

# Test-Retest Reliability of the Thai Migraine Disability Assessment (Thai-MIDAS) Questionnaire in Thai Migraine Patients

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## Abstract

**OBJECTIVES:** The aim of this study is to evaluate the comprehensibility, internal consistency, patient-physician reliability, and test-retest reliability of the Thai version of Migraine Disability Assessment (Thai-MIDAS) questionnaire in Thai migraine sufferers.

**MATERIAL AND METHODS:** Study participants were recruited from patients diagnosed with migraine headache according to International Classification of Headache Disorders version 2 (ICHD-2) criteria who attended the Headache Clinic at Bangkok Hospital headquarters. Standard forward and backward translation procedures were used to translate the MIDAS questionnaire into the Thai-MIDAS version. Patients completed the Thai-MIDAS questionnaire at baseline (visit 1), after meeting the physician (visit 2), and at the two-week follow up (visit 3) to assess disease severity and comprehensibility, internal consistency, as well as test-retest reliability.

**RESULTS:** A total of 82 patients, aged between 15 and 54 years were enrolled in the study (71 females and 11 males). At baseline, most of the patients had severe migraine disability (MIDAS grade IV) and severe pain score. All 5 items of the Thai-MIDAS questionnaire demonstrated excellent internal consistency (ICC 0.95; 95% CI 0.91-0.99). The total Thai-MIDAS score showed good test-retest reliability by Pearson correlation coefficient ( $r = 0.81$ ; 95% CI 0.69-0.88,  $p = 0.05$ ).

**CONCLUSION:** These findings demonstrated that the Thai translation of MIDAS is equivalent to the English version of MIDAS in terms of internal consistency and test-retest reliability. Physicians can reliably use the self-administered tool, the Thai-MIDAS questionnaire, to assess the severity and disability of migraine in Thai patients.

**Keywords:** MIDAS questionnaire, migraine, reliability

Migraine is one of the most common chronic neurological disorders with a high disease-related disability and a significant impact on the public health system.<sup>1-4</sup> Migraine is characterized by recurrent episodes of unilateral, throbbing pain which is of moderate to severe intensity and is often debilitating. If untreated or unsuccessfully treated, those symptoms can persist from 4 to 72 hours.<sup>5</sup> Associated symptoms of migraine including nausea, vomiting and hypersensitivity to either light, sound, or smell also lead to impaired quality-of-life and functional disability.<sup>6</sup>

Global Burden of Disease studies report that migraine is the third most prevalent medical disorder worldwide. Migraine also ranked as the eighth most burdensome disease, and the sixth highest cause of disability in the world.<sup>7,8</sup> The 1-year prevalence of migraine in the United States is 11.7% (17.1% in women and 5.6% in men) of the adult population and highest in those aged 30 to 39 years for both men and women.<sup>9</sup> A report from the National Health Interview Survey shows the overall prevalence of migraine or severe headache in adults during the last 3 months was 17.7%.<sup>10</sup>

The headache-related disability and disease-specified impact scores were determined by the Migraine Disability Assessment (MIDAS)<sup>11,12</sup> and the Headache Impact Test (HIT-6)<sup>13,14</sup> respectively. Both tools can improve communication between patients and their physicians regarding the impact of migraine, measuring migraine severity, and monitoring treatment efficacy.<sup>15</sup> The MIDAS Questionnaire is a self-administered questionnaire designed to assess headache-related disability in the past 3 months including 5 disability questions in 3 domains of activity.

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MIDAS was validated in English, Italian, Japanese, Turkish, French, Persian, and Bahasa Malayu.<sup>16-23</sup> MIDAS was translated in to Thai to assist in communication between physician and patient in clinical practice. The aim of this study was to assess internal consistency and test-retest reliability of the Thai MIDAS questionnaire in Thai migraine patients and to determine that the Thai translation is equivalent to its original English version.

## Materials and Methods

### Study population

Study participants were recruited from patients diagnosed with migraine with and without aura according to ICHD-2 who attended in the Headache Clinic at Bangkok Hospital Headquarter between February 4, 2013 – July 7, 2015. All participants were given informed consent forms to complete before enrollment in the study. A total of 82 participants were initially enrolled in this study; 28 were excluded from the analysis due to failure to return for follow up visit.

At baseline (visit 1), all participants were asked to complete the Thai-MIDAS questionnaire by themselves, then they were evaluated by a neurologist and a full neurological examination was performed. Demographic data, headache characteristics, treatment history, trigger factors, and severity of disease including frequency of headache, duration of headache, and pain score (numerical rating scale; NRS 11 points) were recorded. Patients

were asked to complete the Thai-MIDAS questionnaire after a full evaluation by a neurologist (visit 2; approximately 2-3 hours after meeting with the physician) and at 2-week follow up (visit 3).

### Questionnaire

The MIDAS questionnaire (Figure 1) was developed by Stewart et al in 1999.<sup>16</sup> The MIDAS Questionnaire is a self-administered questionnaire designed to assess headache-related disability in the past 3 months including 5 disability questions in 3 domains of activity. Questions 1, 3, and 5 assess the number of missed days, due to headache, from school or paid work, household chores, and family, social, or leisure activities. Questions 2 and 4 assess the number of additional days with significant reduction in activity (defined as at least 50% reduced productivity) in the paid work and housework domains. The total MIDAS score is the sum of responses to Questions 1 through 5. Two supplemental questions (A and B) provide the physician with additional clinical information about headache frequency and the average pain intensity of headaches over the previous 3 months.<sup>12</sup> Higher scores indicate more severe disability due to headache. Scores on the MIDAS are highly correlated with physician judgments regarding patients' pain, disability, and need for medical care.<sup>11</sup> The total MIDAS score was categorized into 4 groups on the basis of disability score; Grade I = MIDAS 0-5 (little or no disability), Grade II = MIDAS 6-10 (mild disability), Grade III = MIDAS 11-20 (moderate disability), and Grade IV = MIDAS ≥ 21 (severe disability).

**The Migraine Disability Assessment Test**

The MIDAS (Migraine Disability Assessment) questionnaire was put together to help you measure the impact your headaches have on your life. The information on this questionnaire is also helpful for your primary care provider to determine the level of pain and disability caused by your headaches and to find the best treatment for you.

**INSTRUCTIONS**

Please answer the following questions about ALL of the headaches you have had over the last 3 months. Select your answer in the box next to each question. Select zero if you did not have the activity in the last 3 months. Please take the completed form to your healthcare professional.

- On how many days in the last 3 months did you miss work or school because of your headaches?
- How many days in the last 3 months was your productivity at work or school reduced by half or more because of your headaches? (Do not include days you counted in question 1 where you missed work or school.)
- On how many days in the last 3 months did you not do household work (such as housework, home repairs and maintenance, shopping, caring for children and relatives) because of your headaches?
- How many days in the last 3 months was your productivity in household work reduced by half or more because of your headaches? (Do not include days you counted in question 3 where you did not do household work.)
- On how many days in the last 3 months did you miss family, social or leisure activities because of your headaches?

Total (Questions 1-5)

**What your Physician will need to know about your headache:**

- On how many days in the last 3 months did you have a headache? (If a headache lasted more than 1 day, count each day.)
- On a scale of 0 - 10, on average how painful were these headaches? (where 0=no pain at all, and 10=pain as bad as it can be.)

**Scoring:** After you have filled out this questionnaire, add the total number of days from questions 1-5 (ignore A and B).

MIDAS Grade	Definition	MIDAS Score
I	Little or No Disability	0-5
II	Mild Disability	6-10
III	Moderate Disability	11-20
IV	Severe Disability	21+

If Your MIDAS Score is 6 or more, please discuss this with your doctor.

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Figure 1: Original version MIDAS Questionnaire

**แบบประเมินการสูญเสียความสามารถจากอาการปวดศีรษะในกรม**

แบบประเมิน "ไมเดาส" (แบบประเมินการสูญเสียความสามารถจากอาการปวดศีรษะในกรม) เป็นแบบสอบถามที่จัดทำขึ้นเพื่อวัดผลกระทบของอาการปวดศีรษะที่มีต่อชีวิตประจำวัน ข้อมูลในแบบสอบถามนี้จะใช้เพื่อช่วยในการดูแลรักษา ช่วยในการตัดสินใจเรื่องระดับความปวดและสาเหตุการสูญเสียความสามารถจากอาการปวดศีรษะของแพทย์ เพื่อเลือกการรักษาที่ดีที่สุดสำหรับท่าน

คำแนะนำ: กรุณาตอบคำถามต่อไปนี้ ซึ่งเกี่ยวข้องกับอาการปวดศีรษะทั้งหมดที่เกิดขึ้นในช่วง 3 เดือนที่ผ่านมา ขอให้อ่านคำถามก่อนเขียนลงในช่องถัดไปของคำถามแต่ละข้อคำถาม เลือก "0" ในกรณีที่ท่านไม่ได้ทำกิจกรรมนั้นๆ ในช่วง 3 เดือนที่ผ่านมา

1. มีจำนวนกี่วันในช่วง 3 เดือนที่ผ่านมา ที่ท่านหยุดงานหรือหยุดเรียนเนื่องจากอาการปวดศีรษะของท่าน	.....วัน
2. มีจำนวนกี่วันในช่วง 3 เดือนที่ผ่านมา ที่ท่านสามารถทำงานหรือเรียนได้ตามปกติลดลงจากปกติครึ่งหนึ่งหรือมากกว่าเนื่องจากอาการปวดศีรษะของท่าน (ไม่รวมวันที่ท่านนับในข้อ 1 ที่ท่านหยุดงานหรือหยุดเรียน)	.....วัน
3. มีจำนวนกี่วันในช่วง 3 เดือนที่ผ่านมา ที่ท่านไม่ได้ทำงานครัวเรือน (เช่น งานบ้าน, ซ่อมแซม, บำรุงบ้าน, ซักรีด, ซักผ้า, ซักผ้า, ซักผ้า, ซักผ้า) เนื่องจากอาการปวดศีรษะของท่าน	.....วัน
4. มีจำนวนกี่วันในช่วง 3 เดือนที่ผ่านมา ที่ท่านสามารถทำงานครัวเรือนได้ตามปกติลดลงจากปกติครึ่งหนึ่งหรือมากกว่าเนื่องจากอาการปวดศีรษะของท่าน (ไม่รวมวันที่ท่านนับในข้อ 1 ที่ท่านไม่สามารถทำงานครัวเรือน)	.....วัน
5. มีจำนวนกี่วันในช่วง 3 เดือนที่ผ่านมา ที่ท่านไม่สามารถทำกิจกรรมร่วมกับครอบครัว, สังคม หรือกลุ่มเพื่อนเนื่องจากอาการปวดศีรษะของท่าน	.....วัน
(ข้อ 1-5) รวมทั้งหมด .....วัน	

**อะไรที่แพทย์ควรทราบเกี่ยวกับอาการปวดศีรษะของคุณ:**

A. มีกี่วันใน 3 เดือนที่ผ่านมา ที่ท่านมีอาการปวดศีรษะ (อาการปวดศีรษะเป็นแบบมากกว่า : วัน ให้บันทึกเป็นอีกวัน)	.....วัน
B. ท่านให้คะแนนความปวดจากอาการปวดศีรษะของท่าน โดยเฉลี่ยกี่ครั้งต่อวัน จาก 1-10 คะแนน, 0 ไม่ปวดเลย, 5 ปวดปานกลาง, 10 ปวดมากจนนอนไม่ไหว	.....คะแนน

**การให้คะแนน:** หลังจากท่านกรอกแบบสอบถาม, ให้รวมจำนวนวันทั้งหมดจากข้อ 1-5 (วันทั้งหมด A และ B)

ระดับ	ความหมาย	คะแนนไมเดาส
1	ไม่มีหรือมีการสูญเสียความสามารถน้อยมาก	0 - 5
2	มีการสูญเสียความสามารถน้อย	6 - 10
3	มีการสูญเสียความสามารถปานกลาง	11 - 20
4	มีการสูญเสียความสามารถมาก	21 +

ถ้าคะแนนไมเดาสของคุณมากกว่าหรือเท่ากับ 6, โปรดปรึกษาแพทย์ผู้ทำการรักษาท่าน

Figure 2: Thai version MIDAS Questionnaire

### Translation of the original MIDAS questionnaire into the Thai MIDAS version

The request to translate MIDAS was permitted and approved by the Institutional Review Board. The translation of the English version of the MIDAS questionnaire into Thai used in this study followed all standardized processes.<sup>24</sup> The translation process included forward translation from English into Thai by the principle investigator and reconciliation was administered by a native speaker. Back translation was performed by a translator who is fluent in English and did not participate in this study. The back-translated version was then reviewed by another professional translator in order to compare it to the original version. Cognitive debriefing was tested in 5 migraine patients. Proof-reading and a final report were completed. The original MIDAS questionnaire is shown in Figure 1 and the final version of the Thai-MIDAS questionnaire is shown in Figure 2.

### Test-retest reliability and internal consistency of Thai MIDAS

Test-retest reliability assessment, the correlation of MIDAS scores of all participants at visit 1, 2, and 3 were calculated. The short period between visit 1 and visit 2 (before and after meeting with the neurologist) was to test the consistency of the participants. The 2-week period between visit 1 and visit 3 was accepted as a reasonable timeframe short enough not to cause significant changes in severity of disease but long enough to ensure that patients would not recall their answer from the first questionnaire. The severity of the disease at visit 1 and visit 3 were compared to ensure that there were no significant changes during the 2-week follow up period. During this period, changes in acute or prophylactic medications were not permitted. The internal consistency of Thai-MIDAS questionnaire was also assessed.

### Statistical analysis

Test-retest reliability analysis was calculated by the Spearman and Pearson correlation coefficients between the five individual questions and the overall MIDAS score. Pearson product-moment correlation method and given as Pearson correlation coefficient ( $r$ ). Correlation Coefficient values between 0.90 and 1.00 indicate very high correlation, values between 0.70 to 0.90 indicate high correlation, values between 0.50 to 0.70 indicate moderate correlation, values between 0.30 to 0.50 indicate low correlation, and values between 0.00 to 0.30 indicate very negligible correlation.<sup>25</sup>

The internal consistency of Thai-MIDAS questionnaire was assessed using Intraclass Correlation Coefficient (ICC), Model: Two-way Mixed, Type: Absolute Agreement. An ICC values greater than 0.9 represent excellent reliability, ICC values between 0.75 and 0.9 represent good reliability, ICC values between 0.5 and 0.75 represent moderate reliability, and ICC values lesser than 0.50 represent poor reliability.<sup>26</sup>  $A p < 0.05$  was regarded as the level of statistical significance.

The study was approved by the institutional ethics committee of the study center and was conducted in compliance with ICH-GCP Guidelines, the Declaration of Helsinki, and local regulatory requirements. All participants gave written informed consent before enrollment to the study.

## Results

### Patients Demographics

A total of 82 patients (11 males and 71 females) were enrolled into the study. The mean age of participants was 33.4 years (standard deviation, 7.8). Demographics of participants including frequency of headaches per week is shown in Table 1. The distribution of MIDAS scores at baseline were as follows: MIDAS grade I 19.5%, MIDAS grade II 9.8%, MIDAS grade III 25.6%, and MIDAS grade IV 45.1%. Severity of headache including pain score and MIDAS grade are summarized in Table 2.

### Reliability

Test-retest reliability of each MIDAS question had a high correlation, with correlation coefficients ranging from 0.36 (missed days of household work) to 0.94 (missed work or school). The overall correlation for the reliability of the total Thai-MIDAS score was 0.81 (95% CI 0.69-0.88). Migraine Disability Assessment Question A (pain intensity) and Question B (headache frequency) showed high test-retest reliability with correlation coefficients of 0.85 (pain intensity) and 0.7 (headache frequency). There was no significant change in the severity of disease including mean value of MIDAS score and pain score between the three visits.

### Internal consistency

The internal consistency of the Thai MIDAS measured by the intraclass correlation coefficient was found at the excellent level for the five MIDAS questions (ICC = 0.95, 95%CI 0.91-0.99). A summary of MIDAS data from the test-retest reliability and the internal consistency study of the Thai-MIDAS questionnaire is shown in Table 3.

**Table 1:** Demographic data of the participants (n = 82)

Demographic	n (%)
Gender	
Male	11 (13.4)
Female	71 (86.6)
Age (Mean $\pm$ SD) ; Years	(33.4 $\pm$ 7.8)
15 - 24	10 (12.2)
25 - 34	37 (45.1)
35 - 44	26 (31.7)
Frequency of Headache per week	
Mean $\pm$ SD	3.47 $\pm$ 2.12
Min - Max	1 - 7

**Table 2:** Summary of pain score and MIDAS Grade by visits

Level	Visit 1 (n = 82) n (%)	Visit 2 (n = 82) n (%)	Visit 3 (n = 54) n (%)	Mean diff.	p <sup>b</sup>
Pain Score (Numerical Rating Scale)					
Mild (1 - 3)	-	-	1 (1.9)		
Moderate (4 - 6)	31 (37.8)	35 (42.7)	21 (38.9)		
Severe (7 - 10)	51 (62.2)	47 (57.3)	32 (59.3)		
- Visit 1 vs Visit 2				0.09	0.109
- Visit 1 vs Visit 3				0.29	0.110
- Visit 2 vs Visit 3				0.20	0.273
MIDAS Grade					
Little or no disability	16 (19.5)	16 (19.5)	12 (22.2)		
Mild disability	8 (9.8)	8 (9.8)	6 (11.1)		
Moderate disability	21 (25.6)	19 (23.2)	9 (16.7)		
Severe disability	37 (45.1)	39 (47.6)	27 (50.0)		
- Visit 1 vs Visit 2				-0.9	0.179
- Visit 1 vs Visit 3				-3.5	0.295
- Visit 2 vs Visit 3				-3.0	0.402

b = pair t-test method

**Table 3:** Internal Consistency and Test-Retest Reliability of Thai-MIDAS

Thai-MIDAS equivalent item	Visit 1 Mean (SD)	Visit 3 Mean (SD)	Correlation Coefficient* (95% CI)	ICC** (95% CI)
1. How many days did you skip work or school due to headache in the past 3 months?	4.1 (6.8)	5.2 (7.8)	0.94 (0.90-0.97)	0.96 (0.91-1.0)
2. How many days did your productivity at work or school decrease by 50% or more due to headache in the past 3 months? (Exclude Q 1 days skipped (work or school))	8.6 (10.7)	10.2 (11.7)	0.68 (0.50-0.80)	0.55 (0.27-0.83)
3. How many days were you unable to do household work (such as housework, home repair and maintenance, shopping, taking care of children and relatives) due to headache in the past 3 months?	4.4 (6.5)	5.3 (9.7)	0.36 (0.01-0.57)	0.50 (0.16-0.85)
4. How many days did your productivity in household work decrease by 50% or more due to headache in the past 3 months? (Exclude days in Q 3 for household work)	4.8 (6.4)	6.6 (9.5)	0.53 (0.31-0.70)	0.62 (0.31-0.92)
5. How many days did you miss family, social or friend activities due to headache in the past 3 months?	5.5 (7.6)	6.7 (10.1)	0.92 (0.86-0.95)	0.93 (0.85-1.0)
Total	27.5 (29.4)	34.0 (41.2)	0.81 (0.69-0.88)	0.95 (0.91-0.99)
A. How many days did you have a headache in the past 3 months?	19.5 (20.6)	18.5 (18.7)	0.85 (0.75-0.90)	0.60 (0.33-0.86)
B. On a scale of 1 to 10, what is your average pain level due to headache?	7.1 (1.6)	6.9 (1.8)	0.70 (0.53-0.82)	0.65 (0.35-0.96)

\* Pearson's correlation coefficient (r) \*\* Intraclass correlation coefficient

## Discussion

The demographic of the patients in our study is similar to the general population with female predominance and a mean age in the thirties. The headaches were of a high intensity with an average pain score of 7.1, consistent with the ICHD-2 diagnostic criteria for migraine.<sup>5</sup> Most patients reported high burden from migraine headache (MIDAS III-IV). According to our patient population, reduced or missed days of school/job had higher scores than those in the housework dimensions, suggesting that most patients were of working age.

Our study shows that the Thai-MIDAS questionnaire is a valid instrument to assess disability in migraine sufferers. We demonstrated this by calculating the intraclass correlation coefficient of each question item. The overall intraclass correlation was excellent, with an ICC score of 0.95 (95% CI 0.91-0.99). Such findings indicate conformity among subjects who answer this questionnaire, suggesting that the questions can be reliably applied to patients with migraine. Our results were in line with the findings reported by prior studies which were translated from the original MIDAS into other languages.<sup>21-23</sup> Our questionnaire is different in population characteristics and sample size. Compared to an earlier Thai study completed with 29 patients, around 54 patients collected in our study demonstrated a high degree of reliability.<sup>27</sup>

We also compared the mean of the total MIDAS scores between the first and second visits in all patients to assess test-retest reliability of MIDAS. High overall correlations were found with the correlation coefficient of 0.81 (95% CI 0.69-0.88). The correlation was very high in the first and fifth questions, with a moderate correlation in the second and fourth questions

but a low correlation in the third question (household work impairment). It might be because of the difference in culture between eastern and western countries and different lifestyles seen in our population. Proper correlations (correlation coefficient > 0.5) were found in the majority of individual questions of the MIDAS. These findings also matched previous studies.<sup>21-23</sup> Correlations were best seen in the question items addressing the number of missed days (either at school/work or leisure activities), suggesting that subjects were able to pinpoint the day they had to abandon their planned schedule better than the days that these activities were only impaired.

## Study limitations

Our study population was mostly employees of private companies and business owners, so they are likely to see a doctor when they have a severe headache, because many private companies have a limited amount of welfare to cover medical treatment fees. This might also have affected the drop in follow-up appointments from a total of 82 to 54 patients.

## Conclusion

We have demonstrated that the Thai translation of MIDAS is equivalent to the original English version, using a standard method of linguistic validation and proof of its validity and reliability. Physicians can reliably use this self-administered tool to assess the severity and disability of migraine in Thai patients. MIDAS is an important measurement tool in migraine, and may play a major role in improving the care of migraine sufferers.

## References

1. World Health Organization. Atlas of headache disorders and resources in the world 2011: A collaborative project of World Health Organization and Lifting the Burden. Geneva: World Health Organisation; 2011.
2. Stovner L, Hagen K, Jensen R, et al. The global burden of headache: a documentation of headache prevalence and disability worldwide. *Cephalalgia* 2007;27(3):193-210.
3. Bloudek LM, Stokes M, Buse DC, et al. Cost of healthcare for patients with migraine in five European countries: results from the International Burden of Migraine Study (IBMS). *J Headache Pain* 2012;13(5):361-78.
4. Stokes M, Becker WJ, Lipton RB, et al. Cost of Health Care Among Patients With Chronic and Episodic Migraine in Canada and the USA: Results From the International Burden of Migraine Study (IBMS). *Headache* 2011;51(7):1058-77.
5. Headache Classification Committee of the International Headache Society (IHS). The International Classification of Headache Disorders, 3rd edition (beta version). *Cephalalgia* 2013;33(9):629-808.
6. Lipton RB, Buse DC, Saiters J, et al. Healthcare resource utilization and direct costs associated with frequent nausea in episodic migraine: results from the American Migraine Prevalence and Prevention (AMPP) Study. *J Med Econ* 2013;16(4):490-9.
7. DALYs GBD, Collaborators H, Murray CJ, et al. Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990-2013: quantifying the epidemiological transition. *Lancet* 2015;386(10009):2145-91.
8. Steiner TJ, Birbeck GL, Jensen RH, et al. Headache disorders are third cause of disability worldwide. *J Headache Pain* 2015;16:58.
9. Lipton RB, Bigal M, Diamond M. Migraine prevalence, disease burden and the need for preventive therapy. *Neurology* 2007;68:343-9.
10. Loder S, Sheikh HU, Loder E. The prevalence, burden, and treatment of severe, frequent, and migraine headaches in US minority populations: statistics from National Survey studies. *Headache* 2015;55(2):214-28.

11. Lipton RB, Stewart WF, Sawyer J, et al. Clinical utility of an instrument assessing migraine disability: the Migraine Disability Assessment (MIDAS) questionnaire. *Headache* 2001;41(9):854-61.
12. Stewart WF, Lipton RB, Dowson AJ, et al. Development and testing of the Migraine Disability Assessment (MIDAS) Questionnaire to assess headache-related disability. *Neurology* 2001;56(6 Suppl 1):S20-S8.
13. Kosinski M, Bayliss MS, Bjorner JB, et al. A six-item short-form survey for measuring headache impact: the HIT-6. *Qual Life Res* 2003;12(8):963-74.
14. Yang M, Rendas-Baum R, Varon SF, et al. Validation of the Headache Impact Test (HIT-6) across episodic and chronic migraine. *Cephalalgia* 2011;31(3):357-67.
15. Dowson AJ. Assessing the impact of migraine. *Curr Med Res Opin* 2001;17:298-309.
16. Stewart WF, Lipton RB, Whyte J, et al. An international study to assess reliability of the Migraine Disability Assessment (MIDAS) score. *Neurology* 1999;53(5):988-94.
17. D'Amico D, Mosconi P, Genco S, et al. The Migraine Disability Assessment (MIDAS) questionnaire: translation and reliability of the Italian version. *Cephalalgia* 2001;21(10):947-52.
18. Iigaya M, Sakai F, Kolodner KB, et al. Reliability and validity of the Japanese Migraine Disability Assessment (MIDAS) Questionnaire. *Headache* 2003;43(4):343-52.
19. Ertas M, Siva A, Dalkara T, et al. Validity and reliability of the Turkish Migraine Disability Assessment (MIDAS) questionnaire. *Headache* 2004;44(8):786-93.
20. Gedikoglu U, Coskun O, Inan LE, et al. Validity and reliability of Turkish translation of Migraine Disability Assessment (MIDAS) questionnaire in patients with migraine. *Cephalalgia* 2005;25(6):452-6.
21. Magnoux E, Freeman MA, Zlotnik G. MIDAS and HIT-6 French translation: reliability and correlation between tests. *Cephalalgia* 2008;28(1):26-34.
22. Zandifar A, Asgari F, Haghdoost F, Masjedi SS, Manouchehri N, Banihashemi M, et al. Reliability and validity of the migraine disability assessment scale among migraine and tension type headache in Iranian patients. *Biomed Res Int* 2014;2014:978064.
23. Shaik MM, Hassan NB, Tan HL, et al. Validity and reliability of the Bahasa Melayu version of the Migraine Disability Assessment questionnaire. *Biomed Res Int* 2014;2014:435856.
24. Ramsey S, Willke R, Briggs A, et al. Good research practices for cost-effectiveness analysis alongside clinical trials: the ISPOR RCT-CEA Task Force report. *Value Health* 2005;8(5):521-33.
25. Hinkle DE, Wiersma W, Jurs SG. Applied Statistics for the Behavioral Sciences. 5th ed. Boston: Houghton Mifflin; 2003.
26. Koo TK, Li MY. A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. *J Chiropr Med* 2016;15(2):155-63.
27. Seethong P, Nimmannit A, Chaisewikul R, et al. Reliability and Validity of Migraine Disability Assessment Questionnaire-Thai Version (Thai-MIDAS). *J Med Assoc Thai* 2013;96 Suppl 2:S29-38.