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Development and standardization of voice handicap index (VHI) in the Indian language Kannada

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Abstract
Background: Voice is defined as the laryngeal modulation of pulmonary airstream further modified by the vocal tract. Voice Handicap Inventory (VHI) is one of the most commonly used scales to measure the impact of voice related disorders on the emotional, functional and physical well being of an individual.
Objectives: India being a multilingual country needs to develop such scales in the native languages. So the current study focused on developing and standardizing VHI to a native Indian language (Kannada).
Materials & Methods: The English version of VHI was translated to Kannada by a well qualified Kannada professor. The translated questionnaire was then given to 30 native Kannada speakers for content validity. The final version of VHI-K was administered on 50 subjects who had some kind of voice problem. The data was then taken for statistical analysis.
Results: After the statistical analysis, it was observed that the VHI-K has a Cronbach's alpha score of 0.972 on standardized item which is presumed to have an excellent internal consistency. Cronbach's alpha score for emotional, functional and physical subscales was 0.929, 0.931 and 0.925 respectively.
Conclusion: Scores of Cronbach's alpha score shows that, VHI-K has got an excellent internal consistency. The questionnaire could efficiently measure the impact of voice related disorders on the emotional, functional and physical well being of an individual.

Keywords: Voice Handicap Index (VHI), Kannada, Standardization

1. Introduction
For humans, voice is very important as plays an important role in communication with one another. Therefore, any impairment in the normal mechanism of voice production can cause significant disability to an individual in performing routine and important activities with a resultant handicap [1]. Voice is a multidimensional series of measurable events and is defined as the laryngeal modulation of pulmonary air stream which is further modified by the configuration of vocal tract [2]. A good voice should have a pleasing voice quality, proper balance of oral and nasal resonance, appropriate loudness, a speaking fundamental frequency level suitable for age, sex, and size and appropriate voice inflections involving pitch, and loudness.
Voice is something like a physical strength which cannot be determined using a single scale. There is no single scale measure either with which one can evaluate the entire aspect of vocal function. While assessing the vocal function, the clinician must know what all aspects of voice the measuring scale is assessing and what all are the parameters which cannot be assessed. Another important aspect of voice evaluation is the fact that the purpose of the most tests presently in use is basically not to make a diagnosis of the disease but to evaluate one or the several aspects of vocal function [3]. Almost all the diagnostic modalities assessing voice disorders measure voice in objective terms and does not reflect the true suffering of the patient or the level of handicap that a patient or the level of handicap that a patient is suffering from as a result of the voice disorder [4].
The Voice Handicap Index (VHI) is a client-based self-assessment tool and is considered to be the most relevant, patient friendly and versatile tool available at present to assess the voice related quality of life. This tool consists of 30 items that are equally distributed over the following three domains such as, functional, physical and emotional. The English version of VHI was the only tool available for quantifying the handicap caused by the voice disorders. India being a multilingual country with a multicultural background, there is no such

inventories available in any of the Indian languages other than in Hindi and Malayalam. Most of the populations of India still depend on their regional language for communication and administering these inventories become difficult. As this inventory quantifies the alterations of the daily life of an individual due to voice disorders, reading and understanding the questionnaire by themselves would give a more précised quantification of their problem. Considering the above factors, the present study aimed to develop and standardize the VHI in the Indian language Kannada, the state language of Karnataka, in the southwestern part of peninsular India.

2. Materials & Methods

2.1 Development of Inventory

The study was conceptualized in 2011 and accordingly the English version of VHI was translated to Kannada using the standard translation-back-translation method [5] by two professors who have a degree of MA in Kannada. The validated and scientific terms translated was checked for its accuracy. The translated inventory was given to 30 native Kannada speakers who were also acquainted with English and were able to read and write both languages. A gap of two days was maintained between the providing of two versions (English and Kannada). The speakers were given a five-point scale rating scale to grade the items from very familiar to non-familiar [6]. Later all the 30 filled inventories in both languages were assessed to find out if all the words and the meaning of the questions conveyed the same meaning. The questions in the Kannada version that were rated as 1 or 2 were selected for the inventory and any questions with ratings over 3 were re-framed according to the familiarity of the Kannada speakers.

2.2 Participants and Procedure

Following validation of the Kannada version, the study was undertaken from 10rd June to 3rd August of 2012 at Mangalore Institute of Oncology, a super specialty hospital in Mangalore. The inclusion criteria included people familiar with the Kannada language and complaining of voice problems for more than 2 months. The exclusion criteria include people who were unfamiliar with Kannada, had normal voice and with history of psychiatric or psychological counseling specifically for their cancer and/or their voice related problems. The hospital ethics committee provided the permission for the study.

During the first visit, one of the investigators introduced the purpose of the study to eligible patients and their caregivers in English or in Kannada. The subjects were also informed that they had the right to withdraw from the study at any time during the course of the study and that their non-willingness to be a part of the study will not deprive them of the necessary treatment and an oral permission was taken from them. The Kannada version of VHI (VHI-K) was provided and the volunteer was asked to rate the questions based on the severity and difficulties faced by them due to the voice problems. Later based on the scoring, the total scores were calculated. After the tabulation, in order to check for the internal consistency of the items, Cronbach alpha scores were calculated for the whole 30 items in the questionnaire and also independently for the three subscales functional, emotional and physical. An Item total correlation was also carried out. Scale statistics such as mean, variance and standard deviation were calculated for different subscales and for the entire questions. All the statistical analysis was carried out using SPSS statistics 17.0 software.

3. Results

The mean total VHI scores of the dysphonic patients were 41.94 with a standard deviation of 28.96 and a variance of 838.711. With respect to the subscales, mean VHI score for emotional subscale were 13.34 with a standard deviation of 13.34 and a variance of 98.637. The mean VHI scores for the functional subscale were 13.96 with a standard deviation of 10.298 and a variance of 106.039. In case of physical subscale, the mean is 14.64 with a standard deviation of 10.119 and a variance of 102.398.

After the complete analysis of the obtained data, the percentages of subjects falling under various severities were found out. It was observed that VHI-K could classify 36% of the subjects as having no handicap, 16% of the subjects fall under mild category, 24% of subjects fall under moderate category and 24% of the subjects fall under severe category as illustrated in Figure 1. The Cronbach Alpha test was carried out to find out the internal consistency of the VHI-K and found out that the VHI-K has a Cronbach alpha score of 0.972 on standardized item which is categorized as excellent reliability and the same was also calculated for three subscales and observed to be 0.929, 0.931 and 0.925 respectively for emotional, functional and physical subscales. An Item-total correlation was also carried out using the SPSS software and the results are shown in Table: 1

Table 1: Item-total correlation of the VHI-K

Items	Item-Total Correlation
F1 My voice makes it difficult for people to hear me	0.798
P2 I run out of air when I talk	0.742
F3 People have difficulty under-standing me in a noisy room	0.756
P4 The sound of my voice varies throughout the day	0.796
F5 My family has difficulty hearing me when I call them throughout the house	0.787
F6 I use the phone less often than I would like	0.787
E7 I'm tense when talking with others because of my voice	0.771
F8 I tend to avoid groups of people because of my voice	0.795
E9 People seem irritated with my voice	0.731
P10 People ask, "What's wrong with your voice?"	0.662
F11 I speak with friends, neighbors, or relatives less often because of my voice	0.703
F12 People ask me to repeat myself when speaking face-to-face	0.688
P13 My voice sounds creaky and dry	0.689
P14I feel as though I have to strain to produce voice	0.698
E15 I find other people don't understand my voice problem	0.692
F16 My voice difficulties restrict my personal and social life	0.747
P17 The clarity of my voice is unpredictable	0.776
P18 I try to change my voice to sound different	0.776
F19 I feel left out of conversations because of my voice	0.750
P20 I use a great deal of effort to speak	0.694
P21 My voice is worse in the evening	0.681
F22 My voice problem causes me to lose income	0.649
E23 My voice problem upsets me	0.625
E24 I am less out-going because of my voice problem	0.726
E25 My voice makes me feel handicapped	0.701
P26 My voice "gives out" on me in the middle of speaking	0.689
E27 I feel annoyed when people ask me to repeat	0.639
E28 I feel embarrassed when people ask me to repeat	0.714
E29 My voice makes me feel incompetent	0.694
E30 I'm ashamed of my voice problem	0.722

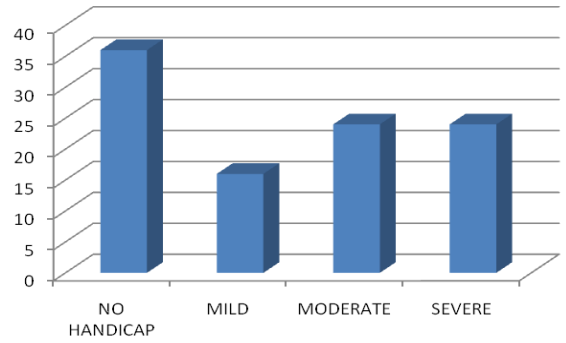

Fig: Percentage of participants falling under various severities

4. Discussion

The main aim of the current study was to develop and standardize voice handicap index (VHI) in Kannada. The study was carried out in an oncology hospital and there was an increase in the report of voice related symptoms during the first visit, along the treatment duration and also during the post therapy follow up visits. So there was a need to administer any voice related questionnaires on patients, to have a report of the severity of the voice related symptoms and the effect of such problems on the functional, emotional and daily life. VHI was selected for this purpose because it was used widely in clinics and is reported to be very sensitive in measuring various voice related outcomes. Moreover it can be used to assess the patient's emotional, functional and physical domains. But the problem faced at this point of time was the inability of majority of patients to read and understand the English VHI and the only languages were VHI is available was in Hindi and Malayalam and not in Kannada. So there emerged a need to develop VHI in Kannada language so that an easy understanding of patient's voice related distress will be possible.

The voice handicap index is a preferred subjective evaluation score for dysphonic patients, which consists of 30 questions developed by Jacobson and coworkers in 1997 and it is also a useful instrument in quantifying the biophysical impact of a voice disorder [7]. Understanding of voice related symptoms is very important, so that a voice therapist can plan a better counseling session for the client as well as document the outcome of the rating scale as a baseline measure to compare the results pre and post intervention. VHI-K can also be used to address the effect of voice related distress on patient's emotional, functional and physical domains and knowing which domain in highly affected can help the clinician to keep a specific management goal to improve the social well being of the individual.

When analyzing the mean VHI scores across the emotional, functional and physical domains, it was observed that, physical domains has a higher mean (14.64) when compared to the other two domains (13.34 and 13.96 respectively). The same observation was documented in the Hindi version of VHI [8] where the author reported an increased mean for the physical domain (15.14) when compared to emotional and functional domains (14.46 and 14.17 respectively). Cronbach's alpha is the most common measure of internal consistency (reliability). It is most commonly used when we have multiple Likert questions in a survey/questionnaire that form a scale and we wish to determine if the scale is reliable. Cronbach alpha scores of above 0.9 is considered as having excellent reliability, above 0.8 as having good reliability and above 0.7 as having satisfactory reliability. The Cronbach alpha score for the overall VHI-K is 0.972 which falls under excellent reliability category when compared to the Hindi and Malayalam version of VHI which has Cronbach alpha scores of 0.95 and 0.946 respectively. The Cronbach alpha scores for individual domains were also calculated and observed to be 0.929, 0.931 and 0.925 respectively for emotional, functional and physical domains. These kinds of an analysis for the separate domains were not carried out in the Hindi and Malayalam version of VHI. But when compared to the Malayalam and Hindi VHI, VHI-K has got highest internal reliability and 98% of the participants could read and understand the questionnaires without the help of the clinician.

With the current study, it was found out that, VHI-K is a reliable tool to measure the voice related distresses in dysphonic patients and this serve as a good clinical tool in different set ups like hospitals, speech and hearing clinics and voice clinics in and around Karnataka. The main drawback of the current study was a reduced sample size and majority of the subjects had voice related symptoms secondary to various head and neck cancers. Future researches should focus on obtaining data by administering VHI-K in other voice pathologies such as vocal fold nodules, polyps, professional voice users, neurogenic voice disorders and endocrinology voice disorders.

5. Conclusion

With the current study, the Kannada version of voice handicap inventory came out successfully and found to be highly reliable in classifying patients suffering from voice disorders into various severities which in turn help the clinicians in counseling, management and can be easily used by voice pathologist as well as otorhinolaryngologists.

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