

TRANSLATION AND LINGUISTIC VALIDATION OF COMPOSITE AUTONOMIC SYMPTOM SCALE (COMPASS 31) IN HINDI

Physiotherapy

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ABSTRACT

Objective: Assessing the functioning of the autonomic nervous system is important in the evaluation of common neurological disorders, including polyneuropathy, diabetes, and Parkinson's disease. The COMPASS 31 is a self-assessment instrument investigating autonomic symptoms. Reliable translations of the questionnaire shall facilitate the clinical and scientific exchange and cooperation between autonomic research groups in different laboratories and in different countries. **Materials and Methods:** The study aimed to provide translation and linguistic validation of the Hindi version of the Composite Autonomic Symptom Scale COMPASS 31. The research was conducted in two stages. Phase 1 consisted of the translation of the English version of the Composite Autonomic Symptom Scale COMPASS 31 into the Hindi version. The second phase consisted of field testing of the translated version to check test-retest reliability and validity. Phase 1 of this study was carried out as per the guidelines laid down by the American Academy of Orthopedic Surgeons (AAOS). **Results:** Test-retest reliability was assessed correlating the total score and domain scores derived from the English and Hindi versions of COMPASS 31 using Spearman correlations. A positive correlation for the overall score between English and Hindi versions ($r = 0.98, P < 0.001$); a positive correlation was found also for individual domain scores. There was an overall excellent internal consistency (alpha value > 0.9). There was an overall almost perfect agreement (single measures value > 0.8) with a statistically highly significant p value ($p < 0.01$). **Conclusion:** In summary, this study contributes a translated Hindi version of the COMPASS 31 that is reliable, highly internally consistent, and provides results identical to those of the original US English version.

KEYWORDS

COMPASS 31 Autonomic dysfunction Translation Linguistic Validation Hindi Language

INTRODUCTION:

Autonomic dysfunction, is a complex and multifaceted condition which poses a formidable challenge to clinicians worldwide. Assessing the functioning of the autonomic nervous system is important not only in the evaluation of common neurological disorders but also in older adults. Dysautonomia can cause multiple symptoms, including low blood pressure when standing (orthostatic hypotension), tachycardia, upper and lower gastrointestinal complaints, pupil and sweating abnormalities, and bladder and sexual dysfunction.^[1]

Studies have shown that Autonomic Nervous System (ANS) responses display a significant decline with increasing age groups.^[2] In elderly individuals, the symptoms of Autonomic Dysfunction (AD) are often atypical and subtle, leading to a lower level of suspicion.^[3] The sympathetic and parasympathetic divisions of the autonomic nervous system, vital for key bodily functions, mature progressively over time.

However, the extent of their variation is largely influenced by aging due to their different neural pathways. Consequently, normal aging is a significant confounding factor in diagnosing AD, and age alone is an independent predictor of this condition, regardless of other existing health issues.^[4]

There are not many reliable clinical tests for the evaluation and diagnosis for Autonomic Dysfunction. The evaluation and diagnosis of Dysautonomia includes different tests for different symptoms for e.g. Autonomic function tests, tilt-table test, gastrointestinal test, quantitative sudomotor axon reflex test, thermoregulatory sweat test, urinalysis, and bladder function (urodynamic) tests. A clinical questionnaire for the evaluation of relevant autonomic symptoms has been considered necessary for several years to assess the severity and distribution of symptoms and the autonomic capacity of patients with autonomic disorders.^[1]

COMPASS 31 is an improved, cohesive, and significantly condensed quantitative tool for assessing autonomic symptoms. Derived from the original Autonomic Symptom Profile (ASP) and COMPASS, it features a streamlined scoring system, making it ideal for broad application in both autonomic research and clinical practice.^[6]

Suarez et al.^[6] created the Autonomic Symptom Profile (ASP) with 169 questions and 11 domains of autonomic functions. Selecting 84 clinical tasks from the ASP, the Composite Autonomic Symptom Score (COMPASS) was generated: 72 questions investigating 11 autonomic

domains (orthostatic intolerance, secretomotor, male sexual dysfunction, urinary, gastroparesis, constipation, diarrhoea, pupillomotor, vasomotor, reflex syncope, and sleep) and 12 items to score an understatement index and psychosomatic index. COMPASS has been used in many autonomic and research studies.^[7-12] However, over the years, several critical issues have emerged. Firstly, the scoring algorithm was highly complex and required computer analysis to generate results. Secondly, the administration was time-consuming, and the questions within domains lacked internal consistency evaluation. Lastly, various questions seemed insignificant and redundant. For these reasons, Sletten and colleagues^[1] redesigned a simplified, time-saving, and statistically stronger version called COMPASS 31. They identified six clinical domains submitting the ASP to 405 healthy controls and using exploratory factor analysis and critical clinical review for the selection of items and domains with higher internal consistency.

The COMPASS 31^[1] is a self-assessment instrument investigating autonomic symptoms. The scale comprises 31 elements that evaluate six areas of autonomic functions: orthostatic intolerance (4 items), vasomotor (3 items), secretomotor (4 items), gastrointestinal (12 items), bladder (3 items), and pupillomotor (5 items). To score, one sums the points from questions within each domain to calculate raw domain scores. These raw scores are then multiplied by a weight index to obtain the final domain scores. The total score is the sum of all domain scores and ranges from 0 (normal) to 100 (the worst condition).^[1]

Recently, the original US English version of COMPASS 31 has been validated in the Italian, German, Danish, Croatian and Serbian languages.^[13-16] A reliable Hindi version of the COMPASS 31 had been missing although it is needed for a more standardized clinical evaluation of patients with autonomic complaints. Reliable translations of any questionnaire facilitate the clinical and scientific exchange and cooperation between autonomic research groups in different laboratories and different countries. The translations offer a necessary standardized questionnaire that ensures international comparability while maintaining comprehensiveness, providing valid and reliable data.

Therefore, in this study, we aimed to develop a validated COMPASS 31 questionnaire in the Hindi language.

Methodology:

The study aimed to provide translation and linguistic validation of the Hindi version of the Composite Autonomic Symptom Scale COMPASS 31. Permission was obtained from the institutional ethical committee (EC/OA-76/2022). This research was conducted in two stages. Phase 1 consisted of translating the English version of the Composite Autonomic Symptom Scale COMPASS 31 into the Hindi version. The second phase consisted of field testing of the translated version to check test-retest reliability and validity. Phase 1 of this study was carried out as per the guidelines laid down by the American Academy of Orthopedic Surgeons (AAOS) [17]. To undertake the translation, written permission was obtained from the COMPASS 31 author through email. The COMPASS 31 was translated into Hindi and the translation has been copyrighted (L-149966/2024).

The translation process was followed according to the AAOS guidelines which involved six stages. For the Hindi version T1 and T2 were the provisional Hindi translated versions of COMPASS 31. Translator 1 (T1) was the Hindi teacher in a convent school. Translator 2 (T2) was a college professor who had completed his education in Hindi medium. Discrepancies in both versions were dealt with through extensive judgmental analysis and an agreement was reached on the T12 version. After this phase of the translation process, the T12 version was presented for further discussion and sent for pilot testing on patients at 5 physiotherapy clinics. This T12 version was well accepted in the Hindi-speaking community. Two professionals, blinded to the original version, independently back-translated the single Hindi version (T12) into an English one. B1 and B2 were the backward translations of the T12 version. One translator (B1) was a school teacher and another translator (B2) was a primary school principal and a mother tongue professional translator. Thereafter, the revised final T12 version was sent for field testing.

COMPASS 31 scoring system:

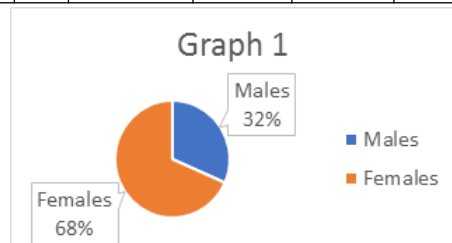
The scoring system [1] was applied (supplemental appendixes by Sletten et al.) [1]. Simple yes or no questions were scored as 0 point for no and 1 point for yes. Questions about a specific site of symptoms or symptoms under specific circumstances were scored as 0 if not present and 1 if present for each site and circumstance. Questions about symptom frequency were rated on a scale: 0 for rarely or never, 1 for occasionally or sometimes, 2 for frequently or 'a lot of the time,' and 3 for almost always or constantly. Severity of symptoms was rated as 1 for mild, 2 for moderate, and 3 for severe. When assessing the time course of a symptom, we scored 0 points for responses such as "gotten somewhat better," "gotten much better," "completely gone," and "I have not had any of these symptoms," 1 point for "stayed about the same," 2 points for "gotten somewhat worse," and 3 points for "gotten much worse." The scores for changes in bodily functions depend on the individual question asked. For example, "I get full a lot more quickly than I used to when eating a meal" was scored 2 points and "I get full a lot less quickly than I used to" was scored 0 points, while the answer "I sweat much more than I used to" was given 1 point and "I sweat much less than I used to" was scored 2 points. The minimal weighted score for the instrument equals 0 and the maximum weighted score equals 100. This is calculated by obtaining the maximum raw score of each domain and multiplying it with the weighting factor of the respective domain.

RESULTS:

19 participants were enrolled in the study with the mean age of 68.26±5.84 (Table 1) and M:F ratio of 6:13 as depicted in Graph 1.

Table 1-

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	19	60	84	68.26	5.84



All data were entered into a computer by giving coding system, proofed for entry errors. Data obtained was compiled on a MS Office

Excel Sheet. Data was subjected to Statistical Analysis using Statistical package for social sciences (SPSS v 26.0, IBM). Normality of numerical data was checked using Shapiro-Wilk test & was found that the data did not follow a normal curve; also a smaller size, hence non-parametric tests have been used for comparisons.

Test-retest reliability was assessed by correlating the total score and domain scores derived from the English and Hindi versions of COMPASS 31 using Spearman correlations. A positive correlation between the overall score of English and Hindi versions ($r = 0.98$, $P < 0.001$); a positive correlation was found also for individual domain scores as shown in Table 2.

Table 2.

	English Version	Hindi Version	r value
N=19			
Total Score	28.29±12.22	28.84±12.50	0.98
Domain Score			
Orthostatic intolerance	11.32±9.06	11.47±9.06	0.98
Vasomotor	1.49±1.37	1.44±1.32	0.98
Secretomotor	5.74±4.63	5.86±4.56	0.993
Gastrointestinal	6.23±3.10	6.32±3.19	0.98
Bladder	2.09±2.10	2.21±2.13	0.96
Pupillomotor	1.42±1.11	1.53±1.08	0.993

There was an overall excellent internal consistency (alpha value > 0.9). There was an overall almost perfect agreement (single measures value > 0.8) with a statistically highly significant p-value ($p < 0.01$) as shown in Table 3.

Table 3.

Variable	Cronbach's Alpha	Intraclass Correlation	Lower Bound	Upper Bound	Value	p value
Orthostatic intolerance	1.000	Single Measures	1.000	1.000	6.089	.000*
		Average Measures	1.000	1.000	6.089	.000*
Vasomotor	.995	Single Measures	.990	.974	199.222	.000*
		Average Measures	.995	.987	199.222	.000*
Secretomotor	.997	Single Measures	.994	.985	349.090	.000*
		Average Measures	.997	.993	349.090	.000*
Gastrointestinal	.996	Single Measures	.991	.977	223.000	.000*
		Average Measures	.996	.988	223.000	.000*
Bladder	1.000	Single Measures	1.000	1.000	1.124	.000*
		Average Measures	1.000	1.000	1.124	.000*
Pupillomotor	1.000	Single Measures	1.000	1.000	6.089	.000*
		Average Measures	1.000	1.000	6.089	.000*
TOTAL	.999	Single Measures	.998	.994	877.342	.000*
		Average Measures	.999	.997	877.342	.000*

DISCUSSION:

In this study, we aimed to provide a reliable Hindi translation of COMPASS 31 and demonstrate significant correlations between the English and the Hindi translation across all domains. The COMPASS 31 questionnaire has already been demonstrated to be a robust tool in the assessment of autonomic dysfunction symptom burden with scores that are well correlated with objective autonomic dysfunction test (haemodynamic response to head up tilt test and the Valsalva manoeuvre, heart rate response to deep breathing and sympathetic skin response). The questionnaire was shown to possess strong psychometric properties and proved to be an effective instrument for measuring autonomic dysfunction in conditions linked to this

dysfunction, including Parkinson's disease^[18], multiple system atrophy^[18], postural orthostatic tachycardia syndrome^[19], small-fibre neuropathy^[11] and diabetes^[20].

The translation process followed a strict protocol following the guidelines laid by AAOS (American Academy of Orthopedic Surgeons)^[17].

The Intra Class Correlation (ICC) Analysis shows an overall excellent internal consistency between the groups. There was an overall almost perfect agreement with a statistically highly significant p-value. Hence, we can conclude that this study contributes a Hindi version of the COMPASS 31 that is reliable, internally consistent, and provides results identical to those of the original US English version.^[1]

The Hindi COMPASS version also identifies and quantifies autonomic dysfunction of various organs and functional systems with a high sensitivity, similar to the English version^[6]. The English and the Hindi COMPASS 31 yielded significantly similar total COMPASS 31 scores in the 19 patients, and the scores of the six domains were again similar in all the versions. The translated version may also serve as a clinically useful screening tool that helps determine whether a patient needs specialized autonomic testing with not everywhere available equipment such as devices for continuous blood pressure monitoring, tools for analyzing heart rate and blood pressure variability, and equipment for sudomotor testing, among others.

The COMPASS 31 questionnaire is highly effective for screening autonomic symptoms, quantifying the severity of these symptoms as perceived by individuals, and evaluating changes over time in follow-up studies. However, positive results from the questionnaire require additional diagnostic evaluation.

CONCLUSION:

In summary, this study contributes a Hindi-translated and validated version of the COMPASS 31 that is reliable, highly internally consistent, and provides results identical to those of the original US English version. The translated version of COMPASS 31 (Composite Autonomic Symptom Scale) can be used in clinical setups to measure and assess autonomic symptoms in a wider range of population.

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