



# ROLE OF PELVIC ELECTRICAL STIMULATION IN SUBJECTS WITH STRESS URINARY INCONTINENCE

<sup>1</sup>Dr. Pooja Chandel, <sup>2</sup>Dr. Saurabh Anand

<sup>1</sup>Assistant Professor, <sup>2</sup>Associate Professor

<sup>1</sup>Department of Physiotherapy

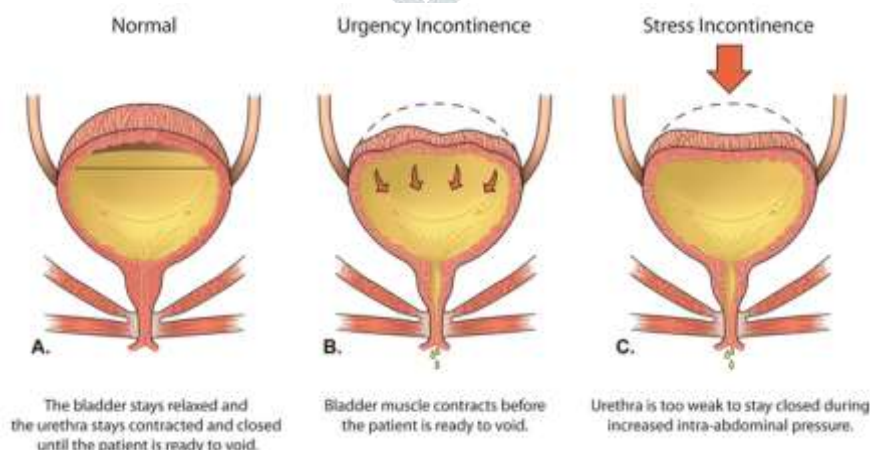
<sup>1</sup>Apex College of Nursing and Paramedical Institute, Varanasi, India

**Abstract:** Stress urinary incontinence (SUI) is a prevalent condition affecting a significant proportion of women globally, with approximately 50% of all urinary incontinence cases attributed to stress incontinence. SUI is defined as the involuntary leakage of urine during physical activities that increase intra-abdominal pressure, such as coughing, sneezing, or lifting heavy objects. The condition arises when the bladder receives pressure signals before the urethral closure mechanism can respond, typically due to a compromised bladder support system. The weakening of pelvic floor muscles, often resulting from pregnancy and childbirth, is a leading cause. Electrical stimulation of the pelvic floor using a portable functional electrical stimulation system equipped with percutaneously inserted electrodes to address detrusor urinary incontinence. After 4-8 weeks of electrical training, urinary incontinence improved in five out of six patients. Subjectively, incontinence had disappeared in two out of six cases. Urodynamic assessments revealed an elevation in detrusor reflex threshold and reduced incidence of abortive detrusor contractions. This manuscript explores the underlying mechanisms, contributing risk factors, and prevalence of stress urinary incontinence, highlighting the urgent need of pelvic electrical stimulation for effective prevention and management strategies in women's healthcare.

**Keywords:** - Stress urinary incontinence, pelvic floor muscles, intra-abdominal pressure, urinary leakage, pregnancy, women's health, electric stimulation.

## I. INTRODUCTION

In many women worldwide, stress urine incontinence is a widespread problem. Stress incontinence is reported by about 50 % of women with urine incontinence. Therefore, the definition of urinary incontinence is the deliberate loss of urine when the abdominal pressure rises. As a result of the effort, the bladder receives the signal before the urethra. Urine leaks caused by increased strain on the bladder. Such strain can be caused by coughing, sneezing, exercising, or carrying heavy weight objects are known as stress incontinence. It appears that the system which is keeping the bladder outflow closed gets compromised. It is primarily caused by weak pelvic floor muscles. Pregnancy and childbirth are the most evident reasons. Urge, stress, and mixed urine incontinence are the three main form that affect women.



The rehabilitation of the pelvic floor muscle is aided significantly by the advent of neuromuscular electrical stimulation (NMES) in pelvic healthcare. Pelvic floor exercises are the first line of treatment; however, patients may not apply the proper technique. A technique for strengthening the pelvic floor muscles through positive reinforcement is biofeedback. For urge incontinence that does

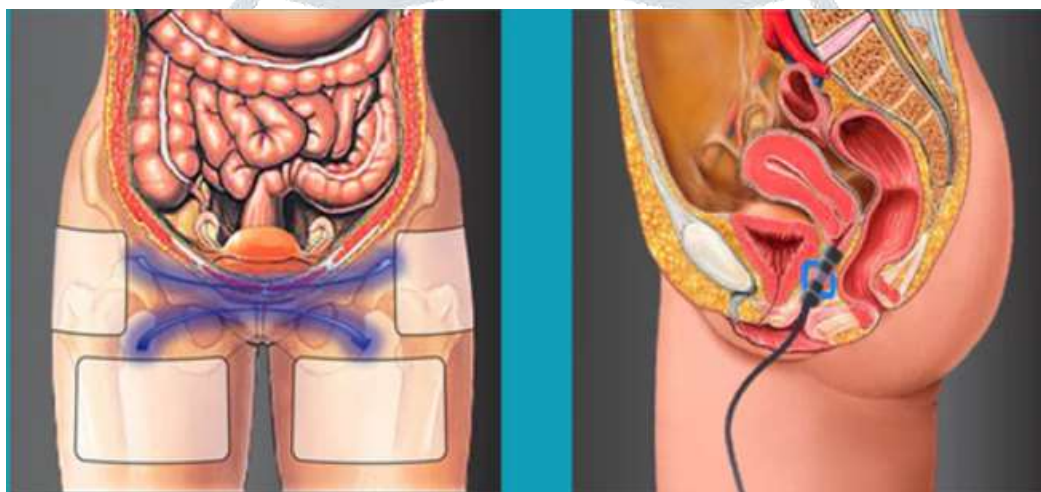
not improve with behavioral therapy neuromodulation devices like the post-tibial nerve simulator are an alternative. It has also been demonstrated that surgically inserted sacral nerve stimulators can reduce the symptoms of urine incontinence.

It is a health, social and hygienic concern. SUI is caused due to a lack of strength in urethral sphincter muscle, pelvic floor muscle, connective and fascial tissue.

Non-pregnant or prepartum women are less likely to suffer from UI compared with postpartum women. However, in the last few decades, there has been an increase in the number of women experiencing incontinence among non-pregnant women hence the importance of prevention and Rx of SUI has grown.

According to Karibo et al. international urogynecology association 2004, several randomized control trial have shown that pelvic floor muscle training is effective in treatment of female stress urinary incontinence and mixed urinary incontinence and therefore it is recommended first line therapy.

We conducted electrical stimulation of the pelvic floor using a portable functional electrical stimulation system equipped with percutaneously inserted electrodes to address detrusor urinary incontinence. We applied cyclic stimulation, employing negative pulse trains at a frequency of 20 Hz, 3 to 6 times daily to the bilateral pudendal nerves that innervate the pelvic floor muscles. This aimed to strengthen these muscles, including the urethral sphincter, while simultaneously suppressing detrusor overactivity and increasing cytometric capacity. After 4-8 weeks of electrical training, urinary incontinence improved in five out of six patients. Subjectively, incontinence had disappeared in two out of six cases. Urodynamic assessments revealed an elevation in detrusor reflex threshold and reduced incidence of abortive detrusor contractions. No noticeable complications were observed during these periods. This approach appears to be effective for managing patients with detrusor incontinence who show limited response to conservative treatments.



The stress urinary incontinence has adverse effect on Quality of Life (QOL). The impact of QOL depends on several factors, i.e. frequency and severity of incontinence episodes, extent of patient's desired physical function and influence on social functioning. Quality of life will be measured by the Incontinence Impact Questionnaire (IIQ). The IIQ is a 30-item questionnaire designed to assess the effect of urinary incontinence across 4 domains: physical activity, travel, social relationships, and emotional health. Subjects completed the IIQ at the baseline and post treatment examinations. Scores on the IIQ range from 0 to 400 with a higher score indicating poorer perceived quality of life.

## II. NEED OF STUDY

Stress urinary incontinence is a condition affecting the quality of life. Until now it is believed that pelvic floor muscle exercises improve bladder function. Recent studies use the pelvic floor electric stimulation biofeedback as the treatment option for stress urinary incontinence but there is no consensus in literature regarding the best option. Hence the need for study.

## III. AIMS AND OBJECTIVES

To compare the effectiveness of using pelvic floor muscle exercises alone in contrast to both pelvic floor stimulator and pelvic floor muscle exercise in subjects with stress urinary incontinence.

## IV. RESEARCH METHODOLOGY

### 4.1 Sample

Total 30 female subjects participated in the study. Subjects were chosen based on convenience sampling. Sample was collected from Apex Hospital, BLW, Varanasi.

### 4.2 Study Design

Experimental study design

### 4.3 Ethical Clearance

Ethical approval of this study was obtained from the Apex Multi-specialty Hospital, Gynaecology Department, Varanasi, U.P. and was done in accordance with Helsinki declaration revised in 2013 and National Guidelines for Biomedical Research involving Human participants, 2017.

### 4.4 Inclusion Criteria

- Recorded at least one SUI episode.
- Only female.
- Age 30 to 55 years.
- Score below 7 on Stress Incontinence Diagnostic Questionnaire
- Cough stress test positive.
- Diabetic patients

### 4.5 Exclusion Criteria

- Pelvic pain.
- Severe endometriosis.
- Any intrauterine device
- Any metabolic or neurological disorder.
- Incontinence due to any reason other than stress.
- Pregnant women
- Acute vaginal injuries
- Pelvic inflammatory diseases

### 4.6 Variables

- Independent Variables
  - Age
  - BMI
  - Abdominal circumference
- Dependent Variables
  - Marital Status

### 4.7 Instruments

- Pelvic floor electrical stimulator.
- Pen
- Diary
- Measuring tape
- Weighing scale
- Conducting paste
- Female condoms

### 4.8 Outcome Measures

The severity of urinary incontinence can be accessed by various methods such as urinary symptoms questionnaire, frequency/volume chart and quality of life questionnaire but as quality-of-life assessment gives only subjective data hence this Study takes no. of incontinence episodes as an outcome measure. A three-day bladder diary provides the means for assessing voiding frequency and volume together with the frequency of leaks. The cough test provides the means for documenting stress urinary incontinence. This clinical test is simple and reproducible. A positive cough test carried out with empty bladder with patients in supine line tend to indicate an intrinsic urethral sphincter deficiency. So, no. of incontinence episodes was measured by using stress urinary incontinence diagnostic questionnaire.

- Number of incontinence episodes

### 4.9 Protocol

2 groups were selected based on exclusion and inclusion criteria. Total 30 female patients were included in sample.

Group A: Subjects were given pelvic floor muscle exercise training.

Group B (Experimental group): Subject were given Pelvic Floor Muscle Exercises + Pelvic Floor Electrical Stimulation.

Duration of exercise program two times per day for six weeks and each exercise for two repetitions and hold it for 8-10 seconds. Pelvic floor stimulation with frequency 50-60 Hz and intensity according to patient's tolerance. Duration of treatment once daily up to six weeks for 20 minutes in each session. Intravaginal electrode probe was used. Reference electrodes placed over the medial aspect of upper thigh.

## V. RESULTS

Paired t-test done to compare pre and post incontinence episodes for each group.

For Group 1 standard deviation and standard error mean of pre and post IE was  $2.65 \pm 0.71$  and  $2.14 \pm 0.57$  respectively.

or Group 2 standard error mean and standard deviation of pre and post IE was  $2.9 \pm 0.77$  and  $2.4 \pm 0.65$  respectively.

Sample correlation between two groups for pre and post IE has increased slightly.

Sample t-test has showed p-value for pre-IE as 1 and post IE 0.7 which is above our significant level.

Table 5.1: Descriptive Statistics

|         | No of Patients | Minimum | Maximum | Mean |
|---------|----------------|---------|---------|------|
| Pre IE  | 30             | 0       | 8       | 4.67 |
| Post IE | 30             | 0       | 7       | 3.97 |

Table 5.2: Paired Sample Statistics

|         |         | No of Patients | Standard Deviation | Standard Error Mean |
|---------|---------|----------------|--------------------|---------------------|
| Group 1 | Pre IE  | 15             | 2.65               | 0.71                |
|         | Post IE | 15             | 2.14               | 0.57                |
| Group 2 | Pre IE  | 15             | 2.87               | 0.77                |
|         | Post IE | 15             | 2.42               | 0.65                |

Table 5.3: Paired Sample Correlation

|         |                  | No of Patients | Correlation |
|---------|------------------|----------------|-------------|
| Group 1 | Pre IE & Post IE | 15             | 0.93        |
| Group 2 | Pre IE & Post IE | 15             | 0.99        |

Table 5.4: Paired Sample T-test

| Pre IE Scores | Post IE Scores |
|---------------|----------------|
| 1             | 0.701          |

## VI. DISCUSSIONS

Pelvic floor muscle electrical stimulation is an effective treatment of stress urinary incontinence and mixed incontinence and therefore it is recommended as a first line of treatment but previously bladder training which include Kegals exercise were used in management of stress incontinence but there is dearth of literature in this regards, so the purpose of study was therefore to determine the effectiveness of pelvic low frequency stimulation over simple bladder training .Although both protocols were effective in improving the quality of life and decreasing incontinence episodes ,there was significant differences statistically between two .

In a study by J. Andrew Fantlel pelvic stimulation reduced the number of incontinence episodes by 57%. This was greater for patients with detrusor- instability than for those without it. Diurnal and nocturnal voluntary micturition was also reduced. The effect of nocturnal micturition however was not observed in patients with unstable detrusor function. It is thus recommended that bladder training with intravaginal stimulation be considered as an initial step in treatment of women with urinary incontinence. According to research done, Bladder training with stimulation yield a mean of 80.7% reduction of incontinence episode was significantly more effective than drug treatment (mean reduction 68.5%,  $p=.04$ . Patients perceived improvement was greatest for pelvic stimulation. According to Burgioet.al behavioral treatment is safe and effective conservative intervention so can be used as the first line for stress, urge, and mixed incontinence.

In our study we compared two treatment strategies and results show significant differences, Group B showed more improvement compared to Group 1. The small sample size could be a possible reason for the result, moreover the data was self-reported by the subjects and could not be independently verified by researcher may also contribute to the results. Both the groups shows significant improvement over Pre intervention data shows pelvic stimulation is more effective .The greater improvement in Group 2 (voiding diary) compared to (scheduled bathroom trips) may be explained by better compliance in subjects of Group 2 who were asked to increase voiding interval progressively by 15 to 30 minute each day as compared to subjects in Group 1 who were asked to increase voiding interval over a week .Moreover the voiding log may also have acted as a reminder to the subjects and in turn ensure better compliance. The inclusion of fluid intake chart in Group 2 may have encouraged the subjects to better manage their fluid intake and may have contributed to results. Overall, the frequency of voiding interval or fluid intake does not seem to make a difference.

## VII. REFERENCES

- W. Stuart Reynolds, MD, MPH, Roger R. Dmochowski, MD, MMHC ,David F. Penson, MD, MPH, MMHC, Current Urology Report 12, 370-376 2011
- Ui-Jae Hwang, PhD, PT, Min Seok Hee, MD, Oh-Yun Kwon, PTD, Received 12 Feb 2021, Accepted 11 Apr 2022, Published online 18 Apr 2022

- Dr. Lauren R. Hersh, MD, Dr. Brooke E. Salzman, MD, Clinical Manifestation of Urinary Incontinence in Women
- Dr. Eleanor F Allen, The British Journal of Nursing, 2019, Role of Neuromuscular Electrical Stimulation in the Rehabilitation of Pelvic Floor Muscles
- Dr. Alba Sorrigueta-Hernandez et. al, J Clin Med – 2020 PMID - 33050442 Benefits of Physiotherapy on Urinary Stress Incontinence in High Performance Female Athlete
- Souhail Alouini et. al Int Environ Res Public Health 2022 Pelvic Floor Muscle Training for Urinary Incontinence with or without Biofeedback or Electrical Stimulation in Women: A Systemic Review PMID – 35270480
- Hiralal Conar Chapter 25: Urinary Problems in Gynaecology D.C. Dutta Textbook of Gynaecology, 8th Edition
- Fiona Stewart et. al, Cochrane Data Base System Rev. 2017, DOI -10.1002/465/858 Electrical Stimulation in Non-implanted Devices for Stress Urinary Incontinence in Women, PMID – 29271482
- Sangrak Bae, Kyu Won Lee, Hyun Cheol Jeong, Bong Hee Park, Woong Jin Bae, Yong Seok Lee, Chang Hee Han, Sung Hak Kang, Sae Woong Kim Effects of Low-Frequency Intravaginal Electrical Stimulation on Female Urinary Incontinence, Quality of Life, And Urinary Symptoms: A Pilot Study First Published: 09 October 2019 under LUTS Volume 12 Issue 1 / p. 25-32
- Herbert H Juliah, Speciales continence physiotherapy, female urinary incontinence protocol.

