

Research Submissions

Migraine Awareness in Italy and the Myth of “Cervical Arthrosis”

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Objective.—The primary aim of this study was to assess the degree of awareness migraine patients had of their condition. The secondary aims were to evaluate the frequency of an incorrect diagnosis of “cervical arthrosis” in patients unaware of having migraine and to compare the clinical features, diagnostic investigation, and treatment strategies between the 2 subgroups of migraineurs, that is, those with and without the incorrect diagnosis of “cervical arthrosis.”

Methods.—Patients, between 18 and 65 years, were consecutively referred to 5 Headache Centers in 2 Italian regions for a first visit. They fulfilled the diagnostic criteria for migraine (with/without aura, episodic/chronic) and were enrolled in this cross-sectional study. Each patient underwent a specific cranial/cervical musculoskeletal clinical examination.

Results.—A total of 117/250 subjects (46.8%) were unaware that they suffered from migraine. In these *unaware subjects*, the most frequently reported diagnosis was “cervical arthrosis” in 34/117 (29.1%), followed by tension-type headache in 23/117 (19%). The cervical region was the most common site of pain onset in the so-called “cervical arthrosis” group (52.9%, $P < .0001$), where also more pericranial (58.8%; $P = .041$) and neck (70.6%; $P = .009$) muscle tenderness, restricted range of cervical vertical (47.1%; $P < .001$), and lateral (29.4%; $P = .040$) movements were reported. More “cervical arthrosis patients” had been referred to an Emergency Department (88.2%; $P = .011$) and had undergone more cervical spine radiography (23.5%; $P = .003$) and magnetic resonance imaging (20.6%; $P = .044$). While they had used fewer triptans (11.8%; $P = .007$) and received less pharmacological prophylaxis (2.9%; $P = .004$).

Conclusions.—In our sample, there were high misdiagnosis rates for migraine sufferers in Italy. The most common misdiagnosis, that is, “cervical arthrosis,” led to misuse of healthcare facilities and had a negative impact on the migraine treatment.

Key words: migraine, headache, neck pain, migraine diagnosis

Abbreviations: CT computed tomography, MRI magnetic resonance imaging

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INTRODUCTION

Although migraine is the third most prevalent disease worldwide,¹ it is still under- and/or misdiagnosed and undertreated in a large proportion of cases.² In Italy, numerous educational campaigns have been directed toward General Practitioners to enhance their skills in making a correct diagnosis of migraine. Moreover, it has been demonstrated

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that straightforward questionnaires, such as the ID-Migraine, are useful to this aim.^{3,4} Nevertheless, migraine still remains under- and/or misdiagnosed,⁵ with a discouragingly low degree of migraine awareness in a large proportion of migraine sufferers. Indeed, a study aimed at evaluating the prevalence of migraine in a population of hospital care providers in Central Italy, showed a very low awareness of illness.⁶⁻⁸ Although hospital care providers were expected to be particularly attentive to health problems, only 35% of the subjects with a diagnosis of migraine were aware they had this condition.^{6,7}

Although still unsatisfactory, the self-awareness of migraine in other countries seems to be higher than in Italy. Indeed, the American Migraine Prevalence and Prevention study, carried out on 162,576 participants, reported that 56.2% of the subjects with migraine had received a correct medical diagnosis.⁹ A study carried out on a sample of 4406 Chinese university students showed that the awareness of definition/classification/symptoms, treatment, and triggering factors of migraine were 40.4%, 42.4%, and 68.6%, respectively.¹⁰

The low degree of self-awareness of their pathology in migraineurs may well exert a strong negative effect on migraine management. Indeed, migraine sufferers who are *unaware* of being so do not usually consult a Headache Center, are less likely to receive adequate acute and/or prophylactic treatment and have more frequent complications, such as chronicization and/or overuse of pharmacologic treatment.^{9,11}

In our clinical experience, many migraineurs wrongly believe to be suffering from “cervical arthrosis,” that is, cervical spine pathology, a *false diagnostic myth* still alive mostly among General Practitioners. This misdiagnosis is more likely to be posed, if pain is located in the cervical area. About 75% of migraineurs complained of neck pain at the time of an attack. Indeed, in a cross-sectional study on migraineurs, neck pain was associated with migraine more commonly than was nausea.¹² In a recent study, carried out in a tertiary Headache Center in Italy, it turned out that patients with self-diagnosed “cervical pain syndrome” or “cervical pain attack” were suffering from migraine or probable migraine in 91% of cases.¹³

In the present study, we aimed at assessing the awareness of migraine in a sample of patients referred

for a first visit to 1 of 5 Italian Headache Centers and diagnosed as suffering from migraine (with or without aura), according to ICHD-III β criteria.¹⁴

Secondary outcomes were: (1) to evaluate, the frequency of the incorrect diagnosis of “cervical arthrosis” in patients unaware of having migraine in the same sample; (2) to compare the clinical features, the diagnostic investigations and the treatments between the 2 subgroups of migraine patients, with or without an incorrect diagnosis of “cervical arthrosis” (all the other “non-cervical arthrosis” subjects, aware or unaware of migraine).

METHODS

All patients, aged 18-65 years, consecutively referred to 1 of 5 Headache Centers (1 tertiary, 4 secondary) in 2 Italian regions (Emilia Romagna and Lazio) for a first visit, within a 6-month period, fulfilling the diagnostic criteria for migraine (with or without aura, both episodic and chronic), according to ICHD-III β criteria,¹⁴ were enrolled in this cross-sectional study. Exclusion criteria were: the presence of more than 1 type of primary headache; comorbidity with relevant medical or psychiatric conditions; impaired ability (ie, language barrier) to provide a detailed history or informed consent. The study was approved by local Ethical Boards and written informed consent was obtained from all participants.

Each patient was given, in addition to the routine clinical examination, a specific assessment by an experienced headache neurologist, including: (1) a structured interview, based on an *ad hoc* questionnaire, aimed at collecting a detailed headache history (with particular emphasis on headache features, previous diagnostic procedures and treatment) and to investigate the patient’s awareness as to his/her headache diagnosis. Specifically, all the subjects enrolled were asked which type of headache they believed to be suffering from, reporting the diagnosis they had been given during previous medical consultations and/or their personal opinion about their headache; (2) a specific cranial and cervical musculoskeletal examination, encompassing the range of cervical and mandibular movements (if normal or restricted, on both lateral and vertical axis) and the muscle palpation of pericranial (masseter, lateral pterygoid,

medial pterigoid, temporal, both mandibular and cranial insertion) and neck (sternocleidomastoid, both belly and cranial insertion, trapezius, and nuchal) muscles. This muscle palpation was carried out in a standardized way, according to the simplified version of a previously described technique,^{15,16} to assess the presence and degree of muscular tenderness.

Statistical Analysis.—Descriptive analysis, based on mean and standard deviation (SD) values, was used to illustrate the demographic and clinical characteristics of the sample. No statistical power calculation had been carried out prior to the study, due to the lack of relevant scientific data. The sample size was chosen on the expected referral of migraine patients within a 6-month period.

The features of the patients unaware of being migraineurs in the group with the incorrect diagnosis of “cervical arthrosis” (those who believed to have “cervical arthrosis”), were compared to all the other subjects (“non-cervical arthrosis,” aware or unaware of migraine) by means of 2-tailed independent sample *t*-test and chi-squared test (or Fisher’s exact test), for nominal and interval variables, respectively.

The Kolmogorov-Smirnov test was applied to verify the normal distribution of the data.

The level of statistical significance was set at .05.

Data analyses were carried out by the statistical package IBM SPSS Statistics 24.

RESULTS

Two hundred and fifty patients were enrolled within a 6-month period, 204 (81.6%) females, mean age 40 ± 13 years. Thirteen patients (F 53.8%; mean age 37 ± 11.4 years) were excluded from the study, as they declined to participate.

The diagnoses, made by a neurologist at enrollment, were: migraine without aura in 187/250 patients (74.8%), migraine with aura in 25 (10%), chronic migraine in 20 (8%), probable migraine in 18 (7.2%). “Mixed” diagnoses, including other comorbid primary headaches (such as tension-type headache) were not made as this represented one of the exclusion criteria in this study.

One hundred and thirty-three (53.2%) subjects were aware of the migraine diagnosis, while 117 (46.8%) did not know they were suffering from migraine. Notably,

23 (19.7 %) migraineurs did not report any diagnosis, as if they had no definite opinion about their headache.

The diagnoses reported by the patients (received during previous medical consultations or a self-diagnosis) unaware of being migraineurs are reported in Table 1. No diagnosis of cervicogenic headache was reported in our study.

The authors of incorrect diagnoses (physicians or the patients themselves), compared to the authors of the “correct” diagnosis of migraine, are reported in Table 2.

As shown in Table 1, the most frequently reported diagnosis was “cervical arthrosis,” in 34/117 patients (29.1%) who were unaware of suffering from migraine, followed by tension-type headache in 23/117 (19%); sinusitis was reported by only 4/117 (3.4%).

The main clinical features of headache reported by the total sample, by the migraine patients with the “cervical arthrosis” misdiagnosis ($N = 34$), compared to the “non-cervical arthrosis” group (all the other subjects, aware or unaware of migraine) ($N = 216$) are detailed in Table 3. Healthcare resource use and treatment are reported in Table 4.

Pain onset was more frequent ($P < .0001$) in the cervical region in the “cervical arthrosis” group, where there were more pericranial ($P = .041$) and cervical ($P = .009$) muscles tenderness, restricted range

Table 1.—Diagnoses Reported by Patients Unaware of Having Migraine

Diagnosis	N	%
Cervical arthrosis	34	29.1
Tension-type headache	23	19.7
No diagnosis	23	19.7
Sinusitis	4	3.4
“Vascular” headache	2	1.7
Post-traumatic headache	5	4.3
Cluster headache	3	2.6
Chronic headache	4	3.4
Insomnia-induced headache	3	2.6
Stress-induced headache	7	5.9
Menstrual cycle-related headache	1	0.8
“Ophthalmic” headache	5	4.3
Trigeminal neuralgia	2	1.7
“Gastroenteric-related” headache	1	0.8
Total	117	100.0

Table 2.—Authors of the “Incorrect” Diagnoses in Patients Unaware of Having Migraine, Compared to Authors of the “Correct” Diagnosis of Migraine

Author	Incorrect Diagnosis		Correct Diagnosis	
	N	%	N	%
General practitioner	26	22.2	30	22.6
Neurologist	8	6.8	52	39.1
Headache center specialist	6	5.1	31	23.3
Other specialist†	17	14.5	5	3.8
Self-diagnosis	44	37.6	13	9.8
Unknown (the patient does not remember)	16	13.7	2	1.5
Total	117	100.0	133	100.0

†Pharmacologist, rehabilitation medicine specialist, gynecologist; internal medicine specialist; neurosurgeon; casualty department specialist; and ear, nose, and throat specialist.

of cervical vertical ($P < .001$) and lateral ($P = .040$) movements, as well as vertigo/dizziness ($P = .020$).

Moreover, the migraine patients with an incorrect diagnosis of “cervical arthrosis” had the following characteristics more frequently than those with a correct diagnosis: previous referral to an Emergency Department ($P = .011$), cervical spine radiography ($P = .003$), and magnetic resonance imaging (MRI; $P = .044$). Conversely, they were less frequently investigated by brain computed tomography (CT) scans ($P = .035$), used fewer triptans ($P = .007$) to treat the attacks and were given fewer pharmacological prophylaxes ($P = .004$). Indeed, only 11.8% of the subjects with a misdiagnosis of “cervical arthrosis” used triptans and only 5.8% had been given a prophylaxis in the past, compared to 33.3% and 94.2%, respectively, of the “non-cervical arthrosis” patients. No significant difference was observed between the 2 groups of migraineurs with “cervical arthrosis” and “non-cervical arthrosis” as to the use of over-the-counter medications.

Additionally, no significant difference was observed between the “cervical arthrosis” and “non-cervical arthrosis” groups ($P = .363$) as to the level of education (primary school, secondary school, university) or in the anthropometric features, notably BMI (mean \pm SD). The BMI for the total sample was

24.4 ± 5.04 , 24.5 ± 4.72 in the “cervical arthrosis” group, 24.4 ± 5.10 in the “non-cervical arthrosis” patients.

DISCUSSION

The data from this study show that in our sample, made up of patients referring to secondary/tertiary Headache Centers in Italy, a large proportion of cases of migraine are misdiagnosed, meaning that migraineurs have a low self-awareness of their condition. Indeed, only about a half of our patients (53.2%) were aware of being migraine sufferers. This proportion is even higher if 2 previous Italian studies are considered. A 2009 survey,⁵ involving ten tertiary Headache Centers, reported that only 26.8% of migraine patients had been given a previous diagnosis of migraine. Another study, on hospital care providers, reported that only 35% of the subjects diagnosed as migraineurs were knowledgeable on this condition.⁶

However, our data suggest that the educational campaigns carried out in Italy^{17,18} have had a positive, although still unsatisfactory, effect that might have increased migraine awareness, over time, to rates similar to other countries, such as the United States.⁹

A *missed diagnosis* of migraine may be due to multiple factors, mainly cultural in nature, each of which may influence one another. Interestingly, education level does not seem to affect the awareness of migraine in our sample. However, if the sufferers do not connect the signs and symptoms of migraine to its pathology, then they are less likely to seek the correct medical consultation. Consequently, the possibility of a correct diagnosis and treatment, both for an acute attack and prophylaxis if required, are reduced. According to the aforementioned Italian study,⁵ about 37% of the migraine sufferers did not go to their General Practitioner, losing any chance of diagnosis and referral to a neurologist/headache center. Noteworthy in our study is the fact that, although a wrong diagnosis was frequently a result of a self-diagnosis and the consequence of self-management (37.6% of our sample), 22.2% of the patients without knowledge of migraine had been misdiagnosed by their General Practitioners or by other physicians (Table 2).

Table 3.—The Main Clinical Features of Headache in Migraine Patients With the Incorrect Diagnosis of “Cervical Arthrosis,” Compared to All the Other Subjects (“Non-Cervical Arthrosis”)

	Total (N = 250)		Cervical arthrosis (N = 34)		Non-cervical arthrosis (N = 216)		P Value
	N	%	N	%	N	%	
Female sex	204	81.6	25	73.5	179	82.9	.191
Pain onset in the cervical region	36	14.4	18	52.9	18	8.3	<.0001
Photophobia	225	90.0	29	85.3	196	90.7	.354
Phonophobia	224	89.6	28	82.4	191	87.2	.398
Osmophobia	123	49.2	12	35.3	111	51.4	.059
Nausea	211	84.4	25	73.5	186	86.1	.058
Vomiting	99	39.6	12	35.3	87	40.3	.361
Worsening with physical activity	224	89.6	28	82.4	196	90.7	.135
Pericranial tenderness	106	42.4	20	58.8	86	39.8	.041
Cervical tenderness	61	24.4	24	70.6	37	44.9	.009
Restricted range of cervical vertical movements	57	22.8	16	47.1	41	19.0	<.001
Restricted range of cervical lateral movements	43	17.2	10	29.4	33	15.3	.040
Vertigo/dizziness	96	38.4	19	55.9	77	35.6	.020
Depression	61	24.4	12	35.3	49	22.7	.133
Anxiety	96	38.4	15	44.1	81	37.5	.456
No physical activity	145	58.0	22	64.7	123	56.9	.143

The figures with a statistically significant difference are indicated in bold values.

Table 4.—HealthCare Resource Use and Treatment in Migraine Patients With the Incorrect Diagnosis of “Cervical Arthrosis,” Compared to All the Other Subjects (“Non-Cervical Arthrosis”)

	Total (N = 250)		Cervical Arthrosis (N = 34)		Non-Cervical Arthrosis (N = 216)		P Value
	N	%	N	%	N	%	
Previous referral to Emergency Department	169	67.6	30	88.2	139	64.4	.011
Previous brain CT scans	83	33.2	4	11.8	79	36.6	.003
Previous brain MRI	86	34.4	7	20.6	79	36.6	.048
Previous cervical spine radiography	33	13.2	8	23.5	25	11.6	.035
Previous spine MRI	26	10.4	7	20.6	19	8.8	.044
Previous pharmacological prophylaxis	35	14.0	1	2.9	34	15.7	.004
Previous non-pharmacological prophylaxis	13	5.2	4	11.8	9	4.2	.097
Previous use of triptans	76	30.4	4	11.8	72	33.3	.007
Previous referral to a Headache Center	191	76.4	32	94.1	159	73.6	.012

The figures with a statistically significant difference are indicated in bold values.

“Cervical arthrosis” was the most common incorrect diagnosis in this study, which seems to mirror Italian medical culture, as it differs from other countries where there is a prevalence of a misdiagnosis of sinus headache.¹⁹ According to our data and in agreement with another study carried out in a tertiary headache

center in Italy,¹³ the common misinterpretation that every pain located in the cervical region is related to a cervical spine musculoskeletal disorder underlies the misdiagnosis of “cervical arthrosis.” The authors phenotyped and classified the headache in patients with a self-diagnosed “cervical pain syndrome” or “cervical

pain attack” and demonstrated that 91% of them were suffering from migraine or probable migraine.¹³ On the other hand, neck pain and/or stiffness may precede or even accompany migraine attacks in about 75% of migraineurs^{12,20} and this may delay an effective attack treatment.²¹

Indeed, the challenge of headache accompanied by neck pain raises some interesting doubts: could neck symptoms be part of the primary headache disorder? Or, is the neck pain the real source of the headache? Or, does the patient have 2 distinct, comorbid conditions, that is, is a primary headache complicated by a secondary one?²² A reciprocal interaction between trigeminal and cervical afferents in the trigeminal brainstem nucleus is likely to underlie the cervical localization of migraine pain²³ and/or a centrally sensitized trigemino-cervical nucleus may underpin neck muscle tenderness and pain in migraineurs.²⁴ Indeed, trigeminal sensory fibers that innervate the meninges also project branches that cross the calvarial sutures and supply the pericranial muscles,²⁵ so that extracranial activation of meningeal nociceptors by peripheral causes (eg, pericranial muscle inflammation), or activation of extracranial sensory fibers via activated meningeal nociceptors, may be the pathophysiological mechanisms explaining why extracranial pathology can trigger migraine attacks in susceptible individuals and pericranial muscle tenderness can be the result of a migraine attack triggered by an intracranial process.^{11,26} Moreover, recent studies have reported that posterior dura overlying the cerebellum is innervated by cervicovascular neurons in C2 and sensitization of central cervicovascular neurons from the posterior dura can lead to hyper-responsiveness to the stimulation of neck muscles.²⁷ Hence, this convergence between upper cervical, occipital, and trigeminal nociception via the trigeminal nucleus caudalis may provide a pathophysiological mechanism for headache resulting from cervical pathology as well as neck pain in primary headache disorders.²⁸

When our study patients with the misdiagnosis of “cervical arthrosis” were compared to the “non-cervical arthrosis” subjects, it was observed that pericranial and cervical muscle tenderness, along with a restricted range of cervical movements, were more

frequent in the former. These features are most likely responsible for misleading the diagnosis toward some kind of cervical spine musculoskeletal pathology and, notably, also toward tension-type headache (the second most frequent misdiagnosis), where increased pericranial tenderness on manual palpation is common and included in diagnostic criteria. Indeed, it is well known that neck pain and pericranial tenderness are highly prevalent in the general population and even more so among migraineurs. According to a cross-sectional study, 76.2% of migraine patients suffer from neck pain and pericranial tenderness.²⁹ Moreover, in a recent study, the presence of self-reported neck pain in patients with migraine was associated with a peculiar clinical presentation, including more severe cutaneous allodynia, reduced upper cervical mobility, and poor deep cervical flexor performance.³⁰ Our findings of restricted range of cervical both lateral and vertical movements and of increased pericranial and cervical muscle tenderness are in agreement with these results.

The question arises whether a true cervical musculoskeletal dysfunction is a clinical feature of migraine, something which is still under debate,³¹ as is whether neck pain is a predictor of migraine-related disability. A recent paper³⁰ did not find any association, in disagreement with a previous cross-sectional study.³²

However, despite the misleading influence neck pain and tenderness may have on the diagnosis, other more typical clinical features of migraine could have suggested the correct diagnosis in our sample. For instance, the presence of nausea and osmophobia were more common in patients with a correct diagnosis of migraine ($P = .058$ and $.059$ at univariate analysis, respectively).

Our study is in agreement with a previous Italian study,¹³ where the patients with “cervical pain syndrome” or “cervical pain attack” were given unnecessary investigations and incorrect treatment. Indeed, the incorrect diagnosis of “cervical arthrosis” had a negative impact on the use of healthcare facilities, as migraineurs mistaken for subjects with “cervical arthrosis” were given more numerous, likely inappropriate, cervical spine radiography, and MRI, than the migraineurs who had been correctly diagnosed. Conversely, they were given fewer brain CT scans, maybe due to neck pain misleadingly indicating a

spine disorder. Moreover, the patients with migraine mistaken for “cervical arthrosis” were more frequently referred to the Emergency Department, suggesting an inappropriate clinical management.³³ This entails a significant cost for the patients and the healthcare system alike.³⁴

Indeed, the data from our research confirm that an under-misdiagnosis yields an under-mistreatment of migraine, both symptomatic and prophylactic, in agreement with previous findings that support a suboptimal pharmacological management of migraine patients in Italy.⁵ In particular, inadequate and/or incorrect use of triptans for migraine (eg, abusers, elderly) has been reported by another Italian study.³⁵

Finally, the migraine patients in our study population with the misdiagnosis of “cervical arthrosis” reported to have turned more to non-pharmacological, and quite possibly inappropriate, treatment eg, osteopathy, and other “alternative” interventions and had used fewer triptans and pharmacological prophylaxes than migraine sufferers with the correct diagnosis. It has been demonstrated that an inadequate pharmacological treatment of an acute migraine attack and prophylaxis may render migraineurs more likely to develop chronicization and/or pharmacological abuse, increasing the disease burden.^{9,11}

However, we are aware that this study does have some limitations. First, the small sample size. Moreover, in the absence of a biomarker, even the current gold standard diagnostic system for migraine (ie, a diagnosis made by a physician, according to international criteria) is far from perfect, making it difficult to state that 1 diagnosis rendered by 1 physician at 1 point in time was the “correct diagnosis.” The previous diagnoses were based on self-reported information and not clinic records. As such, 2 issues were being compared: a current diagnosis versus the memory of past interactions with diagnosing physicians. There was no way to know how reliable these memories were. Even if the patients stated they could remember their previous diagnoses perfectly, it may also have been that the underlying disease state had changed since the last visit with a diagnosing physician. Indeed, there may also be a recall bias of the diagnoses reported by the patients, that is, it cannot be ruled out that at least

some patients had received more than 1 diagnosis in their numerous previous medical consultations, but reported only the most recent. Moreover, our study enrolled subjects who referred to 1 of 5 Headache Centers (1 tertiary, 4 secondary) in 2 northern and central Italian regions; therefore, such a sample of migraine sufferers may not be representative of the general migraine awareness in the whole of Italy. Lastly, since patients who refer to Headache Centers are more likely to be affected by a more severe and debilitating headache, they may well be more interested in obtaining a more qualified level of medical care; and, therefore, it is reasonable to presume that their migraine awareness might be higher than that of unselected migraineurs in the general population. Indeed, the hypothesis that migraine awareness in patients not referring to Headache Centers is even lower and misdiagnoses even more frequent cannot be excluded.

CONCLUSIONS

According to the findings of this study, the false diagnostic myth of cervical arthrosis is still thriving in Italy and a large proportion of migraine patients remain without a correct diagnosis and/or clinical management. In light of the prevalence and disability related to this pathology, we welcome further and more effective educational campaigns to promote increased migraine diagnosis and awareness in Italy. The General Practitioner would be one of the ideal targets for these campaigns, as would even chemists as migraine sufferers often turn to them for help. Moreover, a cooperative network involving neurologists and headache specialists, along with other specialists, such as pharmacologists, rehabilitation specialists, gynecologists; ear, nose, and throat specialists; internal medicine operators; and Emergency Department members, would hopefully benefit from further education and help to reduce the migraine burden, consequently leading to a positive cost/benefit ratio for patients and healthcare facilities alike.

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