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Chronic Daily Headache in Korea: Prevalence, Clinical Characteristics, Medical Consultation and Management

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Background and Purpose Chronic daily headache (CDH) is a commonly reported reason for visiting hospital neurology departments, but its prevalence, clinical characteristics, and management have not been well documented in Korea. The objective of this study was to characterize the 1-year prevalence, clinical characteristics, medical consultations, and treatment for CDH in Korea.

Methods The Korean Headache Survey (KHS) is a nationwide descriptive survey of 1507 Korean adults aged between 19 and 69 years. The KHS investigated headache characteristics, sociodemographics, and headache-related disability using a structured interview. We used the KHS data for this study.

Results The 1-year prevalence of CDH was 1.8% (95% confidence interval, 1.1−2.5%), and 25.7% of the subjects with CDH met the criteria for medication overuse. Two-thirds (66.7%) of CDH subjects were classified as having chronic migraine, and approximately half of the CDH subjects (48.1%) reported that their headaches either substantially or severely affected their quality of life. Less than half (40.7%) of the subjects with CDH reported having consulted a doctor for their headaches and 40.7% had not received treatment for their headaches during the previous year.

Conclusions The prevalence of CDH was 1.8% and medication overuse was associated with one-quarter of CDH cases in Korea. Many subjects with CDH do not seek medical consultation and do not receive appropriate treatment for their headaches. **J Clin Neurol 2014;10(3):236-243**

Key Words chronic daily headache, chronic migraine, epidemiology, headache, migraine.

Introduction

Chronic daily headache (CDH) is a categorization applied to various types of headache disorder that occur more than 15 days per month for longer than 3 months. Approximately 10% of patients with headaches seen in general neurology clinics meet the CDH criteria.[1,2] CDH is usually associated with a profound decline in quality of life. In spite of recent advances in our understanding of the pathophysiology and treatment of CDH, a considerable proportion of patients with this condition are underdiagnosed and undertreated.[3,4] Most individuals with primary CDH report headaches with migrainous features.[2,4-7] The close association between migraine and CDH has prompted proposals for the chronic migraine (CM) criteria.[8-10] Although CDH is a common problem in clinical practice, no population-based data on CDH have yet been reported in Korea. In the present study we estimated the 1-year prevalence of CDH in a Korean population using the Korean Headache Survey (KHS) data.[11] We also investigated the clinical characteristics and the incidence of seeking medical consultation and treat-

ment for CDH.

Methods

Korean Headache Survey was a nationwide, cross-sectional, descriptive survey conducted on headache disorders in 1507 participants sampled from the Korean general population aged between 19 and 69 years. Semistructured interviews were performed with the aid of a questionnaire to investigate the status of headache disorders. The survey reported on the symptoms, impact on quality of life, and management of headache disorders. This study was performed in March 2009 in accordance with the ethical guidelines of the Council for International Organizations of Medical Sciences[12] and the principles of the Declaration of Helsinki.[13] Detailed information on the KHS process is available elsewhere.[11]

Sample

According to the 2005 population and housing census conducted by the National Statistical Office, the estimated population of individuals aged 19−69 years in Korea in 2009 was 37782000.[14] The present study included all Korean territories (with the exception of Jeju-do) and classified residential areas into large city, medium-to-small city, and rural area according to the degree of urbanization (Table 1). Our sample targeted 1500 individuals and the selection process was based on the Korean population structure. We adopted a two-stage systematic clustered random sampling method. The 15 administrative divisions were designated as the primary sampling units. In each of the 15 administrative divisions, 4 representative basic units were randomly selected as secondary sampling units. The survey was therefore applied in 60 representative basic units where appropriate assessments of residential status, population structure, household income, and occupational structure were available. In each sampling unit, the target sample number was determined based on the distributions of sociodemographic parameters such as age, gender, educational level, and monthly household income. Interviewers recruited participants who met the assigned sociodemographic characteristics by door-to-door visits. The estimated sampling error of the KHS was ±2.5% with a 95% confidence interval (CI).[15] Weighted values were assigned to each subject according to the distribution of the Korean population in order to estimate the adjusted prevalence. The representativeness of our sample was assessed by comparing sociodemographic distributions between our samples and the total Korean population by using data from the Korean National Statistical Office.[14]

Questionnaire

The questionnaire was designed to assess demographic and socioeconomic characteristics (9 questions), headache profiles according to the second edition of the International Classifica-

Table 1. Sociodemographic distribution of all survey participants, the total Korean population, and of cases identified as having chronic daily headache (CDH)

	Sample, *n* (%)	Total population, *n* (%)	*p*	CDH, *n*	Crude prevalence, % (95% CI)	Adjusted prevalence, % (95% CI)	*p*
Gender							
Men	755 (49.4*)	17584365 (50.6)	0.78†	12	1.6 (0.7−2.5)	1.4 (0.6−2.3)	0.28‡
Women	752 (50.6*)	17198350 (49.4)		15	2.0 (1.0−3.0)	2.3 (1.2−3.3)	
Age group (years)							
19−29	241 (22.8*)	7717947 (22.2)	0.99†	4	1.7 (0.4−3.3)	1.8 (0.4−3.3)	0.11§
30−39	340 (23.5*)	8349487 (24.0)		4	1.2 (0.2−2.3)	1.1 (0.2−2.2)	
40−49	418 (23.0*)	8613110 (24.8)		5	1.2 (0.1−2.2)	1.3 (0.8−2.4)	
50−59	324 (19.8*)	6167505 (17.7)		7	2.2 (0.6−3.8)	2.1 (0.5−3.8)	
60−69	184 (10.8*)	3934666 (11.3)		7	3.8 (1.0−6.6)	4.1 (1.0−7.1)	
Residential area							
Large city	704 (46.7*)	16776771 (48.2)	0.89†	13	1.8 (0.8−2.8)	2.0 (1.0−3.0)	0.54‖
Medium-to-small city	658 (43.7*)	15164345 (43.6)		10	1.5 (0.6−2.5)	1.5 (0.6−2.4)	
Rural area	145 (9.6*)	2841599 (8.2)		4	2.8 (0.6−5.5)	3.0 (0.7−5.7)	
Educational level							
Middle school or less	240 (15.9*)	6291149 (19.0)	0.57†	8	3.3 (1.0−5.6)	3.5 (1.1−5.9)	0.09¶
High school or more	1267 (84.0*)	26861726 (81.0)		19	1.5 (0.6−2.5)	1.6 (0.6−2.5)	
Total	1507 (100.0)	7717947 (22.2)		27	1.8 (1.1−2.5)	1.8 (1.2−2.5)	

*Adjusted prevalence with weighted value, †Comparison of distributions of gender, age group, size of residential area, and educational level between the sample of the present study and the total population of Korea, ‡-¶Comparison of adjusted CDH prevalence among the different ‡genders, §age groups, ‖sizes of residential area, and ¶educational levels.
CI: confidence interval.

tion of Headache Disorders (ICHD, ICHD-2; 21 questions), and headache management plans (8 questions). We included the six-question Headache Impact Test (HIT-6) questionnaire to evaluate the impact of headache on quality of life.[16] The questionnaire was validated for migraine (75.0% sensitivity and 88.2% specificity) and tension-type headache (86.2% sensitivity and 75.5% specificity) diagnoses by comparing the doctors' diagnoses in an additional telephone interview and the diagnoses in the survey. The additional telephone interview was applied to 135 subjects who consented to it.[11]

Survey procedures

Subjects were stratified according to age, gender, and occupation. Prior to meeting the subjects, the interviewers were provided with the following information: 1) the aims of the present study, 2) the meaning of each question, 3) instructions for interpreting the subjects' responses, and 4) other details that were relevant to conducting a proper interview. All interviewers were employed by Gallup Korea and had previous social-survey interviewing experience. The interviewers were not medical personnel. The survey was conducted by door-to-door visits and face-to-face interviews.

Case definition of CDH

If a subject responded positively to the statement "In the past year, you had at least one headache lasting more than 1 min," and the subject's headache presented ≥15 days per month for more than 3 months, he/she was classified as having CDH.

Case definition of CM

In the present study, we used the modified CM criteria outlined in the new appendix criteria for a broader concept of CM, which provides more inclusive criteria for the diagnosis of CM.[9] A diagnosis of CM was assigned if a CDH subject's headaches met the ICHD-2 criteria for migraine or probable migraine (PM). A diagnosis of PM was based on the assigned A−D criteria for migraine without aura (code 1.1) in the third edition of the ICHD (beta version). If a participant's response met all criteria except one, he/she was identified as having PM.[10]

Case definition of medication overuse

A diagnosis of medication overuse (MO) was based on the new appendix criteria for a broader concept of CM.[9] A participant with CDH was diagnosed with MO if he/she reported regularly overusing acute/symptomatic treatment drugs that were defined in either criterion 1 or 2 for more than 3 months (criterion 1: ergotamine, triptans, opioids, or a combination of analgesics, triptans, or analgesic opioids ≥10 days/month for >3 months; criterion 2: simple analgesics or any combination of ergotamine, triptans, or analgesics opioids ≥15 days/month without the overuse of any single class alone).

Impact of headache

We included the Korean version of the HIT-6 questionnaire in order to assess the impact of headaches on quality of life.[17] The HIT-6 score was used to assign the subjects to an impact grade as follows: 36−49, little-to-no impact; 50−55, some impact; 56−59, substantial impact; or 60−78, severe impact.[16]

Medical consultations and treatment for CDH

We examined the medical consultations and treatment that the subjects received. To assess medical consultations, we used the question "Have you ever visited a medical doctor for your headaches?" If a subject replied "yes", he/she was classified as having sought a medical consultation for his/her headaches.

The treatment of CDH was assessed by asking the question, "How did you treat your headaches over the past year?" This allowed the interviewer to distinguish between different treatment strategies such as 1) medical treatment, 2) over-the-counter (OTC) medications, 3) oriental medicine, 4) alternative methods other than oriental medicine, and 5) no treatment. If a subject treated his/her headaches with a medicine, an additional question was asked to evaluate the medical treatment regimen.

Analyses

The 1-year prevalence with a 95% CI was calculated for each diagnosis, after adjustment of weighted values. Age- and gender-specific prevalence rates of CDH were also calculated using a 95% CI. The results were analyzed with statistical software for R (version 2.14.1) and R commander (version 1.7−3) (The R Foundation, GNU general public license). The Kolmogorov-Smirnov test was applied to test whether the continuous variables were normally distributed. After a normal distribution was confirmed, Student's *t*-tests, Mann-Whitney U tests, and chi-square tests were used for comparisons, as appropriate. Except where stated otherwise, the data are presented as mean±SD values, and the cutoff for statistical significance was set at $p<0.05$.

Results

Sample

Of the 4054 individuals approached by our 76 interviewers, 1699 agreed to participate in the survey. Of these, 192 individuals suspended the interview, so that ultimately 1507 subjects completed the survey (cooperation rate of 37.2%) (Fig. 1). The distributions of age, gender, size of residential area, and educational level across our samples did not differ significantly from those for the total Korean population (Table 1).

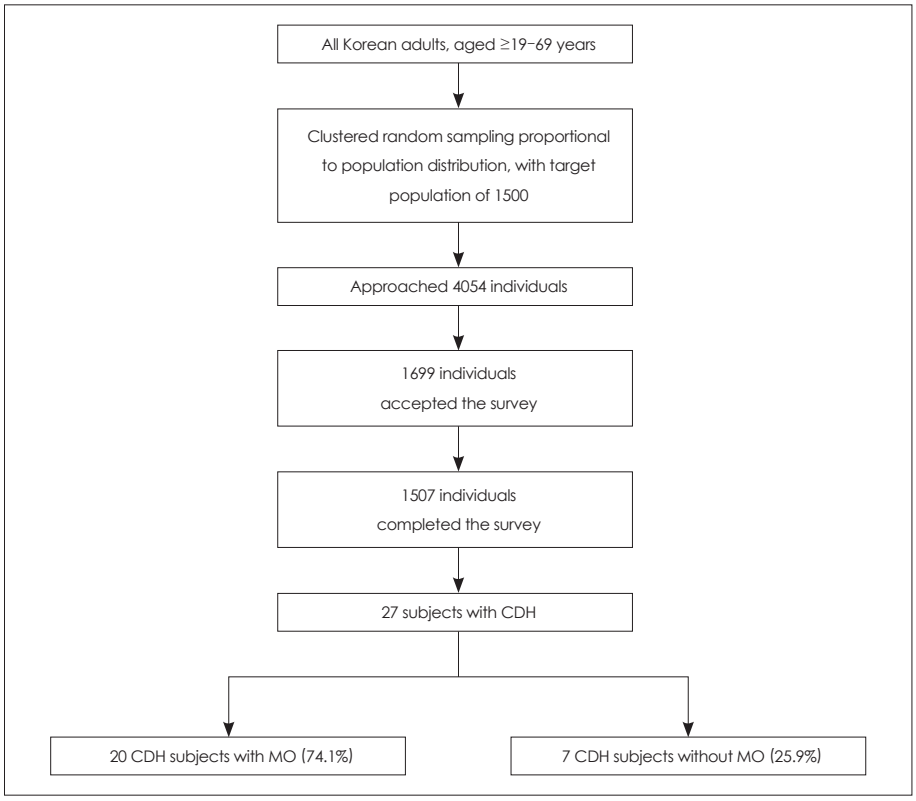

Fig. 1. Flow chart depicting the participation of subjects in the Korean Headache Survey. CDH: chronic daily headache, MO: medication overuse.

Prevalence, clinical characteristics, and impact of CDH

Of the 1507 subjects interviewed, 27 patients were classified as having CDH (1.8% of total cases; 95% CI, 1.1–2.5%). The prevalence of CDH did not differ significantly between men and women (1.4% vs. 2.3%, respectively; p=0.28) (Table 1). The prevalence of CDH was higher among subjects with up to a middle-school level of education than among those with at least a high-school level of education. Of the 27 subjects with CDH, 6 (22.2%) reported that the headache had little or no impact, 8 (29.6%) reported some impact, 5 (14.8%) reported a substantial impact, and 8 (33.3%) reported a severe impact. The clinical characteristics of the subjects with CDH are summarized in Table 2. Seven (25.9%) of the subjects with CDH met the criteria for MO, of which three overused symptomatic prescription drugs, two overused acetaminophen, and one overused aspirin; the remaining subject did not know the name of the overused drug. Eighteen (66.7%) subjects with CDH were diagnosed with CM.

Medical consultations and treatment for CDH

Of the subjects with CDH, 11 (40.7%) had previously consulted a doctor for their headaches. The reported HIT-6 score was higher in subjects with CDH who had participated in a medical consultation than in those who had not (61.7±9.3 vs. 53.7±8.7, p=0.04). CDH subjects with MO were more likely to have consulted a doctor than were CDH subjects without MO (87.5% vs. 25.0%, p<0.01). Headache frequency per month (28.3±3.7 vs. 27.9±5.2, p=0.39) and the score on a visual analogue scale for headache intensity (6.2±1.1 vs. 5.1±2.0, p=0.06) did not differ significantly between individuals who had and who had not participated in a medical consultation.

Of the subjects with CDH during the previous year, 11 subjects (40.7%) had not treated their headaches, 9 (33.3%) subjects had treated their headaches with prescription drugs after visiting a doctor, and 9 subjects (33.3%) had treated them with OTC medications. Among the nine CDH subjects who treated their headaches with OTC medications, two (7.4%) had used both OTC medications and prescription drugs, and seven (25.9%) had only used OTC medications.

Discussion

The 1-year prevalence of CDH was 1.8% and MO was associated with CDH in one-quarter of the cases in this study. CM was the predominant form of CDH, with two-thirds of subjects with CDH being diagnosed with CM. Approximately half of the subjects with CDH reported that their headaches had a substantial or severe impact on their quality of life. Less than half of the subjects with CDH reported having consulted a doctor for their headaches and only one-third of subjects with CDH used prescription drugs to treat their headache symptoms.

Table 2. Clinical characteristics of cases identified as having CDH, CDH with CM, and CDH without CM

	All CDH, *n* (%)	CDH with CM, *n* (%)	CDH without CM, *n* (%)	*p**
Headache characteristics				
Headache days per month (mean±SD)	28.5±0.8	28.4±4.7	28.6±3.9	0.95
Unilateral pain	8 (29.6)	14 (77.8)	5 (55.6)	0.23
Pulsating quality	11 (40.7)	12 (66.7)	4 (44.4)	0.27
Aggravation of headache by movement	12 (44.4)	7 (38.9)	8 (88.9)	0.01
Headache severity				
Mild	11 (40.7)	6 (33.3)	5 (55.6)	0.26
Moderate	12 (44.4)	8 (44.4)	4 (44.4)	
Severe	4 (14.8)	4 (22.2)	0 (0.0)	
VAS for pain intensity (mean±SD)	5.5±1.8	5.3±1.8	6.0±1.9	0.38
Associated symptoms				
Nausea	18 (66.7)	18 (100.0)	0 (0.0)	
Vomiting	11 (40.7)	11 (61.1)	0 (0.0)	
Photophobia	8 (29.7)	8 (44.4)	0 (0.0)	
Phonophobia	17 (63.0)	13 (72.2)	4 (44.4)	0.16
Osmophobia	16 (59.3)	12 (66.7)	4 (44.4)	0.27
Duration of headache in hours (mean±SD)	2.9±4.4	3.7±5.2	1.3±1.4	0.23
HIT-6 score				
Little-to-no impact	6 (22.2)	4 (22.2)	2 (22.2)	
Some impact	8 (29.6)	3 (16.7)	5 (55.6)	
Substantial impact	4 (14.8)	4 (22.2)	0 (0.0)	
Severe impact	9 (33.3)	7 (38.9)	2 (22.2)	
Total HIT-6 score (mean±SD)	55.7±9.5	56.4±9.6	52.6±8.4	0.16
Total	27 (100.0)	18 (66.7)	9 (33.3)	

*Comparison between CDH with and without CM.
CDH: chronic daily headache, CM: chronic migraine, HIT-6: six-question headache impact test, VAS: visual analogue scale.

The reported prevalence of CDH in Asian countries has ranged between 1.0% and 3.9%.[18-23] These rates are similar or slightly lower than those in Western countries, which range between 2.0% and 7.6%.[5-7,24-27] The prevalence of CDH in the present study was similar to that found in other Asian countries (Table 3). The discrepancy in CDH prevalence between Asian and Western countries may be explained by factors such as differences in the race, health-care system, socioeconomic status, body mass index, diet, and cultural background.[28-30] Racial differences in pain perception and response have been identified in some clinical trials.[31] Factors related to the health-care system factors include access to doctors and medications.[32] The prevalence rates of CDH were reported to be higher among individuals with a lower socioeconomic status.[33]

Chronic daily headache was more prevalent in women than in men in these previous studies, with reported female-to-male ratios ranging from 1.6 to 2.6 (Table 3).[4,5,20,23,25,27,34] The gender ratio in the present study was similar to those found in previous studies. The absence of a significant difference in the prevalence of CDH in men versus women in the present study may have been due to the small number of CDH cases in the present study.

In the present study, MO was associated with CDH in 25.9% of subjects, while previous hospital-based studies found that more than half of subjects with CDH had MO.[1,35] Population-based studies have revealed a weaker association between MO and CDH, with a prevalence ranging from 25.1% to 34.0%.[2,4,6,20,25,34] The discrepancy in the prevalence of MO between population- and hospital-based studies may be due to differences in symptom severity. CDH subjects with MO had more severe symptoms compared to CDH subjects without MO,[36] which may have resulted in increased visits to hospitals among the former, and a consequently higher prevalence of MO in hospital-based studies.

While the diagnosis of CM remains a matter of controversy, it has been shown to be a prevalent form of CDH in previous population- and hospital-based studies.[20,27,34,37] Two-thirds of the subjects with CDH in the present study were diagnosed with CM. This high incidence suggests that CDH treatment strategies would benefit from recent advances in CM treatments.[38-41] An effective treatment strategy for CDH other than that used for CM has not yet been identified.[42] Previous stud-

Table 3. Population-based studies related to CDH, CM, MOH, or CTTH

Country, year	Study/first author	Methods	Sample size	Age (years)	CDH prevalence	Men:women	CM	MOH	CTTH
Denmark, 1991	Rasmussen[7]	Clinical interview and examination	740	25–64	1-year	ND	ND	ND	3.0%
Germany, 1994	Göbel[49]	Questionnaire	4061	>15	Lifetime	ND	ND	ND	3.0%
Chile, 1998	Lavados[50]	Questionnaire	1385	>14	1-year	ND	ND	ND	2.6%
USA, 1998	Scher[27]	Telephone interview	13343	18–65	1-year, 4.1%	2.8:5.0%	1.2%	ND	2.2%
Spain, 1999	Castillo[34]	Clinical interview and examination	1883	>44	Unknown, 4.7%	Women, 90% of CDH subjects	50.6% of CDH subjects	ND	2.2%
Norway, 2000	Head HUNT/Hagen[5]	Questionnaire	51383	>20	1-year, 2.0%	1.7:2.8%	ND	ND	ND
France, 2003	GRIM2000/Lantéri-Minet[4]	Interview	10585	>15	Point, 3.0%	ND	72.3% of CDH subjects	ND	ND
The Netherlands, 2006	Wiendels[51]	Questionnaire	16232	25–55	3-month, 3.7%	ND	ND	ND	ND
Denmark, 2005	Russell[52]	Questionnaire	3471	40	1-year	ND	ND	ND	2.3%
Norway, 2008	Akershus study/Grande[25]	Clinical interview and examination	20598	30–44	1-year, 2.9%	ND	ND	ND	2.6%
Brazil, 2008	Queiroz[6]	Telephone interview	3848	18–79	1-year, 6.9%	4.0:9.5%	72.0% of CDH	ND	26.0% of CDH subjects
Georgia, 2009	Katsarava[26]	Interview	1145	>15	1-year, 7.6%	5.1:9.3%	1.4%	0.9%	3.3%
Malaysia, 1996	Alders[18]	Door-to-door survey	595	5–87	1-year, 2.4%	ND	0.6%	ND	
Taiwan, 2000	KINDS, Wang[22]	Interview	3377	≥65	1-year, 3.9%	1.8:5.6%	1.0%	1.0%	25.0% of CDH subjects
Taiwan, 2001	Lu[20]	Telephone interview	2096	15–92	1-year, 3.2%	1.9:4.3%	1.7%	1.1%	1.4%
Singapore, 2001	Ho[19]	Interview	2096	14–74	1-year, 3.3%	ND	ND	ND	ND
India, 2010	Lifting the Burden, Rao[21]	Interview	2329	18–65	1-year, 2.9%	ND	ND	41% of CDH subjects	ND
China, 2012	Lifting the Burden, Yu[23]	Interview	5041	18–65	1-year, 1.0%,	0.5:1.4%	ND	0.6%	ND
Korea, 2009	Korean Headache Survey (present study)/Chu	Interview	1507	19–65	1-year, 1.8%	1.4:2.3%	66.7% of CDH subjects	25.9% of CDH subjects	ND

CDH: chronic daily headache, CM: chronic migraine, CTTH: chronic tension-type headache, MOH: medication-overuse headache, ND: no data.

ies found that a significant proportion of subjects with CDH experience a decreased quality of life because of factors such as disability or an impact to perform the activities of normal daily life.[3,35,43,44] In the present study, approximately half of subjects (48.1%) with CDH reported that their headaches had a substantial-to-severe impact on their quality of life, which was a higher proportion than in our previous studies examining migraine (31.5%) and tension-type headache (7.1%).[11] Although a direct comparison is not possible because of the use of different assessment tools, the HIT-6 results for CDH in the present study were comparable to those of previous studies.[4,35]

Less than half of the subjects with CDH in the present study participated in a medical consultation. Furthermore, a significant proportion of subjects with CDH either did not treat their headaches or used only OTC medication.[4,35] These proportions differ from those in previous studies, which could be explained by several possible factors. First, migraine symptoms, which are commonly associated with CDH, have been reported to be milder in Asian countries than in Western countries.[45] A lower severity of symptoms may decrease the rate of subjects seeking a medical consultation and treatment. Second, the cultural background may influence how reluctant individuals are to treat their headache with medications. For example, many individuals with headache in Korea concerned about developing substance dependency when they use medication regularly and may therefore fail to seek proper treatment for their headaches despite their suffering.[46] Considering that approximately half of the subjects with CDH reported substantial-to-severe headache impact scores, the proper diagnosis and treatment of CDH might reduce the adverse impact of headaches on quality of life in these subjects.

The similarity of the sociodemographic distributions of our samples and the total Korean population ensured that the data were representative of the general population. In addition, our study collected data through face-to-face semistructured interviews. Face-to-face interviews are favored over telephone interviews or mail surveys since they yield higher quality and more accurate data.[47]

The current study was subject to several limitations. First, we defined subjects with CDH as having CM if they were also diagnosed with either migraine or PM. The new appendix criteria for CM were not strictly applied because the exact number of days of migraine or PM was difficult to determine using the questionnaire method. Furthermore, the diagnostic criteria for CM remain a matter of controversy and continue to require further revision.[9,10,24,48] Second, we did not thoroughly investigate the secondary causes of CDH other than MO because this is difficult to document with the questionnaire method used in this population study. Third, although this was a population-based study with a low sampling error, its statistical power was limited for examining subgroups. Thus, some of the comparisons might not have reached statistical significance due to the smallness of the sample rather than the actual absence of group differences.

This is the first nationwide study to examine the clinical epidemiology of CDH in a general Korean population. The results of the present study indicate that promoting physician consultation for CDH and increasing public awareness may reduce the burden of CDH in Korea. Further studies examining the major factors contributing to the debilitating effects of CDH and their impact on quality of life would provide a significant health benefit for the Korean population.

Conflicts of Interest

The authors have no financial conflicts of interest.

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