DOI: https://doi.org/10.54393/pjhs.v7i4.3839

PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (E): 2790-9352, (P): 2790-9344
Volume 7, Issue 04 (April 2026)

Systematic Review

OPEN ACCESS

Platelet-Rich Plasma and Er: YAG Laser Therapy for Female Stress Urinary Incontinence: A Systematic Review

Misbah Ur Rahman[1], Waqas Ahmad[1], Sana Idrees[2], Wajeeha Nadeem[3], Rabia Khan[4] and Zarmeena Liaqat[5*]

[1]Department of Urology, Institute of Kidney Diseases, Hayatabad Medical Complex, Peshawar, Pakistan
[2]Department of Gynaecology and Obstetrics, Abwa Medical College, Faisalabad, Pakistan
[3]Department of Gynaecology and Obstetrics, Amina Innayat Medical College, Lahore, Pakistan
[4]Department of Gynaecology and Obstetrics, Usman Memorial Hospital, Karachi, Pakistan
[5]Department of Gynaecology and Obstetrics, Saidu Group of Teaching Hospital, Swat, Pakistan

ARTICLE INFO

Keywords:
Stress Urinary Incontinence, Platelet-Rich Plasma, Er: YAG Laser, Vaginal Laser, Pelvic Floor Dysfunction, Minimally Invasive Therapy

How to Cite:
Rahman, M. U., Ahmad, W., Idrees, S., Nadeem, W., Khan, R., & Liaqat, Z. (2026). Platelet-Rich Plasma and Er: YAG Laser Therapy for Female Stress Urinary Incontinence: A Systematic Review: Platelet-Rich Plasma and Er: YAG Laser Therapy for Female Stress Urinary Incontinence: A Systematic Review. Pakistan Journal of Health Sciences, 7(4), 165-172. https://doi.org/10.54393/pjhs.v7i4.3839

***Corresponding Author:**
Zarmeena Liaqat
Department of Gynaecology and Obstetrics, Saidu Group of Teaching Hospital, Swat, Pakistan
liaqzar@gmail.com

Received Date: 16th January, 2026
Revised Date: 30th January, 2026
Acceptance Date: 3rd March, 2026
Published Date: 30th April, 2026

ABSTRACT

In female, stress urinary incontinence (SUI) is widely encountered and has a notable negative impact on daily living and overall well-being. Even though surgery is a good treatment, issues of morbidity and patient resistance have made the treatment of minimally invasive surgery more interesting. **Objectives:** To systematically evaluate clinical evidence on the effectiveness and safety of platelet-rich plasma (PRP) injections and 'non-ablative Er:YAG' vaginal laser interventions in women with SUI. **Methods:** This is a systematic review that adhered to PRISMA 2020. PubMed/MEDLINE, Scopus, and Cochrane Library were searched to identify studies published between January 2018 and March 2025. Randomized controlled trials and prospective interventional cohort studies that included adult women with SUI were included. Data were extracted on validated symptom scores, objective outcomes, adverse events, and treatment effects. Cohen Cochrane RoB-2 and NIH tools were used to assess the risk of bias. Because of heterogeneity, synthesis of results was in the form of narratives. **Results:** Ten studies (six randomized trials and four cohort studies) were included. Both PRP and Er: YAG laser therapy demonstrated improvement in symptom severity using validated patient-reported and objective measures. Sham-controlled trials generally favored active treatment, while combined PRP and pelvic floor muscle training showed greater benefit. Most randomized trials had some risk of bias, and cohort studies were of fair quality. **Conclusions:** PRP injections and Er: YAG vaginal laser therapy (NA Er:YAG laser) are promising minimally invasive options for selected women with mild to moderate SUI, though further high-quality trials are needed to confirm long-term effectiveness.

INTRODUCTION

Stress urinary incontinence (SUI) is one of the most prevalent conditions of the pelvic floor in women in all nations of the world and has been a significant source of physical, psychological and social morbidity [1]. It is an involuntary urine leakage during activities that raise intra-abdominal pressure, such as physical activity, coughing, sneezing, or laughing, and is caused by urethral hypermobility and/or intrinsic sphincter deficiency. Epidemiological statistics show prevalence rates of 10-40 percent in adult women, and more prevalence in parous, postmenopausal, and obese groups. SUI is the involuntary leakage of urine during physical activity, coughing, or sneezing, and is disproportionately prevalent in parous and postmenopausal women and is generally underreported due to stigma surrounding it and lack of access to specialized care [2, 3]. The present therapeutic environment of SUI includes conservative treatment, pharmacological and surgical treatment. Mid-urethral sling

DOI: https://doi.org/10.54393/pjhs.v7i4.3839

surgeries, have been developed as gold-standard surgical interventions with long-term effectiveness and objective cure rates of 60-85% at 5-10 years [4]. However dyspareunia, and urinary retention, have caused regulatory warnings and market recalls in a number of countries, with a significant effect on the rates of surgical utilization. Also, operative intervention has its own risks, such as anesthesia morbidity, infection, bleeding, and recovery time, which play a significant role in causing high patient reluctance, especially in younger women, those with mild-moderate severity, or those with medical comorbidities who should not undergo surgery [5, 6]. The main conservative first-line intervention is PFMT, which moderately, alleviating severity symptoms and achieving better continence outcomes with appropriate technique and supervision. Nevertheless, inconsistent patient compliance, inconsistent quality of training, need to continue treatment over a long period (usually 3-6 months to achieve maximum effect), and slow re-emerging symptoms after withdrawal are major factors that limit the clinical efficacy of PFMT. Additionally, PFMT is best applied in mild cases of SUI and shows decreasing returns in moderate-to-severe cases, which underscores the necessity of intermediate-intensity therapeutic strategies between conservative care and invasive surgery [7, 8]. Advances in regenerative and energy-based medicine have introduced PRP injections and non-ablative Er: YAG vaginal laser therapy as potential minimally invasive treatment options for female SUI [9-11]. PRP is rich in growth factors that promote angiogenesis, fibroblast proliferation, and tissue remodeling, while Er: YAG laser therapy induces controlled photothermal effects leading to collagen contraction and nucleogenesis, potentially improving urethral support and vaginal wall integrity [12].

Despite increasing clinical use, evidence regarding the efficacy, durability, and comparative benefit of these modalities remains heterogeneous, with variable outcomes reported across studies. Therefore, a contemporary systematic synthesis of high-quality clinical evidence is required to better define their therapeutic role and support evidence-based clinical decision-making. This study aims to determine the clinical evidence on the effectiveness and safety of PRP injections and NA Er:YAG laser in women with SUI.

METHODS

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. An electronic literature search was conducted in PubMed/MEDLINE, Scopus, and Cochrane Library, to find out the relevant clinical studies published between January 2018 and March 2025. The reason behind the selection of these databases is that they cover a wide area of urogynecology, pelvic floor disorders, regenerative therapies, and interventional clinical trials. Both controlled vocabulary (MeSH terms) and free-text keywords were used, combined with Boolean operators. The search strategies were adapted to the indexing structure of each database to ensure optimal retrieval. The PubMed/MEDLINE search syntax was ("Stress Urinary Incontinence" [MeSH] OR "female stress urinary incontinence" OR SUI) AND (("Platelet-Rich Plasma" OR PRP OR "autologous platelet rich plasma") OR ("Er: YAG laser" OR "erbium: YAG laser" OR "vaginal laser")). The Scopus search strategy was: TITLE-ABS-KEY ("stress urinary incontinence" OR "female stress urinary incontinence" OR SUI) AND (TITLE-ABS-KEY ("platelet rich plasma" OR PRP OR "autologous PRP") OR TITLE-ABS-KEY ("Er: YAG laser" OR "erbium: YAG laser" OR "vaginal laser"). The Cochrane Library search syntax was((stress urinary incontinence): OR (female stress urinary incontinence): OR SUI:) AND ((platelet rich plasma): OR PRP: OR (Er:YAG laser): OR (erbium: YAG laser): OR (vaginal laser). All the included studies also had their reference lists screened manually to identify any other eligible publications that might not have been identified by electronic searching. Inclusion criteria were that the studies were human clinical studies that included adult women diagnosed with stress urinary incontinence and that they were assessed with PRP injection therapy and/or Er: YAG vaginal laser therapy. Included studies comprised randomized trials along with prospective interventional cohorts and controlled clinical studies. The studies had to present validated clinical outcomes, including the International Consultation on Incontinence Questionnaire–Short Form (ICIQ-SF), pad test data, urodynamic data, or quality-of-life data. Pilot studies, case reports, case series, narrative reviews, systematic reviews, and meta-analyses were excluded. Studies that were animal or in-vitro, studies that used men exclusively, conference abstracts that were not available in full-text, and studies that did not provide extractable clinical outcome data were also excluded. Despite the large number of PRP and laser studies using relatively small cohorts, pilot studies and case series were excluded because of the lack of methodological strength and the lack of reporting comparative outcomes. All retrieved records were screened by two reviewers who independently screened the titles and abstracts. Predefined inclusion and exclusion criteria were then used to evaluate the full-text articles of potentially eligible studies. Any differences among reviewers were solved by discussion and consensus. A PRISMA 2020 flow diagram was used to document the study selection process, including the number of identified records, duplicates eliminated, records screened, full-text articles reviewed,

DOI: https://doi.org/10.54393/pjhs.v7i4.3839

exclusion reasons, and included final studies. A standardized, pre-defined data extraction form was used to extract data, covering study identifiers, design, population demographics, intervention protocols (PRP and Er: YAG laser), comparator, follow-up, outcome measures, adverse events and quantitative efficacy data. Quantitative outcomes were baseline and post-intervention, within- and between-group, effect estimates with confidence intervals where reported, and p-values. In the case where there were many follow-up points, the longest follow-up was considered first in order to determine durability. Moreover, direction and magnitude of treatment effects such as reported mean changes, between-group differences, and statistical significance were also extracted where they were available. Two reviewers independently extracted data and cross-checked the data to validate accuracy and completeness. Randomized controlled trials were evaluated using the Cochrane Risk of Bias-2 (RoB-2) tool to assess their methodological quality and prospective and observational interventional studies were assessed using the National Institutes of Health (NIH) Quality Assessment Tool. Two reviewers independently rated each study and disagreements in quality ratings were addressed by consensus. The reason why meta-analysis was not conducted was that there was a significant clinical and methodological heterogeneity, which included differences in PRP preparation protocols, injection sites, Er: YAG laser parameters, treatment protocols, outcome measures, comparator groups, and follow-up periods. The lack of numerical reporting in studies also did not allow effective pooling of effect estimates. Based on this, a systematic narrative synthesis was developed, which summarized the nature of the studies, clinical effectiveness, response duration, and the quality of the methods. The protocol of the review was not registered in the International Prospective Register of Systematic Reviews (PROSPERO). Available literature was systematically compiled and analyzed retrospectively of recently published clinical studies, but all methodological steps were predetermined and strictly adhered to following PRISMA 2020 guidelines to reduce the risk of reporting bias and guarantee transparency (Figure 1).

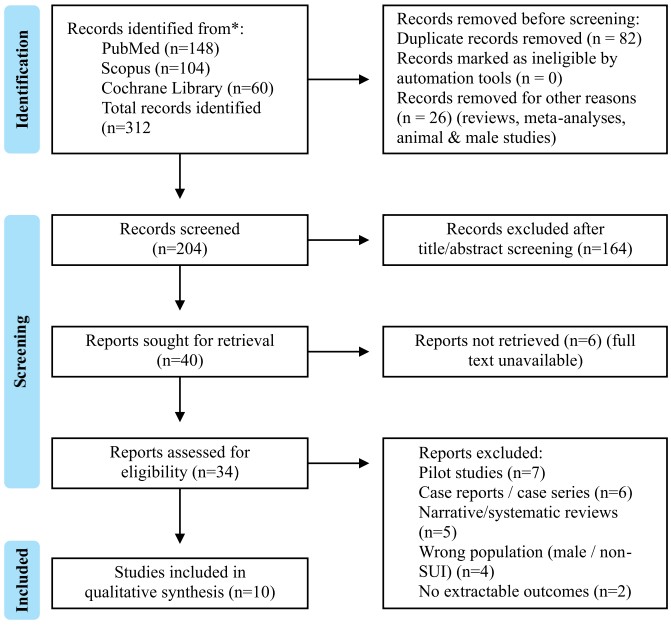

Figure 1: PRISMA 2020 Flow Diagram of Study Selection

This figure illustrates the systematic identification, screening, eligibility assessment, and inclusion of studies evaluating PRP injection therapy and Er: YAG vaginal laser therapy for female stress urinary incontinence. After removal of duplicate records (n = 82) and records excluded for predefined reasons (n = 26), 204 records underwent title and abstract screening. Among them, 164 records were eliminated. Forty full-text articles were identified to be retrieved, and six were not retrieved because of the unavailability of the full text. Eligibility was evaluated on 34 full-text articles, with 24 being excluded with reported reasons (pilot studies, case reports or case series, narrative or systematic reviews, wrong population, or no extractable outcomes). Finally, 10 studies met the inclusion criteria and were included in the qualitative synthesis.

RESULTS

A total of ten clinical studies published between 2018 and 2025 fulfilled the eligibility criteria and were included in the qualitative synthesis. These include of six Rcts and four prospective observational interventional cohort studies. The studies that were included were carried out in different geographic areas and clinical environments, which increases the external validity. The majority of the studies assessed non-ablative Er: YAG vaginal laser therapy, and three studies were assessing autologous PRP injections as a single intervention or combined with PFMT. The follow-up time in the studies was between 3 and 24 months. The studies included all used validated outcome measures with the most common outcome measure being the ICIQ-SF and objective pad test. The specific features of the studies included are described (Table 1).

DOI: https://doi.org/10.54393/pjhs.v7i4.3839

Table 1: Characteristics of Included Clinical Studies on PRP & Er: YAG Laser Therapy for Female SUI (2018–2025)

References	Country	Sample Size	Population	Intervention	Comparator	Follow-Up	Outcome Tools
Randomized Controlled Trials							
[13]	Slovenia	114	Female SUI	Er: YAG laser (IncontiLase)	Sham laser	3 Months	ICIQ-UI SF, perineometer
[7]	China	144	Adult women SUI	Er: YAG laser (2 sessions)	Sham laser	6 Months	ICIQ-SF, pad test
[14]	Multicenter	120	Female SUI	Er: YAG laser (3 sessions)	Sham laser	3 Months	ICIQ-SF, Incontinence QoL
[15]	Multicenter	86	Urodynamic SUI	Er: YAG laser	Sham laser	~6 Months	Pad test, QoL
[16]	Thailand	72	Female SUI	PRP + PFMT	PFMT alone	6 Months	ICIQ-SF, pad test
[17]	Greece	60	Female SUI	Periurethral PRP	Sham injections	6 Months	ICIQ-SF
Prospective & Observational Interventional Studies							
[8]	Taiwan	40	Female SUI	PRP sphincter injections	—	12 Months	ICIQ-SF
[18]	Portugal	43	Female SUI	Er: YAG laser (3 sessions)	—	18 Months	Pad test, ICIQ-SF
[19]	Switzerland	96	Female SUI	Er: YAG laser (multiple sessions)	—	24 Months	1-hr pad test, ICIQ-SF
[20]	China	50	Female SUI (± MUI)	Er: YAG laser (3 sessions)	—	6 Months	QoL questionnaires

Across the included studies, both PRP and Er: YAG laser therapy were associated with measurable improvements in stress urinary incontinence symptoms. In randomized controlled trials evaluating Er: YAG laser therapy, reductions in ICIQ-SF scores and pad test leakage were consistently reported at short-term follow-up (3–6 months) when compared with sham treatment. Where numerical data were available, studies reported statistically significant within-group reductions from baseline and between-group differences favoring active treatment, with p-values generally <0.05. In PRP-based interventions, periurethral or urethral sphincter injections resulted in reductions in symptom severity scores over follow-up periods of 6 to 12 months. Studies combining PRP with PFMT demonstrated greater magnitude and durability of improvement compared with PFMT alone, indicating a potential additive effect. Although effect sizes and confidence intervals were inconsistently reported, the direction of effect was uniformly favorable across PRP studies. Longer-term observational studies with follow-up extending to 18–24 months demonstrated persistence of treatment benefit for both modalities, as reflected by maintained reductions in pad test weights and sustained enhancement in health-related 'quality of life' domains. However, magnitude benefit varied between studies, likely reflecting heterogeneity in intervention protocols, baseline disease severity, and patient characteristics. A structured summary of reported effectiveness outcomes is presented (Table 2).

Table 2: Reported Effectiveness of PRP and Er: YAG Laser Therapy in Female Stress Urinary Incontinence

References	Intervention	Outcome Measures Reported	Follow-Up	Direction of Effect vs Comparator	Statistical Significance
[13]	Er: YAG laser	ICIQ-UI SF, perineometry, sexual function	3 months	Significant improvement vs sham	p<0.001
[7]	Er: YAG laser	ICIQ-SF, pad test	6 months	Modest improvement vs sham	Significant
[14]	Er: YAG laser	ICIQ-SF, I-QOL	3 months	Significant improvement vs sham	Significant
[15]	Er: YAG laser	Pad test, QoL	6 months	Significant improvement vs sham	Significant
[16]	PRP + PFMT	ICIQ-SF, pad test	6 months	Superior to PFMT alone	Significant
[17]	PRP	ICIQ-SF	6 months	Superior to sham injections	Significant
[8]	PRP	ICIQ-SF	12 months	Sustained symptom improvement	Significant
[18]	Er: YAG laser	Pad test, ICIQ-SF	18 months	Sustained improvement	Significant
[19]	Er: YAG laser	Pad test, ICIQ-SF	24 months	Sustained improvement	Significant
[20]	Er: YAG laser	Pelvic floor QoL domains	6 months	Significant symptom & QoL improvement	Significant

Evaluation of the quality of methods showed that the majority of randomized controlled trials were rated as having some concerns of bias based on Cochrane Risk of Bias-2 (RoB-2) tool. These issues are mainly related with the incomplete reporting of allocation concealment, difficulties in preserving the blinding, and absence of prespecified statistical analysis plans (Table 3).

Table 3: Risk of Bias Assessment of Randomized Controlled Trials Using the Cochrane RoB-2 Framework

References	Study (Year)	Randomization Method	Blinding & Intervention Fidelity	Completeness of Data	Outcome Measurement	Selective Reporting	Overall Risk
[13]	2018	Moderate concerns	Minor limitations	Adequate	Adequate	Moderate concerns	Moderate
[7]	2025	Minor limitations	Adequate	Adequate	Adequate	Moderate concerns	Moderate
[14]	2025	Minor limitations	Adequate	Moderate concerns	Adequate	Moderate concerns	Moderate
[15]	2024	Minor limitations	Adequate	Moderate concerns	Adequate	Moderate concerns	Moderate

DOI: https://doi.org/10.54393/pjhs.v7i4.3839

[16]	2024	Moderate concerns	Moderate concerns	Moderate concerns	Adequate	Moderate concerns	Moderate
[17]	2024	Moderate concerns	Moderate concerns	Moderate concerns	Adequate	Moderate concerns	Moderate

Across randomized controlled trials, overall risk of bias was predominantly rated as "some concerns", mainly due to incomplete reporting of allocation concealment procedures, partial blinding, and limited pre-specification of analysis plans, while outcome measurement and data completeness were generally assessed as low risk.

The National Institutes of Health (NIH) Quality Assessment Tool was used to rate prospective observational interventional studies as fair quality. Typical weaknesses were single-arm study designs, lack of confounder adjustment, and unreported participation rates and attrition. Nevertheless, outcome measures were validated and the follow-up time was mostly adequate to lend internal validity to the reported results. Risk-of-bias assessments (randomized and observational) are provided in detail (Table 4).

Table 4: Risk of Bias for Prospective/Observational Studies (NIH Quality Assessment Tool)

References	Clear Research Question	Defined Population	Participation Rate Adequate	Exposure Measured Reliably	Outcome Measures Valid /Reliable	Follow-Up Sufficient	Loss to Follow-Up ≤20%	Confounders Adjusted	Overall Quality
[8]	Yes	Yes	NR	Yes	Yes	Yes (12 months)	NR	NR	Fair
[18]	Yes	Yes	NR	Yes	Yes	Yes (18 months)	NR	NR	Fair
[19]	Yes	Yes	NR	Yes	Yes	Yes (24 months)	NR	NR	Fair
[20]	Yes	Yes	NR	Yes	Yes	Yes (6 months)	NR	NR	Fair

Due to heterogeneity, GRADE assessment was not feasible, although overall evidence was considered moderate based on study quality, consistency, and follow-up duration. The certainty of evidence regarding long-term durability is still low because most evidence is of the observational nature and the reporting of effect sizes and confidence intervals is not consistent.

DISCUSSION

This systematic review included 10 clinical studies (six randomized controlled trials and four prospective interventional cohorts) to determine the effectiveness of PRP injections and non-ablative Er: YAG vaginal laser therapy on female SUI. Overall, both modalities demonstrated improvements in validated patient-reported outcomes, particularly ICIQ-SF scores, and objective measures such as pad test results. Randomized trials under Sham control tended to prefer active intervention to controls, whereas observational cohorts indicated that benefit persisted in patients. But quantitative pooling of effect estimates was constrained by methodological and clinical heterogeneity. There is mixed evidence on the use of non-ablative vaginal laser therapy, such as Er: YAG and CO 2 systems, but it indicates a short-term symptomatic effect. Sham-controlled randomized trials were included that showed statistically significant reductions in leakage and symptom severity at 3-6 months. These results are in agreement with other external randomized and multicenter trials which demonstrated an improvement in pad test results and quality-of-life indicators after laser therapy [21-23]. However, long-term follow-up has not been consistent and some studies have not shown long-term superiority over sham at 12 months or longer[7, 24]. The inconsistency in the results is probably caused by variability in treatment protocols, such as wavelength, fluence, the number of sessions, and the intervals between treatment. Laser-induced collagen remodeling and tissue tightening are proposed by external mechanistic and imaging studies but the extent and sustainability of these changes differ significantly[25-28]. Other patient-related variables like the severity of SUI at baseline, menopause and body mass index have also been found to predict treatment response, making cross-study comparisons more difficult [8, 16]. Interventions based on PRP showed encouraging yet inconsistent results. Randomized and prospective studies that reported a reduction in symptom severity after periurethral or urethral sphincter injection were included, especially those that used PRP in several sessions or in conjunction with pelvic floor muscle training (PFMT). External pilot and cohort studies also indicate a regenerative effect of PRP in enhancing sphincter activity and pelvic support, but the effect sizes were reported to be different [28, 29]. Notably, a randomized trial with placebo control showed no significant effect after a single PRP injection, indicating that the intensity of treatment and the standardization of protocols are key factors of effectiveness[27]. On the other hand, the studies with repeated injections or adjunct PFMT showed a higher and longer-lasting improvement, which suggests the possibility of an additive effect [15]. External evaluations point to a high degree of heterogeneity in PRP preparation methods, platelet concentration, amount of injection, and the anatomical location, which hinder reproducibility and generalizability [29-31]. PRP injections and non-ablative vaginal laser therapies were both found to have a generally positive safety profile. Adverse events reported were mostly mild and temporary such as local pain and temporary urinary symptoms [32-34]. Most serious complications were infrequent but have been reported,

DOI: https://doi.org/10.54393/pjhs.v7i4.3839

underscoring the need to select patients properly, use standard-based protocols, and clinician skills. External safety audits always suggest cautious counseling and prevention of exaggerating the efficacy assertions due to the changing evidence base [35]. A moderate level of evidence was observed, reflecting differences in study quality, potential bias, consistency of findings, and outcome precision regarding short-term effectiveness of Er: YAG laser therapy and low to moderate regarding PRP interventions, especially when it comes to long-term durability. There is limited evidence after 12 months and much of it is based on observational evidence [18, 19].

The limitations of the review are high levels of heterogeneity in treatment regimens (e.g., PRP preparation, laser settings, number of sessions), mainly short-term follow-up data, and methodological shortcomings of the studies included in the review (e.g., lack of blinding, small sample sizes), which cannot be used to make conclusive conclusions concerning long-term efficacy and comparative effectiveness. To effectively test the long-term safety and efficacy of SUI and identify the best treatment regimes, future studies must focus on large, multi-centric, sham-controlled randomized trials, longer follow-up (at least two years), and stratified research based on SUI severity and patient functions (e.g., menopausal status).

CONCLUSIONS

Platelet-rich plasma injections and non-ablative Er: YAG vaginal laser therapy demonstrate clinically meaningful short-term improvements in female stress urinary incontinence with acceptable safety profiles. However, heterogeneity in intervention protocols, variable durability of effect, and methodological limitations restrict definitive conclusions regarding long-term efficacy. Based on current evidence, these therapies may be considered in carefully selected women with mild to moderate SUI, particularly those seeking non-surgical options or adjuncts to pelvic floor muscle training. Future research should focus on adequately powered, sham-controlled, multicenter randomized trials with standardized treatment protocols, harmonized outcome measures, and extended follow-up to better define comparative effectiveness and durability.

Authors' Contribution

Conceptualization: MUR
Methodology: WA, SI, ZL
Formal analysis: ZL
Writing and Drafting: MUR, WA, SI, WN, RK
Review and Editing: MUR, WA, SI, WN, RK, ZL

All authors approved the final manuscript and take responsibility for the integrity of the work.

Conflicts of Interest

All the authors declare no conflict of interest.

Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Behnia-Willison F, Nguyen TT, Norbury AJ, Mohamadi B, Salvatore S, Lam A. Promising Impact of Platelet Rich Plasma and Carbon Dioxide Laser for Stress Urinary Incontinence. European Journal of Obstetrics and Gynecology and Reproductive Biology: X. 2020 Jan; 5: 100099. doi: 10.1016/j.eurox.2019.100099.

[2] Long CY, Lin KL, Shen CR, Ker CR, Liu YY, Loo ZX *et al.* A Pilot Study: Effectiveness of Local Injection of Autologous Platelet-Rich Plasma in Treating Women with Stress Urinary Incontinence. Scientific Reports. 2021 Jan; 11(1): 1584. doi: 10.1038/s41598-020-80598-2.

[3] Athanasiou S, Kalantzis C, Zacharakis D, Kathopoulis N, Pontikaki A, Grigoriadis T. The Use of Platelet-Rich Plasma as a Novel Nonsurgical Treatment of the Female Stress Urinary Incontinence: A Prospective Pilot Study. Urogynecology. 2021 Nov; 27(11): e668-72. doi: 10.1097/SPV.0000000000001100.

[4] Juhász ML, Korta DZ, Mesinkovska NA. Vaginal Rejuvenation: A Retrospective Review of Lasers and Radiofrequency Devices. Dermatologic Surgery. 2021 Apr; 47(4): 489-94. doi: 10.1097/DSS.0000000000002845.

[5] Bujnak A, Crowder CA, Krychman ML. Energy-based Devices for Functional Vaginal Problems: Issues and Answers. Current Sexual Health Reports. 2021 Mar; 13(1): 1-3. doi: 10.1007/s11930-021-00302-x.

[6] Filippini M, Angioli R, Luvero D, Sammarini M, De Felice G, Latella S *et al.* The Utility of CO2 Laser Treatment of Pelvic Symptoms in Women with Previous Perineal Trauma during Delivery. Journal of Personalized Medicine. 2023 Dec; 14(1): 60. doi: 10.3390/jpm14010060.

[7] Lee P, Perruzza D, Edell H, Jarvi S, Kim K, Sultana R *et al.* Double-blind Randomized Controlled Trial of Er: YAG Vaginal Laser to Treat Female Stress Urinary Incontinence. American Journal of Obstetrics and Gynecology. 2025 Jun; 232(6): 541-e1. doi: 10.1016/j.ajog.2024.11.021.

[8] Chiang CH and Kuo HC. The Efficacy and Mid-Term Durability of Urethral Sphincter Injections of Platelet-Rich Plasma in Treatment of Female Stress Urinary Incontinence. Frontiers in Pharmacology. 2022 Feb; 13: 847520. doi: 10.3389/fphar.2022.847520.

DOI: https://doi.org/10.54393/pjhs.v7i4.3839

[9] Reisenauer C, Hartlieb S, Schoenfisch B, Brucker SY, Neis F. Vaginal Therapy of Mild and Moderate Stress Urinary Incontinence Using Er: YAG Laser: A Real Treatment Option. Archives of Gynecology and Obstetrics. 2019 Dec; 300(6): 1645-50. doi: 10.1007/s00404-019-05334-2.

[10] Setyaningrum T, Listiawan MY, Santoso B, Prakoeswa CR, Widjiati W, Tjokroprawiro BA. Experimental Analysis of Vaginal Laxity in Rats Treated with a Combination of Er: YAG Fractional Lasers and AMSC-MP. Journal of Lasers in Medical Sciences. 2023 Jan; 14: e2. doi: 10.34172/jlms.2023.02.

[11] Cañadas Molina A, Sanz Baro R. The First Major Complication Due to Laser Treatment for Stress Urinary Incontinence: A Short Report. Climacteric. 2021 Mar; 24(2): 206-9. doi: 10.1080/13697137.2020.1816958.

[12] Zhang G, Song Y, Zhuang T, Zhao Y, Pan Z, Pan Z. Clinical Application and Research Progress of Platelet-Rich Plasma. Hematology. 2025 Dec; 30(1): 2549159. doi: 10.1080/16078454.2025.2549159.

[13] Blaganje M, Šćepanović D, Žgur L, Verdenik I, Pajk F, Lukanović A. Non-ablative Er: YAG Laser Therapy Effect on Stress Urinary Incontinence Related to Quality of Life and Sexual Function: A Randomized Controlled Trial. European Journal of Obstetrics and Gynecology and Reproductive Biology. 2018 May; 224: 153-8. doi: 10.1016/j.ejogrb.2018.03.038.

[14] Wang X, Zhang Z, Meng L, Xu S, Zheng J, Wang H *et al.* Efficacy and Safety of Non-Ablative Er: YAG Laser for Mild to Moderate Stress Urinary Incontinence: A Prospective, Multicenter, Randomized, Sham-Controlled Clinical Trial. Lasers in Medical Science. 2025 Apr; 40(1): 195. doi: 10.1007/s10103-025-04400-3.

[15] O'Reilly BA, Viereck V, Phillips C, Toozs Hobson P, Kuhn A, Athanasiou S *et al.* Vaginal Erbium Laser Treatment for Stress Urinary Incontinence: A Multicenter Randomized Sham Controlled Clinical Trial. International Journal of Gynecology and Obstetrics. 2024 Mar; 164(3): 1184-94. doi: 10.1002/ijgo.15222.

[16] Saraluck A, Chinthakanan O, Kijmanawat A, Aimjirakul K, Wattanayingcharoenchai R, Manonai J. Autologous Platelet Rich Plasma (A PRP) Combined with Pelvic Floor Muscle Training for the Treatment of Female Stress Urinary Incontinence (SUI): A Randomized Control Clinical Trial. Neurourology and Urodynamics. 2024 Feb; 43(2): 342-53. doi: 10.1002/nau.25365.

[17] Grigoriadis T, Kalantzis C, Zacharakis D, Kathopoulis N, Prodromidou A, Xadzilia S *et al.* Platelet-rich Plasma for the Treatment of Stress Urinary Incontinence—A Randomized Trial. Urogynecology. 2024 Jan; 30(1): 42-9. doi: 10.1097/SPV.0000000000001378.

[18] Gaspar A, Koron N, Silva J, Brandi H. Vaginal Erbium Laser for Treatment of Stress Urinary Incontinence: Optimization of Treatment Regimen for a Sustained Long-Term Effect. Lasers in Medical Science. 2022 Jun; 37(4): 2157-64. doi: 10.1007/s10103-021-03474-z.

[19] Kuszka A, Gamper M, Walser C, Kociszewski J, Viereck V. Erbium: YAG Laser Treatment of Female Stress Urinary Incontinence: Midterm Data. International Urogynecology Journal. 2020 Sep; 31(9): 1859-66. doi: 10.1007/s00192-019-04148-9.

[20] Lia M, Pilát P, Weydandt L, Baessler K, Kempe T, Aktas B. The Effect of Vaginal Er: YAG Laser Therapy on Pelvic Floor Symptoms in Women with Stress Urinary Incontinence: A Single Center Cohort Study. Lasers in Surgery and Medicine. 2025 Mar; 57(3): 265-75. doi: 10.1002/lsm.70001.

[21] Sigurdardóttir HB, Kirschner B, Obel J, Aziz M, Stenz CB, Schroll JB. Vaginal CO2 Laser Treatment for Urinary Stress Incontinence: A Randomized Controlled Trial. Maturitas. 2025 Jul: 108658. doi: 10.1016/j.maturitas.2025.108658.

[22] Phillips C, Shah G, Gamper M, Kuszka A, Chandrakumaran K, Viereck V. Vaginal Erbium Laser for the Treatment of Mild to Moderate Stress Urinary Incontinence: A Multicentre Randomized Sham–Controlled Trial. An International Journal of Obstetrics and Gynaecology. 2025 Nov. doi: 10.1111/1471-0528.70080.

[23] Alexander JW, Karjalainen P, Ow LL, Kulkarni M, Lee JK, Karjalainen T *et al.* CO2 Surgical Laser for Treatment of Stress Urinary Incontinence in Women: A Randomized Controlled Trial. American Journal of Obstetrics and Gynecology. 2022 Sep; 227(3): 473-e1. doi: 10.1016/j.ajog.2022.05.054.

[24] Yim LW, Wan OY, Wong D, Tam MS, Lee YT, Lee KW *et al.* Vaginal Laser Treatment on Stress Urinary Incontinence: A Randomized Controlled Trial. International Urogynecology Journal. 2025 May: 1-1.

[25] Long CY, Wu PC, Chen HS, Lin KL, Loo Z, Liu Y *et al.* Changes in Sexual Function and Vaginal Topography Using Transperineal Ultrasound After Vaginal Laser Treatment for Women with Stress Urinary Incontinence. Scientific Reports. 2022 Mar; 12(1): 3435. doi: 10.1038/s41598-022-06601-0.

[26] Gao L, Wang Y, Wen W, Duan Y, Li Z, Dang E *et al.* Fractional Carbon Dioxide Vaginal Laser Treatment of Stress Urinary Incontinence: Remodeling of Vaginal Tissues and Improving Pelvic Floor

DOI: https://doi.org/10.54393/pjhs.v7i4.3839

Structures. Lasers in Surgery and Medicine. 2023 Mar; 55(3): 268-77. doi: 10.1002/lsm.23641.

[27] Ashton L, Nakatsuka H, Johnson CM, Kenne K, Kreder KJ, Kruse R *et al.* A Single Injection of Platelet-Rich Plasma Injection for the Treatment of Stress Urinary Incontinence in Females: A Randomized Placebo-Controlled Trial. Urology. 2024 Nov; 193: 63-8. doi: 10.1016/j.urology.2024.06.047.

[28] Hsiao SM, Wu WY, Lin HH. Predictors of the Efficacy of CO2 Laser Therapy for Female Stress Urinary Incontinence. Journal of the Chinese Medical Association. 2025 Feb; 88(2): 145-50. doi: 10.1097/JCMA.0000000000001193.

[29] Wu YR, Shen D, Zhang YQ, Cui ZY, Yang WZ. Efficacy Evaluation of Lattice Carbon Dioxide Laser Therapy in the Treatment of Postmenopausal Patients with Mild to Moderate Stress Urinary Incontinence. Pakistan Journal of Medical Sciences. 2021 Nov; 37(7): 1989. doi: 10.12669/pjms.37.7.4077.

[30] Filippini M, Elmi S, Sozzi J, Pieri L, Fusco I, Zingoni T *et al.* Thermo-Ablative Fractional CO2 Lasers Combined with 1540 nm Wavelengths Is a Promising Treatment Option in Stress Urinary Incontinence. Medical Sciences. 2025 Mar; 13(1): 25. doi: 10.3390/medsci13010025.

[31] Petca A, Fotă A, Petca RC, Rotar IC. Modern Conservative Management Strategies for Female Stress Urinary Incontinence: A Systematic Review. Journal of Clinical Medicine. 2025 May; 14(10): 3268. doi: 10.3390/jcm14103268.

[32] Li PC and Ding DC. Exploring the Role of Laser Therapy for Stress Urinary Incontinence: A Literature Review. Lasers in Medical Science. 2025 Dec; 40(1): 1-3. doi: 10.1007/s10103-025-04385-z.

[33] Sima RM, Pleș L, Bălălău OD, Amza M, Conea IM, Bunea TI *et al.* Surgical Techniques for Urinary Incontinence in Young Women—Narrative Review. Surgical Techniques Development. 2025 Aug; 14(3): 28. doi: 10.3390/std14030028.

[34] Le C, Murgia RD, Noell C, Weiss M, Weiss R. Female Genitourinary Treatments in Aesthetics. Clinics in Dermatology. 2022 May; 40(3): 259-64. doi: 10.1016/j.clindermatol.2021.11.009.

[35] Mohamed-Ahmed R, Taithongchai A, da Silva AS, Robinson D, Cardozo L. Treating and Managing Urinary Incontinence: Evolving and Potential Multicomponent Medical and Lifestyle Interventions. Research and Reports in Urology. 2023 Dec: 193-203. doi: 10.2147/RRU.S387205.