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Original article

Quality of Life of Patients with Cervicogenic Headache: A Comparison with Migraine Patients without Aura Using MSQ v.2.1 Questionnaire

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Abstract

Purpose: Migraine-Specific Quality of life (MSQ) questionnaire v.2.1 is being used in practice to evaluate cervicogenic headache-specific quality of life. We aimed to provide evidence for validity and reliability of MSQ version 2.1 in cervicogenic patients compared to migraine. **Method:** A cross-sectional study included 30 cervicogenic (CGH) patients and 30 migraine patients without aura. All patients were diagnosed according to International Classification of Headache Disorders (ICHD-3). The inclusion criteria include adults aged 18–65 years without other causes of secondary headaches or other primary headaches patients. All patients were subjected to historical physical examination and structured MSQ questionnaire interviewing. Confirmatory factor analysis (CFA) was used with AMOS.V.26 to evaluate the latent structure with 3 dimensions of the MSQ.v.2.1 in CGH and migraine without aura. **Results:** Total scores of the MSQ with CGH patients were better than those of migraine without aura patients (mean±SD, 65.37±9.59 vs 51.63±5.41). Additionally, domain scores for "Role Restrictive" of patients with CGH were better than those of migraine. CFA model fits the input data into MSQ.v.2.1 questionnaire indicated by the fitness indices. All standardized path coefficients in CFA significantly exceeded 0.5, indicating good latent structure. Subgroup analysis of CFA showed significant difference between the groups (X^2 =21.4, p<0.001). The MSQ exhibited good discriminant validity (p<0.001), internal consistency reliability (α =0.9), and composite reliability (0.87). **Conclusion:** MSQ.v.2.1 is a reliable and valid tool to evaluate CGH-specific quality of life. Quality of life of CGH patients may be better than those with migraine among Egyptians.

Keywords: Cervicogenic headache, Migraine, MSQ, Quality of life.

Introduction

A cervicogenic headache (CGH) is a common chronic and recurrent headache that typically starts with a unilateral neck pain and may be radiate from the neck/back of the head up to the front of the head or behind the eye (1). However, in clinical practice, patients with bilateral headache may be acceptable (2).

CGH It was first described in 1983 by Sjaastad et al. [2]. Due to its significant overlap with migraine and a lack of easily applicable tests and diagnostic criteria, CGH is difficult to be diagnosed and treated. CGH is a chronic headache that arises from the atlanto-occipital and upper cervical joints and perceived in one or more regions of the head and/or face.(3).It may be aggravated by particular neck movements or sustained neck posture (4).

Associated symptoms include reduced range of motion (ROM) of the neck, and diffuse ipsilateral shoulder and arm pain. Other symptoms, such as photophobia, phonophobia, dizziness, blurred vision, nausea, and dysphagia, may coexist but are not predominant (5).The autonomic symptoms and signs, like photophobia and phonophobia, nausea and vomiting, and ipsilateral periocular edema are generally less common than in migraine (2). A diagnostic criteria was established in 1998 which includes 3 major components, head pain characteristics, other characteristics of some importance, and other features of lesser importance (6). Now the diagnostic criteria for CGH have been revised and modified in the third edition (beta version) of the International Classification of Headache Disorders (it is put under Headache attributed to neck disorders: 11.2.1 CGH) [1].

CGH prevalence seems to be common with a prevalence rate of 1–4.1% (7). Potential risk factors associated with CGH were reported to involve female sex (6),neck pain, limited cervical ROM, high Neck Disability Index score, and a diagnosis of cervical spondylotic myeloradiculopathy (8).

The impact of chronic headaches on patients ‘quality of life might be underscored (9). However, consensus exists that health-related Quality of Life (HRQoL) is a general and reliable tool (10). Quality of life assessment among patients with CGH was performed using different specific scales. A 36-Item Short Form questionnaire (SF-36) is a brief questionnaire providing a valuable instrument among different headache types which showed acceptable validity and reliability (11). It has been utilized in CGH in comparison to tension headache and migraine

and seemed reliable (12). The SF-36 has been also utilized in different types of headache including episodic migraine, chronic migraine, and CGH headache (13). Noteworthy, earlier migraine-specific instruments were developed such as a 15-item Migraine-Specific Quality of Life Questionnaire which comprises of five domains; work, social, vitality, migraine symptoms, and feelings (14). Another questionnaire instrument, namely "Migraine Specific Quality of Life (MSQ)", which is specific for migraine headache, was early developed with version 1.0 in 1998 by GlaxoWellcome Inc. to assess the effect of migraine and its treatment on the migraine-related quality of life, involving 16 questions (15).

It examines three dimensions; Role of Restrictive (RR), Role of Preventive (RP), and Emotional Function (EF). The instrument was demonstrated to be a reliable and valid tool to estimate the effect of migraine and its treatment on the patient's health-related quality of life (15). Soon, version 2.1 of the MSQ instrument was developed, involving 14 questions(16).The version 2.1 consists of three dimensions similar to version 1.0, but with less items as follows; seven items in the RR dimension, four items in the RP dimension, and three items in the EF dimension(16). Construct validity and reliability of the MSQ version 2.1 were demonstrated among migraine patients (16, 17). The construct validity was performed through correlation with SF-36 score. Furthermore, It seemed reliable and valid for patients undergoing prophylactic migraine treatment(18). Episodic migraine and chronic migraine also showed good internal reliability, test retest reliability, and discriminant validity (19). However, to the best of our knowledge, utilizing the MSQ 2.1 to assess quality of life of patients with CGH headache has not been well studied. Therefore, we aimed to provide evidence for validity and reliability of MSQ version 2.1 for use in CGH patients compared to migraine patients.

Patients and methods

Patients

A cross-sectional study was carried out at Menoufia student and employees' hospital and Menoufia University Hospital outpatient clinic during the period from February 2021 to February 2022. The Ethical Committee of the Benha University approved the study protocol (MD.3.3.2021, and written informed consent was obtained from all patients before starting the study. The study planned to recruit a total 60 patients with headache; 30

patients in each group. The sample size calculation was based on 80% power, 5% type I error, and sigma = 10. The inclusion criteria included adult patients with CGH or migraine without aura, age from 18 to 65 years old, Exclusion criteria included patients with other primary headaches and patients with other causes of secondary headaches (CNS infections, trauma, SOL, eye, teeth, ENT disorders, systemic diseases as hypertension – anima, or patients taking some drugs e.g. sildenafil or analgesics over use).

Assessment

Experienced neurologist made the various headache diagnoses. Diagnosis of CGH was based on ICHD-3 (beta) criteria (20) (international classification of headache disorders) and CHISG criteria (21) (CGH headache international study group), diagnosis of migraine without aura was performed based on ICHD-3 (beta). Patients fulfilled the inclusion criteria were face-to-face questioned with 14 items of the MSQ version 2.1.

All questions were asked in a simple and comprehensible way by the same neurologist to ensure consistency using structured interview. All items were checked for missing data before the patient left the hospital. The MSQ is widely used and exhibits good validity and reliability. It contains 14 items in 3 domains. The first domain, namely “RR”, consists of 7 questions as follows; family, leisure, activity, work, contract, tired, and energy. The second domain, namely “RP”, consists of 4 questions as follows; cancel, help, stop, and social. The third domain, namely “EF”, consists of 3 questions as follows; frustrated, burden, and afraid.

Statistical Methods

Demographic data and historical data were compared between the groups using Chi-square/Fisher exact test for qualitative type or independent samples t-test for quantitative type. Each dimension score in the MSQ version 2.1 was calculated as sum of its component items, expressed as mean ± SD (standard deviation), and compared using independent samples-test.

Confirmatory factor analysis (CFA) with second order models were used to assess reliability, validity, and factor loading of the MSQ in CGH headache and migraine headache. CFA-based subgroup analysis was used by comparing constrained and unconstrained models to test the difference between CGH headache and migraine in factor loading of the MQS. Validity was assessed as discriminant validity according to the method of CFA-based Chi-square

difference test (22). Reliability was measured as internal consistency of the total scales and subscales using Cronbach's alpha (23), and as CFA-based composite reliability according to the given method (24). All tests were conducted as 0.05 level of significance using the Statistical Package For The Social Sciences IBM® SPSS® v.26 (Armonk-USA) software for comparisons and AMOS v.26.

RESULTS

Patients

The study recruited 60 patients with headache who fulfilled the inclusion criteria, of them 30 patients had CGH headache and 30 patients had migraine headache. All patients were included in our final analysis. The recruited patients represented high diversity of genders, education levels, occupation levels, marital status, and monthly income as shown in table (1). Distributions of demographic and historical factors between the groups did not show significant difference. However, family history was more frequent in patients with migraine (73.3%) compared to patients with CGH headache (10%) ($p< 0.001$).

Quality of life assessment

The assessment of life quality in the form of means and standard deviations for each item of MSQ version 2.1 is shown in table (2). The subscale scores of the MSQ were obtained as a simple sum of Q1 – Q7 items of RR dimension, Q8 – Q11 items of RP dimension, and Q12 – Q14 items of EF dimension. The difference between the CGH headache and migraine headache in the three subscale scores was significant in the RR dimension and total score. However, the differences in RP dimension and EF dimension were not significant.

Results of the confirmatory factor analysis

The results of the second-order CFA conducted on all patients are shown in Figure (1). All path coefficients of the first-order and second-order factors were significant indicating good fit between the three-factor model and the observed data. The goodness-of-fit indices for the CFA were acceptable as follows: GFI = 0.791, AGFI =0.703, CFI = 0.902 and RMSEA = 0.1.The CFI value exceeds 0.90, indicating a good fit. The RMSEA value is close to 0.08 indicating a relatively good fit (the reasonable fit range is 0.05 – 0.08) [31].

Moreover, all factor loadings based on the three-factor model of the 14 items were higher than the general standard (0.4). CFA of subgroups showed that the model exerted better with the CGH group, where all path coefficients of the first-order and second-

order factors were significant and all factor loadings based on the three-factor model of the 14 items were higher than the general standard (0.4) (Figure 2 and 3). The goodness-of-fit indices for the CFA of subgroups were acceptable as follows: GFI = 0.686, AGFI =0.555, CFI = 0.632 and RMSEA = 0.12.The difference between the two groups was significant indicated by the difference between unconstrained model and measurement weights-constrained model with Chi-square of 21.446 (p = 0.029).

Internal reliability

The internal consistency of the 14-item MSQ was excellent: Cronbach's alpha = 0.9. The internal consistency of each conceptual dimension of the 14-item MSQ ranged from poor to excellent: RR dimension (Cronbach's alpha = 0.93), RP dimension (Cronbach's alpha = 0.67), and EF dimension (Cronbach's alpha = 0.56). This demonstrated excellent internal consistency reliability, indicating adequate interrelations between the items of the scale.

Composite reliability

The composite reliability of the 14-item MSQ was good (composite reliability = 0.87). It was calculated from the standardized path coefficients of the first and second-order factors.

Discriminant validity

Chi-square of the model with no correlation = 160.14, df = 77, p-value < 0.001. Chi-square of the model with correlation = 117.27, df = 74, p-value < 0.001. The difference between the two models has Chi-square = 42.87, df = 3, and p-value < 0.001 which means that the two constructs present discriminant validity (Figure 4).

Table 1: Sociodemographic data comparison

Variables	CVH (n = 30)		Migraine (n = 30)		*p*-value
Age (yrs), mean ± SD	45.0 ± 7.1		43.3 ± 6.5		0.38
Male, no. (%)	12	40.0	10	33.3	0.79
Residence, no. (%):					
Urban	12	40.0	17	56.7	0.197
Rural	18	60.0	13	43.3	
Level of education, no. (%):					
Illiterate	6	20.0	2	6.7	0.302
1ry school	2	6.7	1	3.3	
2ry school	15	50.0	15	50.0	
High education	7	23.3	12	40.0	
Occupation, no. (%):					
Office worker	7	23.3	11	36.7	0.514
Home worker	10	33.3	9	30.0	
Manual worker	13	43.3	10	33.3	
Marital state, no. (%):					
Single	5	16.7	9	30.0	0.633
Married	20	66.7	17	56.7	
Divorced	2	6.7	1	3.3	
Widowed	3	10.0	3	10.0	
Total monthly income, no. (%):					
Adequate	13	43.3	16	53.3	0.438
Inadequate	17	56.7	14	46.7	
F.H of same headache, no. (%):					
Yes	3	10.0	22	73.3	<0.001*
No	27	90.0	8	26.7	

CVH: Cervicogenic headache. Chi-square or Fisher exact test was used for the qualitative data comparison, independent samples t-test was used for age comparison. *: Significant p-value < 0.05.

Table 2: The 14 items of the 3 dimensional MSQ version 2.1 instrument results of the study group patients.

Items	**Migraine headache**		**Cervicogenic headache**		*p*-value
	Mean	**SD**	**Mean**	**SD**	
Q1	2.63	0.61	4.23	1.01	<0.001*
Q2	2.50	0.63	4.53	0.97	<0.001*
Q3	2.80	0.66	4.40	1.07	<0.001*
Q4	2.70	0.70	4.77	1.19	<0.001*
Q5	3.37	0.76	4.43	1.38	<0.001*
Q6	3.07	0.69	4.40	1.10	<0.001*
Q7	3.20	0.66	4.97	0.85	<0.001*
RR score	20.27	2.48	31.73	5.83	<0.001*
Q8	3.83	1.23	4.73	0.91	0.02
Q9	3.97	1.35	4.53	1.17	0.09
Q10	5.20	0.61	5.17	0.87	0.86
Q11	5.10	0.71	4.93	0.94	0.44
RP score	18.10	2.87	19.37	2.92	0.09
Q12	4.43	1.14	4.83	0.99	0.15
Q13	4.17	1.05	4.70	0.95	0.04
Q14	4.67	0.88	4.73	1.08	0.79
EF score	13.27	2.07	14.27	2.35	0.09
Total score	51.63	5.41	65.37	9.59	<0.001*

CVH; cervicogenic headache, EF; emotional function, RP; role preventive, RR; role restrictive, SD; Standard deviation. Each dimension value was obtained by summing its item values. The comparisons were conducted using independent samples-test at 0.05 level of significance. *: Significant p-value

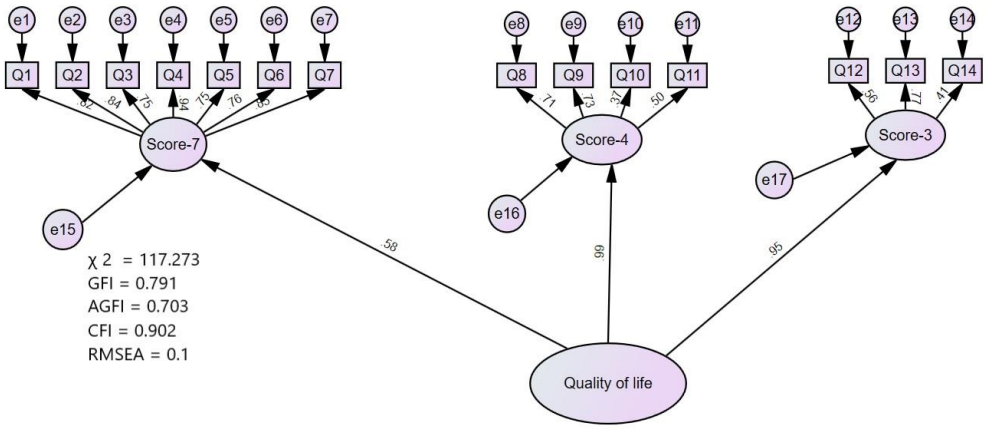

Figure 1: Results of the confirmatory factor analysis of The 14-item Migraine Specific Quality of Life (MSQ) in Egyptian patients with CGH headache or migraine headache. GFI: goodness-of-fit index; AGFI: adjusted GFI; CFI: comparative fit index; RMSEA: root mean square error of approximation.

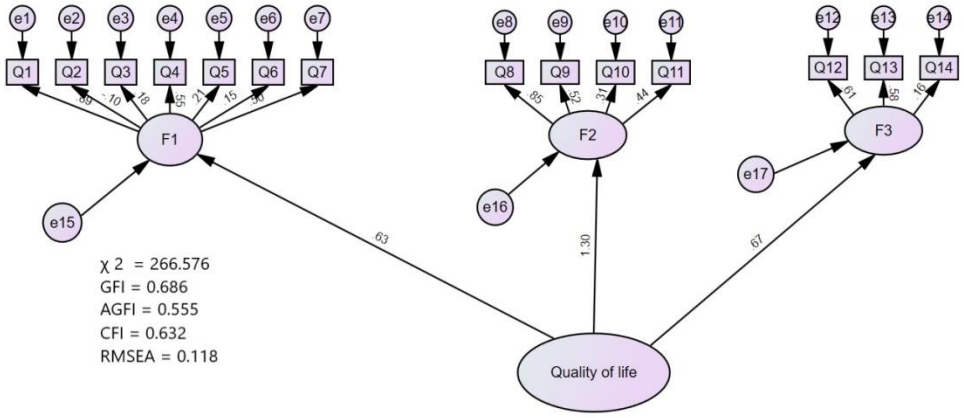

Figure 2: Results of the confirmatory factor analysis of The 14-item Migraine Specific Quality of Life (MSQ) in Egyptian patients with migraine headache. GFI: goodness-of-fit index; AGFI: adjusted GFI; CFI: comparative fit index; RMSEA: root mean square error of approximation.

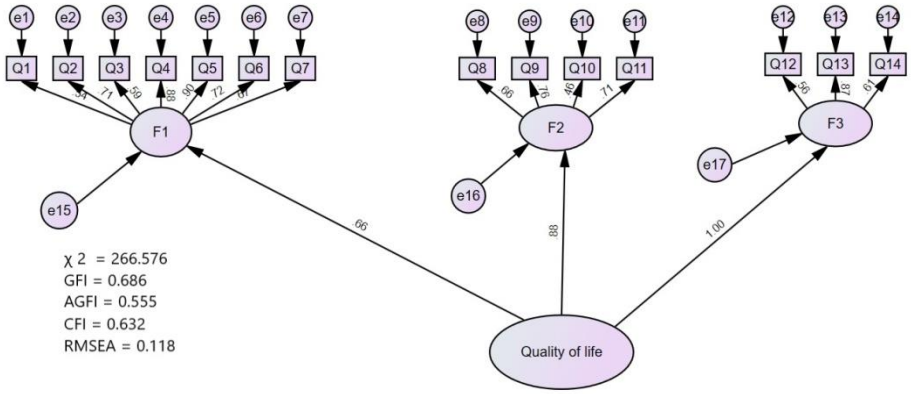

Figure 3: Results of the confirmatory factor analysis of The 14-item Migraine Specific Quality of Life (MSQ) in Egyptian patients with CGH headache. GFI: goodness-of-fit index; AGFI: adjusted GFI; CFI: comparative fit index; RMSEA: root mean square error of approximation.

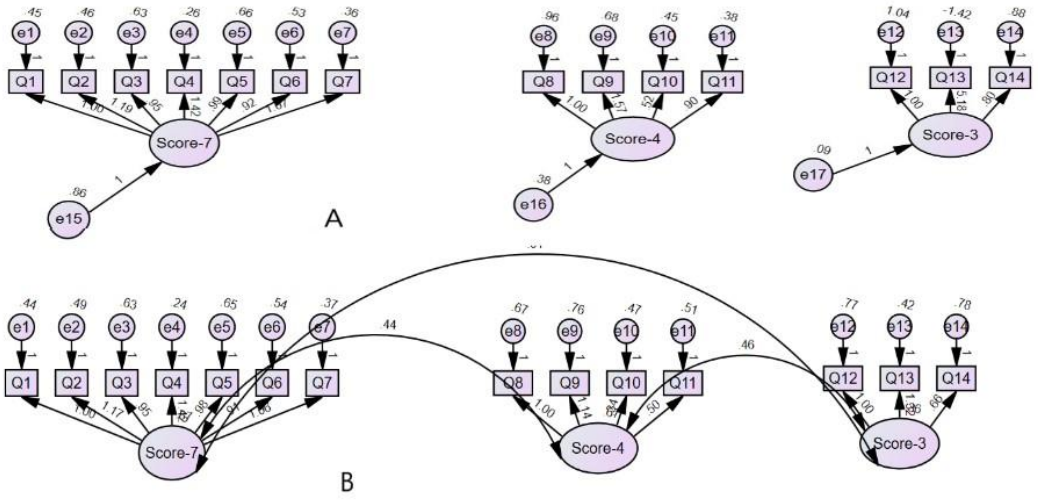

Figure 4: Confirmatory factor analysis-based assessing discriminant validity through comparing the correlated (B) and uncorrelated (A) models

Discussion

To the best of our knowledge, this is the first study to evaluate the MSQ v2.1 in assessing CGH-specific quality of life. The study used the second order CFA to assess usefulness, reliability, and validity of the instrument in CGH. The findings support the reliability and validity of the MSQv2.1 for assessing the quality of life specific to CGH patients compared to migraine patients. Our findings contribute to the literature by providing the

usefulness of MSQ version 2.1 for CGH patients, enhancing our ability to evaluate CGH-related quality of life in many more Egyptians with CGH.

The MSQv2.1 demonstrated satisfactory internal consistency among CGH and migraine patients (overall Cronbach's alpha > 0.8), consistent with previous reports that documented reliability and validity of the version 2.1 of the MSQ questionnaire (16, 17, 25)

Moreover, we used multiple approaches to establish the validity and reliability of the MSQv2.1 in patients with CGH and migraine, in terms composite reliability (coefficient > 0.8), discriminant validity ($p < 0.001$), and good latent structure (all factor loading in the CFA were higher than 0.5 and $p < 0.05$, ensuring the adequacy of the factorial model structure). Additionally, the CFA model showed good fitness indicated by the fit indices, including Chi-square test, GFI, AGFI, CFI, RMSEA. Subgroup analysis performed by CFA showed better performance with CGH than migraine.

In agreement with our findings, multiple studies have demonstrated good validity and reliability of the MSQ v.2.1 in patients with migraine. A study evaluating the usefulness of MSQ v.2.1 in chronic migraine using CFA reported that the discriminant validity, convergent validity, and internal consistency reliability were good(17).Another study aimed to evaluate the MSQ instrument in chronic and episodic migraine in 9 countries. The study found good internal consistency reliability, construct validity, and discriminant validity of MSQ. The questionnaire could differentiate between chronic and episodic migraine in the functional impact, and help researchers in testing treatment efficacy by obtaining MSQ input directly(26).The MSQ v.2.1 was also reported to be useful in evaluating a migraine education program named “the Mercy Migraine Management Program (MMMP)” in reducing headache days, and improving migraine-related quality of life(27).

On the other hand, another questionnaire named SF-36 was utilized to evaluate quality of life in cervicogenic headache compared to migraine and tension headache(12). The study reported that the CGH-specific quality of life was comparable to migraine and tension headache with some differences, which agreed with our findings. However, the study considered the SF-36 instrument valid and reliable in CGH based on its ability in different headache syndromes.

Limitations

The study faced some important limitations that should be addressed when interpreting the results. First, we did not evaluate the convergent validity of the MSQv.2.1 as we have not found another valid questionnaire to correlate with. Second, patients were consecutively recruited from the neurology department of Menoufia University Hospital. Therefore, the sample may not reflect all population with migraine in Egypt. Third, the relatively small sample size used in this study negatively affects CFA fit indices.

Conclusion

Migraine Specific Quality of Life (MSQ) version 2.1 questionnaire is reliable and valid tool to evaluate cervicogenic-specific quality of life. Quality of life of cervicogenic headache patients may be better that in migraine patients. Further studies are required with larger sample size to compare MSQ v.1.2 with different instruments in validity and reliability to evaluate cervicogenic-specific quality of life.

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