

EFFICACY OF COMBINING TENS WITH ALTERNATE NOSTRIL BREATHING AMONG GERIATRIC HYPERTENSIVE SUBJECTS

Vignesh Srinivasan¹, Praveen Kumar Kandakurti^{2,3}, Jagatheesan Alagesan⁴, Kumaraguruparan Gopal⁴,
Kishore Jebasingh T.⁵, Prathap Suganthirababu⁴

¹Tutor, Saveetha College of Physiotherapy, Saveetha Institute of Medical and Technical Sciences, Chennai, India.

²Department of Physiotherapy, College of Health Sciences, Gulf Medical University, Ajman, UAE.

³Adjunct Faculty, Saveetha College of Physiotherapy, Saveetha Institute of Medical and Technical Sciences, Chennai, India.

⁴Professor, Saveetha College of Physiotherapy, Saveetha Institute of Medical and Technical Sciences, Chennai, India.

⁵Physiotherapist, Khorfakkan Ministry of Health Hospital, Sharjah, UAE.

¹Corresponding Author's E-mail: vigneshphysio1989@gmail.com

ABSTRACT

BACKGROUND: Geriatric population is getting increased worldwide. In addition to the ageing process hypertension will be one of the risk factor for various diseases. At the same time increasing the anti hypertensive drug dosage and adding up new drugs at the late age, could lead to potential side effects. Thus along with the pharmacological therapy an adjunct therapy is needed to keep the blood pressure under controlled levels. This study aims to explore the efficacy of Combining Tens with Alternate Nostril Breathing Among Geriatric Hypertensive Subjects.

METHODS: An Experimental study was carried out with 68 participants. Experimental group received Tens therapy along with the alternate nostril breathing exercise. Control group received pharmacological therapy along with alternate nostril breathing therapy. The Mean arterial pressure was recorded pre and post to the intervention by blinded tester who was not aware about group allotment.

RESULT: Pre-test and post-test mean and standard deviation values of MABP of Experimental group found to be 119.69 (± 4.93) and post-test be 115.73 (± 4.86) with p value of < 0.0001 . It is proved that there is statistically significant reduction in MABP in experimental group treated with Tens therapy and alternate nostril breathing exercise.

CONCLUSION: Combining Tens therapy and alternate nostril breathing exercise has shown to be effective in keeping the blood pressure levels under control among geriatric population.

KEY WORDS: Tens, Alternate nostril breathing, Geriatrics, Hypertension, Mean arterial blood pressure

I. INTRODUCTION

Ageing seems to be a worldwide phenomenon. Almost every country in the world is seeing a spike in the number of elderly adults. In 2019, there had been 703 million people worldwide who were 65 and older. This figure is likely to double to 1.5 billion in 2050. Worldwide, the proportion of people aged 65 and up rose from 6% in 1990 to 9% in 2019 and the proportion is expected to get inflated upto 16% by 2050. In Eastern and South-Eastern Asia, the percentage of people aged 65 or older has nearly doubled, increasing from 6% in 1990 to 11% in 2019.¹

The Ministry of Health & Family Welfare has mentioned that "in 2011, the 60 years above population constituted for 8.6% of Population in India, accounting for 103 million older people," highlighting the significance of the

Longitudinal Aging Study conducted in India (LASI). Seventy-five percent of the elderly had one or more serious illnesses. 40% of the elderly have kind of a disease, and 20% have mental health issues.²

Physical fitness and functionality can deteriorate as people get older, which can have a negative impact on their well-being. As a result, elderly people could face more difficulties in pursuing healthy aging.³⁻⁷

Few studies have examined the occurrence of medical problems in this elderly community. Cardiovascular disease (CVD) was perhaps the most prominent, responsible for 72% of all cases. It is followed by central nervous system conditions (37%, musculoskeletal disorders 28%, gastrointestinal conditions 24%, & respiratory diseases 14%). Diabetes, thyroid problems, and glaucoma affected 5–8% of the whole population, and cancer treatment was being used by 4%.⁸

Hypertension, particularly in the aged, is a significant risk factor for cardiovascular disease incidence and death. Cardiovascular (CV) specialists and other practitioners face a treatment challenge when it comes to hypertension in the aged. The patterns of BP fluctuations and rising hypertension incidence with age are two primary reasons for this phenomenon (about 1 billion people worldwide). Hypertension affects more than two-thirds of adults over the age of 65, according to the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7).^{9,10,11}

Primarily the Adrenaline and nor adrenaline, that are released by the adrenal medulla in response to sympathetic nervous system stimulus and secondarily the stimulation renin-angiotensin-aldosterone production in the kidney due to hypotension are the key hormones that increase blood pressure.⁹ Traditionally, hypertension has been diagnosed using clinic blood pressure (BP) measurements. Since 2011, NICE guidelines in the British Isles have recommended that a patient with a raised clinic BP reading (140/90 mmHg) obtain confirmation of Hypertension.¹²

Hypertension is treated with first-line drugs such as angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARBs), diuretics, calcium channel blockers (CCBs) and beta-blockers.¹³ Apart from the pharmacological therapy, the American Heart Association gives the guidelines to various other therapies such as a diet modification which insists the intake of vegetables, fruits, whole grains, Reducing salt intake to less than 2,400 mg a day and exercising three to four days per week for an average of 40 minutes per hour.¹⁴

Antihypertensive medications have many side effects and risks, and their failing to comply rate is high. Apart from drug therapy, one of the complementary and alternative therapies is breathing techniques. The alternate nostril breathing exercise stimulates the major nerve in the parasympathetic nervous system and the vagus nerve, which helps to slow the heart rate, lower blood pressure, and calm the body and mind. Few studies have advocated that, Complementary therapy, such as alternative nostril breathing exercise, is shown to be the most effective at lowering pressure in patients with hypertension.¹⁵ In association to the available therapeutic options, it is now identified that, the TENS therapy also plays a significant role in the treatment of hypertension. Hypertensive subjects have altered autonomic nervous system activity, resulting in elevated sympathetic response. Transcutaneous Electrical Nerve Stimulation (TENS) is an effective pain relief modality that has already been shown to minimize sympathetic response.^{16,17,18} Hence aim of the study is to rule out the efficacy in the treatment of hypertension by combining Tens therapy and alternate nostril breathing exercise among the geriatric population.

II. MATERIALS & METHODS

An experimental study design was framed and a total of 68 participants, who showed their willingness to participate in the study, were recruited from Saveetha medical college and hospital in Chennai. On the basis of selection criteria, 16 participants were excluded and 52 participants were selected. The participants were informed about the intent of the study and therapeutic procedures were explained to the subjects and received informed consent from them. The study was approved by institutional review board. The study was conducted from Jan 2021 to March 2021.

Subjects who were diagnosed to be hypertensive were involved in this study. Both genders, aged from 60 to 70 years were included. Subjects with Severe cardiovascular, neurological diseases, renal failure, diabetes mellitus, and cancer were excluded from the study. Participants were randomly allotted using sealed envelope method into experimental and control group with 26 participants in each group. Experimental group received

Tens therapy along with the alternate nostril breathing exercise. Control group received only pharmacological therapy prescribed by their respective physician along with alternate nostril breathing therapy.

The selected participants were randomized to undergo either "Tens therapy with alternate nostril breathing exercise or Pharmacological therapy with alternate nostril breathing exercise". Both the groups were balanced throughout the study with equal sample size. Pre-test and post-test data were collected by a trained physiotherapist who is blinded about the group allotment.

Participants in the experimental group were comfortably accommodated in an acclimatized room 23°C in supine position, with head elevation of 30° and knees resting on a wedge. All the participants were forbidden to perform exhaustive exercises and avoid ingestion of caffeine at least twelve hours before the intervention, and they were instructed to have a meal before the assessment. Initially, subjects were asked to rest for 30 minutes. The experimental group received TENS therapy & Alternate Nostril breathing exercise.

Before the application of TENS, the skin site was cleaned with alcohol to avoid any barrier conduction of the electrical current. Adhesive electrodes measuring 9x5 cm were used, placed on the bilateral paravertebral region in the paravertebral ganglionic region (from T1 to L2). Asymmetric biphasic square impulses were applied in bursts of trains, 9 pulses per train, with an internal frequency of 160 Hz, a repetition rate of 2 Hz, and a pulse width of 100 micro sec has been advocated as a beneficial treatment in the previous studies. The TENS was applied for thirty minutes a day for 5 days a week, for 6 consecutive weeks.

Then the participants were instructed to do alternate nostril breathing for 15 min in sitting posture either in a lotus posture or a comfortable sitting posture. The surroundings were kept calm, quiet, with enough fresh air ventilation. The participants were instructed to maintain a steady posture with head, neck and trunk to be maintained straight.

The following commands were given. Bring the right hand up to the nose, fold the index and middle fingers so that the right thumb can close the right nostril and the ring finger can close the left nostril, with the right nostril closed by the right thumb, exhale completely through the left nostril.

The exhalation should be controlled and free from exertion and jerkiness. At the end of the exhalation close the left nostril with ring finger, open the right nostril and inhale slowly and completely. Inhalation should be smooth, controlled and of the same duration as exhalation.

Participant were instructed to repeat the cycle of exhalation through the left nostril and inhalation through right nostril, exhale completely through the same nostril keeping the left nostril closed with ring finger.

Each exercise session consisted of 3 cycles of exhalation through the left nostril and inhalation through the right nostril followed by 3 cycles of exhalation through the right nostril and inhalation through the left nostril and this was repeated for about 15 min after the completion of Tens therapy and this exercise was also given for 5 days a week, for 6 consecutive weeks.

Participants in control group were allowed to take their pharmacotherapy prescribed by their physicians and they were asked to perform alternate nostril breathing exercise with the same instructions mentioned above. Mean arterial Blood Pressure (MABP) was recorded as an outcome measure on the day of 1st week before starting the therapy session and on the day of 6th week after completing the session.

III. RESULT

The collected data was tabulated and analyzed using descriptive and inferential statistics. To the parameter used mean and standard deviation (SD) was calculated. Paired t-test was used to analyze the significant changes between pre-test and post-test measurements. Unpaired t-test was used to analyze significant changes between two groups significance level of ($p < 0.0001$) was considered statistically significant. The data from the Table 1 shows between group analysis at baseline and Table 2 shows with in group analysis for MABP of the experimental group and control group Subjects.

Table 1 shows the pre-test mean and standard deviation values of MABP in experimental group is 119.69(±4.93) and in control group is 117.35(±7.42), with p value 2.009. This shows there was homogenous distribution of subjects between two groups at baseline. Table 2 shows the pre-test and post-test mean and standard deviation

values of MABP of Experimental group found to be 119.69 (± 4.93) and post-test be 115.73 (± 4.86) with p value of < 0.0001 . Table 2 also shows the pre-test and post-test mean and standard deviation values of MABP of Control group found to be 117.35 (± 7.42) and post-test be 115.81 (± 8.29) with p value of equal to 0.9101. The analysis proves that there is statistically significant reduction in MABP in experimental group treated with Tens therapy and alternate nostril breathing exercise.

IV. DISCUSSION

Hypertension is an important risk factor for cardiovascular morbidity and mortality, especially in the elderly. Hence this study focused to probe an effective alternative treatment option for the elderly to keep their Blood pressure levels under control with no side effects.

To advocate the ideology of this study, there are various other studies which mentioned about the complementary therapeutic options available in keeping the blood pressure under control, (Oza R et.al; 2015)¹⁴. (Kalaivani s et.al; 2019)¹⁵ concludes in their study that, regular simple alternate nostril breathing exercise effectively reduces hypertension. It is well known that, while breathing both the nostril does not takes part equally in at a time. One nostril predominate the other and follows a definite cycle. When a subject performs an alternate nostril breathing the right nostril dominance corresponds to the activation of sympathetic activity and left nostril correspond to activation of parasympathetic activity. Thus equality between sympathetic and parasympathetic activity is maintained. (Do Amaral Sartori S et al :2018) concluded in their study that, they were first people to investigate the effects of application of different frequencies of TENS on the paravertebral ganglionar region on the cardiac sympathetic and parasympathetic nervous system in hypertensive subjects. It is evident that both the Alternate nostril breathing exercise and Tens therapy influences on Sympathetic and parasympathetic nervous activity, hence an ideology to combine the alternate nostril breathing exercise and tens therapy was originated and the objective was to prove the efficacy of the combination therapy among Indian geriatric population to keep their blood pressure levels under control with no side effects.

Our group has conducted research relevant to physiotherapeutic intervention on various neurological and musculoskeletal ailments¹⁹⁻²⁸, and warrants further experimental research by our group in signifying the results. However there were few limitations in the study, Considering the prevalence of geriatric population, this study targeted only the hypertensive subjects from elderly population, But the author would like to suggest that, the efficacy of the treatment should be compared with different age group population in the future research work. Future studies should postulate a further more effective outcome measure by analysis of blood gases for PO₂ and PCO₂ post Alternate nostril breathing exercises.

V. CONCLUSION

Combining Tens therapy and alternate nostril breathing exercise has shown to be effective in keeping the blood pressure levels under control among geriatric population.

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Table 1: Between group analysis of Mean Arterial Blood Pressure (MABP) for pre and posttest values of Experimental group and Control Group

Groups		Mean	Standard Deviation	t value	p value
Pre test	Experimental Group - MABP	119.69	4.93	1.369	2.009
Post test	Control Group - MABP	117.35	7.42		

Table 2: Within group analysis of Mean Arterial Blood Pressure (MABP) for Experimental group and Control Group

Groups		Mean	Standard Deviation	t value	p value
Experimental Group	Pretest - MABP	119.69	4.93	6.954	<0.0001
	Post test - MABP	115.73	4.86		
Control Group	Pretest - MABP	117.35	7.42	1.009	0.9101
	Post test - MABP	115.81	8.29		