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## The body posture pain scale: Assessment of pediatric sickle cell pain intensity

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### Abstract

The aim of the study was to test a new non-verbal assessment tool focusing on pain intensity, specifically for vaso-occlusive episodes of Sickle Cell Disease (SCD). Scores on the Body Posture Pain Scale from 28 children with SCD ranging in age from 6 to 16 years were compared to those of 56 pain free children ranging in age from 5 to 11 years. Children were asked to classify 10 photos presented randomly according to the degree of pain intensity they believed the photo depicted. Results show that it was difficult for the children in the control group to associate a body posture with a pain intensity level. There was a high level of variation in the classification of control children. Variation was less among children with SCD and agreement as to the classification of pictures was higher, suggesting children could more easily assign a specific intensity of pain to each photo. Showing a body posture photo to express pain could be more relevant than an interview, specially in vaso-occlusive episodes. Future research will have to investigate if the Body Posture Pain Scale could improve the child's and parents' ability to accurately report the intensity of pain. In addition, the focusing on body postures to express pain could be easily reliable to active pain management skills such as relaxation, massage or self-hypnosis.

**Keywords:** Pediatric pain, sickle cell disease, self-assessment.

### Introduction

Pain is the most common symptom in sickle cell disease (SCD). Even if not all people have crises (1), children with SCD may experience pain from mild to severe, as young as 6 months old and continuing throughout their lives. SCD pain may be acute and chronic, varying in intensity, location, quality and

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temporal patterns. The acute painful episode is a dynamic process that changes from day to day (2). In pediatric patients, vaso-occlusive episodes require admission in emergency department (3-5) once to twice yearly (6). These painful episodes are often described as terrible and have profound effects upon comfort and function in school, play, social relationships (7) and psychological adjustment (8).

The accurate evaluation of pain is an essential step toward the development of specific treatment guidelines (9). Many authors have highlighted that assessing psychometric properties of pain instruments is recommended (10-12). However, pain measures often have been extended to populations and situations beyond those on which they were standardized (13). Measures have been used with pediatric SCD participants who were much older than the norms provided for the instrument. It is generally accepted that pain is a complex experience that cannot be adequately assessed by a numeric rating of pain intensity alone (4,14). A multimodal approach to pain assessment is preferred whenever possible (15) and research suggests that children with SCD as young as 7 years of age are capable of reporting about multiple aspects of their pain experience. Parents and children were able to identify psychological stressors associated with SCD and many parents reported that anxiety, anger or sadness might actually trigger their child's painful episodes (16).

Finally, personal factors and characteristics can affect how pain is perceived, evaluated and reported. Although the gold standard for pain assessment remains patient self-report, the literature about SCD reports that ethnic factors are important in assessing pain in this population because there may be differences in the way that cultural and ethnic minorities communicate their pain experience (17). This does not invalidate self-report, but does indicate that methods that do not rely on language or verbal report, a major component of many pain assessment strategies, may facilitate more valid reliable communication regarding pain for minority groups (18).

The purpose of our study was to assess the preliminary validity of a new assessment tool focusing on pain intensity, specifically for vaso-occlusive episodes of SCD. Because this tool does not require a verbal response, making it useful for patients

with SCD who may be from ethnic or cultural minority groups. It also does not require numeracy skills, an asset for any tool that could be used with young children.

## Methods

Participants in the control group consisted of 30 first grade pain free children, 15 girls and 15 boys ( $M=6$  years, ages 5;6 - 6;6) and 26 fifth grade pain free children, 16 girls and 10 boys ( $M=10$  years, ages 9 - 11) recruited from a public school on the outskirts of Caen, Lower-Normandy, France.

Participants in the SCD group consisted of 28 children, 9 girls and 19 boys ranging in age from 6 to 16 years ( $M=11$  years, range 6 to 16) recruited from the patients list of the University Hospital Centre of Pointe-à-Pitre, Guadeloupe, an overseas department of France.

## Procedure

All the children were tested individually by a trained interviewer, in school for the control group or in the hospital for the SCD group. Informed consent was obtained from each child. Children of the SCD group were interviewed during a hospital visit. After agreement about what the meaning of the word "pain", children were asked to sort 10 photos presented randomly, "from the smallest pain to the biggest pain. On the first photo, the person does not have pain or a little pain, and on the last photo, the person has more pain than on all other photos." In agreement with the article L.1123-6 of the French health code, the research protocol will not be submitted to a consultative committee of protection of people in biomedical research, as far as the experimental protocol implies no invasive measure.

## Material

Ten black and white photos (21 x 29.7 cm) were used, representing a variety of body postures performed by a professor of dance. In all photos, the face was expressionless. In four photos the the person was

standing, but displayed varying degrees of being bent or curled up. In three photos the person sat on the floor in various positions. In the final three photos the

person was lying on the ground in various positions (see figure 1).

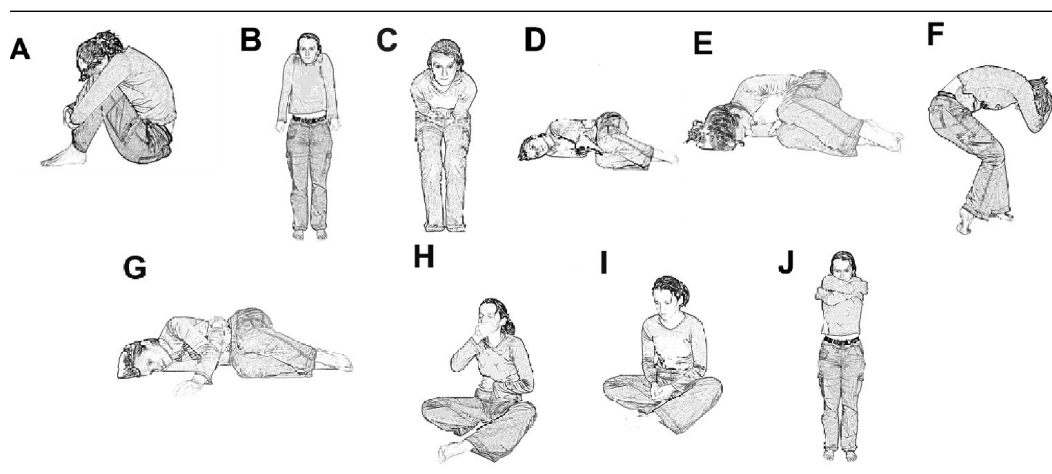


Figure 1. The 10 black and white photos showing a variety of body postures (21 x 29.7 cm).

Data were analysed using Statistica software. Alpha was set at  $p = .05$  for determining significant differences. Preliminary tests to assess demographic factors between the groups were conducted using an independent t-test (age) and chi-square analyses (gender). Comparisons were made of the mean rank/position (01 = lowest pain, 10 = highest pain) of the two control groups and SCD group using the Wilcoxon rank-sum test. Control groups were considered separately to control for the potential confounding effect of the children's school grade, because children in Grade 5 may have better abilities at seriation/ ranking than children in Grade 1. For each group, the coefficient of variation was generated as a measure of dispersion within the set of ranks provided by the children. There was no missing data.

## Results

The two control groups have a mean age significantly different ( $t(54)=18.66$   $p=.0001$ ) and do not differ in gender ( $X^2 = 0.751$   $p>.5$ ). All the children were able to understand and to perform the task. Significant differences were found in the order

in which children sorted the photos compared to the SCD group (see table 1; ( $p=.01$ )).

Visual inspection also suggested that the control groups had some difficulty sorting the photos. In these groups, the dispersion of the children's choices was high, and some children were not able to place the photos E, F and H in the series based on pain intensity.

The rank positions of the photos sorted by the group of children with SCD had a lower coefficient of variation, indicating the degree of agreement was better in the group, with children as a group more able to distinguish that a specific photo represented a particular intensity of pain.

Table 3 and figure 2 show the order of the photos made by the children with SCD. We can observe that the intensity of pain is visually recognizable by the posture which is gradually changed from standing and facing forward to lying down and not facing forward.

It was also apparent that for these children with SCD, increasing pain intensity was reflected in a decreasing ability to stand up.

It is also interesting that pictures chosen to reflect less pain depict the person facing the reader, then as pain progresses, the photos depict apparent attempts to hide the face, and, at the highest levels, no more attempt to hide the face seems possible.

**Table 1. Chi-square test of independence for the classifications of the three groups and coefficient of variation (CV) of frequency distributions (the coefficient of variation (CV) is a measure of dispersion of a probability distribution)**

	Chi-square (df 9)		CV
6 years-old children (n = 30)	36.67	$p < .001$	0.51
10 years-old children (n = 26)	37.1	$p < .001$	0.52
children with SCD (n=28)	24.35	$p < .01$	0.38

**Table 2. Mean rank that each picture was given by the separate groups**

Photos	A	B	C	D	E	F	G	H	I	J
6 years-old children	6	2	4	8	7	9	7	9	1	3
10 years-old children	7	2	3-4	8	6-10	10	9	5-6	1	4
children with SCD	7	2	4	10	8	5	9	6	1	3

**Table 3. Percentages of children with SCD who agreed on the classification of each photo**

I	B	J	C	F	H	A	E	G	D
89.3	67.8	67.9	50	50	42.8	42.8	46.3	53.6	67.9

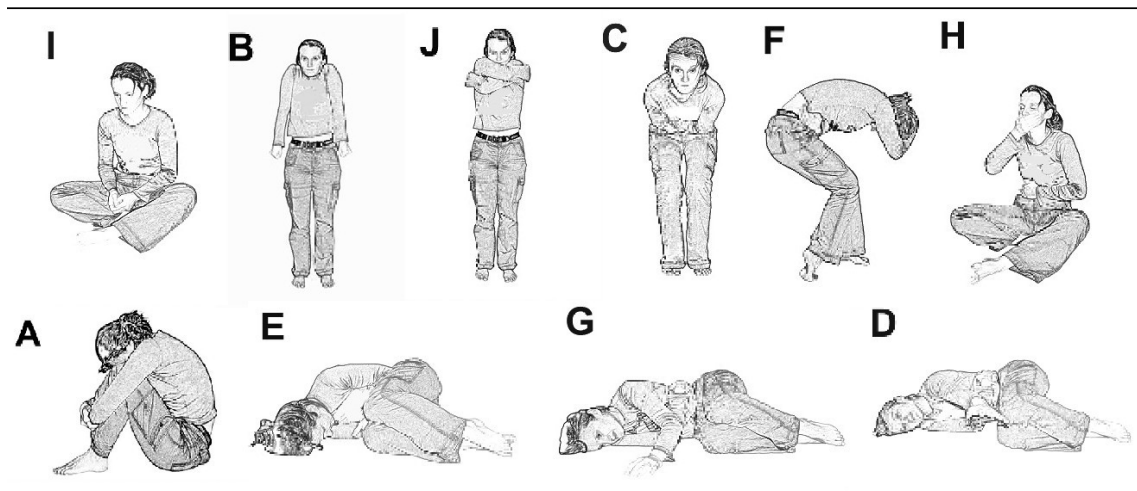


Figure 2. Mock scale derived from the classification of photos by the children with SCD. From top left “the person does not have pain or a little pain” to bottom right “the person has more pain than on all other photos”.

## Discussion

The aim of this study was to explore a non-verbal pain intensity assessment tool designed for children with SCD. The results show that it is possible for children with SCD, who experience pain frequently, to identify and classify body postures representing degrees of pain intensity. However, children in the control groups showed less agreement in their classifications of the photos, regardless of grade level. This suggests that children in the control groups may not share the same representation of a pain which concerns the entire body as children with SCD. The differences may also reflect the fact that they have less pain experience in general.

Although abdominal and limb pain are more common for children with SCD, they often experience multiples pains at other locations. Showing a body posture photo to express rather than using numerical or verbal scales could facilitate self-report in these children, especially in vaso-occlusive episodes. Depending on age and level of cognitive development, children may have limitations in using these measures under optimal conditions (19). These difficulties can be exacerbated by pain, which can cause distress and interfere with attention and make it difficult for a child and parents to provide specific details when asked questions related to pain (20).

Stollger Jones and colleagues (13) argue that adequate assessment can facilitate more effective pain management and reliable and valid pain assessment is imperative for children with SCD. Whether patients are provided medication or not seems to be influenced by medical staff perception of child's pain experience. Patient self-report of pain is an important component in the treatment of children in both inpatient and outpatient settings (21). The belief exists that patients with SCD might abuse medication and become psychologically dependant (9). Use of a tool incorporating body postures in a painful episode, as investigated here, could help to fight against misconceptions, because adults may have more confidence in the child's report. The ease with a photo can reflect the multiple dimensions of pain, which is also of great value. Reliance on reports of pain intensity alone have been discouraged by many (15,19,22). It could also contribute to a better representation of the pain experience during a child's

vaso-occlusive episode. Finally, if this tool better alerts medical staff to how the pain concerns the whole body, it could decrease fear and stress in patients and their parents who may have more confidence that the child's pain report will be responded to.

The study provides preliminary information regarding a novel method of pain assessment for children that has potential for use in children with sickle cell disease. Once further research has confirmed the psychometrics of the tool in this group, it has potential for use in other pediatric groups, especially those who have limited numeracy skills or with cognitive impairments. Previous studies have examined children's abilities to judge the pain depicted in pictures (23). Adesman and Walco (24) report differences in how the school-age children in their study rated the pictures that comprise the Charleston Pediatric Pain Pictures, relative to the pre-school children in Belter et al.'s earlier study. They suggest the differences may reflect a combination of age and methodological differences. One factor they do not address is that the pictures contained within the Charleston Pediatric Pain Pictures depict painful *situations*. For example, in one drawing, a child has tripped and fallen on a sidewalk, while in another, a child has touched a hot stove. While these are everyday occurrences, younger children may still not yet have seen these occur or experienced them personally. This also means the Charleston Pediatric Pain Pictures cannot be used to report current pain for a type of pain not depicted and that there is only one level of pain depicted for each painful situation.

The scale developed here overcomes these difficulties. Showing only a body posture of an individual that is not imposed upon a specific situation, the photos are more generalizable. In addition, the photos depict varying levels of pain, allowing the child to report his or her current experience by choosing which picture best reflects his or her personal experience *now*.

## Conclusions

In summary, reporting pain that is identified as a body posture could be more intuitive for children and facilitate their self-report because it more fully

reflects pain experienced during a vaso-occlusive episode. This preliminary research suggests that the the Body Posture Pain Scale has some validity as a self-report pain tool for children with SCD, and, potentially, children with other painful conditions. This novel tool could encourage a better interface between children, parents and medical staff, easing report and communication in painful situations.

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