

Research Article

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Physiotherapeutic Effects of TENS, IFT and Standard Home-Based Exercises for the Management Stress Urinary Incontinence–A Prospective Study

Thangavelu Karthikeyan*

Head, Department of Physiotherapy, Gurugram University, Gurugram, Haryana, India

***Corresponding author:** Thangavelu Karthikeyan, Head, Department of Physiotherapy, Gurugram University, Gurugram, Haryana, India**Received Date:** December 16, 2023**Published Date:** January 11, 2024

Abstract

Stress urinary incontinence (SUI) is the involuntary, sudden loss of urine secondary to increased intra-abdominal pressure that is bothersome or affecting the patient's quality of life. Physical activities precipitating SUI include laughing, sneezing, straining, coughing, or exercising. Methods consists of single experimental study 15 women participated in this study. The participants undergone TENS, IFT aware Home-Based Standard Exercises with duration 6 weeks study was carried out. Initially the at the time of entry into the study investigator administered King's Health Questionnaire then readminister the end of 6th weeks the severity of symptoms changed from 13.0 to 9.60 ($P < 0.5$). The investigator concluded that this tailored made therapeutic form of TENS, Interferential therapy and home-based standard exercises can be used as an effective conservative management to improve quality of life in women with stress urinary incontinence. This physiotherapeutic approach which helps to improve kidney health, overall health well-being livelihood wisdom of the women with urinary stress incontinence.

Keywords: Stress urinary incontinence (SUI); interferential therapy (IFT); transcutaneous electrical nerve stimulation (TENS); king's health quality of life questionnaire (KHQ); SHBE

Introduction

Stress urinary incontinence (SUI) is the involuntary, sudden loss of urine secondary to increased intra-abdominal pressure that is bothersome or affecting the patient's quality of life [1]. Physical activities precipitating SUI include laughing, sneezing, straining, coughing, or exercising. SUI main symptoms are Cough or sneeze, Laugh, Bend over, Lift something heavy, Exercise, & Have sex [2]. It is a common problem with widespread human and social implications causing discomfort, shame and loss of self-confidence. It not only affects the quality of life but also has significant cost complications. Urinary incontinence (UI) commonly classified as the stress urinary incontinence (SUI), if there is any involuntary loss of urine when coughing or sneezing; urge urinary incontinence (UUI), if there is an abrupt and sudden urge to urinate that cannot be postponed

and stress urinary incontinence (MUI) if it is associated with both situations mentioned above [3-5].

The International Urogynecological Association (IUA) and International Continence Society (ICS) defined stress urinary incontinence as "the complaints of involuntary loss of urine associated with urgency and also with the effort or physical exertion or on sneezing and coughing" [6]. Stress urinary incontinence has been described urodynamically as "representing both urodynamic stress incontinence and detrusor over activity with or without incontinence" [7]. Many people have symptoms of both stress incontinence and urge incontinence because; stress urinary incontinence is the combination of both stress urinary incontinence and urge urinary incontinence. Also stress urinary

incontinence share the causes of both stress urinary incontinence and urge urinary incontinence [8,9]. Stress urinary incontinence is commonly seen in pregnancy, after vaginal birth, sneezing, coughing or other factors leads to weakness of muscles that support and control the bladder or increase pressure on the bladder causing urine to leak [10]. Urge incontinence is caused by involuntary action of the bladder muscles.

These may occur because of damage to nerves of the bladder, the nervous system or muscle themselves. Such damage may be caused by certain surgeries or diseases such as multiple sclerosis, parkinson's disease, diabetes, stroke or injury. The study of prevalence of urinary incontinence (2013) in Indian women shows that among the total women having incontinence, highest number were found in stress urinary incontinence (60.8%) followed by stress urinary incontinence (26.8%) and urge incontinence (12.4%) [11]. It was seen that prevalence was low in women up to 30 years of age. In women above 30 years of age, the prevalence ranged from 27.8% to 42.8% with maximum prevalence in the age group between 40 to 55 years of age [12]. The prevalence of all type of urinary incontinence was significantly higher in postmenopausal women and women who had hysterectomy. The prevalence of incontinence is maximum among group with the vaginal delivery (26.84%) followed by women with BMI > 25 (20%), caesarian delivery (10.12%) [This is possible explanation of damage of bladder, either neurologically, muscularly, or mechanically during dissection].

More women with stress urinary incontinence used locally applied estrogen than in stress urinary incontinent women. The women with stress urinary incontinence more often suffered from chronic constipation than stress urinary incontinence. The frequency of cases with history of radiation because of gynecological cancers was higher in women with stress urinary incontinence, but the actual numbers were small [13]. Epidemiological studies show that women with stress urinary incontinence symptom typically have worse incontinence than do women with stress urinary incontinence and urge urinary incontinence. Treatment for stress urinary incontinence will require a combination approach used to relieve both stress urinary incontinence and urge urinary incontinence. The condition often poorly responds response when treated using either pharmacological or surgical approach [14].

The practice of the conservative management of stress urinary incontinence is widespread and should be encouraged. All modalities appear to be more effective than no therapy. Unlike surgical treatment of urinary incontinence, which carries a significant risk of complication and poor long-term outcomes, conservative management is associated with minimal adverse outcome. It includes different modalities and different exercises. Acupuncture, electrical stimulation, Interferential therapy, TENS, vaginal cones, pelvic floor exercise, abdominal exercises, breathing exercises, bladder training etc. For a significant number of patients, conservative management is satisfactory as it obviates the need for medical or surgical interventions [15] (Figure 1).



Figure 1: IFT with TENS.

Methodology

Materials

The following materials were used in this study:

- Assessment Chart
- Bladder diary
- Home based standard Exercise Chart
- IFT & TENS Equipment
- Velcro Band and Microspore tape

f) Cotton and Gel

g) Covering sheet

Study Design

This is a single group prospective experimental study done in the pre-test post-test format.

Study Setting

This study was conducted on outpatients, in the Department of Physiotherapy, Gurugram University Gurugram. Informed consent was obtained from all patients, and all were considered for the study after prior referral from the General physician.

Sampling

Seventeen women with stress urinary incontinence based on the history were selected by convenient sampling.

Selection Criteria

Inclusion Criteria

- a) Women with stress incontinence Age group between 35-50 years.
- b) Women with stress incontinence who had vaginal or caesarean delivery.
- c) Women with stress incontinence who were suffering from stress urinary incontinence for 3 months.
- d) Women with stress incontinence who were willing to use modalities.
- e) Women with stress incontinence who were able to complete the questionnaire in English.

Exclusion Criteria

1. Women with stress incontinence who were using medication that enhances the urinary incontinence.
2. Women with stress incontinence who were pregnant or within 8 months after delivery.
3. Women with stress incontinence with advanced genital prolapse.
4. Women with stress incontinence who had surgery for urogenital prolapse.
5. Women with psychiatric and neurological disorders.
6. Women with previous history of head trauma.
7. Women having cardiac pacemaker, metal implants.
8. Women with chronic cardiovascular, respiratory, and renal disease.
9. Women with chronic degenerative disease that affects muscles and nerves.
10. Women with physical impairment making treatment impossible.

Technique

Initially, seventeen women with stress urinary incontinence were selected for this study. Informed consent was obtained from all participants. Baseline assessment was taken before the start of the study. Before starting the intervention two of them were withdrawn from this study due to personal reasons. The remaining 15 participants completed the treatment. All the participants were treated with TENS Interferential therapy and exercises (pelvic floor, transverse abdominus and diaphragmatic breathing exercises. Interferential therapy was given with Output intensity 0-90mA, frequency channel I 4000 Hz- 4250 Hz, channel II 4000 Hz constant, base 0-100 Hz, Spectrum 0 -150Hz. The patient was positioned in

semi- fowlers position. Interferential therapy was given using the quadripolar method. Two electrodes were placed on the lower abdomen just above the outer half of the inguinal ligament and another two on the inner aspect of thigh near to the origin of adductor muscle.

The parameters used were intensity up to the tolerable limit of participants, carrier frequency of 2000Hz, vector 900, rhythmic sweep frequency of 10-100 Hz. Interferential therapy (IFT) was given for 15 minutes, three times a week for 6 weeks. (Refer appendix II) Acu- TENS was given with Vectrostim model (Technomed Electronic private Ltd). Participants were positioned in supine lying and Acu-TENS were given on acupoints CV4, CV6, ST28, ST36, SP36, and KI 3. Then the participants were re-positioned to prone lying and Acu-TENS were applied on BL23, BL32, BL33, and BL35. The parameters used were, intensity up to the subjective feel tickling sensation, frequency of 10Hz and pulse duration of 200 μ s. The Acu-TENS was given for 30 minutes (3 minutes for each 10 acupoints) once a week for 6 weeks. All participants were taught about the anatomy of the pelvic floor and lower urinary tract, physiology, and continence mechanism and all were advised to do relaxed breathing, transverse abdominus and pelvic floor exercise at home.

This exercise program was accompanied by instruction of the Knack and Quick-flick maneuver. Participants were asked to maintain the bladder diary and exercise chart (Refer Appendix II & III). All were taught to contract the pelvic floor correctly and asked to perform 10 repetition of 2-5 seconds contraction, three times a day at home. The rest period was about 10 seconds between each contraction. The participants were encouraged to use their preferred position initially and then progressed in all functional positions. All were advised to perform equally intensive contractions. 3 or 4 fast contractions were then added. Transverse abdominus exercise is also performed in all functional positions with relaxed breathing. Participants were advised to do 10 repetitions of 5 seconds held in all positions. Diaphragmatic breathing exercise was performed in crook lying, sitting, and standing for 10-15 repetitions, once a day.

Parameter

Quality of Life

Outcome Measure

Quality of life is measured by King's Health Quality of life Questionnaire (KHQ).

Treatment Duration

The treatment was given for 6 weeks.

- a) Acu-TENS: Once a week, 30 minutes for 6 weeks.
- b) Interferential Therapy: 3 times a week, 15 minutes for 6 weeks.
- c) Exercise: 45 minutes per day, 3 times a week for 6 weeks.

Study Duration

This study was carried out for the period of one year from April 2023 to December 2023.

Results

The pretest and posttest values were obtained before and after

six weeks of intervention respectively. A significant difference between pretest and posttest value is found by using Paired "t" test (Figure 2).

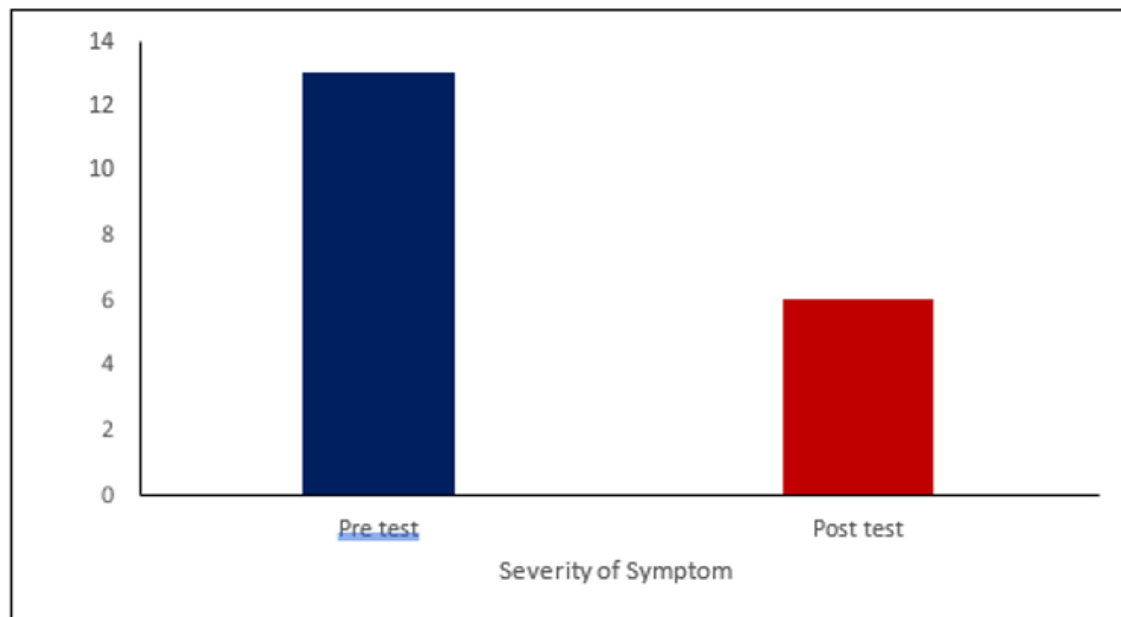


Figure 2: It shows Severity of Symptoms Changes of from Baseline to post intervention.

Result

The mean values, standard deviation and calculated 't' value for the King's Health Questionnaire (KHQ) domains are shown in Tables 1-3. The first part of the King's Health Questionnaire dealt with the perception of general health and the impact of incontinence. The second part of the King Health Questionnaire explored the limitations (role, physical and social), personal relationship, emotions and sleep/ (role, physical and social), personal relationship, emotions, and sleep/energy. The third part dealt with

the perception of symptom severity. Higher the score indicates poor quality of life. Lower the score indicates the good quality of life. At the baseline, women with stress urinary incontinence scored higher in general health perception, incontinence impact, role limitation, physical limitation. The mean and standard deviation for these scores is 66.66 ± 22.49 , 62.16 ± 17.21 , 64.4 ± 18.75 , 62.88 ± 24 , 65.12 ± 25.14 respectively. This indicates that women with stress urinary incontinence are affected moderate to poorly in the above said domains.

Table 1: Exercise Protocols.

S.no	No of Participants	Name of Equipment's/Exercise	Duration of Treatment
1	15	TENS	3times/Weekly/Total 6 weeks
2	15	IFT	3times/Weekly/Total 6 weeks
3	15	DBE	3times/Day//Total 6 weeks
4	15	Pelvic Floor	3times/Weekly//Total 6 weeks
		Transverse abdominus	3times/Weekly//Total 6 weeks

Table 2: Showing Demographic Variables.

No of Participants	Variables	Minimum	Maximum	Mean, Standard deviation
15	Age	35	50	39.9 ± 3.5
	Weight (kg)	70	97	84.9 ± 7.4
	Height (cm)	153	174	162.3 ± 7.9
	Body Mass Index (BMI)	30.7	33.8	32.2 ± 0.8

Table 3: Mean, Standard deviation and 't' value for King's Health Questionnaire (KHQ) domains.

King's Health Questionnaire Domains (KHQ domains)	Mean, Standard Deviation		't' value
	Pretest	Posttest	
General Health Perception	66.66 ± 22.49	33.33 ± 22.49	10.57
Incontinence Impact	62.16 ± 17.21	26.64 ± 18.66	15.99
Role Limitation	64.4 ± 18.75	34.41 ± 20.37	16.87
Physical Limitation	62.88 ± 24	32.92 ± 25.12	4.46
Social limitation	35.96 ± 24.14	28.86 ± 18.07	6.10
Personal Relationship	58.85 ± 28.05	28.86 ± 25.56	5.59
Emotions	65.12 ± 25.14	39.96 ± 26.46	16.36
Sleep/Energy	54.4 ± 20.37	28.85 ± 21.31	12.32
Measures of severity	55.52 ± 23.08	35.52 ± 24.87	6.48
Symptom Severity	13 ± 6.25	9.06 ± 5.80	7.82

Personal relationship, sleep/energy, measures of severity domains showed mean and standard deviation of 58.85 ± 28.05, 54.4 ± 20.37, 55.52 ± 23.08 respectively. This indicates that women with stress urinary incontinence are affected moderately in personal relationship, sleep/energy, and measures of severity aspect of quality of life. Social limitation and symptom severity scored the mean and standard deviation of 35.96±24.14, 13±6.25 respectively. This indicates the women are slightly bothered about social limitation and symptom severity since this study was conducted on women who have stress urinary incontinence for 3 months duration. After six weeks of treatment using Acu-TENS, Interferential therapy and exercises, women showed greater improvement in all the domains of King's Health Questionnaire. None of the women had adverse effect. The mean and standard deviation of General Health Perception, Incontinence Impact, Role Limitation, Physical Limitation, Social limitation, Personal Relationship, Emotions, Sleep/Energy, Measures of severity, Symptom Severity are 33.3 ± 22.49, 26.64 ± 18.66, 34.41 ± 20.37, 32.92 ± 25.12, 28.86 ± 18.07, 28.86 ± 25.56, 39.96 ± 26.46, 28.85 ± 21.31, 35.52 ± 24.87, 9.06 ± 5.80 respectively.

This indicates that women improved more obviously after 6 weeks of treatment in their quality of life. The calculated 't' value for General Health Perception, Incontinence Impact, Role Limitation, Physical Limitation, Social limitation, Personal Relationship, Emotions, Sleep/Energy, Measures of severity, Symptom Severity are 10.57, 15.99, 16.87, 4.46, 6.10, 5.59, 16.36, 12.32, 6.48, 7.82 respectively at 0.05 level of significance. The calculated 't' value is greater than the table value of 2.145 at 0.05 level of significance. This clearly shows that the combination therapy using Acu-TENS, Interferential therapy and exercises significantly improved the quality of life of women with stress urinary incontinence.

Discussion

Urinary incontinence impacts several dimensions of women's life due to either the physiological limitations imposed by the disease or the psychological confrontation resulting from social and family isolation, with consequences on quality of life. It is extremely important to assess the impact and perception of quality of life

in women with urinary incontinence. Several studies concluded that women with urinary incontinence often report a decrease in their quality of life. The King's Health Quality of Life Questionnaire (KHQ) is considered a complete questionnaire that assesses both the impact of incontinence in different aspects of quality of life and the lower urinary tract symptoms perceived by the patients [16]. The present study, we utilized the combination of TENS, IFT, and Exercises. Each treatment has its own role in improving the quality of life in women with stress urinary incontinence. Transcutaneous electrical nerve stimulation at acu points combines the advantage of electrical stimulation and acupuncture therapy. In this study TENS is used to stimulate the specific acu points related to stomach, spleen, kidney, bladder, and conception vessel meridians.

Acu point stimulation affects the nervous system as a whole and causes the release of neuro-chemical messenger molecules, thus results in biochemical changes that influence body's homeostatic mechanism, thus promoting physical and emotional wellbeing [17,18]. TENS also brings increased blood flow to the bladder, strengthens the urinary system, controls urethral sphincter, controls the unwanted urinary incontinence symptoms through the inhibition of sensory afferent nerve of bladder, increase bladder capacity and suppresses the detrusor muscle over activity. Electro-stimulation of the pelvic floor is widely used in the management of female urinary incontinence. The feeling of contraction of the pelvic floor is a useful reminder to the pattern of the sensation that should be achieved. IFT has an advantage of deeper stimulation, and less discomfort is felt by the subject while stimulating the pelvic floor muscles. Slow and fast twitch muscles are activated using the rhythmic sweep frequency [19].

Several reports confirmed the effect of pelvic floor exercise on female urinary incontinence. found that 71% of patients were cured or improved following pelvic floor exercise. Pelvic floor muscle exercise is thought to help with deferment process by utilizing the perineo-detrusor inhibitory reflex. Evidence based study claimed that deep abdominal muscle contraction will make the pelvic floor muscle co-contracted and co-ordination of pelvic floor muscle contraction with deep abdominal muscle contraction is more effective than specific strength training of the pelvic floor muscle

to enhance continence. Jones et al (2006) found that both continent women and women with stress urinary incontinence demonstrated co-contraction of the pelvic floor muscle during deep abdominal contractions [20]. The pelvic floor works in co-ordination with breathing. Holding your breath may increase intra-abdominal pressure and thus cause descent stretching and weakness of the pelvic floor muscles [21].

The result obtained in the present study shows that women with stress urinary incontinence perceived their overall quality of life as moderate to poor before the treatment. But, after 6 weeks of treatment using combination therapy of TENS, IFT and exercises, women achieved significantly superior results. The result supported an overall improvement in quality of life. Hence it clear that combined use of TENS, Interferential therapy and exercises significantly improved the quality of life in women with stress urinary incontinence.

Conclusion

The investigator concluded that this tailored made therapeutic form of TENS, Interferential therapy and home-based standard exercises can be used as an effective conservative management to improve quality of life in women with stress urinary incontinence. This physiotherapeutic approach which helps to improve kidney health, overall health well-being livelihood wisdom of the women with urinary stress incontinence.

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