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To Investigate the Interrater Reliability of pGALS to be used as a Reliable Musculoskeletal Screening Tool for Pediatric Population in Guwahati Urban Society of Northeast India

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Abstract

Research question: Whether pGALS can be used as reliable tool to assess the musculoskeletal system of pediatric population in northeast India.

Background: Musculoskeletal pain among paediatric population is an important public health problem. Musculoskeletal pains among children need to be assessed as early as possible. The assessment for the musculoskeletal pain needs the total screening of the body for its association with abnormality in the physical well-being. pGALS is a screening tool to assess the musculoskeletal areas in the pediatric population. Based on adult GALS (Gait, arm, leg, and spine) pediatric GALS has been developed .The reliability of the pGALS need to be checked in the pediatric population of this region so that the tool can be used for assessing the musculoskeletal system by different clinician.

Materials and method

Study Design: Interrater reliability study

Participants: Three high school level schools were taken where children ages between 5 to 15 years were included in the study. 100 subjects were included in the study with both the genders randomly allocated for the screening where 98 students have completed the data. Two physiotherapists as a rater were allotted and children were screen by the them with pGALS in a gap between 2 week.

Outcome measures: pGALS Examination tool.

Statistical analysis: The two observer's score where the open ended data / qualitative data were coded into quantitative data. Cronbach's Alpha value has been computed for the Interrate; r reliability.

Result: Overall acceptable to excellent inter rater reliability has been found ($\alpha \geq 0.9$).An unacceptable internal consistency found in the screening questions but the overall consistency of the different test items are acceptable.

Conclusion: The pGALS examination tool has been found to be reliable tool and can be implemented for screening the children for any musculoskeletal disorder.

Keywords: Musculoskeletal pain; pGALS; MSK

Introduction

Musculoskeletal pain among paediatric population is an important issue to be discussed in terms of its origin and assessment .Pain among children and adolescents has been identified as an important public health problem [1,2]. Kristjansdottir [3] reported a prevalence of 15% to 20% for pain in ≥1 location (head, abdomen, and back) among school-aged children. Musculoskeletal pain during childhood is common; in population surveys, 16% of school-age children reported limb pain [4]. Musculoskeletal pain can be difficult for children to characterize and can cause children and parents great anxiety. Although the cause of acute musculoskeletal pain in children usually is obvious, the cause of chronic musculoskeletal pain or pain that has associated systemic symptoms can be more difficult to determine. Musculoskeletal pain among children needs to assess as early as possible. The assessment for the musculoskeletal pain needs the total screening of the body for its association with abnormality in the physical well-being. Any abnormality found in the child's body may cause pain and difficulty in functional activities. For this a reliable screening methodology need to be checked. pGALS is a screening tool to assess the musculoskeletal areas in the pediatric population. An ideal musculoskeletal screening test for children must be sensitive (i.e.,

does not miss significant abnormalities), be acceptable to the child and parent, distinguish the abnormal child from the normal child, and direct the assessor to a focused regional examination [5]. Based on adult GALS (Gait, arm, leg, and spine) pediatric GALS have been developed. The amendments required for adult GALS were derived through consultation with members (doctors and allied health professionals) of the British Society for Pediatric and Adolescent Rheumatology (BSPAR), with invitations to participate being distributed at BSPAR national meetings5.The use of the pGALS as a reliable tool to screen for musculoskeletal problem in the north eastern India need to be checked for its implementation. The study was limited to the school going children because of easier to approach and age specific stratification is possible. Therefore, the aims of the current study were to: (1) evaluate the Interrater reliability of findings in the pGALS examination by 2 different rater in school going children (2) report any variation in the findings of the raters in the different components and (3) assess the consistency of the subsequent classification of widespread discomfort from the pGALS data .

Materials and Methods

Subject recruiting and selection

Three high school level schools were taken where children ages between 5 to 15 years were included in the study. 100 subjects were included in the study with both the genders randomly allocated for the screening. In order to participate in the study written consent were taken from the parents. Ethical clearance taken from Institutional ethical committee of Gauhati Medical College, Guwahati, Assam. For Interrater reliability test for pGALS two raters were allotted and children were screen by the two raters with pGALS in a gap between 2 weeks. The two raters were blinded from each other findings. Subjects in the study were randomly selected from each standard with equal subjects in each of the ten strata. The subjects were included randomly irrespective of any musculoskeletal pain, pyrexia, and any inflammatory joint disease, clumsy child as referred by parents or any neurological problems. If any red flags found in the subjects then immediate referral to hospital or concern medical setup will be made.

Using pGALS for assessing the musculoskeletal status of school children

The selected school children were assessed with pGALS. pGALS has been demonstrated to have excellent sensitivity to detect abnormalities, incorporates simple manoeuvres often used in clinical practice and is quick to do , taking an average of two minutes to complete. pGALS was originally developed and validated in school aged children with excellent practicality and acceptability [5]. Three screening questions whether with overt musculoskeletal problem and with positive response or with no MSK problems and negative response does not stop from further assessing the pGALS. Assessing school age children with adult pGALS and comparing it with standard clinical approach gave satisfactory inter observer variation with intraclass correlation coefficient of 0.81 (0.8 is regarded as satisfactory [6,7].

Statistical analysis

Data were pooled and put under statistical analysis. The two observer's score were lined up in the excel sheet where the open ended data / qualitative data answer for questions i.e. Do you have any pain or stiffness in your joints, muscles or your back? Do you have any difficulty getting yourself dressed without any help? Do you have any difficulty going up and down stairs? Were coded into quantitative data. Each component of the pGALS were analysed for inter rater reliability. Interrater reliability done with independent ratings of the same event by two rater. No discussion or collaboration occurred when reliability is tested. Reliability is determined by the correlation of the scores from two independent raters (for ratings on a continuum). Cronbach's Alpha value has been computed for the Interrater reliability. SPSS statistical software and Microsoft excel was used to find out the Interrater reliability.

Results

Demographic information

There were 100 students involved in the study. However 98 students had complete data with no missing values ,thus the response rate was 98%.The sample population were both males and females constituting male with 56.3% and female with 43.7%. Demographic details including age, height and weight were described in Table 1.

	Mean (n=98)	SD
Age	10.12	2.72
Height	140.9	17.1
Weight	36.8	12.5

Table 1: Demographic details.

Overall, raters demonstrated acceptable to excellent agreement on each of variable in pGALS for the total sample. The two assessor's mean and SD for different variables of pGALS has minimal difference .An Excellent reliability has been found when two raters assessed the individual variables i.e. $\alpha \geq 0.9$.As shown in the Table 2.

	Mean N=98		**SD**		**Cronbach's alpha**
	R1	**R2**	**R1**	**R2**	
Any Pain?	2.55	2.56	0.49	0.49	0.99
Problem with dressing.	0.05	0.03	0.19	0.17	0.92
Problem with walking	0.05	0.07	0.22	0.25	0.9
Gait	0.93	0.92	0.24	0.25	0.95
Arms	0.92	0.92	0.25	0.25	1
Leg	0.624	0.62	0.48	0.48	1
Spine	0.673	0.68	0.47	0.46	0.98

Table 2: Individual variables.

The pGALS has three questions regarding the pain and functional activities. The mean values and the SD values found by the two raters have no significant difference for each question. But the internal consistency of the questions were found to be unacceptable i.e. $0.5>\alpha$. As shown in the Table 3.

	Mean N=98	SD

	R1	R2	R1	R2
Any Pain?	2.55	2.56	0.49	0.49
Problem with dressing.	0.04	0.03	0.19	0.17
Problem with walking	0.05	0.07	0.22	0.25

Table 3: Cronbach's alpha=0.342.

The mean values and SD values for Gait, Arms, Legs and spine were found to be approximately equal and have no significant differences between the two raters. The internal consistency between the examinations manoeuvres were acceptable i.e. $0.8 > \alpha \geq 0.7$. As shown in the Table 4.

	Mean		SD	
	R1	R2	R1	R2
Gait	0.93	0.92	0.24	0.25
Arms	0.92	0.92	0.25	0.25
Legs	0.62	0.62	0.48	0.48
Spine	0.67	0.68	0.47	0.46

Table 4: Cronbach's alpha=0.789.

The internal consistency of the pGALS examination has been checked where the two raters values for each variables were compared. The mean and SD values of the two raters has very minimal difference. An acceptable internal consistency has been found between the different variables of the pGALS assessment i.e. $0.8 > \alpha \geq 0.7$. As shown in the Table 5.

	Mean N=98		SD	
	R1	R2	R1	R2
Any Pain?	2.55	2.56	0.49 0.49	
Problem with dressing.	0.04	0.03	0.19	0.17
Problem with walking	0.05	0.07	0.22	0.25
Gait	0.93	0.92	0.24	0.25
Arms	0.92	0.92	0.25	0.25
Leg	0.62	0.62	0.48	0.48
Spine	0.67	0.68	0.47	0.46

Table 5: Cronbach's alpha=0.746.

Discussion

This Interrater reliability study investigates the use of pGALS musculoskeletal examination as a reliable tool to be used for screening musculoskeletal problems in pediatric population. The pGALS examination was originally adapted from adult Gait Arms Legs and Spine examination [8,9]. Early screening of the pediatric population for any musculoskeletal abnormalities has been found to be important .The pGALS test performs very well; it is sensitive, quick to perform, and is acceptable to children and parents/guardians. It is widely accepted by teachers in rheumatology, and effectively improves musculoskeletal clinical competence among junior doctors assessing adults. Following the screening examination, the observer is directed to a more detailed examination of the relevant area, based on the 'look, feel, move' principle as in the adult Regional Examination of the Musculoskeletal System (called REMS) 9. It incorporates simple manoeuvres often used in clinical practice, and is quick to do, taking an average of 2 minutes to perform 5.Interrater reliability has been found to be significant and with acceptable internal consistency except in a particular test item.

For the overall sample, Interrater agreement and internal consistency were satisfactory for the different variables of the pGALS that we examined. However, there were some variables that had questionable levels of reliability, particularly when finding the internal consistency of the screening questions for pain and function. One general problem is that reliability estimates can be overinflated because subjects may remember how they responded the first time and therefore respond similarly the second time (Nunnally, 1978). Thus, the time frame between assessments should be long enough to minimize effects due to memory. In the current study, the subjects were examined 2 weeks apart by two raters. Thus, the memory for specific responses is not likely to be strong in the current study. The low reliability for the internal consistency of the screening questions was found to be same for both the raters. Though there is relationship between pain and the functional activities, this study has shown unacceptable internal consistency between the screening questions. In the pGALS examination pain intensity was not measured instead only being asked about its presence or absence i.e. Do you (or does your child) have any pain or stiffness in your (their) joints, muscles or back? The Functional questions i.e. Do you (or do your child) have any difficulty getting yourself (him/herself) dressed without any help? And do you (or does your child) have any problem going up and down stairs? Cronbach's alpha will generally increase as the intercorrelations among test items increases, and so the internal consistencies which estimate the reliability of test scores. Because intercorrelations among test items of screening questions are minimum and all items measures the different construct, so the internal consistency among three screening questions is unacceptable .When we measured the internal consistency of all the variables of pGALS we found an acceptable Cronbach's alpha i.e. $0.8 > \alpha \geq 0.7$.This can be due to increase number of test items though with different construct and somehow the screening questions got related to the examination part. The two rater has rated an approximately similar result with no significant differences. Our study confirms that the assessing the musculoskeletal system for any disorder by multiple raters using pGALS is highly reliable. Good inter- rater reliability of assessing the school going children by pGALS has also been shown. The overall findings in the study shows that pGALS screening pGALS screening question examination had been tailored with the view of involving all the body part irrespective of the specific body part like upper extremity had been designated with arm lower extremity with leg and the trunk with spine. Any changes in the gait of the children suggest any possible problem in the specified part .The cause of the finding that is the good reliability of the pGALS screen is due to its detail examination which are documented in simple form Table 6.

Any pain?		
Problemwith dressing?		

Problem with walking?		
	Appearance	Movement
Gait		
Arms		
Legs		
Spine		

Table 6: Documentation of pGALS.

Furthermore, we provide evidence for good consistency among the variables of pGALS. We have attempted to provide a variety of estimates of reliability, as well as some possible explanations of low reliability, so that readers can make their own judgements as to the acceptability of the examination. Limitation of the study comprises of small sample size, devoid of any musculoskeletal problems and any neurological disorder in participant children, and subjects were collected only from schools. A future reliability study can be conducted with larger population and inclusion of the children with musculoskeletal pain and neurological disorder and the study can be conducted in the outpatient pediatric department of a hospital.

Conclusion

Though there are number of assessment and clinical examination to screen any possible musculoskeletal disorder in children pGALS can be used for its simple and quick measures. This study has shown that the pGALS examination can be used in pediatric population in Guwahati urban society as a reliable screening tool to find out musculoskeletal disorder and there affect in the functional activities. An extended study need to be conducted in the outpatient pediatric department of a hospital for a cross sectional population. Since the examination takes quick time to screen, it can be widely used up in all outpatient department and the screened children can be kept for further investigations for the final diagnosis.

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