

# Vocal Function Exercises for Muscle Tension Dysphonia: Auditory-Perceptual Evaluation and Self-Assessment Rating

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**Summary: Objective.** Muscle tension dysphonia (MTD) is a functional dysphonia, which appears with an excessive tension in the intrinsic and extrinsic laryngeal musculatures. MTD can affect voice quality and quality of life. The purpose of the present study was to assess the effectiveness of vocal function exercises (VFEs) on perceptual and self-assessment ratings in a group of 15 subjects with MTD.

**Methods.** The study comprised 15 subjects with MTD (8 men and 7 women, mean age 39.8 years, standard deviation 10.6, age range 24–62 years). All participants were native Persian speakers who underwent a 6-week course of VFEs. The Voice Handicap Index (VHI) (the self-assessment scale) and Grade, Roughness, Breathiness, Asthenia, Strain (GRBAS) scale (perceptual rating of voice quality) were used to compare pre- and post-VFEs.

**Results.** GRBAS data of patients before and after VFEs were compared using Wilcoxon signed-rank test, and VHI data of patients pre- and post-VFEs were compared using Student paired *t* test. These perceptual parameters showed a statistically significant improvement in subjects with MTD after voice therapy (significant at  $P < 0.05$  (\*) and  $P < 0.004$  (\*\*)). Also results indicated statistically noticeable reduction in the mean VHI scores across subjects with MTD (significant at  $P < 0.05$  (\*) and  $P < 0.004$  (\*\*)).

**Conclusions.** Significant improvement after therapy for participants has been observed by the aid of auditory-perceptual ratings of voice quality (with the GRBAS scale) and the patient's self-assessment ratings measurements (with the VHI). As a result, the data provide evidence regarding the efficacy of VFEs in the treatment of patients with MTD.

**Key Words:** Muscle tension dysphonia–Vocal function exercises–VHI–GRBAS–Perceptual evaluation.

## INTRODUCTION

In 1983, Morrison et al offered the label muscle tension dysphonia (MTD) to clearly delineate traits of patients with functional dysphonia. Although various terms existed in literature, MTD became the preferred term.<sup>1</sup> To be more precise, an excessive tension in the intrinsic and extrinsic (para) laryngeal musculatures is a clinical feature of MTD.<sup>2–4</sup> Furthermore, the tension in the extrinsic muscles is altered by MTD, which causes the larynx to experience a higher level of vocal strain. As a result, MTD has an impact on the intrinsic muscle of the larynx and vocal folds' tension, which may lead to voice disturbance as well.<sup>5,6</sup> With respect to the multifactorial etiology of MTD, a couple of its contributing factors, namely, inappropriate vocal behavior, gastroesophageal reflux, psychological and personality factors which enhance the vocal fold tension, could be taken into account when regarding voice disorder as a possible outcome.<sup>1,7–9</sup> First and foremost, voice therapy is regarded as the pioneer method of treatment in MTD,<sup>10,11</sup> which involves various

therapeutic techniques<sup>12,13</sup> such as relaxation, yawn-sign, chewing, and laryngeal muscle tension reduction. The purpose of such techniques is to reduce or retrieve inappropriate use of voice so as to rebuild normal phonatory function, in parallel with obliterating excessive tension in the intrinsic and extrinsic (para) laryngeal muscles. Henceforth, diverse methods could be selected by the practitioners to perform maneuver on posture, breathing, phonation, articulation, or on muscle tension.<sup>14,15</sup>

According to one of the voice therapy techniques, vocal function exercises (VFEs),<sup>16,17</sup> which use a holistic approach in focusing on vocal mechanism, are the proposed treatment for MTD.<sup>18</sup> Vividly, VFEs include a series of voice manipulations, which are designed to increase the laryngeal muscles' strength as well as coordinate airflow with muscular effort. To put it more simply, laryngeal pathologies may be primarily or secondarily related to "weakness" of the laryngeal muscles. However, for as long as VFEs are practiced properly, laryngeal muscular strength might be enhanced, providing a systematic exercise program to restore balance, strength, and ease of phonation, in addition to breaking the hyperfunctional cycle of functional voice disorders.<sup>17,19,20</sup>

There are several published studies on the effectiveness of VFEs that are conducted on healthy subjects and also in patients with voice disorders. According to one study on people without voice disorders, the effectiveness of the VFEs, placebo exercises, or no exercises over a 4-week period between 35 female adults was performed by Stemple et al in 1994. After the 4-week period they found that maximum phonation time and pitch range did improve in the VFE group.<sup>19</sup> In an investigation on singers, Sabol et al provided some evidence in support of Stemple et al's finding. In the study by Sabol et al, 20 singers were divided into one experimental and one control group. Each group

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continued their regular singing practice regimen and the experimental group added the vocal function exercise program. Their results showed changes in flow rate, phonatory volume, maximum phonation time, and pitch range in the experimental subjects, suggesting an increase in glottal efficiency.<sup>20</sup> Tay et al carried out the VFEs program on a group of 22 choral singers. Auditory-perceptual, aerodynamic, acoustic, and self-evaluation voice measures paved the way for pre- and posttraining comparisons. It was reported that significant improvements in perceived roughness, maximum phonation time, jitter, shimmer, and harmonics-to-noise ratio in the VFE group were clearly observed.<sup>21</sup> In one study concerned with effectiveness of the VFE on teachers with voice disorder, 58 of that group were under a 6-week period of treatment by Roy et al, which was reported to have a noticeable reduction in mean Voice Handicap Index (VHI) scores before and after the treatment period.<sup>22</sup> In another study performed by Gillivan-Murphy et al, the effectiveness of the VFEs in 20 teachers with voice disorder was examined. Practically, Gillivan-Murphy et al used two self-assessment scales: the Voice-Related Quality of Life and the Voice Symptom Severity Scale. Consequently, self-reported voice symptoms were improved by the aid of VFEs.<sup>23</sup> According to one study by Gorman on elderly patients, VFEs were performed in 19 elderly men, twice a day for 12 weeks. The authors reported prominent improvement in maximum phonation time and several aerodynamic measures related to glottal closure.<sup>24</sup> In another study conducted by Sauder et al, nine patients with presbylaryngis underwent a 6-week course of VFEs. Pre- vs posttherapy comparisons were made of self-ratings of VHI and phonatory effort level, as well as auditory-perceptual voice assessments, acoustic analyses, and visual-perceptual evaluations of laryngeal images. Therefore, results indicated significant decreases in VHI scores, self-ratings of phonatory effort level, and auditory-perceptual measures of breathiness and strain.<sup>25</sup> In one solitary study about primary school teachers with MTD by Nguyen and Kenny, the treatment effects of VFEs were evaluated. It is worth mentioning that in this study, study patients were randomly allocated into a treatment group, in which acoustic and perceptual data were used as primary outcome measures. Nguyen and Kenny's observable findings showed positive changes in perturbation, harmonics-to-noise ratio, and perceptual data in the group who had received VFEs.<sup>26</sup> Teachers with behavioral dysphonia were another target group who had been under treatment procedures. Relevantly, Teixeira and Behlau assessed the improvement in VFEs by using the auditory-perceptual evaluation of voice, self-ratings of the impact of dysphonia, and acoustic analysis in the mentioned group. The VFE group represents the effective changes across treatment outcome measures in that regard.<sup>27</sup> Last, but not least, Pedrosa et al evaluated the efficiency of the VFEs in another group that underwent VFEs—the functional dysphonia group. The rehabilitation program consisted of six voice treatment sessions and three assessment sessions performed before, immediately after, and 1 month after treatment. The outcome measures were self-assessment protocols Voice-Related Quality of Life and VHI, perceptual evaluation of vocal quality, and a visual examination of the larynx. By and large, their result revealed positive outcome measures.<sup>28</sup>

All in all, the study on Vietnamese speakers is the only study that used VFEs for MTD treatment. Unfortunately, in the Persian context, no firm evidence to support VFE usage in treating voice issues related to MTD exists. Henceforth, the major goal of the current study was to provide scientific reasons to support the merits of VFE efficiency on perceptual and self-assessment ratings to treat Persian speakers with MTD and, consequently, to prove further the positive results of VFEs in clinical practice.

## METHODS

### Subjects

There were 15 subjects with MTD (8 men and 7 women, mean age 39.8 years, standard deviation [SD] 10.6, age range 24–62 years) who participated in the study. The mean duration of MTD in the participants was 5.1 months, SD 1.5. The patients with MTD were recruited at the ENT Department of the Tehran University Hospital in Tehran, Iran. Before recruitment, each subject was diagnosed with MTD by a speech-language pathologist and an otolaryngologist, following a case history, endoscopic, videostroboscopic, and musculoskeletal evaluation, which were routine clinical procedure for collecting diagnostic information about patients and for estimating the study group as a diagnosis measure and not as an outcome measure.

All participants were native Persian speakers with normal speech and language skills. None of them had any hearing defects or any neurologic or velopharyngeal abnormalities. All participants were examined by an ENT physician before their involvement in the study. Furthermore, an audiogram was conducted to exclude any severe hearing defects. Participants were excluded if they had acute or chronic upper respiratory infection at the time of testing and a history of cardiac, pulmonary, or neurologic problems; participants were included if they used Farsi as their primary native language, had not currently received voice therapy services, were aged 18 years old or older, had normal laryngeal framework with no history of laryngeal surgery, and had no current or prior swallowing problems reported.

### Subject demographics

Demographic data and the characteristics of the subjects, including gender, age, duration of MTD, and initial complaints are provided in [Table 1](#).

### Ethical aspects

Notably, an informed consent was provided for all participants and, consequently, all subjects were informed about the procedure and were told to inform the examiner whether they intended to discontinue from the study. Meanwhile, treatment procedure was free of charge for all participants. Additionally, all patients were constantly asking for treatment, and none of them was willing to be included in the control group. In addition, the instituting committee did not allow us to deprive the patients of treatment.

### Treatment approach

In what follows, the diagram of design can be categorized into four major aspects:

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