

Immediate Effect of Laryngeal Massage on Peri Laryngeal Muscle Tension in Theatre Actors with Vocal Fatigue: An Experimental Study

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ABSTRACT

Introduction: Theatre actors are a group of elite vocal performers who have serious consequences for the slightest vocal difficulty. They are required to exhibit various human emotions on stage with various intensities in a way such that they can be easily conveyed to the present audience with a voice throw which can be heard clearly by everyone present. Vocal fatigue is a syndrome characterized by symptoms like increased vocal effort, laryngeal discomfort, neck pain, throat pain, reduced pitch, and reduced vocal projection which usually manifests as increased tension in the peri laryngeal musculature. The symptoms increase with vocal use throughout the day use and reduce with rest. Studies have shown the relation of vocal fatigue with vocal hyperfunction which makes professions like teachers, singers, and theatre actors prone to this syndrome. Laryngeal massage (LM) is performed on the peri laryngeal and the laryngeal area to relax the excessively tense musculature which inhibits normal phonatory function.

Method: 42 theatre actors who were regular performers with a minimum experience of 2 years and, a minimum of 5 hours of rehearsals in a week within the age group 18-25 were approached and consented to the diagnosis and intervention. vocal fatigue index was used to diagnose vocal fatigue and after diagnosis, pre-intervention laryngeal manual palpatory evaluation scale (LMPTE) was taken to assess tension in the peri laryngeal musculature and laryngeal height, laryngeal massage was performed and post-intervention LMPTE scale was taken.

Result: A paired t-test was used for the statistical analysis of the pre-and post-results in the peri laryngeal musculature. The tests showed significant results with p-value <0. 0001. There was no significant change in the laryngeal height post-laryngeal massage.

Conclusion: It is concluded in the study that there is an immediate effect of laryngeal massage on vocal fatigue.

Keywords: Vocal Fatigue, Laryngeal Massage, Theatre Actors, Laryngeal Manual Palpatory Evaluation Scale

INTRODUCTION

Theatre artists are a unique gathering of world-class vocal entertainers where the

smallest vocal trouble can have serious results. Theatre plays frequently require long practices described by escalated vocal

use (or potential vocal maltreatment). The stage climate is a significant impacting factor for voice production in these entertainers. These artists are expected to show many human emotions on the stage, extending their voice over the crowd's voice which requires an outrageous amount of physical effort.^[1] Guzman and Correa saw in their study that expressing various emotions on the spectrum of voice affected the vocal quality.^[2] Roy et al described this as vocally violent behavior. Theatres are in some cases dusty and amplification can be improper. The costumes of artists are sometimes hard to endure given the weight, dust, or certain actual limitations. At last, cosmetics that limit facial development can make projection and enunciation more troublesome. These are risk factors conceivably making changes in laryngeal structures and physiology. According to a study by Hoffmann Ruddy et al, some of the most common disorders of voice faced by the actors are chronic laryngitis, dehydration, and chronic laryngeal muscle tension. Van Houtte et al studied the prevalence of disorders concerning the larynx in patients visiting the ENT department for complaints of dysphonia 41% of the patients were found to be professional voice users and 16% of them were theatre actors.^[1] Dysphonia in theatre entertainers can decrease the nature of the theatre execution or in the direst outcome cancelling of the whole show.^[1]

Vocal fatigue (VF) is a term that has been habitually utilized in clinical writing and is a peculiarity numerous clinicians perceive as far-reaching, possibly weakening, and oftentimes puzzling.^[3] All the more extensively, clinicians have depicted VF as a worldwide disorder recognized by a progression of side effects during or after discourse, including an individual's view of expanded vocal exertion, laryngeal distress, neck or shoulder pressure, throat or neck pain, decreased pitch range, loss of vocal adaptability, diminished vocal projection or power, decreased vocal control, voice projection, increase in symptoms across the

talking day, and commonly, improvement of symptoms with rest.^[3] It has been laid out in a few studies that vocal fatigue has an immediate relationship with vocal abuse or hyperfunction. Populaces with proficient necessities causing vocal hyperfunction are inclined to suffer from vocal fatigue. Vocal fatigue as a result of overuse of voice is frequently seen in theatre artists as a result of vocal misuse or high-performance demands in their industry. A study conducted by Kitch and Oats et al stated that actors reported voice power in terms like voice projection to be most affected through a self-rating questionnaire.^[2] Drawn-out maltreatment of voice and utilization of compensatory techniques lead to vocal fatigue further hastening muscle tension dysphonia.

Laryngeal massage (LM) is a Finnish strategy, created by massage therapist Leena Koskinen beginning around 1984 in close participation with doctors and voice experts. The essential point of manual treatments in the peri laryngeal and laryngeal region is to loosen up the exorbitantly tense muscle structure which hinders typical phonatory capability. In the laryngeal massage procedure, the sternocleidomastoid muscle is first and foremost, and afterward, the supra-laryngeal region is targeted. The treatment involves kneading the muscles along the length of the muscle in a circular fashion with lateral pressure applied on the thyroid cartilage from time to time. The reasoning for focusing on these areas, and in a specific order, depends on the clinical perception that in numerous patients having muscle tension dysphonia the sternocleidomastoid muscles are exorbitantly tense. Albeit these accessory muscles are not straightforwardly connected with laryngeal capability, patients now and again complain of stiffness and tenderness of these muscles which has created in relationship with their voice disorders.^[4]

MATERIALS & METHODS

This was an experimental study conducted on 42 theatre artists from theatres in and around Pune by convenient sampling method within 6 months. Theatre actors selected were regular performers both males and females within the age group 18-25 with minimum experience of 2 years, 2 hours of acting in a week, 5 hours of rehearsals in a week, and 50 min of performance duration with 30 min of speech. Actors using microphones, smokers, or participants suffering from respiratory diseases, cough/cold, laryngeal pathologies, skin conditions, obesity, and thyroid were excluded from the study.

PROCEDURE

The study started with the presentation of synopsis and ethical clearance from the ethical committee.

Participants were selected according to the inclusion and exclusion criteria

The study was explained and intervention was informed to the participants and written consent was taken.

Pre-intervention VFI was taken to diagnose the vocal fatigue mentioned in VFI. For factor 1, a score ≥ 24 indicates VF and for factor 2, a score of ≥ 7 indicates VF. In other words, a greater score on factors 1 and 2 indicates a greater severity of VF. On the other hand, for factor 3, questions are worded positively, such that lower scores indicate worse fatigue (for this factor, a score of ≥ 7 indicates that VF does not improve with rest).^[3]

The palpatory evaluation was done using the laryngeal manual palpatory evaluation scale the assessment included; Sternocleidomastoid muscle right (SCM right), Sternocleidomastoid muscle left (SCM left), Supra laryngeal area, Laryngeal resistance to lateral pressure. Peri laryngeal muscle tension is assessed in the range 0–5, where 0 represents the minimum resistance, and 5 denotes the maximum resistance. The

second section of the scale determines the position of the larynx, which can be; Elevated, Neutral, Low, or very low. A total score of the “tension” subscale may range from 0–20 points.^[4]

Laryngeal massage was performed on the participant.

LM began with the bimanual circular massage of the sternocleidomastoid muscles and kneading of the supra laryngeal area with the fingers of one hand. Circular massage was applied to the hyoid bone along its length When the supra laryngeal muscles became less resistant to digital pressure, the larynx was depressed by pressure applied Bimanually to the upper edge of the thyroid cartilage. Changes in the tension of the peri laryngeal musculature, if any, were monitored by the application of alternate lateral digital pressure to the thyroid cartilage. The massage was terminated when the peri laryngeal musculature softened and while the larynx could be moved effortlessly to and fro with the aid of using the software of lateral virtual pressure. The time for this stage to be reached ranged approximately from 5 to 10 minutes of direct LM, including brief pauses for patients to rest, if necessary.^[4]

Post-intervention Palpatory evaluation was done using the LMPTE scale

RESULT

Samples of 42 theatre artists were collected for the study, they were diagnosed for vocal fatigue by the vocal fatigue index. The average age of the participants was 23 years with an average experience of 2.6 years and their rehearsal hours in a week averaged 13 hours. Post diagnosis laryngeal massage was performed on them and the following results were obtained. A paired t-test was performed to compare the pre-and post-results of the Laryngeal Manual Palpatory Evaluation Scale.



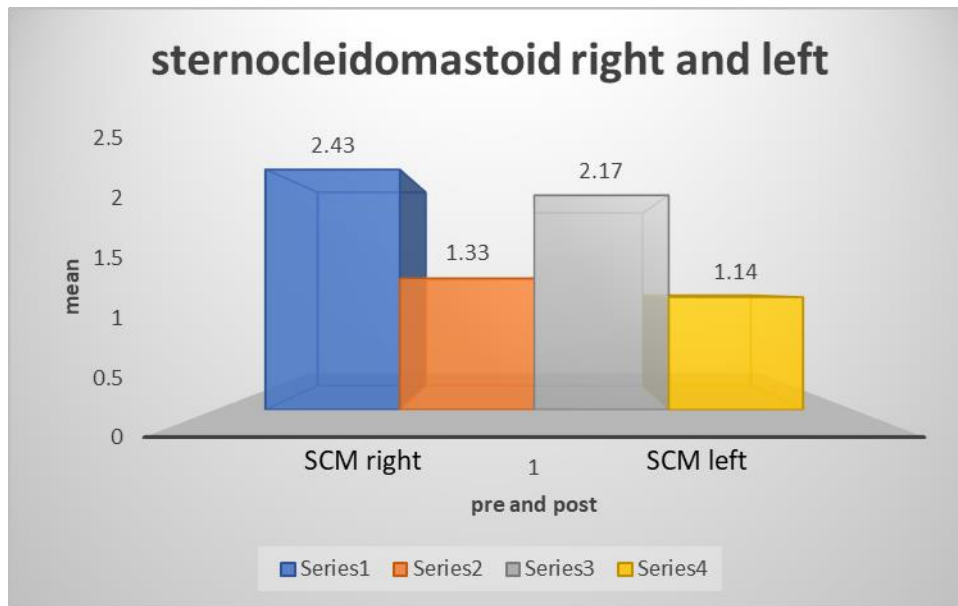
SCM RIGHT AND LEFT

Table 3 shows the comparison between pre- and post-results of the right and left sternocleidomastoid muscle. The mean score of muscle tension in the right sternocleidomastoid muscle is calculated to be 2.43 and post-intervention is calculated to be 1.33. The p score is <0.0001 after performing the paired t-test which is extremely statistically significant.

Comparison between pre- and post-results of the left sternocleidomastoid muscle. The mean score of muscle tension in the left sternocleidomastoid muscle is calculated to be 1.79 and post-intervention is calculated to be 1.14. The p score is <0.0001 after the paired t-test which is extremely statistically significant.

	MEAN		SD		T VALUE	P VALUE
	PRE	POST	PRE	POST		
SCM right	2.43	1.33	0.5	0.48	16.4655	<0.0001
SCM left	1.79	1.14	0.56	0.35	6.2506	<0.0001

Table 1 SCM Right and Left



Graph 1 SCM Right and SCM Left

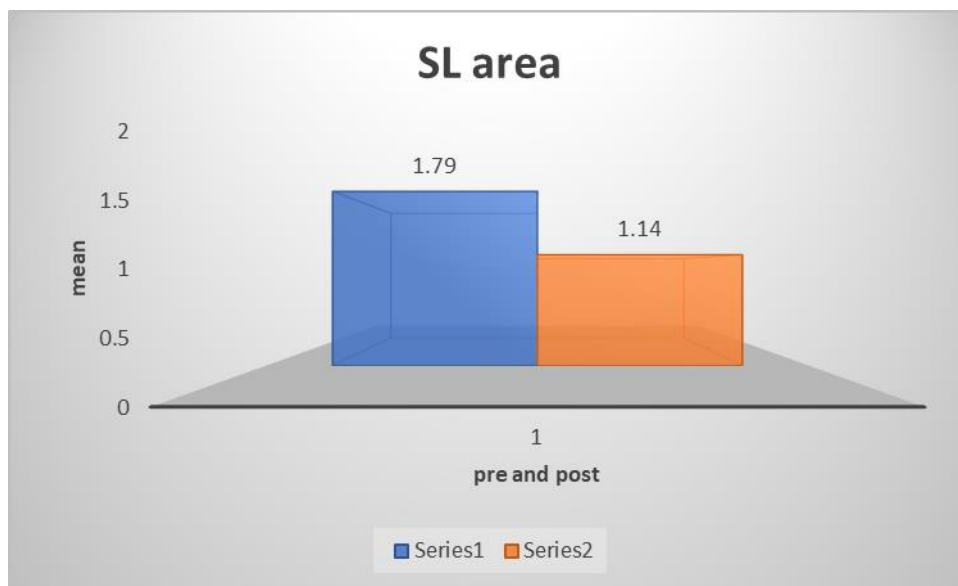
SUPRALARYNGEAL AREA

Table 5 shows the compared pre- and post-results of muscle tension of the supra laryngeal area. The mean score is calculated to be 1.9 and post the intervention the mean calculated is 1.1. After performing a paired

t-test the p score is <0.0001 which is considered to be extremely significant

	PRE	POST	T VALUE	P VALUE
MEAN	1.9	1.1	8.8292	<0.0001
SD	0.66	0.3		

Table 2 Supra laryngeal Area



Graph 2 Supra laryngeal Area

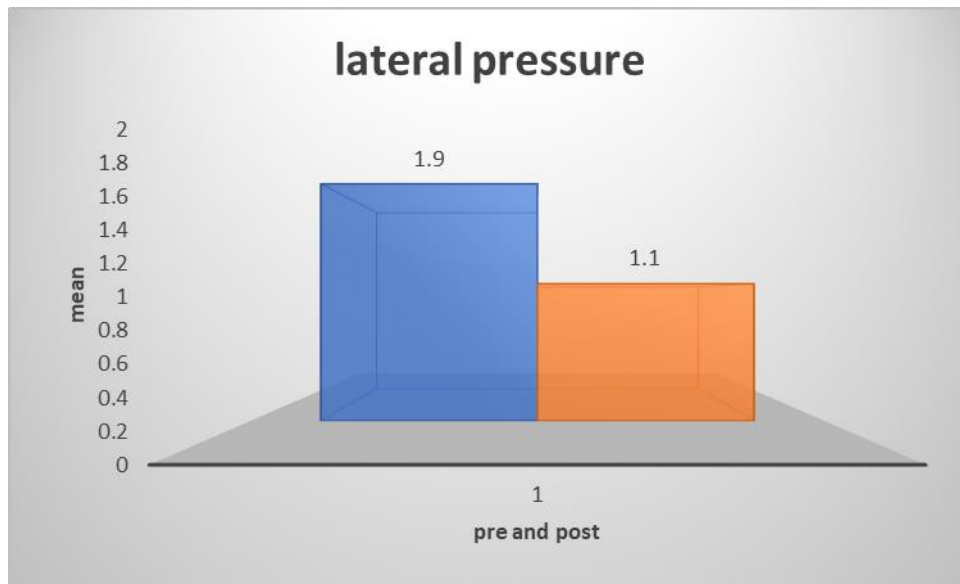
LATERAL PRESSURE

Table 6 shows the pre- and post-results of the lateral resistance seen in the subjects. the mean of the scores is calculated to be 1.9 and the post results show a mean of 1.1. After the t-test, the p score is calculated to

be <0.0001 which is considered to be extremely significant

	PRE	POST	T VALUE	P VALUE
MEAN	1.9	1.1	8.8292	<0.0001
SD	0.66	0.3		

Table 3 Lateral Pressure



Graph 3 Lateral Pressure

LARYNGEAL HEIGHT

Table 7 shows the pre- and post-scores of the laryngeal height in the subjects. The mean is calculated to be 1.93 before the intervention and 2 post the intervention. The

p score calculated by paired t-test is 0.0832 which is not statistically significant.

	PRE	POST	T VALUE	P VALUE
MEAN	1.93	2	1.7759	0.0832
SD	0.26	0		

Table 4. Laryngeal Height



Graph 4. Laryngeal Height

DISCUSSION

This study shows the immediate effect on peri laryngeal muscle tension in theatre actors with vocal fatigue in response to laryngeal massage. The statistical analysis of the study shows that laryngeal massage has a significant effect on the pre-and post-muscle tension of sternocleidomastoid and

supra-laryngeal musculature. The difference between pre-and post-results of resistance felt during lateral pressure applied to the larynx is found to be statistically significant. Although the laryngeal height does not seem to be affected by the therapy the statistical data shown is insignificant.

The vocal fatigue experienced by theater performers is the main focus of this study. According to a study by N.P. Solomon Vocal exhaustion is the result of prolonged vocal hyperfunction, and its symptoms include the participants' stated "discomfort," which is most commonly described as "aching." This pain could be brought on by using extrinsic and postural muscles of the head and torso, as well as intrinsic laryngeal and neck muscles.^[5]

Phonation difficulties are caused by the actor's continuous struggle to maintain performance and the inefficient and excessive usage of these muscles, which further exacerbates weariness and discomfort.

Theatre artists were chosen for this study since their work involves vocal hyperfunction regularly which has a significant impact on their occupational health. The study aimed to determine the immediate effect of LM on subjects who were regular theatre performers who suffered from vocal fatigue. To provide direction for future research, scientists have put forth several models of vocal fatigue. McCabe and Titze (2002), for example, describe a cyclic model of vocal fatigue that is based on vocal overuse that results in neuromuscular changes, which then recruit antagonist muscles and alter the larynx position through excessive adductory forces. The issues get worse as a result of these compensations.^[6] The treatment's goal is to release the stiff muscles, which will lessen the pressure. The peri laryngeal musculature and the neck muscles are the main targets of the laryngeal massage treatment method. Studies on the impact of LM on muscular tension dysphonia brought on by vocal fatigue have been done in the past, albeit they involved multiple sessions and did not result in an immediate improvement.

According to the results of this study, LM has a beneficial effect on the vocal fatigue of theatre artists. There was reduced muscle tension in the perilaryngeal musculature. According to a study by Marianna Conde et al., individuals with MTD who receive

laryngeal manual therapy report feeling less pain and discomfort right away. LMT helps the muscles circulate more blood, which carries nutrients and oxygen to the muscles and helps remove waste products like lactic acid that build up from spasms and cause discomfort.^[7]

The results of a study by Laukkanen et al. indicate that following massage therapy, there is a drop in stress hormones and an increase in the production of endorphins and oxytocin. resulting in even lower blood pressure, enhanced lymphatics, and an increased pain threshold.^[6] According to a study by Roy, Leeper, and Roy et al. on the short- and long-term effects of laryngeal manual treatment on patients with functional dysphonia, voice quality, and signal-to-noise ratio improved as well as jitter and shimmer values were reduced.^[6]

Similar findings to the current study were found in a study by Lorna das et al where the LMPTE scale was used to find the immediate effect of LMT in women with MTD There were significant changes in the extra laryngeal muscle tension but no change in the laryngeal position was seen.^[8]

It can be concluded that laryngeal massage can be used in the immediate management of vocal fatigue in theatre artists. There is a reduction in the muscle tension of the peri laryngeal musculature but it does not show an effect on laryngeal height.

The limitation of this study is that the only focus of this study is the effects of laryngeal massage on the tension in the extra laryngeal muscles, which is measured qualitatively using a palpatory method. Objective variations were not recorded because the results cannot be measured quantitatively due to the unavailability of machines such as laryngeal EMG.

Future research must be done with a wider range of age groups and more seasoned professionals. Electromyography, as an alternative to palpatory examination, can be used to qualitatively analyze the effect of LM on muscle tension. Acoustic tests can be utilized to ascertain the immediate effect of LM on voice quality.

Declaration by Authors

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