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Research Methodology

Morning Stiffness Assessment Scale for Patients With Rheumatoid Arthritis: Turkish Adaptation and Validity and Reliability

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ABSTRACT

Aim: The present study aimed to adapt into Turkish the Morning Stiffness Assessment Scale for Patients with Rheumatoid Arthritis, developed in 2021, and to examine the validity and reliability of the Turkish version.

Design: The study was conducted with a methodological design.

Methods: The present methodological study was carried out with 150 patients diagnosed with rheumatoid arthritis between August and November 2024, using the 'Patient Information Form' and 'Morning Stiffness Assessment Scale (MSAS)' in the data collection process.

Results: The findings indicated that the KMO value was 0.737, and the Bartlett's Test of Sphericity yielded a significant result ($\chi^2 = 462.745$; $p < 0.001$). There was a range of 0.48 to 0.83 for the factor loadings of the items. The confirmatory factor analysis demonstrated acceptable model fit ($\chi^2 = 52.73$, df = 33, $\chi^2/df = 1.59$, RMSEA = 0.063, CFI = 0.96, SRMR = 0.053, TLI = 0.94, and RMR = 0.037). The Cronbach's alpha coefficient for the overall scale was 0.792, while the subscales yielded coefficients of 0.734 and 0.716. The validity and reliability of the Turkish version were demonstrated without requiring any modifications to the original scale.

Conclusion: The Turkish version of the MSAS was found to be a valid and reliable tool consistent with Turkish culture. It consists of ten items and two dimensions. The scale provides a practical and standardized assessment tool for nurses to evaluate and monitor morning stiffness in patients with rheumatoid arthritis and to support symptom management in clinical practice.

Patient or Public Contribution: No patient or public contribution.

1 | Introduction

Rheumatoid arthritis (RA) is a systemic and chronic disease that has been linked to systemic complications, synovial tissue proliferation, pannus formation, and cartilage destruction (Jang et al. 2022). Globally, RA has been reported to affect approximately 0.5%–1% of the population, with a prevalence varying across continents. The prevalence is higher, especially in the USA, compared to European countries. The prevalence of RA was calculated as 0.56% in Turkey (0.89% in women and 0.10% in men) (Tuncer et al. 2017).

Although RA affects people of all ages, studies show RA is three times more common in women, especially after the age of 40 years. This suggests that oestrogen hormone is effective in the aetiology of this inflammatory polyarthritis (Mengi et al. 2024; Singh 2022). The interaction of genetic and epigenetic factors causes rheumatoid arthritis (RA). It has been reported

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that the risk of developing the disease is significantly increased in individuals with HLA-DRB1 and HLA-DR4 genes in terms of genetic predisposition (Jang et al. 2022). In individuals with a genetic predisposition, cigarette smoke, exposure to dust, and particularly physical factors that directly affect the immune system, representing the 'internal' environment, are thought to trigger the clinical emergence of the disease (Mengi et al. 2024; Singh 2022). The clinical course of RA is characterized by joint and non-joint symptoms (Bacci et al. 2017). Non-joint symptoms may include symptoms related to the cardiovascular, respiratory, and gastrointestinal systems. Joint symptoms result from disease-related structural and functional changes in cartilage and bone tissue, as well as inflammatory tendinitis. They are characterized by pain, swelling, redness, symmetrical joint involvement, and morning stiffness, especially in small joints. Morning stiffness is a distinguishing sign of RA, and in patients with RA, systemic and local inflammation markers are associated with it (Oh et al. 2021). It has been found that morning stiffness is associated with localized joint inflammation in addition to disease activity and systemic inflammation markers, including acute phase reactants (such as CRP) and cytokines (such as IFN-γ, TNF-α, and IL-6) in established RA and early arthritis (Boer et al. 2020). In RA patients, morning stiffness usually lasts between 30 and 60 min, and this condition is considered to be a critical complaint that significantly negatively affects the quality of life of individuals and exacerbates the pain (Boer et al. 2020; Finckh et al. 2022; van Onna et al. 2020).

Morning stiffness is described as an indicator of worsening or improvement of the disease by a large number of RA patients (Orbai and Bingham 2015). For this reason, it is necessary to evaluate both disease activity and morning stiffness to assess inflammatory status in patients with RA (Krijbolder et al. 2022; Oh et al. 2021).

Nurses are health professionals who have important roles and responsibilities in the management and evaluation of disease symptoms in RA patients and in providing information about the disease. Although morning stiffness is included in some pain scales developed for RA in the literature, there is an evaluation and approach that morning stiffness is not a condition independent of pain. Traditionally, the duration of morning stiffness is measured in minutes or hours, or its severity is assessed by using a visual analog scale (VAS), a numerical rating scale (Halls et al. 2015; Oh et al. 2021). However, as morning stiffness is a complex and multidimensional symptom with many aspects (e.g., duration, location, timing, intensity, and impact) (Orbai and Bingham 2015), responses to a single question are insufficient to reflect the morning stiffness condition (Oh et al. 2021). By utilizing comprehensive assessment tools, nurses can move beyond identifying symptoms to actively guiding clinical interventions and patient-centred care strategies. 'Morning Stiffness Assessment Scale for Patients with Rheumatoid Arthritis (MSAS)' is a 10-item, simple, and short scale. Since it was from the perspectives of patients, it provides more comprehensive assessments. It has been found that there is no valid and reliable scale that independently assesses RA-specific morning stiffness in our country. Thus, the present study aimed to adapt HyunSoo Oh et al. (2021)'s MSAS for Patients with Rheumatoid Arthritis into Turkish.

2 | Materials and Methods

2.1 | Study Design

This methodological study was conducted to evaluate the validity and reliability of the Turkish version of the Morning Stiffness Assessment Scale in patients with rheumatoid arthritis.

2.2 | Study Setting and Period

The study was conducted as a nationwide online survey in Turkey between August and November 2024. Data were collected using Google Forms and distributed via e-mail and social media platforms (patient support groups and rheumatic disease networks) targeting individuals diagnosed with rheumatoid arthritis.

2.3 | Participants and Sample

The study population consisted of adults diagnosed with rheumatoid arthritis living in Turkey. A total of 273 individuals were initially reached. Of these, 80 did not meet the inclusion criteria, and 43 declined participation. Consequently, the final sample consisted of 150 participants. To mitigate selection bias, the study recruited participants from various geographic regions and diverse online platforms (e.g., patient support groups, social media RA communities) to ensure a wide range of disease durations and treatment stages. Furthermore, since the online survey tool utilized a 'forced response' setting for mandatory items, no missing data were recorded in the final dataset. Sample size adequacy was evaluated based on methodological recommendations for scale adaptation studies, which suggest 5–10 participants per item (DeVellis and Thorpe 2021; Seçer 2020). Since the original scale consists of 10 items, the minimum required sample size ranged between 50 and 100 participants; therefore, the final sample size of 150 was considered sufficient. The flow diagram of the study participants according to STROBE guidelines is presented in Figure 1.

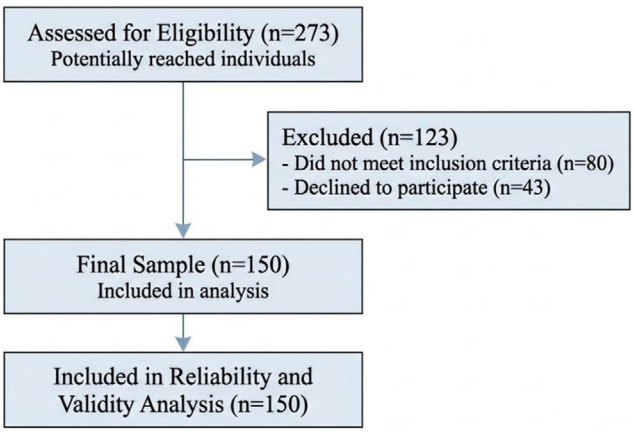

FIGURE 1 | Flow diagram of the study participants according to STROBE guidelines.

2.4 | Eligibility Criteria

Inclusion Criteria

- Being ≥ 18 years of age.
- Having a diagnosis of Rheumatoid Arthritis for at least 6 months (confirmed by participant self-report of a rheumatologist's diagnosis and current use of RA-specific medications/DMARDs).
- Being in a stable treatment phase (no major medication changes in the last month) to ensure accurate assessment of morning stiffness.
- Ability to read and understand Turkish and complete the online questionnaire.
- Provision of electronic informed consent prior to participation.

Exclusion Criteria

- Presence of other major inflammatory rheumatic diseases (e.g., Ankylosing Spondylitis, Lupus) that could overlap with RA symptoms.
- Duplicate submissions identified through survey system records.
- Invalid responses identified based on data quality checks (e.g., extremely short completion time).

2.5 | Data Collection Tools

'Personal Information Form' *and* 'Morning Stiffness Assessment Scale' constituted the data collection tools of the study.

2.5.1 | Personal Information Form

This form asked about the participants' gender, age, educational status, employment status, marital status, other chronic diseases, and year of diagnosis.

2.5.2 | Morning Stiffness Assessment Scale

Oh et al. developed MSAS in 2021 for the assessment of morning stiffness in patients with rheumatoid arthritis. The scale has two factors and 10 items. The factors are 'Characteristics of morning stiffness (first 5 items)' and 'Overall impact of morning stiffness (last 5 items)'. The first item of the scale determines the presence of morning stiffness. The responses are as 'No stiffness (1)', 'Almost no stiffness (2)', 'Some stiffness (3)', 'A lot of stiffness (4)'. Item 2 analyses the duration of morning stiffness. 'Within 10 minutes after waking up (1), Within 30 minutes after waking up (2), Within 60 minutes after waking up (3), Within 3 hours after waking up (4), Almost all day (5)'. The remaining items are 4-point Likert-type with the responses 'strongly disagree (1), disagree to some extent (2), agree to some extent (3), strongly agree (4)'. The minimum possible score is 10, and the maximum possible score is 41. Increased scores show increased morning stiffness. Cronbach's Alpha value is between 0.80 and 0.89 (Oh et al. 2021).

2.6 | Adaptation Process

There were three stages involved in the adaptation process.

First Stage: The Turkish translation was completed by two English language experts. Following that, the translated form was forwarded to a group of experts consisting of one nurse who specialized in public health nursing, two nurses who specialized in nursing principles, two nurses who specialized in internal medicine nursing, one theology expert, and one Turkish language expert. We decided to keep all of the items because the findings of the CVI showed that none of them had a score lower than 0.80. A few of the items were revised after receiving feedback from specialists, and then they were translated back into English. The pilot application stage was initiated once it was discovered that there was no difference between the initial version and the final version.

Second stage: According to DeVellis and Thorpe (2021) and Shrestha (2021), each item on the scale should have an item correlation value that is greater than 0.30 and a Cronbach's alpha value that is greater than 0.70 at the pilot application stage. Thirty participants were reached during the pilot application stage. Every single item had a correlation value that was more than 0.30. There was no deletion of any items because the Cronbach's alpha value was greater than 0.70, and the primary application was started with 10 items.

Third stage: The items were uploaded to 'Google Forms', and a link was provided in order to collect the data that was needed. The link was distributed to persons for data collection on the specified dates. In this study, confirmatory factor analysis and reliability studies were conducted, and the fit indices that were obtained from these analyses were analysed (Woo 2012). It was demonstrated by the findings that the scale structure was correct. Between 15 and 30 days after the initial test, it is advisable to retest (Seçer 2020). The retesting was carried out after a period of 15 days had passed.

2.7 | Statistical Analysis

The data were first exported from 'Google Forms' into an Excel file, and then they were imported into SPSS version 27, and LISREL software was used for analysis. Prior to the analyses, the data were screened for normality; skewness and kurtosis values were within the range of ±2, confirming the suitability for parametric testing. Item total correlation values and total Cronbach's alpha values were analysed. Data set and sample size suitability were tested with Kaiser Meyer Olkin (KMO) and Bartlett's sphericity test. Adequacy of the sample and the suitability of the data set for analysis are indicated with a KMO value above 0.60 and a significant Bartlett's test of sphericity (Seçer 2020). Since the MSAS has a well-established theoretical framework and its factor structure has been consistently validated in previous studies, a confirmatory approach was adopted instead of Exploratory Factor Analysis (EFA).

Accordingly, CFA was preferred to directly test whether the original two-factor structure would demonstrate adequate fit and structural validity within the Turkish cultural context, rather than exploring a new factor solution (Seçer 2020). Model fit indices were examined in the LISREL software package to analyse construct validity. Acceptable model fit is typically indicated by a CMIN/DF value below 5, an RMSEA less than 0.08, CFI and TLI values exceeding 0.90, and SRMR and RMR values lower than 0.08 (Bae 2017; Byrne 2013; Seçer 2020). In order to determine the level of dependability, Cronbach's alpha coefficient and McDonald's Omega reliability analysis were conducted. When it comes to reliability, the reliability coefficient needs to be more than 0.70 (Pallant 2020; Seçer 2020; Woo 2012). Through the use of the retest method, the invariance of the scale over time was examined. A 15-day interval was chosen as it is considered sufficient to prevent participants from remembering their previous answers while ensuring that no significant clinical change in rheumatoid arthritis activity occurred (Seçer 2020; Terwee et al. 2007). The test–retest procedure was completed with a subsample of 30 participants who volunteered to be contacted again after the initial survey. According to the quality criteria for health status questionnaires, a sample size of at least 30 is considered adequate for evaluating the reliability and temporal stability of a scale (Terwee et al. 2007). The statistical analyses were performed by G.B.T., who has experience in methodological research and psychometric validation studies published in SCI-indexed journals. To ensure methodological rigour and accuracy, all analyses were independently reviewed and cross-checked by an expert in quantitative research methods (M.A., Associate Professor in Educational Sciences).

2.8 | Ethical Considerations

Ethical approval for this study was obtained from the Fırat University Non-Interventional Research Ethics Committee (Decision No: 2024/10-04, Date: 18.07.2024), and institutional permission was granted by the hospital where the study was conducted. Written permission for scale adaptation was obtained from the original scale developer via e-mail. Strict electronic informed consent was obtained from all participants prior to accessing the survey. Consent was obtained through a mandatory confirmation statement ('I agree to participate in this study') placed at the beginning of the online questionnaire. Only participants who approved this statement were able to proceed to the survey. The study was conducted in accordance with the principles of the Declaration of Helsinki.

3 | Results

Participants were aged between 40 and 83 years, with a mean age of 60.50 ± 10.26 years. Regarding the demographic profile, 64.0% were female, 72% were married, and 36.6% had a middle school education. Additionally, 56.0% of the participants were unemployed, and 44.0% reported that their income was equal to their expenses. In terms of clinical characteristics, 32.0% had been diagnosed with RA for a period of 5–7 years, and all participants were currently receiving pharmacological treatment for RA (Table 1).

TABLE 1 | Descriptive characteristics ($n = 150$).

Characteristics	Number ($n = 150$)	%
Gender		
Female	96	64.0
Male	54	36.0
Marital status		
Married	108	72.0
Single	42	28.0
Educational status		
Literate (no formal degree)	25	16.7
Primary school	33	22.0
Middle school	55	36.6
High school	36	24.0
University or higher	1	0.7
Employment status		
Yes	66	44.0
No	84	56.0
Income status		
Income < expense	12	8.0
Income = expense	66	44.0
Income > expense	72	48.0
Duration of diagnosis		
6–12 months	18	12.0
1–3 years	25	16.7
3–5 years	17	11.3
5–7 years	48	32.0
7–10 years	12	8.0
10 years and higher	30	20.0
The status of receiving treatment		
Yes	150	100
No	0	—
	Mean ± SD	**Min–max**
Age (years)	60.50 ± 10.26	40–83

3.1 | Validity

3.1.1 | Content Validity

The scale-level content validity index (S-CVI) was 0.98, while the item-level content validity index (I-CVI) had a range that went from 0.85 to 1.00.

3.2 | Construct Validity

The adequacy of the sample size and data set for analysis was assessed using the KMO measure and Bartlett's Test of Sphericity.

The KMO value was found to be 0.737, and Bartlett's Test yielded a significant result ($\chi^2 = 462.745$; $p < 0.001$). To demonstrate the validity of the existing 10-item, two-sub-dimensional structure, confirmatory factor analysis (CFA) was performed without exploratory factor analysis (EFA). Factor loadings ranged from 0.480 to 0.830, supporting the two-factor model (Table 2).

3.2.1 | Confirmatory Factor Analysis

CFA fit index values were: $\chi^2 = 52.73$, df = 33 ($p < 0.05$), $\chi^2/df = 1.59$, RMSEA = 0.063, CFI = 0.96, SRMR = 0.053, RMR = 0.037, TLI = 0.94 and AIC = 96.73 (Table 3). Figure 2 displays the path diagram representing the structure and relationships identified through the confirmatory factor analysis.

When Table 4 was examined, scale factors showed a significant correlation. Moderate correlations found indicated no multicollinearity problem between the factors.

3.3 | Reliability

Cronbach's alpha coefficients were 0.734 for 'F1', 0.716 for 'F2', and 0.792 for the overall scale. In addition, Omega reliability coefficients were 0.804 for 'F1', 0.803 for 'F2', and 0.866 for the total scale (Table 4). The item-total correlation coefficients ranged

TABLE 2 | Mean, item correlation coefficient, and CFA factor load results.

Scale items		Mean ± SD	Corrected item-total correlations	Factor load value	
				F1	F2
Item 1	How much stiffness do you experience	3.27 ± 0.79	0.436	0.680	
Item 2	How long does morning stiffness last after waking up?	3.42 ± 1.08	0.323	0.460	
Item 3	I have difficulties moving my body for a while after waking up due to morning stiffness	3.30 ± 0.74	0.508	0.830	
Item 4	My morning stiffness affects only one or two joints	3.34 ± 0.70	0.498	0.530	
Item 5	Morning stiffness causes more pain	3.33 ± 0.72	0.406	0.480	
Item 6	I have difficulties performing daily activities, such as tooth brushing or face washing, due to morning stiffness	3.26 ± 0.83	0.497		0.660
Item 7	I have difficulties performing housework or going to work due to stiffness in the morning	3.26 ± 0.81	0.456		0.650
Item 8	I am unable to work and stay in bed all morning due to morning stiffness	3.14 ± 0.86	0.566		0.740
Item 9	I am depressed due to morning stiffness	3.11 ± 0.99	0.530		0.690
Item 10	Morning stiffness lowers my quality of life	3.36 ± 0.78	0.481		0.630

Abbreviations: F, factor; Factor 1, characteristics of morning stiffness; Factor 2, overall impact of morning stiffness.

TABLE 3 | Confirmatory factor analysis results.

Fit criteria	Found	Appropriate	Acceptable	Fit result
χ^2	52.73			
df	33			
χ^2/df (CMIN/df)	1.59	< 2	< 5	Excellent
RMSEA	0.063	< 0.05	< 0.08	Acceptable
CFI	0.96	> 0.95	> 0.90	Excellent
SRMR	0.053	< 0.05	< 0.08	Acceptable
RMR	0.037	< 0.05	< 0.08	Excellent
TLI	0.94	> 0.95	> 0.90	Acceptable
AIC	96.73			

Abbreviations: AIC, Akaike information criterion; CFI, comparative fit index; RMR, root mean square residual; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; TLI, Tucker Lewis index.

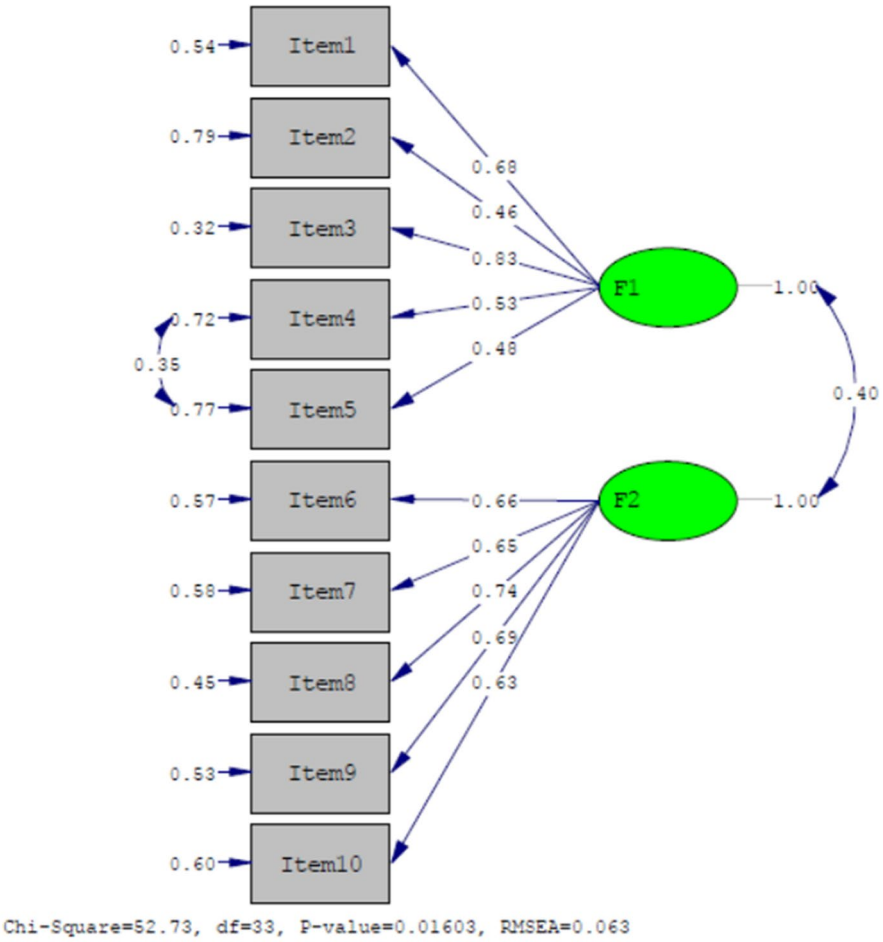

FIGURE 2 | Path diagram.

TABLE 4 | Correlation values, reliability values.

Scale and factor	F1	F2	MSAS total	α	Ω
F1	1			0.734	0.804
F2	$r=0.329$**	1		0.716	0.803
MSAS total	$r=0.790$**	$r=0.839$**	1	0.792	0.866

Abbreviations: F, factor; Factor 1, characteristics of morning stiffness; Factor 2, overall impact of morning stiffness; MSAS, Morning Stiffness Assessment Scale.
**Correlation is significant at 0.01 (2-tailed).

from 0.323 to 0.566 (Table 2). A sensitivity (item-deletion) analysis was conducted to evaluate the impact of Item 2 on internal consistency. Cronbach's alpha values if item deleted ranged between 0.761 and 0.798. The removal of Item 2 resulted in only a negligible change in reliability ($\alpha=0.798$), indicating that excluding this item would not meaningfully improve the overall internal consistency of the scale. Therefore, Item 2 was retained to preserve the theoretical and clinical structure of the instrument.

Correlation values found between the measurements of the test–retest were $r=0.979$ for the total MSAS, $r=0.959$ for 'F1', and $r=0.992$ for 'F2' ($p<0.001$). No statistically significant difference was found between the test–retest measurement results. Test–retest reliability analysis yielded intraclass correlation coefficient (ICC) values ranging from 0.979 to 0.996, demonstrating excellent reliability (Table 5) ($p>0.05$).

4 | Discussion

Validity and reliability of the Turkish version of MSAS were tested in the present study. Language adaptation is required as the first step in the cultural adaptation process (Çapik et al. 2018). At this stage, it is of great importance to ensure meaning and concept equivalence in the translation from the original language of the scale to the target language (Halls et al. 2015). In this regard, the language validity of MSAS was ensured through translation and back translation. According to ITC's 2017 guideline, translation by people who live in the

TABLE 5 | Test–retest results and mean scores ($n = 30$).

Scale and factors	Scale score means		Analysis results				
	First implementation, X ± SD	Second implementation, X ± SD	*r*	*p*	*t*	*p*	ICC
F1	17.50 ± 2.81	17.30 ± 2.81	0.959**	0.000	1.361	0.184	0.979
F2	15.50 ± 4.27	15.33 ± 4.23	0.992**	0.000	1.720	0.096	0.996
MSAS Total	32.00 ± 5.74	32.63 ± 5.85	0.979**	0.000	1.690	0.102	0.988

Abbreviations: F, factor; Factor 1, characteristics of morning stiffness; Factor 2, overall impact of morning stiffness; ICC, intraclass correlation coefficient; MSAS, Morning Stiffness Assessment Scale; *r*, Pearson correlation coefficient; *t*, paired sample *t*-test.
**Correlation significant at 0.01 (2-tailed).

region where the target language is spoken and who are familiar with the cultural characteristics of that society helps to prevent errors due to cultural incompatibility (International Test Commission 2017). In the back translation process based on this guide, the scale was translated back by two linguists who had not seen the original scale, and both versions were compared, and it was found that there was no difference with regard to meaning.

Content validity is related to the appropriateness of scale items and the extent to which they represent the construct being measured (Almanasreh et al. 2019). In culturally adapted measurement instruments, cultural and linguistic equivalence should be ensured through expert review following translation procedures (International Test Commission 2017; Çapik et al. 2018). In this context, expert opinions were collected through a multidisciplinary expert group (1 Public Health Nurse, 2 Nursing Principles experts, 2 Internal Medicine Nurses, 1 theologian, and 1 Turkish language expert). The inclusion of diverse expertise ensured that the items were evaluated not only clinically but also in terms of cultural and spiritual nuances relevant to the target population. The Davis technique analysed the opinions obtained, and CVI was calculated. The I-CVI values ranged between 0.85 and 1.00, and the S-CVI demonstrated an overall value of 0.98, reflecting strong content validity. An I-CVI value above 0.80 indicates that the item is sufficient in terms of scope (Almanasreh et al. 2019). Our CVI results were remarkably similar to the original scale, where all items were also reported to be above 0.80 (Oh et al. 2021) indicating that the Turkish version maintains the conceptual integrity of the original MSAS while aligning with local expert consensus.

In the scale adaptation process, adequacy of sample size and suitability of the data for factor analysis are evaluated with the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity (Seçer 2020). A KMO value above 0.60 shows the sample is suitable for factor analysis (Büyüköztürk 2018). The KMO value of the present study was 0.73, indicating adequate sampling adequacy. Bartlett's test of sphericity was significant ($\chi^2 = 462.745$, $p < 0.001$), confirming the suitability of the data for factor analysis. In the original study, the KMO value was 0.86, and Bartlett's test was also significant ($\chi^2 = 426.04$, $p < 0.001$) (Oh et al. 2021).

Construct validity indicates the extent to which the scale reflects the construct it is intended to measure, and this validity is usually assessed by factor analysis (Kyriazos and Stalikas 2018). Factor loadings of at least 0.40 indicate that the item represents the relevant factor (Shrestha 2021). In the present study, the factor loadings for the Turkish MSAS items ranged between 0.48 and 0.83. These results are consistent with the original development study, where all factor loadings were also reported to be above the 0.40 threshold (Oh et al. 2021). The fact that all items in the Turkish version yielded robust factor loadings above 0.40 further confirms that the linguistic adaptation did not compromise the original conceptual framework of the scale.

Confirmatory Factor Analysis (CFA) was used to evaluate the fit between the observed and latent variables. Within the scope of CFA, various indices (χ^2/df, RMSEA, CFI, SRMR, TLI, RMR, AIC) were calculated for the fit of the model (Bae 2017; Byrne 2013; Seçer 2020; Woo 2012). The values found in the present study are $\chi^2/df = 1.59$, RMSEA = 0.063, CFI = 0.96, SRMR = 0.053, TLI = 0.94, AIC = 96.73, and RMR = 0.037. All these indices were within acceptable limits, indicating that the two-dimensional model of the Turkish MSAS provides a good fit. Although no information on fit indices was reported in the original study (Oh et al. 2021), the strong fit indices obtained in this study provide additional robust evidence for the construct validity of the scale in a cross-cultural context. As the present study is the first international cross-cultural adaptation of the MSAS since its original development, a direct comparison with other language versions was not possible. However, when compared to traditional assessment methods commonly used in Turkey, which typically rely on single-item parameters like duration or intensity (VAS), our findings demonstrate that the MSAS-Turkish fills a critical gap (Halls et al. 2015). By providing a multidimensional evaluation that captures the complexity of morning stiffness, including its functional impact and timing, this study moves beyond conventional measures that often fail to reflect the patient's subjective experience (Orbai and Bingham 2015; Oh et al. 2021). Thus, these results establish a robust and comprehensive baseline for the clinical management of morning stiffness in the Turkish population.

Cronbach's alpha coefficient was employed to evaluate internal consistency, where an alpha value greater than 0.60 signifies sufficient reliability (Pallant 2020; Seçer 2020). In the current study, Cronbach's alpha was calculated as 0.79 for the overall scale and ranged from 0.73 to 0.71 across the subscales. In comparison, the original study reported an alpha of 0.89 for the total scale and values between 0.80 and 0.87 for the subscales (Oh et al. 2021). The results show the Turkish form also has sufficient internal consistency. The slightly lower alpha values observed in the Turkish version may be attributed to

differences in recruitment methods and sample characteristics. While the original scale was developed in a controlled clinical setting with a more homogeneous group, our study engaged a more diverse population via an online platform. This heterogeneity in disease duration and treatment stages likely influenced the consistency of symptom reporting; however, the results remain well above the acceptable threshold, confirming that the Turkish MSAS is a reliable instrument for assessing morning stiffness.

Item-total score correlation analysis, which is expected to be above 0.30, determines the relationship of items with the overall scale (Tabachnick et al. 2013). In the present study, these values ranged between 0.323 and 0.566, confirming that each item contributed significantly to the scale and was consistent with the overall construct. The relatively lower correlation of Item 2 (duration) may reflect the subjective difficulty patients experience in accurately quantifying time. However, its retention was prioritized to maintain the original clinical structure of the scale and to ensure comparability with the international literature.

In addition, the consistency of the scale over time was also evaluated by the test–retest method. In this context, the intraclass correlation coefficient (ICC) was used. An ICC of 0.80 or above indicates high test–retest reliability (Terwee et al. 2007). The MSAS was administered 15 days apart on a group of 30 participants; no significant difference was found between the two administrations ($p > 0.05$). A remarkably strong positive correlation was observed between the two measurements ($r = 0.979$, $p < 0.001$). This high level of stability suggests that the Turkish MSAS yields consistent results over time and that the items are clearly understood by the target population, remaining unaffected by temporary subjective fluctuations (Seçer 2020; Terwee et al. 2007).

4.1 | Implications for Nursing Practice

Morning stiffness is a key symptom that significantly affects functional status and quality of life in patients with rheumatoid arthritis. Nurses, as frontline healthcare providers, play a critical role in the assessment, monitoring, and management of RA symptoms in both clinical and community settings. The validated Turkish version of the MSAS provides nurses with a standardized and multidimensional tool to assess morning stiffness beyond simple duration or intensity measures. Using this scale, nurses can perform comprehensive symptom assessments, identify patients at risk of functional impairment, and monitor changes over time. Specifically, a significant upward trend in MSAS scores can serve as a clinical 'red flag' for an impending disease flare-up, allowing nurses to initiate early triage and pharmacological consultation before structural joint damage occurs.

Furthermore, nurses can utilize MSAS findings to develop individualized care plans, provide patient education on symptom management strategies (e.g., physical activity, joint protection, medication adherence), and evaluate treatment effectiveness. This is particularly relevant in the era of biological therapies, where the MSAS can provide quantifiable data to justify the continuation or adjustment of treatment regimens based on the patient's functional morning recovery. Incorporating MSAS into routine nursing assessments may enhance clinical decision-making and support patient-centred care. In addition, nurse-led interventions focusing on self-management and symptom control may help reduce the impact of morning stiffness and improve overall patient outcomes. Therefore, the use of MSAS strengthens the role of nurses as key agents in symptom management and chronic disease care in rheumatoid arthritis.

4.2 | Limitations of the Study

This study has several limitations that should be acknowledged. First, participants were recruited via convenience sampling through social media and email. While this approach enabled nationwide recruitment from diverse geographic regions rather than a single-center clinical setting, it may introduce selection bias. The sample likely overrepresents individuals with internet access and higher digital literacy, which may limit the representativeness of the findings for the broader RA population in Türkiye. Second, RA diagnosis was based on self-reported information. To reduce potential misclassification, inclusion was restricted to participants who confirmed a rheumatologist-verified diagnosis and reported current use of disease-modifying antirheumatic drugs (DMARDs). However, the absence of confirmation through official medical records remains a limitation and may introduce reporting bias. Third, the confirmatory factor analysis (CFA) was conducted on a relatively modest sample size ($n = 150$), which may limit the stability of parameter estimates and the generalizability of the factor structure. Although acceptable model fit indices were obtained, larger samples are recommended to strengthen the robustness of the measurement model. Fourth, test–retest reliability was assessed in a relatively small subsample ($n = 30$), which may limit the robustness and generalizability of the temporal stability estimates. In addition, the very high correlation coefficients observed ($r > 0.98$) may partly reflect recall bias, despite the 15-day interval being consistent with methodological recommendations (Seçer 2020; Terwee et al. 2007), The short structure of the scale and the absence of clinical status reassessment between measurements may also have contributed to this finding. Fifth, exploratory factor analysis (EFA) was not conducted because the original scale has a well-established and theoretically supported two-factor structure. Although CFA demonstrated good model fit, the absence of EFA may be considered a limitation, as potential culture-specific variations in factor structure could not be explored within the Turkish context. Future studies employing both EFA and CFA in larger and more diverse samples are recommended. Finally, Item 2 demonstrated relatively lower psychometric performance in terms of item-total correlation and factor loading. This may reflect participants' subjective difficulty in accurately quantifying time-related experiences. However, the item was retained to preserve the conceptual and clinical integrity of the original scale and to ensure comparability with international literature.

5 | Conclusion

The findings of this study confirmed that the adapted MSAS comprises two factors and 10 items, and it exhibits strong validity

and reliability within the Turkish cultural context. The results demonstrated consistency between the original instrument and its Turkish version. As a concise and practical assessment tool, the MSAS offers high clinical utility for nurses in the accurate evaluation and monitoring of morning stiffness. Furthermore, it can be employed to assess treatment effects and support the enhancement of nursing-specific clinical outcomes. In conclusion, the MSAS represents a robust and culturally adapted tool that strengthens the role of nurses as key agents in managing symptoms and improving the quality of life for patients with rheumatoid arthritis.

Author Contributions

Gülcan Bahçecioğlu Turan: conceptualization, methodology, data collection, data analysis, writing – original draft, writing – review and editing, supervision. **Ercan Bakır:** conceptualization, methodology, data collection, writing – review and editing. **Zülfinaz Özer:** conceptualization, methodology, writing – review and editing.

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The authors have nothing to report.

Ethics Statement

Ethical approval was obtained from the relevant Ethics Committee (No: 2024/10-04, dated 18.07.2024). Institutional permission was granted by the hospital where the study was conducted. Electronic informed consent was obtained from all participants prior to participation through a mandatory agreement statement at the beginning of the online survey. The study was conducted in accordance with the Declaration of Helsinki.

Consent

The authors have nothing to report.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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