

Translation, Cross-Cultural Adaptation, and Psychometric Validation of Hindi Versions of The Fagerström Test For Nicotine Dependence For Smoking and Smokeless Tobacco

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ABSTRACT:

Statement of Problem: Culturally adapted and psychometrically validated Hindi instruments are needed for assessing nicotine dependence among smoking and smokeless tobacco users.

Purpose: To translate, culturally adapt, and validate Hindi versions of the Fagerström Test for Nicotine Dependence for Smoking (FTND-Smoking) and Smokeless Tobacco (FTND-ST).

Material and Methods: This methodological cross-sectional study included 360 Hindi-speaking adults (180 smokers and 180 smokeless tobacco users). Both instruments underwent forward-backward translation, expert review, cognitive interviewing, and pilot testing. Psychometric evaluation included content validity, internal consistency, test-retest reliability, exploratory factor analysis, convergent validity, known-groups validity, and floor and ceiling effects. Test-retest reliability was assessed in 40 participants per group after 7–14 days. Cotinine concentrations were evaluated in subsamples.

Results: Both instruments demonstrated excellent content validity (S-CVI/Ave: 0.979 and 1.000, respectively). Cronbach's alpha values were 0.601 and 0.372, McDonald's omega values were 0.619 and 0.403, and intraclass correlation coefficients were 0.967 and 0.968, respectively. Factor analysis supported a single-factor structure for FTND-Smoking (KMO=0.682), whereas FTND-ST exhibited marginal sampling adequacy (KMO=0.579) and a three-factor structure. Scores correlated significantly with daily tobacco consumption ($p=0.79$ and 0.62) and cotinine concentrations ($p=0.93$ and 0.92 ; all $p<0.001$). Participants with previous failed quit attempts demonstrated higher dependence scores. No significant floor or ceiling effects were observed.

Conclusions: Hindi FTND-Smoking demonstrated satisfactory overall psychometric performance despite moderate internal consistency. Hindi FTND-ST exhibited excellent temporal stability but limited internal consistency, warranting further refinement and multicentric validation.

Keywords: Cross-cultural adaptation, Fagerström Test, Hindi translation, Nicotine dependence, Psychometric validation, Smokeless tobacco.

Introduction

Tobacco use remains a major preventable cause of morbidity and mortality worldwide, with nicotine dependence contributing to continued tobacco consumption, difficulty in quitting, and relapse. In India, tobacco is consumed in both smoked and smokeless forms, including cigarettes, bidis, khaini, gutkha, zarda, and betel quid with tobacco. According to the Global Adult Tobacco Survey-2 (GATS-2), 28.6% of Indian adults use tobacco, including 10.7% who smoke tobacco and 21.4% who use smokeless tobacco.^{1,2} This highlights the importance of assessing nicotine dependence across different forms of tobacco consumption.

The Fagerström Test for Nicotine Dependence (FTND), revised by Heatherton et al. from the earlier Fagerström Tolerance Questionnaire, is a widely used instrument for assessing physical nicotine dependence among smokers.³ Its brevity and ease of administration make it suitable for clinical and epidemiological applications. However, the original instrument was developed primarily for cigarette smokers, limiting its direct applicability to smokeless tobacco users. To address this limitation, Ebbert et al. developed the Fagerström Test for Nicotine Dependence–Smokeless Tobacco (FTND-ST), which demonstrated an association with serum cotinine concentrations, supporting its usefulness in evaluating nicotine dependence among smokeless tobacco users.⁴

Although both instruments have been used in tobacco-related research, their application across different linguistic and cultural populations requires careful consideration. In India, variations in tobacco products, consumption practices, nicotine delivery patterns, and regional terminology may

influence participants' understanding of questionnaire items.⁵ Consequently, direct translation without cultural adaptation may compromise conceptual equivalence and measurement accuracy. Systematic translation and cross-cultural adaptation are therefore essential to ensure that the translated instruments retain the intended meaning of the original versions.

Internationally accepted guidelines recommend forward translation, reconciliation, back translation, expert committee review, pretesting, and cognitive interviewing to establish semantic, idiomatic, experiential, and conceptual equivalence.^{6,7} Furthermore, psychometric evaluation is necessary to establish the measurement properties of translated instruments, including content validity, internal consistency, test–retest reliability, construct validity, and convergent validity. The COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) framework provides methodological guidance for evaluating these measurement properties.^{8,9}

Despite the availability and clinical use of FTND-related instruments, comprehensive psychometric evidence for systematically translated and culturally adapted Hindi versions of both FTND-Smoking and FTND-ST remains an important area for investigation. This is particularly relevant given the diversity of tobacco consumption patterns among Hindi-speaking populations. Establishing their measurement properties may support more consistent nicotine-dependence assessment in dental, medical, community, and tobacco-cessation settings.

Therefore, the present study aimed to translate and culturally adapt the Fagerström Test for Nicotine Dependence for Smoking (FTND-Smoking) and the Fagerström Test for Nicotine Dependence–Smokeless Tobacco (FTND-ST) into Hindi and evaluate their validity and reliability among adult Hindi-speaking tobacco users.

Materials and Methods

Study Design and Setting

A methodological cross-sectional study was conducted between January 2026 and June 2026 in institutional and community settings to translate, culturally adapt, and psychometrically validate Hindi versions of the Fagerström Test for Nicotine Dependence for Smoking (FTND-Smoking) and the Fagerström Test for Nicotine Dependence–Smokeless Tobacco (FTND-ST) among adult Hindi-speaking tobacco users.

The study comprised two sequential phases. Phase I involved translation and cross-cultural adaptation of both instruments through forward translation, reconciliation, back translation, expert committee review, cognitive interviewing, and pilot testing. Phase II involved psychometric validation of the final Hindi versions among separate groups of smokers and smokeless tobacco users.

The translation and cultural adaptation procedures followed internationally accepted guidelines for adapting health-related questionnaires.^{6,7} Psychometric evaluation was guided by established measurement-property assessment principles, including content validity, internal consistency, test–retest reliability, construct validity, convergent validity, and known-groups validity.^{8,9}

Study Instruments

Two instruments were selected for translation and validation:

Fagerström Test for Nicotine Dependence for Smoking (FTND-Smoking): A six-item instrument revised by Heatherton et al. to assess physical nicotine dependence among smokers. Total scores range from 0 to 10, with higher scores indicating greater nicotine dependence.³

Fagerström Test for Nicotine Dependence–Smokeless Tobacco (FTND-ST): A six-item instrument adapted by Ebbert et al. to assess nicotine dependence among smokeless tobacco users. It modifies the original FTND items to reflect smokeless tobacco consumption behaviours. Total scores range from 0 to 10, with higher scores indicating greater nicotine dependence.⁴

Both instruments were translated and validated independently, with separate participant groups and psychometric analyses maintained for smokers and smokeless tobacco users.

Phase I: Translation and Cross-Cultural Adaptation

The FTND-Smoking and FTND-ST were translated and culturally adapted into Hindi following established guidelines for the cross-cultural adaptation of health-related questionnaires.^{6,7} The process involved forward translation, reconciliation, back translation, and expert committee review.

Forward Translation

Two independent bilingual translators translated each instrument from English into Hindi, generating two forward-translated versions of each questionnaire.

Reconciliation

The two forward translations were reviewed and reconciled to produce a single Hindi version of each instrument. Differences in terminology, conceptual meaning, clarity, and cultural appropriateness were resolved through discussion.

Particular attention was given to terms relating to time to first tobacco use, difficulty refraining from tobacco consumption, morning use, and frequency of use. For FTND-ST, locally relevant examples, including khaini, gutkha, zarda, mawa, and paan with tobacco, were incorporated where necessary to improve comprehension without altering the original scoring structure.

Back Translation

The reconciled Hindi versions were independently translated back into English by two bilingual translators. The back-translated versions were compared with the original instruments to identify discrepancies in meaning and conceptual equivalence.

Expert Committee Review

An eight-member expert committee reviewed the translated instruments. The review focused on semantic, idiomatic, experiential, conceptual, and cultural equivalence between the original and translated versions. Based on the committee's recommendations, pre-final Hindi versions of the FTND-Smoking and FTND-ST were prepared for subsequent evaluation.

Content Validity

Content validity was assessed by a panel of eight subject experts. Each item of the translated instruments was evaluated for relevance, clarity, simplicity, and cultural appropriateness using a four-point ordinal rating scale, where 1 indicated not relevant/not clear, 2 indicated somewhat relevant/major revision required, 3 indicated quite relevant/minor revision required, and 4 indicated highly relevant/clear.

The Item-level Content Validity Index (I-CVI) was calculated as the proportion of experts assigning a score of 3 or 4 to each item. The Scale-level Content Validity Index/Average (S-CVI/Ave) was calculated as the mean of the individual I-CVI values. Modified kappa statistics were calculated to account for chance agreement among experts. Items requiring modification were revised following expert discussion while preserving their original conceptual meaning.

Face Validity and Cognitive Interviewing

The pre-final Hindi versions were evaluated among 30 adult Hindi-speaking tobacco users, comprising 15 smokers and 15 smokeless tobacco users.

Cognitive interviewing was conducted to assess item comprehension, clarity, interpretation, ease of response, cultural relevance, and overall acceptability. Participants were encouraged to explain their understanding of individual questions and identify any ambiguous or difficult terminology. The feedback obtained was reviewed to identify items requiring further clarification before pilot testing.

Pilot Testing

Pilot testing was conducted among 60 participants, comprising 30 smokers and 30 smokeless tobacco users, to evaluate questionnaire feasibility, administration time, participant comprehension, missing responses, and scoring clarity.

Minor linguistic modifications were incorporated following pilot testing to improve item comprehension while preserving the original conceptual meaning and scoring structure.

The pilot participants were excluded from the final psychometric validation sample. The revised Hindi instruments were subsequently administered to a separate validation sample of 360 participants.

Phase II: Psychometric Validation

The final Hindi versions of both instruments were administered to two independent groups of adult Hindi-speaking tobacco users recruited through convenience sampling from institutional and community settings.

Group I comprised 180 smokers who completed the Hindi FTND-Smoking, while Group II comprised 180 smokeless tobacco users who completed the Hindi FTND-ST. Separate psychometric analyses were performed for the two instruments to account for differences in tobacco consumption patterns and dependence-related behaviours.

Sample Size

The sample size was determined based on established recommendations for psychometric validation studies, considering the number of questionnaire items and the requirements for evaluating reliability and construct validity.

The final validation sample comprised 360 participants, including 180 smokers and 180 smokeless tobacco users. The 60 participants involved in pilot testing were excluded from the main validation analysis.

Test–retest reliability was assessed in an independent sample of 80 participants, comprising 40 smokers and 40 smokeless tobacco users, who completed their respective Hindi instruments twice at an interval of 7–14 days. These participants were not included in the main validation sample of 360.

Eligibility Criteria

Inclusion Criteria

Participants were eligible if they were aged 18 years or above, were able to read or understand Hindi, were current users of smoked or smokeless tobacco, and were willing to provide informed consent.

The smoking group included current cigarette or bidi smokers, whereas the smokeless tobacco group included users of products such as khaini, gutkha, zarda, mawa, tobacco quid, and paan containing tobacco.

Exclusion Criteria

Participants were excluded if they were unable to understand Hindi, reported only experimental or occasional tobacco use, were undergoing nicotine replacement therapy or pharmacological tobacco cessation treatment, had cognitive or psychiatric impairment preventing reliable questionnaire completion, or submitted incomplete questionnaires.

Individuals who concurrently used both smoked and smokeless tobacco products were excluded from the validation analysis to maintain distinct participant groups for the two instruments.

Data Collection Procedure

Following informed consent, participants were interviewed using a structured proforma to obtain sociodemographic information, including age, sex, educational status, occupation, and socioeconomic characteristics.

Tobacco-use history was recorded, including product type, age of initiation, duration of use, daily consumption frequency, time to first tobacco use after waking, and previous quit attempts.

The questionnaires were administered either independently or through interviewer assistance, depending on participant literacy. Participants in the smoking group completed the Hindi FTND-Smoking, whereas participants in the smokeless tobacco group completed the Hindi FTND-ST.

For convergent and known-groups validity assessment, additional tobacco-use indicators, including daily consumption, duration of use, and history of failed quit attempts, were recorded.

Biochemical Assessment

Salivary cotinine concentrations were assessed in a convenience subsample selected from the main validation population, comprising 68 smokers and 54 smokeless tobacco users.

The association between salivary cotinine concentrations and total nicotine-dependence scores was evaluated separately for the two instruments to provide additional evidence of convergent validity.

[The analytical technique used for salivary cotinine estimation, including the assay method and laboratory details, must be verified and inserted before submission.]

Scoring of Instruments

Both Hindi instruments were scored according to the original scoring systems of their respective English versions. Each instrument comprised six items, with total scores ranging from 0 to 10. Higher scores indicated greater nicotine dependence.

Total scores were analysed as continuous variables for psychometric evaluation and categorised according to the original dependence-severity classifications for categorical analysis, where applicable.

Reliability Assessment

Internal Consistency

Internal consistency was evaluated separately for the Hindi FTND-Smoking and Hindi FTND-ST using Cronbach's alpha and McDonald's omega. These coefficients were used to examine the consistency of items within their respective instruments.

Test–Retest Reliability

Test–retest reliability was evaluated in an independent sample of 80 participants, comprising 40 smokers and 40 smokeless tobacco users. Participants completed their respective Hindi instruments twice, with an interval of 7–14 days between administrations.

The intraclass correlation coefficient (ICC) was calculated to evaluate the temporal stability of total dependence scores and was reported with its corresponding 95% confidence interval.

Validity Assessment

Content Validity

Content validity was assessed using the Item-level Content Validity Index (I-CVI), Scale-level Content Validity Index/Average (S-CVI/Ave), and modified kappa statistics derived from the ratings of eight subject experts.

Face Validity

Face validity was evaluated through cognitive interviewing among 30 adult Hindi-speaking tobacco users, comprising 15 smokers and 15 smokeless tobacco users. Participants' feedback regarding questionnaire clarity, comprehension, interpretation, and cultural appropriateness was examined.

Construct Validity

Exploratory factor analysis (EFA) was conducted separately for both instruments to examine their underlying factor structures.

Sampling adequacy was assessed using the Kaiser–Meyer–Olkin (KMO) measure, while Bartlett's test of sphericity was performed to evaluate the suitability of the correlation matrices for factor analysis. The number of retained factors was examined using eigenvalues and scree plots.

Convergent Validity

Convergent validity was evaluated by examining associations between total Hindi FTND scores and relevant tobacco-use indicators, including daily tobacco consumption, duration of use, previous quit attempts, and salivary cotinine concentrations.

Spearman's rank correlation coefficient (ρ) was used to assess the strength and direction of these associations.

Known-Groups Validity

Known-groups validity was evaluated by comparing nicotine-dependence scores between participants with and without a history of previous failed quit attempts. Comparisons were performed separately for the Hindi FTND-Smoking and Hindi FTND-ST.

Floor and Ceiling Effects

Floor and ceiling effects were assessed by calculating the proportion of participants obtaining the minimum and maximum possible total scores, respectively. An effect was considered present when more than 15% of participants obtained either extreme score.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using IBM SPSS Statistics.

Descriptive statistics were used to summarise sociodemographic characteristics, tobacco-use patterns, and dependence scores. Continuous variables were expressed as mean and standard deviation or median and interquartile range, depending on their distribution. Categorical variables were presented as frequencies and percentages.

Normality was assessed using the Shapiro–Wilk test. Internal consistency was evaluated using Cronbach's alpha and McDonald's omega, while test–retest reliability was assessed using the intraclass correlation coefficient (ICC) with corresponding 95% confidence intervals.

Content validity was evaluated using the Item-level Content Validity Index (I-CVI), Scale-level Content Validity Index/Average (S-CVI/Ave), and modified kappa statistics. Construct validity was examined through exploratory factor analysis, with sampling adequacy assessed using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's test of sphericity.

Spearman's rank correlation coefficient was used to evaluate associations between dependence scores and tobacco-use indicators, including salivary cotinine concentrations.

Known-groups validity was evaluated by comparing dependence scores between participants with and without previous failed quit attempts. Floor and ceiling effects were calculated as the percentages of participants obtaining the minimum and maximum possible total scores, respectively.

Ethical Considerations

The study was undertaken in institutional and community settings between January 2026 and June 2026. The Institutional Ethics Committee of Saveetha Dental College and Hospital was identified as the relevant ethics committee.

Both written and verbal informed consent were obtained from participants before enrolment. Participation was voluntary, and confidentiality of participant information was maintained throughout the study.

Results

Participant characteristics

A total of 360 adult Hindi-speaking tobacco users were included in the main psychometric validation phase, comprising 180 smokers and 180 smokeless tobacco users.

The mean age of participants was 40.8 ± 16.0 years in the smoking group and 42.0 ± 14.8 years in the smokeless tobacco group. Both groups were predominantly male, with males constituting 91.7% and 83.9% of the respective groups.

The mean duration of tobacco use was 18.8 ± 14.9 years among smokers and 19.6 ± 13.1 years among smokeless tobacco users. The sociodemographic and tobacco-use characteristics of both validation samples are presented in Table 1.

Distribution of Hindi FTND scores and floor/ceiling effects

The Hindi FTND-Smoking scores ranged from 0 to 10, with a mean score of 4.92 ± 2.30 and a median of 5.0 (IQR: 3–7). The Hindi FTND-ST scores ranged from 1 to 10, with a mean score of 5.66 ± 2.00 and a median of 6.0 (IQR: 4–7).

The Shapiro–Wilk test indicated that the total score distributions of both instruments deviated significantly from normality ($p < 0.001$). Accordingly, non-parametric methods were used for relevant statistical comparisons.

Floor and ceiling effects were below the predefined 15% threshold for both instruments. The Hindi FTND-Smoking demonstrated floor and ceiling effects of 1.7% each, while the corresponding values for the Hindi FTND-ST were 0.0% and 0.6%, respectively (Table 2).

The distribution of total dependence scores for both instruments is illustrated in Figure 1.

Content validity

Content validity was evaluated by eight subject experts who independently assessed the relevance, clarity, simplicity, and cultural appropriateness of the translated questionnaire items using a four-point rating scale.

The Hindi FTND-Smoking demonstrated Item-level Content Validity Index (I-CVI) values ranging from 0.88 to 1.00, with a reported Scale-level Content Validity Index/Average (S-CVI/Ave) of 0.979. For the Hindi FTND-ST, all six items demonstrated an I-CVI of 1.00, with an S-CVI/Ave of 1.000.

Modified kappa values ranged from 0.87 to 1.00 for the Hindi FTND-Smoking and were 1.00 for all items of the Hindi FTND-ST, indicating excellent agreement beyond chance among the expert panel.

The available summary findings are presented in Table 3, while the item-wise I-CVI values are illustrated in Figure 2.

Internal Consistency Reliability

The Hindi FTND-Smoking demonstrated moderate internal consistency, with Cronbach's alpha of 0.601 and McDonald's omega of 0.619. The reported corrected item-total correlations ranged from 0.226 to 0.546.

The Hindi FTND-ST demonstrated low internal consistency, with Cronbach's alpha of 0.372 and McDonald's omega of 0.403. The reported corrected item-total correlations ranged from 0.091 to 0.288.

A comparative summary of the reliability coefficients is presented in Table 4 and Figure 3.

Test–Retest Reliability

Test–retest reliability was evaluated in an independent sample recruited separately from the main psychometric validation population. Initially, 40 smokers and 40 smokeless tobacco users were recruited for repeat assessment after an interval of 7–14 days. Some participants did not complete the second assessment.

Among the participants included in the reported reliability analysis, the Hindi FTND-Smoking demonstrated an intraclass correlation coefficient (ICC) of 0.967 (95% CI: 0.94–0.98), while the Hindi FTND-ST demonstrated an ICC of 0.968 (95% CI: 0.94–0.98).

The reported baseline–retest Pearson correlation coefficients were 0.967 and 0.969, respectively ($p < 0.001$).

[Insert the actual number of participants with paired baseline and follow-up assessments in each group after verification.]

The reliability findings are summarised in Table 4.

Construct validity

Exploratory factor analysis was conducted separately for the Hindi FTND-Smoking and Hindi FTND-ST instruments.

The Hindi FTND-Smoking demonstrated a Kaiser–Meyer–Olkin (KMO) value of 0.682, with a statistically significant Bartlett's test of sphericity ($\chi^2(15) = 110.0$, $p < 0.001$). One factor with an eigenvalue greater than 1 was retained, accounting for 24.1% of the reported variance. The highest factor loading was observed for the daily cigarette/bidi consumption item.

The Hindi FTND-ST demonstrated a KMO value of 0.579, indicating marginal sampling adequacy and falling below the prespecified threshold of 0.60. Bartlett's test of sphericity was statistically significant ($\chi^2(15) = 39.6$, $p < 0.001$).

Three factors had eigenvalues greater than 1, with a reported cumulative variance of 32.3%. However, the available summary findings did not establish a clearly interpretable unidimensional structure.

The factor-analytic findings are summarised in Table 5, and the corresponding scree plots are presented in Figure 4.

Convergent Validity

The Hindi FTND-Smoking demonstrated positive correlations between total dependence scores and daily cigarette/bidi consumption ($\rho = 0.79$, $p < 0.001$), duration of tobacco use ($\rho = 0.55$, $p < 0.001$), and previous quit-attempt history ($\rho = 0.35$, $p < 0.001$). A strong positive correlation was also observed between total dependence scores and salivary cotinine concentrations in the biochemical subsample ($\rho = 0.93$, $p < 0.001$).

Similarly, Hindi FTND-ST scores demonstrated positive correlations with daily smokeless tobacco-use frequency ($\rho = 0.62$, $p < 0.001$), duration of tobacco use ($\rho = 0.33$, $p < 0.001$), and previous quit-attempt history ($\rho = 0.24$, $p = 0.001$). The correlation between Hindi FTND-ST scores and salivary cotinine concentrations was 0.92 ($p < 0.001$).

The biochemical assessment included 68 smokers and 54 smokeless tobacco users selected through convenience sampling from the main validation population.

The reported correlation findings are presented in Table 6 and illustrated in Figure 6. Correlations involving consumption-related questionnaire items should be interpreted cautiously because of their overlap with the total dependence scores.

Known-Groups Validity

Known-groups validity was assessed by comparing nicotine-dependence scores between participants with and without a history of previous failed quit attempts using the Mann–Whitney U test. All 360 participants were included in the analysis.

Among smokers, participants with previous failed quit attempts demonstrated significantly higher median Hindi FTND-Smoking scores than those without a failed quit attempt (6.0 [IQR: 4–7] versus 4.0 [IQR: 3–6]; $p < 0.001$).

Similarly, among smokeless tobacco users, participants with previous failed quit attempts demonstrated higher median Hindi FTND-ST scores than those without a failed quit attempt (6.0 [IQR: 5–7.8] versus 5.0 [IQR: 4–6]; $p = 0.002$).

These findings demonstrated significant differences in dependence scores between the predefined comparison groups. The results are presented in Table 7 and illustrated in Figure 7.

Table 1. Sociodemographic and tobacco-use characteristics of the validation samples

Characteristic	Hindi FTND-Smoking n=180	Hindi FTND-ST n=180
Age, years, mean $\pm$ SD	40.8 $\pm$ 16.0	42.0 $\pm$ 14.8
Male, n (%)	165 (91.7)	151 (83.9)
Female, n (%)	13 (7.2)	28 (15.6)

Characteristic	Hindi FTND-Smoking n=180	Hindi FTND-ST n=180
Urban residence, n (%)	75 (41.7)	88 (48.9)
Semi-urban residence, n (%)	63 (35.0)	50 (27.8)
Rural residence, n (%)	42 (23.3)	42 (23.3)
Secondary education or below, n (%)	86 (47.8)	103 (57.2)
Graduate or above, n (%)	47 (26.1)	46 (25.6)
Duration of tobacco use, years, mean $\pm$ SD	18.8 $\pm$ 14.9	19.6 $\pm$ 13.1

Table 2. Distribution of Hindi FTND total scores and floor/ceiling effects

Statistic	Hindi FTND-Smoking	Hindi FTND-ST
N	180	180
Mean $\pm$ SD	4.92 $\pm$ 2.30	5.66 $\pm$ 2.00
Median	5.0	6.0
IQR	3–7	4–7
Range	0–10	1–10
Shapiro–Wilk W	0.968	0.964
Shapiro–Wilk p value	<0.001	<0.001
Floor effect, %	1.7	0.0
Ceiling effect, %	1.7	0.6

Table 3. Content validity of the Hindi FTND-Smoking and Hindi FTND-ST scales

Parameter	Hindi FTND-Smoking	Hindi FTND-ST
Number of experts	8	8
Number of questionnaire items	6	6
I-CVI range	0.88–1.00	1.00–1.00
S-CVI/Ave	0.979	1.000
Modified kappa range	0.87–1.00	1.00–1.00
Interpretation	Excellent	Excellent

Table 4. Reliability of the Hindi FTND-Smoking and Hindi FTND-ST instruments

Reliability parameter	Hindi FTND-Smoking	Hindi FTND-ST
Internal consistency		
Cronbach's alpha	0.601	0.372
McDonald's omega	0.619	0.403
Corrected item-total correlation range*	0.226–0.546	0.091–0.288
Test–retest reliability		
Initially recruited (n)	40	40
Completed paired assessments (n)	To verify	To verify
Reported ICC(A,1)*	0.967	0.968
95% CI	0.94–0.98	0.94–0.98
Baseline–retest Pearson r	0.967	0.969
Reported p-value	<0.001	<0.001

Table 5. Exploratory factor analysis of the Hindi FTND-Smoking and Hindi FTND-ST instruments

Parameter	Hindi FTND-Smoking	Hindi FTND-ST
Sample size	180	180
KMO measure	0.682	0.579
Bartlett's χ^2	110.0	39.6
Degrees of freedom	15	15
Bartlett's p-value	<0.001	<0.001
Factors with eigenvalues greater than 1	1	3
Reported variance explained	24.1%	32.3%
Extraction method	Unverified	Unverified
Rotation method	Unverified	Unverified

Table 6. Convergent validity: correlation of Hindi FTND scores with tobacco-use indicators

Instrument	Indicator	n	Spearman's ρ	p-value
FTND-Smoking	Daily cigarettes/bidis smoked	180	0.79	<0.001
FTND-Smoking	Duration of tobacco use	180	0.55	<0.001
FTND-Smoking	Previous quit-attempt history (Yes/No)	180	0.35	<0.001
FTND-Smoking	Salivary cotinine	68	0.93	<0.001
FTND-ST	Daily smokeless tobacco uses	180	0.62	<0.001
FTND-ST	Duration of tobacco use	180	0.33	<0.001
FTND-ST	Previous quit-attempt history (Yes/No)	180	0.24	0.001
FTND-ST	Salivary cotinine	54	0.92	<0.001

Table 7. Known-groups validity based on previous failed quit attempt

Instrument	Failed quit attempt	n	Median FTND score	IQR	p-value
FTND-Smoking	No	72	4.0	3–6	<0.001
FTND-Smoking	Yes	108	6.0	4–7	—
FTND-ST	No	86	5.0	4–6	0.002
FTND-ST	Yes	94	6.0	5–7.8	—

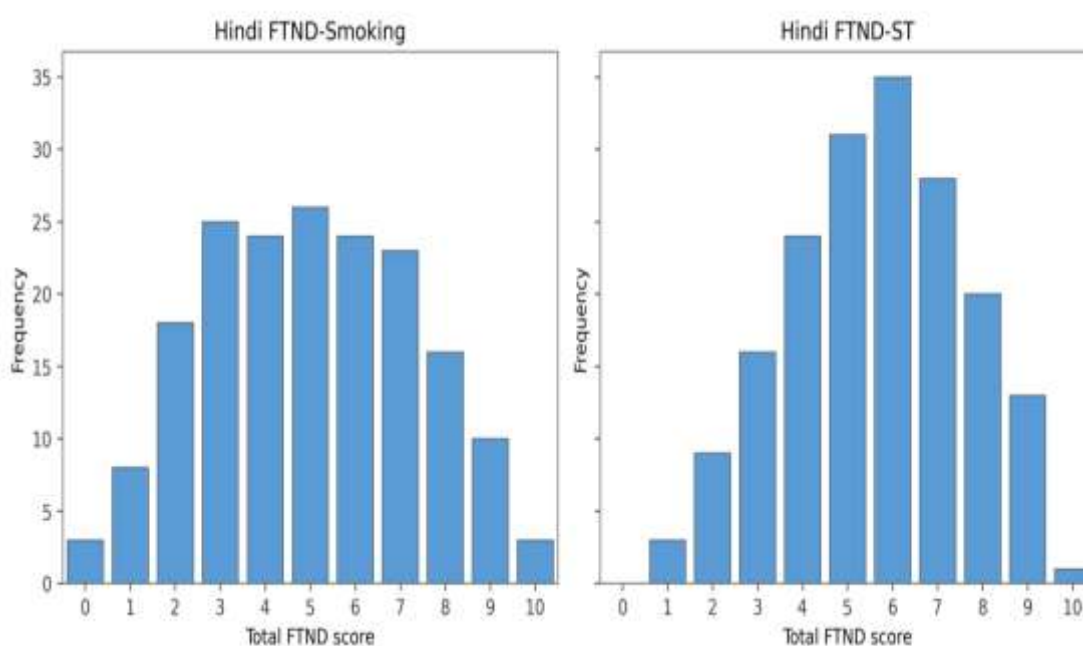


Figure 1. Distribution of total dependence scores on the Hindi FTND-Smoking and Hindi FTND-ST.

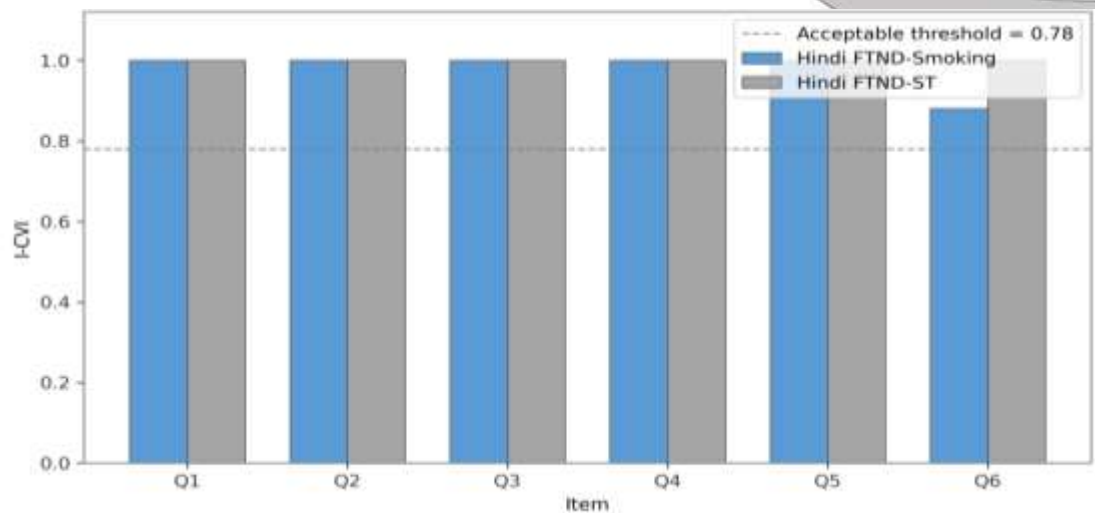


Figure 2. Item-level Content Validity Index values for the Hindi FTND-Smoking and Hindi FTND-ST.

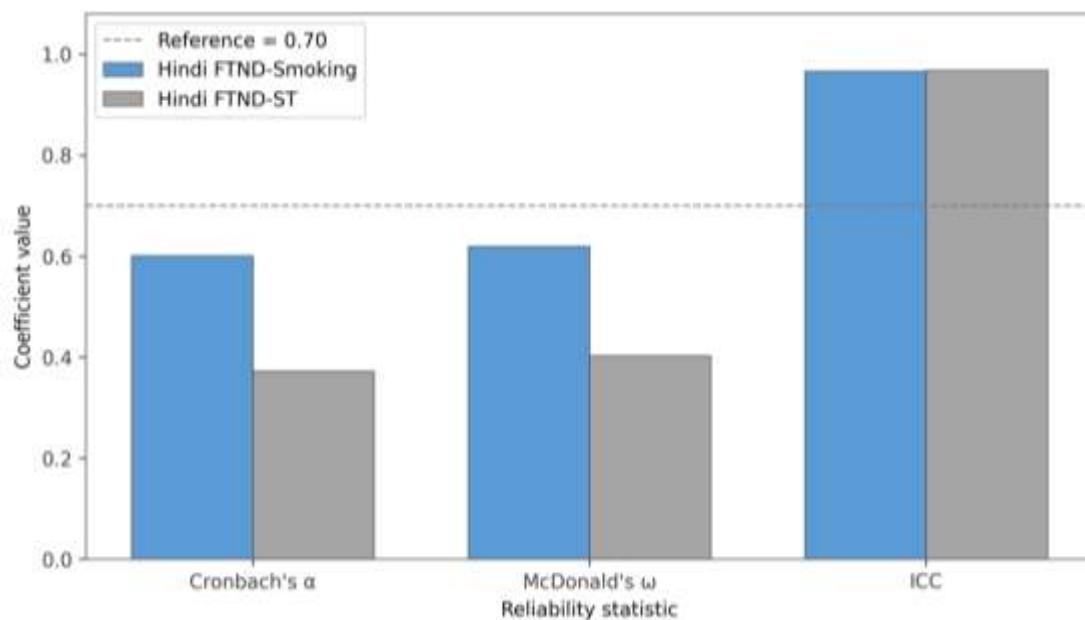


Figure 3. Reliability indices of the Hindi FTND-Smoking and Hindi FTND-ST instruments.

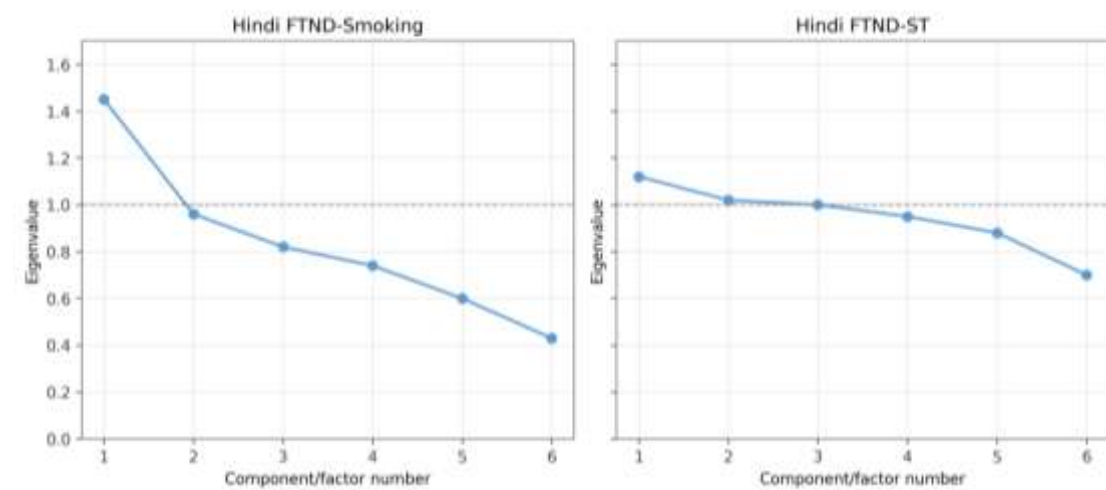


Figure 4. Scree plots from exploratory factor analysis of the Hindi FTND-Smoking and Hindi FTND-ST.

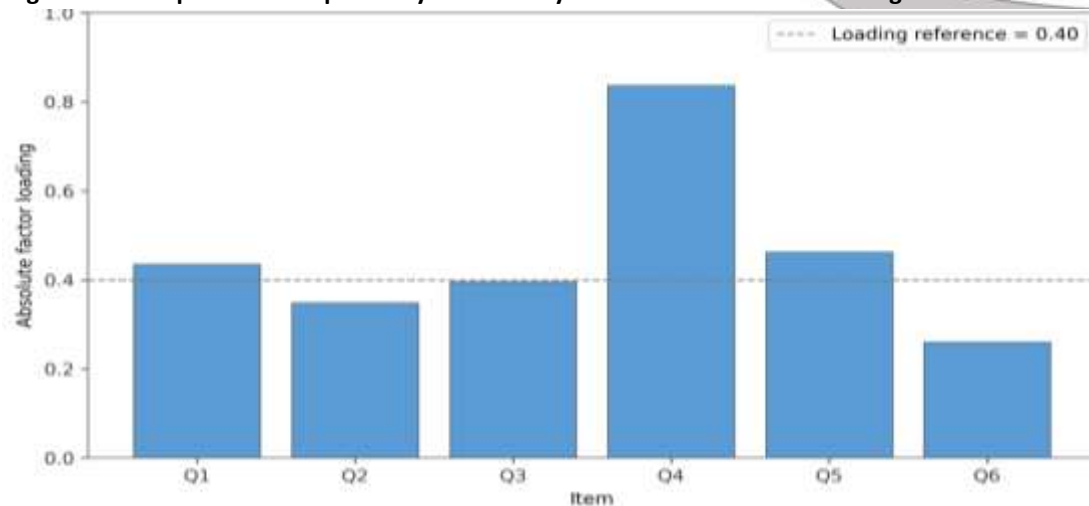


Figure 5. Absolute factor loadings of Hindi FTND-Smoking items from exploratory factor analysis.

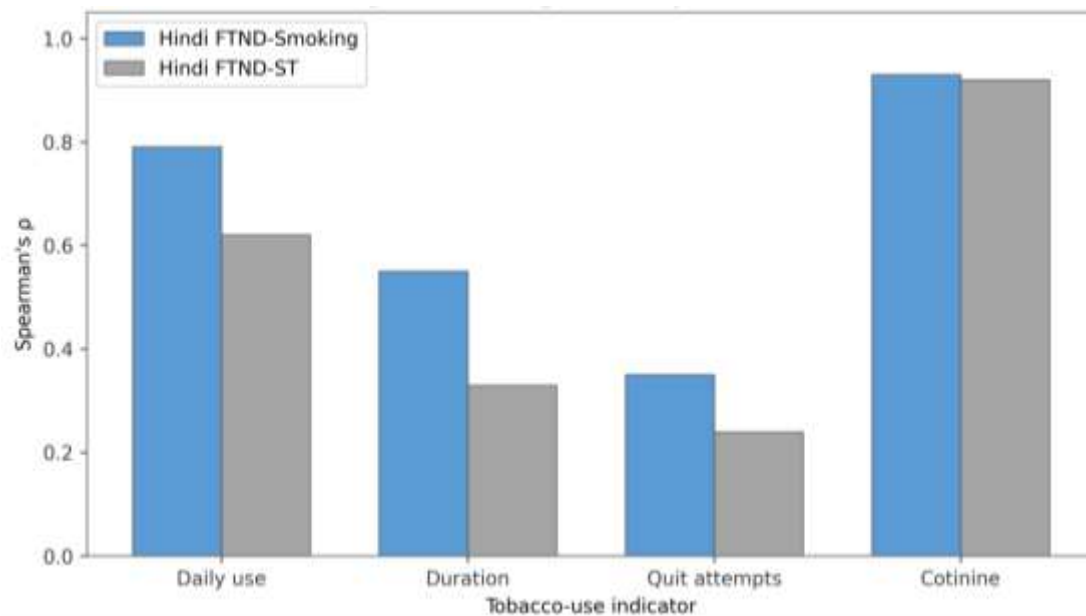


Figure 6. Convergent validity correlations between Hindi FTND total scores and tobacco-use indicators.

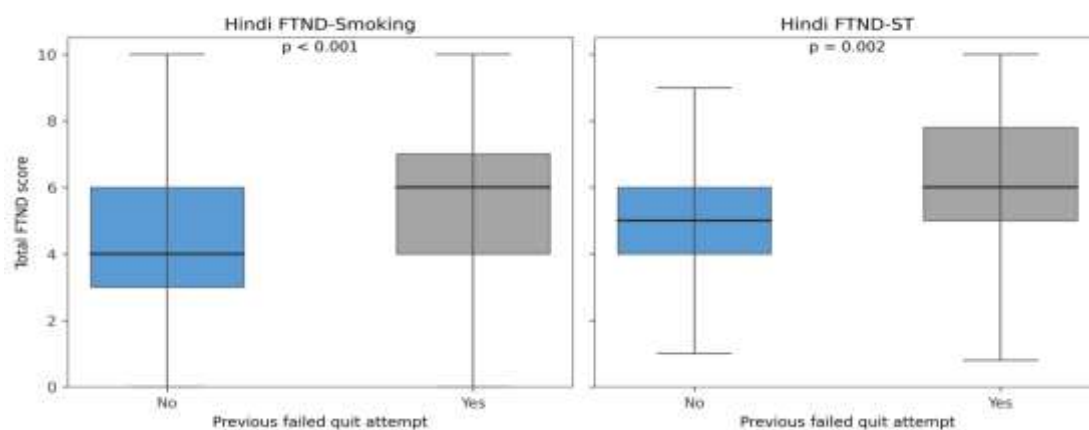


Figure 7. Known-groups validity of the Hindi FTND-Smoking and Hindi FTND-ST based on previous failed quit attempt.

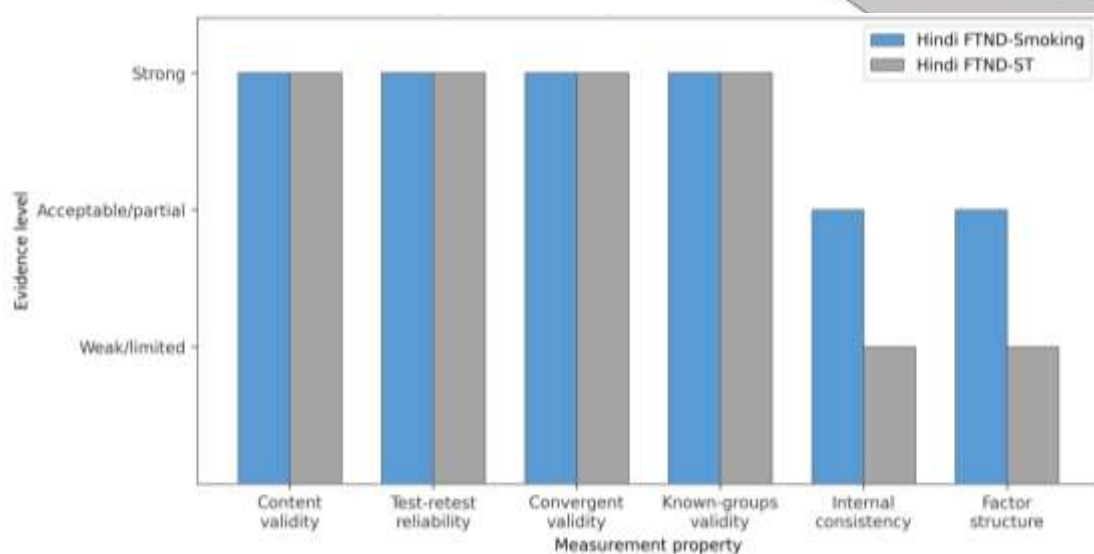


Figure 8. Overall psychometric evidence profile of the Hindi FTND-Smoking and Hindi FTND-ST instruments.

Discussion

The present study translated, culturally adapted, and evaluated the psychometric properties of Hindi versions of the Fagerström Test for Nicotine Dependence for Smoking (FTND-Smoking) and the Fagerström Test for Nicotine Dependence–Smokeless Tobacco (FTND-ST) among adult Hindi-speaking tobacco users. Both instruments demonstrated high content validity, strong temporal stability, and significant associations with relevant tobacco-use indicators. However, differences were observed in their internal consistency and factor structures. The Hindi FTND-Smoking demonstrated moderate internal consistency and a reported single-factor solution, whereas the Hindi FTND-ST exhibited low internal consistency and a less clearly defined factor structure. These findings indicate that the psychometric evidence supporting the two translated instruments should be interpreted separately.

The need for culturally appropriate nicotine-dependence assessment is particularly relevant in India, where smoked and smokeless tobacco products are consumed in diverse forms. Variations in consumption patterns, regional terminology, and tobacco-use practices may influence how respondents interpret questionnaire items. Consequently, translation alone may not ensure conceptual equivalence between the original and adapted instruments. The present study employed forward translation, reconciliation, back translation, expert committee review, cognitive interviewing, and pilot testing, consistent with established recommendations for cross-cultural adaptation of health-related questionnaires.^{6,7}

Content validity assessment demonstrated high expert agreement for both instruments. The Hindi FTND-Smoking yielded a reported S-CVI/Ave of 0.979, with item-level values ranging from 0.88 to 1.00. The Hindi FTND-ST demonstrated an S-CVI/Ave of 1.000, with all items obtaining an I-CVI of 1.00. These findings suggest that the translated items were favourably evaluated by the expert panel. The observed I-CVI values exceeded the commonly accepted threshold of 0.78 for panels comprising more than five experts.¹¹ Nevertheless, content validity represents only one aspect of psychometric evaluation and should be considered alongside reliability and construct validity when determining the suitability of the translated instruments.

Internal Consistency and Test–Retest Reliability

The Hindi FTND-Smoking demonstrated moderate internal consistency, with Cronbach's alpha of 0.601 and McDonald's omega of 0.619. Although these coefficients are below conventional thresholds for satisfactory internal consistency, their interpretation should consider the brief and behaviourally heterogeneous nature of the FTND. The six-item instrument assesses different components of nicotine dependence, including time to first tobacco use, consumption intensity, difficulty refraining, and continued use during illness. Previous psychometric investigations have reported variability in the

internal consistency and dimensional structure of the FTND, indicating that its items may not necessarily represent a single homogeneous construct.¹⁰ Therefore, the present findings provide evidence of moderate internal consistency, which should be interpreted alongside the instrument's other measurement properties.

In contrast, the Hindi FTND-ST demonstrated low internal consistency, with Cronbach's alpha of 0.372 and McDonald's omega of 0.403. This finding indicates limited inter-item homogeneity and warrants particular consideration when interpreting the total dependence score. The lower coefficients may reflect differences in smokeless tobacco consumption behaviours, product characteristics, cultural practices, or item interpretation. Indian smokeless tobacco products vary considerably in their composition and patterns of consumption, potentially influencing responses to dependence-related questions.⁵ However, the present findings do not establish the underlying cause of the low internal consistency. Further item-level evaluation and validation among larger, product-specific populations are therefore necessary to determine whether modifications to the instrument could improve its measurement properties.¹³

Despite these differences in internal consistency, both instruments demonstrated high temporal stability in the reported test-retest analyses. The Hindi FTND-Smoking yielded an intraclass correlation coefficient (ICC) of 0.967 (95% CI: 0.94–0.98), while the Hindi FTND-ST demonstrated an ICC of 0.968 (95% CI: 0.94–0.98) over an interval of 7–14 days. These findings suggest substantial agreement between repeated administrations among participants included in the reliability analyses. However, test-retest reliability reflects the reproducibility of scores over time and should not be regarded as evidence of internal consistency or construct validity. This distinction is particularly relevant to the Hindi FTND-ST, for which high temporal stability was observed despite low internal consistency. Additionally, incomplete follow-up within the independently recruited reliability sample should be considered when interpreting these estimates.

Construct Validity and Exploratory Factor Analysis

Exploratory factor analysis revealed differences in the reported structural characteristics of the two translated instruments. The Hindi FTND-Smoking demonstrated acceptable sampling adequacy (KMO = 0.682), with a statistically significant Bartlett's test of sphericity ($p < 0.001$). A single factor with an eigenvalue greater than 1 was retained, explaining 24.1% of the variance. Although the proportion of explained variance was modest, previous psychometric investigations have reported variable factor structures for the FTND, including single-factor and two-factor solutions.^{10,12} The present findings therefore provide preliminary support for its underlying measurement structure, although the relatively low explained variance warrants cautious interpretation.

In contrast, the Hindi FTND-ST demonstrated marginal sampling adequacy (KMO = 0.579), falling below the prespecified acceptability threshold of 0.60. Although Bartlett's test was statistically significant ($p < 0.001$), this finding alone does not establish the adequacy of the factor solution. Three factors with eigenvalues greater than 1 were reported, collectively explaining 32.3% of the variance. However, the dispersed factor loadings and limited sampling adequacy prevent definitive interpretation of the instrument as having a stable multidimensional structure. These findings may reflect differences in smokeless tobacco-use behaviours across product types, although further investigation is required to establish the underlying dimensionality.

Ebbert et al. developed the FTND-ST to address limitations in assessing nicotine dependence among smokeless tobacco users, particularly difficulties associated with variations in nicotine delivery across products.⁴ Nevertheless, the present findings indicate that further structural validation of the Hindi FTND-ST is necessary. Future investigations should consider larger product-specific samples, detailed item-level analyses, and confirmatory evaluation of the underlying factor structure before drawing definitive conclusions regarding its dimensionality.¹⁴

Convergent and Known-Groups Validity

The convergent validity assessment demonstrated positive associations between total dependence scores and the reported tobacco-use indicators. Hindi FTND-Smoking scores correlated with daily cigarette/bidi consumption ($p = 0.79$, $p < 0.001$), while Hindi FTND-ST scores correlated with daily smokeless tobacco-use frequency ($p = 0.62$, $p < 0.001$). However, because consumption-related variables form part of the original FTND instruments, these associations represent part-whole correlations and should not be interpreted as independent evidence of convergent validity.

Additional biochemical evidence was provided by the significant correlations between total dependence scores and salivary cotinine concentrations for Hindi FTND-Smoking ($p = 0.93$, $p < 0.001$) and Hindi FTND-ST ($p = 0.92$, $p < 0.001$). These findings are consistent with the positive association between FTND-ST scores and serum cotinine reported by Ebbert et al.⁴ Nevertheless, cotinine primarily reflects nicotine exposure rather than all behavioural and physiological dimensions of dependence. Furthermore, biochemical assessment was restricted to convenience subsamples of 68 smokers and 54 smokeless tobacco users. The absence of complete laboratory records and limited biochemical coverage warrant cautious interpretation of these findings.¹⁵

Known-groups validity was supported by differences in dependence scores according to previous failed quit-attempt history. Smokers reporting previous failed quit attempts demonstrated higher median FTND-Smoking scores than those without such a history (6.0 versus 4.0; $p < 0.001$). Similarly, smokeless tobacco users with previous failed quit attempts demonstrated higher median FTND-ST scores than those without such attempts (6.0 versus 5.0; $p = 0.002$). These findings indicate that both instruments distinguished between the predefined comparison groups. However, the cross-sectional design does not establish whether higher dependence scores preceded unsuccessful cessation attempts or resulted from other associated factors.

Taken together, the findings provide supportive evidence for associations between the translated instruments and selected dependence-related indicators. Nevertheless, the part-whole correlations, restricted biochemical subsamples, and previously identified internal consistency limitations should be considered when interpreting the overall psychometric performance, particularly for the Hindi FTND-ST.

Clinical Implications

The findings of the present study have implications for nicotine-dependence assessment in dental, medical, community, and tobacco-cessation settings. The Hindi FTND-Smoking demonstrated supportive psychometric properties, suggesting its potential utility as a brief instrument for assessing nicotine dependence among Hindi-speaking smokers. Its ease of administration may facilitate the identification of dependence-related behaviours and support structured tobacco-cessation counselling.

The Hindi FTND-ST demonstrated high content validity and temporal stability, along with significant associations with selected dependence-related indicators. However, its low internal consistency and uncertain factor structure indicate that its total score should be interpreted cautiously. Until further validation is undertaken, assessment among smokeless tobacco users may benefit from considering additional information, including product type, frequency of consumption, time to first use, and previous quit-attempt history. Such considerations are particularly relevant in India, where smokeless tobacco products vary considerably in composition and consumption practices.^{18–21}

Strengths and Limitations

The principal strengths of this study include the systematic translation and cultural adaptation of two nicotine-dependence instruments, independent validation samples for smokers and smokeless tobacco users, expert-based content validity assessment, cognitive interviewing, and pilot testing. The evaluation incorporated multiple measurement properties, including internal consistency, test-retest reliability, construct validity, convergent validity, and known-groups validity. Additional biochemical assessment using salivary cotinine provided supportive evidence regarding the relationship between questionnaire scores and nicotine exposure.

Nevertheless, several limitations should be acknowledged. First, convenience sampling from institutional and community settings may restrict the generalisability of the findings to broader Hindi-speaking populations. Second, the samples were predominantly male, potentially limiting their applicability to female tobacco users. Third, incomplete follow-up in the independent test-retest sample may have influenced the reported reliability estimates. Fourth, salivary cotinine assessment was restricted to convenience subsamples, and the original laboratory records and analytical method remain unavailable for verification. Furthermore, correlations involving consumption-related FTND items are subject to part-whole overlap and should not be interpreted as independent evidence of convergent validity.

The low internal consistency and marginal sampling adequacy observed for the Hindi FTND-ST represent additional psychometric limitations. The factor extraction and rotation procedures could not be independently verified from the available summary results, restricting the interpretation of its

reported dimensional structure. Finally, the cross-sectional design did not permit assessment of responsiveness to changes in dependence following tobacco-cessation interventions. Future investigations should consider larger multicentric and product-specific samples, comprehensive item-level analyses, confirmatory factor analysis, measurement invariance testing, and longitudinal evaluation of responsiveness.^{16,17}

Conclusion

The Hindi FTND-Smoking demonstrated excellent content validity, high temporal stability, moderate internal consistency, and supportive construct and convergent validity, suggesting its potential utility as a brief instrument for nicotine-dependence assessment among Hindi-speaking smokers.

The Hindi FTND-ST demonstrated excellent content validity and temporal stability, along with supportive associations with selected dependence-related indicators. However, its low internal consistency and uncertain factor structure indicate important psychometric limitations. Consequently, its total scores should be interpreted cautiously until further validation is undertaken.

Further multicentric studies involving larger and more diverse Hindi-speaking populations, particularly product-specific smokeless tobacco users, are recommended to strengthen the psychometric evidence for both instruments.

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Author Contributions

Dr. Sidharth E and Dr. Arun Kumar K contributed to study conceptualisation, methodology development, translation and cultural adaptation, data collection, statistical analysis, data interpretation, and manuscript drafting. Dr. Delfin Lovelina Francis contributed to the critical review and scrutiny of the manuscript. All authors reviewed and approved the final version of the manuscript.

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Conflict of Interest

The authors declare that there are no conflicts of interest related to this study.

Ethical Approval

The study protocol was reviewed and approved by the Institutional Ethics Committee of Saveetha Dental College and Hospital. The study was conducted in accordance with ethical principles for research involving human participants.

Informed Consent

Written informed consent was obtained from all participants prior to enrolment in the study. Participants were informed about the purpose of the study, voluntary nature of participation, confidentiality of responses, and their right to withdraw from the study at any stage without any consequences.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to institutional and ethical approval requirements.

Permission to Use Instrument

Formal permission to translate and reproduce the original FTND-Smoking and FTND-ST instruments was not obtained before conducting the study. The applicable permission and licensing requirements for the original instruments and their Hindi adaptations require clarification with the respective rights holders before publication.

Clinical Relevance

The Hindi FTND-Smoking and Hindi FTND-ST may serve as brief and practical tools for assessing nicotine dependence among Hindi-speaking tobacco users in dental, medical, community, and

tobacco-cessation settings. These instruments can help clinicians identify dependence severity, guide cessation counselling, and support referral for structured tobacco-dependence management.

Strengths of the Study

This study followed a systematic translation and cultural adaptation process, including forward translation, reconciliation, back translation, expert committee review, content validity assessment, cognitive interviewing, and pilot testing. The smoking and smokeless tobacco instruments were validated separately, which strengthened the methodological clarity of the study. The study also assessed multiple measurement properties, including content validity, internal consistency, test-retest reliability, construct validity, convergent validity, known-groups validity, and floor/ceiling effects.

Limitations

The study was conducted among South Indian Hindi-speaking tobacco users recruited from institutional and community-based settings; therefore, the findings may not be fully generalizable to all Hindi-speaking populations across India. Cotinine estimation was performed only in a subsample, limiting the strength of biochemical criterion validation. The Hindi FTND-ST showed lower internal consistency and a less stable factor structure, suggesting the need for further validation among larger and product-specific smokeless tobacco user groups. Dual users of smoked and smokeless tobacco were excluded or analyzed separately, which improved internal validity but may limit applicability to real-world users who consume both forms of tobacco.

Future Recommendations

Future studies should validate the Hindi FTND-Smoking and Hindi FTND-ST in larger, multicentric, and geographically diverse Hindi-speaking populations. Additional research should include product-specific analyses for smokeless tobacco users, confirmatory factor analysis, item response theory, measurement invariance testing, and responsiveness to cessation interventions. Further studies may also evaluate the association of Hindi FTND scores with biochemical markers such as salivary or serum cotinine in larger samples.

Abbreviations

FTND: Fagerström Test for Nicotine Dependence

FTND-ST: Fagerström Test for Nicotine Dependence–Smokeless Tobacco

I-CVI: Item-level Content Validity Index

S-CVI/Ave: Scale-level Content Validity Index/Average

ICC: Intraclass Correlation Coefficient

KMO: Kaiser–Meyer–Olkin

EFA: Exploratory Factor Analysis

SD: Standard Deviation

IQR: Interquartile Range

CI: Confidence Interval

OPD: Outpatient Department

IEC: Institutional Ethics Committee

WHO: World Health Organization

COSMIN: Consensus-based Standards for the Selection of Health Measurement Instruments

SPSS: Statistical Package for the Social Sciences

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Appendix-Tools

सूचित सहमति पत्र

Informed Consent Form

(फेगरस्ट्रॉम निकोटीन निर्भरता परीक्षण — धूम्रपान एवं धूम्ररहित तंबाकू)

अध्ययन/मूल्यांकन का उद्देश्य

आपको तंबाकू उपयोग से संबंधित निर्भरता के स्तर का आकलन करने के लिए दो संक्षिप्त प्रश्नावलियाँ — “फेगरस्ट्रॉम निकोटीन निर्भरता परीक्षण (धूम्रपान)” और “फेगरस्ट्रॉम निकोटीन निर्भरता परीक्षण (धूम्ररहित तंबाकू)” — भरने हेतु आमंत्रित किया जा रहा है। इनसे प्राप्त जानकारी आपकी देखभाल की योजना बनाने और/या शोध उद्देश्यों के लिए उपयोग की जाएगी।

कृपया निम्नलिखित बिंदुओं को ध्यान से पढ़ें:

- इन प्रश्नावलियों को भरना पूर्णतः स्वैच्छिक है।
- आप किसी भी प्रश्न का उत्तर देने से इनकार कर सकते हैं और बिना कोई कारण बताए किसी भी समय भाग लेने से पीछे हट सकते हैं।
- आपकी जानकारी पूर्णतः गोपनीय रखी जाएगी तथा इसका उपयोग केवल चिकित्सकीय देखभाल/शोध उद्देश्यों के लिए ही किया जाएगा।
- भाग लेने या न लेने का निर्णय आपकी चिकित्सा सेवा को प्रभावित नहीं करेगा।
- यदि आपको कोई प्रश्न समझ में न आए, तो आप उपस्थित स्वास्थ्यकर्मी से स्पष्टीकरण माँग सकते हैं।

सहमति घोषणा

मैंने उपरोक्त जानकारी पढ़ ली है / मुझे पढ़कर सुनाई गई है और मैं इसे भली-भाँति समझ गया/गई हूँ। मैं अपनी स्वेच्छा से “फेगरस्ट्रॉम निकोटीन निर्भरता परीक्षण — धूम्रपान” एवं “फेगरस्ट्रॉम निकोटीन निर्भरता परीक्षण — धूम्ररहित तंबाकू” प्रश्नावली भरने हेतु सहमति देता/देती हूँ।

प्रतिभागी का नाम :

आयु / लिंग :

प्रतिभागी का हस्ताक्षर / अँगूठा निशान :

दिनांक :

साक्षी का नाम :

साक्षी का हस्ताक्षर :

सहमति लेने वाले स्वास्थ्यकर्मी का नाम :

हस्ताक्षर एवं दिनांक :

फेगरस्ट्रॉम निकोटीन निर्भरता परीक्षण — धूम्ररहित तंबाकू

Fagerström Test for Nicotine Dependence (FTND) — Smokeless Tobacco

नाम :

दिनांक :

आयु :

आईडी / फ़ाइल सं. :

कृपया अपने मुख्य धूम्ररहित तंबाकू उत्पाद जैसे खैनी, गुटखा, जर्दा, मावा, पान में तंबाकू, तंबाकू किड या अन्य चबाने/मुँह में रखने वाले तंबाकू उत्पाद के आधार पर उत्तर दें। कृपया प्रत्येक प्रश्न के लिए सही उत्तर के सामने बने बॉक्स (□) में सही (✓) का निशान लगाएँ।

क्र.सं.	प्रश्न	उत्तर विकल्प	चयन	अंक
1	सुबह उठने के कितनी देर बाद आप पहली बार धूम्ररहित तंबाकू मुँह में रखते/चबाते हैं?	5 मिनट के अंदर	☐	3
		6-30 मिनट के अंदर	☐	2
		31-60 मिनट के अंदर	☐	1
		60 मिनट से अधिक समय बाद	☐	0
2	आप तंबाकू से बनने वाला रस/लार जानबूझकर कितनी बार निगलते हैं?	हमेशा	☐	2
		कभी-कभी	☐	1
		कभी नहीं	☐	0
3	कौन-सा तंबाकू उपयोग छोड़ना आपके लिए सबसे कठिन होगा?	सुबह का पहला तंबाकू उपयोग	☐	1
		अन्य समय का तंबाकू उपयोग	☐	0
4	आप एक सप्ताह में तंबाकू के कितने डिब्बे/पाउच/सैशे उपयोग करते हैं?	3 से अधिक	☐	2
		1-3	☐	1
		1 से कम	☐	0
5	क्या आप सुबह उठने के बाद शुरुआती घंटों में दिन के बाकी समय की तुलना में अधिक बार धूम्ररहित तंबाकू उपयोग करते हैं?	हाँ	☐	1
		नहीं	☐	0
6	यदि आप इतने बीमार हों कि दिन का	हाँ	☐	1

क्र.सं.	प्रश्न	उत्तर विकल्प	चयन	अंक
	अधिकांश समय बिस्तर पर रहना पड़े, तब भी क्या आप धूम्ररहित तंबाकू उपयोग करते हैं?	नहीं	☐	0

कुल अंक (Total Score)	_____ / 10
-----------------------	------------

अंक-निर्वचन (Scoring Interpretation)

कुल अंक	निर्भरता स्तर
0 – 3	निम्न निर्भरता (Low dependence)
4 – 6	मध्यम निर्भरता (Moderate dependence)
7 – 10	उच्च निर्भरता (High dependence)

फेगरस्ट्रॉम निकोटीन निर्भरता परीक्षण — धूम्रपान

Fagerström Test for Nicotine Dependence (FTND) — Smoking

नाम :

दिनांक :

आयु :

आईडी / फ़ाइल सं. :

कृपया पिछले कुछ सप्ताहों में अपने सामान्य धूम्रपान व्यवहार के आधार पर प्रत्येक प्रश्न का उत्तर दें। यहाँ 'सिगरेट/बीड़ी' से आपका मुख्य धूम्रपान उत्पाद अभिप्रेत है। कृपया प्रत्येक प्रश्न के लिए सही उत्तर के सामने बने बॉक्स (□) में सही (✓) का निशान लगाएँ।

क्र.सं.	प्रश्न	उत्तर विकल्प	चयन	अंक
1	सुबह उठने के कितनी देर बाद आप पहली सिगरेट/बीड़ी पीते हैं?	5 मिनट के अंदर	☐	3
		6–30 मिनट के अंदर	☐	2
		31–60 मिनट के अंदर	☐	1
		60 मिनट से अधिक समय बाद	☐	0
2	क्या आपको उन स्थानों पर धूम्रपान न करने में कठिनाई होती है जहाँ धूम्रपान मना है?	हाँ	☐	1
		नहीं	☐	0
3	कौन-सी सिगरेट/बीड़ी छोड़ना आपके लिए सबसे कठिन होगा?	सुबह की पहली सिगरेट/बीड़ी	☐	1
		कोई अन्य सिगरेट/बीड़ी	☐	0
4	आप प्रतिदिन औसतन कितनी सिगरेट/बीड़ी पीते हैं?	10 या उससे कम	☐	0
		11–20	☐	1
		21–30	☐	2
		31 या उससे अधिक	☐	3
5	क्या आप सुबह उठने के बाद शुरुआती घंटों में दिन के बाकी समय की तुलना में अधिक धूम्रपान करते हैं?	हाँ	☐	1
		नहीं	☐	0
6	यदि आप इतने बीमार हों कि दिन का	हाँ	☐	1

क्र.सं.	प्रश्न	उत्तर विकल्प	चयन	अंक
	अधिकांश समय बिस्तर पर रहना पड़े, तब भी क्या आप धूम्रपान करते हैं?	नहीं	☐	0

कुल अंक (Total Score)

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अंक-निर्वचन (Scoring Interpretation)

कुल अंक	निर्भरता स्तर
0 – 3	निम्न निर्भरता (Low dependence)
4 – 6	मध्यम निर्भरता (Moderate dependence)
7 – 10	उच्च निर्भरता (High dependence)