SHORT REPORT

A comparison of pain scales in Thai children

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Three commonly used pain scales, the visual analogue scale, the Wong-Baker Faces Pain Scale, and the Faces Pain Scale Revised were administered to 122 Thai children, of whom half were HIV infected, in order to assess their validity. These scales presented moderate to good correlation and moderate agreement, sufficient for valid use in Thai children.

Scales to assess pain in children have been extensively studied,¹ but there are few paediatric studies to establish the validity of these tools in non-Western cultures. Our objective was to explore the validity of three commonly used pain scales, the visual analogue scale (VAS), the Wong-Baker Faces Pain Rating Scale (WBFPS), and the Faces Pain Scale-Revised (FPS-R), in measuring the intensity of pain in children belonging to a non-Caucasian ethnic group and culture.

We therefore studied a population of 122 Thai children,² of whom half were human immunodeficiency virus (HIV) infected with a high prevalence of pain at 44%, and half presented no chronic disease with a prevalence of pain of 18%, providing a wide spectrum of pain intensity.

METHODS

Study population

This study was conducted in the outpatient clinic on a previously described cohort² at the Queen Sirikit National Institute of Child Health, Bangkok. Sixty one HIV infected patients aged 4–15 years attending the clinic for routine care, and an equal number of age matched children with no chronic disease were recruited.

Data collection

Each child was asked to grade present pain on three scales, providing an evaluation of pain intensity at the moment of the interview. These scales were presented sequentially:

- The VAS was presented vertically, the top of the scale representing extreme or unbearable pain and the bottom of the scale no pain. The scale was 10 cm high, and the level of pain was subsequently converted into a discrete numerical score graded 0 to 10 by measuring the distance in cm from the lower extremity of the scale.
- The WBFPS³ and the FPS-R,⁴ on which the child pointed out which face corresponded the best to its present degree of pain (fig 1). These scales represent six faces with increasing degrees of pain from left to right. Each face was attributed a score from 0 to 10 as indicated on the scales.

Data analysis

After conversion of the results of the VAS, WBFPS, and FPS-R into discrete numerical data (0 to 10), the degree of correlation between these three scores was established by performing a Spearman's correlation. Their level of agreement was determined on Bland-Altman plots, and the

percentage of children with differences of more than 2 points between scales calculated.

RESULTS

The three pain scales were all significantly correlated with one another on overall analysis (table 1). Analyses of subgroups showed all scores were significantly correlated in both sexes and in children with and without HIV. On analysis by age, there was moderate to good correlation ($r = 0.64$ – 0.84) of all scores in the younger (4–7) and older (8–11) age groups. Correlation between the VAS and WBFPS was low in 4 year old children ($r = 0.38$, $p = 0.07$). The highest coefficients in all subgroups were those correlating the two face pain scales.

On Bland-Altman plots of VAS/WBFPS, VAS/FPS-R, and WBFPS/FPS-R, the 2SD values of differences between scales were respectively 4.4, 4.6, and 4.0. Mean differences and limits of agreement are given in table 1. The percentage of all children with differences of more than 2 points between scales were respectively 19.7%, 18.9%, and 11.4%. The percentage of children aged 4 with differences of more than 2 points between scales were respectively 29.1%, 20.8%, and 16.7%.

DISCUSSION

Overall the pain scales showed significant correlation that was moderate to strong, except between the VAS and WBFPS in 4 year old children. The agreement between scores as observed on the Bland-Altman plots was moderate, with approximately a fifth of all children presenting more than 2 points difference between measurements on the VAS and the face pain scales. Agreement was higher between the two face pain scales, that share a common metric system as well as a continuum of facial expressions despite having been developed separately.⁴ Nearly 30% of 4 year olds presented more than 2 points difference between the VAS and WBFPS. This should invite caution about the possible limitations of these scales when dealing with such young children.

The scales were expected to show some degree of correlation since the face scales can be considered as visual analogue scales, and the fact that the face scales are closely related to one another. There may also have been some bias in results due to the sequential rather than random presentation of the scales to children.

In our experience, children had more difficulty understanding the use of the VAS than that of the WBFPS and FPS-R. Our correlation coefficient values were systematically lower than those observed by Hicks and colleagues,⁴ who compared the FPS-R and VAS using a similar methodology. In that study the overall correlation was very strong ($r = 0.92$), and remained strong on age group analysis (age group: 4–6 years, $r = 0.93$; 7–9 years, $r = 0.87$; 10–12 years, $r = 0.90$). Our results were similar to those obtained by Soyannwo and colleagues,⁵

Abbreviations: FPS-R, Faces Pain Scale-Revised; HIV, human immunodeficiency virus; VAS, visual analogue scale; WBFPS, Wong-Baker Faces Pain Rating Scale

Figure 1 Wong-Baker Faces Pain Scale and Faces Pain Scale-Revised with scores (reproduced with permission).

Table 1 Pain scale correlations

	n	VAS/WBFPS				VAS/FPS-R				WBFPS/FPS-R			
		r	p	MD	LA	r	p	MD	LA	r	p	MD	LA
Overall	122	0.70	<0.01	-0.9	-5.3 to 3.5	0.67	<0.01	-0.6	-5.2 to 4.0	0.79	<0.01	0.5	-3.5 to 4.0
Sex													
Male	67	0.73	<0.01			0.71	<0.01			0.84	<0.01		
Female	55	0.65	<0.01			0.61	<0.01			0.69	<0.01		
HIV infection													
HIV	61	0.68	<0.01			0.63	<0.01			0.78	<0.01		
Non-HIV	61	0.66	<0.01			0.59	<0.01			0.75	<0.01		

r, correlation coefficient; MD, mean difference; LA, limits of agreement.

who compared the visual analogue scale and verbal rating scale in 100 Nigerian adults, and observed moderate correlation between both scales ($r = 0.68$).

Questions arise on the cross-racial validity of facial pain scales, since the expression of pain may differ between ethnic types depending on the way in which a culture encourages or discourages the expression of pain, but also on facial phenotype. Cross-racial validity of pain scales has been studied in selected ethnic minorities in Western countries and more rarely in non-Western countries. Results of these studies are conflicting. In a study of 95 Jordanian children,⁶ three pain assessment tools (the Poker Chip, the Faces, and the Word Description Scales) were found to have sufficient test-retest reliability and convergent validity established by correlation analysis. However no analysis of agreement was performed. When comparing the visual analogue, the box numerical, the Hower, and the McGill verbal descriptive scales in 40 adult females in Zimbabwe,⁷ the authors found the scales to be non-correlated in women who had less than seven years' education. However, the study was limited by its sample size.

The present study suggests that the three investigated pain scales have sufficient convergent validity and agreement for clinical use in Thai children, but that discrepancies between pain scales are to be expected in a significant proportion of children. These tools can be used to evaluate pain intensity in Thai children, but with caution and clinical judgement on the part of the examiner, especially with the younger patients. However, if widespread use is to be considered, further research is necessary for proper cross-cultural validation, as these scales may need to be refined or modified for regional use.

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