ADAPTATION AND VALIDATION OF VOICE DISORDER OUTCOME PROFILE (V-DOP) IN MALAYALAM LANGUAGE

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Manasagangothri, Mysuru-570006

August 2022

CERTIFICATE

This is to certify that this dissertation entitled **"Adaptation and Validation of Voice Disorder Outcome Profile (V-DOP) in Malayalam Language"** is a bonafide work submitted in part fulfillment for the degree of Masters in Science (Speech-Language Pathology) of the student with Registration Number 20SLP040. This has been carried out under the guidance of the faculty of this institute and has not been submitted earlier to any other University for an award of any other Diploma or Degree.

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Guide

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DECLARATION

This is to certify that this dissertation entitled **"Adaptation and Validation of Voice Disorder Outcome Profile (V-DOP) in Malayalam Language"** is the result of my own study under the guidance of Dr. T. Jayakumar, Associate Professor in Speech-Language and Head of department, Department of Speech-Language Sciences, All India Institute of Speech and Hearing, Mysuru and has not been submitted earlier to any other University for an award of any other Diploma or Degree.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Voice is considered as a multidimensional feature and it can be used to speculate the physical and emotional health of speaker as well as the personality and identity of the individual. A voice problem develops when the speaker's vocational, social, and vocal demands are not met by the anatomy and/or function of the laryngeal mechanism (Stemple et al., 2000; Aronson & Bless, 2009) . Voice disorder or dysphonia is variation from the voice in terms of "quality, pitch, loudness, or flexibility in voice among age and gender matched groups" (Dejonckere et al., 2001; Aronson & Bless, 2009). They can be physiological, functional, or a combination of both (Boone et al., 2005). Dysphonia can be caused by changes in the “laryngeal, respiratory or vocal tract mechanism” (structural dysphonia), by inefficient or incorrect use of the vocal folds, or by psychological stresses (Verdolini & Ramig, 2001; Speyer, 2008; Colton et al., 2011). Different vocal modalities, such as “speaking voice, singing voice, and shouting voice”, might exhibit voice difficulties (Hacki, 1996). Nowadays there is an increase in recognition of dysphonia, its effect on individual’s quality of life and on work related aspects (Cohen et al., 2012). Voice assessment is comprehensive and it includes laryngeal evaluation, subjective evaluation, acoustic evaluation, and self-evaluation. The self-evaluation gives an idea about the patient in terms of the frequency of symptoms and the effect of voice issues on their life, which are all part of voice assessment (Behlau et al., 2007; Aaby & Heimdal, 2013; Stemple et al., 2018) .

Although the instruments can precisely quantify voice disorders, there is a rising emphasis on using subjective characteristics in voice evaluation (Roy et al., 2013) to emphasize the effect of vocal issues on an individual's life. The objective evaluation of voice, which includes imaging techniques and acoustic parameters, may not be able to depict people's everyday experiences or functional participation in activities (Mahato et al., 2018; Bottalico et al., 2020) . Indeed, the majority of people who seek specialized help to learn more about this disorder have recognized their symptoms as an issue that affects their physical, social, emotional, and/or professional lives (Verdolini & Ramig, 2001) .

Health has been defined by World Health Organization (WHO) as a "state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (Organization, 1997). The concept was recently been enlarged to incorporate quality of life aspects (Lohr, 2002). Quality of life (QOL) is a comprehensive notion that takes into account the patient's perception of their physical, mental, and social condition. The WHO defined QOL as "the individual's perception about his/her position in life, in the context of culture and system of values in which he/she lives and in relation to his/her objectives, expectations, standards and worries" (The WHOQOL Group, 1995) ("The World Health Organization Quality of Life Assessment (WHOQOL): Position Paper from the World Health Organization," 1995).

After a health-related condition like voice disorder, quality of life can be measured as one of the methods to evaluate the overall result of a patient's physical, psychological, and social status (Lee et al., 2010). To assess quality of life, questionnaires are used which are the most common tool. They also help to quantify the self-perception

of an individual regarding their social, professional, and financial consequences (Organization, 1997). The self-reported symptom-specific scale can provide useful information on not just linked quality-of-life difficulties, but also functional capacities, as well as social and emotional domains (Hanschmann et al., 2011).

Various self-evaluation tools have been developed for voice patients, where they would be able to rate the extent of their voice issues and is used to contribute as an outcome measure after treatment. These questionnaires like "Voice Handicap Index" (VHI) (Jacobson et al., 1997; Verdonck-de Leeuw et al., 2008), "Voice-Related Quality of Life" (V-RQOL) (Hogikyan & Sethuraman, 1999; Behlau et al., 2007; Gasparini & Behlau, 2009), "Voice Activity and Participation Profile (VAPP)" (Ma & Yiu, 2001), "Reflux Symptom Index" (RSI) (Belafsky et al., 2002), "Voice Symptom Severity Index" (VoiSS) (Deary et al., 2003), "Vocal Tract Discomfort Scale" (VTDS) (Mathieson et al., 2009) and "Voice Outcome Survey" (Richard et al., 1999) concentrate on the nature and severity of voice problems, and their effect on quality of life.

Need for the study

There are numerous tools for evaluating quality of life in Western cultures. "Voice Disorder Outcome Profile" (V-DOP) which is adapted in India is a culturally sensitive tool. It was developed in English and Kannada language by Konnai et al., 2010. This tool has been adapted to other South Indian languages such as in Tamil (Mahalingam et al., 2014) and in Telugu by Saraswathi in 2017. It was also used on school teachers (Alva, 2017) and singers (Arunachalam et al., 2014) in Indian population. India has various languages and dialects. Malayalam language which is spoken in the state of Kerala is one of the Indo- Dravidian language and it is spoken by about 2.88% of

Indians and about 34 million people worldwide (indianexpress.com). Hence, there is a need to evaluate the effect of voice difficulties on the quality of life in the widely Malayalam speaking population. Voice disorder outcome profile (V-DOP) is not available in Malayalam. Hence, this present study planned to adapt and validate the questionnaire in Malayalam.

Aim

The present study aims to adapt and validate the Voice Disorder Outcome Profile (V-DOP) in Malayalam.

Objectives of the study

- To adapt the English version of the Voice Disorder Outcome Profile (V-DOP) into Malayalam language.
- To validate the Voice Disorder Outcome Profile (V-DOP) in Malayalam language using individuals with Phono normal and voice disorders.

CHAPTER II

REVIEW OF LITERATURE

Assessing how dysphonic individual see the effects of voice abnormalities might provide important details about their social well-being (Ma & Yiu, 2001). It has been a significant therapeutic outcome indicator (Benninger et al., 1998; Murry & Rosen, 2000; Fung et al., 2001). There are several tools which are available for assessing vocal quality of life. Voice Handicap Index (VHI) (Jacobson et al., 1997), Voice-Related Quality of Life Measure (V-RQOL) (Hogikyan & Sethuraman, 1999), Voice Performance Questionnaire (VPP) (Carding et al., 1999), Voice Symptom Scale (Deary et al., 2003), and Voice Activity and Participation Profile (VAPP) (Ma & Yiu, 2001) are a few of these.

Voice Handicap Index

Jacobson et al., 1997 developed a tool named Voice Handicapped Index (VHI), with the purpose of developing a psychometrically handicapped survey that could be used to people with voice issues. It consists of 30-items that assesses overall voice difficulties. In the methodology, the authors' investigated it in three steps. They developed a scale in the first step, conducted test-retest measurement in the second step, and then checked the correlation between the VHI scores and the severity of the voice issue in the third step. They included 65 adult patients from voice clinic with mean age of 52.3 years. The patients who were diagnosed by an otolaryngologist and Speech Language Pathologist as having various voice disorders participated in the study. Initially, authors developed 85 items for the VHI, which was designed in accordance with patient case history interviews. These items were divided into 3 domains: functional (25 items), emotional

(31 items), and physical (29 items) aspects of voice disorders. These items would be rated on a 5-point rating scale with "0" indicating "never" and "4" indicating "always". The initial version of VHI which consisted of 85-items were reduced to 30-items in the final version. The functional, emotional, and physical subscales had ten items each in the final version. The total score of VHI range from 0 to 120, with 120 being the most severe. The authors found that the internal consistency, reliability and test-retest stability was found to be good for the VHI items. The implications of the study are to influence patients' behaviour motivation by educating them about the benefits of therapy, helping them realize how voice issues affect their daily living and functioning. It can be used to assess the efficacy of different voice disorder managements.

Voice Outcome Survey

Richard et al., 1999 developed Voice Outcome Survey (VOS) in individuals with paralysis of unilateral vocal fold. It is a short tool which consisted of five items and was used as a valid tool for outcome measure. 56 subjects without unilateral vocal card paralysis (UVCP) and 61 subjects with UVCP undergone the VOS process. The VOS gives a patient-based evaluation of quality of life. For the ease of interpretation, the scores obtained on VOS was converted to a scale from 0 (worst) to 100 (best). High values reflect a better quality of life, whereas low values describe a relatively poor quality of life.

Voice-Related Quality of Life measure

Hogikyan & Sethuraman, 1999 developed Voice Related Quality of Life (V-RQOL) instrument. This study was conducted on a group of 109 dysphonic individuals and 22 phono-normal individuals. The tool consisted of 10 items which were

categorized under two domains: physical functioning (6 questions) and social-emotional (4 questions). The increment in the mean value for about 15-20-point separates different stages, which was based on the extent of voice quality improvement by the individual after the treatment. The authors reported that V-RQOL was reliable, valid, and responsive. Thus, V-RQOL is considered as an additional tool to evaluate dysphonic patients and their treatment outcomes.

Voice Activity and Participation Profile

Ma & Yiu, 2001 developed a Voice Activity and Participation Profile (VAPP). It is a self-report tool which consist of 28-items. It was designed to know the perception of voice problem, limitation in activity and restriction in participation, based on the International Classification of Impairments, Disabilities and Handicaps-2 Beta-1 concept (WHO, 1997). The VAPP tries to assess areas where the voice problem has an effect on job, day to day communication, communication in social situations, and effect on emotional aspects. The VAPP uses a visual analog scale where the patients assign a number to the question in proportion to the magnitude of the rating scale. The questionnaire was administered on dysphonic group and control group with 40 participants each. The authors reported that dysphonic group had more issues than the control group. Also, the dysphonic group reported that their participation in everyday activities has been limited and restricted. The study also revealed a strong correlation between the dysphonic individual's perceptions of a voice issue and their perceptions of participation restrictions and voice activity limitations. However, there was poor correlation between the self-reported voice issue and the speech pathologist's acoustical and perceptual measurements of the degree of voice quality impairment. The results also

revealed a significant correlation between the overall scores for activity limitation and participation restriction.

Voice Handicap Index-10

Rosen et al., 2004 conducted a study on Development and Validation of the Voice Handicap Index-10 (VHI-10). The aim was to develop a shortened version of Voice Handicap Index (VHI) and compare it with the original one. They designed the study to validate the abbreviated VHI as well as item analysis of the VHI in individuals with voice disorder and normal individuals. In order to rank the clinical importance of each VHI item, the authors also conducted a clinical consensus review of the VHI items (30 items in all). They used the VHI responses from 159 control participants and 100 patients with voice issues to conduct item analysis. The results of item analysis and clinical consensus resulted in 10 items which were more robust, which led to the development of VHI-10. A statistical study was conducted with 819 individuals spanning a diverse variety of voice problems to compare the validity of VHI-10 with the original 30 item-VHI. Authors reported that VHI-30 and VHI-10 scores from the study group did not exhibit any statistically significant differences. Analysis of the ratios of the short version to original version of VHI scores for disorder group revealed that the value was greater than the expected value (33 %). This suggested that VHI-10 may be a more robust instrument than the VHI-30. The authors concluded that the VHI-10 is a powerful representation of the original VHI-30 and takes only less time for the patient to complete. Thus, the VHI-10 can replace the original VHI-30 as an instrument to quantify.

Singing Voice Handicap Index

Cohen et al., 2007 developed the Singing Voice Handicap Index (SVHI) to assess the physical, emotional, social, and economic impact of voice issues on singers who reports higher voice problems than non-singers (Rosen & Murry, 2000). They considered 112 dysphonic and 129 normal singers in the age range of 16 to 67 years. Professional and nonprofessional singers, of all type of singing styles participated in this study. It is a 36-item survey and a 5-point rating scale which ranges from "never" (score of 0) to "always" (score of 4). The total score is 144 and can be administered for all styles of singing. Cohen et al. observed that the test-retest reliability and internal consistency was good on SVHI. Also, singers who have voice problems had scored lower on SVHI when compared with normal vocalists. It was reported that the response of the SVHI treatment showed good correlation with the VHI which was administered concurrently. Later Cohen et al (2009) modified it as Singing Voice Handicap Index-1 (SHI-10) with 10 items, each with a single score and total score was 40 (Cohen et al., 2009).

In India, Konnai et al., 2010 developed Voice Disorder Outcome Profile (VDOP) in English and Kannada version. The aim was to develop a culture specific tool in India, which can assess the Quality of Life in voice disordered individuals. The authors of the study have taken 4 sets of participants. Set 1 consisted of ten Speech-Language Pathologists (SLPs), ten master's level SLP students, and 5 dysphonia patients. Set 2: included ten SLPs and five master's students, who had not taken part in set one. Set 3: The authors included 30 individuals in the control group (normal voice individuals) and 42 individuals with current Dysphonia. Individuals in both groups varied in age from 18 to 60 years. The subjects with Dysphonia were diagnosed with different voice disorders.

Set 4: They also considered 1 linguist and 5 normal adult speakers who were fluent in both English and Kannada languages. These individuals assisted to translate and verify the Kannada translation of the English version of Voice-DOP. V-DOP was developed first in English and then it was translated into Kannada by the author. V-DOP of Kannada includes 32 questions under three domains: physical, functional and emotional. Then, the Voice-DOP was administered on group with dysphonia individuals and control group. The reliability and validity of the questionnaire was assessed.

The results obtained in the study showed high test-retest reliability (r = 0.96-0.99) and higher internal consistency (Cronbach's alpha values from 0.49 to 0.84). Voice-DOP distinguished the clinical group from the normal group, and correlation was obtained between the domains and the total Voice-DOP score which ranged from 0.49 to 0.87, showing that the construct validity was adequate. A significant correlation (r = 0.51) between the Voice DOP scores and the severity scores of Dysphonic individuals was revealed using concurrent validity. Gender did not have an effect on total score on V-DOP in perception of their voice problems. The authors concluded that Voice-DOP was a reliable and valid measurement tool. One of the study's limitations was that the patients needed more explanation regarding the visual analogue scale, and many of them found it challenging to depict their responses on a visual analog scale. The second drawback was that due to inadequate word distinction, some of the questions in the emotional domain were interpreted as being repeated. The third limitation was that an option of “Not applicable” was not provided in Voice-DOP. The questions provided in the "job" section of functional domain were not applicable, if female subjects were home makers.

Later, Mahalingam et al., 2014 developed a Tamil version of the Voice Disorder Outcome Profile. This study aimed to translate and validate the original version of the Voice Disorder Outcome Profile (V-DOP) into Tamil. 75 Dysphonia subjects were involved in the clinical group and 20 individuals with no voice-related problems were involved in the control group.

Participants who were diagnosed as having voice problems by an Otolaryngologist and Speech Language Pathologist were considered in the clinical group. This study was conducted in two phases where the original V-DOP was adapted and translated into Tamil language and then validated. Then the translated version was given to 5 individuals who were proficient in Tamil language and they verified the appropriateness and usage in the translated version. The V-DOP was finalized after taking into account the opinions and suggestions from Tamil language experts. Then the finalized Tamil questionnaire of V-DOP was administered on subjects of both groups for reliability and validity measures (Phase II). The results obtained for total V-DOP score was that control group had the mean of "0" and individuals with dysphonia had mean of 104.2 (SD = 64.71). The Cronbach coefficient for V-DOP was obtained as 0.89. The physical domain had statistically significant correlation with the total scores followed by emotional and functional domains. The correlation between the domain and the overall scores was also found to be statistically significant. The authors concluded that the self-perception measure VDOP in Tamil was a reliable instrument for measuring the effect of voice disorders in the Tamil-speaking population.

Saraswathi in 2017 developed a Telugu version of Voice Disorder Outcome Profile. The purpose of this study was to adapt the V-DOP questionnaire in Telugu and

validate the same. 35 participants with voice disorders were included and all were diagnosed by an Otolaryngologist and a Speech Language Pathologist as having voice problems. 60 phono normal individuals were considered in control group. The age of participants in the two groups ranged from 18-60 years. This study was executed in two phases: first, the original V-DOP questionnaire was adapted and translated into Telugu language. Then the translated version was given to a Telugu professor who was proficient in Telugu language, and he verified the translated version for appropriateness, adequacy, accuracy, and ambiguity of words and sentences in each of the questions. The corrections suggested by the professor were incorporated and a pre-finalized Telugu version of V-DOP was made. The pre-finalized Telugu version of V-DOP was reverse translated into English by 2 Speech-Language Pathologists who had more than 3 years of experience and who know how to read, write and speak both English and Telugu languages. The reverse translated version, as well as the English version of the questionnaire, were compared and found that both the original and reverse translated version of V-DOP were much similar and 95% agreement was observed between the two. So, the pre-final Telugu V-DOP questionnaire was finalized. The finalized Telugu V-DOP questionnaire was administered on subjects of both groups for reliability and validity measures in the 2nd phase. The Cronbach's coefficient for the questionnaire ranged from 0.86 to 0.95 for individuals with voice disorder. This indicated that the voice problems had an impact on the quality of life in Telugu speaking population can be assessed using Telugu V-DOP and it is taken as a reliable measure. The mean total V-DOP score was 17 (SD=19) for the normals and 140 (SD=69) for the voice disorder individuals. The physical domain had higher scores compared to functional and emotional domains in both groups. The

result of test-retest reliability for Telugu V-DOP questionnaire was higher which indicated good reliability.

CHAPTER III

METHOD

3.1 Study design

The present study employed a survey research design.

3.2 Participants

Two groups of participants from state of Kerala were recruited. Group I consisted of 30 individuals with voice disorders and Group II consisted of 60 age and gender matched phono normal individuals. Both male and female participants were in the age range of 20-60 years. All the participants know to read, write and speak Malayalam language. Only those who fulfilled the inclusion criteria were selected for the present study. The inclusion criteria were as follows:

- For group I: Individuals with present voice disorders and were diagnosed by an Otolaryngologist and a Speech Pathologist from Hospital/ Organization.
- For Group II: Subjects without any history and/or complaint of any voice changes/problems and upper respiratory tract infection.

3.3 Procedure

The present study consisted of two phases: Phase- I is Adaptation of Voice Disorder Outcome Profile (V-DOP) from English to Malayalam. Phase II is Validation of Malayalam V-DOP questionnaire.

Phase-I: Adaptation of Voice Disorder Outcome Profile (V-DOP) in Malayalam.

The Voice Disorder Outcome Profile developed by Konnai et al. (2010) in English was taken for translation. The questionary was translated into the Malayalam language following the standard WHO guidelines for the translation and adaptation of instruments. The following steps were followed in this study:

1. Forward translation
2. Expert panel review
3. Back-translation

   Content Validation
4. Pre-testing and cognitive interviewing (Pilot study)
5. Final version

Step 1: Forward translation

Forward translation of the V-DOP into Malayalam was initially done by the experimenter who have Malayalam as their first language and English as their second language.

Following were the instructions for the experimenter and language experts:

- Questions should be formulated on a simple, clear, and concise manner.
- Avoid using complex phrases with several clauses.
- The target language should focus on common people and should avoid addressing professional people. They should take into account the target people for the instrument being translated as well as what the individuals would comprehend when they hear the question.

- Translators should take into account regarding the issues of gender and age applicability and avoid using terms and phrases that can be offensive to the target population.

Two language experts who has completed doctorate in Malayalam literature and was fluent in reading, writing, and speaking in both languages (Malayalam and English) were given the original English version of V-DOP questionnaire as well as the translated questionnaire by the experimenter. The language experts were requested to examine the suitability of translation, adequacy, accuracy, and ambiguity of words and sentences in each of the question in Malayalam questionnaire. The language experts suggested corrections after verifying the Malayalam V-DOP questionnaire and those suggestions were discussed with an expert committee.

Step 2: Expert panel review

A committee of three individuals who are bilingual in English and Malayalam were present. The members of the expert panel included the experimenter and two Speech-Language Pathologists. The Speech-Language Pathologists included in the expert panel were fluent in both Malayalam and English and had clinical experience for a minimum of 3 years with voice. The corrections suggested by the two language experts were discussed in the committee. Any inconsistencies between the forward translation and the original form of the questions, including improper translations of words or concepts, were found and resolved during this discussion. Then, the committee decides on the appropriate corrections/suggestions by the language experts and those corrections were incorporated and a pre-finalized Malayalam version of V-DOP was generated.

Step 3: Back Translation

Two Speech Language Pathologists (SLPs) with an experience of more than 3 years in evaluating and treating voice issue patients and who can read, write, and speak Malayalam and English participated. The pre-finalized Malayalam version of the V-DOP was given to Speech Language Pathologists individually and were asked to perform "reverse translation," or converting the translated Malayalam V-DOP back to English. The experimenter then compared Konnai et al.'s English version of the V-DOP (2010) questionnaire to both SLP's reverse translated English version of the V-DOP questionnaire and 90-95% agreement was found between the two. Discrepancies between the forward and backward translation were discussed with the members included in the expert committee and necessary modifications were done.

Content validation

The questionnaire was given to five experienced Speech Language Pathologists for content validation and were asked to evaluate the translated questionnaire. They were asked to rate the items on a four-point Likert scale (1-4) where each point had description in terms of ambiguity, cultural appropriateness, clarity and representativeness. They were also asked to provide suggestions regarding the questions. The description given for each parameter for each point for the content validation are depicted in table 3.1.

Table 3.1

Parameters Considered for Content Validation and Their Corresponding Ratings

Parameters	1	2	3	4
Ambiguity	Doubtful	Item needs some revision	No doubt but needs minor revision	Meaning is clear
Cultural Appropriateness	Inappropriate	Item needs some revision	Appropriate but needs some minor revision	Highly appropriate
Clarity	Not clear	Item needs some revision	Clear but needs minor revision	Very clear
Representativeness	Not a representative of the desired content	Item needs some revision	Representative but needs some revision	Highly, representative

The suggestions and corrections provided by the SLP's were discussed with the expert committee. The major suggestion was in the Malayalam heading of Voice-Disorder Outcome Profile where the rating was less and it would not be comprehensible by the common people. So instead of using Malayalam terms for the heading, the title was retained the same 'Voice Disorder Outcome Profile' by writing it in Malayalam. Also, the word 'throat clearing' was added in parenthesis along with the Malayalam word as it is not comprehensible and not used by most of the people. Also, few minor corrections in the words and sentence endings were discussed with the expert committee and the appropriate ones were incorporated and the final version of Malayalam V-DOP was prepared.

The language proficiency of all the members involved in the process of adaptation, translation and validation was assessed through Language Experience and Proficiency Questionnaire (LEAP-Q) (Ramya & Goswami, 2010) and they rated their proficiency as '4', i.e., 'native/perfect'.

Step 4: Pre-testing and cognitive interviewing (Pilot study)

Before the administration of Malayalam V-DOP questionnaire, a pilot study was carried out on nine participants of the target population that is, three individuals with voice disorders and six age and gender matched phono-normal in the age range of 20-60 years. The inclusion criteria for selecting participants in this pilot study was the same as the inclusion criteria for the administration of the study. The ethical consent from participants were taken before considering them for the pilot study via email. The questionnaire was given to the participants through web-platform (www.1ka.si.) and they were asked to read, understand and interpret the questions. Since 'not applicable' option was given for each of the question, the participants marked 'not applicable' option for most of the questions which they felt as not applicable. So, this was discussed with the expert committee, and the decision made was that the option of 'not applicable' can be given only for the job subdomain in Functional domain as the questions in this subdomain may not be applicable for students and homemakers. Then, the final Malayalam V-DOP questionnaire was prepared by giving 'not applicable' option only for the job subdomain.

Step 5: Final version

The final version of the Malayalam V-DOP was the outcome of all the revisions described above (Appendix A).

Phase 2: Validation of Malayalam V-DOP questionnaire.

The Malayalam V-DOP questionnaire was administered to 30 individuals with voice disorders (Group I) and 60 age and gender matched phono normal individuals (Group II). Details of Group I (Individuals with voice disorder) participants is depicted in Table 3.2

Table 3.2

Number of Voice Disorder Patients and its Types Between Male and Female Participants of Group I

Diagnosis	Number of patients		
	Males	**Females**	**Total**
Hoarse voice	3	4	7
Breathy voice	0	1	1
Vocal Nodule	2	3	5
Bilateral Vocal Polyp	0	1	1
Unilateral Vocal fold palsy	2	1	3
Bilateral Vocal fold palsy	1	0	1
Sulcus vocalis	1	3	4
Glottic chink	2	1	2
Muscle Tension Dysphonia	2	1	3
Plica ventricularis	1	0	1
Chronic laryngitis	0	1	1
Hemithyroidectomy	0	1	1
Total	**14**	**16**	**30**

The ethical consent from participants was taken before considering them for the study via email. The information regarding the study objectives were provided to participants. The experiment was initiated only after availing consent from participants.

The researcher collected the required data for the study through web-platform www.1ka.si. The questionnaire was sent as a web-platform (www.1ka.si.) link through email or what's App messenger. Since the study was carried out online, participants also received verbal instructions to aid in understanding the way they have to respond and was instructed to respond to the questionnaire corresponding to the study.

Self-Perceived Severity of Voice Disorder

Before the administration of 32 questions on V-DOP questionnaire, there is a question on self-perceived severity of voice disorder. In order to rate the severity of their voice problem, participants were asked to put an 'X' mark on a 10cm line ["visual analog scale (VAS)"]. If the individual mark the 'X' extremely towards the left side, then it indicates normal and if the 'X' mark is extremely towards the right side then it indicates severe voice issues.

V-DOP Questionnaire

V-DOP Malayalam questionnaire has a total of 32 questions. These 32 questions were grouped in to three domains such as: "physical, emotional, and functional domains". The functional domain comprises of three sub-divisions which include; (i) job, (ii) daily communication, and (iii) social communication. Participants were instructed to rate severity of their voice problems which they may face in their daily living by marking an 'X' on a 10 cm line ["visual analog scale (VAS)"]. On the 10 cm line, towards the extreme left side indicate **"never"** and towards the extreme right side indicate **"always"**.

There would be an option of "not applicable" for job subdomain, where if the participants feels that particular subdomain is not applicable to them, then they can choose this "not applicable" option.

Scoring

Each question was scored by measuring the distance in “centimeters” from the line’s left end to the point where the individual marked their problem on the line. The scores of each domain were acquired through this way. The total V-DOP score was obtained by summing up the scores of all three domain. The total V-DOP score can range between 0-320 (minimum to maximum), as there were 32 items with a maximum score of 10 for each item. Questions rated as “not applicable” by the individuals were not provided with any score.

Test-retest reliability

The test-retest reliability was of the questionnaire was carried out by re-administering the Malayalam V-DOP questionnaire on 20% of the participants in groups (i.e., phono normal and individuals with voice disorders) with an interval of one-week days.

3.4 Data Analysis

The statistical analysis was carried out using a Statistical Package for the Social Sciences - SPSS software (version 26.0). Normality check and Descriptive statistics were carried out. Mann-Whitney U test and Friedman test were used for comparison and internal consistency and reliability were also calculated.

CHAPTER IV

RESULTS

The main objective of the study was to translate and adapt the Voice Disorder Outcome Profile (V-DOP) questionnaire from English into Malayalam language. The second objective of the study was to validate the Malayalam V-DOP questionnaire using Phono normal and individuals with voice disorders. The study comprised of two phases. Phase I include Adaptation of Voice Disorder Outcome Profile (V-DOP) from English to Malayalam and Phase II include Validation of Malayalam V-DOP questionnaire.

Phase I: Adaptation of Voice Disorder Outcome Profile (V-DOP) in Malayalam

Based on the WHO guidelines the adaptation of the V-DOP was done by following the five steps: 1) Forward translation, 2) Expert panel review, 3) Back-translation (Content Validation was done after reverse translation), 4) Pre-testing and cognitive interviewing (Pilot study) and 5) Final version. Thus, final V-DOP was adapted and translated.

Phase II: Validation of Malayalam V-DOP questionnaire.

Administration of Malayalam V-DOP questionnaire.

The translated Malayalam V-DOP questionnaire was administered to thirty individuals with voice disorder (Group I) and sixty phono-normal individuals (Group II). The Malayalam V-DOP questionnaire consisted of three domains: physical, emotional and functional domains along with self-perceived severity. The functional domain consisted of three sub-domains: job, daily communication and social communication.

Using SPSS Software (version 26.0), Descriptive statistics like mean, standard deviation (SD), median and inter-quartile range (IQR) were calculated for each question.

Shapiro-Wilk test of normality was carried out and the data did not follow a normal distribution (p>0.05). Hence, non-parametric test (Mann Whitney –U test) was carried out to find the difference between individuals with voice disorder (Group I) and phono-normal individuals (Group II). To know the questionnaire's reliability, internal consistency of Malayalam V-DOP and test-retest reliability was carried out using Cronbach's alpha test. The internal consistency was estimated using item to total correlation. Spearman correlation was used to measure the relationship between the domains on Malayalam V-DOP questionnaire, total V-DOP score and self -perceived severity.

The results of the study are explained in the following sections:

- Comparison of the scores of the individuals with voice disorder (Group I) and phono-normal individuals (Group II) on Malayalam V-DOP questionnaire.
- Reliability of Malayalam V-DOP questionnaire (Internal consistency and test-retest reliability)
- Correlation of Domains, Total V-DOP Score and Self-perceived Severity

4.1 Comparison of the scores of the individuals with voice disorder (Group I) and phono-normal individuals (Group II) on Malayalam V-DOP questionnaire.

The results are described using descriptive statistics and non-parametric test.

Descriptive Statistics

Self-Perceived Severity

Descriptive statistics was computed for both the groups. The mean, standard deviation, median and inter-quartile range of self-perceived severity are provided in table 4.1.

Table 4.1

Mean, Standard Deviation, Median and Inter Quartile Range of Self-Perceived Severity of Malayalam V-DOP for Group I and Group II

Group	Mean	SD	Median	IQR
Individuals with Voice disorder	3.51	1.87	3.75	3.65
Phono-normal Individuals	0.25	0.47	0.00	0.35

Table 4.1 shows mean, standard deviation, median and inter quartile range of self-perceived severity of Malayalam V-DOP questionnaire for individuals with voice disorders (Group I) and phono-normal individuals (Group II). The results reveal that individuals with voice disorder (Group I) had higher scores (Mean=3.51, SD=1.87) on self-perceived severity than phono-normal individuals (Group II) (Mean=0.25, SD=0.47).

The questions in each domain are represented as PQ for physical domain, EQ for emotional domain and FQ for functional domain. The sub-domains in functional domain are represented as F-JQ for job, F-DQ daily communication and F-SQ for social communication.

Physical Domain

Descriptive statistics for each item in the physical domain of V-DOP was computed for both the groups. The mean, standard deviation, median and inter-quartile range of each item in physical domain are provided in table 4.2.

Table 4.2

Mean, Standard Deviation, Median and Inter Quartile Range of Each Item in Physical Domain of Malayalam V-DOP for Group I and Group II

	Individuals with Voice disorder				**Phono-normal Individuals**			
Items	Mean	SD	Median	IQR	Mean	SD	Median	IQR
P1	4.53	2.72	5.15	4.70	0.50	0.87	0.00	1.00
P2	3.65	2.90	3.65	5.80	0.16	0.42	0.00	0.00
P3	3.28	2.52	2.50	4.55	0.14	0.43	0.00	0.00
P4	3.23	2.52	2.75	4.10	0.32	0.56	0.00	0.75
P5	5.93	2.46	6.50	3.77	0.53	0.97	0.00	0.80
P6	4.33	3.04	5.10	5.15	0.49	0.75	0.00	1.00
P7	4.39	2.89	5.20	5.53	0.47	0.83	0.00	0.95
P8	4.22	3.03	3.85	4.68	1.22	1.28	1.00	2.25
P9	5.79	3.13	6.90	6.08	1.22	1.33	1.00	1.85
P10	2.50	2.23	1.70	3.50	0.38	0.83	0.00	0.35
P-Total	41.86	20.01	43.10	39.65	5.44	4.76	4.00	6.05

Table 4.2 shows mean, standard deviation, median and inter quartile range of each item in Physical domain of Malayalam V-DOP questionnaire for individuals with voice disorder (Group I) and phono-normal individuals (Group II).

Emotional Domain

Descriptive statistics for each item in the emotional domain of V-DOP was computed for both the groups. The mean, standard deviation, median and inter-quartile range of each item in emotional domain are provided in table 4.3.

Table 4.3

Mean, Standard Deviation, Median and Inter Quartile Range of Each Item in Emotional Domain of Malayalam V-DOP for Group I and Group II

	Individuals with Voice disorder				**Phono-normal Individuals**			
Items	Mean	SD	Median	IQR	Mean	SD	Median	IQR
EQ1	5.31	3.07	5.80	5.55	0.13	0.31	0.00	0.00
EQ2	4.16	3.22	3.50	6.75	0.21	0.41	0.00	0.40
EQ3	4.36	2.84	4.95	4.13	0.10	0.22	0.00	0.00
EQ4	3.56	3.72	1.70	6.68	0.16	0.34	0.00	0.00
EQ5	1.69	2.58	0.40	2.60	0.05	0.19	0.00	0.00
EQ6	3.60	3.50	2.25	6.60	0.28	0.59	0.00	0.45
EQ7	1.77	3.15	0.00	2.03	0.33	0.78	0.00	0.00
EQ8	2.94	3.28	1.60	5.80	0.13	0.33	0.00	0.00
EQ9	1.39	2.37	0.00	2.28	0.08	0.27	0.00	0.00
EQ10	1.61	2.49	0.00	3.05	0.14	0.36	0.00	0.00
E-Total	30.41	21.37	26.65	35.95	1.60	2.34	0.50	2.25

Table 4.3 shows mean, standard deviation, median and inter quartile range of each item in Emotional domain of Malayalam V-DOP questionnaire for individuals with voice disorders (Group I) and phono-normal individuals (Group II).

Functional Domain

Descriptive statistics for each item in the functional domain of V-DOP was computed for both the groups. The mean, standard deviation, median and inter-quartile range of each item in functional domain are provided in table 4.4.

Table 4.4

Mean, Standard Deviation, Median and Inter Quartile Range of Each Item in Functional Domain of Malayalam V-DOP for Group I and Group II

	Individuals with Voice disorder				**Phono-normal Individuals**			
Items	Mean	SD	Median	IQR	Mean	SD	Median	IQR
F-JQ1	4.30	3.31	5.00	6.88	0.13	0.46	0.00	0.00
F-JQ2	1.11	1.88	0.00	2.55	0.05	0.19	0.00	0.00
F-JQ3	0.78	1.97	0.00	0.40	0.00	0.00	0.00	0.00
J TOTAL	6.19	4.14	7.50	6.83	0.18	0.52	0.00	0.00
F-DQ1	3.14	3.44	2.40	5.93	0.05	0.19	0.00	0.00
F-DQ2	3.22	3.29	2.00	6.03	0.33	0.62	0.00	0.45
F-DQ3	2.53	2.87	1.55	4.78	0.18	0.50	0.00	0.00
F-DQ4	5.13	3.09	5.70	4.80	0.35	0.72	0.00	0.00
F-DQ5	1.13	1.91	0.00	1.42	0.00	0.00	0.00	0.00
F-DQ6	2.46	2.13	2.45	4.85	0.18	0.40	0.00	0.00
DC TOTAL	17.61	13.83	16.80	20.63	1.08	1.56	0.00	2.00
F-SQ1	2.75	2.89	1.85	5.75	0.05	0.26	0.00	0.00
F-SQ2	2.07	3.07	0.05	4.00	0.02	0.09	0.00	0.00
F-SQ3	2.07	2.94	0.30	4.35	0.07	0.30	0.00	0.00
SC TOTAL	6.89	8.40	2.25	12.30	0.14	0.62	0.00	0.00
F -TOTAL	**30.68**	**23.73**	**30.75**	**34.45**	**1.40**	**2.31**	**0.00**	**2.25**

Table 4.4 shows mean, standard deviation, median and inter quartile range of each item in Functional domain of Malayalam V-DOP questionnaire for individuals with voice disorders (Group I) and phono-normal individuals (Group II).

Table 4.5

Mean, Standard Deviation, Median and Inter Quartile Range of Each Domain and Total V-DOP Score of Group I and Group II

	Individuals with Voice disorder				**Phono-normal Individuals**			
Domains	Mean	SD	Median	IQR	Mean	SD	Median	IQR
Physical	41.86	20.01	43.10	39.65	5.44	4.76	4.00	6.05
Emotional	30.41	21.37	26.65	35.95	1.60	2.34	0.50	2.25
Functional	30.68	23.73	30.75	34.45	1.40	2.31	0.00	2.25
Total	102.94	57.21	99.50	99.45	8.44	7.49	7.00	10.70

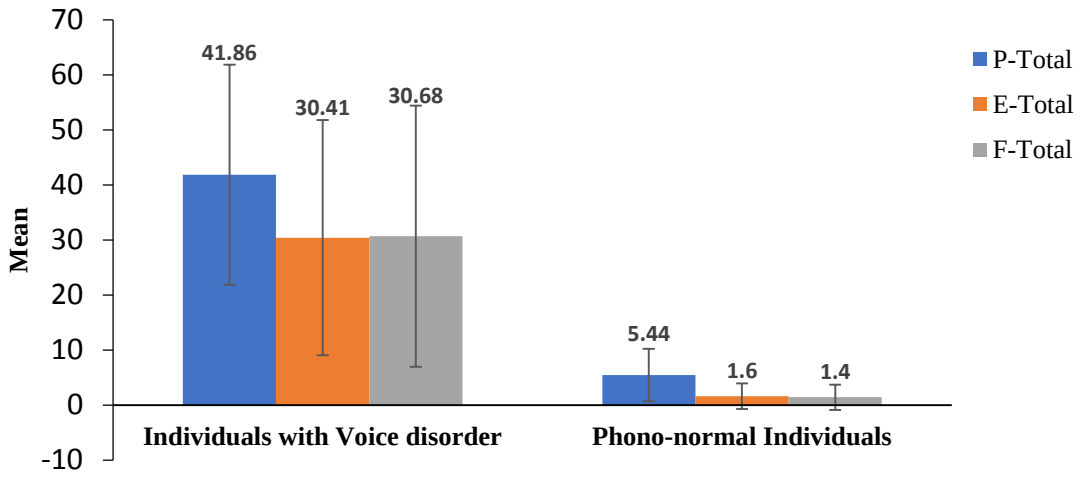
Table 4.5 shows mean, standard deviation, median and inter quartile range of each domain and total V-DOP score for group I (voice disorder patients) and group II (phono-normal individuals). The analysis of the results reveals that individuals with voice disorder (Group I) has mean total V-DOP scores of 103 (SD=57). Also, the total median score for group I is 100. The mean total V-DOP score for phono-normal individuals (Group II) is 8 (SD=7) and the total median score is 7. Then the scores were compared between groups. Group I (individuals with voice disorder) had higher V-DOP scores compared to phono-normal individuals (Group II). Individuals with voice disorders (Group I) scored the highest in physical domain followed by functional and emotional domain. Also, phono-normal individuals (Group II) scored the highest in physical domain followed by emotional and functional domain for mean domain scores. Thus, Voice-DOP

developed here sufficiently differentiates phono-normals from individuals with dysphonia in all the domain.

Figure 4.1 shows the mean and standard deviation of the three domains (physical, emotional and functional) for individuals with voice disorder (Group I) and phono-normal individuals (Group II).

Figure 4.1

Mean and Standard Deviation of the Three Domains (Physical, Emotional and Functional) for Individuals with Voice Disorder (Group I) and Phono-Normal Individuals (Group II)



Comparison of domains of V-DOP across two groups

Shapiro-Wilk test of normality was done (p>0.05). Since the data did not follow normal distribution, non-parametric test was carried out. Inferential statistics were computed using the Mann-Whitney U test (non-parametric test). Table 4.6 shows the result of the Mann-Whitney U test between the two groups i.e., the difference between individuals with voice disorder (Group I) and phono-normal individuals (Group II).

Table 4.6

Result of Mann- Whitney U Test for Physical, Emotional and Functional Domains of V-DOP Between the two Groups.

Physical			**Emotional**			**Functional**		
Items	Z	*p*-value	Items	Z	*p*-value	Items	Z	*p*-value
PQ1	6.342	.000	EQ1	7.889	.000	F-JQ1	5.079	.000
PQ2	5.451	.000	EQ2	7.114	.000	F-JQ2	2.678	.007
PQ3	6.163	.000	EQ3	7.320	.000	F-JQ3	2.790	.005
PQ4	6.385	.000	EQ4	5.671	.000	F-DQ1	5.455	.000
PQ5	7.274	.000	EQ5	5.010	.000	F-DQ2	4.097	.000
PQ6	6.237	.000	EQ6	6.603	.000	F-DQ3	4.826	.000
PQ7	6.367	.000	EQ7	2.827	.005	F-DQ4	6.437	.000
PQ8	4.461	.000	EQ8	6.437	.000	F-DQ5	6.176	.000
PQ9	6.065	.000	EQ9	3.887	.000	F-DQ6	4.185	.000
PQ10	4.680	.000	EQ10	2.764	.006	F-SQ1	5.510	.000
						F-SQ2	5.508	.000
						F-SQ3	4.372	.000

The analysis of the results on the non-parametric test shown in table 4.6 revealed that there is a statistically significant difference between the groups for all the items in the three domains.

Table 4.7

Result of Mann- Whitney U Test for Each Domain Scores, Total V-DOP and Self-Perceived Severity Between the two Groups

	P-Total	E-Total	F-Total	Total V-DOP	Self-perceived Severity
Z	-7.495	-7.391	-6.639	-7.588	-7.811
p-value	.000	.000	.000	.000	.000

The analysis of the results on the non-parametric test shown in table 4.7 revealed that there is a statistically significant difference between the groups across all the three domains namely physical domain (|Z|=7.495, $p< 0.05$), emotional domain (|Z|=7.391, $p<0.05$), functional domain (|Z|=6.639, $p<0.05$), which results in statistically significant difference in total V-DOP score (|Z|=7.588, $p<0.05$). Also, statistically significant difference was noticed in the self-perceived severity between the individuals with voice disorder and phono-normal individuals (|Z|=7.811, $p<0.05$). Thus, this indicates that Malayalam V-DOP is sensitive to differentiate between individuals with voice disorder and phono-normal individuals.

In summary, individuals with voice disorder (Group I) are greatly affected compared to phono-normal individuals (Group II) across the three domains. Of the three domains, individuals with voice disorder had more problem in the physical domain, followed by functional and emotional domains due to their voice problem.

4.2 Reliability of Malayalam V-DOP questionnaire

The reliability of Voice-DOP was tested by establishing:

4.2.1 Internal consistency of the items

4.2.2 Test-retest reliability

4.2.1 Internal Consistency

The internal consistency of Malayalam V-DOP questionnaire was assessed using item-to-total correlation. Items which have higher correlation values contribute to the overall reliability of the questionnaire and those are considered to have more representativeness in the questionnaire than items with low correlation value. Nunally (1978) suggests that Cronbach's alpha coefficient of 0.5 and above for a single item in the scale indicates good internal consistency. Table 4.8 shows the item-to-total correlation (Cronbach's α coefficient) across three domains of Malayalam VDOP questionnaire for group I.

Table 4.8

Item-to-Total Correlation of Each Item of Malayalam V-DOP Questionnaire for Individuals With Voice Disorder (Group-I) Using Cronbach's α Coefficient

Physical		**Emotional**		**Functional**	
Items	Item-Total correlation	Items	Item-Total correlation	Items	Item-Total correlation
PQ1	0.81	EQ1	0.57	F-JQ1	0.22*
PQ2	0.67	EQ2	0.73	F-JQ2	0.28*
PQ3	0.70	EQ3	0.41*	F-JQ3	0.47
PQ4	0.60	EQ4	0.71	F-DQ1	0.87
PQ5	0.68	EQ5	0.47	F-DQ2	0.79
PQ6	0.67	EQ6	0.57	F-DQ3	0.86
PQ7	0.64	EQ7	0.58	F-DQ4	0.59
PQ8	0.60	EQ8	0.87	F-DQ5	0.68
PQ9	0.61	EQ9	0.34*	F-DQ6	0.73
PQ10	0.18*	EQ10	0.51	F-SQ1	0.83
				F-SQ2	0.85
				F-SQ3	0.64

* Item to total correlation is < 0.5.

Results of item-to-total correlation in table 4.8 revealed that the Cronbach's coefficient of V-DOP Malayalam questionnaire for voice disorder (Group I) was greater than 0.5 for majority of the questions except for items PQ10, EQ3, EQ9, F-JQ1, and F-JQ2.

4.2.2 Test-retest Reliability

The Cronbach's alpha test was carried out to determine the test-retest reliability of the questionnaire from 20 % of participants (6 individuals with voice disorders and 12 phono-normal) with a gap of 1 week. Table 4.9 shows the Cronbach's alpha coefficient for test-retest reliability of Malayalam V-DOP.

Table 4.9

Cronbach's Alpha Coefficient for Test-Retest Reliability of Malayalam V-DOP for Group I and Group II.

	Cronbach's alpha coefficient (α)	
	Individuals with voice disorder	Phono-normal Individuals
Self-perceived severity	0.974	0.956
Physical Domain	0.998	0.978
Emotional Domain	0.998	0.992
Functional Domain	1.0	0.992
Total V-DOP	1.0	0.996

Analysis of results as indicated in Table 4.9 revealed that the extent of consistency of the test-retest of the questionnaire across the three domains, namely Physical, Emotional and Functional was found to be excellent in reliability. Also, the reliability was good for self-perceived severity and total V-DOP scores. Hence test-retest reliability was found to be excellent in both the groups for V-DOP**.**

4.3 Correlation of Domains, Total V-DOP Score and Self-perceived Severity

The Spearman's correlation coefficient was carried out to find the relationship between the domains, between the scores of each of the three domains of Voice-DOP and the total Voice-DOP, between each of the domains and the patient's self-perceived severity of the voice disorder, and between total Voice-DOP and perceived severity. The correlation values are shown in Table 4.10.

Table 4.10

Spearman's Correlation Results for Individuals with Voice Disorder (Group I)

	Spearman's rho				
	Self-perceived Severity	P-Total	E-Total	F-Total	Total V-DOP
Self-perceived Severity	1.00	0.63**	0.72**	0.53**	0.74**
P-Total	-	1.00	0.63**	0.83**	0.92**
E-Total	-	-	1.00	0.57**	0.80**
F-Total	-	-	-	1.00	0.91**
Total V-DOP	-	-	-	-	1.00

** Correlation is significant at the 0.01 level (2-tailed).

Spearman correlation analysis from table 4.10 revealed that a strong correlation was found between scores of patients' self-perceived severity of dysphonia and the total Voice-DOP score (ρ=0.74 at 0.01 level of significance).

Also, the score on self-perceived severity of dysphonia had strong correlation with scores of physical (ρ=0.63).and emotional domains (ρ=0.72) of Voice-DOP at 0.01 level of significance and had a moderate correlation with functional domain (ρ=0.53, p<0.01).

It can be seen from Table 4.10 that the correlation value between Total V-DOP score is 0.92 for Physical domain, 0.80 for Emotional domain and 0.91 for Functional domain, which indicates strong correlation between all three domains and total V-DOP. Among the domains, the correlation was found to be highest for Physical and Functional domain (ρ =0.83, p<0.01). The correlation was observed to be statistically significant for all (p<0.01).

CHAPTER V

DISCUSSION

The aim of the present study was to translate and adapt the English version of V-DOP into Malayalam language and validate the same. This procedure was carried out in two steps: 1) Adaptation of Voice Disorder Outcome Profile (V-DOP) to Malayalam language, 2) Validation of Malayalam V-DOP questionnaire.

5.1 Adaptation of Voice Disorder Outcome Profile (V-DOP) in Malayalam

During Phase I, the experimenter translated the English version of V-DOP into Malayalam language following the five steps recommended by WHO. Appropriateness of the translation done by the experimenter was evaluated by two language experts in Malayalam literature. After comparing the translated Malayalam V-DOP to English V-DOP questionnaires, the language experts suggested few modifications. These modifications were discussed with expert committee and appropriate ones were incorporated and pre-final V-DOP was made. The pre-final Malayalam V-DOP questionnaire was reverse translated into English by two SLPs, who were experts in the Malayalam and English languages. The reverse translated version as well as English version of the questionnaire was compared and found both original and reverse translated version of V-DOP was much similar and 90-95% agreement was observed between the two. So, the pre-final Malayalam V-DOP questionnaire was finalized and was given for content validation. The modifications suggested by content validators were discussed with the expert committee and appropriate ones were incorporated. After conducting the pre-testing and cognitive interviewing (Pilot study), the option of ‘not applicable’ was used only to the subdomain: job, in the final Malayalam V-DOP. The option of ‘not

applicable' was not present in the Original V-DOP questionnaire and it was suggested by them that the not applicable option can be used in future studies. Thus, the option was incorporated in Malayalam V-DOP.

5.2 Validation of Malayalam V-DOP questionnaire

5.2.1 Validity of the V-DOP in Malayalam

The mean value of total score obtained in V-DOP for group II (phono-normal individuals) was 8 (SD=7) as against the mean total scores of 103 (SD=57) obtained for group I (individuals with voice disorder) and this difference was statistically significant at 0.05 level. Higher scores for group I (individuals with voice disorder) in Malayalam V-DOP indicate a significant impact on the quality of life of individuals with voice problems encompassing the physical, emotional and functional aspects of their life. As stated earlier, group II obtained a mean total score of 8 and a standard deviation of 7. Therefore, a score of 15 (8 ± 7) or below 15 would indicate a normal voice. Group I obtained a mean total score of 103 and a standard deviation of 57 in Malayalam V-DOP. Hence, a score above 46 (103 ± 57) would indicate voice problem. Also, scores ranging between 15 and 46 would denote at risk to develop voice problems.

Konnai et al. (2010) reported that the mean total score for Kannada V-DOP in dysphonic group was 124 (SD=63) and it was zero for control group. Similarly, Mahalingam et al. (2014) reported the total mean score for Tamil V-DOP in non-clinical group was zero and it was 104 (SD=65) for clinical group. Similarly, Saraswathi (2017) reported the total mean score for Telugu V-DOP in dysphonic group was 140 (SD=69) and it was 17 (SD=19) for control group. In comparison to the above three studies, the total mean scores obtained for phono-normal individuals in the current study was 8

(SD=7) which is lower compared to scores of Telugu V-DOP and higher with respect to Kannada and Tamil. These scores on Malayalam V-DOP by phono-normal individuals can be attributed to the fact that physical domain is affected in some of the normal individuals (working individuals) as they face dry throat after continuous speaking, tired after speaking for long and does throat clearing. Also, few of the participants in group II (phono-normal individuals) were students who were undergoing speech & hearing course and other courses. Relatively they might involve in heavy use of their voice for about 3 to 4 hours a day as per the curriculum. Therefore, the increased Malayalam V-DOP scores in the present study for phono-normal individuals (group II) could be contributed to the above factor.

On comparing the scores obtained among the three domains of Malayalam V-DOP questionnaire, it is observed that the physical domain had higher scores followed by functional and emotional domains in individuals with voice disorders (group I). In phono-normal individuals (Group II), higher scores were noted in physical domain followed by emotional and functional domains. The emotional and functional domains were almost similar in both the groups. These findings are in consonance with the results obtained by Konnai et al. (2010), Mahalingam et al. (2014) and Saraswathi (2017) where these authors found higher scores in physical domain than emotional and functional domains of V-DOP questionnaire. The functional domain had three questions related to "job". The individuals who participated in the study included students and homemakers and also some individual had job which does not require the use of voice. Hence this ‘job’ related questions were not included for scoring as participants indicated as ‘not applicable’. This could have contributed to reduced scores in the functional domain. The

results of the current study revealed that the effect of voice difficulties was unevenly distributed and relied on other factors such as individual factors (voice use, job, life style, food habits) and environmental factors (workspace). These factors were influencing the score, which is the core aim of obtaining self-reported quality of life.

5.2.2 Reliability of V-DOP in Malayalam

Internal Consistency

Using Cronbach α coefficient, the item-to-total correlation in the present study was greater than 0.5 for most of the questions except for items PQ10, EQ3, EQ9, F-JQ1, and F-JQ2 for the individuals with voice disorder (Group I). Though few questions showed poor item to total correlation and deletion of these questions did not significantly improve the α coefficient. Hence these items were retained in the Malayalam V-DOP questionnaire. The high item-to total correlation in Malayalam V-DOP indicated that it is a reliable measure and can used to evaluate the effect of voice issues on quality of life in Malayalam speaking population. Similar findings are noticed in studies of Konnai et al. (2010), Mahalingam et al. (2014) and Saraswathi (2017). Konnai et al. (2010) reported that the item-to-total correlation obtained for Kannada V-DOP questionnaire varied from 0.49 to 0.84. Mahalingam et al. (2014) found that the overall Cronbach coefficient α for Tamil V-DOP had an overall value of 0.89. The item-to-total correlation using Cronbach α coefficient for Telugu V-DOP questionnaire varied from 0.86 to 0.95 as reported by Saraswathi (2017). As mentioned earlier, the present study found the item-to-total correlation using Cronbach α coefficient for Malayalam V-DOP questionnaire was greater than 0.5 for most of the questions except PQ10, EQ3, EQ9, F-JQ1, and F-JQ2. In

comparison to the above three studies, the item to total correlation of Malayalam V-DOP is lesser compared to the previous studies in voice disorder patients.

Test-retest reliability

Test-retest reliability was carried out for individuals with voice disorder (Group I) and phono-normal individuals (Group II) within a span of 1 week and the results revealed that Cronbach's α coefficient was greater than 0.9. This is in consonance with the test-retest reliability scores obtained by Konnai et al. (2010) using Kannada V-DOP questionnaire (r=0.96-0.99) and Saraswathi (2017) using Telugu V-DOP questionnaire (100% reliability).

5.2.3 Correlation of Domains, Total V-DOP Score and Self-perceived Severity

Using the Spearman's correlation coefficient, the results of the present study revealed a strong correlation between scores of patients' self-perceived severity of dysphonia and the total V-DOP score (ρ=0.74 at 0.01 level of significance). These findings are in consonance with the results obtained by Konnai et al. (2010) and Mahalingam et al. (2014) where correlation was found to be 0.51 in Kannada V-DOP and 0.62 in Tamil V-DOP at 0.01 level of significance. In comparison to the above two studies, the correlation between scores of patients' self-perceived severity of dysphonia and the total V-DOP score was higher in Malayalam V-DOP.

In the present study, the score on self-perceived severity of dysphonia had strong correlation with scores of physical (ρ=0.63) and emotional domains (ρ=0.72) at 0.01 level of significance and had a moderate correlation with functional domain (ρ=0.53, $p<0.01$). These findings are in consonance with the results obtained by Konnai et al. (2010) and

Mahalingam et al. (2014) and the correlation in Malayalam V-DOP was higher compared to the other two studies.

The Total V-DOP score had strong correlation with all the three domains in Malayalam V-DOP i.e., 0.92 for Physical domain, 0.80 for Emotional domain and 0.91 for Functional domain. These findings are in consonance with the results obtained by Konnai et al. (2010) and Mahalingam et al. (2014) where correlation was found to be greater than 0.8 for all the domains with the total V-DOP score in both the studies. In the present study, strong correlation was found among all the three domains (ρ=0.57 to 0.83). This was in consonance with the other two studies.

CHAPTER VI

SUMMARY AND CONCLUSION

The primary focus of the present study was to adapt the English version of the Voice Disorder Outcome Profile (V-DOP) questionnaire into Malayalam language. The original English V-DOP questionnaire was translated using the five-step translation process recommended by WHO. The forward translation step was performed by experimenter initially and was then given to two language experts (Malayalam professors) to analyze appropriateness of the translation version of Malayalam V-DOP. The reverse translation step was performed by two SLP'S and 90-95% agreement was found between them.

The other objective of the study was to validate the Voice Disorder Outcome Profile (V-DOP) in Malayalam language. The questionnaire was administered to 30 individuals with voice disorder (Group I) and 60 phono-normal individuals (Group II). Descriptive statistics was performed to determine the overall score of V-DOP and each of the domains separately. The mean of total scores of V-DOP were higher in Group I (mean=140) than in group-II (mean=17). To see the Reliability measures of V-DOP, internal consistency was estimated using item-total correlation and Cronbach α coefficient. The V-DOP items had a high item-total correlation for Group I except for few items. These were in consonance with the previous studies. The result of test-retest reliability for Malayalam V-DOP questionnaire was found to be higher which shows a good reliability (>.0.9) of V-DOP questionnaire.

Therefore, this study was carried out to compare the V-DOP scores between individuals with voice disorder and phono-normal individuals. Total mean V-DOP scores

were higher in individuals with voice disorder (group I) than phono-normal individuals (group II). Mann Whitney U test was executed to see the significant variation between groups and it revealed that scores for group-I for all thirty-two questions and self-perceived severity are higher than group II. This shows group I scored significantly higher in the Malayalam V-DOP questionnaire. The Spearman's correlation coefficient was used to find the relationship between the domains, between each domain of Voice-DOP and the total Voice-DOP, between each domain and the patient's self-perceived severity of the voice disorder, and between total Voice-DOP and perceived severity. A strong correlation was found between scores of patients' self-perceived severity of dysphonia and the total Voice-DOP score. The score on self-perceived severity of dysphonia had strong correlation with scores of physical and emotional domains of Voice-DOP and had a moderate correlation with functional domain. Also, a strong correlation was found between all three domains and total V-DOP.

Implications of the study

The study will give detailed information about:

- It can be used to evaluate the quality of life in individuals with voice disorders, particularly in Malayalam speaking population.
- It provides domain-specific scores to the clinician, which will aid in the planning of suitable treatments.
- V-DOP of Malayalam provides the patient's perception of their voice disorder.
- V-DOP in Malayalam is a quick (<10 minutes) subjective assessment tool to understand the effect of voice problem which can be included in clinical evaluation of voice.

Limitations of the present study

- Lesser number of participants in the voice disorder group participated in the study.
- Few participants found it difficult to rate on a 10 cm line as they do not know to convert their impact of voice problem perceptually on a visual analog scale. So verbal instructions were also required.

Future direction of the study

- Can consider more number of participants in the voice disorder group.
- Future studies can be done to correlate between the subjective perception of voice problem (V-DOP score) and objective findings in voice disorder patients.

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Appendix A

സ്വയം മനസ്സിലാക്കിയ ശബ്ദ പ്രശ്നത്തിന്റെ തീവ്രത

നിർദ്ദേശം: നിങ്ങളുടെ ശബ്ദപ്രശ്നം എത്രത്തോളം ഗുരുതരമാണ് എന്നതിനെ ആശ്രയിച്ച് 100 mm ലൈനിൽ 'X' ഇട്ടുകൊണ്ട് ഇനിപറയുന്ന ചോദ്യങ്ങൾക്ക് ഉത്തരം നൽകുക. ഉദാഹരണത്തിന്, ഇടത്തേ അറ്റത്തേക്കുള്ള 'X' അടയാളം അർത്ഥമാക്കുന്നത് നിങ്ങൾക്ക് സാധാരണ ശബ്ദമാണെന്നാണ്. അതേസമയം വലത്തേ അറ്റത്തേക്കുള്ള 'X' അടയാളം അർത്ഥമാക്കുന്നത് നിങ്ങൾക്ക് ഗുരുതരമായ ശബ്ദപ്രശ്നമാണെന്നാണ്. 50 ശതമാനം പ്രശ്നമുണ്ടെങ്കിൽ വരയുടെ മധ്യത്തിൽ 'X' എന്ന് അടയാളപ്പെടുത്തുക.

നിങ്ങളുടെ ശബ്ദപ്രശ്നം ഇപ്പോൾ എത്രമാത്രം ഗുരുതരമാണ്?

സാധാരണ ├──┼──┼──┼──┼──┼──┼──┼──┼──┼──┤ ഗുരുതരം

വോയിസ് ഡിസോർഡർ ഔട്ട്കം പ്രൊഫൈൽ (V-DOP)

നിർദ്ദേശം: നിങ്ങൾ അഭിമുഖീകരിക്കുന്ന പ്രശ്നത്തിന്റെ വ്യാപ്തിയെ ആശ്രയിച്ച് 100 mm ലൈനിൽ 'X' ഇട്ടുകൊണ്ട് ഇനിപറയുന്ന ചോദ്യങ്ങൾക്ക് ഉത്തരം നൽകുക. ഉദാഹരണത്തിന്, ഇടത്തേ അറ്റത്തേക്കുള്ള 'X' അടയാളം അർത്ഥമാക്കുന്നത് നിങ്ങളെ ഒരിക്കലും ബാധിച്ചിട്ടില്ല എന്നാണ്, അതേസമയം വലത്തേ അറ്റത്തേക്കുള്ള 'X' അടയാളം അർത്ഥമാക്കുന്നത് നിങ്ങളെ എപ്പോഴും ബാധിച്ചിരിക്കുന്നു എന്നാണ്. പ്രശ്നം 50% ആണെങ്കിൽ വരയുടെ മധ്യത്തിൽ 'X' എന്ന് അടയാളപ്പെടുത്തുക.

I. ശാരീരികം

1. ദീർഘനേരം സംസാരിക്കുമ്പോൾ നിങ്ങൾക്ക് ക്ഷീണം അനുഭവപ്പെടാറുണ്ടോ?

ഒരിക്കലുമില്ല ├──┼──┼──┼──┼──┼──┼──┼──┼──┼──┤ എപ്പോഴും

2. സംസാരിക്കുമ്പോൾ നിങ്ങൾക്ക് ശ്വാസം കിട്ടാത്തതായി തോന്നാറുണ്ടോ?

ഒരിക്കലുമില്ല ├──┼──┼──┼──┼──┼──┼──┼──┼──┼──┤ എപ്പോഴും

3. നിങ്ങൾക്ക് ശബ്ദം പുറപ്പെടുവിക്കാൻ ആയാസപ്പെടേണ്ടതുണ്ടോ?

ഒരിക്കലുമില്ല ├──┼──┼──┼──┼──┼──┼──┼──┼──┼──┤ എപ്പോഴും

4. ദിവസത്തിലുടനീളം നിങ്ങളുടെ ശബ്ദത്തിൽ വ്യതിയാനങ്ങൾ സംഭവിക്കാറുണ്ടോ?

ഒരിക്കലുമില്ല ├──┼──┼──┼──┼──┼──┼──┼──┼──┼──┤ എപ്പോഴും

5. ഉറക്കെ സംസാരിക്കാൻ നിങ്ങൾക്ക് ബുദ്ധിമുട്ടുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

6. ദീർഘനേരം സംസാരിച്ചതിന് ശേഷം നിങ്ങളുടെ ശബ്ദം നഷ്ടപ്പെടാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

7. നിങ്ങളുടെ ശബ്ദത്തിന് വ്യക്തത കുറവുള്ളതായി അനുഭവപ്പെടാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

8. നിങ്ങൾ ഇടയ്ക്കിടെ കണ്ഠശുദ്ധി (throat clearing) വരുത്താറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

9. തുടർച്ചയായി സംസാരിച്ചതിന് ശേഷം നിങ്ങൾക്ക് തൊണ്ട വരണ്ടതായി തോന്നാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

10. സംസാരിക്കുമ്പോൾ നിങ്ങൾക്ക് തൊണ്ടയിൽ വേദന അനുഭവപ്പെടാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

II. വൈകാരികം

11. നിങ്ങളുടെ ശബ്ദപ്രശ്നം നിങ്ങളെ അസ്വസ്ഥമാക്കാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

12. ശബ്ദപ്രശ്നത്തെ കുറിച്ച് നിങ്ങൾ ആകുലപ്പെടാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

13. നിങ്ങളുടെ ശബ്ദപ്രശ്നം മറ്റുള്ളവർ മനസ്സിലാക്കാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

14. ശബ്ദപ്രശ്നം കാരണം നിങ്ങൾക്ക് ആത്മവിശ്വാസക്കുറവ് ഉണ്ടാകാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

15. ശബ്ദപ്രശ്നം കാരണം നിങ്ങൾ യോഗ്യനല്ലെന്ന് തോന്നാറുണ്ടോ?

ഒരിക്കലുമില്ല										എപ്പോഴും

16. നിങ്ങളുടെ ശബ്ദപ്രശ്നം കാരണം മറ്റുള്ളവരോട് സംസാരിക്കുമ്പോൾ നിങ്ങൾ ബോധവാന്മാരാകാറുണ്ടോ?

ഒരിക്കലുമില്ല										എപ്പോഴും

17. മറ്റുള്ളവർ നിങ്ങളോട് ആവർത്തിക്കാൻ ആവശ്യപ്പെടുമ്പോൾ നിങ്ങൾക്ക് നാണക്കേട് തോന്നാറുണ്ടോ?

ഒരിക്കലുമില്ല										എപ്പോഴും

18. ശബ്ദപ്രശ്നം നിങ്ങളെ അലോസരപ്പെടുത്താറുണ്ടോ?

ഒരിക്കലുമില്ല										എപ്പോഴും

19. നിങ്ങളുടെ ശബ്ദപ്രശ്നത്തെക്കുറിച്ച് നിങ്ങൾക്ക് ലജ്ജ തോന്നാറുണ്ടോ?

ഒരിക്കലുമില്ല										എപ്പോഴും

20. നിങ്ങളുടെ ശബ്ദപ്രശ്നം നിങ്ങളുടെ വ്യക്തിത്വത്തെ ബാധിക്കുന്നുണ്ടോ?

ഒരിക്കലുമില്ല										എപ്പോഴും

III . പ്രവർത്തനത്തെ സംബന്ധിച്ച

A) തൊഴിൽ ബാധകമല്ല

(ഇതിലുള്ള ചോദ്യങ്ങൾ നിങ്ങൾക്ക് ബാധകമാണെങ്കിൽ മാത്രം വരയിൽ അടയാളപ്പെടുത്തുക. അല്ലെങ്കിൽ 'ബാധകമല്ല' എന്ന സ്ഥലത്ത് അടയാളപ്പെടുത്തുക.)

21. നിങ്ങളുടെ ശബ്ദപ്രശ്നം നിങ്ങളുടെ തൊഴിൽ നിർവഹണത്തെ ബാധിച്ചിട്ടുണ്ടോ?

ഒരിക്കലുമില്ല										എപ്പോഴും

22. താരതമ്യേന കുറഞ്ഞ ശബ്ദ ഉപയോഗം ആവശ്യമുള്ള മറ്റൊരു തൊഴിലിലേക്ക്, നിങ്ങൾ ഇടയ്ക്കിടെ മാറേണ്ടതുണ്ടോ?

ഒരിക്കലുമില്ല										എപ്പോഴും

23. ശബ്ദപ്രശ്നം കാരണമാണ് നിങ്ങൾക്ക് വരുമാനക്കുറവ് ഉള്ളതെന്ന് തോന്നാറുണ്ടോ?

ഒരിക്കലുമില്ല										എപ്പോഴും

B) ദൈനംദിന ആശയവിനിമയം

24. ശബ്ദപ്രശ്നം കാരണം മറ്റുള്ളവരോട് സംസാരിക്കുന്നത് നിങ്ങൾ ഒഴിവാക്കാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

25. നിങ്ങൾ പറഞ്ഞത് ആവർത്തിക്കാൻ മറ്റുള്ളവർ നിങ്ങളോട് ആവശ്യപ്പെടാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

26. ഫോണിൽ സംസാരിക്കുമ്പോൾ മറ്റുള്ളവർക്ക് നിങ്ങളെ മനസ്സിലാക്കാൻ ബുദ്ധിമുട്ടുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

27. നിങ്ങളുടെ ശബ്ദപ്രശ്നം കൂടുതൽ ശബ്ദമുള്ള ചുറ്റുപാടിൽ നിങ്ങളുടെ ആശയവിനിമയത്തെ ബാധിക്കാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

28. നിങ്ങളുടെ ശബ്ദപ്രശ്നം നിശബ്ദമായ ചുറ്റുപാടിൽ നിങ്ങളുടെ ആശയവിനിമയത്തെ ബാധിക്കാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

29. മറ്റുള്ളവർ നിങ്ങളോട് ഉച്ചത്തിൽ സംസാരിക്കാൻ ആവശ്യപ്പെടാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

C) സാമൂഹിക ആശയവിനിമയം

30. ശബ്ദപ്രശ്നം നിങ്ങളുടെ സാമൂഹിക ഇടപെടലുകളെ ബാധിക്കാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

31. നിങ്ങളുടെ ശബ്ദപ്രശ്നം നിങ്ങളുടെ കുടുംബാംഗങ്ങളെയോ സുഹൃത്തുക്കളെയോ സഹപ്രവർത്തകരെയോ അലോസരപ്പെടുത്താറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും

32. നിങ്ങളുടെ ശബ്ദം നിങ്ങളുടെ വ്യക്തിപരവും സാമൂഹികവുമായ ജീവിതത്തെ പരിമിതപ്പെടുത്തുന്നതായി നിങ്ങൾക്ക് തോന്നാറുണ്ടോ?

ഒരിക്കലുമില്ല | | | | | | | | | | എപ്പോഴും