

Reliability and internal consistency of the Thai version of Roland-Morris Disability Questionnaire and Waddell Disability Index for back pain patients

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Background : *The use of disease-specific questionnaires to assess patient progress in routine clinical practice has been recommended. Roland Morris Disability Questionnaire (RMDQ) and Waddell Disability Index (WDI) are questionnaires used for assessing disability due to low back pain (LBP) that have been proved to have high reliability and internal consistency. Based on these factors and their simple application, it was decided to develop a version to be used in Thailand.*

Objective : *To describe the process used to translate RMDQ and WDI into Thai, and to investigate the reliability and internal consistency of the Thai version of RMDQ (Thai-RMDQ) and WDI (Thai-WDI) for Thai-speaking LBP patients.*

Study Design : *Cross-sectional analytic study*

Subjects : *A sample of patients with LBP was studied for a cross-cultural adaptation of the Thai versions of the back specific questionnaires.*

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- Methods** : *The questionnaires were translated and back-translated, pretested and reviewed by a committee. Their reliability was assessed by test-retest reliability according to intraclass correlation coefficient (ICC). To examine ICC, Thai-RMDQ was tested in 22 LBP patients who completed the questionnaire on 2 occasions, 24-hours apart. Meanwhile, test-retest reliability of Thai-WDI was tested in 13 LBP patients who were interviewed by a therapist with the questionnaire on 2 occasions, 24-hours apart. Internal consistency was assessed by Cronbach's alpha. For the evaluation of internal consistency, the Thai-RMDQ and Thai-WDI were tested in 253 LBP patients who attended physiotherapy practices for treatment. Patients were divided into two groups in relation to the radiation of pain: back pain alone and back pain with radiating leg pain. Individual patient completed the Thai questionnaires during their initial visits.*
- Results** : *ICC for a one-day test-retest reliability of the Thai-RMDQ and the Thai-WDI was 0.97 ($p < 0.0001$) and 0.95 ($p < 0.0001$), respectively. Cronbach's alpha internal consistency coefficient for the Thai-RMDQ was 0.85 for the two different patient groups, while the Cronbach's alpha coefficients for the Thai-WDI were 0.86 and 0.78 for the back pain alone group and the back pain with radiating leg pain group, respectively.*
- Conclusion** : *The high levels of test-retest reliability and internal consistency of the Thai versions of the RMDQ and the WDI were found, confirming the usefulness of the questionnaires for assessing functional status of Thai-speaking patients with LBP, and thus can be recommended for routine practice and future clinical trials in Thailand.*
- Keywords** : *Back pain, Thai, Disability, Assessment, Reliability, Questionnaire.*

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- ที่มา** : มีรายงานวิจัยที่ส่งเสริมให้มีการนำแบบสอบถามที่ถูกออกแบบมา เพื่อตรวจหาปัญหาเฉพาะโรคมาใช้ในการตรวจประเมินผู้ป่วยทางคลินิก แบบสอบถามโรแลนด์-มอริส และแบบสอบถามแวดเดิล (ฉบับภาษาอังกฤษ) เป็นแบบสอบถามที่นิยมใช้สำหรับตรวจประเมินภาวะทุพพลภาพของ ผู้ป่วยปวดหลัง ซึ่งแบบสอบถามทั้งสองนี้มีค่าความแม่นยำ และค่าความสอดคล้องภายในสูง ดังนั้นจึงมีความน่าสนใจที่จะแปลและศึกษาคุณลักษณะดังกล่าวของแบบสอบถามทั้งสองในฉบับภาษาไทย
- วัตถุประสงค์** : เพื่อบรรยายกระบวนการในการแปลแบบสอบถามโรแลนด์-มอริส และแบบสอบถามแวดเดิลเป็นภาษาไทย และเพื่อศึกษาความแม่นยำและความสอดคล้องภายในของแบบสอบถามทั้งสอง
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- วิธีการทดลอง** : ทำการแปลแบบสอบถามจากต้นฉบับภาษาอังกฤษเป็นภาษาไทย และแปลย้อนกลับจากฉบับภาษาไทยที่แปลได้เป็นภาษาอังกฤษอีกครั้ง แล้วเปรียบเทียบกับต้นฉบับภาษาอังกฤษเดิม เพื่อให้สามารถค้นหาและ ความหมายเดิมให้ได้มากที่สุด จากนั้นหาค่าความแม่นยำโดยใช้สถิติ *intra-class correlation coefficient (ICC)* การศึกษาแบบสอบถามโรแลนด์-มอริสในผู้ป่วย 22 ราย ใช้วิธีการให้ผู้ป่วยอ่านและตอบแบบสอบถามด้วยตนเอง ส่วนการศึกษาแบบสอบถามแวดเดิลในผู้ป่วย 13 ราย ใช้วิธีการสัมภาษณ์ผู้ป่วยโดยนักกายภาพบำบัด ผู้ป่วยทุกรายถูกทดสอบด้วยแบบสอบถาม 2 โอกาส โดยแต่ละโอกาสห่างกัน 24 ชั่วโมง ส่วนการหาค่าความสอดคล้องภายในใช้สถิติ *Cronbach's alpha* โดยแบ่งผู้ป่วยปวดหลังที่เพิ่งมารับการรักษาทางกายภาพบำบัดในโรงพยาบาลเป็นครั้งแรก จำนวน 253 ราย ออกเป็นสองกลุ่ม ตามความรุนแรงของอาการ ได้แก่ กลุ่มที่ปวดหลังแต่ไม่มีอาการปวดร้าวลงขา และกลุ่มที่ปวดหลังและปวดร้าวลงขาพร้อมด้วย หลังจากนั้นให้ผู้ป่วยทั้ง 253 ราย ตอบแบบสอบถามฉบับภาษาไทยทั้งสองชุดก่อนเริ่มต้นการรักษา

- ผลการศึกษา** : ค่าความแม่นยำจากการวัดสองครั้งโดยมีช่วงห่างนานหนึ่งวัน สำหรับแบบสอบถามโรแลนด์-มอริสฉบับภาษาไทย มีค่า ICC 0.97 ($p < 0.0001$) และสำหรับแบบสอบถามเวดเดลฉบับภาษาไทย มีค่า ICC 0.95 ($p < 0.0001$) ส่วนการศึกษาความสอดคล้องภายในพบว่า ค่าสัมประสิทธิ์ Cronbach's alpha ของแบบสอบถามโรแลนด์-มอริส มีค่า 0.85 เมื่อทดสอบในผู้ป่วยปวดหลังทั้งสองกลุ่ม ส่วนค่าสัมประสิทธิ์ Cronbach's alpha สำหรับแบบสอบถามเวดเดล มีค่า 0.86 เมื่อทดสอบในกลุ่มผู้ป่วยที่ปวดหลังอย่างเดียว และมีค่า 0.78 เมื่อทดสอบในกลุ่มที่มีอาการปวดหลังและปวดร้าวลงขาาร่วมด้วย
- วิจารณ์และสรุปผล** : ค่าความแม่นยำและความสอดคล้องภายในของแบบสอบถามโรแลนด์-มอริส และแบบสอบถามเวดเดล ฉบับภาษาไทย มีค่าสูงเช่นเดียวกับต้นฉบับภาษาอังกฤษ ซึ่งช่วยสนับสนุนว่าแบบสอบถามทั้งสองชุดนี้เหมาะที่จะถูกนำมาใช้ในการตรวจประเมินภาวะทุพพลภาพของผู้ป่วยปวดหลังชาวไทย ดังนั้นจึงควรแนะนำให้บุคลากรทางการแพทย์รู้จักและนำแบบสอบถามนี้ไปใช้ในงานทางคลินิกหรืองานวิจัยต่อไป
- คำสำคัญ** : ปวดหลัง, คนไทย, ภาวะทุพพลภาพ, ประเมินผล, ความแม่นยำ, แบบสอบถาม

Clinical studies of LBP vary widely, producing a number of measures to assess the outcomes of the care.⁽¹⁾ Conventionally, clinical assessment methods of LBP include the evaluation of patients' symptoms and signs, but so far there is no measures for assessing functional disability.⁽²⁾ In the literature, many conventional impairment measures used by therapists have neither been demonstrated to be reliable nor valid.⁽³⁾ The impairment measures frequently showed poor correlation with the outcomes relevant to patients and to society, such as symptom relief, daily functioning and work status.⁽⁴⁾

In contrast, it is now well recognized that patients' perspectives are essential both in making medical decisions and judging the results of treatment.⁽⁵⁾ Numerous patient-based outcome measures of physical function and health have been devised for LBP, both in practice and research. Advantages of patient-based outcome measures include safety, reliability, validity, provision of a normative database, and cost (time, money).⁽⁶⁾ More importantly, the utilization of these measures in clinical settings will assist clinicians in their screening for functional problems, monitoring a change in a patient's status over time, predicting prognosis, and evaluating treatment effects.⁽⁷⁾

Back-specific questionnaires are well recognized as important patient-based outcome measures because they can be used to assess the severity of functional disability of LBP patients.⁽⁸⁾ To date, there are numerous back-specific questionnaires available to researchers and clinicians, for example, Oswestry Disability Questionnaire (ODQ)⁽⁹⁾, Roland-Morris Disability Questionnaire (RMDQ)⁽¹⁰⁾, and Waddell Disability Index (WDI).⁽¹¹⁾ Beurskens et al.⁽⁷⁾

have indicated that the reliability, validity and responsiveness of the RMDQ, OQD, and WDI questionnaires seemed satisfactory in assessing the symptoms and disability in LBP patients. All measures are simple and easy to use and they can be self-administered; however, the appropriateness of these measures depends on the types of patients studied, the specific objectives and the preferences of the investigator.⁽¹²⁾

Based on a cross-sectional survey of physiotherapy management of LBP in Thailand, a lack relevant use, standardized and comparable outcome measure by Thai therapists was found.⁽¹³⁾ This would inhibit the comparison of results between studies, and make it difficult to evaluate treatment interventions and their cost-effectiveness. The use of the reliable and valid outcome measures for assessing clinical outcome of LBP management in Thai practices is needed.

In the literature, there are no published data on the psychometric properties of a Thai version of the self-report disability questionnaires for LBP. Additionally, it has been said that a direct translation of a questionnaire from one language to another does not permit its use in clinical trials because of language and cultural differences. The translation, therefore, must be validated to achieve an equivalent questionnaire and to allow comparability of data.⁽¹⁴⁾ Accordingly, it was decided to carry out a study of the cross-cultural adaptation of a Thai version of Roland-Morris Disability Questionnaire (RMDQ) and Waddell Disability Index (WDI).

In the current study, RMDQ was selected because its both original⁽¹⁰⁾ and various non-English versions i.e. German⁽¹⁴⁾, Spanish⁽¹⁵⁾, Brazilian⁽¹⁶⁾, and Swedish⁽¹⁷⁾ have been shown to be acceptably

reliable and valid outcome measures for assessing functional status of patients with LBP. Similarly, WDI was selected because it was shown to have acceptable test-retest reliability, inter-observer reliability, internal consistency, and construct validity.⁽¹¹⁾ WDI can be applied to patients as an interview or self-report evaluation.⁽¹⁸⁾ From a review of the literature, no published study of WDI in other languages has been reported. So far, the current study is the first attempt in which the questionnaire is translated and adapted for use with non-English speaking patients.

The main purpose of this study was to describe the process used to translate and adapt a Thai version of RMDQ and WDI, and to investigate the test-retest reliability and internal consistency of the two questionnaires when used with Thai patients. The final version used with Thai populations is demonstrated in Appendix.

Methods

Translation and adaptation

It is now recognized that if measures are to be used cross-culturally, they must not only be translated well linguistically, but also must be culturally adapted to maintain the content validity of the instrument at a conceptual level across the cultural borders.^(19,20) It is strongly recommended that a systematic approach, called a **cross-cultural adaptation**, which includes translation and cultural adaptation issues, is warranted in the process of preparing a questionnaire for use in another setting.^(19,20)

The current study applied the recommendations for the translation and cross-cultural

adaptation process made by Guillemin et al.⁽¹⁹⁾ and Guillemin.⁽²¹⁾ The present adaptation process included 4 stages: 1) translations, 2) back-translations, 3) committee review of the translations and back-translations, and 4) pre - testing of the equivalence in source and final version, as described below.

Stage I: initial translation

Initially, three translations from English to Thai were performed by three independent translators whose mother tongue was Thai, allowing detection of errors and different interpretations of items with ambiguous meanings in the English questionnaire. The three translators included the main researcher who was aware of the process purpose and the concept being examined in the questionnaires, a Thai physiotherapist who considered the words used in questionnaires from a therapist perspective, and a native translator who was aware of the language appropriate to the general Thai population. The three translations were then compared and their discrepancies in choices of wording were identified and resolved in a discussion between the translators. This subsequently led to the production of the final consensual version in Thai language.

Stage II: Back translation

The final consensual version was then given to two commercial translators (all native English speakers) who did not have prior knowledge of RMDQ and WDI, and were asked to translate the Thai version back to English. This was a process of verification, to make sure that the Thai version was reflecting the same item content as the original. Back-translators, lacking awareness of the intended purpose and

medical background, were free of biases and expectation and were supposed to elicit unexpected meaning of the items in the translated (Thai) version.⁽¹⁹⁾ The two new (English) versions obtained from this stage were compared to each other and used to reconstruct a consensual English version from the back-translations.

Stage III: Expert committee review

To produce a pre-final version based on the various translations and back-translations, an expert committee was organized, consisting of a senior academic physiotherapist, a senior clinical physiotherapist, and the principal researcher. The committee consolidated the original (English) RMDQ and WDI, the consensual Thai version (from Stage I), and the consensual back-translation version (from Stage II) to develop the pre-final version of Thai-RMDQ and the Thai-WDI questionnaires.

Stage IV: Test of the pre-final version

The final stage in the current adaptation process was the pretest. The pre-final version of the two questionnaires were pretested by 15 LBP patients who consecutively attended physiotherapy at the Metropolitan Electricity Authority Hospital in Bangkok. Each patient was asked to complete the RMDQ and to be interviewed by a therapist using the WDI. They were asked to provide comments on the questionnaires and identify any words or meanings of the questions that were difficult to understand. The therapists who administered the test were also asked to note any problems that occurred during the pretest. The test consequently showed that the wording and content of the pre-final questionnaires were easy to

understand and unambiguous, and the questionnaires were completed within approximately 5 minutes without any requirement for therapist's aid in completion of the questionnaire. Moreover, no questions in both questionnaires were left unanswered, therefore this was suggestive that no further revisions were necessary. The two questionnaires were also tested with three 12-year-old children to ensure that a person with limited educational ability could understand the version. On the basis of this pre-test, it allowed the pre-final version of the questionnaires to be accepted as the final version in the Thai language.

Subject selection

The current study was conducted at 50 hospitals located across Bangkok, and the central and northeastern parts of Thailand. Participants were recruited from patients who were referred to physiotherapy departments. Inclusion criteria for patients in this study were LBP patients with a duration of current episode more than 6 weeks, who were between 18-65 years of ages, with no signs of trauma, no malignant, infectious or systemic diseases, and no history of back surgery, as well as, ability to understand written and spoken Thai. After giving their verbal informed consent, each patient was asked to provide demographic and background data on the questionnaire. For test-retest reliability, 22 LBP patients were asked to complete the Thai-RMDQ questionnaire on 2 occasions, 24-hours apart, and another 13 patients were interviewed by one therapist using Thai-WDI on 2 occasions, 24-hour apart .

The study of internal consistency of the two questionnaires was carried out in conjunction with the main study of the longitudinal prospective survey of

LBP management in Thailand.⁽¹³⁾ At the beginning of the survey, 253 patients who enrolled in the survey were classified into two different groups in relation to the severity of their back pain symptoms, that is, with and without radiation of leg pain (group I: back pain alone (n=78, 30.8 %); group II: back pain with leg pain (n=175, 69.2 %). According to the perceptions that patient who had radiation would have more severe pathological status and be substantially more disabled than those who did not have leg pain, the internal consistency of the questionnaire then was separately assessed between the two different groups. Patients in both groups were asked to complete the Thai RMDQ. Meanwhile, each patient was also interviewed by a treating therapist who used the Thai-WDI to assess the patient's disability. Table 1 and 3 summarize the characteristics of patients participating in the test-retest reliability study and the internal consistency study.

Instrument application

RMDQ is a self-administered questionnaire consisting of 24 items, chosen from Sickness Impact Profile,⁽¹⁰⁾ describing the effect of a patient's back problem on various dimensions of activities of daily living (ADL), for example, housework, mobility, dressing, and getting help. Each LBP patient was instructed to check each statement that described his or her clinical condition at the time the questionnaire was completed. Items were scored one point if checked and zero if unchecked. Thus, the scores could vary from 0 (no perceived disability) to 24 (maximum disability).

WDI consisted of nine activities which were thought to be restricted by LBP.⁽¹¹⁾ These activities were lifting, sitting, standing, walking, traveling, sleeping, social activity, sexual activity and putting on footwear. The patient was informed by the treating therapist to respond to each item in terms of restriction

Table 1. Background characteristics of LBP patients in the test-retest reliability study of the Thai-RMDQ and Thai-WDI.

Characteristics	Test-retest reliability study			
	RMDQ (n=22)		WDI (n=13)	
	n	(%)	n	(%)
Age (yr)*	36.5, 20		60, 10.5	
Gender (n,%)	Male	11 (50)	5	(38.5)
	Female	11 (50)	8	(61.5)
Education	Primary school	7 (31.8)	7	(53.8)
	Secondary school	6 (27.3)	3	(23.1)
	Higher education	9 (40.9)	3	(23.1)
Duration of current episode	< 6 weeks	0	0	
	6-12 weeks	8 (36.4)	3	(23.1)
	3-6 months	5 (22.7)	5	(38.5)
	> 6 months	9 (40.9)	5	(38.5)

* Median, Interquartile Range (IQR)

since the onset of the LBP episode, and because of the LBP. The items of the questionnaire were answered "yes" or "no" and added together to yield an overall measure of disability, ranging from 0 (no disability) to 9 (maximum disability).

Data analysis

Statistical analyses were performed by the Statistical Package for Social Sciences (SPSS Release 8.0 for Windows).⁽²²⁾ Percentages, means and standard deviations were calculated to describe the demographic data of the patients. The reliability of the Thai questionnaires was examined as described below. In all analyses, an alpha level of $P < 0.05$ was used as a criterion for statistical significance.

Test-retest reliability

Test-retest reliability evaluates whether an instrument yields the same results on repeated measures over time if the patient's condition is unchanged.⁽³⁾ In the current study, a time interval of 24 hours was used. During the 24-hour interval, none of the patients had any intervention or treatment. The test-retest reliability was calculated by the intraclass correlation coefficient (ICC). ICC of 0.75 indicates good reliability and is commonly cited as a minimal standard of reliability coefficient for studies of patients in clinical trials,⁽²³⁾ however, reliability coefficients of 0.90 have been advocated to ensure valid interpretation of findings.⁽²⁴⁾

Internal consistency

Internal consistency is a reflection of the correlation among the items on a scale and the correlation of each individual item with the total score.

This index indicates how well overall the items on a scale are measuring the same characteristic.⁽²⁴⁾ In this study, internal consistency was measured by calculating Cronbach's alpha. Cronbach's alpha is based on the average correlation of items within a questionnaire.⁽²⁵⁾ For Cronbach's alpha to be acceptable, the coefficient should be above 0.70 but not higher than 0.90.⁽²⁶⁾

Results

Table 1 summarizes the patients' characteristics in the test-retest reliability study. For the group of 22 patients participating in the test-retest reliability study of RMDQ, the median age was 36.5 years. The number of male and female patients was equal, with 11 patients in each group. All subjects were literate with 7, 6, and 9 completing primary school, secondary school, and higher education, respectively. In relation to the duration of LBP, 14 patients (63.6 %) reported that they had a current episode lasting more than 12 weeks, whereas the rest (36.4 %) had LBP between 6-12 weeks. All 22 patients completed the questionnaire twice, at baseline and after 24 hours. The patients were generally able to fill in the questionnaires without help. At the initial assessment, the mean RMDQ score was 10.41 (\pm SD=5.33), and on the second assessment, the mean RMDQ score was 9.73 (\pm SD=5.45) (Table 2). The mean RMDQ different score between the first and second assessments was 0.68 (\pm SD=1.67; 95 % confidence interval [CI] of the mean different score, -0.059 - 1.42). Intraclass correlation coefficient (ICC) was computed to assess test-retest reliability. Table 2 shows that the ICC for the one-day test-retest reliability of RMDQ was high (ICC=0.97, $P < 0.0001$).

Table 2. Test-retest reliability study for the Thai-RMDQ and Thai-WDI.

Disability score	Mean (\pm SD)	Test-retest Reliability (ICC)
RMDQ (n=22)		0.97*
Initial assessment	10.41 (\pm 5.33)	
Final assessment	9.73 (\pm 5.45)	
Difference score	0.68 (\pm 1.67)	
95 % CI of the difference	-0.059 – 1.42	
WDI (n=13)		0.95*
Initial assessment	3.46 (\pm 2.57)	
Final assessment	3.15 (\pm 2.27)	
Difference score	0.31 (\pm 1.03)	
95 % CI of the difference	-0.93 – 0.32	

* *P* value < 0.0001

Data in Table 1 demonstrated that the majority of the patients (n=13) participating in the test-retest reliability of the WDI were females (61.5 %), with the median age of 60 years. Approximately half of these patients (n=7, 53.8 %) completed primary school. The majority of the patients reported had LBP that lasted longer than 3 months (n=10, 77 %). Each patient was interviewed by a physiotherapist with WDI initially and 24 hours later. All patients generally understood the questions and were able to answer all the questions. At the first assessment, the mean WDI score was 3.46 (\pm SD=2.57), and on the second assessment, the mean WDI score was 3.15 (\pm SD=2.27). The mean WDI different score was 0.31 (\pm SD=1.03; 95 % CI of the difference, -0.93 - 0.32). The results in Table 2 showed that the ICC for a one-day test-retest reliability of the Thai-WDI was 0.95 (*P*<0.0001).

With regard to the internal consistency of the two questionnaires, data from two LBP patient groups were used (Table 3). 78 patients in the **back pain alone** group (group I) included 40 females (51.3 %) and 38 males (48.7 %), with a mean age of 41.7 (\pm SD=15.4) years (Table 3). 70.5 % of the patients in this group reported that they suffered from LBP less than 6 weeks (n=55), and had average mean RMDQ score and mean WDI score of 10.4 (SD= \pm 5.18), and 3.63 (SD= \pm 2.52), respectively. While 175 patients in the **back pain with leg pain** group (group II) consisted 98 females (56 %) and 77 males (44.1 %), with a mean age of 44.4 (\pm SD=13.2) years (Table 3). Fewer number of patients in Group II, compare to group I, had current LBP less than 6 weeks (53.1 %, n=93). As expected, patients in the **back pain with leg pain** group had greater average mean RMDQ score and mean WDI score than those in the **back pain alone** group (RMDQ score,

Table 3. Internal consistency coefficient study of the Thai-RMDQ and Thai-WDI.

Variables	Group I <i>Back pain alone</i> (n=78)	Group II <i>Back pain with leg pain</i> (n=175)
Patient background		
Age (yr), Mean (\pm SD)	41.7 (\pm 15.4)	44.4 (\pm 13.2)
Gender (n,%)		
Male	38 (48.7)	77 (44.1)
Female	40 (51.3)	98 (56.0)
Having previous episodes of LBP (n,%)	37 (47.5)	114 (65.1)
Duration of current episode (n,%)		
< 6 weeks	55 (70.5)	93 (53.1)
6-12 weeks	5 (6.4)	32 (18.3)
3-6 months	6 (7.7)	23 (13.1)
> 6 months	12 (15.4)	27 (15.4)
Mean RMDQ score (\pm SD)	10.4 (\pm 5.18)	12.87 (\pm 5.29)
Mean WDI score (\pm SD)	3.63 (\pm 2.52)	4.74 (\pm 2.41)
Internal consistency study		
Thai-RMDQ		
(Cronbach's Alpha coefficient)	0.8491	0.8526
Thai-WDI		
(Cronbach's Alpha coefficient)	0.8625	0.7837

12.87 \pm 5.29; WDI score, 4.74 \pm 2.41).

Cronbach's alpha coefficient was used to assess the internal consistency of the questionnaire. Table 3 demonstrates that the Cronbach's alpha internal consistency coefficients for the Thai-RMDQ were 0.85 when assessed with both patient groups, while the internal consistency coefficients for the Thai-WDI were 0.86 and 0.78 when assessed with patients having back pain without leg pain and those with back pain and leg pain, respectively. The high values of Cronbach's alpha, and the minimal differences between the two different patient groups, emphasised the high internal consistency of the two questionnaires.

Discussion

The results of the current study show that it is possible to translate and culturally adapt a functional status questionnaire into Thai without modification of the structure and content of the questionnaire. An important problem in the application of a questionnaire is the variation in lifestyle and culture amongst countries. It was important to test the use of the questionnaire in patients with low levels of education because if they could understand the questionnaire, then the comprehensibility of the questionnaire would be confirmed.⁽¹⁵⁾ In spite of being tested in three 12-year-old children and in

subjects with low educational levels (7 out of 22 patients for RMDQ and 7 out of 13 for WDI), no aid in interpretation was required. This indicates adequate comprehensibility of the Thai-RMDQ and the Thai-WDI.

In the analysis for the reliability of the Thai-RMDQ, a one-day test-retest reliability between the two sets of scores was very good, with an ICC of 0.97, and the internal consistency of the questionnaire was high, with a Cronbach's alpha coefficient of 0.85. These high values are in line with other translated versions regarding the reliability of RMDQ. Previous studies of other versions showed that the test-retest reliability of RMDQ varied from 0.72 to 0.97 depending upon the test-retest interval and patient groups;^(8,10,14-17,27) and the internal consistency coefficients varied from 0.81-0.93.^(8,14,15,28)

As mentioned above, no information regarding the use of WDI in other languages was found. Therefore, in the current study the measurement properties of the Thai-WDI were compared only with those of the English version. The results show that the reliability of the Thai-WDI, as indicated by test-retest reliability and internal consistency, proved to be high, suggesting that the Thai-WDI is a reliable measure. An ICC of 0.95 for a one-day test-retest reliability was established for the Thai-WDI. Waddell and Main⁽¹¹⁾ did not report the test-retest reliability of the WDI for their LBP patients; however, Davidson and Keating⁽²⁹⁾ recently reported an ICC of 0.74-0.79 for the English version. It was not surprising that their value was lower than that of the Thai version due to the fact that they administered two measurements six weeks apart, in which the spontaneous recovery might have occurred in their patients. Furthermore,

the current study showed high internal consistency of the Thai-WDI with Cronbach's alpha of 0.78-0.86; this is also in line with the original version. In the English version, factor analysis confirmed that those nine activities included in WDI questionnaire were all interrelated and combined together to yield a good overall measure of disability, with internal consistency of 0.76.⁽¹¹⁾

The Thai-RMDQ is similar to the Thai-WDI regarding the simplicity and easiness of use of both questionnaires. Obviously, both questionnaires sampled activities that are commonly affected by LBP and are designed for measuring the levels of disability typically encountered amongst LBP patients. Both RMDQ and WDI are easy to understand, administer, score and interpret, so that the application of the two disability questionnaires need not disrupt a normal practice routine. In the current study, the results suggest that both Thai questionnaires can be completed within five minutes; and thus they do not take up a significant amount of staff time while providing valid and useful information to assess outcomes.

The differences between the Thai-RMDQ and the Thai-WDI are directly related to the questionnaire contents and mode of administration of the questionnaires. RMDQ does not have any items about lifting, whereas WDI does not have items about housework or self-help. RMDQ has a few items on patient's psychological status, i.e. moods and appetite, whereas WDI has one item pertaining to sex life, although it tends to be omitted by a significant proportion of patients.

Although time for completion was similar, the mode of administration differed between the two

questionnaires. In the current study, the Thai-RMDQ was used as a self-report measure whereas the Thai-WDI was used as an interview-based measure. In general, self-report questionnaires are more consistent and reliable than interviews because they present the questions in exactly the same way to every patient, every time.⁽¹⁸⁾ Although both modes of administration (self-report and interview) have the potential for biased reports from the patients, the use of a self-report format assist therapists to control interviewer bias. Accordingly, if the Thai-WDI is used widely, a further study of it as a self-report questionnaire is necessary.

According to the similarities and differences between RMDQ and WDI, various factors need to be considered in the selection of these functional disability measures for use in either routine practices or clinical studies. These have been identified as measurement properties of the questionnaire, suitability for purpose of use (e.g. quality assessment, clinical efficacy), appropriateness for patient population (e.g. aged, illiteracy), and setting (e.g. primary care or specialty care, telephone or written).^(5,12,29-30) Davidson and Keating⁽²⁹⁾ suggested that if a clinician sees few patients with LBP problems and fast processing of results is the primary consideration, then WDI may be appropriate. On the contrary, RMDQ is more practical an instrument for most clinical use and research,⁽¹⁸⁾ and has been use worldwide ; therefore, it is more likely to be used in LBP studies that aim to compare the results with those published in the international literature. However, other important psychometric properties of the Thai questionnaires have not yet been reported in the current study, therefore, further research is needed to

show their validity and responsiveness.

In conclusion, the results of the current study show that the Thai version of RMDQ and WDI retained the high levels of reliability of the original version when used with Thai-speaking LBP patients. These findings suggested that it is possible to translate a functional status questionnaire into Thai rather than to develop a new scale. The use of reliable and practical subjective questionnaire will facilitate standardized clinical assessment, and thus help promoting better quality of care. Furthermore, the use of the same questionnaires in different countries will enhance the comparability of the results in LBP research. Therefore, the RMDQ and the WDI should be recommended for use in both clinical settings and LBP research studies in Thailand.

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References

1. Bombardier C, Hayden J, Beaton DE. Minimal clinically important difference. Low back pain: outcome measures. *J Rheumatol* 2001 Feb; 28(2): 431 - 8
2. Jette AM, Smith K, Haley SM, Davis KD. Physical therapy episodes of care for patients with low back pain. *Phys Ther* 1994 Feb; 74(2): 101 - 15
3. Beattie P, Maher C. The role of functional status questionnaire for low back pain. *Aust J Physiother* 1997; 43(1): 29 - 38
4. Deyo RA. Measuring the functional status of

- patients with low back pain. *Arch Phys Med Rehabil* 1988 Dec; 69(12): 1044 - 53
5. Bombardier C. Outcome assessments in the evaluation of treatment of spinal disorders. *Spine* 2000 Dec; 25(24): 3100 - 3
 6. Mooney V, Matheson LN. Objective Measurement of Soft Tissue Injury: Feasibility Study Examiner's Manual. California: Industrial Medical Council, 1994
 7. Beurskens AJ, de Vet HC, KÖke AJ, van der Heijden GJ, Knipschild PG. Measuring the functional status of patients with low back pain. Assessment of the quality of four disease-specific questionnaires. *Spine* 1995 May 1; 20(9):1017 - 28
 8. Kopec JA, Esdaile JM, Abrabamowicz M, Abenhaim L, Wood-Dauphinee S, Lamping D, Williams J. The Quebec Back Pain Disability Scale: Measurement properties. *Spine* 1995 Feb 1; 20(3): 341 - 52
 9. Fairbank JC, Couper J, Davies JB, O'Brien JP. The Oswestry low back pain disability questionnaire. *Physiotherapy* 1980 Aug;66(8): 271 - 3
 10. Roland M, Morris R. A study of the natural history of back pain. Part 1: Development of a reliable and sensitive measure of disability of low back pain. *Spine* 1983 Mar; 8(2):141 - 4
 11. Waddell G, Main CJ. Assessment of severity in low back disorders. *Spine* 1984 Mar; 9(2): 204 - 8
 12. Kopec JA. Measuring functional outcomes in persons with back pain: a review of back-specific questionnaires. *Spine* 2000 Dec; 25(24): 3110 - 4
 13. Pensri P. Current Physiotherapy Management of Low Back Pain in Thailand [PhD thesis]. Northern Ireland: University of Ulster, 2002
 14. Wiesinger GF, Nuhr M, Quittan M, Ebenbichler G, WÖfl G, Fialka-Moser V. Cross-cultural adaptation of the Roland-Morris questionnaire for German-speaking patients with low back pain. *Spine* 1999 Jun 1; 24(11): 1099 - 103
 15. Kovacs FM, Liobera J, Gil der real MT, Abaira V, Gestoso M, Fernandez C, and the Kovacs-Atencion Primaria Group. Validation of the Spanish version of the Roland-Morris Questionnaire. *Spine* 2002 Mar 1;27(5): 538 - 42
 16. Nusbaum L, Natour J, Ferraz MB, Goldenberg J. Translation, adaptation and validation of the Roland-Morris questionnaire – Brazil Roland-Morris. *Braz J Med Biol Res* 2001 Feb;34(2): 203 - 10
 17. Johansson E, Lindberg P. Subacute and chronic low back pain. Reliability and validity of a Swedish version of the Roland and Morris Disability Questionnaire. *Scand J Rehab Med* 1998 Sep; 30(3):139 - 43
 18. Waddell G. *The Back Pain Revolution*. London: Churchill Living Stone. 1998
 19. Guillemin F, Bombardire C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. *J Clin Epidemiol* 1993 Dec; 46(12):1417 - 32
 20. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measure.

- Spine 2000 Dec 15; 25(24): 3186 - 91
21. Guillemin F. Cross-cultural adaptation and validation of health status measures. *Scand J Rheumatol.* 1995 Feb; 24(2): 61 - 3
22. SPSS Inc. SPSS Base 8.0 User's Guide, Chicago: SPSS Inc, 1998
23. Fitzpatrick R, Davey C, Buxton MJ, Jones DR. Evaluating patient-based outcome measures for use in clinical trials. *Health Technol Assess* 1998;2(14):i - iv,1 - 74
24. Portney LG, Watkins MP. *Foundations of Clinical Research: Applications to Practice.* 2nd ed. New Sersey: Prentice-Hall, 2000: 557 - 86
25. Leung AS, Lam T, Hedley AJ, Twomey LT. Use of a subjective health measure on Chinese low back pain patients in Hong Kong. *Spine* 1999 May 15; 24(10): 961 - 966
26. Streiner DL, Norman GR. *Health Measurement Scales: A Practical Guide to Their Development and Use,* 2nd ed. New York: Oxford University Press, 1995
27. Jensen MP, Strom SE, Turner J, Romano JM. Validity of the Sickness Impact Profile Roland Scale as a measure of dysfunction in chronic pain patients. *Pain* 1992 Aug; 50(2):157 - 62
28. Hsieh CJ, Phillips RB, Adams, AH, Pope MH. Functional outcomes of low back pain: comparison of four treatment groups in a randomized controlled trial. *J Manipulative Physiol Ther* 1992 Jan 15(1): 4 - 9
29. Davidson M, Keating JL. A comparison of five low back disability questionnaires: reliability and responsiveness. *Phys Ther* 2002 Jan; 82(1): 8 - 24
30. Deyo RA, Andersson G, Bombardier C, Cherkin DC, Keller RB, Lee CK, Liang MH, Lipscomb B, Shekelle P, Spratt KF, et al. Outcome measures for studying patients with low back pain. *Spine* 1994 Sep 15;19(18 Suppl): 2032S - 6S