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Adaptation and Validation of Hindi Version of Vocal Tract Discomfort Scale (H-VTDS)

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Abstract: Human voice plays a vital role for communication, self-expression and professional roles. Professional voice users (PVUs) such as singers, teachers, pastors and so on experience significant vocal tract discomfort due to occupational demands. This study aims to translate, adapt and validate the Vocal Tract Discomfort Scale (VTDS) into Hindi (H-VTDS). A total of 40 individuals further classified into 30 PVUs (10 each: singers, teachers, pastors; aged 20-50 years, ≥2 years' experience) and 10 normal participated in the study. Phase 1 involved forward/backward translation and expert validation. Phase 2 assessed content validity. Phase 3 evaluated test - retest reliability (14 -day interval, Pearson's r). Kruskal-Wallis tests compared group differences (SPSS v 23.0, $p<0.05$). Test-retest reliability was excellent ($r=0.932$, $p<0.001$). Pre-assessment of all groups showed negligible symptoms. Post assessment revealed highly significant differences across most symptoms (burning, tight, dry, aching, tickling, sore and irritable) between PVUs and normal, except "lump in throat" remained non-significant ($p=0.988$ frequency, $p=0.324$ severity). Hence, the implementation of self-assessment scales like the H-VTDS is important for the comprehensive assessment and treatment of voice disorders in PVUs.

Keywords: Voice, Vocal tract discomfort, PVUs, Vocal tract discomfort scale (H-VTDS)

1. INTRODUCTION

Voice plays a key role in human life. It serves as fundamental and irreplaceable element in human communication, identity and expression. Change in voice quality may cause severe emotional distress, social impairments and vocational disabilities. Occupational voice users form a diverse group with different levels of vocal demands from moderate use to high-performance professional voice users (PVUs) like singers, teachers are more prone to vocal pathologies like vocal polyp, nodule, laryngitis and vocal fatigue. Due to the diverse challenges they face, specialized assessment instruments are vital for measuring vocal discomfort in singers, teachers and pastors.

Vocal tract discomfort which is majorly seen in PVUs is less addressed. To understand the effect of vocal load in PVUs, many psychosocial assessment tools are used to assess the patients view on their voice problems. They include The Vocal Tract Discomfort Scale (VTDS-Mathieson, Hirani, Epstein, Baken, Wood & Rubin, 2009), Voice Handicap Index (VHI-Jacobson, Johnson, Grywalski, Silbergleit, Jacobson, Benninger & Newman, 1997), Voice-Related Quality of Life (V-RQOL - Hogikyan & Sethuraman, 1999), Voice Activity and Participation Profile (VAPP - Ma & Yiu, 2001) and Voice Symptom Scale (VoiSS - Deary, Wilson, Carding & Mackenzie, 2003). The VTDS is a self-assessed questionnaire originally developed in English language by Mathieson et al (2009) to understand the frequency and severity of discomfort primarily in eight major symptoms. Validated initially on muscle tension dysphonia (MTD) patients later adapted and validated in various languages.

VTDS should be culturally and linguistically appropriate. The VTDS is adapted and validated nationally in Malayalam (Ravi, Shabnam, Thupakula, Narne, Yerraguntla, Almudhi, Madathodiyil, Sajan & Jacob, 2025) and

across the world. For example, Polish (Niebudek-Bogusz, Woźnicka, Wiktorowicz & Śliwińska-Kowalska, 2012), Persian (Torabi, Seyyedeh, Nakhostin & Dabirmoghaddam, 2016), German (Lukaschyk, Brockmann-Bauser & Beushausen, 2017) and so on.

Irkli and Çiyiltepe (2023) has confirmed the validity and reliability in individuals with and without voice disorders. They also observed a high degree of correlation between VTDS and VHI and concluded that it's a highly reliable and valid tool.

Rodrigues, Zambon, Mathieson and Behlau (2013) investigated the relationship between vocal tract discomfort using VTDS and self-reported voice problems in two groups of teachers, 32 with voice complaints and 30 without. They found that teachers with vocal complaints showed significantly higher VTDS total and sub-scale scores than asymptomatic teachers.

Devadas, Jose and Gunjawate (2016) conducted a study among Mar Thoma priests in Kerala and reported a high prevalence of voice problems with 47.8% of participants experiencing vocal difficulties at some point during their careers. They also observed several contributing risk factors including asthma, allergies and habitual throat clearing which were associated with the increased incidence of voice disorders.

Silva, Lacerda, Depolli, Azevedo, Moreti and Guimarães (2024) conducted a study among amateur church singers using the VoiSS and VTDS. The results revealed that amateur church singers reported moderate levels of vocal symptoms with an average VoiSS total score of 22.6 points. The most self-perceived sensations in the VTDS were dryness, sore throat and itchiness with mild to moderate intensity. Thus, the study highlighted the importance of implementing vocal heath education and intervention strategies for amateur church singers.

Ravi et al (2025) developed the Malayalam version of the VTDS and confirmed its validity and reliability for use among Malayalam-speaking professional voice use.

According to the 2011 census, in India about 528 million people speak Hindi which accounts for 43.63% of the population. The PVUs like singers, teachers and pastors face vocal discomfort after their day-to-day occupational activities which is not addressed properly. There is no validated tool in Hindi currently to understand the voice discomfort faced by PVUs who speak Hindi language. The development of Hindi version of the VTDS (H-VTD) is thus essential for providing these singers, teachers and pastors with a relevant and reliable tool for self-assessment. Beaton, Bombardier, Guillemin and Ferraz (2000) provided guidelines requiring a strict process for cross-cultural adaptation. This ensures the tool retains its original meaning and concepts.

The H-VTDS will serve as a key tool for speech-language pathologists (SLPs) and voice therapists to diagnose and treat voice problems in Hindi - speaking PVUs. It aids in spotting vocal discomfort among PVUs allowing for focused treatment. Adapting the VTDS into Hindi will also advance voice disorder research in India, improving culturally sensitive care and expanding knowledge in voice assessment.

The present study aims to fill this gap by translating, adapting and validating the VTDS into Hindi to provide an effective self - assessment tool for Hindi - speaking professional voice users with voice difficulties.

2. METHODOLOGY

Aim: The aim of the study was to translate, adapt and validate VTDS into Hindi language.

Subjects: A total of 40 subjects in the age range of 20 to 50 years were selected randomly and further divided into 30 PVUs which includes 10 singers, 10 teachers, 10 pastors and a control group of 10 normal individuals.

Inclusion criteria:

- Native Hindi speaking individuals.
- Singers, teachers and pastors with minimum 2 years of experience.
- Individuals within the age range of 20 to 50 years.

Exclusion criteria:

- Singers, teachers and pastors who have less than 2 years of experience.
- Subjects with a history of psychiatric, neurological impairments and those unable to read or understand Hindi.
- Individuals with voice complaints who have undergone laryngeal surgery or any major voice treatment.

Stimulus: VTDS developed by Mathieson et al (2009) was the stimulus for the present study and written consent was obtained from the primary authors.

Procedure: The study was mainly conducted in three phases:

Phase 1: Translation and Content validation

The original English version VTDS was translated into Hindi by two native Hindi speakers fluent in English - a professional translator and a professor. They independently translated the entire English VTDS questionnaire including instructions and response options into Hindi. Their versions were reconciled into one draft as per standard cross-cultural adaptation protocols to maintain semantic and conceptual equivalence. An independent bilingual expert, unaware of the original, back-translated it to English for validation against the source. A panel of five SLPs then reviewed everything for clarity, accuracy and culturally fit finalizing the Hindi version of VTDS (H-VTDS) based on their input.

Phase 2: Administration

The Hindi translated version of VTDS was distributed among singers, teachers, pastors and normal individuals and were instructed/requested to carry out a self-assessment at the start of the day (pre-assessment) and second assessment at the end of the day after work (post-assessment). All subjects completed the questionnaire individually as instructed.

Phase 3: Test - Retest Reliability

The test-retest reliability was done on 30 professional voice users and 10 normal individuals who completed the H-VTDS again after a 14 days' time interval. The collected data was tabulated, analysed and subjected for statistical analysis to test if the Hindi VTDS is reliable and valid.

Statistical Analysis

The data was analysed using Kruskal Wallis's test to compare the pre and post vocal tract discomfort across the groups. While the test-retest reliability was assessed using Pearson correlation coefficient (r). A p-value <0.05 was considered as statistically significant. All analysis was done using SPSS version 23.0 software.

3. RESULT

The aim of the study was to translate, adapt and validate VTDS into Hindi language. Data was statistically analysed and the results are discussed below.

Table 1. *Shows the test-retest reliability of H-VTDS.*

	Test - retest reliability
"r"	0.932
p value	< 0.001
Significance	S

("r" = Pearson correlation coefficient), S = Significance.

The "r "coefficient assessed test-retest reliability revealing strong agreement ($p < 0.05$) in normal individuals.

Table 2. *Shows the comparison of pre and post assessment of frequency across the groups.*

Parameter				Mean	Std. Deviation	Median	IQR		Kruskal Wallis' s test
							Lower	Upper	
Frequency	Burning	**Post**	Teachers	1.80	1.317	2.00	0.75	3.00	**0.000, HS**
			Singers	4.90	0.876	5.00	4.00	6.00	
			Pastors	1.80	1.317	2.00	0.75	3.00	
			Normals	0.70	0.823	0.50	0.00	1.25	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	**NS**
			Singers	0.00	0.000	0.00	0.00	0.00	
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	0.00	0.00	0.00	
	Tight	**Post**	Teachers	1.50	1.354	1.50	0.00	2.25	**0.000, HS**
			Singers	4.50	0.972	4.00	4.00	5.25	

			Pastors	1.40	1.350	1.00	0.00	2.25	
			Normals	0.90	0.738	1.00	0.00	1.25	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	**0.564, NS**
			Singers	0.20	0.422	0.00	0.00	0.25	
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	0.00	0.00	0.00	
	Dry	**Post**	Teachers	3.20	1.033	3.00	2.00	4.00	**0.000, HS**
			Singers	4.60	1.075	5.00	3.75	5.25	
			Pastors	3.20	1.033	3.00	2.00	4.00	
			Normals	0.60	0.699	0.50	0.00	1.00	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	**NS**
			Singers	0.00	0.000	0.00	0.00	0.00	
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	0.00	0.00	0.00	
	Aching	**Post**	Teachers	3.20	1.033	3.00	2.00	4.00	**0.000, HS**
			Singers	4.50	0.972	4.00	4.00	5.25	
			Pastors	3.20	1.033	3.00	2.00	4.00	
			Normals	0.90	0.876	1.00	0.00	2.00	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	**NS**
			Singers	0.00	0.000	0.00	0.00	0.00	
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	0.00	0.00	0.00	
	Tickling	**Post**	Teachers	1.10	0.994	1.00	0.00	2.00	**0.000, HS**
			Singers	2.40	1.350	2.00	1.75	4.00	
			Pastors	1.10	0.994	1.00	0.00	2.00	
			Normals	0.90	0.738	1.00	0.00	1.25	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	**NS**
			Singers	0.00	0.000	0.00	0.00	0.00	
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	0.00	0.00	0.00	
	Sore	**Post**	Teachers	3.50	0.972	3.00	3.00	4.25	**0.000, HS**
			Singers	4.80	0.919	4.50	4.00	6.00	
			Pastors	3.40	1.075	3.00	2.75	4.25	
			Normals	1.00	0.816	1.00	0.00	2.00	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	**0.718, NS**
			Singers	0.10	0.316	0.00	0.00	0.00	
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	0.00	0.00	0.00	
	Irritable	**Post**	Teachers	3.30	0.675	3.00	3.00	4.00	**0.000, HS**
			Singers	4.40	1.713	5.00	4.00	5.25	
			Pastors	3.10	0.738	3.00	2.75	4.00	
			Normals	0.70	0.675	1.00	0.00	1.00	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	**0.830, NS**
			Singers	0.10	0.316	0.00	0.00	0.00	
			Pastors	0.00	0.000	0.00	0.00	0.00	

			Normals	0.00	0.000	0.00	0.00	0.00	
	Lump in the throat	**Post**	Teachers	1.20	1.398	0.50	0.00	3.00	**0.988, NS**
			Singers	1.30	1.059	1.50	0.00	2.00	
			Pastors	1.10	1.287	0.50	0.00	2.25	
			Normals	0.90	0.994	0.50	0.00	2.00	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	**0.798, NS**
			Singers	0.10	0.316	0.00	0.00	0.00	
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	0.00	0.00	0.00	

**NS = Not significant, HS = highly significant*

From the above table it can be inferred that pretest values were not significant whereas the post test scores were highly significant (p =0.000) across the subjects expect lump in the throat symptom which was not significant difference (p = 0.988).

Table 3. *Shows the comparison of pre and post assessment of severity across the groups.*

Parameter				**Mean**	**Std. Deviation**	**Median**	**IQR**		**Kruskal Wallis's test**
							Lower	**Upper**	
Severity	Burning	**Post**	Teachers	2.00	4.00	4.00	1.50	3.00	**0.000, HS**
			Singers	4.30	1.252	3.00	3.75	5.25	
			Pastors	2.50	1.509	0.50	1.50	4.00	
			Normals	0.60	0.699	0.00	0.00	1.00	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	**NS**
			Singers	0.00	0.000	0.00	0.00	0.00	
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	1.50	0.00	0.00	
	Tight	**Post**	Teachers	1.50	1.269	4.00	0.00	3.00	**0.000, HS**
			Singers	4.10	1.197	1.50	3.00	5.00	
			Pastors	1.50	1.269	1.00	0.00	3.00	
			Normals	0.90	0.738	0.00	0.00	1.25	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	**NS**
			Singers	0.00	0.000	0.00	0.00	0.00	
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	3.00	0.00	0.00	
	Dry	**Post**	Teachers	2.80	0.789	4.00	2.00	3.25	**0.000, HS**
			Singers	4.20	0.789	3.00	3.75	5.00	
			Pastors	2.80	0.789	0.50	2.00	3.25	
			Normals	0.60	0.699	0.00	0.00	1.00	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	**NS**
			Singers	0.00	0.000	0.00	0.00	0.00	
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	3.00	0.00	0.00	
	Aching	**Post**	Teachers	2.70	0.675	5.00	2.00	3.00	**0.000, HS**
			Singers	4.70	0.949	3.00	4.00	5.25	

			Pastors	2.70	0.675	1.00	2.00	3.00	
			Normals	0.90	0.876	0.00	0.00	2.00	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	
			Singers	0.00	0.000	0.00	0.00	0.00	**NS**
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	2.00	0.00	0.00	
	Tickling	**Post**	Teachers	1.40	1.075	3.00	0.00	2.00	
			Singers	2.80	1.033	1.50	2.00	4.00	**0.000, HS**
			Pastors	1.30	1.059	1.00	0.00	2.00	
			Normals	1.00	0.816	0.00	0.00	2.00	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	
			Singers	0.00	0.000	0.00	0.00	0.00	**NS**
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	4.00	0.00	0.00	
	Sore	**Post**	Teachers	3.60	1.075	5.00	2.75	4.25	
			Singers	4.80	0.919	4.00	4.00	5.25	**0.000, HS**
			Pastors	3.60	1.075	1.00	2.75	4.25	
			Normals	1.00	0.816	0.00	0.00	2.00	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	
			Singers	0.00	0.000	0.00	0.00	0.00	**0.718, NS**
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	3.00	0.00	0.00	
	Irritable	**Post**	Teachers	3.00	0.943	4.50	2.00	4.00	
			Singers	3.90	1.524	2.50	2.00	5.00	**0.000, HS**
			Pastors	2.70	0.823	1.00	2.00	3.25	
			Normals	0.70	0.675	0.00	0.00	1.00	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	
			Singers	0.00	0.000	0.00	0.00	0.00	**NS**
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	0.00	0.00	0.00	
	Lump in the throat	**Post**	Teachers	0.60	1.075	1.50	0.00	1.25	
			Singers	1.50	1.080	0.00	0.75	2.25	**0.324, NS**
			Pastors	0.60	1.075	0.50	0.00	1.25	
			Normals	0.90	0.994	0.00	0.00	2.00	
		Pre	Teachers	0.00	0.000	0.00	0.00	0.00	
			Singers	0.00	0.000	0.00	0.00	0.00	**NS**
			Pastors	0.00	0.000	0.00	0.00	0.00	
			Normals	0.00	0.000	0.00	0.00	0.00	

**NS = Not significant, HS = highly significant*

The pre severity assessment of symptoms (Burning, tight, dry, aching, tickling, sore, irritable, lump in throat) across the groups revealed no - significant difference and the post severity assessment result of the following symptoms - Burning, tight, dry, aching, tickling, sore, irritable indicated high significant difference, however the lump in throat showed non - significant difference ($p = 0.324$).

4. DISCUSSION

Unlike other general voice related questionnaires, VTDS gains more importance because it focuses on sensory experience of vocal discomfort. The H-VTDS demonstrated strong test-retest reliability ($r = 0.932$, $p < 0.001$), indicating it is a reliable tool. The results of the study in pre assessment shows no significant differences whereas

post assessment results were highly significant across the subjects for all the parameters except lump in the throat. Silva et al (2024) found dryness as the major symptom seen followed by sore throat and itching which is in accordance with the present study. Studies from many diverse populations such as teachers, singers reveal the importance of understanding the subjects' perception of their own issues so that problems experienced by the subjects that are not reported to the clinician can be addressed.

5. SUMMARY AND CONCLUSION

Voice is crucial for communication, identity, expression and changes cause emotional, social and professional issues especially in PVUs like singers, teachers and pastors prone to pathologies. The present study aimed to translate, adapt and validate the English version of VTDS into Hindi version. A pre and post assessment was conducted among 30 PVUs and 10 normal individuals and results showed no significant differences in pre-assessment and highly significant difference in post-assessment except lump in the throat. Since PVUs often experience symptoms they don't explicitly report, self-assessment scales like the VTDS are indispensable tools for clinicians to accurately assess and treat voice disorders.

6. LIMITATIONS

- Sample size is limited.
- Selection of participants were random.
- Assess H-VTDS among other PVUs.

7. FUTURE DIRECTION

- Adapt and validate the VTDS for other regional languages.
- Administer the H-VTDS to various populations of PVUs.
- Sample size should be more within pastors, teachers and singers.

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