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The efficiency of the DoctorVox voice therapy technique in conversion dysphonia and aphonia

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Main Article

Engin Başer takes responsibility for the integrity of the content of the paper

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Abstract

Objective. The main purpose of this study was to retrospectively evaluate the efficiency of DoctorVox voice therapy in psychogenic dysphonia or aphonia patients, and to share the mid- to long-term results of the method.

Methods. The study was carried out on patients who underwent DoctorVox voice therapy for psychogenic dysphonia or aphonia between January 2015 and September 2019. The evaluation methods used were: the Voice Handicap Index-10; the grade, roughness, breathiness, asthenia and strain ('GRBAS') scale; and videolaryngostroboscopy recordings.

Results. The mean Voice Handicap Index-10 values of the patients were 30.91 ± 2.97 before treatment, 8.14 ± 3.82 after treatment, and 3.36 ± 1.78 in the final follow-up examination. The grade, roughness, breathiness, asthenia and strain scale scores were: 9 ± 0.67 pre-treatment, 0.78 ± 0.80 post-treatment, and 0.57 ± 0.64 at the final follow up.

Conclusion. DoctorVox voice therapy seems to be an efficient treatment method for psychogenic dysphonia or aphonia; it helps develop phonatory muscle functions, using multidimensional biofeedback mechanisms, and increases the patients' therapy adherence.

Introduction

Psychogenic dysphonia or aphonia is also known as type 4 muscle tension dysphonia, conversion dysphonia, phononeurosis, or hysterical aphonia or dysphonia.[1–3] Its general prevalence has been reported as 0.4 per cent.[4] Psychogenic dysphonia or aphonia is a disease primarily characterised by voice changes without organic laryngeal lesions or neurological disease.[5] Psychogenic dysphonia or aphonia is traditionally regarded as a conversion disorder with a psychological background.[4] Conflicts related to stressful family and work environments may make the individual prone to such changes.[6]

Diagnosis is confirmed by stroboscopic analysis. It is characterised by abnormal muscle tension in the absence of organic lesions in the larynx, combined with an abnormal voice (muteness, aphonia or dysphonia); vegetative phonation, unrelated to the communicative behaviour (e.g. cough, throat clearing, yawn-sigh), is normal.[7,8] For the differential diagnosis, insufficient glottic closure, presbyphonia, and certain hyperfunctional voice disorders due to vocal fold atrophy may be considered. Among the various treatment methods recommended for psychogenic dysphonia or aphonia, voice therapy accompanied by psychological approaches seems to be the best treatment of choice.[1] The disease has high rates of recurrence in long-term follow up.[8]

Phonation involves an intricate interplay between physical and emotional factors that creates a vocal personality. A person's tone of voice often carries more meaning than the words they speak. In moments of fear, the throat constricts and breathing is uneven. When the person is angry, their voice is raised. When the person is sad, their speech may be interrupted by sobbing or choking noises, and so on. In more extreme cases, where neurotic conditions affect the voice, the person may suffer from psychogenic dysphonia or aphonia. As with other somatic symptoms, it may be difficult to determine whether the symptom or illness is psychological, biological or both, especially after some time.[9]

The scientific background of voice therapy practice has two dimensions. The first one is the physioanatomy of the vocal apparatus. The glottis is the visor of the physioanatomy, which gives clues about muscles affecting voice production. When the clinician is able to analyse the dynamic glottic behaviour, it is easier to determine the type of vocal exercise to be applied. In this way, the clinician can correctly give answers to 'which exercise for which situation and why' questions. The second dimension is the psychoneurological aspect. The new vocal skill is constructed on motor learning principles, and this new skill is transformed into behaviour via behavioural therapy principles.[10]

LaxVox voice therapy exercises, which use a silicone tube, were first demonstrated by the voice pathologist Marketta Sihvo. These exercises were modified and expanded by İlter Denizoğlu into the DoctorVox voice therapy. DoctorVox voice therapy is a direct holistic method consisting of two main physical tools: artificial elongation and semi-occlusion of

the vocal tract. Semi-occlusion applies a backpressure to the phonatory system. In DoctorVox voice therapy, backpressure with a secondary vibrating resistance provided by water bubbles and/or a continuous backpressure provided by a valve are used in an attempt to alter the vocal tract impedance. Beyond physical applications, the DoctorVox voice therapy framework addresses the psychoneurological side of the voice therapy. The exercise models, feedback strategy and monitorisation of the patient are included in the whole structure. The DoctorVox voice therapy programme combines different approaches (physical, clinical and pedagogical), and provides a multidimensional and multilevel approach to voice therapy (Figure 1).[11]

The main purpose of this study was to retrospectively evaluate the efficiency of DoctorVox voice therapy in psychogenic dysphonia or aphonia patients, and to share the mid- to long-term results of the method.

Materials and methods

The study was carried out on patients who underwent DoctorVox voice therapy for psychogenic dysphonia or aphonia between January 2015 and September 2019. Videolaryngostroboscopy was performed by the authors of the study, using a rigid telescope (70°, 7 mm diameter; or 90°, 10 mm diameter), or using a flexible fibre-optic nasopharyngoscope (3.3 mm diameter) in those patients who did not consent to examination with the telescope.

Aphonic or severely dysphonic patients who did not have organic or neurological pathologies (e.g. inflammation, paralysis, tumours, vocal fold atrophy), and who were observed to have incomplete or improper adduction of the vocal folds during phonation while having complete or proper vocal fold adduction during normal non-communicative reflexive vocal production (such as coughing, crying and laughing), were considered to have psychogenic dysphonia or aphonia and were included in the study.[4] Any psychiatric diagnoses and previous treatments were noted, and the patients were encouraged to have a psychiatric examination.

Patients who had reports of recent co-morbidity related to a respiratory tract infection or existing dysphonia, and those with laryngeal lesions and suspicious diagnoses, were excluded from the study. Patients who did not complete the treatment survey, those whose records were unavailable and patients who underwent a different voice therapy protocol were also excluded.

Evaluation method

The validated Turkish version of the Voice Handicap Index-10[12] was used for positive self-reporting of the severity of vocal symptoms. The purpose of the Voice Handicap Index-10 questionnaire is not to differentiate between different pathologies, but to enable the patient to evaluate their problem; the higher the score, the greater the problem with the voice. The Voice Handicap Index-10 evaluates psychogenic perception as well as physical and physiological evaluation.[12] The Voice Handicap Index-10 values were recorded three times: before treatment, after the completion of the sessions, and at least six months later.

As most of our patients had psychogenic aphonia, acoustic voice analysis methods were not used given that a complete response could not be obtained before therapy. The grade, roughness, breathiness, asthenia and strain ('GRBAS') scale[13] was used (by the same clinician) for subjective evaluation before therapy, after therapy, and at the final follow up (at least six months later). Based on videolaryngostroboscopy records, the observation (after DoctorVox voice therapy) that the vocal folds were completely closed, with proper vibratory behaviour, was used for objective evaluation.

Patients were invited to our clinic for a final examination (in order to present these findings in our study); the Voice Handicap Index-10, the grade, roughness, breathiness, asthenia and strain scale, and videolaryngostroboscopy were performed, and the patients were questioned as to whether or not they had received psychiatric treatment.

Application of DoctorVox voice therapy

The sessions were all performed for all patients by the same phoniatrician, who was experienced with DoctorVox voice

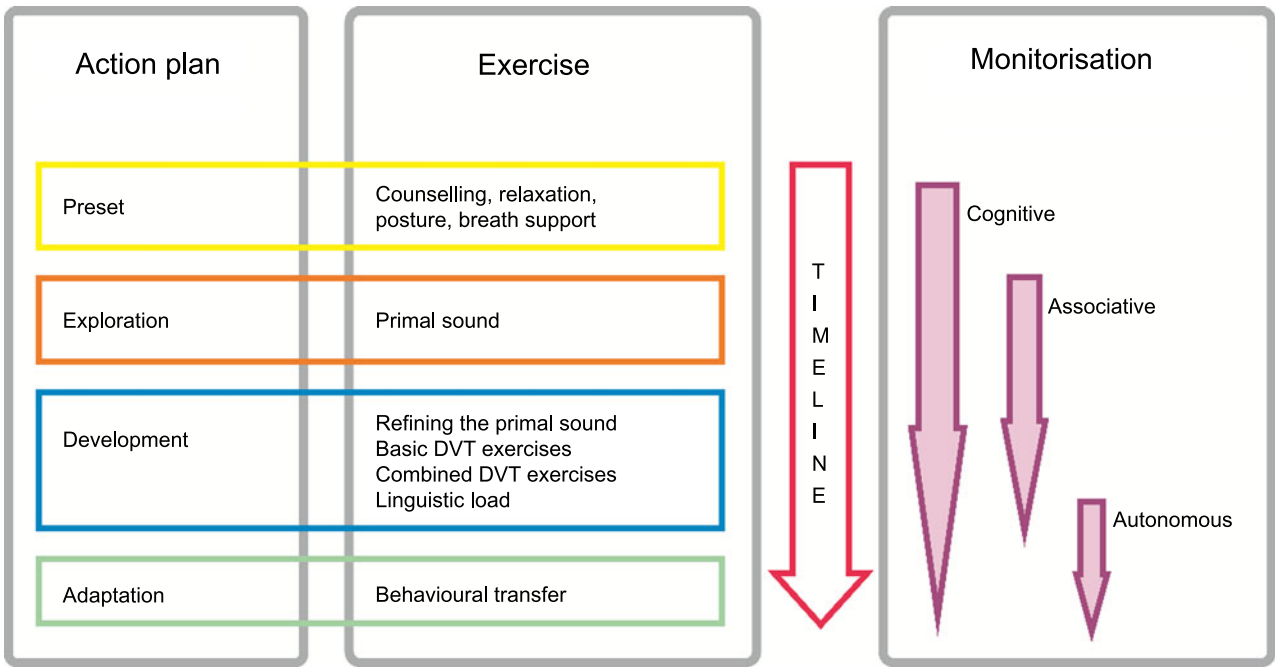

Figure 1. DoctorVox voice therapy (DVT) framework: four levels and three dimensions are considered throughout the timeline.

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therapy. The DoctorVox voice therapy procedure applied in this study for psychogenic dysphonia or aphonia is described in the following text.

First, counselling was provided, wherein the nature of the disorder was explained in detail using laryngeal images. Mostly, patients are referred under the stress of an accusation of malingering. Therefore, care was taken not to offend the patient. In light of the fact that psychogenic dysphonia and aphonia generally occur in response to a psychological stressor, the clinician was mindful and tactful in regard to each patient's psychological history. The patients were informed about the 'normal' timbre and pitch of the voice beyond physioanatomy. The patient and their family were informed about the nature of the problem and the importance of active support (being a 'third ear' during homework exercises, giving proper feedback, and being tactful and patient during the treatment process). At this level, psychiatric medical support was recommended; its importance and its major contribution to treatment were also stressed.

Second, the DoctorVox Apparatus® (Figure 2) was used for the vocal exercises. Patients have expressed a high motivation to use a device for their disorder. As well as allowing the patient to feel that care is being taken to address their vocal problem, we assume that using a device has a placebo effect on increasing their motivation. The auditory masking also helped the phonatory act (when bubbling the water by phonation, the patient cannot hear their own voice directly; thus, the air conduction of their own voice is masked). In the first session, the amount of backpressure was decided empirically and raised until the chest register was observed. The water depth and a backpressure valve were used to adjust the amount of the backpressure.

Third, patients performed the DoctorVox voice therapy exercises (starting with sostenuto then glissando) at home. The homework exercise rate was a few minutes every hour.

Fourth, when the patient was not able to use the modal register in low backpressure levels, the backpressure was increased (over 15 cmH_2O), then gradually decreased and adjusted in between 4–7 cmH_2O levels.

Fifth, the linguistic load step was started by applying the new vocal skill to vowels using the oral mask (MaskVox®). The patients were then motivated to phonate simple phrases (counting) and to speak into the mask while continuously (except nasal consonants) bubbling the water. The reading into the mask exercise was given as homework to be carried out 4–5 times a day for 10 minutes each time. Family members were also encouraged to 'assist' and accompany patients during home exercises.

Sixth, the new vocal skill was transferred to speech by sustaining the phonatory muscle setup with and without the device during speaking (e.g. whilst counting or reading, or during conversation) and whilst singing.

Seventh, adaptation to the social environment (family, friends and so on) was achieved through counselling. Reading and speaking with the new motor skill was encouraged by the participation of family or friends in the therapy. Patients were instructed to start exercising immediately if the voice problem recurred, and it was suggested that the patient's immediate environment should be accompanied for psychological support.

Ten sessions of therapy (each session lasting approximately 25 minutes) were given. The first five sessions were given every consequent workday. The subsequent sessions were set at twice a week, then once a week. When the sessions were completed, the behavioural transfer and adaptation period was started. Patients were recalled for examination at one month and again at six months.

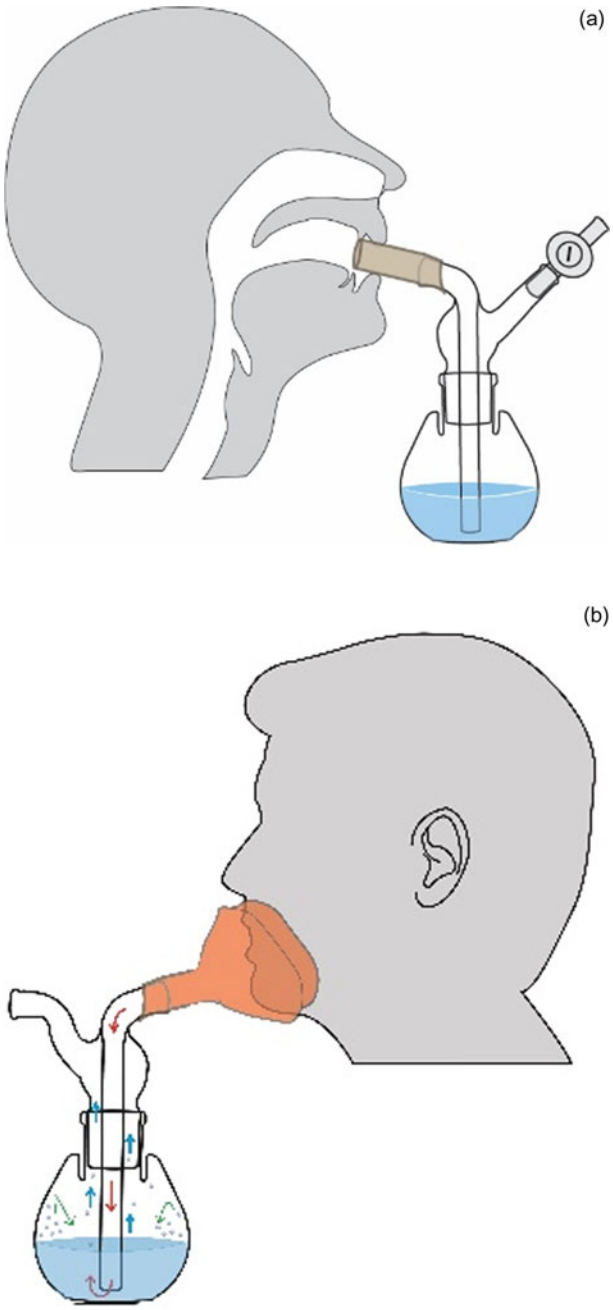

Figure 2. DoctorVox Apparatus images: (a) without mask (adjustable back pressure) and (b) with mask.

Voluntary consent was obtained from all patients included in the study. Ethical approval was obtained for this case–control study from the local ethics committee (number: 2020 / 1–1; dated 23 January 2020).

Statistical reviews

The Number Cruncher Statistical System 2007 program (NCSS; East Kaysville, Utah, USA) was used for statistical analysis. Descriptive statistical methods (mean, standard deviation, median, frequency, ratio, minimum, maximum) were used when evaluating the study data. The Kolmogorov–Smirnov test, Shapiro–Wilk test and graphical evaluations were used to assess the normality distribution of quantitative

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data. The Mann–Whitney U test was used for comparisons between two groups of data without a normal distribution. The Friedman test was used to evaluate the follow up of variables without a normal distribution. The Bonferroni–Dunn test was used to evaluate binary comparisons. Significance was evaluated at the level of $p < 0.05$.

Results

Our study was performed with a total of 14 patients, consisting of 14.3 per cent ($n = 2$) males and 85.7 per cent ($n = 12$) females. Patient age ranged between 18 and 72 years, with mean age of 48.93 ± 18.73 years. While 57.1 per cent ($n = 8$) of the patients were actively employed, 42.9 per cent ($n = 6$) were unemployed. Regarding education status, 21.4 per cent ($n = 3$) were primary school graduates, 42.9 per cent ($n = 6$) were high school graduates and 35.7 per cent ($n = 5$) were university graduates (Table 1).

All of the patients had a sudden onset of voice disorder and a recent history of intense stress or mental fatigue. In the ENT examinations of the patients, no findings suggesting simulation (deliberately pretending to be sick) were encountered and this situation was excluded. Patients did not declare any other somatic complaints.

According to the results of our physical examination, 21.4 per cent ($n = 3$) of the patients were extremely dysphonic (it was observed that one patient phonated in a breathy falsetto register, and two patients had ventricular folds closed and transglottic airflow was almost absent). Among the patients, 78.6 per cent ($n = 11$) were aphonic; the mucosal vibration was not observed in the videolaryngostroboscopic examination of these patients because of the large glottic gap. Eight patients in the aphonic group were whispering, while the other three were completely silent, only moving their lips. The duration of complaints ranged from 4 to 365 days, with a mean of 77.07 ± 101.22 days and a median of 37.5 days. The complaint duration was less than one month in 35.7 per cent ($n = 5$) of the patients, and was one month or more in 64.3 per cent ($n = 9$). Of the patients, 42.9 per cent ($n = 6$) had only suffered the one dysphonia or aphonia attack prior to referral, whereas 57.1 per cent ($n = 8$) had experienced recurrent attacks previously. All of our patients stated that they were dysphonic or aphonic since their last attack. In total, 71.4 per cent ($n = 10$) of the patients had previously presented to an ENT department and were first diagnosed with an upper respiratory infection; 28.5 per cent ($n = 4$) had their first referral to the voice clinic.

Table 1. Demographic features

Parameter	Values
Age (years)	
– Range (median)	18–72 (53.5)
– Mean ± sum of squares	48.93 ± 18.73
Gender (*n* (%))	
– Male	2 (14.3)
– Female	12 (85.7)
Job status (*n* (%))	
– Working	8 (57.1)
– Not working	6 (42.9)
Education status (*n* (%))	
– Primary school	3 (21.4)
– High school	6 (42.9)
– University	5 (35.7)

Follow-up duration varied between 6 and 40 months, with a mean of 17.00 ± 9.60 months and a median of 14 months. While no recurrence was observed in 50.0 per cent ($n = 7$) of the patients who participated in the study, 21.4 per cent ($n = 3$) developed recurrence only once, and 28.6 per cent ($n = 4$) developed recurrence twice or more. At the last follow-up examination, 71.4 per cent ($n = 10$) of the patients reported that they had not experienced any dysphonia or aphonia attacks for at least 6 months. On the other hand, 28.6 per cent ($n = 4$) identified short-term voice disorders and stated that their voice had recovered with DoctorVox voice therapy exercise. At the last follow up, complete glottic closure was observed in the laryngostroboscopic examinations of all patients.

Of the cases, 28.6 per cent ($n = 4$) received psychiatric therapy before treatment and 28.6 per cent ($n = 4$) received psychiatric therapy after treatment. Three of these cases received psychiatric therapy both before and after treatment; one of the patients received psychiatric therapy only before the treatment and one received psychiatric therapy only after the treatment. The patients' data are given in Table 2.

The mean Voice Handicap Index-10 values were 30.91 ± 2.97 before treatment, 8.14 ± 3.82 after treatment and 3.36 ± 1.78 in the final follow-up examination. The change in the pre-treatment, post-treatment and final follow-up Voice Handicap Index-10 values of the cases was found to be statistically significant ($p = 0.001$). According to the results of the binary comparisons, the decreases in Voice Handicap Index-10 values at post-treatment and at the final follow up, compared to the pre-treatment values, were statistically significant ($p = 0.024$ and $p = 0.001$, respectively). The decrease in the final follow-up Voice Handicap Index-10 value compared to the first post-treatment value was also statistically significant ($p = 0.024$) (Table 3). The pre-treatment, post-treatment and final follow-up Voice Handicap Index-10 values are graphically presented in Figure 3.

The changes between pre-treatment, post-treatment and final follow-up Voice Handicap Index-10 values, according to the attack status at the time of referral (whether there had been a single or multiple attacks), whether or not they received psychiatric treatment, and their employment status, were not statistically significant ($p > 0.05$). However, the decrease in the final follow-up Voice Handicap Index-10 values of the unemployed group was found to be statistically significant compared to those of the post-treatment group ($p = 0.049$).

Patients with complaints lasting longer than one month had significantly greater changes in Voice Handicap Index-10 values at post-treatment compared to pre-treatment, and at final follow up compared to post-treatment, than patients with complaints lasting less than one month ($p = 0.041$ and $p = 0.044$, respectively) (Table 4).

The R score of the grade, roughness, breathiness, asthenia and strain scale was always evaluated as zero for the psychogenic dysphonia or aphonia patients in the study group; the other scores had different values. In one severely affected patient, the strain voice was dominant, where others were generally seen to have a breathy and asthenic voice. According to the grade, roughness, breathiness, asthenia and strain scale evaluation (pre-treatment = 9 ± 0.67, post-treatment = 0.78 ± 0.80, final

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Table 2. Disease features distribution

Parameter	Values
Complaint duration (days)	
– Range (median)	4–365 (37.5)
– Mean ± sum of squares	77.07 ± 101.22
– Duration <1 month (*n* (%))	5 (35.7)
– Duration ≥1 month (*n* (%))	9 (64.3)
Attack status at time of application (*n* (%))	
– First attack	6 (42.9)
– Recurrent attacks	8 (57.1)
Follow-up time (months)	
– Range (median)	6–40 (14)
– Mean ± sum of squares	17.00 ± 9.60
Subsequent recurrence? (*n* (%))	
– No	7 (50.0)
– Yes	7 (50.0)
Number of relapses	
– Range (median)	0–3 (0.5)
– Mean ± sum of squares	0.86 ± 1.03
– No recurrences (*n* (%))	7 (50.0)
– 1 recurrence (*n* (%))	3 (21.4)
– ≥ 2 recurrence (*n* (%))	4 (28.6)
Psychiatric treatment before DoctorVox voice therapy? (*n* (%))	
– No	10 (71.4)
– Yes	4 (28.6)
Psychiatric treatment after DoctorVox voice therapy? (*n* (%))	
– No	10 (71.4)
– Yes	4 (28.6)
Pathology (*n* (%))	
– Severe dysphonia	3 (21.4)
– Aphonia	11 (78.6)

Table 3. Evaluation of VHI-10 values in follow up

VHI-10 parameter	Values
Pre-treatment VHI	
– Range (median)	24–36 (30.5)
– Mean ± sum of squares	30.91 ± 2.97
Post-treatment VHI	
– Range (median)	2–14 (7.5)
– Mean ± sum of squares	8.14 ± 3.82
Final follow-up VHI	
– Range (median)	0–6 (4)
– Mean ± sum of squares	3.36 ± 1.78
Comparisons (*p*-values)	
– Pre- *vs* post-treatment *vs* final follow up	0.001* (Friedman)
– Pre- *vs* post-treatment	0.024† (Bonferroni–Dunn)
– Pre-treatment *vs* final follow up	0.001* (Bonferroni–Dunn)
– Post-treatment *vs* follow up	0.024† (Bonferroni–Dunn)

*$p < 0.01$; †$p < 0.05$. VHI-10 = Voice Handicap Index-10

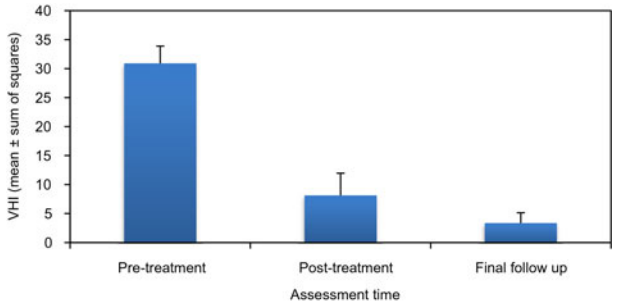

Figure 3. Graphical representation of Voice Handicap Index-10 values in follow up.

follow up = 0.57 ± 0.64), there were statistically significant changes between the pre-treatment and post-treatment scores and between the pre-treatment and final follow-up scores ($p = 0.001$ and $p < 0.05$). The change between post-treatment and final follow-up values was not statistically significant ($p = 0.257$).

Discussion

Phonation performed using high backpressure has been observed to provoke use of the chest register of the voice.[11] DoctorVox voice therapy was utilised to increase auditory feedback and to provoke the chest voice in psychogenic dysphonia or aphonia patients, and the results were analysed in our study.

Psychogenic dysphonia may be defined as a rough and breathy phonation, and psychogenic aphonia refers to involuntary whispering; the larynx is normal in both cases.[14] There are difficulties in diagnosing psychogenic dysphonia or aphonia because of the variable clinical manifestations, and the conditions may be mistaken for other functional voice disorders. Muscle tension dysphonia can have similar findings, such as failure of the true vocal folds to adduct, vocal fold bowing, hyperadduction of the true vocal and ventricular folds, anterior-posterior squeezing of the supraglottic structures, and paradoxical movements of the vocal folds.[15,16] Therefore, videolaryngostroboscopic evaluation may not always distinguish psychogenic dysphonia or aphonia from other functional dysphonias. The most important distinguishing factors in the evaluation of this patient group are the history of the patient, the course of the disease and the non-communicative reflexive voices (such as coughing, crying and laughing).[1] In our study, it was first ensured that our patients met the specified criteria before the diagnosis of psychogenic dysphonia or aphonia was made, and the differential diagnosis of non-type-4 muscle tension dysphonia was discounted.

Psychogenic dysphonia has been noted to be highly predominant in women.[17] Baker *et al.*[16] reported that psychogenic dysphonia was 7 times (14:2) more common in women, while Martins *et al.*[18] revealed that it was 13 times (26:2) more common in women. Especially today, with the significant contribution of women to household budgets, the stress and demands of both domestic and professional tasks may be partially responsible for the increased utilisation of psychological and psychiatric consultations among women.[16] In our study, psychogenic dysphonia or aphonia was six times (12:2) more prevalent in women, in line with the literature. In addition, nearly half of the patients (57.1 per cent, $n = 8$) were retired or unemployed, and there was no significant difference in terms of response to treatment.

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The most frequent form of clinical presentation was conversion aphonia, followed by musculoskeletal tension and intermittent voicing.[18] Sudden onset of vocal symptoms due to psychogenic dysphonia can be accurately identified by the patient. In a study by Tezcaner *et al.*,[1] the majority of the patients (86.2 per cent) stated that vocal complaints appeared suddenly. Among our patients, onset was also sudden, which is an important factor in the differential diagnosis. Eleven of our patients were aphonic and three were highly dysphonic. An intermittent nature of psychogenic dysphonia is the most prevalent course, in which periods of normal voice alternate with periods of aphonia or dysphonia.[18] Eight (57.1 per cent) of our patients stated that they had experienced two or more dysphonia or aphonia attacks before DoctorVox voice therapy.

Dysphonia due to psycho-emotional and psychosocial factors (anxiety, distress, depression, conversion reaction, personality disorders, and interpersonal conflicts in the family or professional setting) is defined as a psychogenic vocal disorder.[1,2,19] Nemr *et al.*[5] reported that 22.4 per cent of patients (13 out of 58) diagnosed with psychogenic dysphonia or aphonia had a previous psychiatric diagnosis, and 17.2 per cent (10 out of 58) had received medical treatment. In our study, 28.6 per cent ($n = 4$) of the patients stated that they had previously received psychiatric treatment before voice therapy, compared with 71.4 per cent ($n = 10$) who had not. Multidisciplinary approach (voice therapy, psychotherapy) has been described in the literature as being vital; however, it has also been reported that most psychogenic dysphonia or aphonia patients do not accept psychiatric evaluation.[1,4,8,15] In our study, only 1 of the 10 patients (10 per cent) who had not undergone any prior psychiatric interventions consented to such intervention. Furthermore, the Voice Handicap Index-10 changes for the group with a complaint duration of one month or more were significantly greater than those for the group with a complaint duration of less than one month ($p < 0.05$). This indicates that patients are more affected psychologically and the response to the treatment is more appreciated as the duration of the voice disorder experienced by the patient increases.

Some studies have reported that, in most patients with psychogenic dysphonia or aphonia, normal voice can be produced within five sessions of therapy.[2,20] While 92.8 per cent of the patients in our study ($n = 13$) started phonation within the first three sessions, one patient (7.1 per cent) began phonation in the sixth session. Emotional responses were especially remarkable in terms of improved Voice Handicap Index-10 results, which could be used to reflect how patients felt about the therapy. Reiter *et al.* used the Voice Handicap Index-10 to evaluate the treatment results of 40 patients, in which 70 per cent achieved total recovery and only 37.5 per cent accepted psychotherapy.[8] The authors stated that 30 per cent of patients improved with intensive voice exercises with visual feedback of the laryngostroboscopic findings, with therapeutic counselling, and, in some cases, voice therapy could be used alone.[8] In our study, the Voice Handicap Index-10 values before DoctorVox voice therapy, after DoctorVox voice therapy

Table 4. Evaluation of VHI-10 values by complaint duration

	Complaint duration		
VHI-10 parameter	<1 month ($n = 5$)	≥1 month ($n = 9$)	*p*-value (Mann–Whitney U)
Pre-treatment VHI			
– Range (median)	24–32 (29)	30–36 (32)	0.026*
– Mean ± sum of squares	28.60 ± 2.97	32.22 ± 2.17	
Post-treatment VHI			
– Range (median)	4–14 (8)	2–14 (7)	0.687
– Mean ± sum of squares	8.80 ± 4.15	7.78 ± 3.83	
Final follow-up VHI			
– Range (median)	0–6 (4)	1–6 (4)	0.891
– Mean ± sum of squares	3.20 ± 2.28	3.44 ± 1.59	
– *P*-value (Friedman)	0.007†	0.001†	
Pre- minus post-treatment VHI			
– Range (median)	14–24 (20)	19–34 (24)	0.041*
– Mean ± sum of squares	19.80 ± 4.02	24.44 ± 4.25	
– *P*-value (Bonferroni–Dunn)	0.342	0.102	
Pre-treatment minus final follow-up VHI			
– Range (median)	22–28 (25)	26–35 (28)	0.044*
– Mean ± sum of squares	25.40 ± 2.61	28.78 ± 2.59	
– *P*-value (Bonferroni–Dunn)	0.005†	0.001†	
Post-treatment minus final follow-up VHI			
– Range (median)	2–10 (4)	1–9 (4)	0.456
– Mean ± sum of squares	5.60 ± 3.29	4.33 ± 2.92	
– *P*-value (Bonferroni–Dunn)	0.342	0.102	

*$p < 0.05$; †$p < 0.01$. VHI-10 = Voice Handicap Index-10

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and at final follow up were 30.91 ± 2.97, 8.14 ± 3.82 and 3.36 ± 1.78, and there was a significant change between these periods. The successful Voice Handicap Index-10 results obtained at the final follow up suggests that DoctorVox voice therapy has a positive effect on patients' coping strategies.

There are various treatment approaches available for psychogenic dysphonia or aphonia, with a consensus on the use of symptomatic voice therapy, counselling, treating underlying psychological factors or a combination of these elements.[20] Little information exists regarding the long-term success or recurrence after voice therapy; a high recurrence rate is inevitable if the underlying psychogenic factors (anxiety, depression and somatic complaints) remain unchanged in these patients.[16,8,20,21] In the study by Tezcaner *et al.*,[1] recurrence was observed in 10 of 20 patients (50 per cent) who received only voice therapy. However, only 14.7 per cent of patients (5 out of 34) who underwent additional psychiatric intervention showed recurrence. The psychiatric intervention was stated to be effective in the long-term follow up, but did not alter the response to voice therapy.[1] In our study, 28.6 per cent ($n = 4$) of our patients were receiving psychiatric or psychogenic treatment simultaneously with DoctorVox voice therapy. However, no statistical relationships were observed between the Voice Handicap Index-10 values and the number of attacks or recurrences between the groups who received and did not receive psychiatric or psychogenic therapy ($p > 0.05$). Complete recovery was achieved in all of our patients after DoctorVox voice therapy. However, 50 per cent ($n = 7$) of our patients stated that they had experienced one or more dysphonia or aphonia attacks and recovered with DoctorVox voice therapy exercises (early-onset self-therapy). Especially in patients who experience recurrence, the self-therapy option of DoctorVox voice therapy may be an important advantage. This provides additional confidence to the patient and their family.

In psychogenic dysphonia or aphonia, the high failure rate of voice therapy may reflect inadequately trained clinicians and speech therapists, or inadequate therapy technique(s).[1] According to the literature, direct and indirect voice therapy in combination with cognitive behaviour therapy has achieved significant success in the treatment of psychogenic dysphonia or aphonia.[8,22] While DoctorVox voice therapy offers an activation plan and exercise programme structured in line with motor learning principles, it shifts the patient's attention from the voice production to the use of a 'device'. Therefore, in addition to vocal exercises, the method, with its devices and biofeedback strategy, has similar processes to cognitive behaviour therapy. The technique, after being taught to the patient, can be used by the patient and repeated if necessary. DoctorVox voice therapy may also be regarded as a supportive approach with its placebo effect. However, the need for specific devices for the DoctorVox voice therapy programme may be regarded as a limitation. In addition, patients who are not allowed to over-exert themselves (e.g. because of uncontrolled hypertension or intracranial pressure deficits) may not be suitable for vocal exercises that involve high backpressure levels (over 10 cmH_2O) as are sometimes used in DoctorVox voice therapy. All the patients in our study were suitable for DoctorVox voice therapy.

Although psychogenic dysphonia or aphonia is the result of a psychiatric aetiology, the application of vocal exercises is of great importance. In a patient presenting with aphonia, the personal and environmental expectation is primarily vocal recovery.[4] One previous study of immediate symptomatic intensive voice therapy stated that psychotherapy was not always considered necessary.[23] Although most patients may declare that they do not have any psychiatric problems, psychiatric intervention, in our opinion, cannot be substituted by any other means, and patients should be encouraged to receive psychiatry consultation, especially in cases of severe psychogenic stress. In addition, psychological support in the voice clinic helps with therapy adherence, and the social environment of the patient can be included in the therapy process as well. Aronson *et al.* (as cited in Kiliç *et al.*[22]) stated that the voice clinician, serving as a temporary supporting psychotherapist, may encourage the patient to explain and resolve the problem by understanding personal or behavioural, and environmental or social, causes.

- Psychogenic dysphonia or aphonia is also known as type 4 muscle tension dysphonia, conversion dysphonia, phononeurosis, or hysterical dysphonia or aphonia
- LaxVox exercises with a silicone tube were first demonstrated by voice pathologist Marketta Sihvo
- DoctorVox voice therapy is a direct holistic method involving artificial elongation and semi-occlusion of the vocal tract
- There are various treatment approaches available for psychogenic dysphonia or aphonia
- The consensus regarding treatment is for symptomatic voice therapy, counselling, treatment of underlying psychological factors, and a combination of these elements
- DoctorVox voice therapy seems to be an efficient treatment method for psychogenic dysphonia or aphonia

There are several limitations to this study. Future investigations require a longer follow-up duration, a larger number of cases for better statistical results, and better psychiatric consultation and liaison for all patients. In addition, the study should be conducted by different clinicians multicentrically, and the method should be compared with other therapies.

Conclusion

DoctorVox voice therapy seems to be an efficient treatment method for psychogenic dysphonia or aphonia; it helps develop phonatory muscle functions, using multidimensional biofeedback mechanisms, and increases patients' adherence to therapy. In addition, DoctorVox voice therapy provides self-precaution exercises for cases of recurrence in psychogenic dysphonia or aphonia patients.

Competing interests. The second author is the founder, inventor and patent owner of the DoctorVox voice therapy and devices. (The first author has no conflict of interest.)

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