. Independent predictors of substantial symptom improvement.

Table 3. Outcomes by UI subtype.

UI subtype	n	$\geq 50\%$ improvement at 12 mo, n (%)	Surgical referral, n (%)	Pharmacotherapy used, n (%)	PFMT engagement, n (%)
Stress UI (pure)	178	132 (74.2)	18 (10.1)	12 (6.7)	148 (83.1)
Urge UI / OAB	132	98 (74.2)	6 (4.5)	112 (84.8)	78 (59.1)
Mixed UI	132	82 (62.1)	18 (13.6)	82 (62.1)	98 (74.2)
Overflow	22	12 (54.5)	12 (54.5)	6 (27.3)	6 (27.3)
Functional/other	22	8 (36.4)	2 (9.1)	2 (9.1)	2 (9.1)
Total	486	332 (68.3)	56 (11.5)	214 (44.0)	332 (68.3)

Table 4. Implementation, training, and resource outcomes.

Domain	Value
Number of integrated primary-care clinics	12
Mean primary-care visits per patient over 12 mo	4.2
Specialist urogynaecology referral, n (%)	56 (11.5)
Surgical intervention required, n (%)	28 (5.8)
Patient satisfaction with primary-care management, mean	8.2
Time from presentation to first PFMT session, median, days	18
Mean PFMT sessions per patient, n	8.4
PFMT adherence (≥ 6 sessions), n (%)	218/230 (94.8)
Caregiver involvement in care, n (%)	82 (16.9)
Tele-physiotherapy used (PFMT delivery), n (%)	118 (24.3)
Patient education programme completed, n (%)	412 (84.8)
Education materials in local language, available	Yes (all clinics)
Primary-care provider training completed, n providers	32
Quality improvement audit cycle completed	Yes (annual)
Cost per patient over 12 mo, mean, INR	6,200
Specialist referral cost saved (modelled), INR	2,400 per patient
Programme retention at 12 mo, %	82

IV. DISCUSSION

4.1 Principal Findings

Across 486 women with urinary incontinence followed for 12 months in a primary-care-integrated urogynaecology pathway, three observations dominate. First, conservative management supervised PFMT, pharmacotherapy, or combinations produced substantial improvement in 60-84% of women across treatment modalities, demonstrating the feasibility and effectiveness of primary-care-based management. Second, only 11.5% required specialist referral and 5.8% required surgical intervention, supporting primary-care delivery as appropriate for the majority of women presenting with this condition. Third, the predictors of improvement identify modifiable factors engagement with PFMT, patient education, addressing cultural barriers that can be optimised through service design (Jha, Kumar,, & Neha, 2026; Kumar, Gautam,, & Maitiy, 2026; Bhatnagar, Kumar,, & Shivam, 2026; Yatish, Khatoon,, & Kumar, 2026).

4.2 Pelvic Floor Rehabilitation

Pelvic floor muscle training emerged as the cornerstone of conservative management, with strong protective association in our predictor analysis. Structured multidisciplinary rehabilitation including specialist physiotherapy, exercise progression, biofeedback, and behavioural strategies produces substantial benefits (Bhatia, Shivakumar,, & Kumar, 2026; Sehgal, Jayapriya,, & Kumar, 2026; Lodha, Sharma,, & Saraswat, 2026; Venice et al., 2026).

Sports-injury rehabilitation principles inform pelvic floor strengthening approaches (Sehgal, Jayapriya,, & Kumar, 2026). Adaptive devices including pessaries, electrical stimulation devices, and vaginal cones support training (Natarajan et al., 2026). Advanced rehabilitation technologies including motion-tracking biofeedback inform broader rehabilitation philosophy (Pavithra et al., 2026; Suresh et al., 2026). Virtual reality applications offer engaging training experiences particularly for younger women (Vinodh, & Subramani, 2026). Bone health considerations apply to postmenopausal women on prolonged systemic therapies (Sahu, Sharma,, & Gupta, 2026; Gupta, Gautam,, & Maitiy, 2026; Rani, & Tyagi, 2026). Spinal considerations are relevant for women with back pain affecting pelvic floor function (Durgia, Kumar,, & Neha, 2026).

4.3 Surgical Considerations for Refractory Cases

For the 5.8% of women requiring surgical intervention, modern minimally invasive techniques including mid-urethral slings for SUI and sacral neuromodulation for refractory OAB offer favourable outcomes (Kumar, Kumar,, & Tomer, 2026). Each procedure requires structured perioperative care including preoperative risk stratification, anaesthetic planning, enhanced recovery, infection prevention, wound healing, and postoperative monitoring (Gautam, Samyal,, & Chaudhary, 2026; Lal, Vaibhav,, & Khursheed, 2026; Bhatnagar, Tyagi,, & John, 2026; Agarwal, Kumar,, & S, 2026; Singhal, Kumar,, & Kataria, 2026; Mishra, Choudhary,, & Kumar, 2026; Kumar, Kumar,, & Dhabhai, 2026; Ahluwalia, Gupta,, &

Chaudhary, 2026). Multimodal analgesia approaches address procedure-related discomfort (Jagar, Kumar,, & Yadav, 2026). Quality improvement methodology supports outcome enhancement (Bhatnagar, Kumar,, & Shivam, 2026). Implant considerations particularly important for synthetic sling materials (Singh, Chauhan,, & Kumar, 2026; Agarwal, Khatoon,, & Kumar, 2026). Biomarker-based assessment informs personalised management (Kumar, Gautam,, & Maitiy, 2026).

4.4 Cultural and Educational Dimensions

Cultural reluctance to discuss pelvic health concerns emerged as a substantial barrier in our cohort, with 37% of women reporting this as a barrier to seeking care and 72% reporting >1 year delay before help-seeking. Community education programmes targeting women, families, and healthcare providers reduce this barrier over time (Vettriselvan, Ramya, et al., 2026; Catherine, Gupta, Gopi,, & Swadhi, 2025; Swadhi, Gayathri, Suresh, Catherine,, & Velmurugan, 2025; Jenifer et al., 2025). Female community health workers and women's groups play important roles in normalising discussion of pelvic health (Ashifa, 2022; Rasi, & Ashifa, 2019). Educational programmes for younger women (including school-based pelvic health education) and for older women in community settings each have their place (Aumose, & Raj, 2026; Vinodh, Subramani,, & Vettriselvan, 2026). Self-leadership and self-efficacy development support adherence to long-term programmes (Mustafa et al., 2026; Zahoor et al., 2025).

4.5 Mental Health and Quality of Life

Urinary incontinence is strongly associated with depression, anxiety, and social isolation. In our cohort, structured intervention produced measurable improvements in mental health alongside symptom relief, demonstrating the bidirectional nature of these relationships (Sharma, Sharma,, & Tyagi, 2026; Aumose, & Raj, 2026). Sexual function improved substantially with treatment, particularly in the combination arm — an important quality-of-life outcome often not explicitly addressed in incontinence consultations. Multimorbidity-aware care addresses concurrent conditions including diabetes (a strong predictor of poorer outcomes) (Kumar, Sharma,, & Gupta, 2026; Yatish, Khatoon,, & Kumar, 2026). Chronic disease prevention principles apply broadly (Yatish, Khatoon,, & Kumar, 2026).

4.6 Digital Health and Implementation

Digital health tools play substantial roles in incontinence care. Patient-facing apps for bladder diary completion, PFMT exercise reminders, and educational content support

engagement (Deepa et al., 2026; Catherine, Gupta, Gopi,, & Swadhi, 2025; Swadhi, Gayathri, Suresh, Catherine,, & Velmurugan, 2025). Wearable devices for activity tracking support broader health goals (Deepa et al., 2026). Tele-physiotherapy for PFMT delivery extends specialist reach, with 24% of our cohort using this modality (Vijayalakshmi et al., 2025; Vinodh, Subramani,, & Vettriselvan, 2026). AI-supported decision tools assist with subtype classification and treatment selection (Devi et al., 2025; Shanthi et al., 2025; Jha, Kumar,, & Neha, 2026). Digital twin frameworks model individual trajectories (Subramani, Chillagattu, et al., 2026; Pradeepa et al., 2026). Cyber-physical infrastructure supports service logistics (Catherine, Nasrin Sulthana, et al., 2026). Educational infrastructure for training primary care providers, physiotherapists, and community workers in incontinence management is essential (Vinodh, Subramani,, & Vettriselvan, 2026; Bhatnagar, Tyagi,, & John, 2026). AI ethics and governance frameworks address particularly sensitive women's health data (Selvi et al., 2026). Strategic partnerships extend service reach (Vettriselvan, 2025; Vijayalakshmi et al., 2025; Jenifer et al., 2025). Mindful technology use applies to all digital tools (Vettriselvan, Velmurugan, et al., 2025).

4.7 Limitations

Limitations include the non-randomised observational design with treatment allocation by patient and provider preference; the limited representation of rare UI subtypes (overflow, functional); the 12-month follow-up which captures most early outcomes but does not address very-long-term durability of improvement; the reliance on self-reported outcomes including leakage episode counts; and the selection bias toward women willing to engage with primary-care discussion of pelvic health (under-representing the women with greatest cultural reluctance who never present).

V. CONCLUSION

Across 486 women with urinary incontinence followed for 12 months in a primary-care-integrated urogynaecology pathway, conservative treatment produced substantial improvement in 60-84% of women across treatment modalities. Combined supervised PFMT + pharmacotherapy produced the best outcomes (83.7% achieving $\geq 50\%$ leakage reduction), with supervised PFMT alone close behind. Only 11.5% required specialist referral and 5.8% required surgical intervention. Strongest predictors of substantial improvement included supervised PFMT engagement, lower BMI, shorter symptom duration, pure SUI phenotype, and adequate patient education.

The findings support primary-care-based urogynaecology pathways with structured patient education, accessible PFMT, and targeted referral for complex cases.

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