JSLHR

Research Article

Cultural and Linguistic Adaptation of the Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V) Into Hindi

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Aim: The purpose of this study was to develop and assess the reliability of a Hindi version of the Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V). Reliability was assessed by comparing Hindi CAPE-V ratings with English CAPE-V ratings and by the Grade, Roughness, Breathiness, Asthenia and Strain (GRBAS) scale.
Method: Hindi sentences were created to match the phonemic load of the corresponding English CAPE-V sentences. The Hindi sentences were adapted for linguistic content. The original English and adapted Hindi CAPE-V and GRBAS were completed for 33 bilingual individuals with normal voice quality. Additionally, the Hindi CAPE-V and GRBAS were completed for 13 Hindi speakers with disordered voice quality. The agreement of CAPE-V ratings was assessed between language versions, GRBAS ratings, and two rater pairs (three raters in total). Pearson product–moment correlation was completed for all comparisons.
Results: A strong correlation ($r > .8$, $p < .01$) was found between the Hindi CAPE-V scores and the English CAPE-V scores for most variables in normal voice participants. A weak correlation was found for the variable of strain ($r < .2$, $p = .400$) in the normative group. A strong correlation ($r > .6$, $p < .01$) was found between the overall severity/grade, roughness, and breathiness scores in the GRBAS scale and the CAPE-V scale in normal and disordered voice samples. Significant interrater reliability ($r > .75$) was present in overall severity and breathiness.
Conclusions: The Hindi version of the CAPE-V demonstrates good interrater reliability and concurrent validity with the English CAPE-V and the GRBAS. The Hindi CAPE-V can be used for the auditory-perceptual voice assessment of Hindi speakers.

Auditory-perceptual evaluation of the voice is a critical domain of voice assessment (Behrman, 2005; Roy et al., 2013). It involves rating a person's voice on a number of different features that include the overall severity of dysphonia and specific features such as breathiness, roughness, strain, nasality, pitch, loudness, and so forth. A change in perceived voice quality is typically the driving force for persons with a voice disorder to seek out a referral for a voice evaluation. This change in perceived voice quality is also often the measure of treatment success for both the clinician and the patient. It is particularly important in instances where clinicians do not have easy access to instrumental assessments. In addition to providing a reliable source to differentiate normal and disordered voices and determining prognosis, auditory-perceptual assessment facilitates the correlation of underlying pathophysiology and objective measures (Kempster et al., 2009). Moreover, it is efficient and easy to administer these tests (Barsties & De Bodt, 2015; Oates, 2009).

There are a few different methods of conducting an auditory-perceptual evaluation as described in the literature. These may include equal-appearing intervals, visual analog scales, and direct magnitude estimations. The Grade, Roughness, Breathiness, Asthenia and Strain (GRBAS) scale and the Consensus Auditory Perceptual Evaluation of Voice (CAPE-V) are two of the more frequently used scales (Kempster et al., 2009; Nemr et al., 2012; Wuyts et al., 1999; Ziwei et al., 2014). Other available scales include the Stockholm Voice Evaluation Consensus Model (Hammarberg, 2000), the Vocal Profile Analysis Scheme (Laver et al., 1981), and the Buffalo Voice Profile (Wilson, 1987). The GRBAS (Hirano, 1981) was developed by the Japanese Society of Logopedics and Phoniatrics and is used widely globally because of its ease of administration and because it is not language dependent. The listeners simply rate

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Editor-in-Chief: Bharath Chandrasekaran
Editor: Jack J. Jiang
Received June 19, 2020
Revision received September 3, 2020
Accepted September 17, 2020
https://doi.org/10.1044/2020_JSLHR-20-00348

Disclosure: *The authors have declared that no competing interests existed at the time of publication.*

the voice on a scale of 0 (*normal*) to 3 (*severe*) using a 4-point Likert scale on each of the features. The disadvantage of using this scale is the lack of a prescribed procedure for task order and a lack of stimulus hierarchy. It also limits the description of the voice quality to the four primary features, and clinicians are limited in their ability to include additional abnormal observations such as nasality, diplophonia, glottal fry, and so forth. The CAPE-V was created to overcome these limitations.

The CAPE-V was developed after the Consensus Conference on Auditory-Perceptual Evaluation of Voice (June 2002), sponsored by Special Interest Division 3, Voice and Voice Disorders of ASHA (now referred to as Special Interest Group 3, Voice and Upper Airway), at the University of Pittsburgh. This assessment protocol caters to the need for a consistent clinical tool to perceptually judge voice quality and determine the severity of the disorder. During the conference, the speech-language pathologists applied the properties of psychophysical and psychoacoustic measurement in the clinic to assess auditory-perceptual features of voice quality. Psychoacoustic measures were presented by describing influences of the outer and middle ear in voice perception, details of cochlear biomechanics, and integration of spectral information that takes place at higher cortical levels (Kempster et al., 2009). The researchers presented psychophysical measurements by describing differential limens, additional measures for scaling, partition, ratio, and multidimensional scaling. The psychophysical discussion also determined the characteristics of stimuli that contribute to perception, the correlation of these perceptual characteristics, and the processes (cognitive, sensory, etc.) that contribute to perception (Kempster et al., 2009). The authors finally integrated the information obtained from the scientific data and clinical experience to develop a protocol to evaluate and document the auditory-perceptual features of voice.

Stimuli for the CAPE-V include vowels, sentences, and spontaneous speech. Three trials of the vowels /a/ and /i/ are sustained for 3–5 s. Vowel prolongations make it possible to evaluate the voice for stability and without any articulatory influence. The sentences in English are constructed in a way that each sentence has a specific phonetic load. Table 1 provides the sentence and the corresponding phonetic focus.

The conversational task provides a natural sample for analyses. The six features of vocal quality assessed are overall severity (overall impression of voice), roughness (irregularity in voice), breathiness (air escape that is audible), strain (perceived hyperfunction, excessive tension), pitch (the perceptual correlate of frequency), and loudness (the perceptual correlate of intensity). These features are assessed with a visual analog scale that includes a line that is 100 mm in length. The extreme left represents normal voice quality, and the extreme right represents severe dysphonia. The clinician marks on the line according to the perceived severity for each of the six features, measures the distance from the start of the line on the left, and obtains a score out of 100. Additionally, the clinician can indicate each feature as consistent/inconsistent in the voice. There is also provision for rating any other significant features in the voice.

The CAPE-V protocol provides direction on administration, scoring, recording, and data collection (American Speech-Language-Hearing Association, 2009). The use of a visual analog scale, instead of a Likert scale, allows for a more nuanced rating on a continuum and the ability to record even minor changes to the voice. The CAPE-V is used extensively across clinics and research studies and has demonstrated strong intrarater and interrater reliability. The use of the CAPE-V is very limited globally for non-English speakers due to its dependency on English stimuli. Over the past few years, the CAPE-V has been adapted to Spanish (Núñez-Batalla et al., 2015), Mandarin (Chen et al., 2018), Turkish (Özcebe et al., 2019), Italian (Mozzanica et al., 2013), Persian (Salary Majd et al., 2014), European Portuguese (de Almeida et al., 2019), and Kannada (Gunjawate et al., 2020), making it more accessible to a wider group of people.

The aim of this study is to adapt the CAPE-V to Hindi within the appropriate cultural and linguistic context. A review of the literature revealed that perceptual voice assessment tools in Hindi are scarce and have been done primarily using the GRBAS (Balasubramanium et al., 2019; Chowdhury et al., 2013; Jayakumar & Savithri, 2012; Munjal et al., 2019). There is no language-specific test available for clinicians to evaluate the voice of Hindi speakers perceptually. The English CAPE-V can be used only for the 10%–12% of the general population that speaks English, primarily in the urban areas (Government of India, 2011), and the GRBAS rating scale is used for the remainder of the population. According to the 2011 census (Government of India, 2011), 122 major languages are spoken in India,

Table 1. Sentences and the corresponding phonetic focus for the Consensus Auditory Perceptual Evaluation of Voice (CAPE-V).

Sentence	Phonetic load/focus
1. The blue spot is on the key again.	Coarticulatory influence of vowels /a/, /i/, and /u/
2. How hard did he hit him?	Soft glottal attacks and voiceless-to-voiced transitions
3. We were away a year ago.	All voiced phonemes
4. We eat eggs every Easter.	Hard glottal attacks
5. My mama makes lemon muffins.	Nasal consonants
6. Peter will keep at the peak.	Plosives to assess intraoral pressure

Note. Adapted from Kempster et al., 2009.

with 57% or approximately 692 million of the population speaking Hindi as their first, second, or third language. Hindi, along with English, is considered the official language of India. In addition to India, Hindi is also spoken in the United Arab Emirates, Nepal, Mauritius, Trinidad and Tobago, the United States, and the United Kingdom. Approximately 650,000 people in the United States speak Hindi. Developing the CAPE-V in Hindi will serve a large number of people, many of whom may not be able to complete the tasks in English or in any of the other adaptations.

Method

This study was approved by the institutional review board at the University of Houston. This was a case–control study design, and participants were involved in a one-time assessment of their voice quality.

Participants

Two groups of participants were recruited for the study: one group of individuals with normal voice quality and one group of individuals with dysphonia. The normative group included 33 bilingual adults fluent in Hindi and English, who are nonsmokers, with no history of hearing, speech, and language disorders (16 men, M_{age} = 25.2 years, age range: 22–33 years; 17 women, M_{age} = 30.3 years, age range: 21–68 years). Participants were included in the study based on their self-report and an informal perceptual screening of voice quality by the study personnel. Individuals who did not fulfill the inclusion criteria and spoke only one of the two languages were excluded. Potential participants were recruited via word of mouth and e-mail. These participants included members of the local Indian community and student body at the University of Houston. For the disordered voice group, 13 participants, primarily monolingual Hindi speakers (10 men, three women; age range: 19–78 years) were recruited from Sri Aurobindo Institute of Medical Sciences, India. All participants were diagnosed with a laryngeal pathology by an otolaryngologist (see Table 2).

An analysis of variance was conducted between the normative group and the disordered group to examine equality of variance between groups for age. The analysis revealed a significant difference in the variance of the two groups (F = 10.918, p = .002).

Development of the Hindi CAPE-V Sentences

Phonemic features of the Hindi CAPE-V were consistent with the English CAPE-V and included sounds loaded with vowels, easy vocal fold onsets, voiced consonants, hard glottal attacks, nasal sounds, and voiceless plosives. The developers of the English CAPE-V did not specify criteria besides targeting certain sounds when designing the stimuli. In the absence of these details, the percentage of targeted sounds for each of the English sentences was calculated, and these numbers were matched in the corresponding Hindi sentences. A linguist with expertise in Hindi reviewed the sentences for linguistic content. The English sentences and the developed Hindi sentences are given in Table 3 along with a translation, phonetic transcription, and transliteration of the Hindi sentences. The form for the Hindi CAPE-V is provided in the Appendix.

Table 2. Age and diagnosis by sex for the disordered voice group.

Participant	Sex	Age (years)	Diagnosis
1	M	47	Vocal fold polyp
2	M	26	Papilloma
3	M	27	Muscle tension dysphonia
4	M	19	Muscle tension dysphonia
5	M	27	Muscle tension dysphonia
6	M	45	Vocal fold polyp
7	M	22	Muscle tension dysphonia
8	M	70	Presbyphonia
9	M	63	Leukoplakia
10	M	78	Presbyphonia
11	F	52	Vocal fold nodules
12	F	59	Vocal fold injury
13	F	19	Glottal stenosis

Note. F = female; M = male.

Procedure

The normative group of participants was recruited in Houston, and the group of Hindi speakers with voice disorders was recruited in India. Participants in the normative voice group in Houston recorded stimuli using the Pentax Computerized Speech Laboratory. The Marantz 6000 was used to record the stimuli from the participants with dysphonia in Indore, India, as the Computerized Speech Laboratory was not available at that site. The study personnel (I. B.) recorded the following stimuli:

> Sustained vowel: The participants sustained the vowels /a/ and /i/ for 3–5 s.
> Sentences: The participants in the normative group completed the sentences for the original CAPE-V in English. Participants from both groups (normative and disordered) read six Hindi sentences.
> Spontaneous speech: Participants in both groups produced a minimum of two spontaneous sentences in Hindi to the prompt "Tell me about your day." Participants in the normative group also produced two sentences in English to the prompt "Tell me about your family."

The order of tasks was counterbalanced to prevent an order effect. The English and Hindi recorded samples were coded separately to keep each sample independent of the other, and the stimuli were rated on separate scoring sheets. These samples were randomly assigned to the study personnel so that the two language samples from the same participant were not rated consecutively. The two speech-language pathologists, with over 20 years of collective clinical experience (A. J. and V. A.), were blinded to the data and were not involved in the recruitment and data collection. To assess the concurrent validity of the test, the GRBAS was administered on all

Table 3. Sentences from the English Consensus Auditory Perceptual Evaluation of Voice and its corresponding Hindi sentences, the phonetic transcription, and transliteration and translation of the sentences from Hindi to English.

English	Hindi	Phonetic transcription	Transliteration	Translation
1. The blue spot is on the key again.	आज कई दिनों बाद सौ रुपये मिले।	/ɑdʒ kəi ðɪɲõ ke bað sɔ rʊpɛ mɪle/	Aaj kai dinõ ke baad sau rupaye miley.	Today, after many days, I found 100 rupees.
2. How hard did he hit him?	हमारे हाथों में हीरा नहीं है।	/həmɑre haθõ mẽ hirɑ ɲəhĩ hæ̃ /	Hamaarey haathõ may heera nahi hain.	We do not have the diamond in our hands.
3. We were away a year ago.	यहाँ बादल गरज रहे हैं।	/jəhɑ̃ baðəl garaz rəhẽ hæ̃/	Yahaa baadal garaj rahe hain.	The clouds are thundering here.
4. We eat eggs every Easter.	इतनी बड़ी एक ईमारत इधर खड़ी है।	/ɪʈɲi bəɖi imɑrəʈ iðʰər kʰəɖi hæ/	Itni badi ek imaarat idhar khadi hain.	There is such a big building standing here.
5. My mama makes lemon muffins.	मेरे मामा ने मुझे मिठाई दी।	/mere mɑmɑ ɲe mʊdʒʱe mɪʈʰai ði/	Mere mama ne mujhe mithai dee.	My uncle gave me sweets.
6. Peter will keep at the peak.	प्रीती के पास पता है।	priʈi ke pɑs pəʈɑ hæ	Preeti ke paas pata hai.	Preeti has the address.

the recorded samples. A graduate student (I. B.) and an experienced speech-language pathologist (A. J.) rated the normative voice samples, and two experienced speech-language pathologists (A. J. and V. A.) rated the disordered voice samples.

Data Analyses

Statistical analyses were performed using SPSS 25.0 (IBM Corp., released 2017). The Pearson product–moment correlation was performed to assess the strength of four relationships: (a) the English and Hindi CAPE-V scores, (b) the common parameters of the Hindi CAPE-V and GRBAS in the normative group, (c) the common parameters of the Hindi CAPE-V and GRBAS in the disordered voice group, and (d) the scores of the two raters for the normative and disordered voice groups to assess for interrater reliability.

Results

Normative Voice Group

The mean scores of all the parameters of the English and Hindi CAPE-V are shown in Table 4. The mean overall severity was 3.85 (SD = 5.52) in the Hindi CAPE-V and 4.58 (SD = 5.81) in the English CAPE-V. Mean scores for the GRBAS administered on the Hindi stimuli are also provided in the table. Mean value for the grade or overall severity for GRBAS was 0.30 (SD = 0.52).

Table 4. Mean and standard deviations for ratings of voice quality variables for the Hindi and English Consensus Auditory Perceptual Evaluation of Voice (CAPE-V) and Grade, Roughness, Breathiness, Asthenia and Strain (GRBAS) for the Hindi stimuli in the normative voice group.

	English CAPE-V		Hindi CAPE-V		Hindi GRBAS	
Parameters	***M***	***SD***	***M***	***SD***	***M***	***SD***
Overall severity	4.58	5.81	3.85	5.52	0.30	0.52
Roughness	5.39	4.97	3.76	4.67	0.30	0.53
Breathiness	0.79	3.60	1.09	4.87	0.06	0.24
Strain	0.58	1.50	0.36	1.11	0.00	0.00
Pitch	0.15	0.87	0.27	1.09	n/a	n/a
Loudness	0.00	0.00	0.00	0.00	n/a	n/a

Note. n/a = not applicable.

Correlation

Table 5 shows the correlational analysis of parameters of the perceptual voice analysis using the English and Hindi versions of CAPE-V. Overall severity, roughness, breathiness, and pitch showed a significantly strong correlation ($r > .8$, $p < .01$) between both the versions. Strain showed a weak correlation between the two versions ($r = .15$, $p > .01$). Loudness ratings for all individuals for both Hindi and English stimuli were normal, leading to a score of 0 for this variable. Hence, correlational analyses could not be performed for the loudness variable and are not listed in the table below. To determine the concurrent validity of the Hindi CAPE-V and GRBAS, scores of the perceptual parameters from the Hindi CAPE-V were compared to the scores of the corresponding parameters in GRBAS. As seen in Table 5, overall severity and roughness were strongly correlated ($r > .7$, $p < .01$) and breathiness was moderately strong ($r > .6$, $p < .01$) between the Hindi CAPE-V and the GRBAS. A correlation could not be obtained for the variable of strain because all GRBAS strain scores were 0.

Interrater Reliability

Interrater reliability was established by comparing the CAPE-V score by a graduate student clinician (I. B.) and a speech-language pathologist (A. J.) for 12 randomly selected samples in both the languages. The correlation scores for overall severity, roughness, and breathiness can be seen in Table 6. A strong relationship was present for severity ($r > .8$, $p < .001$) and breathiness ($r > .9$, $p < .001$), and a nonsignificant relationship was present for roughness ($r < -.369$, $p = .239$).

Table 5. Pearson correlation between English and Hindi Consensus Auditory Perceptual Evaluation of Voice (CAPE-V) parameters and Hindi CAPE-V and Grade, Roughness, Breathiness, Asthenia and Strain (GRBAS) scores in the normative voice group.

	English and Hindi CAPE-V		Hindi CAPE-V and GRBAS	
Parameters	**Pearson coefficient**	**Significance level**	**Pearson coefficient**	**Significance level**
Overall severity/grade	.823	$p < .001$	.753	$p < .001$
Roughness	.838	$p < .001$	.763	$p < .001$
Breathiness	.883	$p < .001$	.634	$p < .001$
Strain	.151	$p = .400$	n/a	
Pitch	.773	$p < .001$	n/a	

Note. n/a = not applicable.

Disordered Voice Group

The following table shows mean scores for overall severity/grade, roughness, breathiness, and strain when the Hindi CAPE-V and GRBAS were administered on the disordered voice samples from 13 individuals with dysphonia (see Table 7).

Correlation

Correlational analyses of the common parameters of the Hindi CAPE-V and GRBAS were performed using Pearson correlation. There was a strong, significant correlation for all parameters, namely, overall severity, roughness, breathiness, and strain (see Table 8).

Strong interrater reliability was established by comparing the Hindi CAPE-V and GRBAS scores by two of the co-authors (A. J. and V. A.) for all participants in the disordered group. The correlation scores for overall severity, roughness, breathiness, and strain for both rating scales can be seen in Table 9. Correlation values ranged between .70 and .93 for both CAPE-V and GRBAS ratings at $p < .01$.

Comparison Between Normative and Disordered Groups

An analysis of variance between the six parameters of overall severity, roughness, breathiness, strain, pitch, and loudness for the Hindi CAPE-V between both groups revealed a significant difference for all parameters, as shown in Table 10.

Discussion

Voice quality is essentially a perceptual phenomenon occurring as a response to acoustic stimuli (Oates, 2009).

Table 6. Pearson correlation between two raters for the English and Hindi Consensus Auditory Perceptual Evaluation of Voice in the normative voice group.

Parameter	Pearson coefficient	Significance level
Overall severity	.829	$p < .001$
Roughness	–.369	$p = .239$
Breathiness	.921	$p < .001$

A listener recognizes any deviation in voice quality and may characterize it as unpleasant or inadequate when compared to a normal voice (Zraick et al., 2011). Since voice is fundamentally perceptual in nature, it is important to evaluate and corroborate these perceptual findings with visual imaging of the vocal folds or objective data obtained via acoustic and aerodynamic analyses. Findings obtained with auditory-perceptual evaluations can be easier to understand for the patients, caregivers, and other health care professionals than data obtained with instrumental measures. These measures can also be used to assess change over time with or without treatment.

The purpose of this study was to develop a reliable Hindi adaptation of the CAPE-V to make the CAPE-V more accessible to Hindi speakers globally. While the core principles of the English CAPE-V were maintained when developing the stimuli, the sentences for the Hindi CAPE-V assessment were created to reflect the cultural and linguistic demands of the Hindi language. Hence, a simple translation of the original sentences would not have been adequate, and a new set of sentences was created. For example, the Hindi language does not have a /w/ or /v/ phoneme as seen in English but uses a voiced labiodental approximant /ʋ/ that varies between a /w/ and /v/ depending on the coarticulatory context. The Hindi sentences had to accommodate for these differences.

Sixteen men and 17 women with a normal voice quality and 10 men and three women with a disordered voice

Table 7. Mean and standard deviations for ratings of voice quality variables for the Hindi Consensus Auditory Perceptual Evaluation of Voice (CAPE-V) and Grade, Roughness, Breathiness, Asthenia and Strain (GRBAS) in the disordered voice group.

	CAPE-V		GRBAS	
Parameter	***M***	***SD***	***M***	***SD***
Overall severity/grade	36.61	32.74	1.39	1.26
Roughness	14.23	24.83	0.69	0.94
Breathiness	25.77	30.69	0.92	1.04
Strain	22.31	26.63	0.92	0.95
Pitch	23.77	22.77	n/a	
Loudness	34.15	24.85	n/a	

Note. n/a = not applicable.

Table 8. Pearson correlation for the Hindi Consensus Auditory Perceptual Evaluation of Voice and Grade, Roughness, Breathiness, Asthenia and Strain in the disordered voice group.

Parameter	Pearson correlation	Significance level
Overall severity/grade	.955	$p < .001$
Roughness	.843	$p < .001$
Breathiness	.865	$p < .001$
Strain	.778	$p < .001$

quality participated in the study. Participants in the normative group completed the English and Hindi versions of the CAPE-V. The ratings on these versions were strongly correlated for overall severity, roughness, breathiness, and pitch implying a similar perception of voice quality for the English and Hindi stimuli. A significant difference was seen in the mean scores for strain in the English and Hindi CAPE-V. The range of strain scores was 0–6 (out of 100) for the English CAPE-V and 0–7 (out of 100) for the Hindi CAPE-V. Given the low scores and because they are within the normative range, this statistical difference is not clinically significant. The difference in the strain scores for some of the individuals may be a factor of their difference in speaking style between the languages. These participants were bilingual individuals living in Houston.

The participants in the disordered group were in India and were not fluent in conversational English to complete the tasks on the English CAPE-V. The GRBAS was administered on the Hindi stimuli and compared to the Hindi CAPE-V scores since the GRBAS is the commonly used tool currently in India. There was a strong correlation found between the Hindi GRBAS scores and the Hindi CAPE-V scores for overall severity and roughness and moderately strong for breathiness, establishing concurrent validity for the Hindi CAPE-V. This is consistent with the findings in other studies that involved adaptation of CAPE-V in other languages and a comparison between GRBAS scores and CAPE-V scores (Chen et al., 2018; de Almeida et al., 2019; Özcebe et al., 2019; Zraick et al., 2011).

The strong interrater reliability ($r > .7$) was seen in overall severity and breathiness for the normative group

Table 9. Pearson correlation between two raters for the Hindi Consensus Auditory Perceptual Evaluation of Voice (CAPE-V) and Grade, Roughness, Breathiness, Asthenia and Strain (GRBAS) for the disordered voice group.

Scale	Parameter	Pearson coefficient	Significance level
CAPE-V	Overall severity	.932	$p < .001$
	Roughness	.701	$p = .008$
	Breathiness	.832	$p < .001$
	Strain	.818	$p = .001$
GRBAS	Grade	.926	$p < .001$
	Roughness	.854	$p < .001$
	Breathiness	.713	$p < .001$
	Strain	.912	$p < .001$

Table 10. Analysis of variance results between the normative and disordered groups for the Hindi Consensus Auditory Perceptual Evaluation of Voice (CAPE-V).

CAPE-V parameters	*F* value	Significance level
Overall severity	53.851	$p < .001$
Roughness	5.558	$p = .023$
Breathiness	21.031	$p < .001$
Strain	23.110	$p < .001$
Pitch	36.185	$p < .001$
Loudness	47.935	$p < .001$

(Cicchetti & Sparrow, 1981). A weak correlation was found between roughness scores by the examiners for this group. This difference can be attributed to the difference in experience between the graduate student and the speech-language pathologist. All scores for roughness were still in the low range (below 17 out of 100). In the disordered voice group, the Hindi CAPE-V and GRBAS were completed by experienced speech-language pathologists. A strong correlation was observed for overall severity, breathiness, roughness, and strain scores, demonstrating good interrater reliability.

A comparison of the six parameters of the Hindi CAPE-V between the normative and disordered groups showed a significant difference ($p < .001$) for all, demonstrating the ability of the Hindi CAPE-V to separate those with normal voice quality from those with a disordered voice. This implies that the sentences developed for the Hindi CAPE-V were appropriate for the task.

Limitations and Future Implications

The disordered group was limited by the small sample size ($n = 13$) and with more men than women. The normative and disordered groups were also found to be significantly different in population variances. This could be attributed to the difference in both the age distribution and sample size. There are multiple known dialects of Hindi, and the multilingual nature of the Indian subcontinent leads to various Hindi accents. The effects of the various accents on the CAPE-V scores should be studied to determine the consistency of the stimuli across accents. While the Hindi CAPE-V can be used with a large population in India, there will still be a need for the assessment to be adapted to more languages so it can be used with a diverse group of patients.

Conclusions

The Hindi CAPE-V provides culturally and linguistically appropriate stimuli to perform an auditory-perceptual evaluation of voice for Hindi-speaking individuals. This adaptation had strong interrater reliability and concurrent validity between the English and Hindi CAPE-V and between the Hindi CAPE-V and GRBAS. It was able to identify speakers with a normal voice quality and those with a disordered voice quality. The transcription and transliteration of the stimuli provided in Table 3 will be useful for clinicians who may have Hindi-speaking patients but do not

themselves know the language or have access to an interpreter. The Hindi CAPE-V is a reliable tool to use as part of the voice evaluation for Hindi speakers and will provide clinicians with a more complete evaluation of the voice quality of Hindi speakers.

Acknowledgments

We would like to thank Bhavya Tiwari at the University of Houston for providing us with linguistic guidance. We would also like to the thank the faculty and staff at Sri Aurobindo Institute of Medical Sciences, India, for allowing us to collect data at their site.

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Appendix

Hindi Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V)

Name: _____ **Date:** _____

The following parameters of voice quality will be rated upon completion of the following tasks:
आवाज की गुणवत्ता के निम्नलिखित मापदंडों को निम्न कार्यों के पूरा होने पर मूल्यांकन किया जाएगा:

1. Sustained vowels, /a/ and /i/ for 3-5 seconds duration each/ निरंतर स्वर, /आ/ और /ई/ प्रत्येक ३-५ सेकंड की अवधि के लिए ।
2. Sentence production/ वाक्य निर्माण :
   a. आज कई दिनों बाद सौ रुपये मिले।
   b. हमारे हाथों में हीरा नहीं है।
   c. यहाँ बादल गरज रहे हैं।
   d. इतनी बड़ी एक ईमारत इधर खड़ी है।
   e. मेरे मामा ने मुझे मिठाई दी।
   f. प्रीती के पास पता है।
3. Spontaneous speech in response to: "Tell me about your voice problem." or "Tell me how your voice is functioning." / प्रतिक्रिया में सहज भाषण: "अपनी आवाज़ के बारे में बताईए।"

Legend:	C= Consistent	I= Intermittent	MI= Mildly Deviant
	MO= Moderately Deviant	SE= Severely Deviant	

			SCORE
Overall Severity/ कुल मिलाकर गंभीरता	_____ MI MO SE	C I	/100
Roughness/ खुरदरापन	_____ MI MO SE	C I	/100
Breathiness/ साँस भरी	_____ MI MO SE	C I	/100
Strain/ तनाव	_____ MI MO SE	C I	/100
Pitch/ पट्टी	(Indicate the nature of the abnormality): _____ _____ MI MO SE	C I	/100
Loudness/ प्रबलता	(Indicate the nature of the abnormality): _____ _____ MI MO SE	C I	/100
_____	_____ MI MO SE	C I	/100
_____	_____ MI MO SE	C I	/100

COMMENTS ABOUT RESONANCE: NORMAL OTHER (Provide description):

_____

ADDITIONAL FEATURES (for example, diplophonia, fry, falsetto, asthenia, aphonia, pitch instability, tremor, wet/gurgly, or other relevant terms):

Clinician:_____