Section: Urology

Original Research Article

ROLE OF SALEM STRESS URINARY INCONTINENCE SCORE IN EVALUATING SEVERITY AND IMPACT OF TREATMENT OF STRESS URINARY INCONTINENCE

Senthilkumar Poovathai[1], Barani Somasundaram[2], Kavi Prabha Eswaran[3]

[1]*Associate Professor, Department of Urology, Government Mohankumaramangalam Medical College, Salem, Tamilnadu, India.*
[2]*Assistant Professor, Department of UrologyGovernment Mohankumaramangalam Medical College, Salem, Tamilnadu, India.*
[3]*Senior Resident, Department of Urology, Government Mohankumaramangalam Medical College, Salem, Tamilnadu, India.*

Received *: 05/10/2025*
Received in revised form *: 19/11/2025*
Accepted *: 03/12/2025*

Corresponding Author:
Dr. Senthilkumar Poovathai,
Associate Professor, Department of Urology, Government Mohankumaramangalam Medical College, Salem, Tamilnadu, India.
Email: poovathaisenthilkumar@gmail.com

DOI: 10.70034/ijmedph.2025.4.423

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (4); 2347-2351

ABSTRACT

Background: Stress urinary incontinence (SUI) is one of the most common urinary problems in women and affects their social and physical activities. Many patients delay treatment because of embarrassment or the belief that leakage is age-related. Simple scoring methods are helpful when urodynamic studies are not easily available. This study aimed to evaluate the utility of the Salem SUI Score in assessing disease severity and monitoring treatment response.

Materials and Methods: A retrospective observational study was conducted in the Department of Urology, including 20 patients aged 35–65 years with clinically diagnosed SUI, confirmed by history, clinical examination, Bonney's test, and a 3-day voiding diary. The Salem SUI Score was recorded before treatment. Mild cases received pelvic floor muscle training (PFMT), while moderate and severe cases underwent transvaginal tape (TVT) or transobturator tape (TOT) procedures. Follow-up at 3 months included repeat scoring.

Results: The mean age and BMI of patients were 49.5 years and 29.5 kg/m². All patients had SUI (20/20). The duration of symptoms ranged from 3-4 years, with a mean of 3.50 years. Based on the Salem Score, 6 (30%) patients had mild SUI, 4 (20%) had moderate SUI, and 10 (50%) had severe SUI. Conservative treatment was given to 6 (30%), TVT to 7 (35%), and TOT to 7 (35%). The mean scores reduced from 4.6 to 2.8 in the conservative group, 7.5 to 5.25 in the TVT group, and 9.9 to 5.5 in the TOT group.

Conclusion: The Salem SUI Score proved effective in grading SUI severity and evaluating clinical improvement following both conservative and surgical treatments, supporting its use as a practical tool in clinical follow-up.

Keywords: Pelvic Floor Muscles, Stress Urinary Incontinence, Suburethral Slings, Treatment Outcome, Urinary Incontinence.

INTRODUCTION

Stress urinary incontinence (SUI) is the involuntary loss of urine during activities that increase abdominal pressure, such as coughing, walking, lifting, or sneezing. It is one of the most common forms of urinary leakage among women, especially after childbirth and in the post-menopausal period.[1] Many women do not report their symptoms because of embarrassment or the belief that leakage is a normal part of aging. This delay in seeking care affects quality of life and limits social and physical activity.[2]

Reports from large U.S. community surveys have shown that urinary leakage is common with national NHANES data indicating that 61.8% of adult women experience some form of urinary incontinence and 32.4% report leakage at least once per month. Among them, SUI accounts for 37.5% of cases which means SUI affects approximately 23% of adult women in the United States.[3] Studies from Europe show similar numbers, and research from India shows that almost one-fifth of adult women have urinary incontinence with stress incontinence being the most common type.[4,5] Risk factors such as increasing age, multiparity, obesity, and hard physical work are frequently associated with SUI in Indian women.[6]

The main reason for SUI is weakness of the pelvic floor support. During an increase in abdominal pressure, the pelvic floor muscles contract and the connective tissues provide passive support to the urethra. Age-related changes, childbirth injury, and obesity can weaken this support and leading to leakage even with simple activities.[1] Conservative management, such as pelvic floor muscle training (PFMT) and lifestyle change is often used as first-line therapy.[7] Several studies have shown that PFMT strengthens pelvic floor muscles and reduces urine leakage in many women.[8,9]

Women who do not respond to conservative treatment may undergo sling procedures, such as transvaginal tape (TVT) or transobturator tape (TOT). These surgeries provide support to the mid-urethra and help prevent leakage during exertion. A study has shown that sling procedures provide good improvement and better quality of life in most patients.[10] A major challenge in clinical practice is the need for a simple and clear scoring method to assess symptom severity. Urodynamic studies provide detailed information but are not easily available, especially in smaller centres. Therefore, simple scoring systems are commonly used. One widely used tool is the Incontinence Severity Index (ISI), which has two questions about frequency and amount of leakage and is known to correlate well with symptom improvement after treatment.[11] A small hospital-based study has shown that ISI grading correlates well with symptom changes after conservative and surgical therapy.[11]

In this study, the Salem SUI Score was used. It is a modified form of the ISI, with additional points for common risk factors such as age > 40 years, high BMI, and multiparity with difficult labour. This modification was made to suit routine clinical practice in Indian women, in whom these risk factors are frequently observed. In this scoring system, severity is categorised into mild, moderate, and severe based on symptom burden. Therefore, this study aimed to assess the usefulness of the Salem SUI Score in evaluating the severity of SUI and measuring treatment outcomes among women undergoing conservative or surgical management.

MATERIALS AND METHODS

Study design & setting

This retrospective study was conducted at the Department of Urology in a tertiary referral center from April 2024 to March 2025. A total of 20 patients with symptoms of SUI were included in the study. Approval for the study was obtained from the Institutional Ethics Committee of Government Mohan Kumaramangalam Medical College Hospital, Salem. Written informed consent was obtained from all patients before their enrolment.

Inclusion Criteria

Women aged 35–65 years diagnosed with SUI based on history, clinical examination, Bonney's test, and a 3-day voiding diary were included. Only patients willing to participate and complete the follow-up were enrolled.

Exclusion Criteria

Women with urge incontinence, mixed incontinence, urinary tract infection, neurogenic bladder, overactive bladder, third- or fourth-degree uterovaginal prolapse, malignancy, or those unwilling to follow up were excluded.

Method of assessment

Detailed clinical history was recorded for all women, including duration of symptoms, mode of delivery, parity, menstrual status, comorbidities, and lifestyle habits. A complete physical examination was performed along with a per abdomen, per speculum, and vaginal examination. Height and weight were documented to calculate the BMI. Bonney's test and patients were asked to keep a 3-day voiding diary to confirm the diagnosis.

The Salem SUI Score was used for all the patients. The score included the frequency and amount of leakage and additional points for risk factors such as age > 40 years, BMI > 30, and parity more than two with difficult labour. Based on the total score, patients were categorised as mild (2–5), moderate (6–8), or severe (9–11).

Treatment given

Women with mild SUI received conservative management, including pelvic floor muscle training and lifestyle modifications. Women with moderate-to-severe SUI were offered surgical management. TVT and TOT procedures were performed based on clinical judgment and patient preference.

Follow-up and outcomes

All patients were reviewed 3 months after treatment. Clinical examination, Bonney's test, and a repeat Salem score were performed at follow-up. Improvements in symptoms and changes in scores were recorded for comparison with the pre-treatment values. The primary outcome was the change in the Salem SUI Score after treatment. Secondary outcomes included symptom improvement and a comparison between conservative and surgical management.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using SPSS version 21.0. Continuous variables are expressed as mean ± standard deviation, and categorical variables are expressed as percentages. Paired t test was done for pre and post treatment scores. P value <0.05 is considered as significant.

RESULTS

The mean age was 49.5 years (range: 35–65), and the median parity was 2 (range: 1–3). Mean BMI was 29.5 ± 2.05 kg/m² (range: 27.5–34). Socioeconomic status showed that 16 (80%) belonged to the lower group, 4 (20%) to the moderate group, and none to the upper group. [Table 1]

Table 1: Baseline demographic characteristics of study patients

Category	Sub-type	N (%)/Mean
Age (years)		49.5 (range: 35–65)
Parity (Mean)		2 (range: 1–3)
BMI (kg/m²)		29.5 ± 2.05 (range: 27.5–34)
Socioeconomic status	Lower	16 (80%)
	Moderate	4 (20%)
	Upper	0

All had SUI 20 (100%), and none had urge incontinence. The mean symptom duration was 3.50 ± 0.25 years. According to the Salem SUI score, 6 (30%) had mild severity, 4 (20%) had moderate severity, and 10 (50%) had severe symptoms. [Table 2]

Table 2: Clinical characteristics and Salem SUI score classification

Category	Sub-type	N (%)/Mean ± SD
Symptoms	SUI	20 (100%)
	Urge incontinence	0
Duration (years)		3.50 ± 0.25
Salem SUI score	Mild (2–5)	6 (30%)
	Moderate (6–8)	4 (20%)
	Severe (9–11)	10 (50%)

Conservative treatment was given to 6 (30%), TVT to 7 (35%), and TOT to 7 (35%). The mean pre-treatment scores were 4.6 for conservative management, 7.5 for TVT, and 9.9 for TOT. After treatment, scores reduced to 2.8 in the conservative, 5.25 in the TVT, and 5.5 in the TOT ($p<0.0001$). [Table 3]

Table 3: Comparison of treatment methods and change in scores

Category	Sub-type	N (%)
Treatment Given	Conservative treatment	6 (30%)
	TVT	7 (35%)
	TOT	7 (35%)
Mean pretreatment score (before treatment)	Conservative management	4.6
	TVT	7.5
	TOT	9.9
Mean posttreatment score (after treatment)	Conservative management	2.8
	TVT	5.25
	TOT	5.5

DISCUSSION

In our study, most patients were middle-aged women with a higher BMI. The majority belonged to the lower socioeconomic group, while a smaller proportion belonged to the moderate socioeconomic group. This shows that middle-aged women, especially those with increased body weight and lower socioeconomic status, accounted for most of the affected cases. Similarly, Sharma et al. studied 40 women and reported a mean age of 41.60 ± 8.43 years (30–65 years), a mean parity of 2.73, and a mean BMI of 24.2 ± 2.18 kg/m², with most belonging to the lower socioeconomic group (65%), followed by the moderate (30%) and upper groups (5%).[12] In contrast, Zalewski et al. studied 57 women with a higher mean age of 70.28 years (61–87 years), which was older than our mean age of 49.5 years.[13]

Öztürk et al. studied 64 women and reported a mean age of 40.25 ± 9.64 years, mean BMI of 25.1 ± 4.46 kg/m², and mean parity of 2.16 ± 1.18, all lower than our mean values.[14] Moreover, Adhyapak et al. studied 60 women with a mean age of 46.05 ± 8.2 years and mean BMI of 28.7 ± 3.15 kg/m², which were close to our findings, and a mean duration of symptoms of 3.45 ± 1.65 years, similar to our duration of 3.50 ± 0.25 years.[15] Overall, these findings show that SUI commonly affects middle-aged women, particularly those with higher BMI and lower socioeconomic backgrounds.

In our study, all patients had SUI, and none had any urge symptoms. Most women reported a long duration of complaints, indicating persistent problems. According to the Salem SUI scoring system, a considerable number of patients had mild or moderate-severe symptoms, whereas half of the group presented with severe symptoms at the time of assessment. Similarly, Sharma et al. reported that all 40 patients (100%) had SUI and none had urge incontinence, which is consistent with our findings. The duration ranged from 0.6 to 6.5 years, with a mean of 4.04 ± 3.58 years, which is slightly higher than our mean of 3.50 ± 0.25 years. Based on the Incontinence Severity Index, 27.5% had moderate, 60% severe, and 12.5% very severe symptoms, showing a more severe cases similar to our study, where 50% had severe symptoms.[12]

Sandvik et al. reported a 29.4% prevalence among 1820 women, and among 445 graded for severity, 46% had slight, 27% moderate, and 27% severe incontinence, with a strong correlation between severity index and leakage ($R = 0.48$, $p < 0.001$).[16]

Öztürk et al. found 28.2% had moderate and 53.1% had severe symptoms, comparable to our distribution of 20% moderate and 50% severe, with a mean pre-treatment ISI score of 7.78 ± 2.86.[14] Tunitsky-Bitton et al. documented urinary urgency in 52%–64% and frequency in 44%–53%, while we did not report these symptoms; their median pre-treatment ISI score was 6, indicating moderate severity.[17]

Adhyapak et al. reported higher baseline severity with a mean pre-treatment ISI of 12.8 ± 2.4 in the study group and 13.1 ± 2.3 in the control group, whereas in our study, 50% of patients had severe symptoms, but their scores were lower than 12. After treatment, the study group improved to 6.2 ± 1.8, while the control group showed minimal change.[15] These comparisons indicate that the Salem SUI score effectively reflected the severity of symptoms in our patients and was consistent with the scoring systems used in previous studies.

In our study, some women were treated conservatively, whereas others underwent the TVT or TOT procedure. All three treatment methods resulted in improvements after the intervention. However, the decrease in symptom severity was more noticeable in women who underwent surgical procedures than in those who underwent conservative therapy. Similarly, Sharma et al. reported that 10% of patients received conservative treatment, while 45% underwent Burch's colposuspension and tension-free obturator tape, differing from our distribution of 30% conservative, 35% TVT, and 35% TOT. Their mean pre-treatment score for conservative therapy was 4.5, reducing to 2.2, while surgical groups showed greater improvement with pre-treatment ISI scores of 9.2 after colposuspension and 9.0 after TOT, reducing to 1.1 and 1.3 respectively.[12]

Frick et al. noted a mean pre-treatment ISI score of 5.4, which decreased to 1.7 one year after TVT and TOT, showing a 64.8% improvement.18 In addition, Öztürk et al. compared medical treatment, TOT, and Burch colposuspension and reported mean post-treatment ISI scores of 2.26, 2.09, and 2.05, with no significant difference between groups (p = 0.68).14 Furthermore, Tunitsky-Bitton et al. recorded a median post-treatment ISI score of 0 at 6 weeks after sling procedures, indicating marked improvement.[17] Adhyapak et al. showed a mean reduction of 6.6 points in the intervention group, whereas the control group improved by only 0.2 points, demonstrating better outcomes with active treatment.[15] The Salem SUI Score was effective in detecting symptom changes in all treatment groups, with surgical procedures showing greater reduction in scores than conservative therapy.

Limitations

This study was conducted at a single centre with a small sample size. Follow-up was limited to 3 months; therefore, long-term outcomes could not be assessed.

CONCLUSION

Salem SUI Score proved useful in grading symptom severity and monitoring improvement after treatment. Both conservative and surgical methods showed a clear reduction in scores at 3 months. Women managed with pelvic floor exercises and those who underwent sling procedures showed a noticeable reduction in symptoms at the follow-up. The score helped compare the treatment response between TVT, TOT, and pelvic floor exercises. Future studies with larger sample sizes and longer follow-ups are needed to confirm the long-term clinical usefulness of this model.

REFERENCES

1. Lugo T, Leslie SW, Mikes BA, Riggs J. Stress urinary incontinence. Treasure Island (FL): StatPearls Publishing; 2025. https://www.ncbi.nlm.nih.gov/books/NBK539769/.
2. Chin Huang K. Health care-seeking behaviors among women suffering from urinary incontinence. J Yoga Phys Ther 2016;06. https://doi.org/10.4172/2157-7595.1000223.
3. Patel UJ, Godecker AL, Giles DL, Brown HW. Updated prevalence of urinary incontinence in women: 2015-2018 national population-based survey data. Female Pelvic Med Reconstr Surg 2022;28:181–7. https://doi.org/10.1097/SPV.0000000000001127.
4. Hunskaar S, Lose G, Sykes D, Voss S. The prevalence of urinary incontinence in women in four European countries. BJU Int 2004;93:324–30. https://doi.org/10.1111/j.1464-410x.2003.04609.x.
5. Agarwal BK, Agarwal N. Urinary incontinence: prevalence, risk factors, impact on quality of life and treatment seeking behaviour among middle aged women. Int Surg J 2017;4:1953. https://doi.org/10.18203/2349-2902.isj20172131.
6. Singh U, Agarwal P, Verma ML, Dalela D, Singh N, Shankhwar P. Prevalence and risk factors of urinary incontinence in Indian women: A hospital-based survey. Indian J Urol 2013;29:31–6. https://doi.org/10.4103/0970-1591.109981.
7. Li M, Qiu K, Guo H, Fan M, Yan L. Conservative treatments for women with stress urinary incontinence: a systematic review and network meta-analysis. Front Med (Lausanne) 2024;11:1517962. https://doi.org/10.3389/fmed.2024.1517962.
8. Fogleman C, Prescott N. Pelvic floor muscle training vs. control for urinary incontinence in women. Am Fam Physician 20201;101:393. https://www.aafp.org/pubs/afp/issues/2020/0401/p393.pdf
9. Hagen S, Elders A, Stratton S, Sergenson N, Bugge C, Dean S, et al. Effectiveness of pelvic floor muscle training with and without electromyographic biofeedback for urinary incontinence in women: multicentre randomised controlled trial. BMJ 2020;371:m3719. https://doi.org/10.1136/bmj.m3719.
10. Ford AA, Rogerson L, Cody JD, Aluko P, Ogah JA. Mid-urethral sling operations for stress urinary incontinence in women. Cochrane Database Syst Rev 2017;7:CD006375. https://doi.org/10.1002/14651858.CD006375.pub4.
11. Twiss C, Triaca V, Anger J, Patel M, Smith A, Kim J-H, et al. Validating the incontinence symptom severity index: a self-assessment instrument for voiding symptom severity in women. J Urol 2009;182:2384–91. https://doi.org/10.1016/j.juro.2009.07.025.
12. Sharma JB, Kakkad V, Roy KK, Kumari R, Pandey K. Role of incontinence severity index in evaluating severity and impact of treatment of stress urinary incontinence. J Midlife Health 2022;13:139–44. https://doi.org/10.4103/jmh.JMH_113_20.
13. Zalewski M, Kołodyńska G, Mucha A, Andrzejewski W. A prospective study of the quality of life of patients with stress incontinence before and after a transobturator tape (TOT)

procedure-preliminary report. J Clin Med 2021;10:4571. https://doi.org/10.3390/jcm10194571.
14. Öztürk B, Atlıhan U. The role of the incontinence severity index in the treatment of stress urinary incontinence. J Urol Surg 2025;12:34–9. https://doi.org/10.4274/jus.galenos.2024.2024-10-9.
15. Adhyapak S, Jamadar K, Mangarule P, Yangad S, Waghane U, Talsandekar AP. Effect of exercise regimen on stress urinary incontinence among admitted patients in selected hospital. J Pharm Bioallied Sci 2025;17:S296–8. https://doi.org/10.4103/jpbs.jpbs_1906_24.
16. Sandvik H, Hunskaar S, Seim A, Hermstad R, Vanvik A, Bratt H. Validation of a severity index in female urinary incontinence and its implementation in an epidemiological survey. J Epidemiol Community Health 1993;47:497–9. https://doi.org/10.1136/jech.47.6.497.
17. Tunitsky-Bitton E, Murphy A, Barber MD, Goldman HB, Vasavada S, Jelovsek JE. Assessment of voiding after sling: a randomized trial of 2 methods of postoperative catheter management after mid-urethral sling surgery for stress urinary incontinence in women. Am J Obstet Gynecol 2015;212:597.e1-9. https://doi.org/10.1016/j.ajog.2014.11.033.
18. Frick AC, Ridgeway B, Ellerkmann M, Karram MM, Paraiso MF, Walters MD, et al. Comparison of responsiveness of validated outcome measures after surgery for stress urinary incontinence. J Urol 2010;184:2013–7. https://doi.org/10.1016/j.juro.2010.06.114.