

**Voice Disorder Outcome Profile (V-DOP) – Adaptation and  
Validation in Telugu**

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University Of Mysore

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May, 2017

## **CERTIFICATE**

This is to certify that this dissertation entitled “**Voice Disorder Outcome Profile (V-DOP) – Adaptation and Validation in Telugu**” is a bonafide work submitted in part fulfilment for degree of Master of Science (Speech-Language Pathology) of the student Registration Number: 15SLP029. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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## **CERTIFICATE**

This is to certify that this dissertation entitled “**Voice Disorder Outcome Profile (V-DOP) – Adaptation and Validation in Telugu**” has been prepared under my supervision and guidance. It is also been certified that this dissertation has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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## DECLARATION

This is to certify that this dissertation entitled “**Voice Disorder Outcome Profile (V-DOP) – Adaptation and Validation in Telugu**” is the result of my own study under the guidance of Dr. R. Rajasudhakar, Lecturer in Speech Sciences, Dept. of Speech-Language Sciences, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

*Mysuru,*

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*Registration No. 15SLP029*

*Dedicated to my Amma and Nanna*

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## CHAPTER I

### INTRODUCTION

“Every human society, no matter how primitive has developed the ability to communicate through speech and our ability to communicate through spoken and written language has been cited as one single most important characteristic that sets the human apart from the animals”(Curtis,1978).

A good voice is a clear, resonant, stable, well supported by adequate breath control. It is at a pitch level that is appropriate to the speaker and the message. Rate of speech is such that messages are clearly understood. An effective speaking voice should have the following characteristics (Anderson, 1961) adequate loudness, ease and flexibility, clearness and purity of tone, a vibrant sympathetic quality, pleasing and effective pitch level, and ease of diction.

The larynx and all parts of vocal tract are changing throughout life and the voice reflects these changes. Some vocal features are the result of gross alterations such as the size of the vocal folds and the dimensions of the vocal tract, but there are the result of more subtle changes, such as the changing histology of the vocal folds and the timing of the neuronal impulses that initiate and regulate phonation.

The structure and the controlling mechanism of phonation are in the process of maturation for the first 20 years of life. From embryological stage to old age, maturation and subsequent decline of the anatomy, physiology and histology of the vocal tract and its related systems results in acoustic changes in the voice.

The physiology of voice production is remarkably complex. Preparations are made in the cerebral cortex of the brain for production of voice. Other major brain centers of

the brain are responsible in sending adequate impulses to the nerves and muscles of larynx required for phonation. Kinesthetic and auditory feedback information are relieved by the brain and it tries to make subtle adjustments to control the voicing. Phonation involves a complex interaction between power source, oscillator and resonator. Power is generated by the lungs with the help of chest abdomen and back muscles whose combined action produces a high-pressure airstream. As the respiratory system is preparing to provide the airflow, the two vocal folds begin to approximate towards each other. Once they reach appropriate level of adduction, the airflow from the lung forces the vocal cords apart, an impulse of air escapes through the glottis, sub glottal pressure drops, vocal cords are sucked into adductory state, and the whole process repeats. Based on the voice thus produced, the brain maintains and alters impulses sent to the voice and respiratory musculatures. Rapid complex adjustments at the sub glottal level are necessary during phonation because the resistance in the vocal tract changes almost continuously as the vocal folds adduct and abduct during vibration.

The quasi-periodic complex tone produced by the “source” is then “filtered” by the vocal tract, as per the source-filter theory (Fant, 1960). The quality of the voice thus produced depends on the myoelastic properties of the vocal folds and the vocal tract. Communication via spoken language is hampered or even rendered impossible when the production of vocal sound is faulty. Since the voice is governed by such a complex set of dimensions, it is quite natural that it is affected by various intrinsic and extrinsic factors.

## **Factors affecting voice production**

### *Physiological factors*

Physical makeup of a person plays a significant role in shaping one's voice. The shape and size of the jaw, teeth, tongue and lips determine, in part the sounds that the person makes. Illness can affect the way voice is produced. Consistent vocal abuse through yelling, screaming, smoking and many other factors can temporarily or even permanently affect one's voice. Vocal nodule is one of the commonly seen conditions affecting voicing in singers, actors, teachers, athletic coaches, cheerleaders, and others who strain their voices (Schutte, 1980).

The vocal apparatus begins to deteriorate due to aging process. Vocal folds become thinner and tighter in men accounting for increased fundamental frequency of voice with advancing age (Hollien and Ship, 1972). On the other hand, the vocal folds become thicker and loose in women, which explains the lowering of fundamental frequency of voice with advancing age, and lead to hoarse voice (Greene and Mathieson, 1989). Flexibility is reduced with age (Biever and Bless, 1989; and Aronson, 1990). Diet and medications can also affect the voice by dehydrating the mucus lining and vocal folds (Sataloff, 1997).

### *Psychological factors*

Voice production is not only influenced by the psychological status of an individual. For example, extroversion may be indicated by the use of a marked pitch range ; nervousness may be by the use of high habitual pitch while nasality may be linked to neuroticism (Street and Hopper, 1982).

There are some evidences to link certain qualities of voice to depression, anxiety and loss of hope. With the low habitual pitch, narrow frequency range and a slow speech rate has been thought to be associated with depression, while anxiety is thought to be associated with a fast speech rate, breathy and irregular voice (Gudykunst, 1986). Likewise, stress and strain can be indicated by high pitched harsh voice (Deary, Wilson, Carding and Mackenzie, 2003).

### *Environmental factors*

The physical and psychological factors influencing voice assume greater significance if the speakers have a difficult speaking-environment. The effects of physical and psychological factors on voice are compounded when one has to use voice in a large, dusty or polluted hall or theater, which has poor acoustics, poor amplification and/or high noise levels. Lectures and speech given in open fields in rural settings pose particular problems for speakers because, apart from the open air, the speakers also have to encounter dusty situations (Schutte, 1980).

Voice disorders arise when an individual's quality, pitch or loudness differs from voice characteristics of a typical speaker(s) of age, gender, cultural background and geographical location, or when an individual indicates that his/her voice is not sufficient to meet daily needs, even if it is not perceived as deviant from others (Stemple, Glaze, & Klaben, 2004). The range of etiologies of voice disorders is large and these differences may result from a variety of factors. Structural, medical and neurologic alterations of the respiratory, laryngeal and vocal tract mechanisms, maladaptive or inappropriate voice use may create a voice disorders.

For humans, voice plays an important role in the process of communication. Therefore, any impairment in the normal mechanism of voice production can cause



significant disability to an individual in performing routine and important activities. If the voice problem is untreated it will result to voice handicap.

Voice disorders can be divided into three main categories: *organic, functional, or a combination of the two*. A voice disorder can be termed as organic if the cause is structural or physiologic. It can be due to a disease of the larynx by itself or by remote systemic or neurologic diseases that may alter laryngeal structure or function.

Structural lesions of the larynx can occur in any of the tissues of the larynx and vocal folds. These lesions have a wide variety of causes including congenital conditions, injury, systemic diseases, infectious and inflammatory conditions, and phonotrauma. Lesions can interfere with phonation. Some structural disorders interfere more with respiration than with phonation and some affect both the functions.

Some of the voice disorders with neurologic involvement occur in isolation whereas others are a symptom of a larger disease process eg. Dysarthria.

*“Psychogenic Voice Disorder* occurs in the absence of structural or neurological pathology sufficient to account for the voice difficulty, with onset and maintenance of the voice difficulty caused by disturbed psychological processes.”

In the literature and in the clinic, group of voice disorders that occur without organic laryngeal pathology, the terms functional, Psychogenic, psychosomatic and nonorganic are used synonymously

Nature and degree of voice use shows the impact on voice across all dimensions of the person's quality of life. Vocational demands can be critical if the individual gives a large number of presentations, spends a significant amount of time on the telephone, in meetings or other group situations, is a performer or, works in a noisy environment.

Recreational activities such as amateur or professional singing or acting, attending sports events and concerts, cheerleading, or coaching can all tax the vocal mechanism. The degree to which the effect of voice disorder on ones' daily activities may vary significantly depending on the severity of the voice disorder. It may also depend on the voice needs of the patient. Several self-perception tools which are standardized are available to evaluate the effect of voice disorders on the daily activities.

As stated by World Health Organization (WHO), the evaluation of health before and after therapy outcomes are not adequate to specify the severity of disease, rather assessing the quality of life is necessary to compile in overall assessment. A common method in order to evaluate quality of life is questionnaires; Quality of life measurement is one way to assess the overall outcome of the physical, mental, and social well-being of a patient after a health-related problem.

India has diverse languages and dialects. In the recent years, Indians are majorly dependant on their voices for their daily living. One who use voice as a major source of earning for daily living include politicians, singers, teachers, sales persons, actors, and street vendors. Noise and dust pollution (poor ambience), lack of acoustic amplification, poor life style such as spicy foods, excessive consumption of coffee, tea, and carbonated soft drinks, the tropical climate, and excessive voice use are some of the factors that increase individual's susceptibility to voice problems in the Indian context (Prakash et al., 2008). For example, a person selling food in a public railway station has to increase his vocal loudness above the noise of the loud trains and the crowd, in the dusty environment for long hours. A full-time school teacher is likely to teach an average of about 30 classes per week and the duration of each class would be about 40 minutes (Prakash et al., 2008). Classrooms typically have about 30–40 students and no amplification systems are provided. The above mentioned factors are

likely to differ across cultures, socio-economic status, occupation, environment and life style. Hence, there is a need to develop a specific tool in every Indian language that addresses all these factors.

### **Need for the present study**

There is ample number of Quality of life measuring tools available in Western cultures. But in Indian context, only in two Indian languages the Quality of life questionnaires is available in Kannada and Tamil languages. There is no Quality of life assessment tool for voice disorders in Telugu language. There is a need to assess individual's self perception of voice problems in Telugu population.

Telugu language is one of the Indo- Dravidian language, which is widely spoken in south India, in the states of Andhra Pradesh and Telangana. Worldwide there are 70 million people who speak Telugu as their native language and 5 million people use Telugu as their second language [Data source: *Ethnologue: Languages of the World*, 15th ed. (2005)]. There is a need to assess the impact of voice problems on the quality of life in the widely Telugu speaking population.

### **Aim of the Study:**

To adapt and validate the Voice Disorder Outcome Profile (V-DOP) in Telugu.

### **Objectives of the study:**

- (i) To adapt and translate the English version of the Voice Disorder Outcome Profile (V-DOP) into Telugu language.
- (ii) To validate the Voice Disorder Outcome Profile V-DOP in Telugu language.
- (iii) To compare the V-DOP scores between individuals with voice disorder and phononormal individuals.

## CHAPTER II

### REVIEW OF LITERATURE

The need for a communication is achieved through spoken language and it is the voice that is modified to achieve speech sounds. The ability to use vocal system to express feelings, describe an event and to establish communication is very unique to human beings. Boon (1977) considers the act of speaking as a very specialized way of using the vocal mechanism, demanding a combination or interaction of the mechanisms of respiration, phonation, resonance and articulation.

The underlying basis of speech is voice. According to Green (1964) “voice plays the musical accompaniment to speech rendering it tuneful, pleasing, audible and coherent and is an essential feature of efficient communication by spoken word”. The speaking voice conveys information about the individual who is speaking and the quality of voice serves as an important means by which speakers portray to the world, their physical, psychological and social characteristics.

Occupational voice health is becoming more important as more people depend on their voices for their work. Due to their nature of work and life style, professional voice users are more susceptible to laryngeal pathologies than the general population (Stemple, Glaze and Gerdeman, 1995).

The impact of a voice disorder on professional voice users is twofold. It not only causes vocal symptoms that are characteristic of the disorder, it also carries with it a high level of emotional strain and anxiety. This anxiety may be caused by the disorder’s potential impact on the person’s reputation, the ability to meet professional commitments, or simply the ability to perform his or her job. These concerns and

anxieties add to the actual causes of the voice disorder and must also be addressed in a positive manner within the vocal management program.

Voice assessment is necessary in management of voice disorders. It has 4 primary purposes: to arrive at a diagnosis, to determine underlying cause, to facilitate planning of voice treatment, and to evaluate outcomes of treatment. Overall, voice assessment focuses on acoustical, perceptual, aerodynamic, instrumental, and quality of life evaluation.

Historically voice assessment was limited to auditory-perceptual assessment; with advancement in technology, the instrumentation for voice assessment becomes more popular, and user friendly. Computer assisted voice analysis programs can complete the analysis and present the results in the form of numbers in few seconds, but clinicians should not rely on numerical values alone. Clinicians should know what the parameters are assessing and interpret the results accordingly in relation to laryngeal anatomy and physiology (with respect to different clinical population).

Whenever clinician assesses the vocal function, *a combination of invasive, acoustic, perceptual and aerodynamic evaluations* must be carried out to get a holistic view of vocal functioning.

In order to objectively evaluate voice: first step in the voice evaluation is a thorough history and examination of the interior of the larynx; the oral, pharyngeal, and nasal cavities; and the head, neck and chest.

Some of the *invasive methods* which are used for observations of vocal function are as follows: *Endoscopy, Stroboscopy, Kymography, Cinematography etc.*,

These techniques can help us obtain information about the exact function of the larynx, including photographic, photoelectric, impedance, and acoustic methods. They provide a close-up view of the relatively fine details of the movement and contact patterns of the vocal fold themselves. Hence, the value of these techniques to the therapist is high. Progress can be evaluated throughout the therapy. The laryngological examination and voice evaluation are inseparable and interdependent.

#### *Acoustic Assessment*

Speech and voice measures rely on three events: signal detection, signal manipulation, and signal reconversion. In the three processes, the physical phenomenon, whether it be a sound (sustained vowel) or a physiologic event (e.g. air pressure, muscle movement) is detected and input by a device, such as a microphone, camera, electrode, pressure transducer, or flow meter. It is further manipulated in some manner, such as filtering, amplification, or digitization, for use with a specific type of equipment or analysis routine; then the same is reconverted for output and display in some readable form, such as numerical value, oscilloscope tracing, or speaker.

The basic acoustic analysis would give the following measures: (a) Fundamental frequency (F0), (b) Intensity, (c) Perturbation measures, (d) A ratio of signal (or harmonic) energy to noise, and (e) Spectral features.

Some of the non invasive methods which are used for observations of vocal function are as follows: *LTAS, Electroglottograph, Spectral analysis, MDVP, Dr.Speech, PRAAT etc.,*

### *Aerodynamic Evaluation*

Aerodynamic evaluation of voice provides: (i) information related to the efficiency of valving of the glottis during phonation and the respiratory capacity, (ii) insight into speech system dysfunction & efficiency, (iii) get adequate information about the neuromuscular control of respiratory mechanism, (iv) improving the precision of initial diagnosis, (v) documenting the changes during therapy, and (vi) providing bio-feedback to the patient.

There are 15 general parameters of aerodynamic measures that are reported in the literature. They are peak air flow, airflow volume, mean air pressure, vital capacity, maximum duration of sustained blowing, mean air flow rate, phonation quotient, maximum phonation time, s/z ratio, phonation volume, adductor / abductor rate, sound pressure level range, mean glottal power, mean glottal efficiency, and mean glottal resistance. While the first five give information on the function of respiratory system, the remaining measures provide information on the coordination of respiratory and laryngeal systems.

### *Subjective evaluation of aerodynamic measures*

Many times, the question of whether the patient is using the respiratory system efficiently enough to have functional communication can be answered through careful observation of the patient while he or she performs the following four tasks: (a) Read aloud a standard paragraph; (b) Sustained vowel production (to measure Maximum Phonation Time – MPT); (c) Sustained s/z production task; and (d) Endurance for sustained speech production.

Activities for objective evaluation of respiratory coordination are; (i) Mean Air Flow Rate (MAFR); (ii) Estimated Subglottal pressure (ESGP); (iii) Laryngeal airway resistance (LAR); (iv) Laryngeal airway conductance (LAC); (v) Phonation Threshold Pressure (PTP); and (vi) Phonation quotient (PQ).

## INSTRUMENTS

*Air pressure:* It is a measure of force over area ( $P = F/A$ ). Instruments used to measure air pressure are (i) Manometer; (ii) U-tube manometer; (iii) Air-gauge manometer; (iv) Aneroid Gauge Manometer; (v) Bourdon Gauge Manometers; (vi) Water Bubble Manometer; and (vii) Pressure transducers (Mechanical-Electrical Manometers).

*Airflow:* It is the measure of movement of volume (quantity) through a given area in a unit time. Liters or milliliter per sec is the commonly used unit. Instruments used for air flow measurements are: (i) Pneumotachograph; (ii) Warm wire anemometer; and (iii) Electro- aerometer.

*Air volume:* The amount of air consumed during the act of speaking relative to the amount left in lungs. Instruments for lung volume measurements are: (i) Plethysmograph; (ii) Spirometer (wet spirometer and dry spirometer); (iii) Spirometer RMS Helios 701; (iv) RMS Helios 501; (v) Aerophone II; and (vi) Aeroview.

### *Perceptual voice evaluation*

Human ears have ability to identify and recognize the speaker's voice. A trained voice clinician is often able to determine the causative pathologies on the basis of psychoacoustic impression of voice (Hirano, 1975). Perceptual voice evaluation is an integrated process of listening to and describing a particular voice. The clinician



needs intensive training in voice dimensions that identify pathology most effectively. Perceptual rating of voice quality is universally acknowledged as difficult task and one requires considerable experience in perceptual judgments. Voice quality may be considered as the perceived result of coordinated action of the various systems. The perceptual importance of different aspects of voice depends on context, attention, a listener's background and the listening task (Kreiman, Garratt, Kempster, Erman & Berkae, 1993).

In the literature, there are varieties of perceptual scales described and reliability of the data varies from study to study. There are no reliable verbal terms defining vocal characteristics. Significant correlation between frequency perturbation and perceptual qualities such as instability, flutter, roughness, diplophonia and creakyness/vocal fry were found. Hammerberg, Fitzell, Gauffin and Sundburg (1986) concluded that perceptual evaluation by well trained listeners is reliable and reproducible and can be used for systematic evaluation purposes, if handled with precaution. These authors further concluded that voice quality can be more precisely perceived, if description about the professional terminologies were given to the listener.

The reliability of perceptual voice evaluation can be improved by (Sarita, 2000),

- Operationally defining the voice parameter to be evaluated.
- Illustrating the voice quality parameters by samples of audio recordings.
- Searching for acoustic and physiological correlates of perceptual parameters.

Hammerberg et al. (1986) pointed out that perceptual voice evaluation by clinically well trained listeners can be reliable if based on standardized rating procedure and that training for voice therapists can be more effective if perceptual acoustic relationships are identified.

In literature, there are many types of perceptual rating scales available for the judgement of the voice disorders. And they are Categorical rating scale, Equal Appearing Interval (EAI) scales, Visual Analog Scale (VAS), Direct Magnitude Estimation (DME) or Paired Comparison. The other scales that were developed are; The Voice Profile (Wilson, 1987); The Voice Profile Analysis Protocol (Laver, 1980); The GRBAS scale (Committee of phonatory function tests of the Japan society and Logopedics and phoniatrics (Hirano, 1981)); Buffalo III Voice Profile (Wilson, 1987); and The Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V) (ASHA, 2002).

### **Assessment of voice related quality of life**

Ma and Yiu (2007) conducted a study where in the application of the ICF in voice disorders was highlighted. The aim of this article was to describe the consequences of voice disorders based on the World Health Organization's International Classification of Functioning, Disability and Health (ICF). It described voice disorders under the four pivotal components of the ICF: Body Structures, Body Functions, Activities and Participation, and Contextual (Environmental and Personal) Factors. Using the ICF framework, the study also described the assessment and treatment tools for voice disorders.

### *Need for voice related Quality of life assessment*

Development of the tools that can be used by a patient to communicate their feeling and impressions to clinicians about the impact of the voice disorder has on their lifestyle. The domains of lifestyle can be defined as in terms of activities of the daily living, communication ability, and quality of life, among other. A tool that defines these impacts on a patient and/or their family needs beyond the immediate

impairment. It is not uncommon for clinicians to underestimate the difficulties their patients are having, so any means to improve clinician awareness of such problems will ultimately enhance communication and patient care.

### *ICF and Voice Disorders*

The impact of voice disorder on an individual is more than a mere visible abnormality of the larynx or audible deviant voice quality. The daily function of an individual are often affected as well.

### *Impairment, Activity Limitation, and Participation Restriction:*

The WHO first proposed International Classification of Impairments, Disabilities and Handicaps (ICIDH) framework by in 1980 to describe disablement in three levels of experience as a consequence of disorder. These three levels are impairment, disability and handicap.

*Impairment* refers to the impact on bodily function. For example, a nodule on a vocal fold may cause impairment in vocal fold closure. *Disability* is defined as the impact on performance due to impairment, and *handicap* is the impact of the impairment or disability on social, environmental, or economic functioning. A salesperson with a vocal nodule who cannot speak loudly enough when talking to customers can be considered as having a form of disability. If the salesperson is required to change his or her job because of the inability to speak loudly, this occupational consequence and the economic consequences that follow are regarded as handicaps. Using the modified and new ICIDH-2 model (WHO, 1997), help the clinicians to differentiate between the two dimensions in voice disorders, i.e. the problem is due to activity-limitation dimension or due to participation-restriction dimension. If the problems are due to the

activity-limitation dimension, the activities could then be modified. If, however, it is related to participation restriction, one might aim to facilitate participation through counselling. Hence, limiting from the activities and restriction from participating in social contexts are the major concerns posed due to voice disorders.

#### *Voice Disorders and Body Structures and Functions*

Under the ICF, voice impairments are described in terms of impairments in body structures body functions. Body structures are the “anatomical parts of the body” [Aronson, 1990]. Vocal fold with bilateral nodules is an example of Body Structures impairment. Body functions are the “physiological functions of body systems (including psychological functions)” [Aronson, 1990]. An individual with a voice disorder may exhibit deficits in terms of loudness, vocal quality in production of voice. This also included Psychological consequences. The emotional reactions that the individual with dysphonia experiences because of the vocal deficits can be classified under personality and emotional functions. They define limitations of voice activity as the “barriers for the adequate voice activities,” and voice participation restrictions as “reduction of voice activities by an individual”.

ICF helps in understanding how environmental factors facilitate or hinder the functioning of individuals with dysphonia and then it also guides therapeutic directions as to how the environments should be modified to facilitate participation in the tasks. It also provides a comprehensive list of environmental factors.

#### *Voice Disorders and Contextual Factors*

Contextual Factors include both Environmental factors and Personal Factors components. They can externally influence (Environmental Factors) or internally

influence (Personal Factors) on the individual's functioning and disability (Aronson, 1990).

### *The ICF and Assessment of Voice Disorders*

An effective clinical voice assessment should comprehensively document the impacts of dysphonia on the individual. Traditional voice assessment batteries focus mainly at the impairments of laryngeal structures and functions, with little emphasis on the functional impacts on the dysphonic individuals and their quality of life. The ICF provides an excellent framework for extending voice assessment from merely an impairment approach to a more holistic approach by taking all the four ICF components: (1) Body Structures, (2) Body Functions, (3) Activities and Participation, and (4) Contextual Factors (both Environmental and Personal) into consideration (Verdolini, 2000). It is important to ask patients to fill out handicap scales and quality of life scales at the time of the initial assessment in order to gauge influence of the disorder. It is also equally important to have the patient fill out questionnaires, during the course of treatment, as an indicator of improvement or deterioration in status.

Some Quality of life measuring tools available for Western cultures include the Voice Handicap Index (VHI) by Jacobson, Johnson, Grywalski, Silbergleit, Jacobson, Benninger and Newman (1997), Voice Outcome Survey (VOS) by Richard, Robert, and William (1999), Voice-related Quality of Life (VRQOL) by Hogikyan and Sethuraman (1999), Voice Activity and Participation Profile (VAPP) by Ma and Yiu (2001), Pediatric Voice Outcome Survey (PVOS) by Hartnick (2002), the Voice Symptom Scale (VoiSS) by Deary, Wilson, Carding, and MacKenzie (2003), and Voice Handicap Index-10 (VHI-10) by Rosen, Lee, Osborne, Zullo, and Murry

(2004). In India Konnai, Jayaram, and Scherer (2010) developed a culturally sensitive tool, Voice Disorder Outcome Profile (VDOP) in English and Kannada version. In 2014, Mahalingam, Boominathan, and Subramaniyan developed a Tamil version of voice disorder outcome profile (VDOP). The self-assessment about how much can a voice problem affect the quality of life provides important data for the diagnosis of voice quality.

Jacobson et al. (1997) developed a tool named Voice Handicapped Index (VHI), the purpose of the study was to develop a psychometrically handicap inventory that can be used for patients with voice disorders. In the methodology the authors investigated in 3 steps. In the 1<sup>st</sup> step they developed a scale, in 2<sup>nd</sup> step test-retest measurement was done, and in the 3<sup>rd</sup> step they checked the relationship of VHI scores to voice disorder severity. They included 65 adults patients from voice clinic with mean age of 52.3 years. The patients were diagnosed with different voice disorders by otolaryngologist and speech language pathologist. The items of the VHI was developed according to patients case history interview, initially authors were developed 85 items. 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; where “0” indicate “never” and “4” indicate “always”. The 85-item preliminary version of the VHI was reduced to a 30-item final version. The final version consisted of a 10-item in each of the subscale (functional, emotional, and physical). Authors found that the VHI items had good internal consistency, reliability and test-retest stability. Implications of the study is to educate the patients regarding the treatment process, and to understand the implications of voice problems in their own daily living and functioning contexts, and to change their

behavior motivation. It can be used to evaluate the efficacy of various voice disorder managements.

Gliklich et al. (1999) validated a voice outcome survey in unilateral vocal cord paralysis patients with unilateral vocal cord paralysis (UVCP). The aim of the study was to develop and validate the Voice Outcome Survey (VOS). 56 subjects were without UVCP and 61 subjects were with UVCP were undergone the VOS process, 5-item questionnaire with a single score. Mainly for unilateral vocal fold paralysis. The VOS gives a patient based evaluation of quality of life.

Hogikyan and Sethuraman (1999) have presented a measure of voice related quality of life (V-RQOL) in a population of 109 patients with voice disorders and 22 phononormal individuals. It consists of a 10 items and the items were divided into two domains; 6 questions in Physical Functioning domain and 4 questions in Social-Emotional domain. Mean increments of 15-20 point separate different stages in the degree of self perceived voice quality improvement following treatment. The authors reported that V-RQOL was reliable, valid, and responsive, and it carries a low burden. Measurement of V-RQOL is a valuable addition to the evaluation of dysphonic patients and their treatment outcomes.

Ma & Yiu (2001) developed a Voice Activity and Participation Profile (VAPP). The 28-items assessment tool was designed to evaluate the perception of voice problem, activity limitation and participation restriction, based on the International classification of Impairments, Disabilities and Handicaps-2 Beta-1 concept (WHO, 1997). The questionnaire was administered on 40 subjects with dysphonic, 40 control subjects with normal voices. Results showed that the dysphonic group reported significantly more severe problem, limitation in daily voice activities and restricted

participation in these activities than the control group. The study also showed that the perception of a voice problem by the dysphonic subjects correlated positively with the perception of limitation in voice activities and restricted participation. However, the self-perceived voice problem poorly correlated with the degree of voice quality impairment measured acoustically and perceptually by speech pathologist. The data also showed that the aggregate scores on activity limitation and participation restriction were positively correlated.

Rosen et al. (2004) conducted a study on Development and Validation of the Voice Handicap Index-10. The objective was to develop an abbreviated voice handicap assessment instrument and compare it with the Voice Handicap Index (VHI). They designed the study to validate the abbreviated VHI as well as item analysis of the VHI in individuals with and without voice disorders also the authors held the clinical consensus review of the VHI items to prioritize the clinical value of each of the VHI items (30 items in all). To do Item analysis of the VHI, they used the VHI responses of 100 patients with voice problems and 159 control subjects. The 10 most robust VHI items were selected using the item analysis and clinical consensus results to form the Voice Handicap Index-10 (VHI-10). Statistical analysis comparing the validity of the VHI-10 with the original 30 item- VHI was performed with 819 patients representing a wide spectrum of voice disorders. Authors found that in Statistical analysis of the VHI-30 and VHI-10 scores from the study group showed no statistically significant differences between the VHI-30 and the VHI-10. Irrespective of diagnosis, the correlation between the VHI-30 and the VHI-10 was greater than 0.90 ( $P < 0.01$ ). The ratios of the VHI-10 to VHI-30 scores for a variety of voice disorder categories were analyzed and found to be consistently 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 which takes less time for the patient to complete without loss of validity. Thus, the VHI-10 can replace the original VHI-30 as an instrument to quantify.

*Singing Voice Handicap Index (SVHI)* developed by Cohen et.al (2007), to evaluate the voice problems impact on singers. They were consisted 112 dysphonic and 129 normal singers. The age range was 16 to 67 years. This study included professional and nonprofessional singers, of all type of singing styles. It consisted of 36 items which address the physical, social, emotional and economical effect of singing voice problems. It is a 5-point rating scale ranging from” never” (score of 0) to “always” (score of 4). Total score is 144 and can be administered for all styles of singing. It was reported that the SVHI treatment responsiveness correlated well with that of the VHI which was administered concurrently. Later it was modified by Cohen et al (2009) as *singing voice handicap index-10 (SVHI-10)* with 10 items as part of the questionnaire with single score for each item and total score was 40.

In India, Konnai et al. (2010) developed Voice Disorder Outcome Profile (VDOP) in English and Kannada version. The objective of the study was to develop a culture specific Quality of Life measurement instrument for individuals with voice disorders in India. In the study, authors have taken 4 sets of individuals. Set 1: included 10 SLPs, 10 masters students of SLP, and 5 patients with Dysphonia. Set 2: included of 10 SLPs and five masters students, who were not participated in set one. Set 3: Authors have included 42 individuals with current Dysphonia and 30 were control group. Age of individuals in both the groups was ranged from 18–60 years. The control subjects were normal voice individuals. The subjects with Dysphonia were

diagnosed with a voice disorders. Set 4: They also considered 1 linguist and 5 normal adult bilingual speakers. They were proficient in both English and Kannada languages, which incorporated in set 4. They helped in translating and verifying the translation of the English version of Voice-DOP into Kannada. First, Voice-DOP was developed in English and they translated into Kannada. Voice-DOP of Kannada had 32 questions under three domains such as physical, functional and emotional. Then they administered the Voice-DOP in both groups, and they obtained the scores. And they evaluated the reliability and validity of the Voice-DOP. Findings showed that Voice-DOP had higher internal consistency (Cronbach's alpha levels from 0.49 to 0.84) and high test-retest reliability ( $r= 0.96-0.99$ ). Voice-DOP distinguished the clinical group from the normal group, and correlations between co-efficient varied between 0.49-0.87 and the domain scores, results indicated appropriate construct validity. Concurrent validity was revealed a significant correlation ( $r= 0.51$ ) between the Voice-DOP scores and the severity scores of the Dysphonic individuals. Correlation between males and females, Voice-DOP scores exhibited no significant difference between them. Authors concluded that the Voice-DOP was a reliable and valid measurement tool. Limitations of the study were that the patients needed more explanation about the visual analog scale, many of them found it difficult to visualize their responses on a 10-cm line. Second limitation was some of the questions in the emotional domain were understood as repeated due to inadequate discrimination between the words. "No option" or not applicable response was not mentioned in the Voice-DOP. The questions under "job" in the functional domain were not applicable if female subject who are home makers, these questions may not be applicable.

Later in 2014, Mahalingam et al. developed a Tamil version of voice disorder outcome profile. The purpose of the study was to translate and validate Voice

Disorder Outcome Profile (V-DOP) in Tamil from Kannada. 75 Dysphonia subjects were included in the clinical group; all were diagnosed by an Otolaryngologist and a speech pathologist as having voice problems. 20 individuals with no voice related problems were included in nonclinical group. This study was conducted in two phases: the English language V-DOP was adapted and translated into Tamil language. Then they given the translated version to 5 individuals who were proficient in Tamil language, they verified the translated version for appropriateness of meaning and usage. The expert individuals in Tamil language were given comments and suggestions were incorporated and finalized the V-DOP. Finalized Tamil version of V-DOP was administered on subjects of both groups for reliability and validity measures. The overall Cronbach coefficient for a V-DOP was 0.89 and the mean total V-DOP score was “0” for the normals and 104.28 for the dysphonic individuals (SD =64.71). The emotional and functional domains were followed by the physical domain revealed a statistically significant correlation with the total scores. The authors concluded that the self-perception measure VDOP in Tamil was a reliable and valid instrument for measuring the impact of voice disorders in Tamil-speaking population.

Individuals' vocational demands can increase the nature and degree of voice usage. It shows the impact on person's quality of life across different dimensions in their life. There is an availability of several self perception measuring tools which is standardized to assess the impact of vocal difficulties on the daily activities. World health organization suggested assessing the health problems before-after the therapy is not enough to give the severity of the disorder, rather measuring the quality of life is also necessary part in the assessment. There are several western culture tools available to measure the quality of life. In Indian culture only two quality of life assessment

tools are there; one in Tamil and another in Kannada language. There are 70 million people who speak Telugu language in world wide. No quality of life measurement tools available in Telugu language. There is a need to evaluate vocal difficulties and the impact on their quality of life in Telugu speaking population.

### **Objectives of the study**

1. To adapt and translate the English version of the Voice Disorder Outcome Profile (V-DOP) into Telugu language.
2. To validate the Voice Disorder Outcome Profile V-DOP in Telugu language.
3. To compare the V-DOP scores between individuals with voice disorder and phononormal individuals.

## **CHAPTER III**

### **METHOD**

#### **Participants**

Two groups of subjects were participated in the study. Group-I consisted of 35 participants with voice disorders and group-II consisted of 60 phono-normal individuals. The age of participants in the two groups ranged from 18 to 60 years.

#### **Inclusion criteria for group-I**

1. These subjects had history of voice problems.
2. Subjects were diagnosed as having voice problems by an Otolaryngologist/ Speech pathologist.

#### **Inclusion criteria for group-II**

1. Subjects did not have any history and/or complaint of voice problems/difficulties.
2. Subjects did not have any upper respiratory tract infection at the time of the study.

#### **Common criteria**

1. Subjects should know to read, write and speak both languages; Telugu (L<sub>1</sub>) and English (L<sub>2</sub>).
2. Both the group of subjects was recruited from the state of Andhra Pradesh and Telangana.

#### **Procedure**

The present study consisted of two phases; Phase-I is translation of voice disorder outcome profile (V-DOP) from English to Telugu. Phase-II is measuring the reliability and validity of the V-DOP in Telugu.

### **Phase-I: Translation of voice disorder outcome profile (V-DOP) in Telugu**

Phase-I has 3 steps; in step-1 the V-DOP developed by Konnai et al. (2010) in English was adapted in this study. The experimenter translated the English version of V-DOP into Telugu, who knows both English and Telugu languages to read, write and speak. In step-2, translated version of Telugu V-DOP questionnaire and original English version of V-DOP questionnaire was given to a Telugu professor who has completed Ph.D in Telugu literature and was proficient in reading, writing and speaking in both languages (Telugu & English). The professor was asked to check and verify the appropriateness, adequacy, accuracy, and ambiguity of words and sentences in each of the question in Telugu translated V-DOP questionnaire. After verifying the Telugu version of V-DOP, a few minor corrections were suggested by the professor and the same was incorporated and thus, a pre-finalized Telugu version of V-DOP was ready. Two Speech Language Pathologists (SLPs) who had more than 3 years of experience in assessing and treating voice disorder patients participated in step-3. Both the SLPs know Telugu and English languages to read, write and speak. Pre finalized Telugu version of the V-DOP was given to them and were asked to do “Reverse translation” i.e., Revert back to English of the translated Telugu V-DOP. The experimenter compared Konnai et al.’s (2010) English version of V-DOP questionnaire with the reverse translated English version of V-DOP questionnaire by both SLPs and found 95% agreement between the two. These procedures ensured that the translated V-DOP in Telugu questionnaire has appropriateness interns of choice of words, sentence structure and meaning. Thus, the pre-final Telugu V-DOP was finalized after these 3 steps to use it for further validation process (phase II). Final version of the Telugu V-DOP questionnaire was shown in appendix I.

## **Phase-II: Measurement of reliability and validity of the V-DOP in Telugu**

Phase-II was carried out with series of steps such as; (a) Administration of Telugu V-DOP questionnaire, (b) Measuring the validity of Telugu V-DOP questionnaire and (c) Measuring the reliability of Telugu V-DOP questionnaire.

### **a) Administration of Telugu V-DOP**

Telugu V-DOP questionnaire has 32 questions. These 32 questions were grouped under three domains such as: physical, emotional, and functional domains. The functional domain has three sub-divisions which include; (i) job, (ii) daily communication, and (iii) social communication. Participants were instructed to give severity ratings of their voice problems which they may face in their daily living by putting an 'X' mark on a 10 cm line that is a visual analog scale (VAS). On the 10 cm line towards the extreme left side indicate "*never*" and towards the extreme right side indicate "*always*". If the individual mark the 'X' extremely towards the left side it indicates normal if the 'X' mark is extremely towards the right side means it indicates severe voice problem. There was an option of "not applicable" under each question, if the participants felt a question is not applicable to them then they can choose this "not applicable" option.

The objectives of the present study were explained to the participants. Both oral and written consent were obtained from them (Appendix II). The translated version of the V-DOP in Telugu was administered to group I and group II participants individually for marking the symptoms on a VAS of 10 cm. Table 1 shows the details of the participants of group I.

Table 1.

*Number of voice disorder patients and its types between male and female participants of group I*

Diagnosis	Number of patients		
	Males	Females	Total
Puberphonia	10	0	10
Aphonia	1	0	1
Low loudness	1	0	1
Harsh voice	0	1	1
Hoarse voice	2	1	3
Breathy voice	2	3	5
Glottic chink	1	0	1
Unilateral vocal fold paralysis	2	2	4
Vocal nodules	1	1	2
Cyst in left side	1	0	1
Sulcus vocalis	2	0	2
Vocal polyp	1	1	2
Squamus cell carcinoma	2	0	2
<b>Total</b>	<b>26</b>	<b>09</b>	<b>35</b>

#### **b) Measuring the validity of Telugu V-DOP**

Validity of the Telugu V-DOP questionnaire was measured by administering it to both the group I and II.

#### **Scoring:**

In scoring, experimenter was measured the distance in centimeters from the left end of the line to the right end of the line. Total V-DOP consisted of 32 questions and each question carried maximum score '10' and minimum score '0'. If a subject rated a question as "not applicable" that was not considered for scoring. The total V-DOP scores were calculated by adding the three domains scores. The



maximum score of V-DOP would be 320 and minimum would be 0. The total V-DOP scores were compared between two groups using appropriate statistical methods.

### **c) Measuring the reliability of Telugu V-DOP**

To measure the reliability of the Telugu V-DOP, internal consistency and test-retest reliability were employed in the study.

*Internal consistency* of the Telugu V-DOP questionnaire was measured by correlating the individual item score to total V-DOP scores. The internal consistency of the V-DOP was estimated using item-to-total correlation and Cronbach  $\alpha$  coefficient

*Test-retest reliability* was measured by re-administering the Telugu V-DOP questionnaire on 10% of the participants in group II with a gap of two weeks. For re-administration, only 10 individuals of phono-normal individuals were considered. Owing to some difficulty in re-accessing the participants in group I, individuals with voice disorders were not included for test-retest reliability. As the participants in group I were (recruited) from outpatient departments in few hospitals, they did not follow-up for voice therapy in the period of data collection.

### **Statistical analysis**

*Descriptive statistics* – Mean, standard deviation and median scores of each item of Telugu V-DOP questionnaire were calculated for each individual in group I and II and then the scores were compared between the groups (domain specific as well as total V-DOP score). Non-parametric test was carried out for further statistical analysis. Mann-Whitney U test was performed for between group comparisons. Internal consistency of the Telugu V-DOP questionnaire was performed by using item-to-total

correlation and Cronbach coefficient  $\alpha$  for both groups. Test-retest reliability was measured by re-administering the Telugu V-DOP questionnaire on 10% of the participants with a gap of two weeks.

## CHAPTER IV

### RESULTS

The primary objective of the study was to adapt and translate the English version of the Voice Disorder Outcome Profile (V-DOP) questionnaire into Telugu language. The secondary objective of the study was to validate the Telugu V-DOP questionnaire. The tertiary objective of the study was to compare the Telugu V-DOP scores between individuals with voice disorder and phono-normal individuals. The study comprised of two phases. Phase I include translation of voice disorder outcome profile (V-DOP) questionnaire in Telugu and Phase II include the measurement of reliability and validity of the Telugu V-DOP questionnaire.

#### **Phase I: Translation of voice disorder outcome profile (V-DOP) in Telugu**

Translation of English version of V-DOP into Telugu language was done in Phase I by the experimenter. Appropriateness of the translation was evaluated by a Professor of Telugu literature. Professor suggested a few modifications after comparing the translated Telugu V-DOP and English V-DOP questionnaires and that was incorporated in the Telugu version of V-DOP (pre-final version). The pre-final Telugu V-DOP questionnaire was reverse translated into English by two SLPs who were experts in the Telugu 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 95% agreement was observed between the two. So, the pre-final Telugu V-DOP questionnaire was finalized and utilized further in the present study.

## Phase II: Reliability and validity of the V-DOP in Telugu

**Reliability measures of Telugu V-DOP:** The internal consistency of the Telugu V-DOP questionnaire was estimated using item-to-total correlation. Table 2 shows the item-to-total correlation (Cronbach's  $\alpha$  coefficient) across three domains of Telugu V-DOP questionnaire for group II.

Table 2.

*Item-to-total correlation of each Item of Telugu V-DOP questionnaire for Group-II (phono-normal individuals) using Cronbach's  $\alpha$  coefficient*

<b>Physical</b>		<b>Emotional</b>		<b>Functional</b>	
<b>Items</b>	Item-Total correlation	<b>Items</b>	Item-Total correlation	<b>Items</b>	Item-Total correlation
<b>1</b>	0.77	11	0.78	21	0.83
<b>2</b>	0.75	12	0.78	22	0.85
<b>3</b>	0.75	13	0.76	23	0.85
<b>4</b>	0.74	14	0.79	24	0.85
<b>5</b>	0.73	15	0.80	25	0.86
<b>6</b>	0.74	16	0.81	26	0.83
<b>7</b>	0.75	17	0.76	27	0.86
<b>8</b>	0.74	18	0.78	28	0.84
<b>9</b>	0.76	19	0.78	29	0.86
<b>10</b>	0.75	20	0.78	30	0.84
				31	0.85
				32	0.85

Results of item-to-total correlation revealed that the Cronbach's coefficient of Telugu V-DOP questionnaire for phono-normal individuals (group II) ranged from 0.73 to 0.86 for the 32 questions. The Telugu V-DOP items revealed a high item-to-total correlation ( $\alpha > 0.5$ ). Cronbach  $\alpha$  coefficients for physical and emotional domain are similar (0.8) and for functional domain, it is 0.9 for the phono-normal individuals (group-II).

Table 3.

*Item-to-total correlation of each Item of Telugu V-DOP questionnaire for Group-I (voice disorder) using Cronbach's  $\alpha$  coefficient*

<b>Physical</b>		<b>Emotional</b>		<b>Functional</b>	
<b>Items</b>	Item-Total correlation	<b>Items</b>	Item-Total correlation	<b>Items</b>	Item-Total correlation
<b>1</b>	0.95	11	0.90	21	0.87
<b>2</b>	0.94	12	0.90	22	0.87
<b>3</b>	0.94	13	0.90	23	0.86
<b>4</b>	0.95	14	0.89	24	0.87
<b>5</b>	0.94	15	0.90	25	0.88
<b>6</b>	0.95	16	0.91	26	0.88
<b>7</b>	0.95	17	0.91	27	0.87
<b>8</b>	0.94	18	0.90	28	0.87
<b>9</b>	0.95	19	0.90	29	0.89
<b>10</b>	0.95	20	0.90	30	0.88
				31	0.86
				32	0.87

Table 3 shows the results of item-to-total correlation of Telugu V-DOP questionnaire for patients with voice disorders (group I) ranged from 0.86 to 0.95. The Telugu V-DOP items revealed a high item-to-total correlation ( $\alpha > 0.5$ ). Cronbach  $\alpha$  coefficient for physical domain is 0.95; for emotional and functional domain it is 0.9 for individuals with voice disorder (group I).

## Validity measures of V-DOP

Table 4.

*Mean, standard deviation and median of each item in Telugu V-DOP for Group-II*

Items	Physical				Emotional				Functional			
	Mean	SD	Median	Items	Mean	SD	Median	Items	Mean	SD	Median	Items
1	1.90	2.11	1.00	11	0.32	0.77	0.00	21	0.48	1.15	0.00	
2	1.03	1.69	0.00	12	0.30	0.80	0.00	22	0.21	0.41	0.00	
3	0.35	0.84	0.00	13	0.48	1.44	0.00	23	0.21	0.41	0.00	
4	1.13	1.65	0.00	14	0.17	0.41	0.00	24	0.12	0.32	0.00	
5	1.10	1.85	0.00	15	0.43	1.74	0.00	25	0.57	1.14	0.00	
6	0.93	1.41	0.00	16	0.77	2.28	0.00	26	0.28	0.80	0.00	
7	0.68	1.28	0.00	17	0.57	1.29	0.00	27	0.68	1.53	0.00	
8	0.65	1.24	0.00	18	0.18	0.62	0.00	28	0.28	0.71	0.00	
9	1.90	1.92	2.00	19	0.17	0.49	0.00	29	0.55	1.18	0.00	
10	0.57	1.25	0.00	20	0.17	0.52	0.00	30	0.31	0.88	0.00	
								31	0.29	0.77	0.00	
								32	0.16	0.36	0.00	

Table 4 shows mean, standard deviation and median scores of each item of Telugu V-DOP questionnaire for the phono-normal individuals (group II).

Table 5.

*Mean, standard deviation and median of each item in Telugu V-DOP for Group I*

Items	Physical				Emotional				Functional			
	Mean	SD	Median	Items	Mean	SD	Median	Items	Mean	SD	Median	Items
1	6.29	2.92	7.00	11	6.46	2.68	7.00	21	3.22	2.64	3.50	
2	4.71	3.38	5.00	12	6.69	2.84	8.00	22	3.00	2.70	3.00	
3	4.63	3.60	5.00	13	6.00	2.93	6.00	23	2.44	2.91	2.50	
4	4.97	3.39	5.00	14	4.03	3.15	4.00	24	4.06	3.08	4.00	
5	6.43	2.97	7.00	15	3.71	3.01	4.00	25	3.77	3.40	3.00	
6	5.60	3.24	5.00	16	3.14	3.40	2.00	26	4.71	3.19	5.00	
7	5.63	3.00	6.00	17	4.86	3.58	5.00	27	5.17	3.27	5.00	
8	5.11	3.50	6.00	18	4.74	2.93	5.00	28	3.57	3.31	3.00	
9	5.69	2.90	5.00	19	3.89	3.33	4.00	29	4.89	2.80	4.00	
10	2.63	2.81	2.00	20	3.00	3.02	3.00	30	4.21	3.44	3.00	
								31	3.03	3.17	3.00	
								32	3.85	3.38	3.00	

Table 5 shows mean, standard deviation and median scores of each item of Telugu V-DOP for voice disorder patients (group I).

Table 6.

*Mean, standard deviation and median of each domain and total V-DOP score of group I and group II in Telugu*

<b>Domains</b>	<b>Group I</b>			<b>Group II</b>		
	<b>Mean</b>	<b>SD</b>	<b>Median</b>	<b>Mean</b>	<b>SD</b>	<b>Median</b>
<b>Physical</b>	51.68	26.96	61.00	10.25	8.99	9.50
<b>Emotional</b>	46.51	23.31	46.00	3.55	7.18	0.00
<b>Functional</b>	41.40	26.57	46.00	3.65	6.31	0.00
<b>Total</b>	139.60	69.46	147.00	17.45	18.52	10.50

Table 6 shows mean, standard deviation and median scores of each domain and total V-DOP score for group II (phono-normal individuals) and group I (voice disorder patients). The mean total V-DOP scores for the group II is 17 (SD=19). Also, the total median score for group II is 11. The mean total V-DOP score for group I is 140 (SD=69). Voice disorder patients (group I) 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 emotional and functional domain. Mean physical domain scores are higher then followed by functional and emotional domains in group II.

Table 7.

*Mean rank scores for group comparison (between I and II) for all items*

<b>Items</b>	<b>Group I</b>	<b>Group II</b>
	Mean Rank	Mean Rank
<b>1</b>	70.19	35.06
<b>2</b>	65.49	37.80
<b>3</b>	66.41	37.26
<b>4</b>	66.61	37.14
<b>5</b>	72.80	33.53
<b>6</b>	70.53	34.86
<b>7</b>	73.67	33.03
<b>8</b>	68.54	36.02
<b>9</b>	68.93	35.79
<b>10</b>	59.61	41.23
<b>11</b>	74.90	32.31
<b>12</b>	74.89	32.32
<b>13</b>	74.50	32.54
<b>14</b>	70.90	34.64
<b>15</b>	69.47	35.48
<b>16</b>	60.07	40.96
<b>17</b>	67.54	36.60
<b>18</b>	74.46	32.57
<b>19</b>	69.60	35.40
<b>20</b>	65.27	37.93
<b>21</b>	32.89	18.48
<b>22</b>	32.67	18.62
<b>23</b>	30.72	19.83
<b>24</b>	73.67	33.03
<b>25</b>	63.87	38.74
<b>26</b>	70.36	34.96
<b>27</b>	70.54	34.85
<b>28</b>	65.46	37.82
<b>29</b>	73.73	32.99
<b>30</b>	67.24	34.34
<b>31</b>	62.19	37.30
<b>32</b>	67.22	34.35

Table 7 shows the results of Mann Whitney U test where the mean rank scores for group I (Voice disorder patients) are higher than group II (phono-normal individuals).



Table 8.

*Results of Mann Whitney U test for group comparison for all items*

<b>Items</b>	<b>Mann-Whitney U</b>	<b> Z </b>	<b>Asymp. Sig. (2-tailed)</b>
<b>1</b>	273.50	6.05	0.000
<b>2</b>	438.00	5.00	0.000
<b>3</b>	405.50	5.66	0.000
<b>4</b>	398.50	5.27	0.000
<b>5</b>	182.00	6.95	0.000
<b>6</b>	261.50	6.31	0.000
<b>7</b>	151.50	7.29	0.000
<b>8</b>	331.00	5.95	0.000
<b>9</b>	317.50	5.72	0.000
<b>10</b>	643.50	3.66	0.000
<b>11</b>	108.50	7.91	0.000
<b>12</b>	109.00	7.99	0.000
<b>13</b>	122.50	7.79	0.000
<b>14</b>	248.50	7.04	0.000
<b>15</b>	298.50	6.65	0.000
<b>16</b>	627.50	3.84	0.000
<b>17</b>	366.00	5.84	0.000
<b>18</b>	124.00	8.01	0.000
<b>19</b>	294.00	6.75	0.000
<b>20</b>	445.50	5.72	0.000
<b>21</b>	101.00	3.94	0.000
<b>22</b>	105.00	3.91	0.000
<b>23</b>	140.00	3.14	0.002
<b>24</b>	151.50	7.84	0.000
<b>25</b>	494.50	4.78	0.000
<b>26</b>	267.50	6.78	0.000
<b>27</b>	261.00	6.53	0.000
<b>28</b>	439.00	5.50	0.000
<b>29</b>	149.50	7.42	0.000
<b>30</b>	281.00	6.35	0.000
<b>31</b>	452.50	4.99	0.000
<b>32</b>	281.50	6.53	0.000

Table 8 shows the results of Mann Whitney U test for group comparison of Telugu V-DOP scores. Mann Whitney U test revealed mean rank scores for group I (Voice disorder patients) are higher compared to group II (phono-normal individuals) in the

Telugu V-DOP questionnaire for all the 32 items (table 7). The higher mean rank score in group I indicate that group I individuals scored higher in Telugu V-DOP questionnaire. Higher scores in Telugu V-DOP of group I is statistically found to be significant at  $p < 0.01$  level for all the thirty two questions.

**Test-retest reliability:** Test-retest reliability was measured by re-administering the Telugu V-DOP questionnaire on 10 phono-normal individuals (>10% of participants in group II) with a gap of two weeks. Re-administered scores of Telugu V-DOP questionnaire showed 100% agreement between the two instances of administration (that is, first time and two weeks later).

## **CHAPTER V**

### **DISCUSSION**

The aim of the present study was to adapt and translate the English version of V-DOP into Telugu language and clinically validate the same. This procedure was carried out in three steps; (a) Translation of voice disorder outcome profile (V-DOP) to Telugu language, (b) Measuring the reliability of the Telugu V-DOP questionnaire and (c) Validating the Telugu V-DOP questionnaire.

#### **(a) Translation of voice disorder outcome profile (V-DOP) in Telugu (Phase I)**

Verification of the translated version of Telugu V-DOP was done by an expert (Telugu Professor) which was based on accuracy, appropriateness, adequacy and ambiguity of word choice and sentence structure and its meaning aspects. The translated version of Telugu V-DOP questionnaire has high agreement with the reversed translation version made by two SLPs. Thus, the final Telugu version of V-DOP questionnaire evolved and was used in the study.

#### **Reliability and validity of the V-DOP in Telugu (Phase II)**

##### **(b) Reliability of the V-DOP in Telugu**

The results of the present study revealed that the overall item-to-total correlation using Cronbach  $\alpha$  coefficient was 0.95 for the individuals with voice disorder (group I) and 0.86 for phono-normal individuals (group II) which indicated the Telugu V-DOP is a reliable measure to assess the impact of potential voice problems on quality of life in Telugu speaking population. The result of the present study is in consonance with the earlier findings of Konnai et al. (2010) and Mahalingam et al. (2014). The item-to-total correlation using Cronbach  $\alpha$  coefficient obtained for Kannada V-DOP questionnaire was varied between 0.49 to 0.84, as reported by Konnai et al. (2010).

Whereas, Mahalingam et al. (2014) found the item-to-total correlation using Cronbach  $\alpha$  coefficient for Tamil V-DOP questionnaire was 0.89. The present study found the item-to-total correlation using Cronbach  $\alpha$  coefficient for Telugu V-DOP questionnaire was 0.95 which is higher compared to the previous studies in voice disorder patients. The higher Cronbach  $\alpha$  coefficient and item-to-total correlation indicated Telugu V-DOP questionnaire has higher reliability compared to Kannada and Tamil V-DOP questionnaire.

### **(c) Validity of the V-DOP in Telugu**

The mean total V-DOP scores obtained in Telugu for group II (phono-normal individuals) was 17 (SD=19) as against the mean total scores of 140 (SD=69) obtained for group I (voice disorder patients) and this difference was statistically significant at 0.05 level. Higher scores for group I (voice disorder patients) in Telugu 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 17 and a standard deviation of 19. Therefore, a score of 36 ( $17 \pm 19$ ) or below 36 would indicate a normal voice. Group I obtained a mean total score of 140 and a standard deviation of 69 in Telugu V-DOP. Hence, a score of 70 ( $140 \pm 69$ ) or between 70 and 209 would indicate voice problems. Also, scores ranging between 36 and 70 would denote at risk to develop voice problems. Future studies are warranted in this direction.

Mahalingam et al. (2014) reported the total mean score for Tamil V-DOP in non-clinical group was zero and it was 104 (standard deviation =65) for clinical group. Similarly, 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. In comparison to the above two studies, the total mean scores obtained for phono-normal

individuals in the current study was higher (17). Higher scores on Telugu V-DOP by phono-normal individuals can be attributed to the fact they predominantly belonged to the age range of 18-25 years, where they probably might be still undergoing the pubertal voice changes. Also, majority of participants in group II (phono-normal individuals) were University students who undergoing speech & hearing course. 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 Telugu V-DOP scores in the present study for phono-normal individuals (group II) could be contributed to the above two factors.

On comparing the scores obtained among the three domain of Telugu V-DOP questionnaire, it can be noted that the physical domain had higher scores compared to functional and emotional domains and this phenomena was noticed in both the individuals with voice disorders (group I) and phono-normal individuals (group II). These findings are in consonance with the results obtained by Konnai et al. (2010) and Mahalingam et al. (2014) where these authors found higher scores in physical domain than functional and emotional domains of V-DOP questionnaire. The functional domain had three questions related to 'job'. The individuals who participated in the study were mostly students and homemakers and hence this 'job' related questions were not included for scoring. 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 not equally distributed and depended on other factors such as individual factors (voice use, occupation, life style, food habits) and environmental factors (work space) and so on.

**Test-retest reliability** was carried out for the phono-normal individuals (group II) within a span of 1 week and the results revealed a 100% agreement. This is in consonance with the test-retest reliability scores obtained by Konnai et al. (2010) using Kannada V-DOP questionnaire ( $r = 0.96 - 0.99$ ). For measuring the test-retest reliability, individuals from group I (voice disorder patients) was not considered as they were chosen from the out-patient departments of various hospitals/clinics and was not feasible for follow up by the experimenter and many did not follow for voice intervention.

## CHAPTER VI

### SUMMARY AND CONCLUSIONS

The primary focus of the present study was to adapt and translate the English version of the Voice Disorder Outcome Profile (V-DOP) questionnaire into Telugu language. For this, translation and reverse translation steps were performed with the help of two SLPs and one professor in Telugu literature to analyze appropriateness of the translation version of Telugu V-DOP and there was a 95% agreement for each items evolved in the questionnaire.

The secondary focus of this study was to validate the Voice Disorder Outcome Profile V-DOP in Telugu language. Total mean and standard deviation scores were higher in group-I (mean total 140) than in group-II (mean total 17). To see the Reliability measures of V-DOP, internal consistency of the V-DOP was estimated using item-total correlation and Cronbach  $\alpha$  coefficient. The V-DOP items had a high item-total correlation for both the groups (group I-0.86 and group II-0.95). Similar findings were shown in Kannada V-DOP by Konnai et al (2010), and Tamil V-DOP by Mahalingam et al (2014). In the present study good internal consistency was observed for the V-DOP items in Telugu. Result of test-retest reliability for Telugu V-DOP questionnaire was found to be higher which shows as good test-retest reliability.

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 performed to see the significant difference between groups it revealed mean rank scores for group-I from question

number one to question number thirty two are higher than group II. This shows group I scored significantly higher in the Telugu V-DOP questionnaire.

**Major findings of the present study are as summarized below;**

**First**, the translated questionnaire was verified at two different stages before it was finalized. This included an expert's contribution and reverse translation (by two SLPs). Also, there was higher agreement (95%) between the test items in the original English version of V-DOP and the reverse translated version of Telugu V-DOP into English.

**Second**, there was a good internal consistency measured by item-to-total correlation using Cronbach's  $\alpha$  coefficient (0.95) for each item in Telugu V-DOP questionnaire.

**Third**, significant difference found between group I (phono-normal individuals: 17) and group II (individuals with voice disorders: 140) on mean total V-DOP scores.

**Fourth**, there was a 100% agreement between test-retest reliability measures.

**Implications of the study**

1. The translated version of the V-DOP tool can be used in assessing the quality of life in individuals with voice disorders, particularly Telugu speaking population.
2. V-DOP of Telugu provides the patient's perception of their voice disorder.
3. It provides the clinician with domain specific scores, which in turn will help him/her to plan appropriate intervention.
4. V-DOP in Telugu is a quick (<10 minutes) subjective assessment tool to understand the impact of voice problem which can be incorporated in clinical evaluation of voice.



### **Limitations of the present study**

- A few individuals who participated in the present study found difficulty 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.
- Lesser number of participants in group I participated in the study.

### **Future direction of the study**

- Consider more number of participants in the voice disorder group.
- Use the numbers on 10 cm visual analog scale for the good comprehensibility to rate the voice difficulties of their own perceptions.
- Future studies can be done to correlate between the subjective perception of voice problem (V-DOP score) and objective findings in voice disorder patients.

## REFERENCES

- American Speech-Language-Hearing Association. (2002). Consensus auditory perceptual evaluation of voice (CAPE-V). *Rockville: ASHA Special Interest Division, 3.*
- Anderson, V. A. (1961). Resonance in the voice. *Training the speaking voice. 2nd ed. New York: Oxford University Press, 112-52.*
- Aronson AE. (1990). *Clinical Voice Disorders: An Interdisciplinary Approach*, 3rd ed. New York: Thieme-Stratto
- Aronson, A. E., & Bless, D. (2011). *Clinical voice disorders*. Thieme.
- Avinash, K (2013). *Aerodynamic Measures in Children in the Age Range of 8 to 12 Years* (Master's Dissertation) No: 960.
- Baken, R. J., & Orlikoff, R.F. (2010). Clinical Measurement of speech and voice.
- Biever, D. M., & Bless, D. M. (1989). Vibratory characteristics of the vocal folds in young adult and geriatric women. *Journal of Voice, 3*(2), 120-131.
- Boseley, M. E., Cunningham, M. J., Volk, M. S., & Hartnick, C. J. (2006). Validation of the pediatric voice-related quality-of-life survey. *Archives of Otolaryngology Head & Neck Surgery, 132*(7), 717-720.
- Butcher, P., Elias, A., & Cavalli, L. (2007). *Understanding and treating psychogenic voice disorder: a CBT framework*. John Wiley & Sons.
- Carding, P. N., Horsley, I. A., & Docherty, G. J. (1999). A study of the effectiveness of voice therapy in the treatment of 45 patients with nonorganic dysphonia. *Journal of voice, 13*(1), 72-104.

- Cohen, S. M., Jacobson, B. H., Garrett, C. G., Noordzij, J. P., Stewart, M. G., Attia, A., & Cleveland, T. F. (2007). Creation and validation of the singing voice handicap index. *Annals of Otolology, Rhinology & Laryngology*, *116*(6), 402-406.
- Cohen, S. M., Statham, M., Rosen, C. A., & Zullo, T. (2009). Development and validation of the singing voice handicap- 10. *The Laryngoscope*, *119*(9), 1864-1869.
- Curtis, J. F. (1978). *Processes and disorders of human communication*. Harpercollins College Div.
- Datta, R., Sethi, A., Singh, S., Nilakantan, A., & Venkatesh, M. D. (2011). Translation and validation of the voice handicap index in Hindi. *Journal of Laryngology and Voice*, *1*(1), 12.
- Deary, I. J., Wilson, J. A., Carding, P. N., & MacKenzie, K. (2003). VoiSS: a patient derived voice symptom scale. *Journal of psychosomatic research*, *54*(5), 483-489.
- Epstein, R., Hirani, S. P., Stygall, J., & Newman, S. P. (2009). How do individuals cope with voice disorders? Introducing the Voice Disability Coping Questionnaire. *Journal of Voice*, *23*(2), 209-217.
- Fant, G (1960). Acoustic Theory of Speech Production: with Calculations based on X Ray Studies of Russian Articulations, Mouton & Co *17*(4), 291.
- Frazer, J. E. (1910). The development of the larynx. *Journal of anatomy and physiology*, *44*(Pt 2), 156.

- Gliklich, R. E., Robert, M. G., & William, W. M. (1999). Validation of a voice outcome survey for unilateral vocal cord paralysis. *Otolaryngology--Head and Neck Surgery*, *120*(2), 153-158.
- Green, G (1964). *psychobehavioural characteristics of children with voice nodule: the voice and its disorder*: London: pittman medical publishing company.
- Greene MC, Mathieson L. (1989). *The voice and its disorders, 5th edition*. London: Whurr Publishers.
- Gudykunst, W. B. (1986). *Intraethnic and interethnic uncertainty reduction processes*. In Y. Kim (Ed.), *Current research in interethnic communication*. Beverly Hills, CA: Sage.
- Hammarberg, B., Fritzell, B., Gauffin, J., & Sundberg, J. (1986). Acoustic and perceptual analysis of vocal dysfunction. *Journal of phonetics*, *14*(3-4), 533-547.
- Hartnick, C. J. (2002). Validation of a pediatric voice quality-of-life instrument: the pediatric voice outcome survey. *Archives of Otolaryngology--Head & Neck Surgery*, *128*(8), 919-922.
- Hirano (1981). *Clinical Examination of Voice*, New York, Springer Verlag Publishing.
- Hirano, M. (1981). Psycho-acoustic evaluation of voice: GRBAS scale. *Clinical Examination of voice*. Wien.
- Hirano M(1975). Phonosurgery. *Basic and clinical investigations*. *Otologia (Fakuoka)*; *21*:239-42.
- Hogikyan, N. D., & Sethuraman, G. (1999). Validation of an instrument to measure voice-related quality of life (V-RQOL). *Journal of voice*, *13*(4), 557-569.

- Hollien, H., & Shipp, T. (1972). Speaking fundamental frequency and chronologic age in males. *Journal of Speech, Language, and Hearing Research, 15*(1), 155-159.
- Jacobson, B. H., Johnson, A., Grywalski, C., Silbergleit, A., Jacobson, G., Benninger, M. S., & Newman, C. W. (1997). The voice handicap index (VHI) development and validation. *American Journal of Speech-Language Pathology, 6*(3), 66-70.
- Konnai, R. M., Jayaram, M., & Scherer, R. C. (2010). Development and validation of a voice disorder outcome profile for an Indian population. *Journal of Voice, 24*(2), 206-220.
- Kreiman, B., Garratt, B. R., Kempster, G. B., Erman, A., and Berke, G. S. (1993). *Perceptual evaluation of voice quality: review, tutorial and a framework for future research*. *Journal of Speech Hearing Research, 36*, 21-40.
- Lee, L., Stemple, J. C., Glaze, L., & Kelchner, L. N. (2004). Quick screen for voice and supplementary documents for identifying pediatric voice disorders. *Language, Speech, and Hearing services in schools, 35*(4), 308-319.
- Ma, E. P. M., Yiu, E. M. L., & Abbott, K. V. (2007, November). Application of the ICF in voice disorders. In *Seminars in Speech and Language* (Vol. 28, No. 04, pp. 343-350). Thieme Medical Publishers.
- Ma, E. P. M., & Yiu, E. M. L. (2011). *Handbook of voice assessments*. Plural Publishing.
- Ma, E. P., & Yiu, E. M. (2001). Voice Activity and Participation Profile Assessing the Impact of Voice Disorders on Daily Activities. *Journal of Speech, Language, and Hearing Research, 44*(3), 511-524.

- Mahalingam, S., Boominathan, P., & Subramaniyan, B. (2014). Voice Disorder Outcome Profile (V-DOP)—translation and validation in Tamil language. *Journal of Voice*, 28(6), 841-e21.
- Matheison. L. (2001). *Greene & Matheison's The voice and its disorders* ( 6<sup>th</sup>edn). London: Whurr Publishers
- Mehta, D. D., & Hillman, R. E. (2008). Voice assessment: updates on perceptual, acoustic, aerodynamic, and endoscopic imaging methods. *Current opinion in otolaryngology & head and neck surgery*, 16(3), 211.
- Michael, J.F. & Wendahl, R. (1971) Travis, L. E. (Ed.). *Handbook of speech pathology and audiology*. Prentice Hall Inc., 465-480.
- Prakash B, Chandrasekar D, Nagarajan R, Madraswala Z, Rajan A (2008). *Vocal hygiene program for professional voice users (teachers): an evaluative study from Chennai*. *Asia Pacific Journal of Speech, Language, and Hearing*;11(1):39-45.
- Prakash B, Rajendran A, Nagarajan R, Seethapathy J, Gnansekar M (2008). *Vocal abuse and vocal hygiene practices among different level professional voice users in India: a survey*. *Asia Pacific Journal of Speech, Language, and Hearing*;11(1):47-53.
- Rosen, C. A., Lee, A. S., Osborne, J., Zullo, T., & Murry, T. (2004). Development and validation of the Voice Handicap Index- 10. *The Laryngoscope*, 114(9), 1549-1556.
- Sapienza, C. & Hoffman-Ruddy, B. (2009). *Voice Disorders*. San Diego: Plural Publishing

- Sapir, S., & Aronson, A. E. (1990). The relationship between psychopathology and speech and language disorders in neurologic patients. *Journal of Speech and Hearing Disorders*, 55(3), 503-509.
- Sarita, K. (2000). Classification of Hoarse voice based on Acoustic parameters, *An unpublished masters dissertation submitted to Mysore University, Mysore*
- Sataloff, R. T. (2005). *Clinical assessment of voice*. Plural Publishing.
- Sataloff RT, Hawkshaw M, Rosen DC (1997). *Medications: Effects and Side Effects in Professional Voice Users*. In Sataloff RT (ed): *Professional Voice*. San Diego, Singular Publishing Group, pp 457-471
- Schutte, H. K. (1980). *The efficiency of voice production*.
- Seifpanahi, S., Jalaie, S., Nikoo, M. R., & Sobhani-Rad, D. (2015). Translated Versions of Voice Handicap Index (VHI)-30 across Languages: A Systematic Review. *Iranian journal of public health*, 44(4), 458.
- Stemple J, Glaze L, Gerdeman B (1995). *Clinical Voice Pathology*. 2nd ed. San Diego: Singular Publishing;
- Street, R. L. and Hopper, R (1982). *A model of speech style evaluation*. In E. B. Ryan and H. Giles (eds), *Attitudes Towards Language Variation*. London: Edward Arnold.
- Top 30 Languages by Number of Native Speakers Data source: *Ethnologue: Languages of the World*, 15th ed. (2005) & Wikipedia.org.
- Weinrich, B., Salz, B., & Hughes, M. (2005). Aerodynamic measurements: normative data for children ages 6: 0 to 10: 11 years. *Journal of Voice*, 19(3), 326-339.

Wilson, D. K. (1987). Buffalo III Voice Screening Profile.

Zraick, R. I., Risner, B. Y., Smith-Olinde, L., Gregg, B. A., Johnson, F. L., & McWeeny, E. K. (2007). Patient versus partner perception of voice handicap. *Journal of voice*, *21*(4), 485-494.

Zur, K. B., Cotton, S., Kelchner, L., Baker, S., Weinrich, B., & Lee, L. (2007). Pediatric Voice Handicap Index (pVHI): a new tool for evaluating pediatric dysphonia. *International journal of pediatric otorhinolaryngology*, *71*(1), 77-82.



## APPENDIX I

### Questionnaire used in the study

## మీ యొక్క స్వర తీవ్రతను సొంతముగా గ్రహించుట

సూచన:- దయచేసి క్రింది ప్రశ్నలకు సమాధానాలు ఇవ్వండి. 10 cm గీత మీద మీ స్వర

సమస్య తీవ్రతను బట్టి ('x') గుర్తుని పెట్టండి. ఉదాహరణకి :- 'x' గుర్తుని పూర్తిగా ఎడమవైపు

పెట్టారంటే దాని అర్థం మీ స్వరం సాధారణంగా (ఎటువంటి సమస్య లేకుండా) ఉందని. అదే

విధంగా 'x' గుర్తుని పూర్తిగా కుడివైపు పెట్టారంటే మీ స్వర సమస్య తీవ్రత ఎక్కువగా ఉంది అని

అర్థం.

మీ స్వర సమస్య తీవ్రత ఇప్పుడు ఎంత ఉంది ?

సాధారణంగా \_\_\_\_\_

చాలా తీవ్రంగా

## స్వరంలోని అస్తవ్యస్త ఫలితం గురించి తెలిపే నమూనా

సూచన:- దయచేసి క్రింది ప్రశ్నలకు సమాధానాలు ఇవ్వండి. 10 cm గీత మీద మీరు

ఎదుర్కొంటున్న స్వర సమస్యల ఆధారంగా 'x' గుర్తుని పెట్టండి. ఉదాహరణకి :- 'x' గుర్తుని

పూర్తిగా ఎడమవైపు పెట్టారంటే (0) దాని అర్థం మీ స్వరంలో ఎప్పుడూ అటువంటి సమస్య

✓

రాలేదని. అదే విధంగా 'x' గుర్తుని పూర్తిగా కుడివైపు పెట్టారంటే(10) మీరు ఎల్లప్పుడూ ఆ

సమస్యని ఎదుర్కొంటున్నారని అర్థం. ఒక వేళ క్రింది ప్రశ్నలలో ఎదైనా ప్రశ్న మీకు చెందదు (ఆ

పరిస్థితి మీకు రాలేదు) అంటే మీరు "చెందదు" "(చె)" అనే దగ్గర ( ) గుర్తుని పెట్టండి.

### I.శారీరక సంబంధ

1. మీరు చాలా సేపు మాట్లాడితే అలిసిపోతారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

2. మీరు మాట్లాడుతున్నప్పుడు మీకు శ్వాస సరిపోవటం లేదా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

3. మీరు మాట్లాడటానికి చాలా శ్రమ పడుతున్నారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

4. రోజంతటిలో మీ స్వరంలో మార్పు కనిపిస్తుందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

5. పెద్దగా మాట్లాడటానికి మీకు కష్టంగా ఉందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

6. ఎక్కువ సమయం మాట్లాడిన తర్వాత మీ గోంతు మూగబోయినట్లుగా ఉంటుందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

7. మీ ధ్వనిలో ( స్వరంలో) స్పష్టత కోల్పోతున్నారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

8. మాటిమాటికి మీ గోంతును సవరించుకోవలసిన అవసరం ఉంటుందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

9. మీరు నిరంతరాయంగా మట్లాడిన తర్వాత మీ గోంతు పొడిబారినట్లుగా అనిపిస్తుందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

10. మీరు మాట్లాడుతున్నప్పుడు మీ గోంతులో నొప్పిగా ఉంటుందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

## II. భావోద్వేగానికి సంబంధించి

11. మీ స్వర సంబంధిత సమస్య మిమ్మల్ని కలవరపెడుతుందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

12. మీ స్వర సంబంధిత సమస్య వలన మీరు బాధపడుతున్నారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

13. మీ స్వర సంబంధిత సమస్యని ఇతరులు అర్థం చేసుకుంటున్నారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

14. మీ స్వర సంబంధిత సమస్య వలన మీరు మీ ఆత్మవిశ్వాసాన్ని కోల్పోతున్నారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

15. మీ స్వర సంబంధిత సమస్య వలన మీకు మీరు తక్కువ ప్రాముఖ్యతగా భావిస్తున్నారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

16. మీ స్వర సంబంధిత సమస్య వలన మీరు ఇతరులతో మట్లాడుతున్నప్పుడు స్పృహ కలిగి

ఉంటున్నారా

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

17. ఇతరులు మిమ్మల్ని మరల తిరిగి చెప్పమన్నప్పుడు మీకు ఇబ్బంది కలుగుతుందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

18. మీ స్వర సంబంధిత సమస్య వలన విసిగిపోతున్నారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

19. మీ స్వర సంబంధిత సమస్య వలన సిగ్గుపడుతున్నారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

20. మీ స్వర సంబంధిత సమస్య వలన మీ వ్యక్తిత్వం దెబ్బతింటుంటుందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

### III. కార్య నిర్వహణకు సంబంధించి

(a) ఉద్యోగం :-

21. మీ స్వర సంబంధిత సమస్య వలన మీ పనికి భంగం కలుగుతుందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

22. మీ స్వర సంబంధిత సమస్య వలన మీరు మీ పని నుంచి తక్కువగా స్వరాన్ని ఉపయోగించే

పనికి మారవలసి వస్తుందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

23. మీ స్వర సంబంధిత సమస్య వలన మీ సంపాదన తక్కువగా ఉందని భావిస్తున్నారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

**(b)ప్రతిరోజు సంభాషణ :-**

24. మీ స్వర సంబంధిత సమస్య వలన మీరు ఇతరులతో మాట్లాడటం మానుకుంటున్నారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

25. ఇతరులు మీరు ఏం మాట్లాడారో తిరిగి చెప్పమని అడుగుతున్నారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

26. మీరు ఫోనులో మాట్లాడుతున్నప్పుడు అవతలి వారికి అర్థం చేసుకోవటం కష్టం అవుతుందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)



27. శబ్ద (గోల) ప్రదేశాలలో మీ స్వర సంబంధ సమస్య మీ సంభాషణని దెబ్బతీస్తుందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

28. మీ స్వర సంబంధత సమస్య మీరు నిశ్శబ్ద ప్రదేశాలలో ఇతరులతో సంభాషించడానికి ఇబ్బంది

కలిగిస్తుందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

29. ఇతరులు మిమ్మల్ని పెద్దగా మాట్లాడమని అడుగుతున్నారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

**(c) సామాజిక సంభాషణ :-**

30. మీ స్వర సంబంధిత సమస్య వలన సామాజిక సమావేశాలలో పాల్గొనలేక పోతున్నారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

31. మీ స్వర సంబంధిత సమస్య మీ కుటుంబ సభ్యులను, స్నేహితులను, మీ తోటి ఉద్యోగులను

విసిగిస్తుందా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

32. మీ స్వరం మీ వ్యక్తిగత మరియు సామాజిక జీవితానికి అడ్డుగా ఉందని భావిస్తున్నారా ?

ఎప్పుడూలేదు 0 \_\_\_\_\_ 5 \_\_\_\_\_ 10

ఎల్లప్పుడూఉంది(చె)

**పేరు:-**

**వయస్సు/ లింగం:-**

**పని:-**

## **APENDIX II**

**All India Institute of Speech and Hearing, Manasagangothri,**

**Mysuru, 570006**

### **Voice Disorder Outcome Profile Adaptation and Validation in Telugu**

#### **Consent Form**

I, Saraswathi T, final year Master student, carrying out a research project regarding the above mentioned topic under the guidance of Dr. R. Rajasudhakar, Dept. of Speech- Language Sciences at AIISH. I am developing a questionnaire in Telugu to measure the quality of life individuals within voice disorder. The aim of the study is to adapt the English version of Voice Disorder Outcome Profile (V-DOP) questionnaire and validate the same in Telugu. The outcome of the research project will help the clinician to know about the extent of voice problem in individuals with voice disorder and to plan appropriate intervention. Your identity and your responses in the questionnaire will be kept confidential and will not reveal to anyone.

I ..... have been informed about the aim and outcome of the study as mentioned above. I hereby agree to participate in the study.

**Signature**

**Date:**