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Original research article

Validity and Reliability of Thai Translation of the Multidimensional Dyspnea Profile

Thiti Sricharoenchai[1,*], Noppawan Charususin[2], Kritti Tirakitpanich[3]

[1]*Division of Pulmonary and Critical Care Medicine, Department of Medicine, Faculty of Medicine, Thammasat University, Pathum Thani 12120, Thailand*
[2]*Department of Physical Therapy, Faculty of Allied Health Sciences, Thammasat University, Pathum Thani 12120, Thailand*
[3]*Department of Medicine, Faculty of Medicine, Thammasat University, Pathum Thani 12120, Thailand*

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ABSTRACT

Dyspnea is a common symptom of various organ abnormalities. The Multidimensional Dyspnea Profile (MDP) correctly assesses the characteristics and emotions/feelings of dyspnea. However, no Thai language version is available. The objectives of this study were to translate the MDP into Thai and assess its validity and reliability. The MDP was translated into Thai and culturally modified according to standard guidelines. Thai dyspneic patients ≥18 years old at the Outpatient Department of Medicine, Thammasat University Hospital, from June to August 2020, were recruited for a cross-sectional, longitudinal study for cognitive interview of translation and assessment of content/convergent validity, internal consistency, and test-retest reliability (1st visit, 1-3 hours and 1-4 weeks later). MDP-Thai had perfect content validity (Index of Item-Objective Congruence of 1.00 for all items) in all patients. The patient population was made up of 35 patients, 17 males (48.6%) and 18 females (51.4%), with a mean age±SD of 64.6±14.6 years. Dyspnea was moderate, persistent, mostly presented as air hunger, and occurred with exertion. Most were respiratory patients. Convergent validity was shown by correlation between MDP-Thai A1 and modified Medical Research Council scale, Thai version (r(95%CI) of 0.46 (0.02-0.91), p=0.043; and 0.54 (0.07-1.02), p=0.026 for univariable and multivariable linear regression analyses). MDP-Thai had high and moderate internal consistency for items of dyspneic characteristics and emotion (Cronbach's alpha coefficients of 0.83-0.88 and 0.64-0.74). Test-retest reliability across three MDP interviews, ranged from marginally moderate to good for dyspneic characters/intensities and emotions/feelings (Intraclass Correlation Coefficients of 0.43–0.73, p<0.001 and 0.46-0.89, p<0.001). In conclusion, MDP-Thai has excellent content validity, existing convergent validity, fair to good internal consistency, and moderate test-retest reliability.

***Corresponding author:** thiti_x@tu.ac.th

Keywords: Multidimensional Dyspnea Profile; Respiratory; Test-retest reliability; Thai translation; Validity

1. Introduction

Dyspnea is the abnormal sensation of breathing, e.g., breathing discomfort, difficulty in breathing, or excessively shallow breathing. Dyspnea has multiple degrees of intensity and interacts with physical, psychological, social and environmental factors [1]; thus, observation of symptoms and signs only may be insufficient to evaluate patients holistically. Dyspnea is common and potentially caused by various etiologies, e.g., hypercapnia or hypoxemia, cardiorespiratory diseases, hematologic diseases, neuromuscular diseases, obesity, deconditioning, or psychological diseases. Given that dyspnea has both concrete (e.g., tachypnea, heavy or forceful breathing) and abstract (e.g., emotions or feelings) components, the latter cannot be clearly expressed by verbal or body language so easily. Most instruments for dyspnea evaluation mainly quantify dyspnea intensity, while some grade dyspnea intensity by particular activities, e.g., talking, dressing and walking. Examples of such instruments include modified Medical Research Council dyspnea scale (mMRC) [2], Visual Analogue Scale (VAS) [3], University of Cincinnati Dyspnea Questionnaire (UCDQ) [4], Borg rating of perceived exertion scale [5], Baseline Dyspnea Index (BDI), and Transition Dyspnea Index (TDI) [6]. These instruments do measure the intensity of dyspnea accurately, but they do not adequately measure the other properties of dyspnea, such as the quality of dyspnea or the psychological or emotional effects of dyspnea. However, the Multidimensional Dyspnea Profile (MDP) can explore dyspnea in several aspects, including the intensity, characteristics of dyspnea and emotions from dyspnea [7]. As a result, the MDP may be able to improve the evaluation of dyspnea, in terms of accuracy and comprehensiveness. The MDP has been translated into multiple languages, e.g., Dutch [8], French [9], German [10], Norwegian [11], Swedish [12, 13], Portuguese [14], Turkish [15], Danish [16] and Japanese [17]. The MDP in several languages has been verified in terms of validity and reliability for evaluating dyspnea in several aspects [8, 13-15]. Nevertheless, the MDP has not yet been translated into Thai. The objectives of this study were to translate the MDP into Thai, and to determine the validity and reliability of this new Thai version of the MDP (MDP- Thai). The MDP-Thai is intended to be a comprehensive and accurate instrument for assessment of dyspnea in Thai patients.

2. Materials and Methods

2.1 Translation and Cross-cultural adaptation of MDP

Translation of the MDP into Thai and cross-cultural adaptation were permitted by the developer, with the goal of maintaining the same concepts as the original English version. The process was performed according to the Linguistic Validation Guidance of the MDP [18], as follows:

Step 1. Forward translation. This was an independent translation of the original English version of the MDP into Thai, by two bilingual translators who understand both Thai and English well; one had a medical background (a physician) and the other had a language studies background (a linguist) to minimize information bias. These two Thai translations of the MDP from the first and second translators were designated as Forward translation A and B, respectively.

Step 2. Synthesis of translation. Forward translations A and B were compared in terms of clarity and appropriateness of questions and text. The investigators discussed with both translators to reconcile differences in translation, to obtain the synthesized MDP-Thai version 1.

Step 3. Backward translation. The MDP-Thai version 1 was translated back into

English by a third translator. This translation was then checked to confirm the content was correct and consistent with the original English version. The backward bilingual translator did not see the original MDP.

Step 4. Review and compare the original English MDP and the English back-translated MDP. Five experts in the respiratory field (two pulmonologists, two chest physical therapists and one respiratory nurse) reviewed the correctness in terms of translation, comprehension and accuracy of content of the latter, and modified the text before sending it back to the developers. The developers considered and scrutinized over whether the content of the English backtranslation version was sufficiently similar to the original. Then the investigators discussed with the developers and amended the MDP to reach a consensus for editing the English backtranslation version, in order to produce the MDP-Thai version 2.

Step 5. Implementation of the MDP. The investigators adopted the MDP-Thai version 2 (prefinal version) for five patients with dyspnea. The comments and suggestions of patients regarding the perception of each item were taken into account for modification and refinement of the MDP-Thai version 2 to obtain MDP-Thai version 3.

Step 6. Report of the MDP cross-cultural translation. The developers checked and approved the English report of the MDP-Thai version 3. Then the final version of the MDP-Thai was generated and ready for use.

2.2 Design and Setting

The study design was an observational cross-sectional study to evaluate the content and convergent validity, internal consistency, and a prospective longitudinal study for evaluation of test-retest reliability. The patients visiting the Outpatient Department of Medicine in Thammasat University Hospital during June 2020 to August 2020, who met the inclusion criteria, were screened and recruited. The inclusion criteria were all of the following: 1. Patients aged ≥ 18 years, 2. Patients had stable dyspnea in the past 6 months, with a respiratory rate of 12-35/ min and a pulse oximeter saturation (SpO_2) of $\geq 90\%$ when breathing ambient air, regardless of organ system involvement, 3. Good comprehension of Thai language, and, 4. Requirement of follow-up for dyspnea once or more. The exclusion criteria were the following: 1. Unstable vital signs, and 2. Unable to communicate. The discontinuation criterion was the decision to no longer participate in the study. Data collection was performed for baseline characteristics, comorbidities, SpO_2, Mini- Mental State Examination score, Thai version 2002 (MMSE-Thai 2002) [19], modified Medical Research Council dyspnea scale, Thai version (mMRC-Thai) [20], and MDP-Thai. All data were obtained from medical records, patient interviews and examinations.

2.3 Ethics approval

Ethics approval for research conduct and consent documentation was provided by the Human Research Ethics Committee of Thammasat University No.1 (Faculty of Medicine) (Approval number: MTU-EC-IM-1-056/62). A written informed consent was obtained from each patient or their authorized representative. Identifiable data of individual persons are not presented. This study was registered at https://www.thaiclinicaltrials.org/ (Trial registration number: TCTR20200721002).

2.4 Test of the content validity and reliability of MDP-Thai

For content validity, five experts in respiratory field independently evaluated whether the content of individual items was accurate and aligned with the objectives of the MDP. Then the patients had the study process explained to them in detail. They were subsequently assessed for dyspnea by mMRC-Thai and MDP-Thai. The MDP-Thai consisted of 11 questions regarding the intensity and character of dyspnea, including emotions felt during the dyspneic period, with a score range of 0-110. Each participant was evaluated three

times; at the first visit, 1-3 hours later and 1-4 weeks later, all done by the same assessor. Individual patients were interviewed by research assistants to ensure correct understanding of patients for every single part of the mMRC-Thai and MDP-Thai. The results of all items for each evaluation were analyzed for internal consistency and the serial results of each item for the three evaluations were analyzed for test-retest reliability. The results of the first and second evaluations, and those of the first and third ones were also analyzed separately for test-retest reliability, in order to observe the stability of test-retest reliability in different time frames.

2.5 Definitions of validity, consistency and reliability

Content validity was defined as the correctness of the questionnaire content in terms of the following: 1. Relevancy (to dyspnea), 2. Comprehensiveness, 3. Comprehensibility. Convergent validity was defined as the concordance between the results of questionnaire and the standard measure, herein the mMRC-Thai.

Internal consistency was defined as the concordance of the subitems of the questionnaire.

Test-retest reliability was defined as the concordance of the ≥2 assessment results for each subitem of the questionnaire.

2.6 Statistical analysis

Baseline characteristics of patients were analyzed using descriptive statistics and are reported as mean±standard deviation (SD) for normally distributed continuous data; median (interquartile range, IQR) for non-normally distributed continuous data; and proportion (percentage) for categorical data. Analyses of the MDP-Thai were performed using the following statistics: 1. Content validity using the Index of Item-Objective Congruence (IOC) of each item across five experts in the respiratory field, 2. Convergent validity using linear regression analysis for correlation between the results of MDP-Thai and mMRC-Thai, 3. Internal consistency of subitems using Cronbach's alpha coefficient, and 4. Test-retest reliability of the serial results using Intraclass Correlation Coefficient (ICC). Given that the recommended sample size for a validation study is ≥2 patients per item [21], the sample size for this study was set at 33 patients (3 patients per item for 11 items). Statistical significance was reached when the p-value was less than 0.05. All analyses were conducted using Stata version 14.0 (StataCorp, College Station, Texas, USA).

3. Results and Discussion

3.1 Thai translation of MDP and Content validity

The MDP-Thai was produced through a 6-step translation process as previously discussed. The assessment of content validity of the MDP-Thai showed that the content was exactly correct, comprehensible and complete according to the measurement objectives. The IOC of each item was 1.00, as is shown in Table 1. The MDP-Thai form is presented in the Appendix.

Table 1. Assessment of content validity of the MDP-Thai by five experts in the respiratory field.

Items	IOC*					
	1st Expert	2nd Expert	3rd Expert	4th Expert	5th Expert	Mean IOC
A1 Scale: Unpleasantness or discomfort of breathing sensations (0-10)						
Intensity of dyspnea	1	1	1	1	1	**1**
SQ Choice: Character of dyspnea						
Accuracy of character of dyspnea	1	1	1	1	1	**1**

SQ Scales: Intensity of each character of dyspnea (0-10)						
SQ1 My breathing requires muscle work or effort	1	1	1	1	1	**1**
SQ2 I am not getting enough air or I am smothering or I feel hunger for air	1	1	1	1	1	**1**
SQ3 My chest and lungs feel tight or constricted	1	1	1	1	1	**1**
SQ4 My breathing requires mental effort or concentration	1	1	1	1	1	**1**
SQ5 I am breathing a lot	1	1	1	1	1	**1**
A2 Scales: Intensity of emotions or feelings from dyspnea (0-10)						
A2-1 Depressed	1	1	1	1	1	**1**
A2-2 Anxious	1	1	1	1	1	**1**
A2-3 Frustrated	1	1	1	1	1	**1**
A2-4 Angry	1	1	1	1	1	**1**
A2-5 Afraid	1	1	1	1	1	**1**
Total mean IOC	**1**	**1**	**1**	**1**	**1**	**1**

Abbreviations: IOC, Index of Item – Objective Congruence; MDP-Thai, Multidimensional Dyspnea Profile, Thai version; SQ, sensation quality

*IOC rating: -1 = confidence of no objective congruence, 0 = no confidence of objective congruence, 1 = confidence of objective congruence

3.2 Patient characteristics

A total of 38 patients were screened, 35 of which were recruited for the study (3 patients refused to participate); 17 (48.6%) were male and 18 (51.4%) were female, with a mean age±SD of 64.6±14.6 years. The median overall intensity and duration of dyspnea were 6 out of 10, and 75 days, respectively. The most common symptom of dyspnea was "not getting enough air, smothering or air hunger". Exertion was the most common activity related to dyspneic episodes. The majority of patients had respiratory diseases, the most common of which were asthma, then chronic obstructive pulmonary disease (COPD) and finally bronchiectasis. Each patient had normal perception and cognitive functions with a MMSE-Thai 2002 of ≥22. Baseline characteristics of patients are presented in Table 2. All patients were evaluated for dyspnea using the MDP-Thai three times.

Table 2. Baseline characteristics of patients.

Characteristics	Patients (n=35)	Range
Age (years)	64.6±14.6	26 – 92
Male	17 (48.6)	–
Thai nationality	35 (100)	–
Thai ethnicity	34 (97.1)	–
Weight (kilograms)	61.0±11.1	40 – 82
Height (centimeters)	159.7±7.1	145 – 175
Body mass index (kilograms/square meter)	23.9±3.6	17.1 – 31.1
mMRC-Thai	1.5±1.0	0 – 4
SpO_2 (%)	97 (96 – 98)	92 – 99
MMSE-Thai 2002	29 (27 – 30)	22 – 30
Details of dyspnea		
1. Overall intensity (0-10)	6 (5-7)	1-10
2. Duration (days)	75 (30-120)	7-180
3. Characteristics		
3.1 Requiring muscle work or effort	4 (11.4)	–
3.2 Not getting enough air, smothering or air hunger	25 (71.4)	–
3.3 Tight or constricted chest and lungs	2 (5.7)	–
3.4 Requiring mental effort or concentration	3 (8.6)	–
3.5 Breathing a lot	1 (2.9)	–

4. Activities or conditions during dyspneic episode*		
4.1 Exertion	30 (85.7)	–
4.2 Exposure to smoke or dust	5 (14.3)	–
4.3 High or low temperature	5 (14.3)	–
4.4 Sitting still	3 (8.6)	–
Diagnosis**		
Respiratory diseases	31 (88.6)	–
1. Asthma	13 (37.1)	–
2. COPD	7 (20.0)	–
3. Bronchiectasis	4 (11.4)	–
4. Pulmonary hypertension	2 (5.7)	–
Cardiovascular diseases	3 (8.6)	–
1. Mitral regurgitation	1 (2.9)	–
2. Coronary artery disease	1 (2.9)	–
3. Cardiomegaly	1 (2.9)	–
Endocrinological diseases	1 (2.9)	–
1. Thyroiditis	1 (2.9)	–

Note: Continuous data are presented as mean±standard deviation (SD) for normally distributed data, and median (interquartile range, IQR) for non-normally distributed data. Categorical data are presented as number (percentage, %).
Abbreviations: COPD, chronic obstructive pulmonary disease; mMRC-Thai, modified Medical Research Council dyspnea scale, Thai version; MMSE-Thai 2002, Mini-Mental State Examination score, Thai version 2002; SpO_2, pulse oximeter saturation
*Each patient might have more than one activity or condition during a dyspneic episode.
**Each patient might have been diagnosed with more than one disease.

3.3 Convergent validity

Based on univariable linear regression analysis, the percentage of MDP-Thai A1 (Unpleasantness or discomfort of breathing sensations) ratings was correlated with results of the mMRC-Thai ratings at first visit (r=0.46 (95% CI, 0.02-0.91), p=0.043). The multivariable linear regression analysis showed that the percentage of the MDP-Thai A1 ratings was slightly better correlated with that of the mMRC-Thai rating (r=0.54 (95% CI, 0.07 - 1.02), p=0.026) after adjustment for MMSE-Thai 2002. The linear regression lines showing correlation between the percentage of the MDP-Thai A1 ratings and that of the mMRC-Thai ratings are presented in Fig. 1.

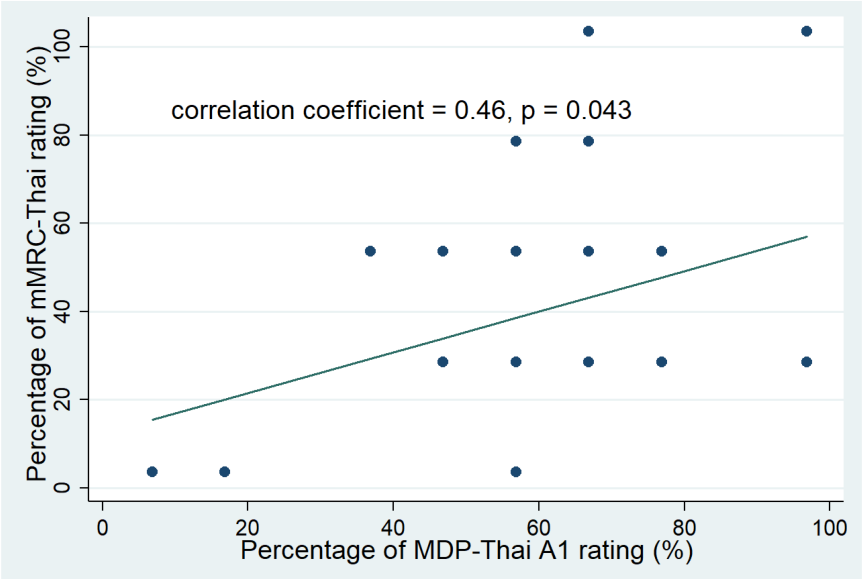
3.4 Internal consistency

The analysis of internal consistency of the MDP-Thai showed that Cronbach's alpha coefficients of dyspneic characteristics and intensity subitems ranged from 0.83 to 0.88, while that of emotions from dyspnea ranged from 0.64 to 0.74, as shown in Table 3.

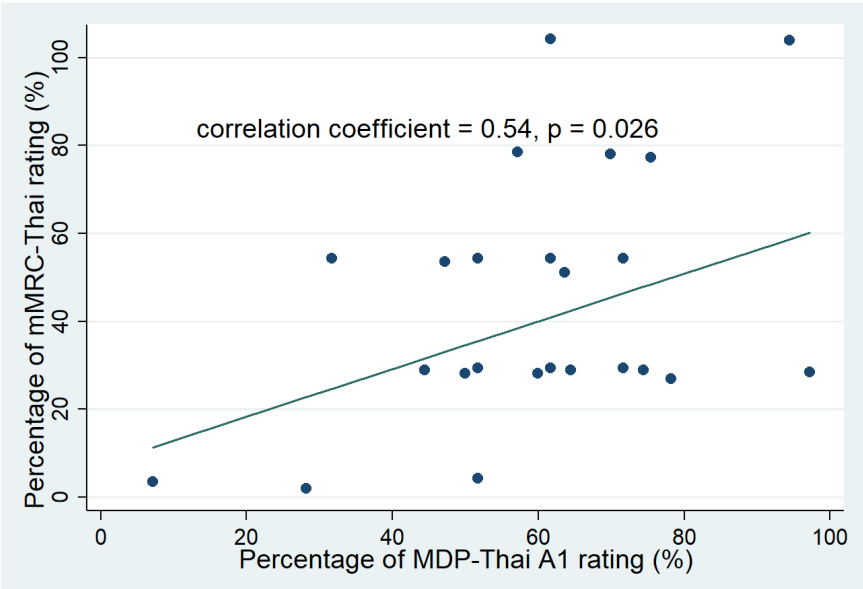
Table 3. Internal consistency of MDP-Thai.

Items	Cronbach's alpha coefficient		
	1st Interview	2nd Interview	3rd Interview
SQ1 to SQ5*	0.83	0.87	0.88
A2-1 to A2-5**	0.64	0.74	0.66

Abbreviations: MDP-Thai, Multidimensional Dyspnea Profile, Thai version; SQ, sensation quality
*SQ1 to SQ5 indicate intensity of each character of dyspnea (SQ1, My breathing requires muscle work or effort; SQ2, I am not getting enough air or I am smothering or I feel hunger for air; SQ3, My chest and lungs feel tight or constricted; SQ4, My breathing requires mental effort or concentration; SQ5, I am breathing a lot).
**A2-1 to A2-5 indicate emotions or feelings from dyspnea (A2-1, Depressed; A2-2, Anxious; A2-3, Frustrated; A2-4, Angry; A2-5, Afraid).



(a) Univariable linear regression analysis



(b) Multivariable linear regression analysis after adjustment for MMSE-Thai 2002

Fig. 1. Graphs showing linear regression lines of correlation between the percentage of MDP-Thai A1 rating and the percentage of mMRC-Thai rating.

Abbreviations: MDP-Thai A1, Unpleasantness or discomfort of breathing sensations part of Multidimensional Dyspnea Profile, Thai version; mMRC-Thai, modified Medical Research Council dyspnea scale, Thai version; *p*, *p*-value.

3.5 Test-retest reliability

Analysis of test-retest reliability of the three MDP-Thai assessments showed that ICCs for the intensity of overall and individual characteristics of dyspnea ranged from 0.43 to 0.73 (p<0.001), while that of emotions from dyspnea ranged from 0.46 to 0.89 (p<0.001). The test-retest reliability of the first and second interviews showed an ICC range of 0.66 to 0.82 (p<0.001) for the intensity of overall and individual characteristics of dyspnea and an ICC range of 0.58 to 0.99 (p<0.001) for emotions from dyspnea. On the contrary, the first and third interviews showed an ICC range of 0.16 to 0.61 (p<0.001 to 0.179) for the intensity of the overall and individual characteristics of dyspnea and an ICC range of 0.22 to 0.82 (p<0.001 to 0.095) for emotions from dyspnea. The details of test-retest reliability are shown in Table 4.

3.6 Discussion

This is the first study that has translated the MDP into Thai, and validated the resulting MDP translation according to standard guidelines [18]. Based on the analysis, the MDP-Thai has excellent content validity for dyspnea assessment. Since all patients in our study had good cognitive function, and most had respiratory diseases, this supported good content validity for the MDP-Thai, especially for respiratory patients. The MDP-Thai was moderately correlated with the mMRC-Thai, suggesting existing convergent validity. Subitems of dyspneic characteristics showed high internal consistency, in contrast to the moderate internal consistency seen for most of the emotion based subitems. Most subitems had moderate test-retest reliability, except some subitems ("I am not getting enough air or I am smothering or I feel hunger for air", "Anxious" and "Afraid") which had low test-retest reliability, suggesting the responses may easily or considerably vary depending on each interview itself. Moreover, the test-retest reliability of the first and second interviews was higher than that of the first and third interviews. This suggests there was instability of dyspnea and emotions from dyspnea during different time periods; as more time passed, answers varied more from the initial assessment.

The correlation between the percentage of the MDP-Thai A1 rating and the mMRC-Thai rating was improved after adjustment for MMSE-Thai 2002. This suggested that cognitive function affected the correctness and accuracy of dyspnea description because the MDP-Thai A1 could better explain the mMRC-Thai when taking MMSE-Thai 2002 into consideration. This correlation reflected the existing convergent validity of the MDP-Thai, as well as the MDP in other studies [12, 15, 22-25]. The correlation coefficient in our study was not as high as was seen in other studies [22, 23] because the meaning of each word in the MDP-Thai may not be exactly the same as that in the original MDP in English, given that Thai grammar is complicated and the origin of the Thai language is considerably distant from that of the English language; additionally, there was different grading of dyspnea intensity between the MDP-Thai and the mMRC-Thai.

Subitems of dyspneic characteristics of MDP-Thai with high internal consistency suggested that each subitem corresponded well to one another, as has been seen in other studies [13-15, 24, 26]. Cronbach's alpha coefficients seen in our study were lower than those of another study [24] possibly because the participants in that study might have had better comprehension of the original English MDP subitems. Consequently, communication with participants in that study was able to be more precise by virtue of not requiring any sophisticated translation or cultural modification of words. However, Cronbach's alpha coefficients from our study were closer to those of the MDP in Swedish [13] and Portuguese [14]. This indicated that language translation and cultural modification of some words may cause errors in the meaning of the content. Cronbach's alpha coefficients for the dyspneic characteristic subitems in our study also approximated to those of the English

Table 4. Test-retest reliability of MDP-Thai.

Items	1st and 2nd interviews		1st and 3rd interviews		1st, 2nd and 3rd interviews	
	ICC (95% CI)	p-value	ICC (95% CI)	p-value	ICC (95% CI)	p-value
A1 Scale: Unpleasantness or discomfort of breathing sensations (0-10)						
A1-1 Intensity of dyspnea	0.66 (0.42 - 0.81)	<0.001	0.31 ((-0.03) - 0.58)	0.035	0.43 (0.23 - 0.63)	<0.001
SQ Scales: Intensity of each character of dyspnea (0-10)						
SQ1 My breathing requires muscle work or effort	0.78 (0.61 - 0.88)	<0.001	0.44 (0.13 - 0.67)	0.003	0.60 (0.42 - 0.76)	<0.001
SQ2 I am not getting enough air or I am smothering or I feel hunger for air	0.70 (0.48 - 0.84)	<0.001	0.16 ((-0.18) - 0.46)	0.179	0.43 (0.22 - 0.63)	<0.001
SQ3 My chest and lungs feel tight or constricted	0.82 (0.67 - 0.90)	<0.001	0.61 (0.35 - 0.78)	<0.001	0.73 (0.58 - 0.84)	<0.001
SQ4 My breathing requires mental effort or concentration	0.81 (0.65 - 0.90)	<0.001	0.58 (0.30 - 0.76)	<0.001	0.68 (0.52 - 0.81)	<0.001
SQ5 I am breathing a lot	0.77 (0.60 - 0.88)	<0.001	0.55 (0.26 - 0.74)	<0.001	0.66 (0.49 - 0.79)	<0.001
A2 Scales: Intensity of emotions or feelings from dyspnea (0-10)						
A2-1 Depressed	0.86 (0.75 - 0.93)	<0.001	0.54 (0.25 - 0.74)	<0.001	0.65 (0.48 - 0.79)	<0.001
A2-2 Anxious	0.73 (0.53 - 0.86)	<0.001	0.22 ((-0.11) - 0.51)	0.095	0.46 (0.26 - 0.65)	<0.001
A2-3 Frustrated	0.99 (0.97 - 0.99)	<0.001	0.82 (0.67 - 0.90)	<0.001	0.89 (0.81 - 0.94)	<0.001
A2-4 Angry	0.58 (0.31 - 0.76)	<0.001	0.32 ((-0.01) - 0.59)	0.027	0.55 (0.36 - 0.72)	<0.001
A2-5 Afraid	0.65 (0.40 - 0.80)	<0.001	0.43 (0.12 - 0.67)	0.004	0.48 (0.27 - 0.66)	<0.001

Abbreviations: 95% CI, 95% confidence interval; ICC, intraclass correlation coefficient; MDP-Thai, Multidimensional Dyspnea Profile, Thai version; SQ, sensation quality

MDP in another study [25]. Nevertheless, Cronbach's alpha coefficients for the emotions section of our study were lower than those seen in other studies [13, 15, 24, 25]. This may be explained by the fact that some English words in the questionnaire may not translate well to Thai. In other words, the Thai language may use different words for the same emotions due to cultural differences.

Based on the ICCs across three interviews, the test-retest reliability of the MDP-Thai regarding dyspneic intensity, characteristics and emotions were mainly moderate. Some subitems ("Anxious" and "Afraid") had low test-retest reliability but one subitem ("Frustrated") had high test-retest reliability. The test-retest reliability of the MDP-Thai was considered somewhat lower than some other studies [13, 15, 26], but was comparable to one study in particular [24]. This may be caused by variability of dyspneic intensity and characteristics. It may also be related to emotions, which can occur spontaneously, time dependently and individually, or can be based on the natural course of disease, or the individual treatment a patient receives. However, all of our patients were stable and did not experience any acute deteriorating conditions throughout the study period. Another explanation may be the inability of patients to clearly specify the dyspneic characteristics and emotions. The test-retest reliability of within the shorter time period (the first and second interviews) was higher than that of longer time period (the first and third interviews), reflecting that dyspnea itself and dyspnea-related emotions are time dependent, as has also been seen in other studies [13, 15, 26].

This study helps us to understand dyspneic features of Thai patients better and more completely, regarding overall intensity, characteristics, emotions from dyspnea and common diseases related to dyspnea. The limitations of this study included the following: 1. The number of patients was small, which may have caused errors or bias in the study findings, especially regarding internal consistency of emotions and test-retest reliability, 2. Our findings probably cannot be adopted for all patients with dyspnea because most patients had respiratory diseases. Interviewing more patients with other diseases using this questionnaire will help to make the MDP-Thai more generalizable, 3. This study did not include patients with unstable conditions who might have had different sensations of dyspnea or emotions from those with stable conditions. Consequently, the findings also cannot be generalized to unstable patients. However, the MDP is usually neither feasible nor practical for use in such patients.

4. Conclusion

The MDP-Thai has excellent content validity, existing convergent validity, moderate to good internal consistency and moderate test-retest reliability. Thus, it should be adopted for interview of Thai dyspneic patients which will allow physicians to understand their patients more correctly and comprehensively, leading to improvement of management and outcomes. However, further study of the MDP-Thai for more non-respiratory patients with dyspnea is needed to help improve the generalizability of the questionnaire.

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References

[1] Dyspnea. Mechanisms, assessment, and management: a consensus statement. American Thoracic Society. Am J Respir Crit Care Med 1999;159:321-40.

[2] Munari AB, Gulart AA, Dos Santos K, Venancio RS, Karloh M, Mayer AF. Modified Medical Research Council Dyspnea Scale in GOLD Classification

Better Reflects Physical Activities of Daily Living. Respir Care 2018;63:77-85.

[3] Subratty AH, Manraj M, Baligadoo S. A new visual analogue scale for assessment of dyspnoea in congestive heart failure. Int J Clin Pharmacol Ther 1994;32:259-61.

[4] Hodgev V, Kostianev S, Marinov B. University of Cincinnati Dyspnea Questionnaire for Evaluation of Dyspnoea during physical and speech activities in patients with chronic obstructive pulmonary disease: a validation analysis. Clin Physiol Funct Imaging 2003;23:269-74.

[5] Borg GA. Psychophysical bases of perceived exertion. Med Sci Sports Exerc 1982;14:377-81.

[6] Witek TJ, Jr., Mahler DA. Minimal important difference of the transition dyspnoea index in a multinational clinical trial. Eur Respir J 2003;21:267-72.

[7] Banzett RB, O'Donnell CR, Guilfoyle TE, Parshall MB, Schwartzstein RM, Meek PM, et al. Multidimensional Dyspnea Profile: an instrument for clinical and laboratory research. Eur Respir J 2015;45:1681-91.

[8] Hegendorfer E, Doukhopelnikoff A, Degryse JM. Validity and reliability of the Multidimensional Dyspnoea Profile in older adults. ERJ Open Res 2021;7.

[9] Morelot-Panzini C, Gilet H, Aguilaniu B, Devillier P, Didier A, Perez T, et al. Real-life assessment of the multidimensional nature of dyspnoea in COPD outpatients. Eur Respir J 2016;47:1668-79.

[10] Stump A, Schroder M, Domanski U, Franke KJ, Nilius G. [German Translation and Linguistic Validation of the Multidimensional Dyspnea Profile (MDP)]. Pneumologie 2019;73:470-3.

[11] Haugdahl HS, Knutli M, Sorger H. Norwegian translation of a new, patient-reported multidimensional questionnaire on dyspnoea. Sykepleien Forsk 2020;15:81376.

[12] Ekstrom M, Sundh J. Swedish translation and linguistic validation of the multidimensional dyspnoea profile. Eur Clin Respir J 2016;3:32665.

[13] Ekstrom M, Bornefalk H, Skold M, Janson C, Blomberg A, Sandberg J, et al. Validation of the Swedish Multidimensional Dyspnea Profile (MDP) in outpatients with cardiorespiratory disease. BMJ Open Respir Res 2019;6:e000381.

[14] Belo LF, Rodrigues A, Vicentin AP, Paes T, de Castro LA, Hernandes NA, et al. A breath of fresh air: Validity and reliability of a Portuguese version of the Multidimensional Dyspnea Profile for patients with COPD. PLoS One 2019;14:e0215544.

[15] Ozcan Kahraman B, Kahraman T, Ozsoy I, Tanriverdi A, Papurcu A, Sezgin NH, et al. Validity and reliability of the Turkish version of the Multidimensional Dyspnea Profile in outpatients with respiratory disease. Turk J Med Sci 2020;50:1930-40.

[16] Bech CS, Noerholm V, Bove DG, Poulsen I. Danish translation and linguistic validation of the multidimensional dyspnea profile. Eur Clin Respir J 2021;8:1905498.

[17] Kanezaki M, Tamaki A, Terada K, Ebihara S. Linguistic Validation of the Japanese Version of the Multidimensional Dyspnea Profile and Relation to Physical Activity in Patients with COPD. Int J Chron Obstruct Pulmon Dis 2022;17:223-30.

[18] Mapi Research Trust. Linguistic Validation Guidance of the Multidimensional Dyspnea Profile (MDP). Lyon, France: 2016.

[19] Neurological Institute of Thailand, Department of Medical Services. Clinical Practice Guidelines: Dementia. Bangkok, Thailand: Tana Press Co., Ltd.; 2014. p. 103-5.

[20] Thoracic Society of Thailand under Royal Patronage, Thai Asthma Council and Association, and National Health Security Office. Public Health Clinical Practice

Guidelines for Patients with Chronic Obstructive Pulmonary Disease (COPD) 2010. Bangkok, Thailand: Union Ultra Violet Co., Ltd.; 2010. p. 92.

[21] Anthoine E, Moret L, Regnault A, Sebille V, Hardouin JB. Sample size used to validate a scale: a review of publications on newly-developed patient reported outcomes measures. Health Qual Life Outcomes 2014;12:176.

[22] O'Donnell CR, Schwartzstein RM, Lansing RW, Guilfoyle T, Elkin D, Banzett RB. Dyspnea affective response: comparing COPD patients with healthy volunteers and laboratory model with activities of daily living. BMC Pulm Med 2013;13:27.

[23] Banzett RB, Adams L, O'Donnell CR, Gilman SA, Lansing RW, Schwartzstein RM. Using laboratory models to test treatment: morphine reduces dyspnea and hypercapnic ventilatory response. Am J Respir Crit Care Med 2011;184:920-7.

[24] Meek PM, Banzett R, Parsall MB, Gracely RH, Schwartzstein RM, Lansing R. Reliability and validity of the multidimensional dyspnea profile. Chest 2012;141:1546-53.

[25] Williams MT, John D, Frith P. Comparison of the Dyspnoea-12 and Multidimensional Dyspnoea Profile in people with COPD. Eur Respir J :1600773:2017;49.

[26] Parshall MB, Meek PM, Sklar D, Alcock J, Bittner P. Test-retest reliability of multidimensional dyspnea profile recall ratings in the emergency department: a prospective, longitudinal study. BMC Emerg Med 2012;12:6.

Appendix

 ชื่อ/รหัส_____ วันที่และเวลา_____

ลักษณะรูปแบบอาการหายใจลำบากในหลากหลายมิติ

คำอธิบายสำหรับการใช้ครั้งแรก

จุดประสงค์ของแบบสอบถามนี้เพื่อช่วยให้เราเข้าใจความรู้สึกในการหายใจของคุณ

ไม่มีคำตอบที่ผิดหรือถูก เราต้องการให้คุณบอกลักษณะการหายใจของคุณ

ในหน้านี้ เราขอให้คุณบอกว่าการหายใจของคุณมีความไม่สุขสบายอย่างไรในหน้าถัดไปเราจะสอบถามคุณเกี่ยวกับความความรุนแรงหรือระดับของการหายใจของคุณ คุณจะเข้าใจความแตกต่างระหว่างความรู้สึกของการหายใจทั้งสองแง่มุมนี้ได้ชัดเจนขึ้น หากคุณคิดถึงการฟังเสียงเพลง เช่น จากวิทยุ เมื่อเสียงดังขึ้น เราจะถามคุณว่าเสียงดังเพียงใดหรือมีความไม่สุขสบายในการได้ยินเสียงอย่างไร ตัวอย่างเช่นเสียงเพลงที่คุณเกลียดอาจทำให้คุณไม่สุขสบายแม้ว่าระดับเสียงจะเบาก็ตาม และจะยิ่งทำให้คุณไม่สุขสบายมากขึ้นเมื่อระดับเสียงยิ่งดังขึ้น แต่เสียงเพลงที่คุณชอบจะไม่ทำให้คุณรู้สึกไม่สุขสบายแม้ว่าระดับเสียงจะดังขึ้นก็ตาม

<u>มาตรา A1</u>

กรุณาใช้มาตรานี้ในการให้คะแนน**ความรุนแรงของความรู้สึกหายใจไม่สุขสบายหรือหายใจอึดอัด**ในการหายใจของคุณว่ารู้สึก(เคย)หายใจได้แย่แค่ไหน กรุณานึกถึงสิ่งที่ทำหรือกิจกรรมที่ทำขณะหายใจไม่สุขสบายหรือหายใจอึดอัด_____

0 1 2 3 4 5 6 7 8 9 10

สุขสบายดี เฉยๆ ทนไม่ได้

Appendix

 ชื่อ/รหัส_____ วันที่และเวลา_____

ตัวเลือก SQ

ต่อไปนี้คือวลีหรือคำที่จัดกลุ่มซึ่งมีความหมายใกล้เคียงกัน

ขั้นที่ 1: เลือกวลีหรือคำแต่ละกลุ่มที่(เคย)อธิบายความรู้สึกในการหายใจ ระหว่าง_____ (ระบุช่วงเวลาที่นึกถึง)

ขั้นที่ 2: กรุณาเลือก *หนึ่ง*กลุ่มที่(เคย)อธิบายความรู้สึกในการหายใจ ได้อย่างถูกต้องที่สุด

	ขั้นที่ 1		**ขั้นที่ 2**
หาก*คำใดคำหนึ่ง*ในกลุ่มสามารถอธิบายความรู้สึกได้ กรุณาเลือกกลุ่มนั้น	**ไม่อธิบายสิ่งที่ฉันรู้สึก**	**อธิบายสิ่งที่ฉันรู้สึก**	**อธิบายสิ่งที่ฉันรู้สึกได้ถูกต้องที่สุด**
ฉันต้องใช้ความพยายามอย่างมาก***หรือ***ต้องออกแรงกล้ามเนื้ออย่างมากในการหายใจ			
ฉันหายใจเอาอากาศเข้าไปไม่เพียงพอ***หรือ***ฉันรู้สึกขาดอากาศ***หรือ***ฉันรู้สึกต้องการอากาศอย่างมาก			
หน้าอกและปอดของฉันรู้สึกแน่น***หรือ***ถูกบีบรัด			
ฉันต้องใช้ความมุ่งมั่นทางใจ***หรือ***ต้องใช้สมาธิจดจ่ออย่างมากในการหายใจ			
ฉันหายใจเร็วมาก***หรือ***แรงมาก			

Appendix

 ชื่อ/รหัส_____ วันที่และเวลา_____

มาตรา SQ

ใช้มาตรานี้ในการให้คะแนนความรุนแรงของความ(เคย)รู้สึกในการหายใจของคุณ (เหมือนความดังของเสียง ไม่ว่าความรู้สึกนั้นจะสุขสบายหรือไม่สุขสบายก็ตาม ตัวอย่างเช่น ความรู้สึกนั้นอาจจะรุนแรงโดยที่ไม่มีความรู้สึกไม่สุขสบาย)

กรุณานึกถึงช่วงเวลาที่_____

หาก*คำใดคำหนึ่ง*ในกลุ่มสามารถอธิบายความรู้สึกได้ กรุณาให้คะแนนกลุ่มนั้น	**ไม่มี**									**รุนแรงที่สุดเท่าที่ฉันสามารถนึกได้**	
ฉันต้องใช้ความพยายามอย่างมาก***หรือ***ต้องออกแรงกล้ามเนื้ออย่างมากในการหายใจ	0	1	2	3	4	5	6	7	8	9	10
ฉันหายใจเอาอากาศเข้าไปไม่เพียงพอ***หรือ***ฉันรู้สึกขาดอากาศ***หรือ***ฉันรู้สึกต้องการอากาศอย่างมาก	0	1	2	3	4	5	6	7	8	9	10
หน้าอกและปอดของฉันรู้สึกแน่น***หรือ***ถูกบีบรัด	0	1	2	3	4	5	6	7	8	9	10
ฉันต้องใช้ความมุ่งมั่นทางใจ***หรือ***ต้องใช้สมาธิจดจ่ออย่างมากในการหายใจ	0	1	2	3	4	5	6	7	8	9	10
ฉันหายใจเร็วมาก***หรือ***แรงมาก	0	1	2	3	4	5	6	7	8	9	10
อื่นๆ*	0	1	2	3	4	5	6	7	8	9	10

*หากคุณต้องการ คุณสามารถเพิ่มคำอธิบายความรู้สึกในการหายใจของคุณได้

Appendix

 ชื่อ/รหัส_____ วันที่และเวลา_____

มาตรา A2

เมื่อการหายใจของคุณรู้สึกไม่ปกติ คุณอาจมีอารมณ์ หรือ “ความรู้สึก” บางอย่าง กรุณาใช้มาตราด้านล่าง บอกเราเกี่ยวกับความรู้สึกที่เกิดจากการหายใจของคุณ –ให้คะแนน 0 หากคุณไม่ได้รู้สึกถึงอารมณ์นั้นๆ

กรุณานึกถึงช่วงเวลาที่ _____

	ไม่มี										**มากที่สุดเท่าที่ฉันสามารถนึกได้**
ซึมเศร้า	0	1	2	3	4	5	6	7	8	9	10
วิตกกังวล	0	1	2	3	4	5	6	7	8	9	10
รำคาญ	0	1	2	3	4	5	6	7	8	9	10
โกรธ	0	1	2	3	4	5	6	7	8	9	10
กลัว	0	1	2	3	4	5	6	7	8	9	10
อื่นๆ?	0	1	2	3	4	5	6	7	8	9	10