



Original Article

Psychiatric symptoms may contribute to poor quality of life in adolescents with migraine

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Abstract **Background:** The impact of migraine on quality of life (QOL) can be aggravated by other comorbid factors. The aim of the present study was to assess the differences in the QOL of adolescents with chronic migraine, episodic migraine, and healthy adolescents, and whether the differences in QOL among the diagnostic groups were associated with the presence of self-reported psychiatric symptoms, such as depression and anxiety.

Methods: A total of 157 adolescents (aged 15–19 years old) were included in the study. Fifty patients had episodic migraine, 56 patients suffered from chronic migraine, and 51 healthy adolescents were controls. All of the participants responded to a detailed headache questionnaire, the Medical Outcomes Trust 36-Item Short-form Health Survey, the State-Trait Anxiety Inventory and the Beck Depression Inventory.

Results: Chronic migraine patients showed a significantly lower QOL than the control subjects in five dimensions of the Medical Outcomes Trust 36-Item Short-form Health Survey, and lower QOL than the episodic migraine patients in four dimensions. High levels of self-reported depressive symptoms were associated with lower QOL in five dimensions and high levels of self-reported anxiety were associated with lower QOL in four dimensions.

Conclusions: The QOL of adolescent migraine sufferers may be aggravated not only by migraine but also by other factors, such as anxiety and depressive symptoms, which may contribute to the poor QOL in adolescents suffering from migraine.

Key words adolescents, comorbidity, headache, migraine, quality of life.

The prevalence of migraine has been progressively increasing in childhood and adolescence,^{1,2} and the impact of migraine on the quality of life (QOL) of children and adolescents is considerable because the disease usually appears during this stage of development.^{3,4} The negative effects on QOL that a migraine causes in the lives of affected individuals are well supported by previous studies, which demonstrate that migraine contributes to reduced QOL of adult migraine sufferers.^{3,5–7} In contrast, few studies have assessed the impact of migraine on the QOL of children and adolescents. To the best of our knowledge, no study has evaluated migraine, QOL and psychiatric symptoms in adolescents.

The purpose of the present study was to assess differences in the QOL of adolescents with migraine (chronic and episodic) and that of healthy adolescents. In addition, we wanted to identify whether differences in the QOL among the diagnostic groups

could be associated with the presence of self-reported psychiatric symptoms (depression and anxiety).

Methods

The present study was conducted in the child neurology clinic at the Federal University of São Paulo, São Paulo, Brazil. A total of 157 adolescents (aged 15–19 years old) were included in the study: 50 patients had episodic migraine (EM), 56 patients suffered from chronic migraine (CM) and 51 healthy adolescents served as controls (CO).

The patients were referred by pediatricians from the university's adolescent clinic service for the evaluation of their headache symptoms. The control adolescents were recruited in schools, exhibited similar age ranges and did not report previous diseases.

The migraine diagnosis was performed according to the diagnostic criteria of the *International Classification of Headache Disorders*, Second Edition (ICHD-2).⁸ Chronic migraine was defined according to the 2006 appendix criteria that recognizes as headache (tension-type and/or migraine) present on ≥ 15 days per month for at least 3 months and headache present on ≥ 8 days per

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month for at least 3 months that fulfill criteria for pain and associated symptoms of migraine without aura. Episodic migraine was considered as headache present on ≤ 15 days per month.⁹

To obtain uniformity in the diagnoses in the chronic migraine group, only adolescents with migraine were selected and we excluded those that had presented another primary headache as tension-type headache. Other exclusion criteria were chronic diseases, secondary headaches, continuous usage of preventive medication, drug addiction or abusive alcohol use and, in control subjects, migraine or any other primary headaches. All of the subjects or their guardians provided written consent for the experimental procedure, which was approved by the Ethics Committee of the Federal University of São Paulo.

All participants underwent a physical evaluation and responded to a detailed headache questionnaire. In addition, the participants answered the Medical Outcomes Trust 36-Item Short-form Health Survey (SF-36), the State-Trait Anxiety Inventory (STAI) and the Beck Depression Inventory (BDI).

To assess the impact of migraine on QOL, we used the SF-36 questionnaire, which is commonly used in the evaluation of patients with migraine. The SF-36 is a self-administered, 36-item questionnaire that measures health-related functions in eight QOL domains: physical functioning, physical role, bodily pain, vitality, general health, social functioning, emotional role and mental health. After summing the items in the SF-36, each scale was later standardized such that it ranged from 0 (lowest level of functioning) to 100 (highest level). The Brazilian-Portuguese version of the SF-36 questionnaire has been psychometrically tested with satisfactory reliability.^{10,11}

To evaluate anxiety symptoms, we used the STAI-Trait (STAI-T). The anxiety trait refers to the differences in the tendency to react to situations that are perceived as threatening (with elevations in the intensity of the symptoms).^{12,13} The scales are considered to be reliable scales to assess an individual's disposition, state of anxiety and response to stressful situations. The total score in this scale can range from 20 to 80; higher values obtained on these scales indicate higher anxiety. For the present analysis, the anxiety symptom levels were classified into low levels (scores ≤ 49), which include mild and moderate anxiety, and high levels (scores ≥ 49), which include significant levels of anxiety.¹³

We used the BDI, which is a 21-item scale, to evaluate depressive symptoms.¹⁴ The total score of the individual items (maximum 63 points) allows for the classification of the levels of severity of depression; higher BDI scores are associated with higher levels of depression.^{15,16} In the present study, the depressive symptoms were classified as low levels (scores ≤ 20), which include non-depressive and mild depression, and high levels (scores ≥ 20), which include significant levels of depression.¹⁴

Data analysis

χ^2 -tests were used for the comparisons of categorical data among the three diagnostic groups.

The mean of the SF-36 domains was compared among the diagnostic groups using ANOVA models. Whenever the ANOVA

showed significant differences, a Bonferroni multiple comparison procedure was used to verify the differences between the groups. ANCOVA models were used to compare the mean scores for the SF-36 domains among the diagnostic groups after controlling for demographic characteristics (age and sex) and psychiatric symptoms (BDI and STAI-T levels). Ninety-five percent confidence intervals were calculated for the differences between the means. All of the tests were two-tailed.

A *P*-value of less than 0.05 was used to indicate statistical significance unless otherwise indicated in the tables. Statistical analyses were performed using the statistical package SPSS 17 for Windows (SPSS, Chicago, IL, USA).

Results

Demographic characteristics and psychiatric symptoms of migraine

The three diagnostic groups were different with respect to the sex distribution; the proportion of girls within the CM group was higher than the other groups ($\chi^2[2] = 9.71$, $P = 0.008$, female proportion CO: 59%, EM: 54% and CM: 82%), as seen in Table 1. In relation to mean age, in this sample, the healthy volunteers were older than the patients with chronic migraine and episodic migraine, but patients with chronic migraine had a similar mean age as the episodic migraine patients ($F_{(2,154)} = 9.60$, $P < 0.001$, CO = 18.4 ± 1.9 , EM = 16.5 ± 1.5 and CM = 16.3 ± 1.2 years old.).

Higher levels of depressive symptoms ($\chi^2[2] = 7.99$, $P = 0.018$) and anxiety symptoms ($\chi^2[2] = 10.20$, $P = 0.006$) were observed in the patients with CM compared with the EM and CO groups.

Migraine and QOL

As shown in Table 1, in the unadjusted comparisons (ANOVA) regarding the QOL SF-36 domains, all omnibus tests disclosed significant differences among the diagnostic groups: physical role ($F_{(2,154)} = 21.64$, $P < 0.001$), bodily pain ($F_{(2,154)} = 18.92$, $P < 0.001$), general health ($F_{(2,154)} = 12.51$, $P < 0.001$), social functioning ($F_{(2,154)} = 18.01$, $P < 0.001$), emotional role ($F_{(2,154)} = 16.74$, $P < 0.001$), physical functioning ($F_{(2,154)} = 3.56$, $P = 0.031$), vitality ($F_{(2,154)} = 6.52$, $P = 0.002$) and mental health ($F_{(2,154)} = 3.37$, $P = 0.037$). Table 1 also shows the post-hoc analysis for the group-by-group comparisons of the SF-36 domains. The post-hoc analysis showed that patients with CM had significantly lower scores than the CO group in physical role ($P < 0.001$), bodily pain ($P < 0.001$), general health ($P < 0.001$), social functioning ($P < 0.001$), emotional role ($P < 0.001$), physical functioning ($P = 0.026$), and vitality ($P = 0.034$). In addition, the CM patients showed worse scores than the EM subjects in physical role ($P < 0.001$), general health ($P < 0.001$), social functioning ($P < 0.001$), emotional role ($P < 0.001$) and vitality ($P = 0.002$) domains. Moreover, the scores from the control adolescents were significantly higher than the episodic migraine adolescents in bodily pain ($P < 0.001$). However, mental health did not differ between the groups in the post-hoc analysis.

Table 1 Results of the ANOVA and ANCOVA models for each domain of the SF-36 using migraine diagnosis as the main factor and adjusting for age, sex, and levels of depressive and anxiety trait symptoms

SF-36 domain	Group	Unadjusted (ANOVA)				Adjusted (ANCOVA)					
		Mean	SE	Group comparison	95%CI (mean difference)	P	Mean [†]	SE	Group comparison	95%CI (mean difference)	P
Physical role	CO	86.3	4.5	CO-EM	[-5.3; 25.8]	0.335	69.5	4.9	CO-EM	[-2.7; 25.2]	0.157
	EM	76.0	4.6	CO-CM	[24.3; 54.5]	<0.001*	58.2	4.7	CO-CM	[16.8; 47.1]	<0.001*
	CM	46.9	4.3	EM-CM	[13.9; 44.3]	<0.001*	37.5	4.4	EM-CM	[6.3; 35.1]	0.002*
					F = 21.64	<0.001			F = 13.30	<0.001*	
Bodily pain	CO	69.3	1.3	CO-EM	[5.0; 14.0]	<0.001*	70.4	1.7	CO-EM	[5.3; 14.6]	<0.001*
	EM	59.8	1.3	CO-CM	[5.7; 14.5]	<0.001*	60.4	1.6	CO-CM	[6.0; 16.2]	<0.001*
	CM	59.2	1.3	EM-CM	[-3.8; 5.0]	1.000	59.3	1.5	EM-CM	[-3.7; 6.0]	1.000
					F = 18.92	<0.001			F = 18.13	<0.001*	
General health	CO	75.3	2.8	CO-EM	[-7.0; 12.1]	1.000	69.0	3.2	CO-EM	[-4.5; 13.3]	0.712
	EM	72.8	2.8	CO-CM	[8.3; 26.9]	<0.001*	64.6	3.0	CO-CM	[5.1; 24.5]	0.001*
	CM	57.7	2.6	EM-CM	[5.8; 24.4]	<0.001*	54.2	2.8	EM-CM	[1.2; 19.6]	0.021*
					F = 12.51	p < 0.001			F = 7.15	0.001	
Social functioning	CO	86.0	2.9	CO-EM	[-4.1; 16.1]	0.450	78.5	3.2	CO-EM	[-0.4; 17.6]	0.066
	EM	80.0	3.0	CO-CM	[13.5; 33.1]	<0.001*	69.9	3.1	CO-CM	[9.8; 29.3]	<0.001*
	CM	62.7	2.8	EM-CM	[7.4; 27.1]	<0.001*	59.0	2.9	EM-CM	[1.6; 20.3]	0.015*
					F = 18.01	<0.001			F = 11.70	<0.001*	
Emotional role	CO	89.5	5.0	CO-EM	[-6.2; 28.0]	0.377	75.9	5.4	CO-EM	[-0.6; 30.0]	0.063
	EM	78.7	5.0	CO-CM	[21.7; 55.0]	<0.001*	61.2	5.2	CO-CM	[17.2; 50.5]	<0.001*
	CM	51.2	4.7	EM-CM	[10.8; 44.2]	<0.001*	42.0	4.8	EM-CM	[3.3; 35.0]	0.012*
					F = 16.74	0.001			F = 12.17	<0.001*	
Physical functioning	CO	88.5	2.3	CO-EM	[-4.1; 12.0]	0.719	86.1	2.9	CO-EM	[-2.7; 13.4]	0.336
	EM	84.6	2.4	CO-CM	[0.8; 16.5]	0.026*	80.8	2.8	CO-CM	[-1.2; 16.4]	0.114
	CM	79.9	2.2	EM-CM	[-3.2; 12.6]	0.455	78.5	2.6	EM-CM	[-6.1; 10.7]	1.000
					F = 3.56	0.031			F = 2.38	0.096	
Vitality	CO	66.1	2.9	CO-EM	[-13.6; 6.3]	1.000	57.7	3.0	CO-EM	[-9.2; 7.7]	1.000
	EM	69.7	2.9	CO-CM	[0.6; 20.0]	0.034*	58.5	2.9	CO-CM	[-3.6; 14.8]	0.429
	CM	55.8	2.8	EM-CM	[4.2; 23.6]	0.002*	52.2	2.7	EM-CM	[-2.4; 15.0]	0.249
					F = 6.52	0.002			F = 1.70	0.186	
Mental health	CO	64.2	1.3	CO-EM	[-5.0; 3.8]	1.000	62.0	1.6	CO-EM	[-5.8; 3.2]	1.000
	EM	64.9	1.3	CO-CM	[-0.7; 7.9]	0.132	63.3	1.5	CO-CM	[-3.5; 6.3]	1.000
	CM	60.6	1.2	EM-CM	[-0.1; 8.5]	0.055	60.6	1.4	EM-CM	[-2.0; 7.4]	0.490
					F = 3.37	0.037			F = 0.989	0.374	

*Statistical significance. [†]Centered at the age of 16.3 years. CM, chronic migraine; CO, controls; EM, episodic migraine; SF-36, Medical Outcomes Trust 36-Item Short-form Health Survey.

Table 2 Results of the ANCOVA models for the comparisons of the BDI groups in each domain of the SF-36 after adjusting for age, sex, diagnosis and STAI-T levels

SF-36 domain	BDI level	Mean [†]	SE	Group comparison	95%CI (mean difference)	F	P
Physical role	Low	74.2	3.0	Low–high	[25.4; 51.3]	34.26	<0.001*
	High	35.9	5.7				
Bodily pain	Low	61.8	1.0	Low–high	[-7.4; 1.2]	1.96	0.163
	High	64.9	1.9				
General health	Low	70.5	1.9	Low–high	[7.5; 24.3]	14.31	<0.001*
	High	54.7	3.6				
Social functioning	Low	77.1	1.9	Low–high	[7.6; 24.3]	14.15	0.001*
	High	61.1	3.7				
Emotional role	Low	76.8	3.4	Low–high	[19.9; 48.4]	2.53	0.001*
	High	42.6	6.3				
Physical functioning	Low	84.0	1.8	Low–high	[-3.2; 11.8]	1.27	0.261
	High	79.7	3.3				
Vitality	Low	62.0	1.8	Low–high	[4.0; 19.7]	9.00	0.003*
	High	50.1	3.5				
Mental health	Low	64.0	0.1	Low–high	[-0.1; 8.3]	3.89	0.050
	High	59.9	1.8				

*Statistical significance. [†]Centered at the age of 16.3 years. BDI, Beck Depression Inventory; SF-36, Medical Outcomes Trust 36-Item Short-form Health Survey; STAI-T, State–Trait Anxiety Inventory-Trait.

Migraine, demographic characteristics, psychiatric symptoms and QOL

The results of the unadjusted ANOVA were contrasted to ANCOVA using age, sex, and levels of depressive and anxiety trait levels as covariates (Table 2). No significant differences were found in physical functioning ($F_{(2,150)} = 2.38$, $P = 0.096$), vitality ($F_{(2,150)} = 1.70$, $P = 0.186$) and mental health ($F_{(2,150)} = 0.99$, $P = 0.374$) after adjusting for age, sex, depressive and anxiety levels. Conversely, using the same procedure, significant differences were found among the three groups for the following five dimensions of the SF-36: physical role ($F_{(2,150)} = 13.30$, $P < 0.001$), bodily pain ($F_{(2,150)} = 18.13$, $P < 0.001$), general health ($F_{(2,150)} = 7.15$, $P = 0.001$), social functioning ($F_{(2,150)} = 11.70$, $P < 0.001$) and emotional role ($F_{(2,150)} = 12.17$, $P < 0.001$). The post-hoc analysis showed that the chronic migraine patients maintained a significantly lower QOL than the control subjects in five dimensions of the SF-36: physical role, bodily pain, general health, social functioning and emotional role (all $P < 0.001$); and they showed lower QOL than the EM patients in four dimensions: physical role ($P = 0.002$), general health ($P = 0.021$), social functioning ($P < 0.015$) and emotional role ($P = 0.012$). The controls had a significantly higher QOL than the EM patients in one dimension: bodily pain ($P < 0.001$).

The comparisons of the BDI groups (low, high) in each domain of the SF-36 after adjusting for age, sex, diagnosis and STAI-T levels are presented in Table 2. A high level of self-reported depressive symptoms was associated with lower QOL in five dimensions: physical role ($F_{(1,150)} = 34.26$, $P < 0.001$), general health ($F_{(1,150)} = 14.31$, $P < 0.001$), social functioning ($F_{(1,150)} = 14.15$, $P < 0.001$), emotional role ($F_{(1,150)} = 2.53$, $P < 0.001$), and vitality ($F_{(1,150)} = 9.00$, $P = 0.003$). Similarly, the comparisons of the STAI-T groups (low, high) in each domain of the SF-36 after adjusting for age, sex, diagnosis and BDI levels are presented in Table 3. High levels of self-reported anxiety were associated with lower QOL in four dimensions, regardless of the study group and

demographics: social functioning ($F_{(1,150)} = 11.35$, $P = 0.001$), emotional role ($F_{(1,150)} = 4.45$, $P = 0.037$), physical functioning ($F_{(1,150)} = 3.90$, $P = 0.049$) and vitality ($F_{(1,150)} = 35.80$, $P < 0.001$).

Given these results, treating individuals with high BDI levels, regardless of the diagnosis, would improve the QOL in five domains, while treating high STAI levels would improve QOL in four domains, but chronic migraine patients would only re-establish control levels of QOL in the vitality domain.

Discussion

The assessment of the QOL of children and adolescents with chronic disorders has gained prominence.⁴ The first studies about health-related QOL in migraine sufferers only evaluated the chronic condition and did not examine the correlations between migraine, QOL and comorbid factors (i.e., psychological disorders that could contribute to reducing the QOL in individuals with migraine). Thus, measuring QOL and identifying factors that can reduce QOL, such as psychiatric symptoms, are important approaches to the evaluation of the burden of migraine.

The present study showed statistically significant differences in most domains of QOL as measured by the SF-36 between adolescent groups. Compared with the control group, the subjects who were suffering from migraine appeared to be most affected in terms of reduction of QOL scores. These findings are in accordance with those of other studies in adolescents, which have demonstrated that headache is associated with reduced QOL.^{1,17,18}

The adolescents with CM showed significantly worse scores on the SF-36 scale (physical role, general health, vitality, social functioning and emotional role) than the other groups. These data suggest that the impact of migraine on the QOL of patients may be directly related to the frequency of the headaches.

The physical role, bodily pain and vitality aspects are the most frequent aspects affected in studies that measure QOL in patients with migraine.^{5,19} In the present study, the bodily pain measure did not differ between the migraine groups but was better in the

Table 3 Results of the ANCOVA models for the comparisons of the STAI-T groups in each domain of the SF-36 after adjusting for age, sex, diagnosis and BDI levels

SF-36 domain	STAI-T level	Mean [†]	SE	Group comparison	95%CI (mean difference)	F	P
Physical role	Low	59.6	3.7	Low–high	[–1.6; 19.9]	2.82	0.095
	High	50.5	4.6				
Bodily pain	Low	64.0	1.2	Low–high	[–2.2; 4.9]	0.53	0.465
	High	62.7	1.5				
General health	Low	65.7	2.4	Low–high	[–0.1; 13.0]	3.13	0.079
	High	59.5	2.9				
Social functioning	Low	75.0	2.4	Low–high	[4.9; 18.8]	11.35	0.001*
	High	63.1	2.9				
Emotional role	Low	66.0	4.1	Low–high	[0.1; 24.5]	4.45	0.037*
	High	53.4	5.0				
Physical functioning	Low	85.0	2.2	Low–high	[0.1; 12.6]	3.90	0.049*
	High	78.7	2.7				
Vitality	Low	66.0	2.3	Low–high	[13.2; 26.3]	35.80	<0.001*
	High	46.2	2.8				
Mental Health	Low	62.1	1.2	Low–high	[–3.2; 3.7]	0.019	0.891
	High	61.9	1.5				

*Statistical significance. †Centered at the age of 16.3 years. BDI, Beck Depression Inventory; SF-36, Medical Outcomes Trust 36-Item Short-form Health Survey; STAI-T, State–Trait Anxiety Inventory–Trait.

control group (healthy adolescents), whereas the physical role and vitality domain scores were significantly lower in the chronic migraine group compared with the other groups.

Studies of the QOL of patients with migraine have reported that patients who suffer from migraines work at a low level of functional capacity, which is often associated with disruptions in the workplace.⁴ For children and adolescents, the school impact is the most common measure that could represent this domain. Several studies have reported that the major repercussions of the functional impact of migraine in the life of young migraine sufferers are poor school performance, high rates of school absenteeism, poor school skills and a reduced performance in social and leisure activities (e.g., play and sports).^{4,19–21}

In the present results, the adolescents with CM had worse scores in the physical functioning domain compared with the control group. The data support the view that the presence of chronic headache disorders is associated with significant limitations in a patient's functional status compared with the healthy population. Importantly, functional disability may be influenced by the frequency of attacks, the intensity of pain and/or other symptoms related to migraine.^{22,23}

Many recent studies have shown that the QOL of individuals who suffer from migraines can progressively decrease, and there can be a progressive change in the frequency and characteristics of the crisis (e.g., chronic migraine and transformed migraine).^{24,25} A study using the SF-36 evaluated the impact of migraine on the QOL of patients with migraine and chronic daily headaches and concluded that the patients with chronic daily headaches had worse scores on QOL for physical functioning, other physical aspects, pain, and perceptions of general health and mental health compared with the patients with migraine.⁵

Although psychiatric comorbidities may be present independent of chronic illness, the association between psychiatric comorbidities and chronic illness might result in an important burden to the affected individuals. Regardless of the presence of

chronic illness, a local study estimated the prevalence of psychiatric diagnoses in patients older than 14 years and observed that anxiety had the highest prevalence (up to 18%), whereas depression ranged from <3% to 10%.²⁶

Psychiatric disorders have a bidirectional relationship with migraine, particularly anxiety and depression. Anxiety disorders may appear in early childhood or adolescence and precede the onset of migraine; however, anxiety disorders may be followed by the development of depression.^{27–29} Children and adolescents with migraine also have a risk of developing other physical and psychiatric morbidities in adulthood, but few studies have examined the impact of psychiatric symptoms, such as anxiety and depression symptoms, in these patients.¹⁷

In the present study, adolescents with CM showed significantly higher levels of depressive and anxiety trait symptoms than the other groups of subjects. These findings are in accordance with studies that have shown that psychiatric disorders affect the QOL of patients with chronic migraine and suggest that psychiatric disorders could trigger or be a psychological reaction to recurrent and severe migraine attacks.³⁰

Although psychiatric disorders can increase the risk of migraine, migraine can also subsequently increase psychiatric disorders.³¹ Studies have attempted to demonstrate the mechanism of this relationship by examining the overuse of medication, serotonergic dysfunction, and the effects of ovarian hormonal fluctuations on central sensitization.³²

Depression seems to be more common in patients with migraine than with other chronic diseases. Approximately half of the patients with depressive disorders have reported headaches during or after a depressive episode. Other studies have also observed a relation between depressive symptoms and QOL using the SF-36 and observed that depression is associated with chronic pathological conditions in approximately half of the patients (all of the patients had low scores on the SF-36).³³

A previous study demonstrated a close relation between migraine and psychiatric disorders and revealed that patients with migraine were more susceptible to episodes of depression.³⁴ Interestingly, a study from the USA showed that depression predicted a greater headache impact for patients with episodic and chronic migraine, whereas anxiety was a predictor for a greater impact of headache on the episodic migraine group.³⁵

The tension-type headache affects not only adults; children and adolescents are frequently affected (about 15–20%), and the association between psychiatric symptoms and type of headache might vary.³⁶ A meta-analysis that evaluated the presence of internalizing (mainly anxiety and depression) and externalizing (mainly behavioral problems) symptoms in different types of headache compared to healthy controls concluded that psychopathological symptoms affect children with migraine, but also children with tension-type headache, and there were no differences between them.³⁷

In contrast, another study showed that children with migraine had significantly higher levels of total, internalizing and somatic symptoms, as well as social and family problems, than those without headache and they had higher levels of somatic symptoms than children with tension-type headache; however, children with tension-type headache had significantly higher levels of somatic symptoms and family problems than those without headache.³⁸

Regarding children and adolescents, a prospective epidemiological study examined the association between major depression and headache from late childhood into early adulthood and concluded that headache was approximately twice as common in depressed adolescents compared with non-depressed adolescents.^{38,39} Egger and colleagues reported striking differences in the outcomes for individuals with anxiety and depression, and these researchers found that depressive girls reported more frequent headaches and more profound effects on their lives as a result of headaches than did anxious girls.⁴⁰

When controlled for the presence of depressive and anxiety symptoms, the present results showed that chronic migraine patients had a significantly worse QOL than the control patients in five dimensions of the SF-36 (physical role, bodily pain, general health, social functioning and emotional role) and a worse QOL than the EM patients in four of the dimensions (physical role, general health, social functioning and emotional role). In summary, migraine has repercussions that are important for physical, social and emotional aspects of a patient's life.

We observed a lower score in the bodily pain domain for the CM and EM patients compared with the control group. These data support the view that patients with migraine who have headache attacks show greater effects in the bodily pain dimension compared with the healthy population.

Interestingly, the vitality domain initially showed a significant difference between the episodic and chronic migraine groups, but the results were not significant after adjustment for age, sex, and levels of depressive and anxiety trait symptoms. These findings question whether the vitality is equally affected among adolescents, regardless of diagnosis, when controlled for psychiatric symptoms.

Among the domains that were different in terms of QOL between the study groups, we observed that a high level of self-reported depressive symptoms was associated with a worse QOL in four dimensions (physical role, general health, social functioning and emotional role), whereas a high level of self-reported anxiety was associated with a worse QOL in two dimensions (social functioning and emotional role), regardless of the study group and the demographics.

A previous study from Taiwan that used the SF-36 showed that the presence of migraine predicted a significantly negative impact in all of the physical subscales of the SF-36 after controlling for depression, age and sex.⁴¹ The present results showed that self-reported depressive symptoms were associated with a major negative impact on QOL (major number of domains affected) compared with anxiety symptoms. The association between migraine and anxiety disorders appears to be an important topic in most of the studies in children and adolescents with migraine, and the impact of depressive symptoms on the life of migraine sufferers may be detrimental.⁴²

The present investigation was the first study to show an association between the QOL of adolescents who suffered from migraine (chronic and episodic) and psychiatric symptoms. There is evidence to suggest that adolescents with chronic migraine exhibit symptoms indicative of a comorbid psychological condition. However, it is evident from the research presented that a considerable number of adolescents who experience recurrent headaches exhibit a poor QOL influenced by chronic pain and psychiatric symptoms (anxiety and depression).

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