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Reliability and Validity of the Thai Short-Form McGill Pain Questionnaire-2 (SF-MPQ-2)

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Abstract

Background: By adding 7 neuropathic pain descriptors, the Short-form McGill Pain Questionnaire-2 (SF-MPQ-2) enables clinicians to assess not only nociceptive pain but also neuropathic pain and presents an improvement over the first version (SF-MPQ). Unfortunately, no Thai language version of this new tool was available, we therefore undertook to create and validate one.

Materials and methods: The translation included the following steps: 1) forward translation: English to Thai, 2) backward translation: Thai to English, 3) testing on patients 4) proof-reading and finalization. Adults suffering from cancer or non-cancer chronic pain completed Thai SF-MPQ and Thai SF-MPQ-2 during 2 separate visits 30 hours apart. Reliability was evaluated by assessing internal consistency and test-retest reliability. Three types of validity were investigated, including concurrent, construct and convergent validity.

Results: A total of 220 Thai patients (127F: 93 M), aged 53 ± 14 year-old, participated in this study. Cancer pain was the most common cause of pain (n=52, 24%), followed by spine related pain (n=48, 22%) and neuropathic pain (n=48, 22%). The reliability for each questionnaire item was high (Cronbach's alpha coefficient 0.771-0.993, ICC 0.985-0.996, Spearman's correlation coefficient r>0.4 p<0.001). In addition, fit indices values of each pain aspect were good. Most descriptors had an acceptable factor loading value, except gnawing and itching (factor loading value; gnawing=0.47, itching=0.49). However, all descriptor had a significant t-value and R^2 value.

Conclusion: The Thai-MPQ-2 had high reliability as well as concurrent, construct and convergent validity. It is a reliable and comprehensive tool for pain assessment in Thai patients.

Keywords: Short-form McGill pain questionnaire-2 (SF-MPQ-2); Neuropathic pain

Introduction

Pain is one of the most common complaints expressed by patients during medical visits and therefore appropriate pain assessment is critical in order to formulate a therapeutic plan [1,2]. Self-reported assessments are more reliable and accurate than observational ones, however only a limited number are available in the Thai language [3].

The McGill Pain Questionnaire (MPQ), based on a patient self-report model, was developed in 1975 and assesses the sensory, affective and evaluative aspects of pain [4]. However, the large number of items it contains makes it too time intensive for routine clinical practice. The Short-Form MPQ (SF-MPQ), developed in 1987, contains only 15 questions and is less onerous to complete [5]. Although available in a Thai version [6] and widely used, it does not adequately evaluate the sensory neuropathic aspects of pain [7]. The latter can have significant impact when selecting an optimal pharmacological regimen, as treatments for nociceptive and neuropathic pain can differ. Dworkin et al. recently developed a SF-MPQ-2 (Short-form McGill Pain Questionnaire-2), which in addition to a more accurate 10-point pain rating scale, also includes 7 questions assessing pain caused by neurological disorders [8]. In this updated version, the SF-MPQ-2 is more versatile than existing neuropathic pain questionnaires such as the DN4 [9], LANSS [10] and NPSI [11] as it is capable of evaluating nociceptive pain as well [8]. It has been shown to have a high level of reliability and validity [7,12-14] and has been translated into multiple languages [15-17]. We therefore undertook to validate a Thai version of the SF-MPQ-2.

Methods

After obtaining a translation license from Mapi Research Trust and ethics approval from the Ramathibodi Hospital Faculty of Medicine, after providing written consent, 220 patients were recruited from a university hospital based pain clinic between September 2015 and April 2016. Inclusion criteria included chronic pain from any cause with a minimum duration of 3 months, age between 18 and 70 years and good comprehension of both spoken and written Thai. Exclusion criteria included impaired cognitive function and refusal to participate in this study.

All participants were instructed on how to fill out both questionnaires and these were read to illiterate subjects if necessary.

The Thai SF-MPQ consists of a visual analogue scale (VAS), present pain intensity (PPI) measure as well as 15 pain descriptors that are each rated on a four-point scale (0-3 scale; 0=none, 1=mild, 2=moderate, 3=severe). It evaluates 3 different pain aspects, including continuous, intermittent and affective. The Thai SF-MPQ-2 contains 22 items to be rated by respondents on a 0-10 numeric scale, with "0" indicating "none" and "10" indicating "worst possible pain." It evaluates 4 different dimensions: 1) continuous pain (throbbing, cramping, gnawing, aching, heavy pain and tender), 2) intermittent pain (shooting, stabbing, sharp, splitting, electrical-shock and piercing), 3) neuropathic pain (hot-burning, cold-freezing, pain caused by light touch, itching, tingling or "pins and needles", numbness), and 4) affective aspects (tiring-exhausting, sickening, fearful, punishing-cruel). All four aspects of pain are presented as mean (± SD) and a total score obtained by adding the 22 individual scores.

Questionnaires were completed twice during visits that were separated by approximately 30 hours, an interval deemed to strike the appropriate balance between ensuring that patients did not remember their initial answers and their underlying painful condition had not changed.

A full linguistic validation process was undertaken following the methodology recommended by the Mapi Research Trust [18], which included 4 steps:

Forward translation from English to Thai by two of the clinician co-authors (PB, NT) who are fluent in both languages.

Backwards translation to English by a philologist and native Thai speaker. This version was then compared to the original English version and translated back to Thai by two clinicians.

Clinical validation of the terms used in the newly translated questionnaire by having 5 Thai-speaking patients review and complete it.

Proof reading and finalization by 5 pain physicians.

Statistical analysis

Sample size was determined according to the subjects-to-variables (STV) ratio. As there should be at least 10 cases [19,20] for each item in the instrument being studied, the total sample size was 220 patients. Data analysis was performed using SPSS for Windows version 18.5 (IBM, Armonk, New York). Demographic data was reported as mean, standard deviation (SD), frequency and percentage as appropriate. Internal consistency for each item score and total scores were analyzed using Cronbach's α coefficient and values ≥ 0.70 were deemed acceptable [21]. Test-retest reliability was assessed using intraclass correlation coefficients (ICC) and values >0.70 were considered acceptable. Concurrent validity was examined by comparing the individual items and total scores of the Thai-SF-MPQ and Thai-SF-MPQ-2 using Spearman's correlation coefficients (r). P values<0.05 and r values r>0.40 were considered significant [15].

Construct validity of the Thai-SF-MPQ-2 was analyzed using confirmatory factor analysis (CFA) and data compared to a hypothesized measurement model. Each pain aspect and overall four-factor model was analyzed. Goodness of fit indices were selected to examine the model fit including relative Chi-square ([x2/df] <3) [22,23], standardized root-mean-square residual (SRMR) (acceptable value <0.08) [24], root-mean-square error of approximation (RMSEA) (acceptable value <0.08) [25] and the comparative fit index (CFI) (value >0.95 indicating a good fit) [26]. As part of the validation process, indices were modified to improve model fit even if the hypothesized model was found to have good construct validity and this was done by removing items, or adding an error covariance between two pain descriptors. Convergent validity was evaluated by examining the effect of loading and unloading each pain descriptor. Critical test values were t-value >1.96, R^2 (Square multiple correlation) >0.2 [27] and loading factor ≥ 0.50 [28,29].

Results

Two hundred and twenty patients were enrolled; their demographics and pain characteristics were presented in Tables 1 and 2.

Characteristics		n (%)
Gender	Male	93 (42%)
	Female	127 (58%)
Age	Mean ± SD (years)	53 ± 14
	<65 year-old	171 (78%)
	>65 year-old	49 (22%)
Duration of pain symptom	>3 months-1 year	85 (39%)
	1-5 years	75 (34%)
	6-10 years	36 (16%)
	>10 years	24 (11%)
Education level	None	5 (2%)
	Primary school	57 (26%)
	Secondary school	37 (17%)
	Diploma or Bachelor degree	91 (41%)
	Master degree or PhD	30 (14%)
Employment	Work	102 (46 %)
	Unemployed	60 (27%)
	Retired	58 (27%)
Nociceptive pain	Cancer pain	52 (24%)
	Mechanical low back pain, neck pain, spondylosis	46 (20%)
	Ischemic limb pain	4 (2%)
	Other nociceptive pain	11 (5%)
Neuropathic pain	Central neuropathic pain	8 (4%)
	Radicular pain	17 (8%)
	Post herpetic neuralgia	8 (4%)
	Painful diabetic neuropathy	4 (2%)
	Complex regional pain syndrome	22 (10%)
	Other neuropathic pain	48 (21%)

Table 1: Demographic data (n=220).

Analysis of the Thai-SF-MPQ-2 found high Cronbach's α coefficient values for total score (0.92), pain descriptors (0.96-0.98) and pain aspects (Table 3). ICC results for total score (0.996) and pain aspect (0.985-0.989) displayed similarly favorable results (Table 3). Significant correlations were found between the Thai-SF-MPQ, VAS and Thai-SF-MPQ-2, supporting concurrent validity (Table 4). In addition, confirmatory factor analysis fit indices indicated good construct validity for the four pain aspects (Table 5).

	Mean	SD	Median	Min	Max	25th percentile	75th percentile	Range (Max-Min)
MPQ-1; 15-descriptors (0-3)	17/45	11	15/45	Jan-45	41/45	Aug-45	21/45	40
VAS (0-10)	10-Jun	3	5.5/10	0	10-Oct	4.5/10	10-Aug	10
PPI (0-5)	2.7/5	1	5-Mar	0	5-May	5-Feb	3.5/5	5
SF-MPQ: McGill Short Form Questionnaire Version 1; VAS: Visual Analog Score; PPI: Present Pain Intensity								

Table 2: SF-MPQ, VAS and PPI scores for the study population.

Aspect of pain	Number of items	T1 (mean ± SD for each item)	T2 (mean ± SD for each item)	Cronbach's α coefficient‡	Intraclass Correlation Coefficient* (ICC)	
					ICC	95% CI
1) Continuous	6	2.74 ± 2.24	2.67 ± 2.14	0.791‡	0.985†	0.990-0.994
2) Intermittent	6	2.02 ± 2.12	2.04 ± 2.08	0.800‡	0.985†	0.990-0.994
3) Affective	4	4.12 ± 3.24	4.14 ± 3.19	0.893‡	0.985†	0.972-0.984
4) Neuropathic	6	1.68 ± 1.93	1.66 ± 1.90	0.771‡	0.989†	0.993-0.996
All items	22	2.50 ± 1.96	2.49 ± 1.91	0.993‡	0.996†	0.995-0.997
T1=first data collection, T2=second data collection, ‡Acceptable Cronbach's α coefficient ≥ 0.70, †Acceptable ICC >0.70						

Table 3: Thai-SF-MPQ-2. Internal consistency and test-retest reliability.

	SF-MPQ-2 (Continuous)	SF-MPQ-2 (Intermittent)	SF-MPQ-2 (Affective)	SF-MPQ-2 (Neuropathic)	SF-MPQ-2 (Total score)
SF-MPQ-2 (Continuous)	-	-	-	-	-
SF-MPQ-2 (Intermittent)	0.529**	-	-	-	-
SF-MPQ-2 (Affective)	0.664**	0.562**	-	-	-
SF-MPQ-2 (Neuropathic)	0.456**	0.583**	0.459**	-	-
SF-MPQ-2 (Total score)	0.835**	0.782**	0.869**	0.701**	-
SF-MPQ (Sensory)	0.820**	0.756**	0.666**	0.593**	0.868**
SF-MPQ (Affective)	0.601**	0.525**	0.910**	0.429**	0.792**
SF-MPQ (Total score)	0.793**	0.718**	0.841**	0.577**	0.916**
VAS (visual analog scale)	0.521**	0.398**	0.559**	0.344**	0.574**
†Spearman's correlation; r >0.4 and **p<0.01					

Table 4: Concurrent validity (Spearman's correlation values†).

R^2 and t-values for descriptors supported convergent validity. As well, high loading factors were found for most descriptors except "gnawing and itching" (Table 6), however no significant improvement in fit indices was obtained by removing the latter. The hypothesized model was modified seven times, however new fit indices values showed a poorer model fit (Table 7).

Pain aspect	χ^2/df	SRMR	RMSEA	CFI
Continuous	1.60	0.0332*	0.0576†	0.99‡
Intermittent	2.22	0.0404*	0.0780†	0.98‡
Affective	0.53	0.0044*	0.0000†	1‡
Neuropathic	1.76	0.0376*	0.0596†	0.98‡

χ^2/df=relative Chi-Square <3, SRMR= Standardized Root Mean Square Residual; value <0.08 to show a good fit*, RMSEA=Root Mean Square Error of Approximation; value <0.08 to show adequate fit†, CFI=Comparative Fit Index; value >0.95 indicated a good fit‡

Table 5: Thai SF-MPQ-2. Fit indices values for pain aspect models.

Discussion

Our study demonstrated a high internal consistency and test-retest reliability for the Thai SF-MPQ-2, as well as good concurrent, construct and convergent validity. Internal consistency for the total score as assessed by Cronbach's α coefficient was higher (0.95) than that reported for the English version (0.92) [7] and Japanese versions (0.90) [15]. Similarly, we found a higher test-retest reliability (0.99) than the Japanese (0.83) [15] and Iranian (0.94) [17] versions. Overall four-factor model analysis (hypothesized) demonstrated good construct validity. In keeping with Melzack et al's [7] original work on the English versions and other validation studies [15], we found a good correlation between Thai-SF-MPQ and Thai-SF-MPQ-2. An exception to this was the poorer correlation found between VAS and neuropathic as well as intermittent pain.

Pain Description (item)	Standardized Factor Loadings				t-value	R^2
	Continuous	Intermittent	Affective	Neuropathic		
Throbbing pain	0.66†				10.45**	0.44
Cramping pain	0.64†				9.82**	0.4
Gnawing pain	0.47				6.82**	0.22
Aching pain	0.66†				10.42**	0.44
Heavy pain	0.67†				10.60**	0.45
Tender	0.65†				10.11**	0.42
Shooting pain		0.68†			10.87**	0.46
Stabbing pain		0.60†			9.21**	0.35
Sharp pain		0.61†			9.45**	0.37
Splitting pain		0.65†			10.28**	0.42
Electrical-shock pain		0.65†			10.33**	0.43
Piercing		0.61†			9.40**	0.37
Tiring-exhausting			0.88†		16.00**	0.77
Sickening			0.90†		16.63**	0.8
Fearful			0.71†		11.66**	0.5
Punishing-cruel			0.81†		14.31**	0.66
Hot-burning pain				0.60†	9.12**	0.36
Cold-freezing pain				0.59†	8.93**	0.37
Pain caused by light touch				0.65†	10.15**	0.43
Itching				0.49	7.18**	0.24
Tingling or 'pins and needles'				0.72†	11.52**	0.52
Numbness				0.58†	8.71**	0.33

Standardized factor loading value; acceptable at value ≥ 0.5†, t-value; significant at value ≥ 1.96 (**p<0.01), R^2= Square multiple correlation; acceptable at value >0.2

Table 6: Standardized factor loading value and t-value of the overall four-factor model.

Hypothesized model	Operating	Change of fit indices
Modified#1	Remove item Gnawing pain	less χ^2/df (less construct validity)
		less factor loading (less convergent validity)
Modified#2	Remove item itching	less χ^2/df (less construct validity)
		less factor loading (less convergent validity)
Modified#3	Add error covariance between aching pain and heavy pain	less χ^2/df (less construct validity)
Modified#4	Add error covariance between Cold-freezing pain and itching	less χ^2/df (less construct validity)
Modified#5	Add error covariance between shooting pain and sharp pain	less χ^2/df (less construct validity)
Modified#6	Add error covariance between stabbing pain and sharp pain	less χ^2/df (less construct validity)
Modified#7	Add error covariance between Tiring-exhausting and Sickening	less χ^2/df (less construct validity)

Table 7: Change of fit indices after modifying hypothesized model.

All descriptors had significant t-value and acceptable R^2 value, supporting their favorable effect on convergent validity. In addition, they also had high loading effect (value >0.5) except for itching and gnawing pain. These findings echo those of Wasuwat et al. [5], suggesting that those terms may translate poorly to Thai. A language specific effect for certain descriptors has been noted in other validation studies [15,17]. However, after modifying the model as recommended by the program, there was no significant change in fit indices and therefore the affected descriptors were not modified.

Our study presents some possible limitations. Firstly, average pain scores for individual aspects (Table 3) were lower than those reported in other languages [7,15]. This may have had an effect on the variability of patient reported scores as well as the number of descriptors that were used. However, intensity scores indicated moderate pain (Table 2: VAS 6/10, PPI 2.7/5) and findings were similar to a Thai study validating the SF-MPQ, suggesting a cultural influence. Secondly, the responsiveness to change was not evaluated. Finally, patients were recruited from a tertiary pain clinic located in a major urban center, which might limit the applicability of the results to other populations.

Conclusions

The Thai SF-MPQ-2 had high reliability as well as concurrent, construct and convergent validity. It can be used as a reliable and comprehensive tool for pain assessment in Thai patients with chronic pain including both nociceptive and neuropathic pain.

Conflicts of Interest and Source of Funding

The authors have no commercial, proprietary, or financial interest in the products or companies described in this article.

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