ORIGINAL ARTICLE

Validation of the Malay Version of Migraine-Specific Quality of Life Questionnaire (MSQ Version 2.1-M)

Nur Ain Amir[1], Hazwan Mat Din[2], Hayati Binti Kadir Shahar[2,3], Liyana Najwa Inche Mat[4], Haswini Narayanasamy[5], Mohd Hazmi Bin Mohamed[6], Ching Siew Mooi[7], Vasudevan Ramachandran[8,9], Wan Aliaa Wan Sulaiman[2,4]

[1] Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia
[2] Malaysian Research Institute on Ageing, Universiti Putra Malaysia, 43400 Serdang Selangor, Malaysia
[3] Department of Community Health, Faculty of Medicine and Health Sciences, University Putra Malaysia, 43400 Serdang, Selangor, Malaysia
[4] Department of Neurology, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia
[5] Centre for the Advancement of Language Competence, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia
[6] Department of Otorhinolaryngology, Faculty of Medicine and Health Sciences, University Putra Malaysia, 43400 Serdang, Selangor, Malaysia
[7] Department of Family Medicine, Faculty of Medicine and Health Sciences, University Putra Malaysia, 43400 Serdang, Selangor, Malaysia
[8] Department of Medical Science, Faculty of Health Sciences, University College of MAIWP International, Taman Batu Muda, 68100 Batu Caves, Kuala Lumpur, Malaysia
[9] School of Pharmaceutical Sciences, Vels Institute of Science Technology and Advanced Studies, Velan Nagar P.V. Vaithiyalingam Road Pallavaram, Chennai 600117, Tamil Nadu, India

ABSTRACT

Introduction: The Migraine-Specific Quality of Life Scale (MSQ) version 2.1 (MSQv2.1) is a migraine- specific instrument containing 14 items that measures the impact of migraine on an individual's quality of life. However, to date, MSQv2.1 is still unavailable in the Malay language. This study aimed to translate and validate the Malay version of the Migraine-Specific Quality of Life Questionnaire (MSQv2.1-M).**Materials and methods:** This cross-sectional study aimed to translate and validate the MSQ version 2.1-M within the Malay adult migraine population residing in the Serdang community, Selangor, Malaysia. The initial MSQv2.1, comprising 14 items, underwent translation from English to Malay, followed by an evaluation to ensure content and linguistic equivalence. Between April 2019 and August 2019, a cohort of 92 participants was recruited to complete a comprehensive questionnaire set that included the MSQv2.1-M. The study involved an analysis of multiple parameters of the MSQv2.1-M within this cohort, encompassing factor analysis and assessment of convergent and discriminant validity, reliability, criterion and predictive validity. **Results:** For the 92 eligible patients, the value Cronback's alpha for the three dimensions of the Malay version MSQ v. 2.1 (Role of function- Restrictive, Role of function – Preventive and Emotional -function) were 0.96, 0.92, and 0.96, respectively. Factor analysis revealed that the adapted MSQv2.1-M questionnaire comprises 13 items, compared to the original 14-item MSQv2.1. Multitrait scaling analysis demonstrated strong convergence and discrimination for the 13-item Malay version, with robust reliability evidenced by Cronbach's alpha values ranging from 0.92 to 0.96 (internal consistency). Predictive validity was confirmed and logistic regression showed that migraine type significantly predicted the quality-of-life score, even after adjusting for potential confounders. **Conclusion:** The study affirms that the Malay-adapted MSQv2.1 serves as a dependable and valid migraine- specific measure of quality of life for Malay-speaking individuals living with migraines. The MSQv2.1 has the potential to enhance clinical care and drive research advancements for Malay-speaking migraine sufferers.
Malaysian Journal of Medicine and Health Sciences (2025) 21(5): 85-90. doi:10.47836/mjmhs.21.5.11

Keywords: Headache, Quality of life, Migraine, Validty, Migraine-Specific Quality of Life Questionnaire

Corresponding Author:
Wan Aliaa Wan Sulaiman, PhD
Email: wanaliaa@upm.edu.my
Tel : +603-9769 9266

INTRODUCTION

Migraine is a prevalent primary headache and is the leading cause of years lived with disability (YLDs) among younger adults worldwide, ranking third in prevalence (1). Approximately 1 in 7 individuals suffer from migraine (2), experiencing recurring, severe throbbing headache accompanied by nausea, photophobia and phonophobia. Moreover, those with migraines commonly contend with additional medical and psychiatric conditions, notably insomnia, anxiety and depression (3, 4). This

places a significant burden on patients and contributes substantially to society's economic costs (5). In Malaysia and the broader Southeast Asian region, the prevalence of migraines mirrors global trends, emphasizing the need for culturally relevant tools to assess their impact. (1) Addressing these challenges requires a multifaceted strategy: educating both the public and policymakers while concurrently enhancing the healthcare system (6). Consequently, utilizing quality of life surveys is imperative to substantiate the burden and disability posed by migraine.

Quality of life (QOL) refers to "an individual's perception of their life situation within the cultural and value frameworks, encompassing their aspirations, standards and concerns" (7). Distinguished from health-related quality of life (HRQOL), which represents the value linked to a health condition (8), QOL tends to be notably lower for individuals with migraines than for those without migraines (9). However, the exact impact of migraines on diverse cultural contexts has not been fully elucidated. Hence, the adaptation of standardized patient-reported outcome measures (PROMS) for assessing the impact of migraine on QOL in various languages has become imperative. Previous adaptations of the MSQv2.1 into languages such as Korean and Italian have demonstrated its reliability and cultural relevance, highlighting the importance of this study in aligning the Malay version with global standards for assessing migraine burden. Assessing the burden of migraine, the efficacy of migraine treatments and the ongoing evaluation of routine clinical care heavily rely on QOL measures (10,8). The MSQv2.1 serves as a valuable, migraine-specific QOL measure tool encompassing 14 items distributed across three dimensions: Role Function-Restrictive (RR), Role Function-Preventive (RP), and Emotional-

Function (EF) (11,12,13). This instrument evaluates the impact of migraine on QOL over the preceding four weeks. Notably, the Korean validation version demonstrated strong internal consistency, supported by high Cronbach's α values of 0.954, 0.909, and 0.898, indicating reliability for both chronic migraine (CM) and episodic migraine (EM) (13). Similarly, an Italian study on chronic migraine revealed that increased disease severity correlated with lower MSQ scores (14).

The MSQv2.1 has shown robust internal consistency (Cronbach's α ranging from 0.86 to 0.96) (11) and has demonstrated good reliability and validity across various migraine classifications (13, 15, 16). Despite these findings, a Malay version of the MSQv2.1 is currently unavailable, limiting cross-cultural surveys assessing the impact of migraines on QOL. Thus, this study aimed to translate the MSQv2.1 into Malay and assess the psychometric properties of the MSQv2.1-M, enabling its clinical and research utilization within the local migraine patient population.

MATERIALS AND METHODS

Data collection

This cross-sectional validation study was carried out within the community setting of Serdang, Selangor, Malaysia, spanning from April 2019 to August 2019 utilizing convenient sampling.

The inclusion criterion included individuals aged 18 to 60 years diagnosed with migraine in accordance with ICHD-3 guidelines, while the exclusion criterion included individuals with non-migraine headache disorders or other neurological diagnoses (17). All participants were furnished with self-administered questionnaires, including the Malay version of the MSQv1.2, and additional clinical and sociodemographic details were provided.

Study instrument: Migraine-Specific Quality of Life Questionnaire version 2.1 (MSQv2.1)

The MSQv2.1 is an instrument used to measure migraine patients' quality of life in the past 4 weeks. The 14-item instrument consists of three scales corresponding to three domains of quality of life. All the items were rated on a 6-point scale ranging from (1) '*none of the time*' to (6) '*all of the time*'. The first domain, the Role Restrictive (RR), originally named Role Function- Restrictive in MSQv1, consists of 7 items measuring the limitation of performing normal activities due to migraine. Second, the Role Preventive (RP) domain, originally named Role Function- Preventive in MSQv1, consists of 4 items measuring the interruptions of normal activities due to migraine. The third domain is the emotional function (EF) domain, which consists of 3 items measuring the impact of the disease on individuals' emotions. At the time of the study, there was no Malay version of the MSQv2.1 available yet, with the Structured Migraine Interview as the only migraine instrument that had been validated in the Malay language. (18,95)

Translation process

This translation of MSQv2.1 involves two stages, the forward and backward translation phases. For forward translation, the English version of the MSQv2.1 was independently translated into the Malay version by two bilingual experts. A team of panelists, comprising neurologists and senior physicians experienced in managing migraine disorders, assessed the translated version for content validity. The agreed forward-translated version was then independently translated back to English by two other bilingual translators. The same panel of experts then thoroughly checked and revised the back-translated version. In addition, a native Malay speaker compared the 2 versions. Inter-rater

consensus were reached through detailed discussions among the panelist, that there were no discrepancies found in the items, and the Malay version was deemed acceptable.

Pilot Study

The preliminary Malay version of the MSQv2.1 was applied to migraine patients (10 participants) who consecutively met the ICHD-3 migraine criteria. Participants self-administered the questionnaire initially and then completed a second set of questionnaires two weeks after the first completion. Feedback includes the wording, phrasing or terminology indicated that all items were easily understood, and the average completion time was acceptable (5-10 minutes), supporting the tool's feasibility. Insights from this pilot informed refinements in the questionnaire's wording and administration process, ensuring clarity and consistency in the main study.

Data analysis

Factor analysis

First, construct validity was assessed based on the definition of agreement between the hypothetical concept and the empirical structure (20). Exploratory factor analysis was performed with oblique rotation, fixing the number of factors to three. Three-factor structure is given priority over single-factor solution as it follows the original underlying factor structure of the MSQv2.1. Prior to the factor analysis, the factorability of the MSQv2.1-M was investigated using the KMO measure of sample adequacy and Bartlett's test of sphericity. Second, for the factor analysis, commonalities were defined as the proportion of the variance in the original variable accounted for by the factor extracted. On the assessment of assumptions for exploratory factor analysis, commonalities were tested to assess whether they met the minimum criteria. The item communalities should be more than 0.50, as recommended by Child (2006) (21). Exploratory factor analysis employing principal axis factoring alongside promax rotation was utilized to uncover the underlying factors within the Malay version of MSQv2.1.

Convergent and Discriminant Validity

A multitrait scaling analysis was then used to evaluate item convergent and discriminant validity. Evidence of item convergence is supported by a substantial correlation (≥0.30) between an item and the total score of its hypothesized factor. In the item discrimination analysis, an item was deemed a "success" if the correlation between the item and its hypothesized scale was greater than 2 standard errors (SE). A correlation was categorized as a "probable scaling error" if it fell within 2 SEs and as a "definite scaling error" if the correlation was more than 2 SE below that with other scales (22). Additionally, item convergence and discrimination were used to help determine the scaling of items in the scale. A multitrait scaling analysis was also conducted to evaluate the hypothesized factor structure of Malay version MSQv2.1. Correlations were between an item with its own factor and other factors were estimated using Pearson's correlation.

Reliability

Reliability was defined as the extent to which a tool yielded consistent results across repeated measures (20). Cronbach's alpha was applied to measure the internal consistency, and a value higher than 0.5 was considered acceptable.

Criterion and Predictive Validity

Criterion validity in general was defined as the extent to which respondent scores correlated with other variables or criteria that measured the same construct. Predictive validity was defined as the power of a tool to predict the outcome measure (23). The predictive validity of the Malay version of the MSQv2.1 was tested using logistic regression, where the type of migraine (with or without aura) was set as the dependent variable.

Ethical Clearance

This study was approved by the University Putra Malaysia Human Ethical Board (JKEUPM- 2019-026). Written informed consent was obtained from all respondents before the data were collected.

RESULTS

A total of 92 participants completed the questionnaires, and 74% were females. Approximately 70% of these participants reported experiencing migraine without aura.

Factor analysis

For the factorability of the MSQv2.1-M, the KMO measure of adequacy was 0.93 above the recommended value of 0.6, and Bartlett's test of sphericity was significant [$\chi^2(91) = 1509.72$, $P<0.001$].

On the assessment of assumptions for exploratory factor analysis, the item communalities ranged from 0.64 to 0.98, which met the minimum criteria. The initial exploratory factor analysis revealed that a single-factor solution accounted for 73.27% of the variance (Eigenvalue= 10.26). However, based on the findings of previous studies, the original MSQv2.1 contained three underlying factors. The analysis was then conducted by restricting the number of factors to three, revealing that all the item factor loadings were above the minimum criterion (0.4). Upon checking the factor solution, item 12 (*Dalam tempoh 4 minggu yang lalu, berapa kerap anda berasa hampa atau kecewa kerana migrain anda?*) In the past 4 weeks, how often have you felt fed up or frustrated because of the migraine? was shown to have a load on a different factor (ER, factor loading 0.47) than its theorized factor (EF, factor loading = 0.38), with cross

loading between factors. Considering these findings and the agreement of all the authors, item 12 was eliminated. The removal of item 12 did not affect remaining items' factor loadings significantly. A principal axis factoring with the remaining 13 items was conducted, with three factors explaining a total of 84.49% of the variance. A previous study reported that scales that extract factors that explain more than 60% of the variance are considered acceptable (21). The results of the exploratory factor analysis are presented in Table I.

In summary, exploratory factor analysis of the Malay version of the MSQv2.1 provided evidence of construct validity, in which three factors were extracted: role restriction, role prevention, and emotional function. These findings were consistent with the hypothesized dimensions of the instrument.

Table I: Result of exploratory factor analysis

Items	Factor			Communalities
	Role Restrictive (RR)	Role Preventive (RP)	Emotion Function	
MSQ1	0.79			0.64
MSQ2	0.90			0.83
MSQ3	0.89			0.85
MSQ4	0.87			0.89
MSQ5	0.90			0.88
MSQ6	0.78			0.79
MSQ7	0.43			0.76
MSQ8		0.74		0.80
MSQ9		0.94		0.77
MSQ10		0.64		0.81
MSQ11		0.70		0.75
MSQ13			0.79	0.91
MSQ14			0.98	0.98

Convergent and Discriminant Validity

The results of the multitrait scaling analysis are presented in Table II. In summary, the findings suggested that the Malay version of the MSQv2.1 has good convergent and discriminant validity.

Table II: Result of convergent and discriminant validity and internal consistency

Subscales	No. of items	Convergent validity		Discriminant validity	Internal consistency
		Range of correlations	Success rate (%)	Success rate (%)	
Role Restrictive	7	0.83-0.93	100	100	0.96
Role Preventive	4	0.87-0.92	100	100	0.92
Emotion Function	2	0.97-0.98	100	100	0.96

Reliability

The Cronbach's alpha values for the Malay version of the MSQv2.1 are presented in Table 2. The Cronbach's alpha coefficients for role restriction, role prevention, and emotional function were 0.96, 0.92, and 0.96, respectively. A reliability above the minimum value of the Malay version of the MSQv2.1 indicated sufficient consistency.

Criterion Validity (Predictive Validity)

The relationship between migraine-specific quality of life and migraine type was examined using multivariate logistic regression after adjusting for potential confounders (age, sex, education, and marital status). The findings of the Hosmer–Lemeshow test of goodness of fit, with a nonsignificant p value ($\chi^2(8) = 3.45$ (8), P = 0.903), indicated a sufficiently fit model. The results of the multivariate logistic model revealed a significant model ($\chi^2(8) = 6.55$ (5), P = 0.010) in which quality of life significantly predicted the type of migraine after adjusting for age, sex, education, and marital status. The results of the predictive validity are presented in Table III.

Table III: Logistic regression model on the predictive validity of migraine-specific quality of life

Quality of life	B	S.E.	Odds ratio	*P*
	-0.04	0.02	0.96 (0.93, 0.99)	0.014

Hosmer-Lemeshow Test of Chi-square = 3.45 (8), *P* = 0.903

Dependent variable (Type of migraine): Migraine with aura (1), migraine without aura (0)

Adjusted for age, sex, education and marital status

DISCUSSION

This study examined the validity and reliability of the Malay version of the MSQv1.2 among individuals with migraine. The findings of exploratory factor analysis revealed that construct validity was sufficient, but one item was identified as problematic. In the analysis, Item 12, which focused on feelings of frustration, exhibited a loading on the role restrictive factor instead of its anticipated factor, emotional function. These observations align with earlier findings documented in a study by Cole (15). Given strong clinical and statistical justifications, item 12 was eliminated from the final analysis. The final 13-item scale demonstrated excellent construct validity, convergent validity, discriminant validity, predictive validity, and reliability in this study.

The scale supported the three-factor solution consistent with the findings of other studies, with item factor loadings ranging from 0.43 to 0.98, above the minimum value of 0.40, confirming the factor solution (24). Compared with the Thai translated version of the MSQv2.1 (25), the three dominant components that explained a large proportion of the variability in the MSQv2.1- M were

similar to those of the original MSQv2.1. In various studies, encompassing the current investigation, the Thai version of the study, and the original MSQv2.1, it was consistently revealed that the components comprised role function restriction (RR), role function prevention (RP), and emotional function (EF).

The solution also revealed a lack of cross-loading between the items across the three factors. Approximately 85% of the variance in the items was explained by these factors, which is greater than that reported in previous studies (15). Item 1 was slightly different in the Chinese version (23), and item 7 was different for most of the other countries (10, 13, 23, 26). The findings from the multitrait analysis revealed that the Malay version of the MSQv2.1 had excellent convergent and discriminant validity, similar to the findings of the MSQv2.1-C study by Chang among Chinese patients with migraine (26).
With regard to predictive validity, the significant association between the MSQv2.1 score and the type of migraine substantiated the evidence. For example, K-MSQ v2.1 has confirmed validity by correlations with the MSQ score assessing QOL over a prolonged long-term duration. This has also been identified as the strongest predictor of QoL between EM and CM patients (13). Similarly, the internal consistency evaluated by Cronbach's alpha was excellent (0.92-0.96), which was consistent with the findings of previous studies (26), confirming the reliability of the Malay version of the MSQv2.1, which was even greater than that of the K-MSQ v 2.1 (0.80-0.95), the Chinese version (0.81-0.93) and the Italian version (0.68-0.91) (27). In summary, the various measurement properties were satisfactory.

It is important to acknowledge that this study has several limitations, particularly the relatively small sample size and the use of convenient sampling method. Convenient sampling can lead to selection bias, as participants are chosen based on accessibility or availability rather than random selection, making them less representative of the broader population. Additionally, a small sample size reduces the study's statistical power, increases the margin of error, and diminishes the reliability of the findings. These limitations collectively hinder the ability to successfully generalize the results to the population. Therefore, future research should aim to include a larger and more diverse sample from across Malaysia to enhance the study's reliability and generalizability.

CONCLUSION

The MSQv2.1-M questionnaire consists of 13 items in 3 dimensions that include functional status specific to migraine role restriction (RR), role prevention (RP), and emotional function (EF), demonstrating good construct validity, convergent and discriminant validity, reliability and predictive validity compared to those of the MSQv2.1. In addition, because of its beneficial use among Malay-speaking adults with migraine, the MSQv2.1-M will facilitate cross-cultural measures of the quality of life of patients with migraine.

ACKNOWLEDGEMENT

We thank Christopher Bell (christopher.f.bell@gsk.com), US Health Outcomes, GSK, for permitting the translation of the English version of MSQv2.1 into the Malay version and the evaluation of the MSQv2.1-M. Permission to use the MSQv2.1 and available translations may be obtained from the MAPI Research Trust (MRT) eprovide. mapi-trust.org/

The authors would like to thank Ms. Rohaida Rahmat, who is a bilingual expert (in the English and Malay languages), for her professional translation service and Ms. Nur Athirah Inche Mat for her help as a native speaker of Malay. This study is supported by the GP/2020/9694100 research grant and Graduate Research Fellowship (GRF) grant for Ms. Nur Ain Amir under Universiti Putra Malaysia. The URL is http:// www.rmc.upm.edu.my/.

REFERENCES

1. Deanna S, Timothy JS. The Global Burden of Headache. Stroke. 2018;279–90. Available from: http://dx.doi.org/10.1016/B978-1-4160-5478-8.10019-3
2. Pinkerton J V, Coun- G, Aspects PP, Aspects PP, Genetics HE, Diversity HG, et al. NIH Public Access. Headache. 1st ed. 2018 Jan 1 [cited 2018 Apr 29];0(1):1–9. Available from: http://dx.doi.org/10.1016/j.ridd.2014.10.023
3. Buse, D.C., Reed, M.L., Fanning, K.M. et al. Comorbid and co-occurring conditions in migraine and associated risk of increasing headache pain intensity and headache frequency: results of the migraine in America symptoms and treatment (MAST) study. J Headache Pain 21, 23 (2020). https://doi.org/10.1186/s10194-020-1084-y
4. Kouhi Fayegh, A., Mat Din, H., Wan Sulaiman, W.A. et al. Relationship of sleep quality, chronotype, and obstructive sleep apnea with migraine in the elderly population. Neuropsychiatr (2023). https://doi.org/10.1007/s40211-023-00467-y
5. Hu XH, Markson LE, Lipton RB, Stewart WF, Berger ML. Burden of migraine in the United States: disability and economic costs. Arch Intern Med. 1999 Apr 26;159(8):813-8. doi: 10.1001/archinte.159.8.813. PMID: 10219926.
6. Wan Sulaiman, WA, Goadsby P.J.,. It is time to improve headache service and migraine care in Malaysia. Malaysian Journal of Medicine and Health Sciences. 2021 Oct; 17(4):1- 2
7. The World Health Organization Quality of Life Assessment (WHOQOL): development and general psychometric properties. Soc Sci Med. 1998 Jun;46(12):1569-85. doi: 10.1016/s0277-

9536(98)00009-4. PMID: 9672396.
8. Karimi M, Brazier J. Health, Health-Related Quality of Life, and Quality of Life: What is the Difference? Pharmacoeconomics. 2016 Jul;34(7):645-9. doi: 10.1007/s40273- 016-0389-9. PMID: 26892973.
9. Abu Bakar N, Torkamani M, Tanprawate S, Lambru G, Matharu M, Jahanshahi M. The development and validation of the Cluster Headache Quality of life scale (CHQ). J Headache Pain [Internet]. 2016;17(1):1–9. Available from: http://dx.doi.org/10.1186/s10194-016-0674-1
10. Zandifar A, Masjedi SS, Haghdoost F, Asgari F, Manouchehri N, Banihashemi M, Najafi MR, Ghorbani A, Zolfaghari B, Gholamrezaei A, Shaygannejad V, Saadatnia M. The psychometric properties of the persian migraine-specific quality of life questionnaire version 2.1 in episodic and chronic migraines. ScientificWorldJournal. 2013 Aug 27;2013:950245. doi: 10.1155/2013/950245. PMID: 24068887; PMCID: PMC3771439.
11. Martin BC, Pathak DS, Sharfman MI, Adelman JU, Taylor F, Kwong WJ, Jhingran P. Validity and reliability of the migraine-specific quality of life questionnaire (MSQ Version 2.1). Headache. 2000 Mar;40(3):204-15. doi: 10.1046/j.1526-4610.2000.00030.x. PMID: 10759923.
12. Jhingran P, Osterhaus JT, Miller DW, Lee JT, Kirchdoerfer L. Development and validation of the Migraine-Specific Quality of Life Questionnaire. Headache. 1998 Apr;38(4):295-302. doi: 10.1046/j.1526-4610.1998.3804295.x. PMID: 9595870.
13. Seo J-G, Park S-P. Validation of the Korean Migraine-Specific Quality of Life Questionnaire Version 2.1 in Episodic and Chronic Migraine. J Oral Facial Pain Headache. 2017;31(3):251–6.
14. Chang HY, Jensen MP, Yang CC, Lai YH. Migraine-Specific Quality of Life Questionnaire Chinese version 2.1 (MSQv2.1-C): psychometric evaluation in patients with migraine. Health Qual Life Outcomes. 2019 Jun 24;17(1):108. doi: 10.1186/s12955-019-1169-y. PMID: 31234894; PMCID: PMC6591995.
15. Cole JC, Lin P, Rupnow MF. Validation of the Migraine-Specific Quality of Life Questionnaire version 2.1 (MSQ v. 2.1) for patients undergoing prophylactic migraine treatment. Qual Life Res. 2007 Sep;16(7):1231-7. doi: 10.1007/s11136-007-9217-1. Epub 2007 Apr 28. PMID: 17468941.
16. Dodick DW, Silberstein S, Saper J, Freitag FG, Cady RK, Rapoport AM, Mathew NT, Hulihan J, Crivera C, Rupnow MF, Mao L, Finlayson G, Greenberg SJ. The impact of topiramate on health-related quality of life indicators in chronic migraine. Headache. 2007 Nov-Dec;47(10):1398-408. doi: 10.1111/j.1526-4610.2007.00950.x. PMID: 18052949.
17. Raggi A, Giovannetti AM, Schiavolin S, Leonardi M, Bussone G, Grazzi L, Usai S, Curone M, Di Fiore P, D'Amico D. Validating the Migraine-Specific Quality of Life Questionnaire v2.1 (MSQ) in Italian inpatients with chronic migraine with a history of medication overuse. Qual Life Res. 2014 May;23(4):1273-7. doi: 10.1007/s11136-013-0556-9. Epub 2013 Oct 16. PMID: 24129671.
18. Shaik MM, Hassan NB, Tan HL, Bhaskar S, Gan SH. Validity and reliability of the Malay version of the Structured Migraine Interview (SMI) Questionnaire. J Headache Pain. 2015 Mar 14;16:22. doi: 10.1186/s10194-015-0509-5. PMID: 25903056; PMCID: PMC4385285.
19. Samaan, Z., MacGregor, E.A., Andrew, D. et al. Diagnosing migraine in research and clinical settings: The validation of the Structured Migraine Interview (SMI). BMC Neurol 10, 7 (2010). https://doi.org/10.1186/1471-2377-10-7
20. Brown TA. Confirmatory factor analysis for applied research. Guilford Publications; 2014.
21. Child D. The essentials of factor analysis. Continuum, London; 2006.
22. Hays RD, Hayashi T, Carson S, Ware JEJ. User's Guide for the Multitrait Analysis Program (MAP). A Rand Note. 1988. p. 1–25.
23. Elasy TA, Gaddy G. Measuring subjective outcomes: rethinking reliability and validity. J Gen Intern Med. 1998 Nov;13(11):757-61. doi: 10.1046/j.1525-1497.1998.00228.x. PMID: 9824522; PMCID: PMC1497034.
24. Raggi A, Leonardi M, Bussone G, D'Amico D. Value and utility of disease-specific and generic instruments for assessing disability in patients with migraine, and their relationships with health-related quality of life. Neurol Sci. 2011 Jun;32(3):387-92. doi: 10.1007/s10072-010-0466-3. Epub 2010 Dec 14. PMID: 21170564.
25. Asawavichienjinda, T., Vorasayan, P., Noiwattanakul, J. & Phanthumchinda, K. (2017). Validity,reliability, and sensitivity to change of the Thai version of the Migraine-Specific Quality of Life Questionnaire version 2.1. Asian Biomedicine, 11(4) 331-342. https://doi.org/10.1515/abm-2018-2005
26. Chang HY, Jensen MP, Yang CC, Lai YH. Migraine-Specific Quality of Life Questionnaire Chinese version 2.1 (MSQv2.1-C): psychometric evaluation in patients with migraine. Health Qual Life Outcomes. 2019 Jun 24;17(1):108. doi: 10.1186/s12955-019-1169-y. PMID: 31234894; PMCID: PMC6591995.
27. Raggi A, Giovannetti AM, Schiavolin S, Leonardi M, Bussone G, Grazzi L, Usai S, Curone M, Di Fiore P, D'Amico D. Validating the Migraine-Specific Quality of Life Questionnaire v2.1 (MSQ) in Italian inpatients with chronic migraine with a history of medication overuse. Qual Life Res. 2014 May;23(4):1273-7. doi: 10.1007/s11136-013-0556-9. Epub 2013 Oct 16. PMID: 24129671.