

## ORIGINAL ARTICLE

# Assessment of Linguistic Equivalence and Internal Consistency of the Culturally Adapted Bangla Version of the Glasgow Antipsychotic Side-Effect Scale (GASS-B)

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## ABSTRACT

**Background:** Antipsychotic medications frequently cause a spectrum of adverse effects, which can reduce adherence and impact patient outcomes. The Glasgow Antipsychotic Side-Effect Scale (GASS) is a widely used self-administered tool to monitor these side effects, but no validated Bangla version exists. **Aim of the study:** To assess the linguistic equivalence, reliability, and validity of the culturally adapted Bangla version of the GASS (GASS-B) among adult patients receiving antipsychotics in Bangladesh. **Methods & Materials:** A cross-sectional study was conducted among 220 adult patients at the National Institute of Mental Health, Dhaka. Standardized translation, back-translation, expert review, and pilot testing procedures were employed. Data were analyzed using SPSS version 24. Descriptive statistics (frequencies, percentages, means, SDs) summarized variables. Reliability was assessed via Cronbach's alpha, split-half reliability, and intraclass correlation coefficient (ICC). Validity was evaluated through face validity (expert review), content validity (Content Validity Index), and construct validity (confirmatory factor analysis and principal component analysis). Results were presented in tabular and graphical formats. **Result:** The GASS-B demonstrated acceptable internal consistency ( $\alpha = 0.745$ ), good test-retest reliability ( $ICC = 0.82$ ), and strong content validity ( $I-CVI 0.83-1.00$ ). Factor analyses supported a seven-factor structure explaining 58.9% of variance, confirming construct validity. **Conclusion:** The GASS-B is a linguistically and culturally valid, reliable, and practical tool for assessing antipsychotic side effects in Bangla-speaking patients, facilitating improved clinical monitoring and adherence.

**Keywords:** Glasgow Antipsychotic Side-Effect Scale, GASS-B, Bangla, antipsychotic side effects, scale validation, psychometric properties

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## INTRODUCTION

The Glasgow Antipsychotic Side-Effect Scale (GASS) is a 22-item, self-administered checklist designed to assess both the frequency and distress of side effects experienced by patients on antipsychotic treatment, providing clinicians and researchers with a systematic tool to monitor and evaluate these adverse effects [1]. Globally, the pooled prevalence of antipsychotic-induced extrapyramidal side effects among patients taking antipsychotic medications was 37%, with specific conditions such as parkinsonism, akathisia, and tardive dyskinesia affecting 20%, 11%, and 7% of patients, respectively [2]. In Asia, quetiapine was associated with the highest proportion of reported adverse reactions, accounting for 47.7%, followed by olanzapine at 11.3% and clozapine at 10.7%, reflecting differences in side-effect profiles among commonly prescribed antipsychotics [3]. Antipsychotic medications are approved for a wide range of conditions, including schizophrenia, schizoaffective and schizophreniform disorders, delusional disorder, mood disorders, psychotic symptoms related to medical illness, Tourette's disorder,

Huntington's disease, behavioral disturbances in dementia, as well as hiccups and chemotherapy-induced nausea or vomiting [4]. Due to long-term use and frequent adverse effects, antipsychotics are monitored using self- and clinician-administered scales, including the Glasgow Antipsychotic Side-Effect Scale, the UKU Side Effects Rating Scale, the Liverpool University Neuroleptic Side Effect Rating Scale, the Subjective Side Effects Scale, and the Simpson-Angus Scale [5]. The Glasgow Antipsychotic Side-Effect Scale has been adapted into multiple languages, including Arabic, Danish, Hindi, Swahili, and American English, and has consistently demonstrated strong sensitivity in detecting side effects associated with antipsychotic treatment [6]. The causes of antipsychotic side-effects are multifactorial: pharmacodynamic interactions as dopamine D2 blockade, anticholinergic burden, dosage, polypharmacy, patient vulnerability as age, comorbidities and duration of treatment all play a role [7]. The effects are profound: side-effects reduce subjective well-being, contribute to stigma, and are among the strongest predictors of non-adherence, with subsequent risk of relapse, rehospitalization

and poorer outcomes. In practice, unrecognized, distressing side-effects may lead patients to discontinue treatment silently, undermining long-term recovery [8]. The GASS offers several advantages: it is short, self-administered, covers a broad spectrum of side-effect domains (neurological, anticholinergic, GI, endocrine), and explicitly weighs distress in addition to frequency thereby capturing what matters most to the patient [9]. As a result, it fosters routine assessment in busy clinical settings. However, there are disadvantages: because it is self-reported, it may be subject to recall bias, social desirability bias or under-reporting especially of embarrassing effects like sexual dysfunction [8]. The original GASS also lacks subscales, though recent work explores factor structure, which may limit granularity of tracking by domain. Linguistic and cultural adaptation raises further challenges: idioms, stigma, literacy levels, and differing symptom-attribution may impact validity, making a rigorous equivalence and reliability assessment imperative [10]. The aim of the study was to assess the linguistic equivalence and internal consistency of the culturally adapted Bangla version of the Glasgow Antipsychotic Side-Effect Scale (GASS-B).

## METHODS & MATERIALS

This cross-sectional scale validation study was conducted at the Inpatient and Outpatient Units of the National Institute of Mental Health (NIMH), Dhaka, Bangladesh. The study spanned May 2019 to April 2020 and focused on adult patients receiving antipsychotic medications. Using a convenient sampling method, a total of 220 participants were enrolled, based on the item-to-participant ratio of 10:1 for the 22-item Glasgow Antipsychotic Side-Effect Scale (GASS). Participants were selected based on strict inclusion and exclusion criteria to ensure validity and clinical relevance. This study was employed to assess the linguistic equivalence, reliability, and validity of the Bangla version of GASS.

### Inclusion Criteria:

- Adults aged 18 years and above of both genders.
- Currently taking antipsychotic medication, regardless of diagnosis or other medications prescribed.
- Able to read and understand Bangla independently or with the help of a family member.

### Exclusion Criteria:

- Individuals who did not provide consent.
- Individuals whose first language was not Bangla.
- Patients cognitively unable to describe side effects of antipsychotic medication.

### Ethical Considerations

All participants provided written informed consent prior to enrollment. Patient confidentiality, data security, and anonymity were strictly maintained. Permission was obtained from the authors of GASS, NIMH Institutional Review Board, and hospital authorities. The study protocol was reviewed and approved by the Institutional Ethical Review Committee.

### Data Collection

Data were collected using a pretested semi-structured questionnaire, the self-administered Bangla version of the Glasgow Antipsychotic Side-Effect Scale (GASS-B), face-to-face interviews, and review of patient records. Information documented included sociodemographic characteristics such as age, gender, education, diagnosed mental illness, duration of illness, duration of taking antipsychotic medications, comorbidities, and type/number of antipsychotic drugs used.

Clinical data regarding type and severity of side effects were recorded using GASS-B. The adaptation of GASS into Bangla followed a standard seven-step procedure: translation, synthesis, back-translation, expert committee review, correlation testing between English and Bangla versions, pretesting, and submission/appraisal by the expert committee. Pretesting was conducted on 20 patients receiving antipsychotics who were not included in the final study. Data collection was carried out by trained researchers, taking approximately 25–35 minutes per participant. Data were recorded manually and later entered into SPSS software for analysis.

### Statistical Analysis

Data were analyzed using SPSS version 24. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize the variables. Reliability was assessed by Cronbach's alpha for internal consistency. Validity was assessed through face validity (expert committee review), content validity (Content Validity Index), and construct validity (confirmatory factor analysis and principal component analysis). Results were presented in tabular and graphical formats.

### RESULT

Nearly half (49.3%) aged 18–27 years and a majority being male (69.5%). Most had secondary (33.2%) or primary (31.4%) education, while fewer attained higher secondary (14.5%) or graduate-level (13.2%) education. Schizophrenia spectrum disorders were most common (49.1%), followed by mood disorders (46.8%), with a small proportion diagnosed with other psychiatric (3.2%) or neurocognitive (0.9%) disorders (Table I). As outlined in Table II, the translation and adaptation of the GASS-Bangla (GASS-B) followed a standardized five-stage procedure. Forward translation produced a preliminary Bangla version (v1), with minor lexical differences resolved through synthesis and consensus. Backward translation confirmed conceptual equivalence, and expert review resulted in a culturally adapted pre-final version. Pilot testing with 20 patients indicated good clarity and comprehension, leading to the finalized GASS-B. Content validity was high, with item-level content validity indices (I-CVI) ranging from 0.83 to 1.00, and 17 items achieving an I-CVI of 1.00. Item-level statistics showed mean scores ranging from 0.02 to 1.56, and corrected item–total correlations from 0.09 to 0.62. Cronbach's alpha if an item was deleted ranged between 0.714 and 0.752. The total Cronbach's alpha coefficient for the 22-item GASS-B was 0.745, demonstrating acceptable internal consistency (Table III). Table IV demonstrated that, showed Cronbach's alpha values ranged from 0.358 to 0.635 across domains, reflecting moderate consistency. Split-half reliability (Spearman–Brown corrected) was 0.76, Guttman's  $\lambda_6$  was 0.78, and the intraclass correlation coefficient (ICC) for test–retest reliability was 0.82 (95% CI: 0.74–0.88). Table V showed that exploratory factor analysis extracted seven factors with eigenvalues greater than one, collectively explaining 58.9% of the total variance. These factors corresponded to clinically relevant domains, including extrapyramidal, anticholinergic, sedation, prolactinaemic, and other side-effect categories. Confirmatory factor analysis supported the seven-factor structure, showing good model fit indices ( $\chi^2 = 145.3$ ,  $df = 74$ ,  $p < 0.001$ ,  $\chi^2/df = 1.96$ , RMSEA = 0.066, CFI = 0.935, TLI = 0.919) (Table VI).

**Table – I: Sociodemographic and clinical characteristics of participants (n = 220)**

Characteristic	Frequency (n)	Percentage (%)
<b>Age (year)</b>		
18–27	73	49.3
28–37	42	28.4
38–47	14	9.5
≥48	19	12.8
<b>Gender</b>		
Male	153	69.5
Female	67	30.5
<b>Educational status</b>		

Illiterate	13	5.9
Primary	69	31.4
Secondary	73	33.2
Higher secondary	32	14.5
Graduate	29	13.2
Others	4	1.8
<b>Diagnosis</b>		
Schizophrenia spectrum disorders	108	49.1
Mood disorders	103	46.8
Others	7	3.2
Neurocognitive disorders	2	0.9

**Table – II: Summary of translation and cultural adaptation process of GASS-Bangla (GASS-B)**

Stage	Procedure	Outcome	Remarks
Forward translation	Two bilingual translators independently translated original GASS into Bangla.	Draft Bangla v1	Minor lexical differences resolved by consensus.
Synthesis	Reconciliation meeting among translators.	Reconciled version	Harmonized idioms/terminology.
Backward translation	Two independent back-translators (blind to original) produced English back-translations.	Back-translations reviewed by experts	Conceptual equivalence confirmed.
Expert committee review	Panel: psychiatrists, linguists, psychometrics specialist, and clinicians.	Pre-final GASS-B	Cultural adaptation of items (examples, phrasing).
Pilot testing	Cognitive interviews / pilot administration to 20 patients for clarity & comprehension.	Final GASS-B	No major comprehension issues; wording fine-tuned.
Content validity	Expert ratings of item relevance (n = 6 experts)	Item-CVI mostly 0.83–1.00	17 items had Item-CVI = 1.00; remainder = 0.83.

**Table – III: Item-level descriptive statistics, corrected item–total correlation and “α if item deleted” for GASS-Bangla (n = 220)**

Item	Mean±SD (range 0–3)	Corrected item–total correlation	Cronbach’s α if item deleted	Item-CVI
Q1	1.56±1.12	0.45	0.73	1.00
Q2	0.44±0.8	0.38	0.734	0.83
Q3	0.74±0.99	0.43	0.732	0.83
Q4	0.62±0.91	0.40	0.733	0.83
Q5	0.54±0.86	0.54	0.723	1.00
Q6	0.75±1.03	0.51	0.725	0.83
Q7	0.9±1.1	0.61	0.715	1.00
Q8	0.48±0.93	0.30	0.740	1.00
Q9	1±1.13	0.50	0.726	1.00
Q10	0.3±0.72	0.37	0.735	1.00
Q11	0.83±1.09	0.62	0.714	1.00
Q12	0.83±1.11	0.50	0.726	1.00
Q13	0.34±0.79	0.38	0.734	0.83
Q14	0.47±0.82	0.44	0.731	0.83
Q15	0.17±0.5	0.13	0.745	0.83
Q16	0.74±1.11	0.38	0.737	1.00
Q17	0.05±0.26	0.21	0.742	0.83
Q18	0.02±0.17	0.09	0.744	1.00
Q19	0.21±0.61	0.12	0.747	1.00
Q20	1.41±1.81	0.43	0.752	1.00
Q21	0.23±0.83	0.38	0.734	1.00
Q22	0.72±1.28	0.28	0.750	1.00
Total	13.35 ± 7.2	Cronbach’s α (total) = 0.745		

**Table – IV: Internal consistency and reliability indices for GASS-Bangla**

Reliability Measure	Value	Interpretation
Cronbach’s α (overall, 22 items)	0.745	Acceptable internal consistency
<b>Subscale Cronbach’s α (by predefined domains)</b>		
Sedation & CNS side effects (2 items)	0.358	Low (few items)
CVS side effects (2 items)	0.484	Low (few items)
Extrapyramidal side effects (6 items)	0.635	Acceptable/moderate
Anticholinergic side effects (3 items)	0.540	Moderate
Prolactinaemic side effects (5 items)	0.608	Moderate
Split-half reliability (Spearman-Brown corrected)	0.76	Acceptable reliability
Guttman’s λ <sub>6</sub>	0.78	Consistent with α
Intraclass Correlation Coefficient (ICC, test–retest, n = 40)	0.82 (95% CI: 0.74–0.88)	Good-to-excellent stability
Mean test–retest interval		14.1±2.0 days

**Table – V: Factor analysis-exploratory factor analysis (EFA) and confirmatory fit indices**

Factor (label)	Eigenvalue	Variance %	Cumulative %	Representative item loadings ( $\geq 0.40$ )
Factor 1 (EPS/autonomic overlap)	3.91	17.8	17.8	Q5, Q10, Q13, Q16
Factor 2 (Anticholinergic/HPRL-like)	2.09	9.5	27.3	Q17, Q18, Q19
Factor 3 (CNS/sedation)	1.87	8.5	35.8	Q3, Q4
Factor 4 (Gastrointestinal/CVS)	1.40	6.4	42.3	Q11, Q20
Factor 5 (Prolactinaemic/reproductive)	1.27	5.8	48.2	Q12, Q21
Factor 6 (Weight gain/GUS)	1.20	5.5	53.7	Q1, Q7
Factor 7 (Miscellaneous)	1.11	5.1	58.9	Q22, Q9

**Table – VI: Confirmatory factor analysis (CFA)-goodness of fit (full sample,  $n = 220$ )**

Model/sample	$\chi^2$	df	p-value	$\chi^2/df$	RMSEA	CFI	TLI
Full sample	145.3	74	<0.001	1.96	0.066	0.935	0.919

## DISCUSSION

The present study investigated the linguistic equivalence and internal consistency of the GASS-B, a crucial step in validating its use for Bangla-speaking patients undergoing antipsychotic therapy [11]. In our study, nearly half of the participants (49.3%) were aged 18–27 years, the majority were male (69.5%), and the most common diagnoses were schizophrenia spectrum disorders (49.1%) and mood disorders (46.8%). Maria et al. reported the patient group included 68.8% men and 31.3% women, with a mean age of 42.6 years (SD = 14.5 years) [12]. Alim et al. reported similar age and educational distributions in their validation of the DASS-21 among medical students [13]. The GASS-B underwent a rigorous translation and cultural adaptation process, including forward and backward translations, expert committee review, and pilot testing. This approach aligns with best practices in instrument adaptation, as demonstrated in the translation of the DASS-21 into Bangla by Alim et al., which also employed a comprehensive adaptation process [13]. The GASS-B demonstrated a mean total score of 13.35 (SD=7.2) across 22 items, with a Cronbach's alpha of 0.745, indicating acceptable internal consistency. Subscale analyses revealed moderate reliability, with Cronbach's alpha values ranging from 0.358 to 0.635. These results are consistent with Bock et al., with the original GASS demonstrating a Cronbach's alpha of 0.745, highlighting comparable internal consistency between the two studies [6]. Rodrigues et al. indicated that a Scale-CVI value greater than 0.90 reflects excellent content validity for the overall scale. Similarly, Shi et al. reported that a S-CVI/Ave  $\geq 0.9$  denotes excellent content validity. The item-level content validity index (I-CVI) ranges from 0 to 1, and according to Zamanzadeh et al. items with I-CVI  $> 0.79$  are considered relevant, those between 0.70 and 0.79 require revision, and items below 0.70 should be eliminated. The GASS Bangla met both of these standards, demonstrating strong content validity [14–16]. The intraclass correlation coefficient (ICC) for test-retest reliability was 0.82 (95% CI: 0.74–0.88), suggesting good-to-excellent stability over a mean interval of 14.1 days. This is consistent with the findings of Bock et al. (2020), who reported satisfactory validity for the GASS as a self-rated tool [6]. Exploratory factor analysis (EFA) identified six factors accounting for 53.7% of the variance, while confirmatory factor analysis (CFA) yielded a  $\chi^2/df$  ratio of 1.96, RMSEA of 0.066, CFI of 0.935, and TLI of 0.919, indicating a good fit. These results align with the validation study by Al-Ruthia et al., in which the Arabic version of the GASS demonstrated satisfactory factor structures, further supporting the cross-cultural robustness and consistency of the scale across different populations [17]. Model fit in the confirmatory factor analysis (CFA) was assessed using multiple indices, including the chi-square statistic, comparative

fit index (CFI), Tucker–Lewis index (TLI), and root mean square error of approximation (RMSEA). Vedsted et al. stated that values of CFI and TLI above 0.90 were considered indicative of good fit [18]. Chen et al. reported that RMSEA values below 0.10 were deemed acceptable, with  $p < 0.05$  suggesting excellent fit. The chi-square statistic was derived using maximum likelihood estimation to evaluate overall model adequacy [19].

**Limitations of the study:** This single-center, cross-sectional study limits generalizability to the wider Bangla-speaking population. Convenience sampling and self-reported data may introduce selection, recall, or social desirability bias, especially for sensitive side effects. Some subscales showed lower internal consistency due to few items per domain, potentially reducing precision in detecting specific adverse effects. Subgroup analyses across diagnoses or antipsychotic types were limited by the sample size.

## CONCLUSION

The culturally adapted Bangla version of the Glasgow Antipsychotic Side-Effect Scale (GASS-B) demonstrates strong linguistic equivalence, acceptable internal consistency (Cronbach's  $\alpha = 0.745$ ), and good test–retest reliability (ICC = 0.82), supporting its psychometric robustness. Content validity, exploratory and confirmatory factor analyses confirmed relevance, clarity, and construct validity across clinically meaningful side-effect domains. The GASS-B effectively captures patient-reported frequency and distress of antipsychotic adverse effects, aligning with cross-cultural validation studies. Its brevity, self-administration format, and focus on patient-perceived distress make it a practical, reliable tool for routine clinical monitoring and research, facilitating improved adherence and informed management of antipsychotic therapy in Bangla-speaking populations.

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**Ethical approval:** The study was approved by the Institutional Ethics Committee.

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