



## A Comparison of Quality of Life in Adults With Voice Disorders Before and After Voice Therapy

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**Background:** Previous studies have documented the effectiveness of voice therapy in terms of voice quality outcomes rather than quality of life outcomes.

**Objective:** To compare the quality of life among patients with voice disorders, before and after voice therapy.

**Methods:** Thirty-six patients with voice disorders who visited the Speech Clinic at Ramathibodi Hospital from March 2013 to January 2015 were enrolled. Thirty minutes per session within 10 weeks period of voice therapy program were used. The voice therapy approaches included direct and indirect therapy. The outcomes of this study were measured using Dr. Speech software version 5 for acoustic analysis and the Voice Handicap Index in Thai version for quality of life. Data was analyzed by descriptive and inferential statistics (Paired *t* test).

**Results:** The total participants were 36 patients with a mean age of 51.31 years. They were divided to 4 groups according to the causes of voice disorders that were 18 patients for structural cause, 8 patients for functional cause, 6 patients for neurological cause, and 4 patients for inflammatory cause. The results for both voice quality and quality of life after voice therapy improved and showed statistically significant differences ( $P < .05$ ). The patients with all causes of voice disorders were statistically significant differences in total the Voice Handicap Index scores ( $P < .05$ ). Moreover the structural causes group exhibited statistically significant differences in all subscales ( $P < .05$ ) but the others causes groups were not statistically significant differences in emotional subscale for functional causes, physical subscale for neurological causes, and functional subscale for inflammatory cause ( $P > .05$ )

**Conclusions:** Voice therapy might be an effective treatment to decrease the severity of voice disorders in role of voice quality and quality of life, especially voice disorders from structural causes.

**Keywords:** Voice disorders, Voice therapy, Quality of life

**Rama Med J:** doi:10.33165/rmj.2019.42.2.102568

**Received:** February 7, 2018 **Revised:** May 8, 2019 **Accepted:** May 27, 2019

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## Introduction

Voice disorders comprise the speech sounds (quality, pitch, or loudness) that differ significantly from those of other people in the same age range, gender, cultural background, and geographical location.<sup>1-3</sup> Speech sounds are appropriately adjusted for the variation of intonation and emotion of the speakers through the modification of anatomy and the physiology of the vocal folds. Alteration of speech sounds can affect the meaning and grammatical use of oral sentences.<sup>4-5</sup>

When the researcher explored the number of patients who visited the Speech Clinic at Ramathibodi Hospital between 2011 - 2015, it was found that voice disorders were one of the top-five ranking problems reported.<sup>6</sup> For new patients between 2011 and 2012, it was found that 25.8% of them presented with voice disorders. Abnormalities causing voice disorders consist of structural, functional, neurological, and inflammatory origins. The most common age range was between 56 - 60 years.<sup>7</sup> The symptoms of voice disorders included hoarseness, vocal fatigue, breathy voice, reduced phonation range, aphonia, pitch break or inappropriately high pitch, strain, tremor, and pain. These symptoms frequently occur in combination.<sup>8</sup>

Voice therapy is the one of the treatments provided by speech-language pathologists (SLP) for patients with voice disorders.<sup>2</sup> Therapy is divided into 2 methods consisting of indirect and direct therapy. Indirect voice therapy involves indirect treatment of the laryngeal mechanism, which supports and maintains the factors affecting voice problems such as eliminating vocal abuse or misuse. On the contrary, direct voice therapy concerns the direct treatment of the laryngeal mechanism by modification of incorrect voice production, which may include respiration, phonation, resonance, and articulation issues.<sup>9</sup> There are several voice therapy approaches employed such as breathing exercises, establishing new pitch, vocal function exercises, yawn-sigh technique, chewing method, chant talk, soft glottal attack, muscle relaxation, pushing approach, and half-swallow boom.<sup>5, 9-12</sup>

In general, people who have voice disorders might diminish their communication ability if lacking voice therapy, which may affect occupation, income, and especially a drop in quality of life.<sup>13</sup> In addition, many studies have focused on the effectiveness of voice therapy in terms of voice quality outcomes rather than quality of life outcomes, in contrast to the World Health Organization (WHO), which is concerned with patients' quality of life. Many reliability and validity questionnaires have measured the effectiveness of various therapy approaches such as behavioral, medical, and surgical treatment of voice disorders.

The dominant assessment tool in clinical practice that was developed from the description of patient's voice and the effect on their lives is the Voice Handicap Index (VHI).<sup>14</sup> The reason for developing this questionnaire because the patient with voice disorders had the same severity of voice disorders but might have different levels of handicap on daily life living. The contents of VHI can show a patient's voice disabilities in terms of 3 subscales: the functional subscale describes the impact of a patient's voice disorders on their daily activities; the physical subscale describes a patient's self-perceptions of laryngeal discomfort, including voice output characteristics; and the emotional subscale describes a patient's affective responses to voice disorders.

Although the VHI has typically been used for the measurement of the effectiveness of voice therapy in several previous studies.<sup>15-19</sup> The results of all studies revealed that patients' voice disabilities were decreased but did not show each subscale and they did not group the causes of voice disorders.

The aim of this study was to compare the quality of life among patients with voice disorders, before and after voice therapy, using the Voice Handicap Index in Thai version (VHI-TH).

## Methods

### Study Design and Sampling

This research was conducted as a quasi-experimental design to compare quality of life among patients with



voice disorders, before and after voice therapy. This study was approved by the Ethics Committee of the Faculty of Medicine, Ramathibodi Hospital, Mahidol University, No. MURA2016/386 on July 1, 2016.

A total of 36 patients with voice disorders who visited the Speech Clinic at Ramathibodi Hospital from March 2013 to January 2015 participated. All subjects were at least 18 years of age and had abnormal voice quality, normal hearing level, and normal structure of the oral cavity as diagnosed by an Ear Nose and Throat (ENT) doctor.

No patient had ever been treated with voice therapy before entering the project and could attend at least 80% of all voice therapy sessions. They were treated with only voice therapy or voice therapy with medication as prescribed by the ENT doctor.

### Procedures

The speech-language pathologist interviewed patients about their demographic data and medical history (general data, history of disorders, behavioral voice used, and other health conditions based on Thai Speech-Language and Hearing Association protocol<sup>20</sup>).

They were evaluated for voice quality and quality of life in a stage of baseline and completing voice therapy program. They received the VHI-TH assessment and evaluated for voice quality again after completing the voice therapy program.

### Objective Voice Evaluation

Patients' voices were assessed using Dr. Speech software version 5 (Tiger DRS Inc, Shanghai, China) with comfortable levels of loudness and pitch via a microphone. The distance between the patient's mouth and the microphone was 5 - 10 cm.

Patients prolonged the vowel /a:/ for as long as possible, but not for less than 3 seconds. Acoustic voice measurements in terms of harshness, breathiness, and hoarse voice were analyzed.<sup>21</sup> The results from acoustic analysis were showed as follows: normal voice, mild, moderate, and severe voice disorders.

### Quality of Life Evaluation

The original VHI was allowed to be translated into Thai, VHI-TH, which had a significant high internal consistency and test-retest reliability (Cronbach's  $\alpha = 0.96$ ,  $r = 0.843$ , respectively). It was used to measure patients' quality of life.<sup>22</sup> This questionnaire quoted that many people had used to describe their voices and the effects of their voices on their lives. The patients checked the response that indicated how frequently they had voice issues by themselves. The questionnaire comprised 30 items along with 3 subscales (10 items each) including functional (F-VHI-TH), physical (P-VHI-TH), and emotional (E-VHI-TH). Items were answered/addressed on a 5-point scale as follows: 0 = never; 1 = almost never; 2 = sometimes; 3 = almost always; and 4 = always. The total score was 120 points. The translation of the total score was the same as the original VHI. A higher score indicated greater severity in terms of impact on quality of life.

### Voice Therapy Program

The voice therapy approaches were used in this study including hygienic (ie, eliminate of poor vocal behavior), symptomatic (ie, chant talk, yawn-sigh technique, chewing method, elimination of hard glottal attack, half-swallow boom, pushing approach, relaxation) and physiologic approaches (ie, vocal functional exercise). The time period for the voice therapy program was 10 weeks using 30 minutes/session/week. The speech-language pathologist treated the patients with appropriate voice therapy treatment according to the symptoms of their voice disorders.

### Statistical Analysis

The statistics for analyzing data were computed by statistical package IBM SPSS Statistics version 22 (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp; 2013). The characteristics of the data were described using descriptive statistics. Comparisons of voice quality before and after voice therapy used McNemar test and the quality of life used the paired *t* test. The significance level is .05.

## Results

### Characteristics of Participants

Among the 36 participants were 11 males (30.56%) and 25 females (69.44%) with a mean age of  $51.31 \pm 13.23$  years (range, 18 - 76 years). Twenty-two patients (61.11%) were occupational voice users (teacher, telephone operator, actor, etc). The etiologies of voice disorder were divided according to the causes of voice disorders that were structural (vocal nodules, vocal polyp, vocal cyst), functional (vocal abuse, muscle tension dysphonia), neurological (vocal fold paralysis, vocal fold paresis, spasmodic dysphonia), and inflammatory (laryngopharyngeal reflux). Eighteen patients (50%) were affected from structural causes. Onset of voice disorders presented that 52.78% had disorders for longer than 1 year (range, 2 - 20 years) (Table 1).

The relationships between etiologies and duration, occupation and duration, and etiologies and occupation were not statistically significant.

**Table 1. Characteristics of Participants (N = 36)**

Characteristic	No. (%)
Gender	
Male	11 (30.56)
Female	25 (69.44)
Occupation voice disorders	
Nonoccupational voice users	14 (38.89)
Occupational voice users	22 (61.11)
Etiologies of voice disorders	
Structural causes	18 (50.00)
Functional causes	8 (22.22)
Neurological causes	6 (16.67)
Inflammatory causes	4 (11.11)
Duration of voice disorders, y	
≤ 1	17 (47.22)
> 1	19 (52.78)

### Objective Voice Quality Measurement

Before voice therapy program participation, all participants were divided into 2 groups according to severity of voice disorders. The first group had 11 participants (30.56%) with normal to mild voice disorders. The second group had 15 participants (69.44%) with moderate to severe voice disorders.

After voice therapy program, 26 patients (72.22%) had normal to mild voices disorders and 10 patients (27.78%) had moderate to severe voice disorders. The result showed improvement to normal and mild levels. The comparisons of voice quality, before and after voice therapy, showed statistically significant differences ( $P < .05$ ) (Table 2).

### Quality of Life Measurement

The mean of total VHI-TH (T-VHI-TH) score before voice therapy program was  $43.61 \pm 20.76$  with scores ranging from 12 to 89. Patients with neurological causes had T-VHI-TH scores higher than those with other causes ( $50.83 \pm 30.69$ ). After the voice therapy program, the mean of T-VHI-TH score was  $20.33 \pm 16.16$  with scores ranging from 0 to 65. Patients with structural causes had lower T-VHI-TH scores than other causes ( $18.55 \pm 16.02$ ).

The mean data of T-VHI-TH, F-VHI-TH, P-VHI-TH, and E-VHI-TH scores were tested for normal distribution using the Shapiro-Wilk W test. The results showed non-normal distribution in that T-VHI-TH, F-VHI-TH, and E-VHI-TH scores in all patients, T-VHI-TH, F-VHI-TH, and E-VHI-TH scores in structural causes, and T-VHI-TH, and E-VHI-TH scores in functional causes. All these data were transform to parametric before used paired *t* test. The results revealed that mean T-VHI-TH, F-VHI-TH, P-VHI-TH, and E-VHI-TH scores, before and after voice therapy, showed statistically significant differences ( $P < .01$ ) (Table 3).

Focusing on each cause and score for each subscale, the researcher found that patients had no significant differences in VHI-TH scores, including E-VHI-TH score for functional causes, P-VHI-TH scores for neurological causes, and F-VHI-TH scores for inflammatory causes.

**Table 2. Objective Voice Quality Measurement Before and After Voice Therapy Program**

Severity of Voice Disorder		No. (%)		Total	P Value*
		After Voice Therapy			
		Normal to Mild	Moderate to Severe		
Before voice therapy	Normal to Mild	11 (30.56)	0 (0)	11 (30.56)	< .01
	Moderate to Severe	15 (41.66)	10 (27.78)	25 (69.44)	
	Total	26 (72.22)	10 (27.78)	36 (100.00)	

\* P < .05 indicates statistical significance.

**Table 3. Quality of Life Measurement Before and After Voice Therapy Program**

Patient	VHI-TH Score	Mean ± SD		Paired T Test		
		Voice Therapy		t	df	P Value*
		Before	After			
All	T-VHI-TH	43.61 ± 20.76	20.33 ± 16.16	8.25	35	< .01
	F-VHI-TH	13.72 ± 7.42	6.19 ± 5.33	6.89	35	< .01
	P-VHI-TH	19.50 ± 7.24	9.36 ± 6.17	6.90	35	< .01
	E-VHI-TH	10.50 ± 8.86	4.75 ± 5.85	5.09	22	< .01
Structural causes	T-VHI-TH	45.05 ± 19.91	18.55 ± 16.02	5.95	17	< .01
	F-VHI-TH	14.22 ± 7.18	5.50 ± 5.31	5.03	17	< .01
	P-VHI-TH	20.83 ± 7.70	8.83 ± 5.85	4.99	17	< .01
	E-VHI-TH	10.22 ± 8.13	4.22 ± 5.75	4.11	10	< .01
Functional causes	T-VHI-TH	36.12 ± 16.51	20.37 ± 10.52	3.85	7	< .01
	F-VHI-TH	13.12 ± 7.18	6.37 ± 4.20	3.13	7	.01
	P-VHI-TH	16.25 ± 6.25	9.62 ± 4.24	4.77	7	< .01
	E-VHI-TH	6.75 ± 4.74	4.37 ± 3.46	-1.65	6	.14
Neurological causes	T-VHI-TH	50.83 ± 30.69	25.66 ± 24.63	3.02	5	.02
	F-VHI-TH	15.83 ± 9.23	8.16 ± 7.35	3.58	5	.01
	P-VHI-TH	19.50 ± 8.82	10.16 ± 9.82	2.28	5	.07
	E-VHI-TH	15.50 ± 14.13	7.16 ± 9.36	2.60	5	.04
Inflammatory causes	T-VHI-TH	41.25 ± 17.44	20.25 ± 15.64	4.75	3	.01
	F-VHI-TH	9.50 ± 7.32	6.00 ± 5.47	2.25	3	.11
	P-VHI-TH	20.00 ± 3.82	10.00 ± 6.68	4.89	3	.01
	E-VHI-TH	11.75 ± 8.18	4.25 ± 4.92	3.96	3	.02

Abbreviations: *df*, degree of freedom; E-VHI-TH, emotional voice handicap index in Thai version; F-VHI-TH, functional voice handicap index in Thai version; P-VHI-TH, physical voice handicap index in Thai version; SD, standard deviation; *t*, *t* test; T-VHI-TH, total voice handicap index in Thai version.

\* P < .05 indicates statistical significance.



## Discussion

The summarize finding that a comparison of severity of voice disorders and quality of life before voice therapy had more severe than after voice therapy. After voice therapy the patients with voice disorders had significantly decreased their severity of voice disorders in role of voice quality and quality of life. The results of voice qualities were similar to several previous studies,<sup>5,9,23-26</sup> in that the severity of voice disorders was decreased because all participants received direct treatment at the larynx. Moreover, patients could modify incorrect voice production through their respiration, phonation, resonance, and articulation systems.<sup>9</sup> When the researcher focused on the quality of life the patients decreased their handicap from voice disorders. The results of quality of life were similar to those previously reported<sup>15, 17, 18</sup> because participants received voice therapy that influenced to decrease the severity of their voice disorders. Thus, they were able to decrease their handicap in daily living.

In addition the present study considered the quality of life more specific than the previous study in the term of quality of life in each causes of voice disorders. The results found that patients with voice disorders from structural causes significantly improved their quality of life compared to other causes because they significantly improved quality of life all subscale especially physical subscale. Patients who had voice disorders from

structural causes might have felt uncomfortable with their vocal folds lesions, which is associated with the mean P-VHI-TH score.<sup>22</sup> Voice therapy was the direct treatment used on the larynx, leading to a direct effect on changing the physical vocal folds. When the physical vocal folds were improved or able to be nearly normalized, patients felt more comfortable then they followed by rating the P-VHI-TH subscale with a lower score.

However the patients with others causes of voice disorders did not significantly improve quality of life all subscale such as functional causes in emotional subscale, neurological causes in physical subscale, and inflammation causes in functional subscale because the VHI-TH was a subjective test with potentially diverse results. Finally the VHI-TH score should decrease below the threshold score of 13 after the voice therapy program.<sup>22</sup>

## Conclusions

Voice therapy comprised the treatment that not only improved voice quality, but also improved quality of life. The VHI-TH score should be less than 13, with the starting point for normal range revealing the improvement of quality of life for voice disorders. Therefore, speech-language pathologists should be concerned with and assess quality of life after completing voice therapy protocol to confirm that patients reach their goal for the therapy program.

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## การศึกษาเปรียบเทียบคุณภาพชีวิตในผู้ใหญ่เสียงผิดปกติ ก่อนและหลังได้รับการฝึกพูด

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**บทนำ:** จากรายงานการศึกษาก่อนหน้านี้จำนวนมากระบุถึงประสิทธิผลของการฝึกพูดโดยวัดผลจากคุณภาพเสียงมากกว่าการวัดผลจากคุณภาพชีวิต

**วัตถุประสงค์:** เพื่อศึกษาเปรียบเทียบคุณภาพชีวิตในผู้ใหญ่เสียงผิดปกติ ก่อนและหลังได้รับการฝึกพูด

**วิธีการศึกษา:** กลุ่มตัวอย่างผู้ป่วยผู้ใหญ่เสียงผิดปกติ จำนวน 36 คน ที่เข้ารับการฝึกพูด ณ คลินิกฝึกพูด โรงพยาบาลรามาธิบดี ช่วงเดือนมีนาคม พ.ศ. 2556 ถึงเดือนมกราคม พ.ศ. 2558 ผู้ป่วยได้รับการฝึกพูดสัปดาห์ละครั้ง ครั้งละ 30 นาที รวมทั้งสิ้น 10 สัปดาห์ เทคนิคที่ใช้ในการฝึกพูดมีทั้งเทคนิคทางตรงและทางอ้อม จากนั้นวัดผลการฝึกพูดด้วยโปรแกรม Dr. Speech รุ่นที่ 5 เพื่อวิเคราะห์คุณภาพเสียงและแบบประเมินภาวะเสียงผิดปกติฉบับภาษาไทย เพื่อประเมินคุณภาพชีวิตการวิเคราะห์ข้อมูลใช้สถิติเชิงพรรณนาและสถิติเชิงอนุมาน (Paired *t* test)

**ผลการศึกษา:** ผู้ป่วยจำนวนทั้งสิ้น 36 คน อายุเฉลี่ยเท่ากับ 51.31 ปี แบ่งเป็น 4 กลุ่มตามสาเหตุการเกิดเสียงผิดปกติ ได้แก่ สาเหตุจากโครงสร้างของเส้นเสียง จำนวน 18 คน สาเหตุจากการทำงานของเส้นเสียง จำนวน 8 คน สาเหตุจากระบบประสาท จำนวน 6 คน และสาเหตุจากการบวมอักเสบ จำนวน 4 คน โดยภายหลังการฝึกพูดพบว่า ผู้ป่วยมีคุณภาพเสียงและคุณภาพชีวิตดีขึ้น และมีความแตกต่างกันก่อนและหลังการฝึกพูดอย่างมีนัยสำคัญ ( $P < .05$ ) ผู้ป่วยทุกกลุ่มมีค่าเฉลี่ยคะแนนรวมของแบบประเมินภาวะเสียงผิดปกติฉบับภาษาไทยแตกต่างกันก่อนและหลังการฝึกพูดอย่างมีนัยสำคัญ ( $P < .05$ ) โดยกลุ่มผู้ป่วยที่มีสาเหตุจากโครงสร้างของเส้นเสียงมีคุณภาพชีวิตแตกต่างกันก่อนและหลังการฝึกพูดอย่างมีนัยสำคัญในทุกหัวข้อของแบบประเมิน ( $P < .05$ ) อย่างไรก็ตาม ผู้ป่วยที่มีเสียงผิดปกติจากสาเหตุอื่นๆ ไม่พบความแตกต่างของคุณภาพชีวิตก่อนและหลังการฝึกพูด ในบางหัวข้อของแบบประเมิน ได้แก่ หัวข้อทางอารมณ์ในกลุ่มผู้ป่วยที่มีสาเหตุจากการทำงานของเส้นเสียง หัวข้อทางกายภาพเส้นเสียงในกลุ่มผู้ป่วยที่มีสาเหตุจากระบบประสาท และหัวข้อการทำงานของเส้นเสียงในกลุ่มผู้ป่วยที่มีสาเหตุจากการบวมอักเสบ ( $P > .05$ )

**สรุป:** การฝึกพูดอาจมีประสิทธิผลในการรักษาผู้ป่วยเสียงผิดปกติให้มีระดับความรุนแรงลดลงทั้งด้านคุณภาพเสียงและคุณภาพชีวิต ซึ่งการฝึกพูดสามารถรักษาเสียงผิดปกติได้ โดยเฉพาะอย่างยิ่งในผู้ป่วยเสียงผิดปกติที่มีสาเหตุจากโครงสร้างของเส้นเสียง

**คำสำคัญ:** เสียงผิดปกติ การฝึกพูด คุณภาพชีวิต

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