

The Outcomes of Bhramari Pranayama on a Patient with Dysphonia: a case report

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KEY WORDS

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ABSTRACT

Bhramari Pranayam (BP) has been assumed to have positive effects on improving the quality of voice. The primary objective of this study is to investigate the effect of Bhramari pranayama on the quality of voice in a dysphonic individual. A patient diagnosed with dysphonia was given voice therapy, wherein bhramari Pranayama was prescribed as a direct intervention strategy for two weeks. After two weeks of therapy, it was found that the patient had significant improvement in acoustic measures, perceptual measures, and voice handicap index scores. The patient was followed up further to check the stabilization, during which the patient's voice parameters had stabilized acoustically and perceptually.

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Introduction

Voice disorder develops when loudness, pitch, and quality are deviated according to the sex, age, and geological location of the person (1). The disorders are classified as organic and non-organic. Organic voice disorders result from structural changes in the larynx whereas inorganic voice disorders result when the physical structure is normal but there is an inefficient use of the vocal mechanism. The organic cause of the voice disorder includes abnormalities in vocal cords such as nodules, edema, cysts, papilloma, polyps, laryngeal trauma, vocal cord palsy laryngitis, and gastroesophageal reflux disorder (2).

The intervention of organic voice disorders includes direct as well as indirect approaches. The direct approach involves the manipulation of the functions of the sub-systems (respiratory, phonatory, and musculoskeletal) that help in voice production whereas the indirect approach involves educating and counselling the patient regarding strategies to maintain vocal health (3).

There are studies that reported that breathing techniques such as *bhramari pranayama* have positive effects on the voice quality of normophonic singers in India (4). "*Bhramari pranayama* is a yogic technique that involves sitting in a comfortable position and inhaling and exhaling through nostrils slowly and deeply. While exhaling, the individual hums sound while keeping the ears closed by fingers and oral cavity by lips" (5). The *pranayama* has a substantial effect on the physiology of the respiratory system as it involves short inhalation and prolonged exhalation. Also, it is said to be one of the forms of meditation that refreshes the mind (5).

The vocal hygiene program is a preventive measure that is necessarily advised to all patients with voice disorders. It

alleviates the symptoms and involves following recommendations such as maintaining proper hydration, avoiding intake of spicy, sour, and citrus food, avoiding vocally abusive behaviors, etc. Additionally, it involves intake of healthy foods at regular intervals, reluctance to carbonated and caffeinated drinks, and speaking in an ideal (noise-free) environment. It targets reducing the unhealthy behaviors that cause a worsening of the quality of voice that further assists in attaining good vocal health. This could also be observed in a study that reported improved voice quality subjectively and objectively in teachers with unhealthy vocal and non-vocal practices after following it (6).

The aim of the current presentation is to investigate the effect of Bhramari pranayama on the quality of voice in a dysphonic individual.

Case presentation

A 41-year-old female, resident of Himachal Pradesh, India, presented with a complaint of change in voice for the last 7 months and came to the Speech and Hearing Unit, Department of Otorhinolaryngology-Head and Neck Surgery. She presented with a history of vocal misuse, vocal abuse, and poor dietary habits.

Evaluation of voice

A detailed evaluation was carried out by professionals- Otorhinolaryngologist and a speech-language pathologist. Otolaryngologist performed indirect laryngoscopy, which showed nodular layer. However, to confirm the findings, fiberoptic laryngoscopy showed the overriding movement of right arytenoids. The speech-language pathologist performed a detailed evaluation of voice which included subjective and objective assessment.

Instrumentation

- Objective voice evaluation was carried out using Multi-Dimensional Voice Program (MDVP) 4500 produced by Kay Elemetric Corp, USA in a sound-treated room. MDVP is a computerized acoustic analysis to analyze sound quality using various parameters such as Mean fundamental frequency, jitter, shimmer, etc.
- Subjective evaluation was carried out by Consensus Auditory Perceptual- Evaluation of Voice (CAPE-V) scale with a 100 mm Visual Analog Scale (VAS) where the listener marks the perceived severity of voice parameters like Overall Severity, Pitch, Loudness, Strain, Breathiness, Roughness. To rate the parameters, the clinician should measure the rating from each scale by physically measuring the distance in mm from each scale. The mm score should be written in a blank space to the far right of the scale, thereby relating results in a proportion to the total 100 mm length of the line.
- Voice handicap index (VHI) is a scale that has the following subsections-physical, functional, and emotional, and was self-administered by the client.

Intervention

The voice therapy program was tailor-made for the client to follow at home. The client was demonstrated the *Bhramari pranayama* as a direct intervention strategy. The client was asked to sit in an upright position on a chair with a straight back so that the upper body was perpendicular to the knees and thighs and the body weight was distributed equally on both hips. Then the client was asked to hum while keeping the eyes and ears closed and sense the vibrations on the face (7). The client was asked to practice the same at home (around 30 times repetitions/per day). For regular monitoring, the client was asked to maintain a notepad and record videos regularly. Along with Bhramari Pranayama, vocal hygiene program was given to the client as a precautionary measure to avoid further worsening of the vocal symptoms. The aim was to reduce the vocally abusive behaviors, incorporate a healthy diet, reduce caffeine consumption, intake of sips of water after every half an hour, and eliminate sour food intake in her daily routine. The client attended voice therapy for 3 sessions with each session extending up to a duration of 40 minutes. A gap of two weeks was given between the 1st and second sessions at the clinic. The third session was again pursued two weeks after the second session. In each of the sessions, the acoustic and perceptual parameters of the voice were recorded and compared to pre and post-voice therapy sessions.

The comparison of pre-and post-therapy assessments on MDVP parameters was carried out. It was observed that the average fundamental frequency had increased from 204 Hz to 226 Hz, which falls well within the normal range for an adult female speaker (8). The standard deviation of Fundamental frequency decreased from 2.231 to 1.138 post-therapy. This is suggestive of decreased pitch variability and stabilization of pitch. Also, the jitter percentage, shimmer

percentage, and noise to harmonic ratio were reduced post intervention. Additionally, there was a decrease in amplitude perturbation quotient, suggestive of increased stability in voice. Henceforth, there was an increase in the overall quality of voice, post-therapy. In conclusion, all the parameters of MDVP were under the normal range post-therapy in session II as shown in Table 1. Also, the parameters were again measured in session III and the parameters were the same as in session II, which showed stabilization in the acoustic parameters post-therapy.

Table 1: Pre and post-therapy values of Multi-Dimensional Voice Program Parameters

MDVP parameters	Pre-therapy (Session I)	Post-therapy (session II)
Average Fundamental Frequency	204.720 Hz	226.55 Hz
Mean Fundamental Frequency	204.696 Hz	226.249 Hz
Average Pitch Period	4.885 ms	4.420 ms
Highest Fundamental Frequency	211.403 Hz	229.048 Hz
Lowest Fundamental Frequency	195.888 Hz	223.17 Hz
Standard deviation of F0	2.231 Hz	1.138 Hz
Phonatory F0 range in semitones	3	1
F0 tremor Frequency	2.516 Hz	3.053 Hz
Absolute Jitter	42.371	14.567
Jitter Percent	0.867%	0.330%
Relative Average Perturbation	0.539%	0.191%
Fundamental Frequency Variation	1.090%	0.503%
Shimmer in dB	0.31 dB	0.21 dB
Shimmer percent	3.602%	2.406%
Amplitude Perturbation Quotient	2.348%	1.630%
Noise to Harmonic Ratio	0.155%	0.141%
Voice Tubulence Index	0.051%	0.041%
Soft Phonation Index	6.956%	6.211%
F0-Tremor Intensity Index	0.140%	0.182%

Perceptual Voice Evaluation was carried out and it was observed that the quality of voice had improved with a decrease in roughness, strain, and overall severity in session II as compared to the session I as shown in Table 2 and Figure 1. In addition, the maximum phonation duration increased from 10 seconds (session I) to 17 seconds (session II).

Table 2: Pre- and post-therapy scores of CAPE-V

CAPE-V	Pre therapy (session I)	Post therapy (session II)
Overall Severity	70	10
Roughness	70	10
Breathiness	30	5
Strain	50	5
Pitch	50	5
Loudness	50	5

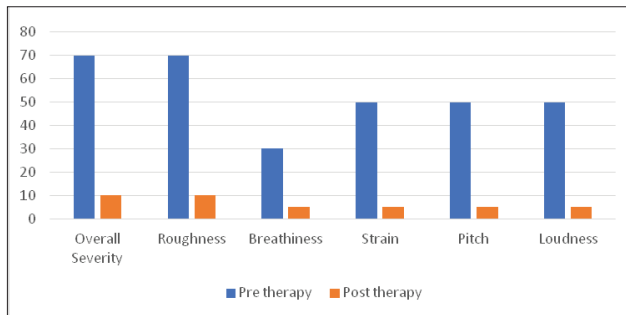


Figure 1: Pre- and post-therapy scores of CAPE-V

VOICE HANDICAP RATING SCALE were administered in the subsequent sessions. There was a decrease in scores observed in all three subsections of the Voice Handicap Index, wherein pre-therapy (session I) scores suggested severe vocal fold scarring whereas the post-therapy (session II) scores suggest minimal problems as shown in Table 3 and Figure 2.

Table 3: Pre- and post-therapy scores of voice handicap index

Voice handicap index	Pre-therapy (session I)	Post-therapy (session II)
Functional	22	6
Physical	32	9
Emotional	16	4
Total	70	19

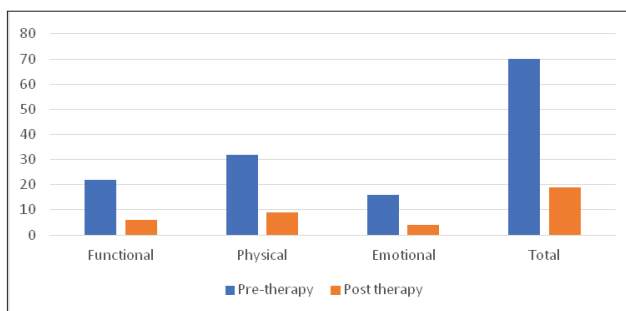


Figure 2: Pre -and post-therapy scores of voice handicap index

Discussion

The objective of the study was to investigate the efficacy of *bhramari pranayama* on the voice quality of the dysphonic individual. *Bhramari pranayama* has positive effects on the voice quality of individuals which is supported by earlier studies by Jayakumar (2022) and Usha (2018). Jayakumar (2022) conducted a research study to find the effects of the pranayama on the voice quality of prospective singers and found that there was an improvement in the parameters of Multi-Dimensional Voice Profiling (MDVP). It was postulated that *bhramari pranayama* leads to improved voice quality. Akin to this, the findings of our study are well supported by the previous findings since all the parameters of MDVP post-therapy had moved within the normal range after practicing *bhramari pranayama* (5). Also, Usha Manjunatha (2018) reported that there was an increase in the average fundamental frequency (a parameter of MDVP) of the female singers after practicing *Bhramari pranayama* which indicates more flexibility in voice (7). This could be seen in the current study as well, wherein the increase in average fundamental frequency and other parameters (jitter, shimmer, noise to harmonic ratio) of MDVP were within the normal range after following *bhramari pranayama*. This is because, during the practice of *bhramari pranayama*, the vibrating sound produced results in the resonance of the vocal tract by creating the forward focus and imparting the tactile sensation. This results in an easy onset of phonation as well.

Usha Manjunatha (2018) explored the effects of *bhramari pranayama* on the acoustic and aerodynamic parameters of voice in female singers. The results showed that there was a significant improvement in the maximum phonation duration (MPD) which showed that the practice of pranayama enhances respiratory phonatory coordination. These results agreed with the findings of the current study as it was found that the MPD of the client increased significantly in the subsequent sessions. It is simply for the reason that during normal breathing, the individual ignores the breathing pattern as well as the posture. However, during *bhramari pranayama*, the individual focuses on both the breathing pattern and the posture, which makes the individual inspire and expire the same volume of air without any strain. Therefore, the lung capacity increases (7).

Conclusion

The presented study has observed the effects of the *Bhramari pranayama* on acoustical, perceptual, and voice handicap index scores. The results showed a significant improvement in the perceptual, acoustic, and voice handicap index scores post-therapy. This indicates that the *bhramari pranayama* has positive effects on the voice quality of the individual. Henceforth, *bhramari pranayama* can be integrated into the treatment of voice disorders.

Acknowledgment

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Limitation

The limitation of the study was the difficulty in monitoring the home training program followed by the patient.

Authors' contribution

SG: Data collection, Analysis, and Writing of the manuscript.
NB: Conceptualization, writing, and critical review of the manuscript.

Informed consent

An informed consent form was duly signed by the patient.

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None.

Conflict of interest

The authors declare no conflict of Interest.

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