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ORIGINAL ARTICLE

Assessing patient satisfaction in gastrointestinal endoscopy: Development and validation of the Turkish GESQ for quality improvement

Türk popülasyonunda hasta memnuniyetini ölçmek için gastrointestinal endoskopi memnuniyet anketinin değerlendirilmesi: Türkiye GESQ'nun geliştirilmesi ve validasyonu

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ABSTRACT • **Background and Aims:** Patient satisfaction has become an essential quality indicator in gastrointestinal endoscopy, complementing traditional performance measures such as adenoma detection and cecal intubation rates. The Gastrointestinal Endoscopy Satisfaction Questionnaire is a validated tool widely used to assess patient satisfaction across multiple domains. However, a culturally adapted Turkish version has been lacking. This study aimed to translate, culturally adapt, and validate the Turkish version of the Gastrointestinal Endoscopy Satisfaction Questionnaire to evaluate patient satisfaction with gastrointestinal endoscopic procedures in Türkiye. **Materials and Methods:** This Methodological Study included 178 adult patients undergoing upper and/or lower endoscopy at a tertiary academic center between July 2025 and September 2025. The original Gastrointestinal Endoscopy Satisfaction Questionnaire was translated and back-translated following established cross-cultural adaptation guidelines. Exploratory factor analysis using principal component extraction with Varimax rotation was performed to evaluate construct validity. Internal consistency was assessed using Cronbach's alpha coefficients. Spearman's correlation analysis was applied to examine inter-domain relationships. **Results:** The final 20-item Turkish version of the Gastrointestinal Endoscopy Satisfaction Questionnaire demonstrated a four-factor structure: *Information before endoscopy, Pain or discomfort during/after endoscopy, Information after endoscopy*, and *Skills and hospital,* accounting for 53.3% of total variance. Cronbach's α ranged from 0.639 to 0.812 across subscales, with an overall α = 0.820, indicating acceptable reliability. Weak to moderate positive correlations among the subscales supported the construct validity of the scale. **Conclusion:** The Turkish version of the Gastrointestinal Endoscopy Satisfaction Questionnaire is a valid and reliable instrument for assessing patient satisfaction with gastrointestinal endoscopy. Its implementation can facilitate benchmarking, quality improvement, and integration of patient-reported outcomes into endoscopy quality assurance frameworks in line with European Society of Gastrointestinal Endoscopy recommendations.

Keywords: Gastrointestinal endoscopy, patient satisfaction, questionnaire validation, Turkish population, endoscopy quality improvement

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ÖZET • Giriş ve Amaç: Hasta memnuniyeti, gastrointestinal endoskopide adenoma tespit oranları ve çekum entübasyon oranları gibi geleneksel performans ölçütlerini tamamlayan önemli bir kalite göstergesi haline gelmiştir. Gastrointestinal Endoskopi Memnuniyet Anketi, hasta memnuniyetini birden fazla alanda değerlendirmek için yaygın olarak kullanılan ve geçerliliği kanıtlanmış bir araçtır. Ancak kültürel açıdan uyarlanmış bir Türkçe sürümü bulunmamaktaydı. Bu çalışma, Türkiye'de gastrointestinal endoskopik işlemlerde hasta memnuniyetini değerlendirmek amacıyla Gastrointestinal Endoskopi Memnuniyet Anketi'nin Türkçe versiyonunun çevrilmesi, kültürel adaptasyonu ve validasyonunu hedeflemiştir. **Gereç ve Yöntem:** Bu metodolojik çalışmaya Temmuz-Eylül 2025 tarihleri arasında üçüncü basamak akademik bir merkezde üst ve/veya alt endoskopi uygulanan 178 yetişkin hasta dahil edilmiştir. Özgün Gastrointestinal Endoskopi Memnuniyet Anketi, yerleşik kültürlerarası adaptasyon kılavuzları doğrultusunda çevrilmiş ve geri çevrilmiştir. Yapı geçerliliğini değerlendirmek amacıyla Varimax rotasyonuyla temel bileşen analizi kullanılarak açıklayıcı faktör analizi gerçekleştirilmiştir. İç tutarlılık Cronbach alfa katsayıları ile değerlendirilmiştir. **Bulgular:** Son haliyle 20 maddelik Gastrointestinal Endoskopi Memnuniyet Anketi 'nin Türkçe versiyonu dört faktörlü bir yapı ortaya koymuştur: *Endoskopi öncesi bilgi, Endoskopi sırasında/sonrasında ağrı veya rahatsızlık, Endoskopi sonrası bilgi ve Beceri ve hastane.* Bu dört faktör toplam varyansın %53,3'ünü açıklamaktadır. Cronbach alfa değerleri alt ölçekler genelinde 0,639 ile 0,812 arasında değişmekte olup genel alfa = 0,820 ile kabul edilebilir güvenilirlik sağlanmıştır. **Sonuç:** Gastrointestinal Endoskopi Memnuniyet Anketi'nin Türkçe versiyonu, Türkiye'de gastrointestinal endoskopi ile ilgili hasta memnuniyetini değerlendirmek için geçerli ve güvenilir bir araçtır. Uygulanması, Avrupa Gastrointestinal Endoskopi Derneği önerileri doğrultusunda endoskopi kalite güvencesi çerçevelerine kıyaslama, kalite iyileştirme ve hasta bildirimine dayalı sonuçların entegrasyonuna katkı sağlayabilir.

Anahtar kelimeler: Gastrointestinal endoskopi, hasta memnuniyeti, anket validasyonu, psikometrik analiz, Türk popülasyonu, endoskopi kalite iyileştirme

INTRODUCTION

Esophagogastroduodenoscopy (EGD) and colonoscopy are fundamental diagnostic procedures in clinical practice for detecting gastrointestinal (GI) diseases. Endoscopy plays a particularly crucial role in the early detection of GI tract malignancies (1). Traditionally, the quality of endoscopic procedures has been evaluated primarily from the healthcare provider's perspective, focusing on indicators such as lesion detection rates and the adequacy of bowel preparation. However, in recent years, increasing attention has been given to the patient's experience and satisfaction (2). Patient perception and experience are key determinants of procedural satisfaction and are now recognized as important indicators of healthcare quality (3). Patients who experience pain or discomfort are less likely to repeat the procedure again (4). Hence the European and American Society for Gastrointestinal Endoscopy has recommended the standardized collection of quality indicators, one of which is patient satisfaction (5). To date, no studies in Türkiye have systematically evaluated patient satisfaction during endoscopic procedures, nor is it well understood which factors influence satisfaction among Turkish patients undergoing gastrointestinal endoscopy (GIE). The Gastrointestinal Endoscopy Satisfaction Questionnaire (GESQ) is a 21-item instrument developed in Europe to assess patient satisfaction across four domains: information provided before the procedure, technical skill and institutional factors, discomfort or pain during and after the procedure, and post-procedure information (6). Therefore, conducting a validation study is essential to account for the differences in healthcare infrastructure and resources between Western countries and Türkiye. The aim of this study was to validate the Turkish version of the Gastrointestinal Endoscopy Satisfaction Questionnaire (T-GESQ) to assess patient satisfaction and to identify factors influencing satisfaction among patients undergoing gastrointestinal endoscopy.

MATERIALS and METHODS

The research included participants who were 18 years or older and underwent an endoscopic procedure. A total of 178 individuals were part of the study, which took place at the Gastroenterology Department of Gazi University between July 2025 and September 2025. Endoscopy and colonoscopy

procedures were performed by two experienced endoscopists, each with more than ten years of clinical experience. All endoscopic procedures included in the study were performed without procedural sedation. Patients with known malignancy, dementia, cognitive impairment, psychiatric disorders affecting their ability to complete the questionnaire, or communication barriers were excluded from the study. No emergent endoscopic procedures were included; only elective outpatient endoscopic interventions were enrolled in the study. Only literate patients who were able to read and understand Turkish were eligible for participation. All participants were asked to read and complete the questionnaire independently.

The patients were required to complete the T-GESQ questionnaire, and their responses to the questions were collected. To ensure that patients felt comfortable and confident in providing their responses, assurances were given that their answers would remain anonymous and confidential. In addition, patients were asked to complete a supplementary questionnaire designed to gather information on several crucial variables, such as their age, gender, smoking habits, the specific endoscopy procedure they underwent (EGD, colonoscopy, or both), and their prior endoscopy experience. The Institutional Review Board of Gazi University granted approval for the study (Date:13.05.2025-Code: 2025-909), and all participants gave their written consent. The study was in accordance with Declaration of Helsinki.

The sample size was determined based on commonly recommended ratios for scale validation studies. It has been suggested that the number of participants should be at least five to ten times the number of items in the scale to achieve adequate statistical power and stable factor structures (7-9). According to this rule, a minimum of 105 to 210 participants would be required for the 21-item GESQ. Therefore, the inclusion of 178 participants in this study was considered sufficient for conducting validity and reliability analyses.

Translation of GESQ to Turkish

After receiving authorization from Hutching HA, the English version of the GESQ was translated into Turkish using the forward-backward translation method (10). A professional translator who was a native Turkish speaker but being fluently bilingual in English and Turkish produced the T-GESQ, and another translator who was a native English speaker but equally fluent in both languages translated it back into English. If any inconsistencies arose between the original and back-translated versions, we carefully evaluated their significance and made the necessary adjustments to produce a more accurate and suitable translation. After minor adjustments, the final version of T-GESQ was formed.

Score Calculation

It is recommended in the original study that the negative status of all component items be converted to 1 and the positives to 5 for analyzing and validating the GESQ. Three-point Likert scales (1, 3, or 5) and binary questions (1 or 5) were applied by same rule. Total sum of scores was transformed from 0 to 100 by the formula: (Score-lowest possible/Score range)×100.[6] A higher total score indicates greater satisfaction.

Statistical Methods

Statistical analyses were conducted using IBM SPSS Statistics version 23.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were presented as number, percentage, mean±standard deviation. A p-value of <0.05 was considered statistically significant for all analyses.

Construct validity

Factor analysis: The suitability of the data for factor analysis was evaluated using the Kaiser Meyer

Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity. Exploratory factor analysis was performed to determine the underlying structure of the GESQ. The principal component analysis (PCA) method with varimax rotation was applied. Factors with an eigenvalue greater than 1 were retained, and items with factor loadings ≥ 0.40 were accepted as meaningful contributors to their respective factors (11).

Discriminant validity was examined by calculating Spearman correlation coefficients among subscales. Low to moderate correlations between subscales were considered indicative of satisfactory discriminant validity (12).

Reliability

The internal consistency reliability of the GESQ and its subscales was assessed using Cronbach's alpha. A Cronbach's alpha value between 0.60 and 0.80 was regarded as good reliability, while values greater than 0.80 indicated excellent reliability (13). Corrected item–total correlations were also computed to evaluate the relationship between each item and the total score. Items were considered appropriate if the corrected item–total correlation ranged between 0.20 and 0.80, consistent with the original GESQ criteria (6). Test–retest reliability was not assessed because it would require patients to repeat the same endoscopic procedure under identical conditions at another time (12).

RESULTS

The study included 178 participants with a mean age of 52 ± 13 years, reflecting a middle-aged population commonly undergoing endoscopic evaluation. The gender distribution was balanced, with 92 females (52%) and 86 males (48%). The primary indication for endoscopy was the presence of gastrointestinal symptoms (72%), followed by screening (17%) and surveillance (11%), suggesting that most procedures were performed for diagnostic rather than preventive purposes. Smoking history was reported by 39 patients (22%). Regarding the type of procedure, 138 patients (78%) underwent upper endoscopy, 6 (3%) had colonoscopy alone, and 34 (19%) underwent both. Finally, 64 patients (36%) reported prior endoscopy experience, while 114 (64%) were undergoing the procedure for the first time, indicating a substantial proportion of first-time endoscopy patients (Table 1).

Table 1 Demographic table

Age	52 ± 13
Female, n (%)	92 (52%)
Male, n (%)	86 (48%)
Indications for endoscopy	
Symptoms, n (%)	128 (72%)
Screening, n (%)	31 (17%)
Surveillance, n (%)	19 (11%)
Smoking, n (%)	39 (22%)
Procedure type	
Endoscopy, n (%)	138 (78%)
Colonoscopy, n (%)	6 (3 %)
Endoscopy + Colonoscopy, n (%)	34 (19%)
Previous endoscopy experience	
Yes	64 (36%)
No	114 (64%)

Validity

The suitability of the data for factor analysis was verified using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's Test of Sphericity. The KMO value was 0.794, indicating adequate sampling adequacy, and Bartlett's Test of Sphericity was statistically significant ($p < 0.001$), confirming the appropriateness of the data for factor analysis. Exploratory Factor Analysis (EFA) was conducted using Principal Component Analysis with Varimax rotation (Table 2). According to Kaiser's criterion (eigenvalue ≥ 1), four factors were extracted, explaining 53.3% of the total variance. During the in-

itial analysis, Item 9 ("Discomfort during endoscopy") had a factor loading of 0.332, which was below the accepted threshold of 0.40. Therefore, Item 9 was removed, and the EFA was repeated (Table 3).

Table 4 shows the inter-correlations between the domains of the Turkish version of the Gastrointestinal Endoscopy Satisfaction Questionnaire (T-GESQ). Spearman's correlation coefficients be-

Table 2 Exploratory factor analysis of T-GESQ

	Skills and Hospital 1	Pain or Discomfort During or After Endoscopy 3	Information Before Endoscopy 2	Information After Endoscopy 4
1 Information sent before endoscopy was easy to understand			0.609	
2 Information sent before endoscopy was useful			0.708	
3 Opportunity to ask questions before endoscopy			0.552	
4 Explanation about the procedure before endoscopy was easy to understand			0.762	
5 Explanation about the procedure before endoscopy was useful			0.653	
6 Communication skills of the endoscopist	0.703			
7 Technical skills of the endoscopist	0.723			
8 Communication skills of other staff	0.655			
9 Discomfort during endoscopy*				
10 Pain during endoscopy		0.796		
11 Discomfort after endoscopy		0.816		
12 Pain after endoscopy		0.838		
13 Comfort of recovery area				0.519
14 Overall satisfaction				0.465
15 Opportunity to ask about findings				0.461
16 Amount of explanation of findings received				0.733
17 Endoscopist explained findings				0.673
18 Previous endoscopy by the same person				0.524
19 Explanation after endoscopy was easy to understand	0.447			
20 Explanation after endoscopy was useful	0.709			
21 Overall reputation of the hospital	0.525			
Eigenvalue	5.3	1.8	2.0	1.5
Percentage of explained variance	26.7	9.2	10.1	7.3
The cumulative percentage of explained variance	53.3			
Kaiser-Meyer-Olkin Measure	0.794			
Bartlett's Test p value	< 0.001			

*Item 9 was excluded from the final EFA because its factor loading was below 0.40. The original item numbering was retained for consistency with the original GESQ.

tween domains were all below 0.70, indicating that the four subscales represent distinct but related dimensions of satisfaction. Moderate positive correlations were observed between the "Skills and hospital" domain and the other three domains ($r = 0.321$ - 0.485, $p < 0.001$), while weaker correlations were noted between the "Pain or discomfort" domain and both "Information before" ($r = 0.184$, $p = 0.016$) and "Information after" ($r = 0.251$, $p = 0.001$) subscales.

Reliability

The internal consistency of the T-GESQ was evaluated using Cronbach's alpha coefficients. The overall reliability of the scale was acceptable (0.820), with Cronbach's alpha values ranging from 0.639 to 0.812 across the four subscales. The "Skills and hospital" subscale (Items 6, 7, 8, 19, 20, and 21) demonstrated good internal consistency ($\alpha = 0.769$). The "Pain or discomfort during or after endoscopy" subscale (Items 10, 11, and 12) had the highest reliability ($\alpha = 0.812$). The "Information before endoscopy" subscale (Items 1–5) showed satisfactory reliability ($\alpha = 0.729$). The "Information after endoscopy" subscale (Items 13–18) had moderate internal consistency ($\alpha = 0.639$). Corrected item–total correlations for the items ranged between 0.23 and 0.80, indicating adequate internal homogeneity (Table 3). Overall, the results demonstrated that the Turkish version of the T-GESQ has acceptable reliability and internal consistency.

Tablo 3 Internal consistency of the components of the gastrointestinal endoscopy satisfaction questionnaire (GESQ) – Turkish version

Component	Question Number	Corrected Item–Total Correlation	Cronbach's α
Skills and hospital	6	0.485	0.769
	7	0.619	
	8	0.488	
	19	0.446	
	20	0.666	
	21	0.424	
Pain or discomfort during or after endoscopy	10	0.620	0.812
	11	0.681	
	12	0.695	
Information before endoscopy	1	0.432	0.729
	2	0.495	
	3	0.372	
	4	0.667	
	5	0.567	
Information after endoscopy	13	0.482	0.639
	14	0.246	
	15	0.230	
	16	0.502	
	17	0.474	
	18	0.444	
T-GESQ			0.820

Note: Cronbach's alpha values above 0.70 indicate acceptable internal consistency. The "Skills and hospital" ($\alpha = 0.769$) and "Pain or discomfort" ($\alpha = 0.812$) subscales showed good reliability, while "Information before endoscopy" ($\alpha = 0.729$) and "Information after endoscopy" ($\alpha = 0.639$) demonstrated moderate reliability.

Table 4 Correlations between the dimensions of the four factors of the T-GESQ

Dimension	Skills and Hospital	Pain or Discomfort During or After Endoscopy	Information Before Endoscopy	Information After Endoscopy
Skills and hospital	1.000	0.321 (< 0.001)	0.485 (< 0.001)	0.477 (< 0.001)
Pain or discomfort during or after endoscopy	0.321 (< 0.001)	1.000	0.184 (0.016)	0.251 (0.001)
Information before endoscopy	0.485 (< 0.001)	0.184 (0.016)	1.000	0.371 (< 0.001)
Information after endoscopy	0.477 (< 0.001)	0.251 (0.001)	0.371 (< 0.001)	1.000

Spearman's rho correlation coefficients between the four subscales of the Turkish version of the Gastrointestinal Endoscopy Satisfaction Questionnaire (T-GESQ).

DISCUSSION

The final 20-item version of the T-GESQ demonstrated a clear and coherent four-factor structure, aligning closely with the theoretical domains of the original English scale (6). The pattern of inter-domain correlations supported the related but non-redundant structure of the subscales. However, convergent validity could not be formally assessed because no additional validated patient satisfaction or anxiety scale was administered. These findings indicate that the four components effectively measure distinct yet related aspects of patient satisfaction without overlap or redundancy. Overall, this study confirmed that the Turkish version of the Gastrointestinal Endoscopy Satisfaction Questionnaire (T-GESQ) is a valid and reliable tool for evaluating patient satisfaction with gastrointestinal endoscopic procedures in the Turkish population. The psychometric analyses further demonstrated that the T-GESQ preserves the conceptual integrity of the original instrument by comprehensively capturing multiple dimensions of satisfaction, namely, information delivery, procedural comfort, technical competence, and institutional quality.

The exploratory factor analysis yielded four domains, *Information before endoscopy, Pain or discomfort during or after endoscopy, Information after endoscopy, and Skills and hospital accounting* for 53.3% of the total variance, which is comparable to findings from previous cross-cultural validation studies (12,13). Although confirmatory factor analysis was not performed, exploratory factor analysis remains a well-established and widely accepted method in cross-cultural adaptation studies for examining the underlying dimensional structure of translated instruments. The factor structure identified in the present study was conceptually coherent and largely consistent with the original version of the questionnaire.

The KMO value (0.794) and significant Bartlett's Test confirmed the adequacy of the sample for factor analysis. Notably, the removal of Item 9 ("Discomfort during endoscopy") improved the model's factor loadings, highlighting possible cultural or procedural differences in how Turkish patients perceive intra-procedural discomfort. Similar observations have been made in other cultural adaptations of satisfaction tools, where local clinical practices, communication styles, and sedation protocols influenced item performance (14).

When questionnaires originally designed in English are adapted into other languages, they may not fully capture cultural nuances, leading to potential biases in interpretation and response. The accuracy and applicability of such instruments in

healthcare settings largely depend on the cultural background of the target population, the healthcare delivery context, and the methodological rigor employed during their translation and validation processes (10).

Reliability analysis demonstrated satisfactory internal consistency across domains, with Cronbach's α ranging from 0.639 to 0.812, and an overall α of 0.820. The high reliability of the *Pain or discomfort* subscale (α = 0.812) underscores the importance of physical comfort in shaping patient perceptions, as previously emphasized by Loftus et al. (2013) (4), and other studies linking procedural discomfort to reduced satisfaction and reluctance for repeat endoscopy (15).

Patient satisfaction in gastrointestinal endoscopy is a complex construct influenced by multiple procedural and interpersonal factors. The strong correlations observed between the *Skills and hospital* domain and other subscales reflect the holistic impact of institutional and operator-related factors on overall satisfaction. Effective communication, professional demeanor, and procedural competence not only reduce anxiety but also foster trust and perceived safety (16,17). This aligns with prior findings that patients' evaluations of endoscopists' communication skills are closely linked to their overall satisfaction and compliance with future procedures (18).

In this study, both pre- and post-procedural information domains exhibited moderate reliability, suggesting that information delivery is a critical yet variable component of satisfaction. Previous research has highlighted that adequate pre-procedure counseling and post-procedure explanations enhance satisfaction and perceived quality of care (19,20). These findings underscore the need for standardized, comprehensible patient education materials and sufficient time allocation for pre-endoscopy discussions, which have been shown to mitigate anxiety and improve overall patient experience (17).

The validation of the T-GESQ holds particular relevance given the growing emphasis on patient-centered care within the Turkish healthcare system. While quality indicators for gastrointestinal endoscopy traditionally focused on technical parameters such as adenoma detection rates and cecal intubation rates, there is now international consensus, endorsed by the European Society of Gastrointestinal Endoscopy (ESGE), that patient-reported outcomes should be integrated into quality assessment frameworks (21,22).

The present study bridges this gap by providing a culturally adapted and psychometrically robust tool that can facilitate benchmarking and quality improvement initiatives across Turkish endoscopy units. Cultural nuances may also influence patient expectations and satisfaction. In collectivist societies like Türkiye, interpersonal warmth, empathy, and respect from healthcare staff may weigh as heavily on satisfaction as technical competence. Moreover, because the procedures in the present cohort were performed without procedural sedation, patients may have been more aware of intra-procedural discomfort, emphasizing the importance of clear communication and reassurance before and after the procedure.

Several limitations warrant consideration. First, the study was conducted in a single tertiary care center, which may limit generalizability to community-based or private healthcare settings. Second, although the sample size was adequate for factor analysis, future multicenter studies with larger and more diverse populations would strengthen external validity. Another limitation is that patient satisfaction was assessed immediately after the procedure within the same healthcare institution. Although responses were collected anonymously and participation was voluntary, social

desirability bias cannot be excluded. Patients may have been reluctant to provide negative feedback regarding healthcare professionals involved in their care, potentially leading to an overestimation of satisfaction scores. Longitudinal follow-up could provide a more comprehensive assessment of patient experience. Fourth, a methodological limitation of this study is the use of PCA rather than common factor extraction methods such as Principal Axis Factoring or Maximum Likelihood. Although PCA remains a widely used and accepted approach in cross-cultural adaptation and validation studies and was also employed in the original GESQ development study, alternative extraction methods may provide a more direct assessment of latent constructs. Fifth, test–retest reliability was not evaluated; therefore, the temporal stability of the Turkish GESQ could not be assessed. Finally, convergent validity with other patient satisfaction instruments or measures of anxiety was not evaluated, which could be addressed in future research. Educational status was not collected and therefore could not be incorporated into the analysis, which may have limited the assessment of how educational background influenced questionnaire comprehension and satisfaction responses. In addition, convergent validity could not be formally assessed because no additional validated patient satisfaction or anxiety scale was administered.

In conclusion, the Turkish version of the Gastrointestinal Endoscopy Satisfaction Questionnaire (T-GESQ) demonstrates strong validity and reliability, supporting its use as a standardized tool for assessing patient satisfaction in endoscopic practice in Türkiye. Implementation of the T-GESQ may help clinicians identify areas for improvement in communication, procedural comfort, and institutional service quality, ultimately contributing to higher-quality, patient-centered endoscopy services.

Ethics: *This study was approved by the Gazi University Ethics Commission (Approval No: 2025-909; Date: 13.05.2025; Reference: E-77082166-604.01-1247127). The study was conducted in accordance with the Declaration of Helsinki.*

Conflict of Interest: *The authors declare no conflict of interest.*

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