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Impact of Bilaterality and Headache on Health-Related Quality of Life in Meniere's Disease

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Objectives: We analyzed the impact of bilaterality and headache on the health-related quality of life (HRQL) of patients with Meniere's disease (MD).

Methods: A case series including 86 patients with a diagnosis of definite MD according to the American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) diagnostic criteria was evaluated by the Short Form 36 (SF-36) Health Instrument and the Dizziness Handicap Inventory Short Form (DHI-S).

Results: The scores on all scales of the SF-36 were significantly lower for bilateral MD than for unilateral cases, except for body pain. Both groups had scores worse than those of their sex- and age-matched normative population on all SF-36 scales ($p = 0.017$ to $p = 0.0001$), except for body pain in men. The DHI-S scores were also better for unilateral than for bilateral cases ($p = 0.04$), suggesting that the dizziness is perceived to be more disabling in bilateral MD. Migraine was significantly associated with bilateral MD (odds ratio, 3.58 [95% confidence interval, 1.25 to 10.31]; $p = 0.021$). Headache and score on the AAO-HNS functional scale, which evaluates the effect of vertigo attacks on daily activities, were two independent factors that explained a great part of the variability on all SF-36 scales, except for "role emotional" in bilateral MD.

Conclusions: Patients with bilateral MD perceived their dizziness to be more disabling and had a worse HRQL than did patients with unilateral MD. Migraine was more frequently found in patients with bilateral involvement. Headache and score on the AAO-HNS functional scale were factors associated with the HRQL in bilateral MD.

Key Words: Dizziness Handicap Inventory, migraine, outcome study, quality of life, recurrent vertigo, Short Form 36, vestibular system.

INTRODUCTION

Meniere's disease (MD) is a chronic progressive disorder that is defined by spells of recurrent vertigo and sensorineural hearing loss associated with tinnitus and aural fullness. These symptoms have a potential impact on the health-related quality of life (HRQL).[1,2] The episodes of vertigo and dizziness cause anxiety and lead patients to restrict their physical and social activities, including driving motor vehicles, and limit their performance at work and affect their psychological well-being. Although the intervals between episodes of vertigo usually last months or years, the time course of vertigo in MD is unpredictable, making it difficult to establish the outcome.[3] Hearing loss results in communication difficulties, more severe in patients with bilateral involvement, which can lead to occupational disability, isolation, social embarrassment, and psychological distress.[4] Tinnitus may be associated with sleep disturbance, anxiety, depression, irritability, loss of concentration, and poor hearing discrimination.[5]

Meniere's disease progresses over several years, causing an increase in hearing loss until it reaches a moderate or severe degree of impairment[6]; in addition, the tinnitus, initially intermittent, becomes louder and constant, causing a decrease in the HRQL of many individuals.[7] Although the frequency of the attacks of vertigo is greater in the first years of the disease and diminishes at advanced stages of MD,[8,9] the balance problems persist along with the disease and may become severe if patients develop bilateral vestibular hypofunction. The prevalence of bilaterality is around 25%, and the risk of developing bilateral MD for a patient with unilateral disease has been estimated as 14%.[10] These patients show a chronic dysequilibrium, initially transient, that becomes permanent. Many individuals are unemployed because of the disease, and the unpredictability of the attacks can cause disability.[1]

The factors associated with a reduced HRQL in MD are known: more severe vertigo, pressure in the ear, hearing loss, tinnitus, being younger, being fe-

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male, living alone, having a lower occupational status, and believing that the attitude of the consultant is unhelpful.[11] Although bilateral severe sensorineural hearing loss is a known disabling condition, the impact of bilateral involvement on the HRQL in MD has seldom been investigated. Cunha et al[12] evaluated the HRQL in 50 patients with MD and found that impairment was worse in patients with bilateral involvement.

Previous studies using quality-of-life instruments (the Short Form 36 [SF-36] and the Dizziness Handicap Inventory [DHI]) have demonstrated that individuals with MD show moderate physical and severe emotional problems[13] and have perceived role limitations (ie, changing activities or having difficulty in accomplishing some activities).[14] However, differences in culture, socioeconomics, and organization of health-care systems make it difficult to compare perceived HRQLs in patients with MD in the context of culture and value differences among countries.

The aim of this study was to analyze the impact of bilaterality of MD on the HRQL in patients with MD and to identify factors associated with a worse HRQL in patients with bilateral MD.

PATIENTS AND METHODS

Patients. We studied a case series of 86 adult patients (36 with bilateral and 50 with unilateral disease) with a clinical diagnosis of definite MD according to the diagnostic scale of the American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS)[15] from October 2007 to June 2008. They were a subset of outpatients at the otoneurology clinic at the Division of Otolaryngology, Hospital de Poniente, El Ejido, Almería, Spain. A neurotologic examination including pure tone audiometry, nystagmus in the primary position, gaze-evoked and head-shaking nystagmus, and a standard bithermal caloric test was performed on the same visit at which health instruments were administered. The protocol of diagnosis included an examination by magnetic resonance imaging of the brain to exclude other possible causes of neurotologic symptoms.

All study activities complied with the principles of the Declaration of Helsinki for investigations with human beings. Written information was given concerning the purpose of the study, and confidentiality was assured for the patients. Informed consent was obtained from the patients after the aim of the study was explained. The research committee of the hospital approved the research protocol.

Health Instruments. The patients' health status was evaluated with the Spanish versions of the Short Form 36 (SF-36) Health Survey[16] and the Dizziness Handicap Inventory Short Form (DHI-S).[17] The SF-36 instrument was designed to evaluate the HRQL, and it has been tested across a wide range of patients with chronic diseases, including patients with MD.[11] It is composed of 36 items, grouped into 8 scales, which include both physical and mental health, assessing 8 dimensions of the quality of life: physical function (PF), role physical (RF; limitation caused by physical problems), body pain (BP), general health (GH), vitality (VT), social function (SF), role limitation due to emotional problems (RE), and mental health (MH). The dimension scores are standardized and range from 0 to 100, where 0 implies the worst possible health status and 100 the best possible. The scores represent the percentage of the total possible score achieved. For example, dimensions on function are scored so that the higher the score, the better the function in question, and the pain dimension is scored so that the highest score indicates freedom from pain. The SF-36 has been validated for use in Spain, and normative data on healthy people have been reported.[18]

The DHI-S is a 10-item scale that was designed to evaluate the effect of dizziness and unsteadiness on the functional, emotional, and physical aspects of everyday life.[17] For each item, the subject was instructed to respond "yes," "no," or "sometimes." The DHI-S scores range from 0 (best possible measured health) to 40 (worst possible). The DHI-S has been adapted to Spanish and shows high internal-consistency reliability values. Both questionnaires (SF-36 and DHI-S) were self-administered in our study.

Main Outcome Measurements. The following variables were assessed: sociodemographics (sex, age, marital status, working status, level of education, urban address), clinical factors (unilateral versus bilateral disease, AAO-HNS hearing stage and class [frequency of vertigo], duration of attacks, time course of the disease, time since last attack, diagnosis of headache), and treatment received (sodium-restricted diet or drugs). The diagnosis of headache was performed according to the International Classification of Headache Disorders.[19] The perceived severity of MD was assessed by the 8 dimensions of the SF-36 (PF, RF, BP, GH, VT, SF, RE, and MH), the DHI-S total score, and the functional scale of the AAO-HNS (dependent variables).

Statistical Analysis. The data are shown as means with standard deviations. Qualitative variables were compared between unilateral and bilateral MD by using Pearson's χ^2 with Yates' continuum correction;

TABLE 1. SOCIODEMOGRAPHIC VARIABLES IN PATIENTS WITH MD

Variables	*Bilateral*	*Unilateral*
Age*	55 ± 11.1	52.9 ± 12.3
Women/men	25 (69.4)/11 (30.6)	33 (66.0)/17 (34.0)
Marital status		
Single	1 (2.9)	3 (6.8)
Married	30 (85.7)	36 (81.8)
Other	4 (11.4)	5 (11.4)
Active working status	14 (42.4)	20 (47.6)
Not working because of disease	10 (23.8)	11 (30.6)
Level of education		
Primary	31 (88.6)	35 (81.4)
Secondary	4 (11.4)	5 (11.6)
University		3 (7.0)
Urban/rural residence	20 (57.1)/15 (42.9)	26 (57.8)/19 (42.2)

MD — Meniere's disease.

*Age (mean ± SD) was compared by unpaired Student's *t*-test. Rest of qualitative variables (number with percent in parentheses) were compared by χ^2 test with Yates' correction.

Fisher's test was calculated when the number of cases per cell was less than 5. Quantitative variables (age, time course, and time since last attack) were compared by unpaired Student's *t*-test. For the SF-36, a raw score was calculated for each dimension by summing the responses for all items on that dimension; each raw score was then transformed into a 0- to 100-point scale by use of the formula specified in the SF-36 scoring manual. Cronbach's α coefficient was calculated to estimate internal reliability.

Parametric methods were used, because the procedure of summated scales is based on these methods. The SF-36 scores obtained for unilateral and bilateral MD were compared with the Spanish SF-36 normative data.[18] An unpaired *t*-test was used to test differences in scale scores of the SF-36, DHI-S, and AAO-HNS functional scale between unilateral and bilateral MD, and to compare the SF-36 scores with normative data from the reference population. Bivariate regression analysis was used to search for an association between clinical and sociodemographic factors and scores on the SF-36 and DHI-S. Using scale scores as dependent variables, we carried out several multiple linear regression models (forward method) to investigate the factors associated with a worse perceived HRQL in unilateral and bilateral MD. Statistical significance was accepted at a p level of less than 0.05.

RESULTS

The sociodemographic and clinical features of our series are shown in Tables 1-3. No differences were found for age, sex, marital status, working status, level of education, or place of residence. Ten

TABLE 2. CLINICAL VARIABLES IN PATIENTS WITH MD

Variables	*Bilateral*		*Unilateral*	*p**
Hearing loss at diagnosis (pure tone average)	Left, 50.8 ± 25.9; right, 49.1 ± 19.4		Affected ear, 44.8 ± 20.36	0.15
Previous history of vertigo	11 (31.4)		5 (11.6)	0.06
Head trauma	3 (8.6)		5 (11.1)	1.00
Previous surgery	23 (65.7)		24 (53.3)	0.37
Headache	22 (62.9)		19 (42.2)	0.11
Migraine	15 (42.9)		9 (19.1)	0.02
Psychiatric disorder	12 (34.3)		13 (28.9)	0.78
Cardiovascular disease	10 (28.6)		16 (35.6)	0.67
Osteoarticular disease	17 (28.6)		16 (35.6)	0.34
Alcohol drinking	4 (11.4)		8 (17.8)	0.64
Smoking	10 (28.6)		6 (13.3)	0.16
Coffee drinking	12 (34.3)		8 (17.8)	0.15
Hypnotic drugs	7 (20.0)		9 (20.5)	1.00
Antivertiginous drugs	20 (57.1)		30 (63.8)	0.70
Hearing stage	Left	Right	Affected ear	
1	2 (6.9)	4 (13.8)	6 (13.0)	
2	8 (27.6)	2 (6.9)	15 (32.6)	
3	11 (37.9)	15 (51.7)	22 (47.8)	
4	8 (27.6)	8 (27.6)	3 (6.5)	
Time course (mo)	110.39 ± 98.9		77.9 ± 60.0	0.09
Time since last attack (mo)	11 ± 14.5		9.9 ± 14.5	0.74
Salt-free diet	31 (86.1)		38 (79.2)	0.60
Drug therapy for MD	26 (72.2)		32 (66.7)	0.76

*Pure tone average (hearing loss at diagnosis), time course, and time since last attack (mean ± SD) were compared by unpaired Student's *t*-test. Other qualitative variables (number with percent in parentheses) were compared by χ^2 test with Yates' correction.

TABLE 3. COMPARISON OF HEARING STAGE, VERTIGO CLASS, DURATION OF ATTACKS, AND FUNCTIONAL SCALE BETWEEN UNILATERAL AND BILATERAL MD

	*Bilateral**	*Unilateral*
Hearing stage, mean† (95% CI)	3.14 (2.85 to 3.42)	2.46 (2.21 to 2.70)
Class		
A	13 (37%)	22 (44%)
B or C	22 (63%)	28 (56%)
Duration of attacks		
None	12 (34%)	20 (40%)
<20 mo	11 (31%)	12 (24%)
20-120 mo	8 (23%)	12 (24%)
>120 mo	4 (11%)	6 (12%)
Functional scale		
1	5 (14%)	9 (19%)
2	5 (14%)	12 (26%)
3	12 (33%)	11 (23%)
4	0	7 (15%)
5	12 (33%)	7 (15%)
6	2 (6%)	1 (2%)

*Hearing stage calculated for worst-hearing ear in bilateral MD.
†$p < 0.001$, unpaired Student's *t*-test.

(23.8%) and 11 (30.6%) patients with bilateral and unilateral MD, respectively, were not working because of the disease when they were evaluated.

The clinical records showed that hearing loss at diagnosis did not differ between unilateral and bilateral cases. Interestingly, 31% of patients with bilateral MD reported a history of vertigo, in contrast to 12% of patients with unilateral MD ($p = 0.06$; marginally significant). However, we cannot know whether these attacks of vertigo were associated with cochlear symptoms, because they occurred before the first visit to the hospital.

Headache was a very common symptom in our series; 63% of patients with bilateral cases and 42% of patients with unilateral cases reported it, although our sample size was too small for us to find differences in frequency between the groups ($p = 0.11$). Headache was not related to the vertigo attacks. Interestingly, migraine was found in 43% of bilateral and 19% of unilateral cases; however, tension-type headache was reported by 21% and 20% of patients with unilateral and bilateral disease, respectively. Migraine was significantly associated with bilateral MD (odds ratio, 3.58 [95% confidence interval, 1.25 to 10.31]; $p = 0.021$).

As expected, the time course was longer for bilateral than for unilateral MD, since the second ear is usually affected later in bilateral cases ($p = 0.09$). There were no differences in therapy or time since last attack between the groups (Table 2).

The mean hearing stages were significantly different between unilateral and bilateral MD when the worst-hearing ears were compared (Table 3); however, the frequency of vertigo (class) and the duration of the attacks did not differ between the groups ($p = 0.68$ and $p = 0.89$, respectively). There was no difference in AAO-HNS functional scale score between unilateral and bilateral MD ($p = 0.10$; data from 3 individuals with unilateral MD were missing).

TABLE 4. SCORES OBTAINED ON SF-36 AND DHI-S INSTRUMENTS IN PATIENTS WITH BILATERAL AND UNILATERAL MD

SF-36 Scale	*Bilateral*	*Unilateral*	*p*
Physical function	55.56 ± 23.26	71.90 ± 25.61	0.003
Role physical	31.94 ± 44.96	56.00 ± 45.61	0.017
Body pain	54.53 ± 29.65	58.48 ± 27.71	0.528
General health	39.64 ± 12.71	46.18 ± 13.67	0.027
Vitality	36.53 ± 21.73	51.40 ± 22.15	0.003
Social functioning	50.69 ± 30.46	71.00 ± 28.39	0.002
Role emotional	35.19 ± 38.99	57.33 ± 41.53	0.014
Mental health	43.89 ± 22.95	60.00 ± 24.86	0.003
DHI-S	22.67 ± 12.55	17.72 ± 9.98	0.045

All scales for SF-36 showed lower scores in bilateral cases, except for body pain (unpaired Student's *t*-test).
SF-36 — Short Form 36; DHI-S — Dizziness Handicap Inventory Short Form.

The SF-36 instrument was reliable in patients with MD. The Cronbach's α coefficient values were between 0.79 (RE) and 0.94 (RF) — all better than 0.7 — for all of the scales of the SF-36.

All scale scores on the SF-36 were significantly lower for bilateral MD than for unilateral MD, except for BP (Table 4). This finding demonstrates that patients with bilateral MD have a worse HRQL than do patients with unilateral MD. Moreover, the scores on the DHI-S were also higher for bilateral than for unilateral cases ($p = 0.04$), suggesting that dizziness is perceived to be more disabling in bilateral MD.

The SF-36 scores obtained from patients with MD were compared with sex- and age-matched normative data from the Spanish population. Table 5[17] presents the scores for 28 men and 58 women for unilateral and bilateral MD. All scale scores were significantly different for men and women with unilateral or bilateral MD, with the exception of BP ($p = 0.15$), although the differences were higher for bilateral cases ($p = 0.01$ to $p = 0.0001$).

A multiple linear regression analysis was performed by using each scale score as the dependent variable to determine which factors could explain its variability. Table 6 details a regression model for each scale of the SF-36 and the DHI-S for bilateral MD. The PF dimension depended on headache

TABLE 5. SF-36 SCORES COMPARED WITH NORMATIVE DATA FROM REFERENCE POPULATION[17]

No. of Patients	*SF-36 Scale*	*Bilateral*	t-*Test*	*p*	*Unilateral*	t-*Test*	*p*
Women (25 bilateral, 33 unilateral)	PF	53.80 ± 24.97	–6.18	<0.001	68.94 ± 27.72	–3.26	0.003
	RF	31.00 ± 44.65	–5.49	<0.001	56.06 ± 45.94	–2.99	0.005
	BP	50.08 ± 30.00	–3.9	0.001	55.79 ± 29.54	–3.44	0.002
	GH	40.40 ± 13.01	–9.83	<0.001	46.00 ± 14.62	–7.85	<0.001
	VT	36.80 ± 20.25	–6.94	<0.001	50.15 ± 24.02	–3.52	0.001
	SF	54.50 ± 29.28	–5.87	<0.001	70.83 ± 30.72	–3.38	0.002
	RE	40.00 ± 39.67	–5.77	<0.001	55.56 ± 41.38	–4.20	<0.001
	MH	46.72 ± 21.22	–5.51	<0.001	58.55 ± 26.24	–2.53	0.017
Men (11 bilateral, 17 unilateral)	PF	59.55 ± 19.29	–3.81	0.003	77.65 ± 20.47	–2.55	0.021
	RF	34.09 ± 47.79	–3.14	0.01	55.88 ± 46.38	–2.82	0.012
	BP	64.64 ± 27.50	–1.56	0.15	63.71 ± 23.74	–3.16	0.006
	GH	37.91 ± 12.41	–6.76	<0.001	46.53 ± 12.02	–8.35	<0.001
	VT	35.91 ± 25.86	–3.83	0.003	53.82 ± 18.42	–4.03	0.001
	SF	42.05 ± 32.73	–4.75	0.001	71.32 ± 24.11	–3.89	0.001
	RE	24.24 ± 36.79	–6.05	<0.001	60.78 ± 42.87	–3.25	0.005
	MH	37.45 ± 26.42	–4.76	0.001	62.82 ± 22.44	–2.77	0.014

PF — physical function; RF — role physical; BP — body pain; GH — general health; VT — vitality; SF — social function; RE — role limitation due to emotional problems; MH — mental health.

and the AAO-HNS functional scale ($R^2 = 0.40$; $p = 0.03$). Interestingly, headache and the AAO-HNS functional scale were two independent factors that explained a great part of the variability in all SF-36 scales, except for RE. The GH dimension perceived was explained by headache, AAO-HNS functional scale, and hearing stage ($R^2 = 0.55$; $p = 0.001$). The variables associated with the DHI-S score in bilateral MD were also hearing stage, AAO-HNS functional scale, and time course ($R^2 = 0.68$; $p = 0.04$).

The regression models performed for each scale in unilateral MD are shown in Table 7. In contrast with the common factors found to be associated with HRQL in bilateral MD, for unilateral MD, different factors were associated for each scale. The time course of MD was associated with the scores for PF, RP, GH, VT, and SF, suggesting that patients with a short time course reported a worse perceived HRQL in unilateral MD.

The PF scores were associated with coffee drinking, time course, and a lower score on the AAO-HNS functional scale ($R^2 = 0.34$; $p = 0.03$). The RF score depended on time course, previous history of vertigo, and coffee drinking. The MH score was associated with the finding of psychiatric disorders and time since last attack ($R^2 = 0.30$; $p = 0.01$). With the DHI-S score used as the dependent variable, the factors associated were AAO-HNS functional scale and time course in unilateral MD ($R^2 = 0.33$; $p = 0.04$).

DISCUSSION

This study demonstrates that bilateral involvement has a significant impact on the HRQL of patients with MD. Our purpose was to determine whether the perceived HRQL differed between patients with unilateral and bilateral MD. Our data show that individuals with bilateral disease have lower scores than do those with unilateral disease for all dimensions of the SF-36, with the exception of BP.

The strength of this study is that there were few clinical differences between our unilateral and bilateral MD groups: the bilateral group more frequently had a history of vertigo, a longer time course, and a higher prevalence of headache. It is relevant that a significant subset of patients with bilateral involvement had migraine. However, the major clinical difference is the bilaterality of hearing loss. This finding confirms that the communication difficulties of patients with bilateral MD can affect their general health perception and result in social problems and psychological distress.[9] Bilateral involvement in MD is a disabling condition that can be devastating and debilitating[10]; in addition to the vestibular symptoms, the bilateral severe to profound sensorineural hearing loss causes communication problems that could benefit from cochlear implantation.

The lifetime prevalence of migraine in patients with MD has been estimated to be around 56%, which is higher than the 25% observed in sex- and age-matched controls.[20] In our study, patients with bilateral MD reported a high prevalence of headache, although this headache was not usually associated with the vertigo attacks. The frequency of tension-type headache did not differ between unilateral and bilateral cases of MD. However, migraine was significantly associated with bilateral involvement in 43% of cases, as opposed to 19% of unilat-

TABLE 6. MULTIPLE LINEAR REGRESSION ANALYSIS FOR DHI-S AND SF-36 SCALES IN BILATERAL MD

	Factor	R^2	R^2 Corrected	Coefficient of Regression	p
DHI-S	(Constant)			−9.55	0.080
	1 Stage			4.23	0.020
	2 Functional scale			6.58	<0.001
	3 Time course	0.68	0.65	−0.03	0.044
PF	(Constant)			86.23	<0.001
	1 Headache			−24.06	0.001
	2 Functional scale	0.40	0.36	−4.66	0.032
RF	(Constant)			106.72	<0.001
	1 Headache			−48.77	<0.001
	2 Functional scale	0.53	0.50	−12.50	0.001
GH	(Constant)			71.61	<0.001
	1 Headache			−15.22	<0.001
	2 Functional scale			−1.88	0.109
	3 Stage	0.55	0.508	−5.21	0.015
VT	(Constant)			65.68	<0.001
	1 Headache			−16.53	0.017
	2 Functional scale	0.31	0.263	−5.34	0.020
SF	(Constant)			99.601	<0.001
	1 Headache			−24.55	0.007
	2 Functional scale	0.42	0.383	−9.63	0.002
RE	(Constant)			86.167	<0.001
	Functional scale	0.33	0.31	−15.17	<0.001
MH	(Constant)			47.18	<0.001
	1 Headache			18.27	0.005
	2 Functional scale	0.48	0.445	−8.20	<0.001

TABLE 7. MULTIPLE LINEAR REGRESSION ANALYSIS FOR DHI-S AND SF-36 SCALES IN UNILATERAL MD

	Factor	R^2	R^2 Corrected	Coefficient of Regression	p
DHI-S	(Constant)			4.18	0.190
	1 Functional scale			0.48	<0.001
	2 Time course	0.33	0.30	0.27	0.039
PF	(Constant)			155.93	<0.001
	1 Coffee			−30.96	0.001
	2 Time course			−0.16	0.006
	3 Functional scale	0.34	0.29	−5.41	0.027
RF	(Constant)			68.39	0.190
	1 Time course			−0.39	<0.001
	2 History of vertigo			43.50	0.025
	3 Coffee	0.37	0.32	−35.06	0.037
GH	(Constant)			83.427	<0.001
	1 Coffee			−16.34	0.001
	2 Time course	0.29	0.25	−0.09	0.004
VT	(Constant)			124.928	<0.001
	1 Functional scale			−6.43	0.002
	2 Coffee			−24.28	0.002
	3 Time course	0.39	0.349	−0.13	0.004
SF	(Constant)			131.313	<0.001
	1 Coffee			−25.30	0.017
	2 Time course	0.21	0.168	−0.17	0.010
RE	(Constant)			174.02	<0.001
	1 Coffee			−46.16	0.005
	2 Functional scale	0.25	0.217	−10.90	0.010
MH	(Constant)			14.44	0.260
	1 Psychiatric disorder			23.21	0.002
	2 Time since last attack	0.30	0.26	0.58	0.011

eral cases. It could be that these patients will have a higher risk of developing MD in the second ear, but a cohort study will be necessary to answer this point.

The major predictors of scores on most dimensions of the SF-36 were headache and the AAO-HNS functional scale (which mainly evaluates the interference of vertigo with daily activities). This finding confirms the clinical value of recognizing headache in patients with bilateral MD, a treatable symptom that could improve their perceived HRQL. However, headache seems to be less important for individuals with unilateral MD, since it was not associated with any SF-36 scale.

Previous studies have evaluated the HRQL by using the SF-36 instrument in patients with MD, although data were compared with the mean general population scores of people who reported having no long-term health problems and those with chronic health problems, respectively.[11] We have analyzed separate data for unilateral and bilateral cases in men and women and compared them with the mean values for each age group, since the normative SF-36 scores generally show a decrease with age, especially for PF, RF, and BP.[18] Our results demonstrate that both men and women have lower scores than their normal age-matched groups in unilateral or bilateral MD. Although it has been reported that women

with MD have worse SF-36 scores than men,[11] these lower scores have also been described for women in normative data for all age groups,[18] so we cannot directly compare scores between men and women.

Some of the dimensions of the SF-36 are severely affected in bilateral MD. When scores were compared in the groups of men and women, most of the scales were between the 5th and 25th percentiles, but the RE scores were lower than the 5th percentile in the group of men.[18]

Vertigo severity and fullness of the ear are variables that have previously been correlated with a worse SF-36 score.[11] Our results failed to demonstrate an association with the number or the duration of attacks in unilateral or bilateral MD. Fullness of the ear is a subjective sensation that is difficult to assess, and it was not considered an independent variable in our regression models.

Some studies have assessed psychological factors such as daily stressors, coping, personality, and mental health in patients with MD, using the Hospital Anxiety and Depression Scale, the Sense of Coherence Scale, and the Coping Inventory for Stressful Situations.[7,21] Hearing loss and tinnitus seemed to influence psychosocial and emotional aspects more than physical aspects.[22] Our results show that in bilateral cases, headache and the level on the AAO-HNS functional scale are factors associated with the SF and MH scores.

The AAO-HNS functional scale, which aims to assess the effects of vertigo on daily activities, seems to be a reliable measure for physical functioning. It was also sensitive for GH, VT, SF, RE, and MH in patients with bilateral disease. This is in contrast to previous findings, in which it was not able to identify those individuals with MD and psychosocial or emotional problems.[7]

Our results show that the AAO-HNS functional scale score is an excellent predictor of perceived HRQL, assessed by either the SF-36 or the DHI-S, in bilateral cases, but also in unilateral cases for PF, VT, and RE scales. This feature of the AAO-HNS functional scale has been partially described,[7,21] although the psychosocial dimension of HRQL is not fully evaluated by the AAO-HNS functional scale in patients with unilateral MD. The AAO-HNS functional scale could be very useful during the follow-up of patients to monitor the effectiveness of the treatment, together with a symptom diary, to evaluate the clinical outcome of MD.

Some findings in our regression models for unilateral cases are difficult to explain. The consumption of coffee was associated with worse scores on the PF, RF, GH, VT, SF, and RE scales. This is an unexpected result, and could be a confusion factor. The time course of the disease is a relevant factor associated with the DHI-S score in unilateral and bilateral MD. However, although a longer time course was associated with a worse DHI-S score in unilateral MD, this was not the case in bilateral MD. In fact, the time course was not associated with any scale of the SF-36 in bilateral cases, but it was associated with the scores for PF, RP, GH, VT, and SF in unilateral cases. It seems that time course could be an important factor for perceived HRQL in unilateral MD. Moreover, it is possible that the worse perceived HRQL in the first few years of the disease could be associated with the higher number of vertigo attacks reported in these years.[3]

CONCLUSIONS

Patients with bilateral MD have a worse HRQL than do individuals with unilateral MD, and dizziness is perceived as more disabling in bilateral cases. Migraine is more frequently found in patients with bilateral involvement. Headache and AAO-HNS functional scale are predictive factors of HRQL in bilateral cases, and a short time course is associated with a worse HRQL in unilateral cases.

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