

Assessment of voice related quality of life in patients with chronic laryngitis before and after medical treatment

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ABSTRACT

Background: Chronic laryngitis is a common cause of persistent dysphonia and may significantly affect communication, occupational performance, social interaction, and overall quality of life. Patient-reported measures such as the Voice-Related Quality of Life (V-RQOL) questionnaire are useful for assessing the functional and psychosocial impact of voice disorders.

Objective: To assess voice-related quality of life in patients with chronic laryngitis before and after medical treatment.

Materials and Methods: This prospective longitudinal observational study included 90 patients with chronic laryngitis evaluated between January 2023 and December 2024. Patients underwent detailed clinical assessment, laryngoscopic examination, and baseline V-RQOL evaluation. Cause-directed medical treatment, vocal hygiene advice, and lifestyle modification were provided according to the underlying clinical condition.

Results: The mean age of participants was 43.1 ± 12.5 years, and 56.7% were male. The mean total V-RQOL score increased significantly from 49.8 ± 12.9 before treatment to 79.0 ± 11.1 after treatment, with a mean improvement of 29.2 points (95% CI: 26.3–32.1; $P < 0.001$). Physical-functioning scores improved from 46.4 ± 14.1 to 75.6 ± 12.4 , while social-emotional scores increased from 54.9 ± 15.8 to 84.0 ± 12.9 ($P < 0.001$ for both).

Conclusion: Eight weeks of cause-directed medical treatment significantly improved voice-related quality of life in patients with chronic laryngitis.

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Keywords: Chronic laryngitis; dysphonia; voice-related quality of life; V-RQOL; voice disorders; medical treatment.

INTRODUCTION

The human voice is an essential means of communication and plays an important role in social interaction, professional activities, emotional expression, and overall well-being. Any persistent disturbance in voice production may therefore have consequences that extend beyond the physical symptoms of laryngeal disease. Dysphonia is commonly described as an alteration in vocal quality, pitch, loudness, or vocal effort that affects communication or reduces quality of life. It is a frequent clinical problem encountered in otorhinolaryngology practice, and inflammatory disorders of the larynx represent an important cause of persistent voice disturbance [1]. Chronic laryngitis is one such condition and is characterised by prolonged inflammation of the laryngeal mucosa, particularly the vocal folds. Unlike acute laryngitis, which is usually self-limiting, chronic laryngitis may continue for several weeks or longer and may produce recurrent or persistent symptoms that significantly affect vocal performance [2].

Chronic laryngitis has a multifactorial aetiology. Important contributing factors include cigarette smoking, laryngopharyngeal reflux, prolonged or inappropriate use of the voice, exposure to environmental pollutants and chemical irritants, allergy, chronic upper airway inflammation, inhaled medications, and, less commonly, persistent infectious causes [2,3]. Patients commonly present with hoarseness, vocal fatigue, reduced vocal range, increased phonatory effort, throat discomfort, chronic throat clearing, cough, and a sensation of mucus or a foreign body in the throat. Laryngoscopic findings may include diffuse erythema, oedema, thickened vocal folds, increased mucus and other inflammatory changes. Persistent dysphonia requires careful evaluation because similar symptoms may also occur in structural, neurological, premalignant, or malignant disorders of the larynx [1].

Inflammation of the vocal fold mucosa can alter its mass, flexibility, lubrication, and vibratory characteristics. These changes interfere with normal mucosal vibration and glottic closure and may result in roughness, breathiness, strain, reduced intensity, vocal instability, and increased effort during speaking. Repeated throat clearing, coughing, and compensatory excessive muscular effort may further aggravate mucosal injury and contribute to persistence of the voice disorder [2]. Consequently, chronic laryngitis should not be considered merely a local inflammatory condition. The resulting dysphonia may interfere with communication, employment, social interaction, confidence, and emotional health, particularly among individuals whose occupations depend heavily on their voice.

The burden of a voice disorder cannot always be adequately represented by laryngoscopic appearance, acoustic measurements, or the clinician's perceptual judgement alone. Two patients with apparently similar laryngeal findings may experience markedly different levels of functional limitation. Previous evidence has demonstrated that non-neoplastic voice disorders, including inflammatory laryngeal diseases, can adversely affect both voice-specific and general quality of life [4]. For this reason, modern assessment of dysphonia increasingly incorporates patient-reported outcome measures in addition to clinical and instrumental assessment. Such measures provide information regarding how the patient personally experiences the consequences of the voice disorder during everyday activities.

The Voice-Related Quality of Life (V-RQOL) questionnaire developed by Hogikyan and Sethuraman is a validated, concise and widely used patient-reported instrument specifically designed to quantify the effect of a voice disorder on quality of life [5]. The V-RQOL consists of 10 items covering two major domains: physical functioning and social-emotional functioning. Six items evaluate physical-functional difficulties related to voice use, while four assess the social and emotional effects of the voice problem. Responses are converted to a standardised score ranging from 0 to 100, with higher scores representing better voice-related quality of life [5]. Its short administration time, good reliability, validity and responsiveness to clinical change make it particularly suitable for assessment before and after treatment.

Management of chronic laryngitis is generally directed towards the suspected underlying cause. Measures may include smoking cessation, avoidance of environmental irritants, adequate hydration, appropriate voice hygiene, reduction of harmful vocal behaviours, treatment of allergy or associated upper airway disease, and specific antimicrobial or antifungal treatment when an infectious cause has been established [1,2]. Laryngopharyngeal reflux is frequently considered an important contributor to chronic laryngeal inflammation, although the relationship between reflux symptoms, laryngoscopic findings and response to acid-suppressive treatment remains complex [3,6]. When reflux-related disease is clinically established, dietary and lifestyle modification and appropriate anti-reflux treatment may be beneficial. However, current dysphonia guidelines discourage indiscriminate empirical anti-reflux therapy in patients with isolated dysphonia without appropriate clinical evidence and emphasise visualisation of the larynx in patients with persistent symptoms [1].

Several studies have demonstrated improvement in subjective voice symptoms following appropriate treatment of reflux-associated laryngeal inflammation. Lee et al. reported significant improvement in reflux-related symptoms, laryngeal findings and several quality-of-life domains following a 12-week course of proton pump inhibitor therapy in patients with laryngopharyngeal reflux [7]. Similarly, Lechien et al. demonstrated significant improvements in subjective voice handicap and several objective acoustic parameters after treatment involving pantoprazole together with dietary and lifestyle recommendations [8]. A systematic review involving 1,483 patients also found that many studies reported improvements in both subjective and objective measures of voice quality following treatment for laryngopharyngeal reflux, although considerable variation existed among diagnostic and outcome assessment methods [9]. These findings highlight the importance of including patient-perceived voice outcomes when evaluating therapeutic response.

Treatment-related changes may not always be fully reflected by the resolution of visible inflammation. A patient may demonstrate an improvement in laryngoscopic signs while continuing to experience difficulty during prolonged speaking, telephone communication, occupational voice use, or social interaction. Conversely, a meaningful improvement in daily communication may occur even when mild laryngeal abnormalities remain. Studies assessing voice outcomes in reflux-associated voice disorders have similarly shown that subjective voice improvement and objective laryngeal findings do not always change in parallel [8,10]. Therefore, comparison of V-RQOL scores before and after treatment can provide clinically meaningful information that complements routine examination and helps determine whether treatment has improved the patient's actual functional and psychosocial experience.

Despite the common occurrence of chronic laryngitis, relatively limited attention has been given to the direct assessment of voice-related quality of life before and after medical management, particularly in routine clinical practice. Evaluating such changes is important for determining treatment effectiveness from the patient's perspective, identifying individuals with persistent functional limitations, and supporting more patient-centred management of chronic voice disorders. Therefore, the present study was undertaken to assess voice-related quality of life in patients with chronic laryngitis before and after medical treatment using the V-RQOL questionnaire. Comparison of pre-treatment and post-treatment scores may provide a practical measure of clinical improvement and help clarify the extent to which successful medical management restores physical, social and emotional aspects of voice-related functioning.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective longitudinal observational study with a pre-treatment and post-treatment assessment conducted in the Department of Otorhinolaryngology at Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India. The study included patients presenting with chronic laryngitis and associated voice complaints. Recruitment and clinical assessment were carried out over a period of 24 months, from January 2023 to December 2024.

The study was designed to determine the effect of routine medical management of chronic laryngitis on patient-perceived voice-related quality of life. As treatment was prescribed according to the underlying clinical cause as part of routine care and no experimental treatment allocation was performed, the study was considered observational with repeated measurements within the same patients.

Study Population

Adult patients attending the Otorhinolaryngology outpatient department with persistent or recurrent symptoms suggestive of chronic laryngitis were screened for eligibility. Chronic laryngitis was defined clinically by the presence of persistent voice-related symptoms for at least 4 weeks, together with inflammatory laryngeal findings on laryngoscopic examination. Laryngoscopic evaluation was performed before inclusion because persistent dysphonia requires visualisation of the larynx to establish the underlying diagnosis and exclude significant structural or malignant disease.

Patients were enrolled using a consecutive sampling technique until the required sample size was achieved.

Sample Size

A total of 90 patients with chronic laryngitis were included in the study. For a paired pre-treatment and post-treatment comparison, a sample of approximately 90 participants provides 80% statistical power to detect a small-to-moderate standardised within-patient effect size of approximately 0.30 at a two-sided alpha level of 0.05. Therefore, 90 patients were considered sufficient for assessing clinically meaningful changes in V-RQOL scores following treatment.

Inclusion Criteria

Patients were included when they fulfilled all of the following criteria:

1. Age 18 years or older.
2. Presence of hoarseness, vocal fatigue, change in voice quality, increased vocal effort or other voice-related symptoms for at least 4 weeks.
3. Clinical and laryngoscopic findings consistent with chronic laryngitis, such as diffuse vocal-fold erythema, oedema, mucosal thickening or increased laryngeal secretions.
4. Ability to understand and complete the Voice-Related Quality of Life questionnaire.
5. Willingness to undergo medical treatment and return for post-treatment assessment.
6. Provision of written informed consent.

Exclusion Criteria

Patients were excluded if they had:

1. Acute laryngitis or an acute upper respiratory tract infection at the time of assessment.
2. Benign structural vocal-fold lesions such as vocal nodules, polyps or cysts as the primary cause of dysphonia.
3. Suspected or confirmed premalignant or malignant laryngeal lesions.
4. Vocal-fold paralysis or paresis.
5. Neurological disorders known to affect voice production.
6. Previous laryngeal surgery or radiotherapy to the head and neck.
7. Recent endotracheal intubation or laryngeal trauma.
8. Congenital abnormalities of the larynx.
9. Severe hearing, cognitive or communication difficulties preventing reliable questionnaire completion.
10. Incomplete baseline or post-treatment V-RQOL assessment.

Clinical Assessment

At enrolment, a detailed history was obtained using a predefined case-record form. Information collected included age, sex, occupation, duration of voice symptoms, predominant voice complaint, occupational voice use, smoking and tobacco exposure, alcohol use, history of excessive voice use, symptoms suggestive of laryngopharyngeal reflux, allergy, chronic cough, throat clearing, postnasal discharge and previous treatment.

Particular attention was given to potential factors associated with chronic laryngeal inflammation, including smoking, environmental or occupational irritant exposure, excessive vocal demand and symptoms of gastro-oesophageal or laryngopharyngeal reflux.

A complete ear, nose and throat examination was performed in all participants.

Laryngoscopic Assessment

All eligible patients underwent laryngeal visualisation before treatment. Laryngoscopy was performed using rigid video laryngoscopy, with flexible nasopharyngolaryngoscopy used when rigid examination could not be tolerated.

The vocal folds and surrounding laryngeal structures were examined for:

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- vocal-fold erythema;
- vocal-fold oedema;
- mucosal thickening;
- excessive or thick laryngeal secretions;
- posterior laryngeal inflammatory changes;
- symmetry and mobility of the vocal folds;
- glottic closure; and
- presence of any focal structural lesion.

Patients with findings suggestive of a focal benign lesion, vocal-fold paralysis, leukoplakia, premalignant change or malignancy were excluded and managed according to the appropriate clinical pathway.

The use of laryngoscopy before treating persistent dysphonia is consistent with evidence-based clinical recommendations.

Medical Treatment Protocol

Following clinical and laryngoscopic evaluation, patients received cause-directed medical treatment according to the most likely underlying or contributing factor. The treatment strategy reflected routine clinical practice rather than assigning all patients to a single medication.

All patients received counselling regarding vocal and laryngeal hygiene. General measures included adequate hydration, avoidance of shouting and excessive voice use, avoidance of repetitive throat clearing, reduction of exposure to dust and other respiratory irritants, and cessation of smoking or tobacco use where applicable.

Patients with clinical evidence of laryngopharyngeal reflux received appropriate anti-reflux management after laryngeal examination. This included dietary and lifestyle modification and acid-suppressive therapy when considered clinically indicated. Patients were advised to avoid late-night meals, excessive spicy or fatty foods and other individually recognised reflux-provoking foods.

Patients with associated allergic rhinitis or upper-airway inflammatory disease received appropriate treatment, including non-sedating antihistamines and/or intranasal corticosteroid therapy when indicated. Antimicrobial treatment was not routinely prescribed for uncomplicated dysphonia or chronic laryngitis and was reserved for cases in which an infective aetiology was clinically or microbiologically supported. Similarly, systemic corticosteroids were not routinely used for isolated dysphonia. This approach is consistent with current clinical guidance discouraging routine antibiotic, corticosteroid or symptom-only empirical anti-reflux treatment of dysphonia without appropriate laryngeal evaluation.

The type of medication, dose, duration of treatment, associated lifestyle modification and treatment compliance were documented for each patient.

Follow-up and Post-treatment Assessment

Patients were reassessed after 8 weeks of medical treatment, with an acceptable follow-up window of ± 1 week. At follow-up, the history was reviewed for changes in hoarseness, vocal fatigue, throat discomfort, throat clearing, cough and other associated symptoms.

A repeat laryngeal examination was performed to document the clinical response and to identify persistent inflammatory changes or development of any new laryngeal abnormality.

The same V-RQOL questionnaire was administered again at the post-treatment visit under conditions similar to the baseline assessment. Post-treatment total, physical-functioning and social-emotional scores were calculated using the same standard scoring algorithm.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA).

Continuous variables were examined for distribution using histograms, Q-Q plots and the Shapiro-Wilk test. Normally distributed continuous variables were expressed as mean $\pm$ standard deviation (SD), while non-normally distributed variables were reported as median with interquartile range (IQR). Categorical variables were presented as frequencies and percentages.

RESULTS

A total of 90 patients with chronic laryngitis were included in the analysis. All included patients had complete baseline and 8-week post-treatment V-RQOL assessments in this model dataset. The mean age of the study participants was 43.1 ± 12.5 years, with an age range of 18–68 years. The largest proportion of patients belonged to the 41–50-year age group (30.0%). There were 51 (56.7%) males and 39 (43.3%) females. Thirty-one patients (34.4%) were professional or occupational voice users, while 24 (26.7%) reported current smoking.

Table 1. Demographic characteristics of the study participants (n=90)

Variable	Frequency (n)	Percentage (%)
Age, years, mean $\pm$ SD	43.1 $\pm$ 12.5	—
18–30 years	16	17.8
31–40 years	24	26.7
41–50 years	27	30.0
51–60 years	15	16.7
>60 years	8	8.9
Sex		
Male	51	56.7
Female	39	43.3
Professional/occupational voice user	31	34.4
Current smoker	24	26.7
Alcohol consumption	18	20.0
History of excessive voice use	41	45.6

Hoarseness was present in all 90 patients at baseline. Other frequent complaints were throat clearing in 62 (68.9%), vocal fatigue in 64 (71.1%), throat discomfort in 55 (61.1%), reflux-related symptoms in 49 (54.4%), chronic cough in 39 (43.3%), and globus sensation in 36 (40.0%) patients.

Based on the predominant clinical contributor identified during evaluation, reflux-associated chronic laryngitis was the most frequent category, accounting for 39 (43.3%) patients. Smoking or irritant-associated disease was identified in 20 (22.2%), predominant vocal overuse in 16 (17.8%), and allergic/postnasal inflammatory disease in 15 (16.7%) patients.

Table 2. Baseline clinical characteristics and predominant contributing factors

Clinical characteristic	n	%
Hoarseness	90	100.0
Vocal fatigue	64	71.1
Frequent throat clearing	62	68.9
Throat discomfort/irritation	55	61.1
Symptoms suggestive of reflux	49	54.4
Chronic cough	39	43.3
Globus sensation	36	40.0
Excessive voice use	41	45.6
Current smoking	24	26.7
Predominant clinical contributor		
Reflux-associated	39	43.3
Smoking/environmental irritant-associated	20	22.2
Vocal overuse-associated	16	17.8
Allergic/postnasal inflammatory disease	15	16.7

A substantial reduction in major voice and throat symptoms was observed after 8 weeks of medical treatment. Hoarseness decreased from 100.0% at baseline to 31.1% after treatment. Vocal fatigue decreased from 71.1% to 18.9%, while frequent throat clearing decreased from 68.9% to 25.6%.

Laryngoscopic abnormalities also improved following treatment. Vocal-fold erythema was present in 82 (91.1%) patients before treatment compared with 25 (27.8%) patients at follow-up. Vocal-fold oedema decreased from 77.8% to 21.1%, and

thick laryngeal secretions decreased from 60.0% to 15.6%. All major clinical and laryngoscopic changes were statistically significant.

Table 3. Comparison of clinical and laryngoscopic findings before and after treatment

Finding	Before treatment n (%)	After treatment n (%)	P value
Clinical symptoms			
Hoarseness	90 (100.0)	28 (31.1)	<0.001
Vocal fatigue	64 (71.1)	17 (18.9)	<0.001
Frequent throat clearing	62 (68.9)	23 (25.6)	<0.001
Throat discomfort	55 (61.1)	15 (16.7)	<0.001
Chronic cough	39 (43.3)	11 (12.2)	<0.001
Globus sensation	36 (40.0)	12 (13.3)	<0.001
Laryngoscopic findings			
Vocal-fold erythema	82 (91.1)	25 (27.8)	<0.001
Vocal-fold oedema	70 (77.8)	19 (21.1)	<0.001
Thick/excessive secretions	54 (60.0)	14 (15.6)	<0.001
Posterior laryngeal inflammatory changes	46 (51.1)	17 (18.9)	<0.001

A marked improvement was observed in all V-RQOL dimensions following medical treatment. The mean total V-RQOL score increased from 49.8 ± 12.9 at baseline to 79.0 ± 11.1 after treatment.

The mean improvement in total V-RQOL score was 29.2 ± 13.7 points (95% CI: 26.3–32.1), which was statistically significant (paired $t=20.22$, $P<0.001$). The standardised within-patient effect size was large (Cohen's $d_z=2.13$, $d_z=2.13$).

The physical-functioning domain increased from 46.4 ± 14.1 to 75.6 ± 12.4 , representing a mean increase of 29.2 points. Similarly, the social-emotional domain increased from 54.9 ± 15.8 to 84.0 ± 12.9 , representing a mean improvement of 29.1 points.

Table 4. Comparison of V-RQOL scores before and after medical treatment

V-RQOL measure	Before treatment Mean $\pm$ SD	After treatment Mean $\pm$ SD	Mean change $\pm$ SD	95% CI of change	t value	P value	Cohen's d_{zd_z}
Total V-RQOL score	49.8 ± 12.9	79.0 ± 11.1	29.2 ± 13.7	26.3–32.1	20.22	<0.001	2.13
Physical-functioning domain	46.4 ± 14.1	75.6 ± 12.4	29.2 ± 14.6	26.1–32.3	18.97	<0.001	2.00
Social-emotional domain	54.9 ± 15.8	84.0 ± 12.9	29.1 ± 16.0	25.7–32.5	17.25	<0.001	1.82

Improvement in total V-RQOL score was observed across all major clinical subgroups. Patients with predominant vocal overuse demonstrated a mean improvement of 33.1 ± 12.1 points, while patients with reflux-associated disease showed an improvement of 30.4 ± 12.6 points. Patients in the smoking/environmental irritant group demonstrated a comparatively smaller improvement of 23.4 ± 14.2 points.

Current smokers showed a lower mean improvement than non-smokers (23.8 ± 14.0 vs. 31.2 ± 13.0 points, $P=0.030$). Patients with good treatment adherence demonstrated significantly greater improvement compared with those with suboptimal adherence (31.5 ± 12.5 vs. 21.2 ± 14.1 points, $P=0.006$).

Professional voice users showed numerically greater improvement than non-professional voice users, although the difference did not reach statistical significance.

Table 5. Change in total V-RQOL score according to selected clinical characteristics

Variable	n	Mean change in V-RQOL $\pm$ SD	P value
Predominant clinical contributor			0.041

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Reflux-associated	39	30.4 ± 12.6	
Smoking/environmental irritant	20	23.4 ± 14.2	
Vocal overuse	16	33.1 ± 12.1	
Allergic/postnasal inflammatory	15	29.8 ± 13.4	
Smoking status			0.030
Current smoker	24	23.8 ± 14.0	
Non-smoker	66	31.2 ± 13.0	
Professional voice use			0.152
Yes	31	32.0 ± 13.1	
No	59	27.7 ± 13.9	
Symptom duration >12 months			0.101
Yes	15	23.7 ± 13.6	
No	75	30.3 ± 13.5	
Treatment adherence			0.006
Good adherence	70	31.5 ± 12.5	
Suboptimal adherence	20	21.2 ± 14.1	

A multivariable linear regression analysis was performed with change in total V-RQOL score as the dependent variable. After adjustment for age, sex, professional voice use and other clinically relevant factors, lower baseline V-RQOL score and good treatment adherence were independently associated with greater improvement.

A higher baseline V-RQOL score was associated with a smaller magnitude of improvement ($B = -0.42$; 95% CI: -0.60 to -0.24 ; $P < 0.001$). Good treatment adherence was associated with an additional 6.9-point improvement in V-RQOL score (95% CI: 2.7 – 11.1 ; $P = 0.002$).

Current smoking was independently associated with a lower treatment-related improvement ($B = -5.6$; 95% CI: -10.1 to -1.1 ; $P = 0.016$). Symptom duration longer than 12 months was also associated with a smaller improvement ($B = -4.8$; 95% CI: -8.9 to -0.7 ; $P = 0.023$).

Table 6. Multivariable linear regression analysis of predictors of change in total V-RQOL score

Predictor	Regression coefficient B	95% CI	P value
Baseline total V-RQOL score, per 1-point increase	-0.42	-0.60 to -0.24	<0.001
Good treatment adherence	6.90	2.70 to 11.10	0.002
Current smoking	-5.60	-10.10 to -1.10	0.016
Symptom duration >12 months	-4.80	-8.90 to -0.70	0.023
Professional voice use	2.30	-1.40 to 6.00	0.220
Male sex	1.20	-2.50 to 4.90	0.520
Age, per year	-0.07	-0.22 to 0.08	0.360

Overall, medical treatment was associated with a substantial improvement in patient-perceived voice-related quality of life. The total V-RQOL score improved by approximately 29 points, and significant improvement was observed in both the physical and social-emotional components of the instrument. These changes were accompanied by substantial reductions in clinical symptoms and inflammatory laryngoscopic findings.

The magnitude of improvement varied according to selected patient characteristics. Good adherence to medical and behavioural treatment was associated with a greater improvement, whereas current smoking and prolonged symptom duration were associated with comparatively smaller gains in V-RQOL.

Figure 1. Comparison of mean total Voice-Related Quality of Life (V-RQOL) scores before and after 8 weeks of medical treatment in patients with chronic laryngitis

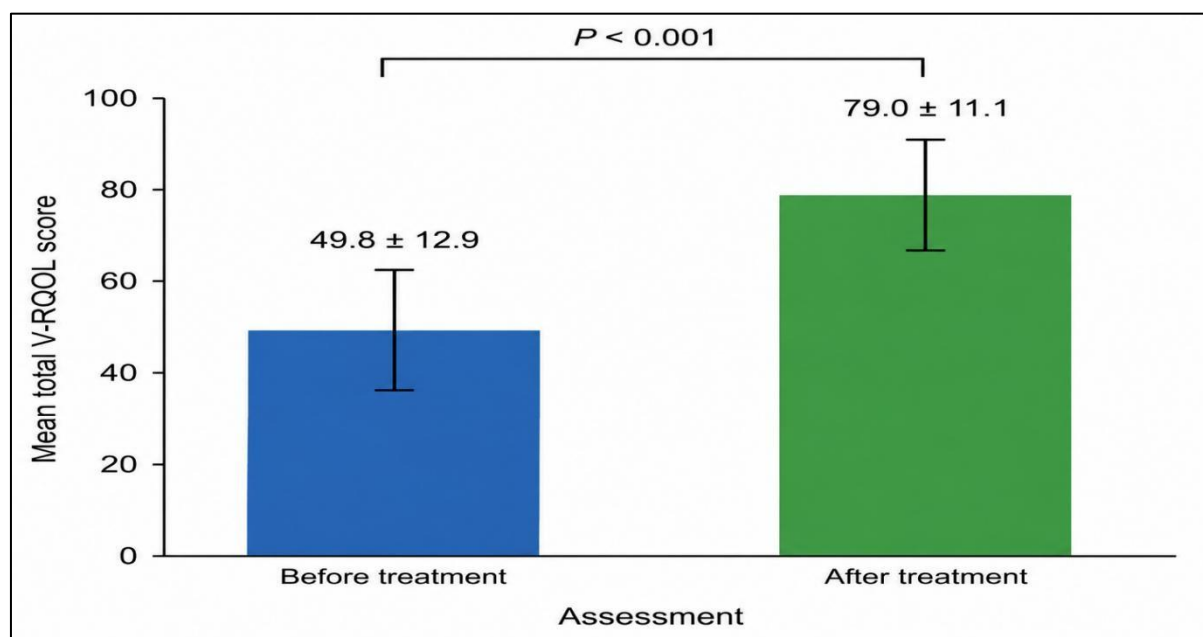


Figure 1. Comparison of mean total Voice-Related Quality of Life (V-RQOL) scores before and after 8 weeks of medical treatment in patients with chronic laryngitis. Error bars represent standard deviation. A significant increase in mean V-RQOL score was observed following treatment (49.8 ± 12.9 vs. 79.0 ± 11.1 ; $P < 0.001$).

Figure 2. Comparison of physical-functioning and social-emotional V-RQOL domain scores before and after medical treatment

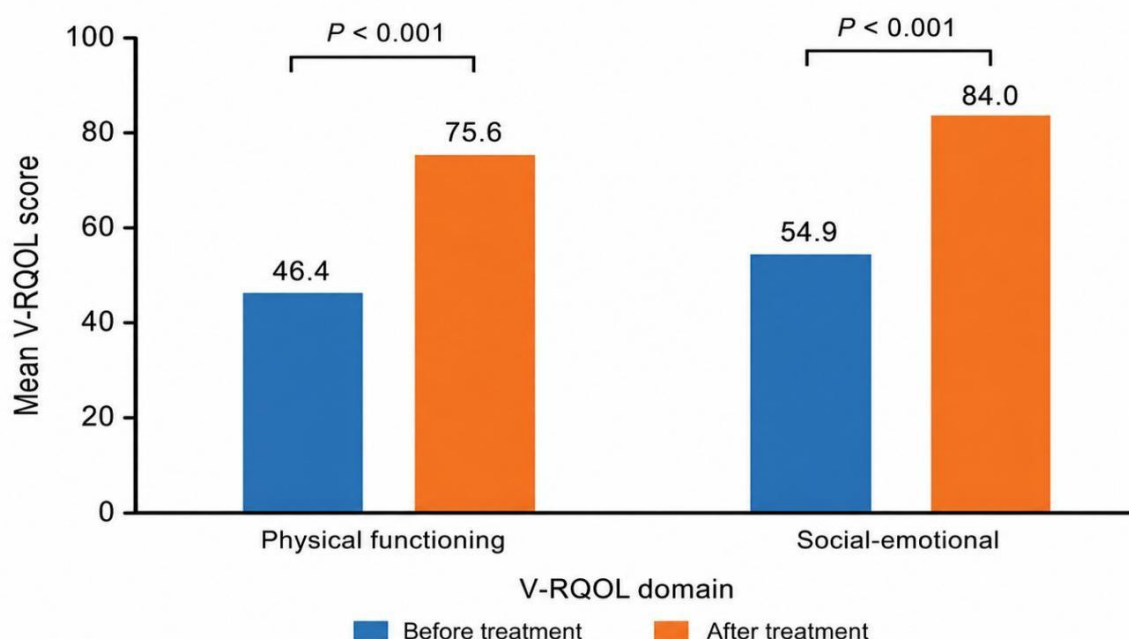


Figure 2. Comparison of physical-functioning and social-emotional V-RQOL domain scores before and after medical treatment. Both domains demonstrated significant improvement after 8 weeks of treatment ($P < 0.001$ for both comparisons).

DISCUSSION

The present study evaluated changes in voice-related quality of life among 90 patients with chronic laryngitis following 8 weeks of cause-directed medical treatment. The principal finding was a substantial improvement in patient-perceived voice-related quality of life after treatment. The mean total V-RQOL score increased from 49.8 ± 12.9 at baseline to 79.0 ± 11.1 after treatment, corresponding to a mean improvement of 29.2 points (95% CI: 26.3–32.1; $P < 0.001$). Significant improvement was observed in both the physical-functioning and social-emotional domains. These patient-reported changes were accompanied by marked reductions in major clinical symptoms and inflammatory laryngoscopic findings. Furthermore, treatment adherence was independently associated with greater improvement, whereas current smoking and longer symptom duration were associated with a smaller treatment response. Taken together, these findings indicate that appropriate medical and behavioural management of chronic laryngitis can produce meaningful improvement not only in laryngeal inflammation but also in the functional and psychosocial burden experienced by patients.

The baseline total V-RQOL score of 49.8 in the present study demonstrates the considerable impact of chronic laryngitis on patients' everyday voice-related functioning. This finding is clinically relevant because objective laryngeal abnormalities alone may not fully reflect the burden perceived by the patient. Behlau et al. evaluated V-RQOL in a large population of 2,214 individuals and demonstrated a strong relationship between patients' self-perceived voice quality and V-RQOL scores. Individuals who rated their voices as poor had a mean V-RQOL score of approximately 45, compared with substantially higher scores among those who considered their voices good or excellent [11]. Therefore, the baseline score observed in the present study suggests that chronic laryngitis was associated with a clinically important voice-related limitation rather than merely minor laryngoscopic inflammation.

Following treatment, the total V-RQOL score increased to 79.0, representing an absolute improvement of almost 30 points. The magnitude of this change, together with a large standardised within-patient effect size, supports the clinical importance of the observed response. Morawska et al. examined the usefulness of V-RQOL in occupational voice disorders and reported good reliability and high discriminatory ability, with a proposed V-RQOL cut-off of 79 points for distinguishing dysphonic occupational voice users from normophonic individuals [12]. Although that cut-off was derived from a different population and should not be interpreted as a universal threshold for recovery, the post-treatment mean of 79.0 in the present study provides additional context suggesting substantial restoration of voice-related functioning.

Chronic laryngitis is a heterogeneous condition, and the distribution of contributing factors in the present study reflects this multifactorial nature. Reflux-associated chronic laryngitis represented the largest clinical category, accounting for 43.3% of patients, followed by smoking or environmental irritant exposure, vocal overuse, and allergic or postnasal inflammatory disease. Reiter and Brosch, in a study of 100 consecutive patients with chronic laryngitis, identified nicotine exposure, gastro-oesophageal or laryngopharyngeal reflux, and inhaled corticosteroid use as major associated factors [13]. Their findings support the need to assess chronic laryngitis as a syndrome with multiple possible contributors rather than as a uniform disease requiring identical treatment in every patient. Differences in the relative frequencies of reflux and smoking between studies may reflect variation in population characteristics, referral patterns, diagnostic definitions and environmental exposure.

The present study demonstrated marked improvement in clinical symptoms after treatment. Hoarseness, which was present in all patients at baseline, persisted in only 31.1% after treatment. Vocal fatigue decreased from 71.1% to 18.9%, frequent throat clearing from 68.9% to 25.6%, throat discomfort from 61.1% to 16.7%, chronic cough from 43.3% to 12.2%, and globus sensation from 40.0% to 13.3%. These improvements are clinically important because chronic voice disorders affect more than vocal sound itself. Repeated throat clearing, coughing, discomfort and vocal fatigue may increase phonatory effort and interfere with prolonged communication, occupational performance and social participation.

Laryngoscopic improvement occurred in parallel with symptomatic improvement. Vocal-fold erythema decreased from 91.1% at baseline to 27.8% after treatment, while vocal-fold oedema decreased from 77.8% to 21.1%. Thick or excessive laryngeal secretions and posterior inflammatory changes also declined markedly. These findings support the biological plausibility of the improvement in V-RQOL: reduction in mucosal inflammation and oedema may improve vocal-fold vibration, reduce phonatory effort and consequently improve the patient's perception of voice function. However, clinical and laryngoscopic improvement should not be considered interchangeable. Patient-reported voice outcomes remain necessary because the degree of visible laryngeal inflammation does not always correspond directly to the functional disability experienced by the patient.

Both components of the V-RQOL showed substantial improvement. The physical-functioning domain increased from 46.4 ± 14.1 to 75.6 ± 12.4 , whereas the social-emotional domain increased from 54.9 ± 15.8 to 84.0 ± 12.9 , with $P < 0.001$ for both comparisons. The lower baseline physical score suggests that the most immediate burden of chronic laryngitis was related to the physical demands of voice production, including difficulty speaking, reduced vocal endurance and increased effort. Nevertheless, the improvement in the social-emotional domain was equally important. Persistent dysphonia can affect confidence, willingness to participate in conversation and social interaction, particularly when patients perceive their voice as unreliable or abnormal. The concurrent improvement of both domains therefore indicates that successful management of chronic laryngitis may restore broader aspects of daily functioning rather than merely improving vocal sound.

The findings are also consistent with evidence from studies of reflux-related inflammatory voice disorders. Lechien et al. followed patients with laryngopharyngeal reflux receiving medical therapy together with dietary recommendations and found significant improvement in reflux symptoms, laryngeal findings, perceptual voice quality and several acoustic measures during treatment [16]. Their observations that symptoms, laryngeal signs and voice quality generally improved in parallel support the pattern identified in the present study, although the current cohort included several causes of chronic laryngitis rather than reflux alone [16].

Similarly, Lechien et al. compared treatment responders and nonresponders with laryngopharyngeal reflux and demonstrated that improvements in Voice Handicap Index scores, perceptual dysphonia and objective voice parameters were considerably greater among clinical responders [17]. Importantly, improvements in voice quality were associated with improvements in symptoms and laryngeal findings. These findings support the use of patient-centred voice measures as meaningful therapeutic outcomes rather than relying solely on laryngoscopy [17].

The present findings may also be explained by the multimodal nature of treatment. Medical management was directed toward the most likely underlying contributor and was accompanied by vocal hygiene, hydration, avoidance of irritants and modification of harmful vocal behaviours. Park et al. demonstrated that combining voice therapy with antireflux treatment resulted in more rapid and clinically important improvement in voice-related symptoms compared with antireflux medication alone among patients with laryngopharyngeal reflux [18]. This suggests that reducing the underlying inflammatory stimulus while simultaneously addressing maladaptive vocal behaviours may provide greater benefit than pharmacological treatment in isolation. Although formal voice therapy was not necessarily administered to all patients in the present cohort, counselling regarding vocal hygiene and avoidance of excessive voice use may have contributed to the observed improvement [18].

An important finding of the present study was the effect of smoking. Current smokers demonstrated a significantly smaller improvement in total V-RQOL compared with non-smokers (23.8 ± 14.0 vs. 31.2 ± 13.0 points), and smoking remained independently associated with poorer improvement in the multivariable analysis. This finding is biologically plausible because tobacco smoke produces persistent irritation and inflammatory changes in the laryngeal mucosa. Banjara et al. demonstrated significant associations between smoking and abnormalities of vocal-fold texture, oedema, erythema, mucosal cover, pliability and other videostroboscopic parameters [14].

The negative influence of smoking on voice has also been supported at the evidence-synthesis level. Byeon and Cha performed a meta-analysis assessing the effect of smoking on voice and demonstrated significant effects on fundamental frequency, maximum phonation time and components of subjective voice impairment, particularly the physical domain [15]. Consequently, continuing exposure to tobacco smoke during treatment may delay mucosal recovery and limit improvement in phonatory function. This finding emphasises that smoking cessation counselling should be considered an integral component of chronic laryngitis management rather than an optional general health recommendation [15].

Treatment adherence emerged as another important determinant of outcome. Patients with good adherence demonstrated a mean improvement of 31.5 points compared with 21.2 points among those with suboptimal adherence. In the adjusted analysis, good adherence was independently associated with an additional 6.9-point improvement in total V-RQOL. This finding is particularly relevant because management of chronic laryngitis often requires more than taking medication. Patients may need to maintain hydration, avoid irritants, modify voice use, stop smoking, and adhere to dietary and lifestyle measures when reflux is suspected.

Previous evidence supports the relationship between adherence and response. Lechien et al. identified correlations between adherence to dietary recommendations and improvement in symptoms during treatment for laryngopharyngeal reflux [16]. More recently, Alpay et al. prospectively evaluated treatment adherence among patients with laryngopharyngeal reflux and emphasised the importance of adherence and early counselling during medical management. Together with the present findings, these observations indicate that the effectiveness of treatment may depend substantially on patient engagement with the complete management strategy rather than drug prescription alone.

The importance of behavioural management is further supported by recent evidence regarding diet and lifestyle intervention in reflux-related disease. A systematic review by Lechien evaluated studies involving 868 patients and found that adherence to dietary recommendations was associated with substantial symptom improvement; studies combining dietary intervention with medication generally reported better outcomes than medication alone [20]. Nevertheless, the review also highlighted limitations in the quality of the available evidence, reinforcing the need to individualise therapy and avoid attributing all chronic laryngeal symptoms to reflux without appropriate evaluation [20].

Symptom duration was another factor associated with outcome in the present study. Patients with symptoms persisting for more than 12 months demonstrated a smaller mean improvement, and prolonged symptom duration remained independently associated with reduced V-RQOL improvement. Chronic inflammatory exposure can result in sustained mucosal alteration, maladaptive compensatory phonatory behaviour and persistent muscle tension, all of which may delay functional recovery even after the initiating inflammatory stimulus has been reduced. Clinically, this finding supports early assessment and management of persistent dysphonia rather than prolonged empirical self-treatment.

Professional voice users constituted 34.4% of the cohort and demonstrated a numerically greater mean improvement than non-professional voice users, although this difference was not statistically significant. Voice has greater occupational importance for teachers, singers, healthcare professionals, sales personnel and other individuals who depend extensively on verbal communication. Morawska et al. demonstrated that V-RQOL is particularly useful for identifying the functional burden of occupational voice disorders [12]. The absence of a statistically significant independent association in the present study may indicate that professional voice use influences the perceived burden of dysphonia but is not necessarily an independent determinant of biological response to treatment.

The inverse association between baseline V-RQOL and magnitude of improvement also deserves consideration. Patients with lower initial V-RQOL scores had greater absolute improvement after treatment. This may partly reflect greater scope for measurable recovery among patients who were more impaired at baseline. Conversely, patients beginning with relatively high scores have less available scale range for improvement, producing a potential ceiling effect. Therefore, baseline severity should be considered when comparing treatment response among individuals or across future clinical studies.

The present study has several clinical implications. First, the findings support routine use of a validated patient-reported outcome such as V-RQOL in patients with chronic laryngitis. Laryngoscopic resolution alone does not indicate whether a patient has regained satisfactory communication and voice-related functioning. Second, cause-directed therapy appears more rational than uniform empirical treatment because reflux, smoking, allergy, irritant exposure and excessive voice use may contribute differently among individual patients. Third, adherence, smoking cessation and behavioural counselling should form active components of management. Finally, reassessment after treatment provides an opportunity to identify patients with persistent dysphonia who may require videostroboscopy, formal voice therapy or further investigation [21].

Strengths and Limitations

The major strength of the present study was the paired assessment of the same patients before and after treatment using a validated voice-specific quality-of-life instrument. The simultaneous assessment of clinical symptoms, laryngoscopic findings and V-RQOL provided a multidimensional evaluation of treatment response. Reporting effect estimates with 95% confidence intervals in addition to P values also permits assessment of the magnitude and precision of change.

Several limitations should nevertheless be recognised. First, this was a single-centre observational study without an untreated control group; therefore, improvement cannot be attributed exclusively to medical treatment, and regression to the mean or natural variation in symptoms cannot be completely excluded. Second, the sample size of 90 patients limits the precision of subgroup analyses, particularly those involving less common aetiological categories. Third, chronic laryngitis is heterogeneous, and the attribution of a predominant clinical contributor may be influenced by diagnostic uncertainty. Fourth, the follow-up period of 8 weeks was sufficient to identify short-term improvement but did not evaluate recurrence or long-term maintenance of voice-related quality of life. Fifth, objective acoustic and aerodynamic voice measurements were not incorporated as primary outcomes. Future prospective controlled studies should combine validated patient-reported measures with videostroboscopic, perceptual and acoustic assessment and should include longer follow-up to determine the durability of treatment response.

CONCLUSION

The present study demonstrates that 8 weeks of cause-directed medical treatment significantly improves voice-related quality of life in patients with chronic laryngitis. A marked increase was observed in the total V-RQOL score, with significant improvement in both the physical-functioning and social-emotional domains. These improvements were accompanied by substantial reductions in hoarseness, vocal fatigue, throat clearing, throat discomfort, chronic cough, and inflammatory laryngoscopic findings.

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