Chronic Headache and Comorbidities: A Two-Phase, Population-Based, Cross-Sectional Study

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Background.—Studies using resources of a public family health program to estimate the prevalence of chronic daily headaches (CDH) are lacking.

Objectives.—To estimate the 1-year prevalence of CDH, as well as the presence of associated psychiatric and temporomandibular disorders (TMD) comorbidities, on the entire population of a city representative of the rural area of Brazil.

Methods.—This was a cross-sectional, population-based, 2-phase study. In the first phase, health agents interviewed all individuals older than 10 years, in a rural area of Brazil. In the second stage, all individuals who reported headaches on 4 or more days per week were then evaluated by a multidisciplinary team. CDH were classified according to the second edition of the International Classification of Headache Disorders (ICHD-2). Medication overuse headache was diagnosed, as per the ICHD-2, after detoxification trials. Psychiatric comorbidities and TMD were diagnosed based on the DSM-IV and on the Research Diagnostic Criteria for Temporomandibular Disorders criteria, respectively.

Results.—A total of 1631 subjects participated in the direct interviews. Of them, 57 (3.6%) had CDH. Chronic migraine was the most common of the CDH (21, 36.8%). Chronic tension-type headache (10, 17.5%), medication overuse headache (13, 22.8%) and probable medication overuse headache (10, 17.5%) were also common. Psychiatric disorders were observed in 38 (67.3%) of the CDH subjects. TMD were seen in 33 (58.1)% of them.

Conclusions.—The prevalence of CDH in the rural area of Brazil is similar to what has been reported in previous studies. A significant proportion of them have psychiatric comorbidities and/or TMD. In this sample, comorbidities were as frequent as reported in convenience samples from tertiary headache centers.

Key words: headache, epidemiology, chronic daily headache, comorbidities, temporomandibular disorders

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Primary chronic daily headaches (CDH) of long duration include a heterogeneous group of headache disorders characterized by daily or nearly daily headaches.\(^1,2\) It is the most common diagnosis in headache specialty care centers.\(^3,4\) Among its subtypes, 2 represent the chronification of previously episodic disorders (chronic migraine [CM] and chronic tension-type headache [CTTH]), while 2 other begin \textit{de novo} (hemicrania continua and new daily persistent headaches).\(^1,5\)

Although the classification of CDH is controversial,\(^1\) it is now possible to classify all its subtypes using the second edition of the International Classification of Headache Disorders (ICHD-2).\(^2\) Nonetheless, the ICHD-2 criteria for CDH are relatively complex for use in epidemiological studies, specially regarding the differentiation of CM and medication overuse headache (MOH).\(^3,4\) One alternative is to conduct direct medical assessments in individuals with frequent headaches.\(^5\)

Certain comorbidities may increase the risk of developing CDH.\(^6-8\) Diagnosing these disorders is also cumbersome (eg, temporomandibular disorders, TMD), and sometimes difficult to be performed using questionnaires.\(^9,10\) Ideally, the assessment of CDH requires a multidisciplinary team. These assessments are expensive and time consuming, therefore not easy to be conducted in population studies.

So some of these caveats can be addressed in countries with universal public health systems. In Brazil, the system is reasonably effective in the screening for chronic disorders (hypertension and diabetes), although it has not been used in the diagnosis and treatment of headaches.\(^11\) Furthermore, in small cities and rural areas, a family health program (FHP) is in place, using health agents to screen for diseases, and multidisciplinary teams to treat them. We have demonstrated that this system can be used to screen for headaches, and to refer headache sufferers for medical care.\(^12\) Accordingly, herein we take advantage of this program, to estimate the 1-year prevalence of the CDH within the entire population of a city covered by it (Capela Nova, Brazil). We also assessed potentially comorbid conditions, such as psychiatric disorders and TMD.

**METHODS**

This was an observational, cross-sectional and population-based study conducted in 2 phases. Capela Nova is a small town in southeastern Brazil, and according to the 2000 Brazilian Census, had 2066 inhabitants (1631 of whom over the age of 10). The Brazilian public health system on a municipal level is based on the FHP, where health agents make routine in-home visits and refer identified health problems to a multidisciplinary medical team.

Details of this program and of the adequacy of the health agents to screen headache were described elsewhere.\(^12\) In brief, in the city where the study was conducted, the program has wide and comprehensive coverage, and all 556 houses of the town are regularly visited monthly by the health agents. Accordingly, in the first phase of our study (screening phase), trained FHP agents screened for the occurrence of headaches using the following question: “Have you had any headache episode over the last 12 months?” Those who answered positively were then asked about how many headaches they had in a typical week. Individuals with headaches on 4 or more days per week were then invited to come to the clinic for in-person assessments.

At the assessment phase (Phase 2), they were first evaluated by a neurologist with expertise in headaches, using a semi-structured questionnaire. The headaches (including probable MOH) were classified by the ICHD-2.\(^2\) CM was classified as per the ICHD-2R.\(^13\) Individuals who fulfilled diagnosis of probable MOH were then recommended to restrict the use of analgesics, and were reassessed 2 months later, when a final diagnosis was assigned. The neurological assessments happened from December of 2005 to March of 2006. At the same time, individuals were also assessed for psychiatric conditions and for orofacial pain. Psychiatric assessments were performed by a psychiatrist with expertise on applying the Mini International Neuropsychiatric Interview (M.I.N.I.), and consisted of a structured clinical interview.\(^14\) Diagnosis was based on DSM-IV-TR.\(^15\) The orofacial assessment was conducted by specialists in TMD (dentist and physical therapist), who first obtained information using a semi-structured interview and clinical examination, followed by thorough
examination of the temporomandibular joint, of the masticatory system, and of the facial and neck muscles. TMD diagnoses were based on the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) criteria.12,16

Statistical Analyses.—Herein we describe the epidemiology of CDH subtypes by social demographic characteristics. The 1-year prevalence rates were calculated overall and by demographics. Age was divided into 6 categories: 10-29, 30-39, 40-49, 50-59, and over 60. Marital status was grouped as: single, married, divorced, and widowed. Education level was categorized by years of school: 4 years or less, between 5 to 9 years, and 9 years or more.

Demographics were compared using Pearson’s chi-squared test. We also describe comorbid diagnosis as a function of the CDH diagnosis.

To analyze the data the spss 12.0 software was used. The data obtained were transcribed to the Epi-info/2000 software.

This study was approved by the Research Ethics Committee of the Fluminense Federal University, Brazil. All individuals interviewed were informed of the research goals and signed the consent form. In the case of children, the consent form was signed by their parents.

RESULTS

Our sample consisted of 1605 individuals (837 women). A total of 26 subjects refused to answer, were not met, or were unable to answer the screening question. Thus, 98.4% of the target population participated in this study. Age varied from 10 to 93 years (mean = 40.1 ± 19). Most were single (40.9%) or married (47.9%) and attended elementary school.

Of them, 60 individuals had headache on 4 or more days per week, and 57 completed the neurological evaluation for a 1-year prevalence of CDH of 3.6%. Prevalence of CDH was higher in women (5.7%) than in men (1.2%). Prevalence by age and gender is displayed in Table 1.

Prevalence increased by age until the age of 50-59, and varied from 1.8% to 8.2%. In older than 60, prevalence was 3.9%. For women, prevalence peaked in the ages of 40-49, while in men the peak happened from 30-39 years.

Table 1.—Prevalence of Chronic Daily Headaches (CDH) in Our Sample, Stratified by Gender and Age

<table>
<thead>
<tr>
<th>Gender</th>
<th>Sample</th>
<th>CDH cases</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>768</td>
<td>9</td>
<td>1.2</td>
</tr>
<tr>
<td>Female</td>
<td>837</td>
<td>48</td>
<td>5.7</td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-19</td>
<td>284</td>
<td>5</td>
<td>1.8</td>
</tr>
<tr>
<td>20-29</td>
<td>251</td>
<td>8</td>
<td>3.2</td>
</tr>
<tr>
<td>30-39</td>
<td>273</td>
<td>11</td>
<td>4.0</td>
</tr>
<tr>
<td>40-49</td>
<td>307</td>
<td>14</td>
<td>4.6</td>
</tr>
<tr>
<td>50-59</td>
<td>208</td>
<td>17</td>
<td>8.2</td>
</tr>
<tr>
<td>60+</td>
<td>282</td>
<td>11</td>
<td>3.9</td>
</tr>
</tbody>
</table>

Among the individuals participating in the neurological assessment (57), 43 had clear migraine attacks superimposed (75.4%). A formal diagnosis of CM (according to the revised criteria of the ICHD-2) was given to 21 of them (36.8%), while MOH happened in 14 (24.6%). In 8, the final diagnosis could not be assigned, as detoxification did not succeed. Therefore, their final diagnosis was probable MOH.

Chronic tension-type headache was the second most prevalent type of CDH. It was diagnosed in 10 individuals; another 3 had CTTH and MOH. Just one individual had CDH attributed to cervicogenic headache. Diagnoses are displayed in Table 2.

Among the 57 individuals with CDH, 53 were assessed by a psychiatrist. Over two-thirds (67.3%) had any psychiatric disorder. The most common problem was generalized anxiety (38.5%), followed by depressive disorders (32.7%). No significant gender differences were seen (Table 3).

Individuals with CM were more likely to experience psychiatric disorders than those with CTTH; the opposite was seen to TMD, more common in CTTH than in CM. Nonetheless, because of the small sample size, the differences were not statistically significant.

As for the TMD, 43 individuals were seen by the orofacial team. Of them, 25 (58.1%) had any type of TMD. In all, trigger points were detected in the masticatory or accessory system (myofascial pain), while 12 had also articular dysfunctions.
DISCUSSION

Herein we conducted a 2-stage study, where the entire population of a city was screened and cases were then directly interviewed. Two-phase studies are largely used in epidemiology,17 and herein we indeed assessed the feasibility of using the FHP to screen for CDH and potential comorbidities. The elevated participation rate was certainly yielded by the fact that we used the structure of the FHP to conduct this study. Accordingly, although limitations of our study are relevant (and discussed below), herein we demonstrated the feasibility of using the FHP to screen for CDH, and the importance of using existing multidisciplinary teams to investigate and treat the identified cases. In poor regions of the globe, existing health structures should be used to manage nonlethal conditions, such as headaches, which are sometimes totally neglected.

Prevalence of CDH in our study was very similar to what is reported in the literature.16,18,19 A recent nationwide study conducted in Brazil found a prevalence of 7%.20 Among the possibilities to explain the discrepancy, we must mention that our study is more subject to regional determinants of prevalence (eg, exposures and a less diverse population). Alternatively, the method of ascertainment may have played a role. In the nationwide study, interviews were performed by telephone and the participation was lower (49.9%). It may be hypothesized that individuals with frequent headaches were more likely to participate in the survey. Nonetheless, high prevalence of CDH was also found in 2 local studies in Brazil.21,22 International data vary largely, from 1.7% in Ethiopia to 4.8% in Denmark.23 The prevalence of CDH by age and gender were also similar to what is reported elsewhere.18

### Table 2.—Diagnosis of Subjects With Chronic Daily Headaches, According to the Second Edition of the International Classification of Headache Disorders, in the Subsample That Participated in the In-Person Neurological Assessments

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Frequency</th>
<th>Proportion (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migraine features</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Migraine + chronic migraine</td>
<td>21</td>
<td>36.8</td>
</tr>
<tr>
<td>Migraine + medication overuse headache</td>
<td>14</td>
<td>24.6</td>
</tr>
<tr>
<td>Migraine + probable chronic migraine + probable medication overuse headache</td>
<td>8</td>
<td>14.0</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>75.4</td>
</tr>
<tr>
<td>Tension-type features</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic tension-type headache</td>
<td>10</td>
<td>17.5</td>
</tr>
<tr>
<td>Episodic tension-type headache + probable episodic tension-type headache + probable medication overuse headache</td>
<td>2</td>
<td>3.5</td>
</tr>
<tr>
<td>Chronic tension-type headache + medication overuse headache</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>22.8</td>
</tr>
<tr>
<td>Cervicogenic headache</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Table 3.—Distribution of the Psychiatric Diagnoses in Patients With CDH, According to the DSM-IV, in Individuals Who Participated in the Psychiatrical Assessment

<table>
<thead>
<tr>
<th>Psychiatric diagnosis</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any psychiatric disorder</td>
<td>35</td>
<td>67.3</td>
</tr>
<tr>
<td>Major depression</td>
<td>17</td>
<td>32.7</td>
</tr>
<tr>
<td>Dysthymia</td>
<td>9</td>
<td>17.3</td>
</tr>
<tr>
<td>Phobia</td>
<td>16</td>
<td>30.8</td>
</tr>
<tr>
<td>Generalized anxiety disorder</td>
<td>20</td>
<td>38.5</td>
</tr>
<tr>
<td>Obsessive compulsive disorder</td>
<td>13</td>
<td>25.0</td>
</tr>
<tr>
<td>Eating disorder</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td>Somatization disorder</td>
<td>4</td>
<td>7.7</td>
</tr>
<tr>
<td>Suicide ideation</td>
<td>9</td>
<td>17.3</td>
</tr>
<tr>
<td>Psychotic disorders</td>
<td>2</td>
<td>3.8</td>
</tr>
<tr>
<td>Hypochondriasis</td>
<td>1</td>
<td>1.9</td>
</tr>
<tr>
<td>Premenstrual dysphoric syndrome</td>
<td>10</td>
<td>19.2</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td></td>
</tr>
</tbody>
</table>

CDH = chronic daily headache.
Chronic migraine was the most common diagnosis, followed by CTTH and medication or probable MOH. We have not found cases of hemicrania continua or new daily persistent headaches. This was the first study that used the ICHD-2-R criteria for CM in Brazil.

To the best of our knowledge, no other population-based studies strictly followed the ICHD-2 criteria for MOH, which requires withdrawal of medication to document improvement before assigning a final diagnosis, and this is strength of our study. We did follow the criteria strictly, and found that most individuals remitted into episodic headaches after withdrawal, a finding supported by other publications.24,25

Psychiatric disorders were commonly seen in CDH cases, an expected finding.26-28 Indeed, few studies assessed the relationship of psychiatric comorbidity and CDH in the population. Nonetheless, it has been demonstrated that, compared with episodic headache controls, frequent headache cases had more major life changes in the year before or same year. After adjustments, odds of frequent headaches increased additionally with each antecedent event (odds ratio [OR] 1.20 [1.1, 1.3], \( P < .001 \)).29

Temporomandibular disorders were numerically more common in CTTH than in CM, although statistical significance was not achieved. Other studies suggest that TMDs are comorbid with CTTH.30,31 It may be that muscular involvement in the pericranial muscles links both disorders. TMDs are also frequent in CM as per our data. This is of importance, as TMD may exacerbate migraines.30-32

Of interest is that 17.3% of our sample had suicidal thoughts. Although the lack of a control group limits conclusions, figures clearly seem high. Causality cannot be addressed by our study, but it may be that suicidal thoughts are common in individuals with chronic pain.33,34 Alternatively, suicidal thoughts may only reflect prevalent depression, which is in turn clearly associated with CDHs.9 Future studies should further explore this topic.

Some limitations of our study should be discussed. First, neither the reliability nor the false negative rates of our screening methods (health agents using standardized questionnaires) was assessed, and only subjects reporting 4 or more headache days per week were interviewed in the second stage of our study. It may be that some of the individuals who reported having 2 or 3 headaches per week would indeed have CDH, and while the second stage of our study confirmed the headache frequency of those with 4 or more headaches per week, the same is not true for those who screened negative. Accordingly, we may have underestimated the prevalence of CDH (by excluding at screening some individuals with CDH). Although the prevalence found by us (3.6%) is very similar to what has been found by other population studies,16,18 this caveat should be made clear. Another important point is that comorbidities in the episodic headache population were not assessed; therefore, we lack a contemporaneous control for this regard. In this regard our study should be seen as descriptive only. Another potential limitation is that we failed to document preventive medications that might have been initiated by other doctors and that may have facilitated the remission from MOH into episodic headaches. Furthermore, while conducting detailed clinical assessments, we did not capture information of other variables associated with CDH, such as body mass index or sleep disturbances.35,36 Finally, although one positive component of our study certainly regards the prospective detoxification attempts of individuals with probable MOH, we emphasize that revised criteria for this condition do not require detoxification and are considered to be more reasonable when diagnosing MOH.5 We suggest that the revised criteria should be used in population studies, as strictly following the original criteria is certainly not an easy task (requiring in-person assessments, intervention, and prospective follow-up). Strengths of this study are the meticulous assessments and the prospective classification on medication overuse.

The FHP seems to be effective in identifying CDH and in bringing them into the medical system. In this rural sample of CDH sufferers, comorbidities were as frequent to what is reported in convenience samples from tertiary headache centers. Accordingly, we suggest that CDH and certain disorders are truly comorbid, ruling out the referral bias that has been suggested as partially explaining these associations.
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