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Effectiveness of Transcutaneous Tibial Nerve Stimulation On Urinary Incontinence Among Individual with Type Ii Diabetes Mellitus

Philomina John kennedy[1], Kanagaraj Jayabalan[2]

[1]Assistant professor, Physiotherapy, Sri Venkateshwara Medical College, Puducherry. India
[2]BPT, Physiotherapy, Sri Venkateshwara Medical College, Puducherry, India

Abstract

Background: Type II diabetes mellitus is the commonest form of diabetes. The prevalence of type II diabetes mellitus around India is 2.4% in rural population and 11.6% in urban population. Over 50% of men and women with diabetes have bladder dysfunction. A number of clinical studies in men and women with diabetes have reported bladder instability or hypersensitivity as the most frequent finding ranges from 39 – 61% of subjects. As the population ages, diabetes mellitus and urinary incontinence markedly increase in prevalence.

Purpose: Peoples with type II diabetes mellitus develop urinary incontinence when disease over years. Early intervention should be done to reduce urinary incontinence. Few studies have reported, that TTNS reduce the urinary incontinence effectively. So, the purpose of this study to determine the effectiveness of Transcutaneous Tibial Nerve Stimulation on urinary incontinence among individuals with type II diabetes mellitus.

Materials and methods: In this experimental study, 30 subjects with type II diabetes mellitus with urinary incontinence were selected. The symptoms of urinary incontinence are assessed. Followed by six weeks of transcutaneous tibial nerve stimulation (TTNS), Kegel's exercise, aerobic exercise and sensory re-education then, the above parameter was re- assessed after interventions.

Results: A significant reduction in symptoms of urinary incontinence ($P < 0.05$) after six weeks of the protocol was observed. It is significant in both groups; GROUP A is more significant than GROUP B.

Conclusion: Transcutaneous Tibial Nerve Stimulation and conventional exercise are reducing the symptoms of urinary incontinence. Therefore, incorporating the TTNS can be effective in the treatment of urinary incontinence among type II diabetes mellitus patients.

Keywords: urinary incontinence, type II diabetes mellitus, TTNS, TENS.

1. Introduction

Type II Diabetes mellitus is the commonest form of diabetes [(1)]. The prevalence of type II diabetes mellitus around India is 2.4% in rural population and 11.6% in urban population. Diabetes mellitus has been associated with an earlier onset and increased severity of urologic disease that often results in debilitating urologic complication such as urinary incontinence [(2)].

Type II Diabetes mellitus results when your body resists effects of insulin to maintain a normal glucose level in your body. Insulin helps to regulate the levels of glucose in the body, too much glucose can damage the body over time[(3)]. The exact mechanism by which diabetes mellitus causing urinary incontinence is not yet known. Diabetes commonly causes nerve damage. Nerves in the bladder once damaged can reduce sensation in the bladder and this coupled with chronic diabetes could weaken the bladder muscles and affect how well they are able to empty the bladder of urine[(4,5)].

Posterior tibial nerve is a mixed nerve containing L5-S3 fibers, originating from thè same spinal segments as the parasympathetic innervations to bladder (S2-S4) TTNS stimulate tibial nerve and sends impulse to sacral plexus, group of nerves at the base of spine responsible for bladder function [(6)]. By stimulating this bladder activity can be changed thereby incontinence will reduce and also TTNS is found to be non-invasive and cost effective; so far, there is no specific studies which has been done in particular regarding the treatment of urinary incontinence using TTNS among type II Diabetes Mellitus [(7,8)]. Therefore, purpose of this study is to investigate the effectiveness of Transcutaneous Tibial Nerve Stimulation on urinary incontinence among individual with type II Diabetes mellitus.

2. Materials And Methodology

study design	:	the experimental study
study setting	:	department of physiotherapy in SVMCH & RC, Puducherry
study population	:	type II diabetes mellitus with urinary incontinence
sample size	:	30 subjects
sample technique	:	randomized sampling
outcome tools	:	ICIQ-SF & M-ISI questionnaire
outcome measures	:	urinary incontinence, symptom severity of urinary incontinence
treatment duration	:	8 weeks
study duration	:	6 months
selection criteria	:	

inclusion criteria:

disease course (type II DM) > 1 year.

ages between 45 - 60 years.

subject with urinary incontinence has a score of ICIQ>15

subject willing to participate in this study.

exclusion criteria:

individuals with pace makers.

chronic diabetic neuropathy with diabetic foot.

metal implants at the treatment area.

malignancy.

3. Procedure and Methodology

GROUP-A: EXERIMENTAL GROUP - Transcutaneous Tibial Nerve Stimulation and Conventional Exercise.

GROUP-B: CONTROL GROUP - Conventional Exercise [Kegels exercise,30 minutes of Aerobic walking, Sensory re-education].

1. **TRANSCUTANEOUS TIBIAL NERVE STIMULATION:**

POSITION OF THE SUBJECT: Supine lying.

POSITION OF THE ELECTRODES:

- Negative electrode over medial ankle below Malleolus
- Positive electrode over 10 cm proximal to medial malleolus.

PROCEDURE:

These electrodes connected to conventional electrical stimulator producing pulses ranging from 10 to 50 m A with a pulse duration of 200 ms and frequency of 10 Hz in continuous mode. All patients showed some degree of hallux mobilization which ensure that tibial nerve was being stimulated.

DURATION: 30 min (5 session /week).

2. **KEGEL'S EXECISE:** 10 times: 4sets/ day – totally 40 repetitions.
3. **AEROBIC WALKING:** 30 minutes

Warm up – 10 mins (static stretching all muscle group)

Activity – 10 mins (aerobic walking)

Cool down – 10 mins (similar to warm up)

4. SENSORY RE-EDUCATION:

- Table top touch therapy
- Texture handling
- Temperature differentiation
- Sensory location

4. Statistical Analysis:

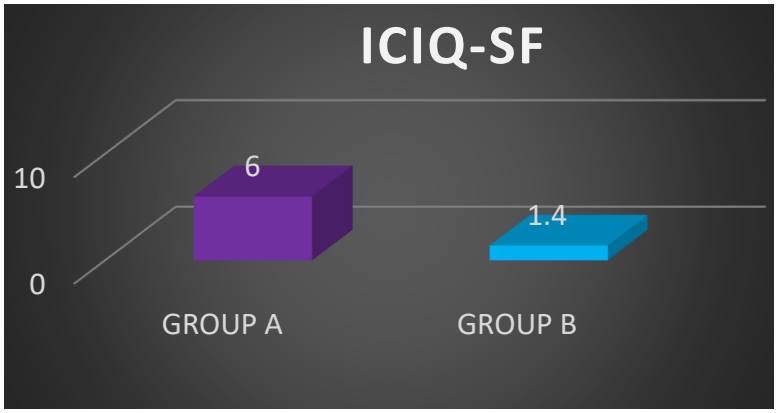
In this study, pre and post interventional differences within the two groups were analyzed using paired 't' test and between the two groups were analyzed using unpaired 't' test for each of the outcome measures. Statistical significance was set at p <0.0001.

5. Result

Between The Group Analysis Of Iciq-Sf

GROUP	Mean	SD	t- value	'p'- value
GROUP-A	6.0	0.39	2.42	<0.0001
GROUP-B	1.4	0.49		

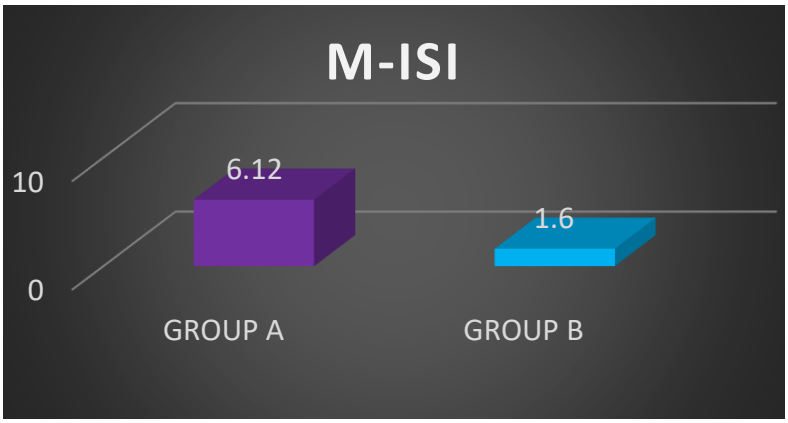
This table showing the group A and B and unpaired 't' value among urinary incontinence



Between The Group Analysis Of M-Isi:

GROUP	Mean	SD	t- value	'p'- value
GROUP-A	6.12	0.12	2.88	<0.0001
GROUP-B	1.6	0.72		

This table showing the group A and B and unpaired 't' value among symptoms and seveity of urinary incontinence.



6. Discussion

In this study 30 subjects were included under the selection criteria, they are randomly allocated into two groups 15 each. Group A received **Transcutaneous Tibial Nerve Stimulation** along with Conventional exercise & Group B received conventional exercises alone which includes **Kegel, Aerobic walking and Sensory re-education.**

WU Zhiyuan, given the transcutaneous tibial nerve stimulation for about 2 months and found that TTNS has regulated & improved the blood index, BMI, lipid index, although they rebounded slightly at follow up. Thus, TENS could improve type II DM similar to the accepted aerobic exercise therapy. Similarly, TENS effect on reducing the urinary incontinence in our study.

Joanne booth, in his study on Percutaneous Tibial Nerve Stimulation for adult with overactive bladder has used the ICIQ-SF and it has been reported that TENS is safe and tolerable for both idiopathic and neurogenic bladder. Similarly, in this study ICIQ-SF measure the urinary incontinence by using the Percutaneous Tibial Nerve Stimulation.

7. Conclusion

The study concluded that the experimental group received Transcutaneous Tibial Nerve Stimulation along with Conventional exercise (kegel, aerobic walking & sensory re-education) shows significant improvement in reducing urinary incontinence and its symptoms severity among Type II Diabetes Mellitus individuals than the control group who received conventional therapy alone.

I. LIMITATION AND RECOMANDATIONS

LIMITATIONS:

- Small sample size.
- Shorter treatment duration (8 weeks).
- Long term follow up of the treatment effects were not done**.**

RECOMMENDATIONS:

- Larger sample size can be taken.
- Frequent follow up can be done.
- Disease course of chronic Type II individuals can be taken.
- Some other quantitative outcome tools can be used.
- Future study done can be don to find out the correlation between TTNS on quality of life can be measured.

References

1. Ramachandran A, epidemiology of type II diabetes in Indians, J Indian medassoc, 2002, 100(7): 425-7.
2. Goldman HB , Appall RA(1999), Voiding dysfunction in women with diabetesmellitus, R. Int urogynecol J volume 10, issue 2, pp 130-1333.
3. Kaplan SA et al (1995), urodynamic finding in patients with diabetic cystopathy,JUrol 153(2): 352-3. [PUBMED].
4. Menendez V et al (1996), urodynamic evaluation in simultaneous insulin dependent diabetes mellitus and end stage of renal disease, The journal of urology 155(6):2001-4.5.
5. Adenine M. Yerkes, BSN,MBH,(1998), Urinary incontinence in individual withdiabetes mellitus, diabetes spectrum, volume 11, page 241-247.
6. Health 24 / TENA, how type II diabetes and incontinenve are connected, 14 nov2018,12:54.7.
7. Suzane et al (2009), Clinical research in diabetes and urinary incontinence, J urol.182:S14-S17.
8. Thom DH, haan MN, van den eeden SK. Medically recognized urinaryincontinence and risks of hospitalization, nursing home admission and mortality.Age ageing. 1997 sep;26(5):367-374.[pubmed].
9. Nygard, turvey et al. urinary incontinence and depression in middle aged unitedstates women. Obstetgynecol,2003 jan101(1).
10. Luc timmermans et al. ICIQ-SF is a tool for assessing urinary incointinence.