

# Acceptability and Practicality of the Turkish Translation of Pediatric Gait Arm Legs and Spine in Turkish Children

Ezgi Deniz Batu, MD,\* Özge Keniş Coşkun, MD,† Hafize Emine Sönmez, MD,\* Duygu Karali, MD,‡ Elif Arslanoğlu Aydın, MD,§ Yelda Bilginer, MD,\* Evrim Karadağ Saygi, MD,‡ and Seza Özen, MD\*

**Abstract: Background:** The pediatric Gait, Arms, Leg, and Spine (pGALS) is a practical questionnaire for musculoskeletal (MSK) system evaluation in school-age children.

**Objective:** The aim of this study was to evaluate the acceptability/practicality of pGALS Turkish translation in Turkey (cross-sectional study).

**Methods:** The Turkish translation of pGALS was administered to children (4–18 years) who attended to the Pediatric Emergency Department of Hacettepe University, Ankara, Turkey, and the outpatient clinic of the Physical Therapy and Rehabilitation Department of Marmara University, Istanbul, Turkey, during 1 month in 2016. The demographics, complaints, final diagnoses, and pGALS parameters were noted. The acceptability of pGALS was evaluated using visual analog scale.

**Results:** Ninety-five patients (median age, 108 months; male/female, 1.1) were enrolled. Sixteen patients (16.8%) had MSK diagnosis, whereas 79 (83.2%) had non-MSK diagnoses. Musculoskeletal diagnoses were as follows: scoliosis (n = 4), metatarsus adductus (n = 4), soft tissue injury (n = 3), lumbar disk herniation (n = 2), muscle spasm (n = 1), Achilles tendinitis (n = 1), and tibia torsion (n = 1). The sensitivity was 64.7%, and specificity was 89.7% for positive response to 1 or more pGALS screening questions to detect abnormal pGALS. The most sensitive question was pain question. The most common abnormal pGALS components were spine and posture. The sensitivity and specificity of pGALS for detecting MSK diagnosis were 93.7% and 97.4%, respectively. The median duration of pGALS examination was 4 minutes. Most patients/parents found the duration acceptable (94.7%/97.9%, respectively) and reported that pGALS caused little/no discomfort (97.9%/96.8%, respectively).

**Conclusion:** This is the first study showing the Turkish version of pGALS as a valid, acceptable, and practical screening test in Turkey.

**Key Words:** child, musculoskeletal, pGALS, screening

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Musculoskeletal (MSK) disorders present a significant burden in children and adolescents.<sup>1</sup> The general practitioners and pediatricians are often the first health care providers consulted with these conditions. However, MSK diseases may not always associate with positive MSK history. Goff et al.<sup>2</sup> demonstrated that MSK history taking failed to identify abnormal joints in nearly

two thirds of the cases. This emphasizes the need for all joints to be examined as a part of physical examination. Therefore, accurate screening tools are critical to alert physicians for further referral in MSK diseases. These tools should be systematic, practical, time efficient, and easy to perform in children.

The pediatric Gait, Arms, Leg, and Spine (pGALS) tool, which was designed in the United Kingdom, is a simple, practical questionnaire for the evaluation of MSK system in school-age children (4–16 years).<sup>3</sup> It was adopted from GALS (the screening method developed and validated in adults)<sup>4,5</sup> after finding out that GALS could not detect problems localized in specific sites such as wrists and temporomandibular joints when administered to school-age children.<sup>4–7</sup> The pGALS tool performs well even when applied by medical students in a mean of 4.25 minutes.<sup>8</sup> The validity of this method in determination of MSK disorders has been already demonstrated in school-age children.<sup>4,9</sup> Furthermore, the acceptability, practicality, and validity of the Spanish translation of pGALS tool were demonstrated in both Peruvian<sup>10</sup> and Mexican children.<sup>11</sup>

In this study, we aimed to evaluate the acceptability and practicality of the Turkish translation of pGALS in Turkey.

## PATIENTS AND METHODS

This is a cross-sectional study. We included children (4–18 years) who attended to the Pediatric Emergency Department of Hacettepe University Faculty of Medicine, Ankara, Turkey, and the outpatient clinic of the Physical Medicine and Rehabilitation (PM&R) Department of Marmara University Faculty of Medicine, Istanbul, Turkey, over a 1-month period in 2016. The pGALS tool was administered by a resident with 2 years' experience in pediatrics in Hacettepe University and another resident with 2.5 years' experience in PM&R in Marmara University. These examiners were trained for pGALS administration with a 1-hour seminar delivered by the pediatric rheumatology and physiotherapy teams (<http://www.arthritisresearchuk.org/health-professionals-and-students/video-resources/pgals.aspx>). A form was used to collect data about the demographics (age and sex), the complaints at presentation, the final diagnoses, and pGALS parameters.

The Turkish version of pGALS was developed using the translation–back-translation method.<sup>12</sup> The pGALS was translated into Turkish by a pediatric rheumatologist (E.D.B.) and physiatrist (Ö.K.C.), who are fluent in both Turkish and English. Then, it was back translated into English by another pediatric rheumatologist (H.E.S.) and another physiatrist (D.K.). The expert team (S.Ö. and E.K.S.) created a combined Turkish text by evaluating the most appropriate translation for each of the items. The original pGALS could be accessed at <http://www.arthritisresearchuk.org>. The Turkish version of pGALS is shown in Online Resource 1, <http://links.lww.com/RHU/A79>.

The children included into the study were first subjected to the 3 screening questions about pain or stiffness in joints, muscles, back; difficulty in getting herself/himself dressed; and difficulty in going up and down the stairs. Then a general pediatrics (E.A.A.) and a PM&R (D.K.) trainee administered pGALS, which was

From the \*Division of Rheumatology, Department of Pediatrics, Hacettepe University Faculty of Medicine, Ankara; †Department of Physical Medicine and Rehabilitation, Dr. Lütfi Kırdar Research and Training Hospital; and ‡Department of Physical Medicine and Rehabilitation, Marmara University Faculty of Medicine, Istanbul; and §Department of Pediatrics, Hacettepe University Faculty of Medicine, Ankara, Turkey  
E.D.B. and Ö.K.C. contributed equally to this study.  
The authors declare no conflict of interest.

Correspondence: Seza Özen, MD, Division of Rheumatology, Department of Pediatrics, Hacettepe University Faculty of Medicine, Sıhhiye, Ankara 06100, Turkey. E-mail: sezaozen@hacettepe.edu.tr.

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organized in 19 sections that assess pain, limitation of movement, and joint disease in the upper limbs, lower limbs, spine, and posture. The children were asked to imitate the examiner while doing pGALS maneuvers. The pGALS tool was reported as positive if at least 1 response is positive.<sup>6,11</sup> Children with positive pGALS were evaluated further by a pediatric rheumatologist or a physiatrist to see if they had an MSK diagnosis. The acceptability of pGALS examination to the child and parents in terms of the duration and additional discomfort caused was evaluated using visual analog scale with smiley faces (0–10, 0 for full acceptability).

The study was approved by the ethics committee of Marmara University and was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki (1964). Informed consents were obtained from all parents/patients before inclusion to the study.

### Statistical Analysis

Statistical analyses were performed using the SPSS software version 21 (IBM Corp, Armonk, NY). Descriptive analyses are presented using proportions, medians, minimum, and maximum values as appropriate. A  $\chi^2$  test or Fisher exact test, where appropriate, was used to compare the proportions in different groups. The Mann-Whitney *U* test was performed to compare non-normally distributed continuous variables.  $P < 0.05$  was considered to show a statistically significant result.

## RESULTS

A total of 95 patients were enrolled; 45 at the outpatient clinic of the PM&R Department of Marmara University and 50 at the Pediatric Emergency Department of Hacettepe University. The median age of children at the time of pGALS administration was 108 months (min–max, 48–215 months). Male/female ratio was 1.1. The comparison of patients from the PM&R and emergency departments is presented in Table 1. The reasons for the PM&R clinic visits (45 patients) were as follows: MSK symptoms ( $n = 33$  [73.3%]) and routine visits (e.g., parents brought their children because there was positive family history of a rheumatic disease) ( $n = 12$  [26.7%]). The reasons for the pediatric emergency department visits (50 patients) were as follows: infection-related symptoms (fever, cough, diarrhea, etc.) ( $n = 42$  [84%]), allergic symptoms (urticarial rash, asthma attack, etc.) ( $n = 4$  [8%]), trauma ( $n = 3$  [6%]), and MSK symptom (arthralgia) ( $n = 1$  [2%]). More patients from the emergency department had acute symptoms than patients from the PM&R clinic (98% vs. 6.6%, respectively;  $P < 0.001$ ). Sixteen patients (16.8%) had MSK diagnosis,

whereas 79 (83.2%) had non-MSK diagnoses. Musculoskeletal diagnoses were as follows: scoliosis ( $n = 4$ ), metatarsus adductus ( $n = 4$ ), soft tissue injury ( $n = 3$ ), lumbar disk hernia ( $n = 2$ ), muscle spasm ( $n = 1$ ), Achilles tendinitis ( $n = 1$ ), and tibial torsion ( $n = 1$ ). Musculoskeletal diagnoses were more frequent in patients from the PM&R as compared with the emergency department ( $P = 0.003$ ).

Nineteen patients (20%) responded positively to at least 1 of 3 pGALS screening questions, and of these, 11 (57.8%) had positive pGALS, and 11 (57.8%) had an MSK diagnosis. The sensitivity was 64.7% and specificity was 89.7% for positive response to 1 or more pGALS screening questions to detect abnormal pGALS. The question about pain had the highest sensitivity (52%) in our study group. The sensitivity rates of questions about difficulty in dressing and climbing stairs were 5% and 17%, respectively (Table 2).

Seventeen children (17.9%) had positive pGALS, and in 15 of them (88.2%), positive pGALS was related to an MSK diagnosis. Positive pGALS was more frequent in the PM&R patients than in the emergency room patients ( $P = 0.001$ ). The most common components of the pGALS screen to be abnormal were spine and posture. One (1.2%) of 78 patients with negative pGALS had an MSK diagnosis. The sensitivity and specificity of pGALS for detecting MSK diagnosis were 93.7% and 97.4%, respectively (Table 2). The sensitivity rates of pGALS were 100% and 92%, whereas the specificity rates were 100% and 94% in the emergency and PM&R departments, respectively.

The median duration of pGALS examination was 4 minutes (min–max, 2–12 minutes). The median time taken for positive pGALS was longer than that of negative pGALS: 5 minutes (min–max, 3–10 minutes) versus 4 minutes (min–max, 2–12 minutes), respectively ( $P = 0.02$ ). The median duration of pGALS in patients with MSK diagnoses was also longer than that of patients with non-MSK diagnoses: 5 minutes (min–max, 3–10 minutes) versus 4 minutes (min–max, 2–12 minutes), respectively; however, this difference was not statistically significant ( $P = 0.13$ ). The median duration of pGALS was longer in the patients from PM&R than in those from the emergency department (5 vs. 4, respectively;  $P < 0.001$ ).

The median visual analog scale score given by children and parents for acceptability of pGALS in terms of duration was 0 (min–max, 0–8) for both and in terms of additional discomfort was 0 (min–max, 0–6) for both. The majority of patients/parents found the duration acceptable (94.7%/97.9%, respectively) and reported that pGALS caused little or no discomfort (97.9%/96.8%, respectively). There was no significant difference between patients with MSK and non-MSK diagnoses. Fewer patients/parents found the pGALS duration acceptable in the emergency as compared with the PM&R department (90%/90% vs. 100%/97.8%,

**TABLE 1.** The Comparison Between Patients From the PM&R Department and Emergency Department

Characteristics	Patients From the PM&R Department (n = 45)	Patients From the Emergency Department (n = 50)	P
Age, median (min–max), mo	108 (48–192)	108 (48–215)	0.9
Sex, male, n (%)	23 (51.1)	27 (54)	0.77
Reason for visit, MSK, n (%)	33 (73.3)	1 (2)	<0.001
Reason for visit, acute complaints, n (%)	3 (6.6)	49 (98)	<0.001
Positive pGALS, n (%)	14 (31.1)	3 (6)	0.001
Duration of pGALS, median (min–max), min	5 (3–12)	4 (2–6)	<0.001
Patients who found pGALS acceptable for duration, n (%)	45 (100)	45 (90)	0.058
Parents who found pGALS acceptable for duration, n (%)	44 (97.8)	45 (90)	0.20
Patients who found pGALS acceptable for additional discomfort, n (%)	43 (95.6)	50 (100)	0.22
Parents who found pGALS acceptable for additional discomfort, n (%)	45 (100)	47 (94)	0.24
Final diagnosis, MSK, n (%)	13 (28.9)	3 (6)	0.003

**TABLE 2.** Sensitivity and Specificity of the pGALS Screening Questions to Detect Abnormal pGALS and pGALS Tool to Detect Musculoskeletal Diagnoses

	Sensitivity, %	Specificity, %
Positive response to $\geq 1$ pGALS screening questions	67.4	89.7
Positive response to question on pain	52	96.1
Positive response to question on difficulty in dressing	5	97.4
Positive response to question on difficulty in climbing stairs	17	100
pGALS tool	93.7	97.4

respectively); however, this difference did not reach statistical significance (Table 1).

## DISCUSSION

This is the first study to our knowledge showing the Turkish version of pGALS as a valid tool to be used in clinical practice in Turkey. We have also demonstrated that the Turkish version of pGALS was acceptable in terms of duration and additional discomfort.

Musculoskeletal problems are very common during childhood. Thus, MSK screening methods should be sensitive, practical, easy to apply, and acceptable for both children and families. The pGALS tool is a quick, easy, and acceptable tool for evaluating MSK problems in school-age children. In previous studies, Foster and Jandial<sup>3</sup> reported a sensitivity of 97% and specificity of 98% for pGALS, whereas Moreno-Torres et al.<sup>11</sup> showed that pGALS had a sensitivity of 97% and specificity of 93% in Mexican Spanish translation. In our study, the sensitivity was slightly lower (93.7%), whereas the specificity was in between (97.4%).

The researchers performing pGALS in our study were general pediatrics and PM&R trainees. Their training was based on pGALS video demonstration, and while performing pGALS, verbal instructions were supplemented by “copy me” approach. The positive findings were validated by a pediatric rheumatologist or PM&R specialists. The time taken to complete maneuvers is approximately 3 to 5 minutes in hands of different health practitioners including medical students in previous studies.<sup>10,11,13,14</sup> The median duration was 4 minutes in our study, comparable with those in previous studies. However, the duration was longer in the PM&R as compared with the emergency department. The probable reason is that the trainee in the emergency department might have acted faster because most of the patients had acute problems of different origin.

The abnormalities in pGALS did not always mean an underlying MSK diagnosis in our study consistent with other studies.<sup>9,10,14</sup> This emphasizes the need to consider pGALS findings not separately but within the clinical context.

The 3 screening pGALS questions are important as prompt for MSK assessment; however, we should keep in mind that MSK history taking may fail localizing significant joint problems.<sup>2</sup> Smith et al.<sup>14</sup> reported a sensitivity of 57% and specificity of 63% for a positive response to 1 or more pGALS screening questions to detect abnormal pGALS. In another study by Abernethy et al.,<sup>10</sup> the sensitivity was 63.6%, and the specificity was 87.1%. Our results were consistent with the previous studies (sensitivity, 64.7%; specificity, 89.2%). Abernethy et al.<sup>10</sup> demonstrated that the most sensitive screening question was difficulty in dressing, whereas it was pain in the study by Smith et al.<sup>14</sup> Pain had the highest sensitivity in our study. The reason for different questions having the highest sensitivity in different studies is probably the cultural differences. For example, because homes are usually on the ground floor in Malawi, climbing stairs is not a regular issue, decreasing the sensitivity of this question in the study

by Smith et al.<sup>14</sup> In our study, there was no cultural bias for any of the 3 questions.

In our study, most patients/parents found pGALS acceptable in terms of time taken and additional discomfort both in emergency and outpatient settings. This was consistent with the previous studies.<sup>10,14</sup> It is important to note that fewer patients found the duration of pGALS acceptable in the emergency department than in the PM&R department, although this difference was statistically insignificant. We suggest that it may be more difficult to tolerate an additional MSK evaluation of 4 minutes especially when the patient has more acute problems of different origin. The difference may reach statistical significance when the comparison is done with a greater number of patients, which may limit the utility of pGALS in the emergency setting.

As a limitation, there might be a selection bias toward less-unwell patients especially in the emergency setting. In addition, we combined 2 groups of children with different characteristics: 1 from the emergency clinic and 1 from the PM&R clinic to our study. The patients admitted to the emergency clinic have acute problems of different kinds, whereas PM&R patients have more chronic and MSK problems. However, by including these 2 groups, we were able to check the practicality and acceptability of pGALS in 2 different settings.

We have demonstrated that the Turkish version of pGALS is an acceptable and practical tool to detect children with MSK problems. This allows us to use pGALS as a screening test in routine clinical practice in Turkey.

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