Reliability and Validity of the Thai Version of Bath Ankylosing Spondylitis Indices

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Objective: *Translate the Thai version of Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Bath Ankylosing Spondylitis Functional Index (BASFI), and Bath Ankylosing Spondylitis Global Score (BASG), and assess their validity in Thai patients with ankylosing spondylitis (AS).*

Material and Method: *The original BASDAI, BASFI, and BASG were translated to Thai language and re-translated back by professional translators. The translated questionnaires were subsequently modified by a panel of rheumatologists and small group of AS patients to suit the Thai culture. To assess the validity, scores from these instruments were validated against clinical signs and symptoms and inflammatory indices including arthritis and fatigue symptoms, occiput to wall distance, chest expansion, Schober's test, finger to ground distance, erythrocyte sedimentation rate, and C-reactive protein. Reliability was tested by internal consistency.*

Results: *Thirty-eight patients were included in the present study. The BASDAI, BASFI, and BASG showed a significant correlation with arthritis and fatigue symptoms, finger to ground distance, erythrocyte sedimentation rate, and C-reactive protein. Internal consistency (Cronbach's alpha) of BASDAI, BASFI, and BASG were 0.867, 0.915, and 0.315 respectively.*

Conclusion: *Thai version BASDAI, BASFI, and BAS-G showed good validity in patients with AS. There was a good internal consistency for BASDAI and BASFI. These questionnaires are feasible for application in clinical practice on Thai AS patients.*

Keywords: *Reliability, Validity, BASDAI, BASFI, BASG, Thai version*

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Ankylosing spondylitis (AS) is a chronic rheumatic disease that most occurs in young adult. Patients with AS suffer from back pain and stiffness by inflammation and end-up with spinal deformity, which reduces their daily activities and quality of life.

Although many valid instruments have been developed to evaluate disease activity, function, well-being, and disability of patients with AS in recent years, the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Bath Ankylosing Spondylitis Functional Index (BASFI), and Bath Ankylosing Spondylitis Global Score (BASG) have been widely accepted as useful instruments for outcome assessment in routine practice and many clinical trials[1-4]. These questionnaires can be completed rapidly and comfortably and have good reproducibility, validity, and sensitivity to clinical change[5]. Furthermore, these questionnaires have been translated and adapted for usage in many countries including Denmark, Egypt, France, Finland, Germany, Mexico, Sweden, Taiwan, and Turkey[5-15].

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The aims of the present study were to translate and adapt the original English version of the BASDAI, BASFI, and BASG to Thai language and assess the validity of the Thai version of these three measures.

Material and Method

Questionnaires

The original versions of the BASDAI, BASFI, and BASG were obtained from Calin A et al with permission. The BASDAI consists of six "10-centimeter" horizontal visual analog scales (VAS)[1]. This self-administered questionnaire measures fatigue, spinal pain, pain and swelling of the peripheral joints, localized tenderness, and duration of stiffness during the past week. The BASFI is a ten-item questionnaire that measures the functional ability of axial and peripheral joint[2]. Ten-centimeter VAS is used where a score of 0 = none and a score of 10 = very severe. The BASG ask the patients to rate the effect of AS on their well-being over the last week and the last six months[3]. The score range is 0 = none to 10 = very severe effect.

Translation

The author translated the original version of BASDAI, BASFI, and BASG to Thai language and subsequently, a professional translator translated back to English version. The professional translator was unaware of the original version. The translation process was performed following the standardized guidelines for the process of cross-cultural adaptation of self-report measures[16]. A panel of rheumatologists examined discrepancies between the original version, Thai version and back-translated English version and then discussed the translation until the consensus was reached. The first version of Thai BASDAI, BASFI, and BASG was experimented in a small group of AS patients. These patients were asked to comment on comprehensiveness and the relevance of the items. The second version was retranslated back to English by another professional translator to prevent bias from first version. Another group of AS patients tested the second version of these instruments. The interviewees were asked to state which wording of the question they would prefer and the reasons of their preferences to develop the final version.

Assessment of reliability and validity

The final Thai version of BASDAI, BASFI, and BASG were administered to Thai AS patients who visited rheumatology clinic of Phramongkutklao Hospital. Inform consent form was obtained before any data were collected from the respondents. Inclusion criteria were Thai patients who (1) aged more than 18 years, (2) fulfilled with modified New York criteria for AS[17], and (3) were willing to participate in the study. Using results of a previous study by Wei JC et al[5], the authors estimated a sample size of 38 subjects would be adequate for the present study. The present study protocol was approved by the Ethic Committee and Institutional Review Board. All patients provided written, informed consent to participate in the study.

To ensure the privacy and convenience of respondents, the interview was performed in a private room before being examined by the treating physician. The interviewer explained the confidentiality and anonymity of data collection to avoid bias occurring from social desirability. After the explanation, the author allowed the patients to read and answer the questionnaires by themselves. Demographic data, disease duration, clinical feature of arthritis, and fatigue symptoms were collected. Clinical assessments including occiput to wall distance, chest expansion, Schober's test, and finger to ground distance; and laboratory tests including erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) were recorded for measuring disease activity.

Statistical analysis

SPSS version 15 for Window was used for the statistical analyses. Internal consistency was assessed using Cronbach's alpha coefficients. A minimum of 0.70 was usually required as an acceptable level of agreement. Validity was assessed by Pearson correlation with the BASDAI, BASFI and BASG and the selected clinical and laboratory tests. The *p*-value is significant if less than 0.05.

Results

Thirty-eight patients were enrolled. Most of AS patients were male (92.1%) (Table 1). Mean ± SD age was 35.03±11.57 years old and disease duration was 9.29±7.77 years. Fifteen patients (39.5%) had peripheral and axial joint pain and 11 patients (28.9%) had fatigue symptom. Mean ESR and CRP were 47.34±37.32 mm/hr and 31.04±46.62 mg/L, respectively. One patient did not have CRP result in the present study.

The authors found it necessary to change the wording of BASDAI scale to clarify the questionnaire, and underline the word that was the most meaningful

Table 1. Demographic data on ankylosing spondylitis patient (n = 38)

Demographic data	Total, n = 38
Age (years), mean ± SD	35.03±11.57
Male, n (%)	35 (92.10)
Disease duration (years), mean ± SD	9.29±7.77
Arthritis symptom, n (%)	15 (39.47)
Fatigue symptom, n (%)	11 (28.94)
Occiput to wall distance (cm), median (range)	3.5 (0-36)
Chest expansion (cm), mean ± SD	2.46±1.65
Modified Schober's test (cm), mean ± SD	2.87±2.65
Finger to ground distance (cm), mean ± SD	15.28±14.07
ESR (mm/hr), mean ± SD	47.34±37.32
CRP (mg/L), median (range)	10.94 (0.3-195.21)

ESR = erythrocyte sedimentation rate; CRP = C-reactive protein

in each question. No one perceived difficulties in understanding the BASDAI, BASFI, and BASG. One patient was unable to read the questionnaire due to visual impairment, but could mark the VAS scale of each item with the help from the patient's relative.

Results on the Thai version BASDAI, BASFI, and BASG and Cronbach's alpha coefficient were shown in Table 2. The coefficient of internal consistency (Cronbach's alpha) for the BASDAI, BASFI, and BASG were 0.867, 0.915, and 0.315, respectively.

All Bath indices had significant correlations with each other (Table 3). The BASDAI had the greatest correlations with the BASG (r = 0.75, $p = 0.01$). All Bath indices were positively correlated with arthritis and fatigue symptom, finger to ground distance, and laboratory parameters (both ESR and CRP). The BASFI was negative correlated with chest expansion and modified Schober's test. In addition, the BASDAI and BASG showed a good correlation with arthritis and fatigue symptoms while the BASFI showed a good correlation with finger to ground distance, chest expansion, and modified Schober's test. However, none of these indices correlated with occiput to wall distance.

Discussion

The results of the present study indicate that the Thai versions of BASDAI, BASFI, and BASG were reliable and valid, and these instruments can be applied for clinical practice. The BASDAI was reported to be of great help to evaluate the disease activity of AS patients. From past studies, reliability across the scale responses was reported to be good[5-8,11,13]. Results of the present study also showed significant correlation between BASDAI and symptom of arthritis and fatigue and inflammatory markers. Thus, the Thai version of BASDAI can represent disease activity of AS patients.

Original BASFI was developed to clarify and monitor daily life function. Our translated BASFI can be completed rapidly and comfortably. BASFI showed better correlations with finger to ground distance and Schober's test than arthritis and fatigue symptoms. Limitation of spinal mobility of patient with AS considerably affects their functional ability.

The internal consistency of the Thai BASG was lower than that of other indices. The BASG consists of two questions that measure overall feeling in daily life in one week and six months ago. A low internal consistency of BASG could be explained by the variability of disease activity. Assessment of disease activity at different time point would be differed due to the natural history of AS and the effect of treatment. Another cause of inconsistency could be an ambiguity of "over the last week" and "over the last six months" in Thai words, that leaded to misinterpretation.

The present study had some limitations. Since the instruments were administered to each patient only

Table 2. Internal consistency of the Thai version BASDAI, BASFI and BASG

Bath indices	Mean	Median	Minimum	Maximum	Cronbach's alpha
BASDAI	3.79	3.58	0	8.61	0.867
BASFI	3.11	2.61	0	7.39	0.915
BASG	4.34	4.55	0	9.6	0.315

BASDAI = Bath Ankylosing Spondylitis Disease Activity Index; BASFI = Bath Ankylosing Spondylitis Function Index; BASG = Bath Ankylosing Spondylitis Global Score

Table 3. Pearson correlation coefficient between BASDAI, BASFI and BASG with clinical and laboratory assessments in ankylosing spondylitis patient

Bath indices	BASFI	BASDAI	Arthritis symptom	Fatigue symptom	Occiput to wall distance	Chest expansion	Schober's test	Finger to ground distance	ESR	CRP
BASG	0.664**	0.750**	0.501**	0.449**	-0.086	-0.322*	-0.336*	0.399*	0.386*	0.390*
BASFI	1.0	0.718**	0.361*	0.417**	0.252	-0.482**	-0.497**	0.572**	0.415**	0.351*
BASDAI	-	1.0	0.607**	0.621**	-0.076	-0.206	-0.274	0.329*	0.481**	0.497**

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

once, test-retest reliability and sensitivity to change could not be assessed. Further study is required to examine these properties. Selection bias could be resulted due to our data were collected from subjects in out-patient clinic in a single tertiary medical center. Many factors that may influence the scoring on the scales such as education level, emotional stress, mood disorder, or even the waiting time, were not estimated in the present study.

In conclusion, the Thai version of BASDAI, BASFI, and BASG were found to be valid self-administered instruments and had good correlation with disease activity and functional status of Thai patients with AS. These Bath indices would be helpful for both routine practice and clinical research.

What is already known on this topic?

Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Bath Ankylosing Spondylitis Functional Index (BASFI), and Bath Ankylosing Spondylitis Global Score (BASG) have been widely accepted as useful instruments for outcome assessment in routine practice and many clinical trials. These questionnaires have been translated and adapted for use in many countries including Denmark, Egypt, France, Finland, Germany, Mexico, Sweden, Taiwan, and Turkey.

What this study adds?

The authors translated and adapted the Thai version of BASDAI, BASFI, and BASG, which were found to be a valid self-administered instruments that have a good correlation with disease activity and functional status of Thai patients with AS. These Bath indices would be helpful for both routine practice and future clinical researches in this field.

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Potential conflicts of interest

None.

References

1. Garrett S, Jenkinson T, Kennedy LG, Whitelock H, Gaisford P, Calin A. A new approach to defining disease status in ankylosing spondylitis: the Bath Ankylosing Spondylitis Disease Activity Index. J Rheumatol 1994; 21: 2286-91.
2. Calin A, Garrett S, Whitelock H, Kennedy LG, O'Hea J, Mallorie P, et al. A new approach to defining functional ability in ankylosing spondylitis: the development of the Bath Ankylosing Spondylitis Functional Index. J Rheumatol 1994; 21: 2281-5.
3. Jones SD, Steiner A, Garrett SL, Calin A. The Bath Ankylosing Spondylitis Patient Global Score (BAS-G). Br J Rheumatol 1996; 35: 66-71.
4. van der Heijde D, Dougados M, Davis J, Weisman MH, Maksymowych W, Braun J, et al. Assessment in Ankylosing Spondylitis International Working Group/Spondylitis Association of America recommendations for conducting clinical trials in ankylosing spondylitis. Arthritis Rheum 2005; 52: 386-94.
5. Wei JC, Wong RH, Huang JH, Yu CT, Chou CT, Jan MS, et al. Evaluation of internal consistency and re-test reliability of bath ankylosing spondylitis indices in a large cohort of adult and juvenile spondylitis patients in Taiwan. Clin Rheumatol 2007; 26: 1685-91.
6. Pedersen OB, Hansen GO, Svendsen AJ, Ejstrup L, Junker P. Adaptation of the bath measures on disease activity and function in ankylosing spondylitis into Danish. Scand J Rheumatol 2007; 36: 22-7.
7. Simon JA, Burgos-Vargas R. Agreement of Mexican rheumatologists with the Assessment in Ankylosing Spondylitis International Working Group and the European League Against Rheumatism recommendations for the management of ankylosing spondylitis. Ann Rheum Dis 2006; 65: 1535-6.
8. Claudepierre P, Sibilia J, Goupille P, Flipo RM, Wendling D, Eulry F, et al. Evaluation of a French version of the Bath Ankylosing Spondylitis Disease Activity Index in patients with spondyloarthropathy. J Rheumatol 1997; 24: 1954-8.
9. Heikkila S, Viitanen JV, Kautianen H, Kauppi M. Evaluation of the Finnish versions of the functional indices BASFI and DFI in spondylarthropathy. Clin Rheumatol 2000; 19: 464-9.
10. Ozer HT, Sarpel T, Gulek B, Alparslan ZN, Erken E. Evaluation of the Turkish version of the Bath Ankylosing Spondylitis Patient Global Score (BAS-G). Clin Rheumatol 2006; 25: 136-9.
11. Cronstedt H, Waldner A, Stenstrom CH. The Swedish version of the Bath Ankylosing

Spondylitis Functional Index. Reliability and validity. Scand J Rheumatol Suppl 1999; 111: 1-9.
12. Cardiel MH, Londono JD, Gutierrez E, Pacheco-Tena C, Vazquez-Mellado J, Burgos-Vargas R. Translation, cross-cultural adaptation, and validation of the Bath Ankylosing Spondylitis Functional Index (BASFI), the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) and the Dougados Functional Index (DFI) in a Spanish speaking population with spondyloarthropathies. Clin Exp Rheumatol 2003; 21: 451-8.
13. Akkoc Y, Karatepe AG, Akar S, Kirazli Y, Akkoc N. A Turkish version of the Bath Ankylosing Spondylitis Disease Activity Index: reliability and validity. Rheumatol Int 2005; 25: 280-4.
14. Ozer HT, Sarpel T, Gulek B, Alparslan ZN, Erken E. The Turkish version of the Bath Ankylosing Spondylitis Functional Index: reliability and validity. Clin Rheumatol 2005; 24: 123-8.
15. Karatepe AG, Akkoc Y, Akar S, Kirazli Y, Akkoc N. The Turkish versions of the Bath Ankylosing Spondylitis and Dougados Functional Indices: reliability and validity. Rheumatol Int 2005; 25: 612-8.
16. Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. J Clin Epidemiol 1993; 46: 1417-32.
17. van der Linden S, Valkenburg HA, Cats A. Evaluation of diagnostic criteria for ankylosing spondylitis. A proposal for modification of the New York criteria. Arthritis Rheum 1984; 27: 361-8.

ความน่าเชื่อถือและความถูกต้องสำหรับ Bath Ankylosing Spondylitis Indices ฉบับภาษาไทย

โชคชัย กิตติญาณปัญญา, สุมาภา ชัยอำนวย, ไพจิตต์ อัศวธนบดี, พงศ์ธร ณรงค์ฤกษ์นาวิน

วัตถุประสงค์: *การศึกษานี้เพื่อทดสอบความน่าเชื่อถือ และความถูกต้องสำหรับ Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Bath Ankylosing Spondylitis Functional Index (BASFI) และ Bath Ankylosing Spondylitis Global Score (BASG) ฉบับภาษาไทย เพื่อใช้สำหรับผู้ป่วยโรคข้อกระดูกสันหลังอักเสบชนิดติดยึดชาวไทย*

วัสดุและวิธีการ: *ต้นฉบับของ BASDAI, BASFI และ BASG ได้รับการแปลเป็นภาษาไทยและแปลกลับอีกครั้งโดยผู้เชี่ยวชาญด้านภาษา อายุรแพทย์โรคข้อและผู้ป่วยโรคข้อกระดูกสันหลังอักเสบชนิดติดยึดร่วมกันปรับเปลี่ยนแบบสอบถามที่ได้รับการแปลแล้วอีกครั้งเพื่อให้เหมาะสมกับวัฒนธรรมไทย ความถูกต้องของแบบสอบถามฉบับภาษาไทยวัดโดยการประเมินเปรียบเทียบกับข้อมูลทางอาการ อาการแสดง และค่าการอักเสบในกระแสโลหิต ได้แก่ อาการข้ออักเสบ อาการเหนื่อยล้า ระยะระหว่าง occiput และผนัง การขยายตัวของทรวงอก การทดสอบ Schober ระยะระหว่างปลายนิ้วมือและพื้น อัตราการตกของเม็ดเลือดแดง และระดับซี-รีแอคทีฟโปรตีน ความน่าเชื่อถือของแบบสอบถามประเมินโดยการวัดความสอดคล้องภายใน*

ผลการศึกษา: *การศึกษานี้ทำในผู้ป่วยโรคข้อกระดูกสันหลังอักเสบชนิดติดยึดจำนวน 38 ราย แบบทดสอบ BASDAI, BASFI, และ BASG มีความสัมพันธ์กับอาการข้ออักเสบ อาการเหนื่อยล้า ระยะระหว่างปลายนิ้วมือและพื้น อัตราการตกของเม็ดเลือดแดง และระดับซี-รีแอคทีฟโปรตีน ของผู้ป่วยอย่างมีนัยสำคัญทางสถิติ ค่าความสอดคล้องภายในของ BASDAI, BASFI และ BASG อยู่ที่ 0.867, 0.915 และ 0.315 ตามลำดับ*

สรุป: *แบบสอบถาม BASDAI, BASFI, และ BASG ฉบับภาษาไทยมีความถูกต้องในการประเมินผู้ป่วยโรคข้อกระดูกสันหลังอักเสบชนิดติดยึดชาวไทย ค่าความสอดคล้องภายในของแบบสอบถาม BASDAI และ BASFI อยู่ในเกณฑ์ดี แบบสอบถามเหล่านี้สามารถนำมาใช้ประเมินผู้ป่วยโรคข้อกระดูกสันหลังอักเสบชนิดติดยึดชาวไทยในเวชปฏิบัติ*
