

Critical Review: Does flow phonation therapy have a positive effect on the voice quality of dysphonic patients in comparison to pre-assessment results?

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Flow phonation (also known as stretch and flow phonation) is a voice therapy technique used for dysphonic patients that focuses on creating an effortless and steady flow of air upon exhalation. Flow phonation causes the vocal folds to relax into a slightly abducted position making it possible to channel a wide stream of air through the glottis creating a breathy voice quality (Titze, 2015). The rationale for this treatment is that it rebalances the respiratory, phonatory, and resonant subsystems of voice in order to produce a better voice quality (Watts et al., 2015). This paper provides evidence-based information that critically evaluates the effectiveness of flow-phonation and investigates the efficacy of this therapy technique regarding whether it should be incorporated into clinical practice to treat dysphonic patients. Multiple databases and article references were used with the following search terms: flow phonation therapy, flow phonation or flow phonation treatment. Articles that are selected were limited to randomized controlled trials, single group design, prospective case series design and expert opinion. Six articles are selected for review including three randomized control trials, one single group design, one prospective case series and one expert opinion. Results indicate suggestive evidence that flow phonation yields improvements in voice quality in dysphonic patients.

Introduction

Dysphonia is an abnormal condition involving the vocal folds that causes changes in voice quality upon phonation where the voice can sound hoarse, strained, low in intensity and pitch as a result of vocal overuse, abnormal phonatory behaviour, unbalanced laryngeal muscle tension and other psychological factors (Yang & Wu, 2018).

According to a recent study, among 536,943 patients seeking treatment for voice disorders, 1% of that population experienced diagnoses associated with dysphonia (Cohen et al., 2012). The substantial number of patients suffering from dysphonia necessitates interventions that alleviate the effects of dysphonia and improve voice quality in order to improve the quality of life of the affected population. As such, it is crucial to determine which voice therapy treatments will yield positive outcomes when designing an intervention program.

Flow phonation is one of many voice therapy treatments available that shows promising improvement in voice quality for dysphonic patients. The specific focus for this intervention method is creating an effortless and steady flow of air during exhalation (Titze, 2015) to negate the effects of vocal overuse and abnormal phonation associated with functional dysphonia. Flow phonation exercises are thought to reduce overall strain and tension of the laryngeal musculature and to create a relaxed position of the vocal folds (McCullough et al., 2012). These exercises balance vocal fold activity as air moves through the system to make phonation effortless and efficient (Boone et al., 2010).

Optimal airflow is a critical component in producing normal voicing for conversational speech (McCullough et al., 2012). Flow phonation provides subjects with volitional control over the production of optimal airflow which is suggested to eventually promote improvements in voice quality (Watts et al., 2015).

There is a necessity to establish the efficacy of available voice therapy treatments to advise clinicians of best practices. The purpose of this article is to critically review current literature in order to determine if flow phonation is an effective intervention to include in clinical practice when treating dysphonic patients. This critical review explicitly addresses the question, does flow phonation therapy have a positive effect on the voice quality of dysphonic patients in comparison to pre-assessment results?

Objective

The primary purpose of this paper is to critically evaluate available literature regarding flow phonation. The secondary purpose is to provide a clinical recommendation on the use of flow phonation in clinical practice.

Methods

Search strategy:

The following databases were used to identify relevant articles: Google Scholar and Western Libraries using the keywords: (flow phonation therapy) or (flow phonation) or (flow phonation treatment). Reference lists from the selected articles were also used to find additional pertinent articles.

Selection Criteria:

Papers selected for review were limited to randomized controlled trials, single group comparing pre-post test results, prospective case series comparing pre-post test results, and expert opinion. Articles were selected exclusively if they were published between 2012 to 2019 to ensure that information is current.

Data collection:

The six articles selected include, three randomized controlled trials, one single group

study, a prospective case series and an expert opinion.

Results

Randomized controlled trials (level 1 evidence):
Randomized controlled trials utilize randomization to assign participants into an experimental or control group. This study design allows for easy comparison of the cause and effect of selected variables

Kapsner-Smith et al. (2015) conducted a randomized controlled trial of two semi-occluded vocal tract voice therapy protocols in order to quantify the efficacy of voice therapy treatments that capitalize on having a semi-occluded vocal tract.

Study population and outcome measures:
Twenty-five subjects with mild-moderate dysphonia (quantified by vocal fatigue and harshness) were analyzed pre and post-treatment using self-perceptual and perceptual measures of voice quality.

Results: VHI scores demonstrated significant improvements for all treatment groups in comparison with the control group. Results of the CAPE-V demonstrated significant improvements in the perception of roughness for FRT. When comparing FRT to VFE, FRT was noninferior to the latter in terms of effect size. All participants showed improvement in their self-perception of their voice quality and demonstrated an observable decrease in roughness.

Analysis: The design of the study was appropriate to the research question. Appropriate descriptive statistics were used to quantify pre and post-treatment data. It also demonstrates appropriate design measures. This evidence is limited by a low number of participants. Also, a single clinician provided the therapy.

This study provides evidence that strongly suggests that phonation through a flow-resistant tube is a viable voice therapy option to adopt the use of, in clinical practice.

Rangarathnam et al. (2015) did a prospective randomized control design study questioning if the administration of flow phonation exercises via telepractice is equivalent to receiving in-person therapy for improvements in voice quality for patients with muscle tension dysphonia (MTD).

Study population and outcome measures: In terms of participants, fourteen subjects with MTD (seven participating on-site and seven at remote locations) were evaluated before and after 12 treatments over a period of six weeks using acoustic, aerodynamic, auditory perceptual and self-perception measures.

Results: Both methods of service delivery demonstrated improvement in perceptual and quality-of-life measures with no significant differences. Acoustic/aerodynamic measures improved but the changes were not statistically significant. All participants demonstrated improvements in voice quality post-treatment based on measures of perceptual and self-perception of voice. In terms of telepractice vs. in-person delivery of treatment, the results were comparable, and there were no significant differences in the perceptual/quality of life measures.

Analysis: This study is well-designed with suitable measures and analysis. It should be noted that there was a low number of participants, and only one clinician administering these treatments. Furthermore, procedure reliability was not tested.

Overall, this study provides suggestive evidence that flow phonation therapy has a significant role in improving voice quality.

Watts et al. (2015) examined the effects of stretch-and-flow (SnF) voice therapy (also known as flow phonation) using a randomized controlled trial for patients with muscle tension dysphonia (MTD).

Study population and outcome measures: Participants were divided into two groups consisting of ten participants per group (twenty total). The experimental group received SnF treatment for six weeks in comparison to a

control group. Outcomes were evaluated using self-perceptual and acoustic measures.

Results: There were significant group differences pre-post treatment data. They concluded that stretch-and-flow exercises yield better results than receiving vocal hygiene education alone when treating patients with MTD, adding evidence towards the efficacy of flow phonation.

Analysis: This study demonstrates appropriate design, measures, analysis. Appropriate descriptive statistics were used to quantify pre-post treatment data. In terms of participants, there was a notable gender discrepancy between groups for which the author's account for a result of pure chance. It is also important to note that the experimenter group had a significantly higher amount of contact with the clinician in comparison to the control group which could have impacted the results.

This study yields suggestive evidence that flow phonation (SnF) is a viable voice therapy option to adopt the use of in clinical practice for patients with MTD who wish to improve overall voice quality in a one-on-one clinical setting.

Single group design (level 3 evidence): In this study design subjects are given a treatment and outcomes are measured. It allows for the evaluation of the efficacy of a treatment.

McCullough et al. (2012) did a pilot study regarding flow phonation as a therapy for patients with laryngeal hyperfunction due to the lack of data to define its ability to improve voice quality.

Study population and outcome measures: Six patients were evaluated before and after five treatment sessions. Acoustic measures were considered along with perceptual voice measures.

Results: All participants demonstrated a notable decrease in self-perception of voice handicap and improvements in perceptual ratings of voice quality and noise-harmonic ratios.

Analysis: The single-group design of this study was appropriate for the research question.

Appropriate descriptive statistics and analysis were used to quantify pre and post-treatment data. It is important to note that this study had a small subject number.

This study provides suggestive evidence that flow phonation would be an appropriate voice therapy treatment to employ with patients with laryngeal hyperfunction, one-on-one, in a clinical setting.

Prospective case series (level 3 evidence): This study design includes a collection of case reports involving participants given the same treatment. It allows to create a hypothesis between a treatment and an outcome.

Watts et al. (2015) used a prospective case series to investigate if stretch and flow (SnF) therapy lead to positive changes in acoustic and self-perception measures.

Study population and outcome measures: Each of the eight participants completed baseline measures which were compared to post-treatment data. Vocal hygiene education was provided to all participants, then subsequently provided with SnF treatment for six weeks utilizing a very detailed protocol. *Results:* Results revealed statistically significant differences in acoustic and self-perceptual measures. Additionally, large-moderate effect sizes were present. They concluded that SnF exercises have a positive effect on measures of voice quality.

Analysis: This study shows appropriate design measures and analysis. Outcome measures were subjected to appropriate statistical analysis. It is important to note that all participants were female, possibly reducing the generalization of the outcome. Also, there was no control for the severity of the dysphonia.

This article conveys suggestive evidence that SnF is a viable voice therapy to adopt the use of in clinical practice for patients with functional voice disorders for those who wish to improve their overall voice quality in a one-on-one clinical setting.

Expert opinion (level 5 evidence): A person who is known to be an expert in the subject, provides an opinion regarding their understanding of a particular subject.

Titze (2015) provides an expert opinion regarding the efficacy of flow phonation. He mentions that although flow phonation is a widely used voice therapy protocol, other factors that must be considered regarding the mechanics of it. He notes that flow phonation is optimal for increasing airflow if the air column is restrictive but states that this is a rare occurrence. He mentions that efficient phonation is controlled not only by vocal fold adduction and amplitude of vibration but also by vocal tract inertance (back pressure at the vocal folds) which is determined by the shape of the vocal tract. This expert opinion provides supporting evidence that the vocal tract has a significant role in flow phonation due to the shape of it. It aids adduction and vibration of the vocal folds to prevent excess tension and optimize airflow. Moreover, the study references scenarios in which flow-phonation would be counterproductive (i.e., if a singer is attempting to produce a long phrase on a single breath). He concludes that the use of flow phonation in clinical practice must be considered on a case-by-case basis because the shape of the vocal tract can vary among patients.

Analysis: The source of the opinion is clearly identified, Ingo R. Titze. Dr. Titze is a professor at the University of Iowa with high familiarity in the fields of voice and speech. His level of experience within the voice and speech field gives credibility to him regarding this area of expertise and the central focus of the opinion pertains to the interests of the relevant population (voice therapy patients). His stated position is the result of an analytical process to evaluate information from other sources regarding the popularity of flow phonation. There is logic within his expressed opinion, however, there is no reference to extant literature besides from a self-authored textbook introducing room for bias.

Overall, this expert opinion only provides equivocal evidence.

Discussion

This critical appraisal reviewed six papers to determine if flow phonation has a positive effect on the voice quality of dysphonic patients. Overall, critical analysis of these studies reveals suggestive evidence that flow phonation yields a positive effect on improving voice quality in dysphonic patients as each study (excluding the expert opinion) yielded positive results in comparison to pre-treatment measures. Kapsner-Smith (2015), Watts et al. (2015) and McCullough et al. (2012), provided suggestive evidence regarding pre and post-treatment data. Rangarathnam et al. (2015) added suggestive evidence demonstrating that flow phonation yields positive outcomes even in a telepractice setting. This indicates that telepractice is a viable service delivery method to consider when delivering flow phonation therapy to individuals in rural areas where access to such treatment in-person may be limited.

The expert opinion provides an alternate opinion for clinicians to consider if flow phonation is an appropriate treatment to use with dysphonic patients. If the patient is interested in improving voice quality for normal speech it will yield positive effects on functional speech but not for singing where a patient has to sing a long phrase on a single breath. Thus, careful consideration needs to be taken based on the patient's goals. However, this advice must be considered cautiously when deciding if flow phonation is a viable treatment option because there is a possibility of bias within this opinion.

Limitations:

Most studies provide suggestive evidence for the benefit of flow phonation, however, are limited by small participant size, gender discrepancies, lack of control for the severity of dysphonia and lack of reliability testing.

Conclusion

This critical review reveals suggestive evidence that flow phonation therapy yields positive results in improving voice quality in dysphonic patients.

Clinical Implications

Overall, these studies provide suggestive information to conclude that flow phonation is a viable therapy to adopt into clinical practice to improve the voice quality of dysphonic patients. It would be applicable for patients with mild-moderate dysphonia and vocal fatigue, who wish for an effective voice therapy protocol to improve voice quality. This is a viable therapy option to consider even for patients that are limited by distance and long travel times. Future studies with larger sample sizes, reliability testing and stronger study designs to further strengthen and support the evidence.

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