

# Prevalence of headache in Europe: a review for the Eurolight project

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**Abstract** The main aim of the present study was to do an update on studies on headache epidemiology as a preparation for the multinational European study on the prevalence and burden of headache and investigate the impact of different methodological issues on the results. The study was based on a previous study, and a systematic literature search was performed to identify the newest studies. More than 50% of adults indicate that they suffer from headache in general during the last year or less, but when asked specifically about tension-type headache, the prevalence was 60%. Migraine occurs in 15%, chronic headache in about 4% and possible medication overuse headache in 1–2%. Cluster headache has a lifetime prevalence of 0.2–0.3%. Most headaches are more prevalent in women, and somewhat less prevalent in children and youth. Some studies indicate that the headache prevalence is increasing during the last decades in Europe. As to methodological issues, lifetime prevalences are in general higher than 1-year prevalences, but the exact time frame of headache (1 year, 6 or 3 months,

or no time frame stated) seems to be of less importance. Studies using personal interviews seem to give somewhat higher prevalences than those using questionnaires.

**Keywords** Epidemiology · Prevalence · Headache · Migraine · Medication overuse

## Introduction

The Eurolight project (<http://www.eurolight-online.eu>) is an initiative supported by the EC Public Health Executive Agency launched in May 2007. Its objectives are to bring together the relevant medical, scientific and lay organizations, and to gather updated reliable comparable information regarding migraine, tension-type and chronic headache. It will be the first data collection on headaches at EU level focusing on a holistic, patient-driven and scientifically validated approach, aiming to fill in the main holes in our knowledge by performing comparable studies on headache prevalence and impact in selected European countries (Austria, France, Germany, Italy, Lithuania, the Netherlands, Spain, UK, Ireland and Luxembourg). A pilot study has already been performed in Luxembourg. The present review of the prevalence of various headaches in Europe was performed as a part of the Eurolight project to assess the current state of knowledge before the data from the current project are published.

A previous study on the headache prevalence in Europe covered the data up till 2005 [1]. The present review will include all previous studies, including relatively recently published reviews [1–3] with the addition of new relevant studies that have appeared in the years between 2005 and 2009. The way the research methodology can influence the results has been thoroughly discussed in some of these and

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On behalf of the Eurolight Steering Committee.

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other publications [1, 4, 5]. The aim of the present article was to give an update on the prevalence of the most important headache types in Europe, to identify gaps in our present knowledge and to analyse some methodological issues in order to choose an optimal methodology for the studies to be performed for the EUROLIGHT project.

## Methodology

### Literature search

A comprehensive literature search was performed to identify population-based studies of headache and migraine. Searches were performed with PubMed using the expressions “migraine epidemiology”, “headache epidemiology” and “migraine prevalence” or “headache prevalence” for each European country. References in relevant publications have also been examined. Only studies in English, German, French or Spanish were considered.

### Data extraction

The information extracted was the country of origin, year of publication, population characteristics and the prevalence estimates for headache, migraine, tension-type headache (TTH) and chronic headache, both overall and for each gender, and for various age categories.

### Case definitions

Only studies where the headache diagnoses are made according to the International Classification of Headache Disorders, first edition (ICHD-1) from 1988 [6] or according to ICHD-2 from 2004 [7] have been used. This classification has later been incorporated in the International Classification of Diseases (ICD-10) [8]. Hence, we have included epidemiologic studies that have appeared after 1988 on migraine (ICD-10 diagnosis G43) and TTH (G44.2), the two types that affect the great majority of headache patients. For migraine, we have not distinguished between migraine with (G43.1) and without (G43.0) aura. This differentiation can reliably be made only in studies using personal interview, preferably by a headache specialist. In addition, it is not known whether the two types differ markedly with regard to the patients' suffering and subsequent economic consequences. For practical reasons, the diagnosis in most headache epidemiologic studies has been made according to somewhat modified criteria, and such studies have also been included.

In order to comprise all headache patients, we have also included epidemiologic studies that have investigated headache in general. The term “headache” is not, however,

defined in the ICHD classifications, and we have therefore included studies on headache prevalence that appeared before 1988. For TTH, the term “chronic” has been applied to patients who have this type of headache for  $\geq 15$  days per month on average for  $\geq 3$  months (ICHD-1 and -2). In many headache studies, a similar definition has been given to patients with headache, irrespective of whether it is of the tension type or not. We have also gathered data on “chronic headache” (i.e.  $\geq 15$  days per month or “daily” headache) to assess the prevalence of these patients who are probably most incapacitated by their condition. A subgroup of these patients are overusing acute medication, a condition termed “Medication overuse headache” (MOH) in the ICHD-2. We have also collected data on this frequent and possibly preventable condition.

### Source populations

For our purpose, we have included only studies performed on the whole population or a representative sample of the whole population within a certain age range in a community, town or country. We have accordingly not included studies based on selected populations (clinic based, in workplaces, among university students, etc.). Since the primary school is obligatory in all European countries, studies on headache in children and youth based on schools have been included.

### Period prevalences

For many patients, headache is troublesome only in certain phases of life. For this reason, most headache epidemiological studies have asked the subjects on headache within a limited time span, usually the last year. The 1-year prevalence figure indicates the proportion of the population that has an active disease, which is more relevant than lifetime prevalence for health economic calculations. Data on lifetime prevalence are also considered less reliable due to recall problems, at least in the elderly. In children and adolescents, one may assume that the lifetime and 1-year prevalences are not very different. The studies with 3-month or not specified timeframe has also been included since these time frames will also give a fairly accurate estimate of the proportion of the population with headache in the relatively recent past, usually not very different from the 1-year prevalence.

## Results

### Headache

Headache in general has been reported in 49 studies (Table 1), whereof 34 have concerned headache during

**Table 1** Studies on headache prevalence

Country (year)	Reference	Time frame	Method	N	Age range (years)	Headache			Chronic headache		
						M	F	Total	M	F	Total
<b>Adults or all ages</b>											
Austria (2003)	Lampl [37]	1-y	P.i.	997	≥15	43.6	54.6	49.4			
Croatia (2001, 2003)	Zivadonov [38, 49]	L.t.	P.i.	3,794	15–65			65.2			
Denmark (1991)	Rasmussen [10]	1-y	P.i.	740	25–64						3
Denmark (1991)	Rasmussen [10]	L.t.	P.i.	740	25–64	93	99	96			
Finland (1981)	Nikiforow [45]	1-y	P.i.	200	>15	69	83	77			
Finland (1981)	Nikiforow [45]	L.t.	P.i.	200	>15			91			
France (1992)	Henry [51]	L.t.	Q	4,204	5–65			35			
France (2002)	Henry [20]	N.s.	Q	10,585	≥15			29.2			3.0
France (2003)	Lanteri-Minet [17]	L.t.	Q	10,585	≥15				1.6	4.2	3
France (1996)	Michel [46]	3-m	Q	9,411	>18	39.0	58.0	49			
Germany (1994)	Gobel [52]	L.t.	Q	4,061	≥18			71.4			
Germany (2009)	Pfaffenrath [61]	6-m	P.i.	7,417	≥20			49.5			
Germany (2009)	Radke [62]	1-y	T.i.	7,341	≥18	53.0	66.6	60.2			
Georgia (2009)	Katsarava [12]	1-y	P.i.	1,145	≥16			46.3			7.6
Greece (1996)	Mitsikostas [18]	1-y	Q	3,501	15–75	19.0	40.0	29	2.1	6.8	4.5
Italy (1988)	D’Alessandro [47]	1-y	Q	1,154	>7	35.3	46.2	46			
Netherlands (2006)	Wiendels [13]	3-m	Q	16,232	25–55						3.7
Norway (2000)	Hagen [15]	1-y	Q	51,383	≥20	29.6	45.7	37.7	1.7	2.8	2.4
Norway (2008)	Grande [22]	1-y	Q	20,598	30–44						2.9
Norway (2008)	Russell [43]	1-y	Q	21,800	20–80	69.6	84.0	77.2			
Portugal (1995)	Pereira Monteiro [53]	L.t.	Q	2,008	All ages			88.6			4.1
Spain (1999)	Castillo [14]	1-y	Q	2,253	>14				1.0	8.7	4.7
Spain (1994)	Laínez [50]	L.t.	P.i.	2,231	16–65			86.7			
Sweden (2001)	Dahlof [42]	1-y	Q	1,668	18–74	50	76	63			
Sweden (2006)	Molarius [63]	3-m	Q	43,770	18–79	10.4	22.9	16.7			
Turkey (2005)	Boru [64]	L.t.	P.i.	1,835	15–45			70.9			
UK (1975)	Waters [65]	1-y	Q	1,718	>21	63.5	78.4	71.0			
UK (2005)	Boardman [48]	1-y	Q	1,589	18–90			76			
UK (1977)	Crisp [66]	L.t.	Q	727	>7	35.3	46.2				
UK (2003)	Boardman [67]	L.t.	Q	1,662	≥18	90.2	94.4	92.6			
UK (2003)	Boardman [67]	3-m	Q	1,662	≥18	62.0	76.8	70.3			
<b>Children and youth</b>											
Finland (1983)	Sillanpää [68]	1-y	Q	3,784	13	79.8	84.2	82.0			
Finland (1994)	Metsähonkala [69]	1-y	Q	3,580	8–9			36.5			
Finland (1991)	Sillanpää [70]	1-y	Q	4,405	5			19.5			
Finland (1994)	Metsähonkala [69]	L.t.	Q	3,580	8–9			36.5			
Germany (2004)	Roth-Isigkeit [71]	3-m	Q	735	10–18	58.9	73.1	66			
Italy (1995)	Raieli [72]	1-y	P.i.	1,445	11–14	19.9	28.1	23.9			
Norway (2004)	Zwart [19]	1-y	Q	8,255	13–19	69.4	84.2	76.8	0.2	0.8	0.5
Serbia (2007)	Milanovic [73]	L.t.	P.i.	1,259	7–12			32.8			
Sweden (2004)	Laurell [33]	1-y	Q	1,850	7–15	39.3	50.3	44.8			
Sweden (1962)	Bille [74]	L.t.	Q	8,993	7–15	58	59.3	58.7			
Turkey (2005)	Bugdayci [75]	N.s.	P.i.	5,777	8–16	46.2	52.8	49.2			1.5
Turkey (2007)	Akyol	L.t.	Q	7,721	9–17	79.6	87.1	83.4			
Turkey (2006)	Karli [76]	1-y	Q	2,387	12–17	45.1	59.8	52.2			
Turkey (2006)	Unalp [77]	N.s.	Q	2,384	14–18	36	53	46			

**Table 1** continued

Country (year)	Reference	Time frame	Method	N	Age range (years)	Headache			Chronic headache		
						M	F	Total	M	F	Total
UK (1977)	Deubner [78]	1-y	Q	600	10–20	74.4	81.5	78.0			
UK (1994)	Abu-Arefeh [79]	1-y	Q	2,165	5–15			66			
Elderly											
Italy (2001)	Prencipe [16]	1-y	P.i.	833	≥65	36.6	62.1	51	2.5	6	4.4
Italy (2003)	Camarda [80]	1-y	P.i.	1,031	≥65	16.5	26.3	21.8			

1-y 1-year prevalence, 3-m 3-month prevalence, 6-m 6-month prevalence, *L.t.* lifetime prevalence, *N.s.* prevalence not stated, *P.i.* personal interview, *T.i.* telephone interview, *Q* questionnaire, *M* males, *F* females

the last year or less (here summarized as “current headache”, also including studies where timeframe were not stated). Calculating the mean of all the studies comprising more than 205,000 adult participants, current headache occurred in 53% of adults (61% among women and 45% among men). The prevalence in the 12 studies restricted to children and youth, including >37,000 participants, was the same (53%), but the only two studies on the elderly, from Italy, showed a somewhat lower figure (36%). The total lifetime prevalence of headache among adults was as expected higher than that of current headache (77%).

### Migraine

The studies on migraine are presented in Table 2. The mean prevalence of current migraine among >170,000 adults was 14.7% (8% in men and 17.6% in women). In studies restricted to children and youth (>36,000 participants), the prevalences were lower (9.2% for all, 5.2% in boys and 9.1% in girls). Lifetime prevalences were higher (16, 11 and 20%, respectively).

Most studies only report the prevalence of “strict migraine”, i.e. cases that comply with all the criteria of either migraine without (ICHD-2 1.1) or with aura (ICHD-2 1.2). However, if also probable migraine (ICHD-2 1.6), i.e. cases which fulfil all but one of the criteria, is included, the proportion with migraine is almost doubled [9].

### TTH

Nineteen studies have reported the TTH prevalences (Table 3). Overall, the prevalence of current TTH among >66,000 adults was 62.6%, and chronic TTH (i.e. on ≥15 days per month) occurred in 3.3%. Much lower figures (current TTH 15.9%, chronic TTH 0.9%) were found in the nine studies among almost 25,000 children and youth.

### Chronic headache and MOH

The definitions of chronic headache varied considerably among studies. Only two studies used the same criteria for chronicity as with chronic TTH (>180 days/year [10] or >14 days/month for more than 3 months during the last year [11]). Most other studies used a definition of ≥15 days per month [12–16] or simply daily headache [17–19].

The 1-year prevalence of current chronic daily headache was 4.0% (mean of 8 studies) [10, 12, 14, 15, 18, 20–22]. A similar figure (4.4%) was found in one study restricted to the elderly [16], but in studies on children and youth, the figure was lower (0.5% among 13–19-year-old in Norway), and 1.5% among 8–16-year-old in Turkey. The highest figure (7.6%) was found among adults in Georgia [12]. Medication overuse is frequent among those with chronic headache, and possible medication overuse headache (i.e. headache ≥15 days per month and use of medication ≥3 months) was found to affect 0.9% in Georgia [12] and 1% of adults in Spain [14, 23]. In the HUNT studies in Norway from the 1990s the prevalence was 1% in adults [24] and 0.5% in adolescents [25], whereas a more recent study showed 1.7% [26]. In Germany, a recent study demonstrated a prevalence of 2% [27].

### Cluster headache

In comparison to migraine and TTH, cluster headache is rare, and to make the diagnosis from questionnaires alone has never been validated. Therefore, the prevalence should preferably be made by personal interview and examination by a neurologist in a large population. A lifetime prevalence of 0.326% was found in a study in which the diagnosis was made by face-to-face interview by a headache expert among more than 1,800 inhabitants of a Norwegian rural community [28]. This is similar to the figure (0.279%) found in an Italian town among >10,000 patients registered in the lists of general practitioners, the sample being representative of the general population [29].

**Table 2** Studies on migraine prevalence

Country (year)	Reference	Time frame	Method	N	Age range (years)	Migraine		
						M	F	Total
<b>Adults or all ages</b>								
Austria (2003)	Lampl [37]	1-y	P.i.	997	≥15	6.1	13.8	10.2
Croatia (2001)	Zivadinov [38]	1-y	P.i.	3,794	15–65	13	20.2	16.7
Croatia (2001, 2003)	Zivadinov [38, 49]	L.t.	P.i.	3,794	15–65	14.8	22.9	19
Denmark (1991)	Rasmussen [10]	1-y	P.i.	740	25–64	6	15	10
Denmark (1991)	Rasmussen [10]	L.t.	P.i.	740	25–64	8	25	16.1
Denmark (1995)	Russell [81]	L.t.	Q	4,061	40	12	24	18
Denmark (2005)	Lyngberg [36]	1-y	P.i.	207	25–36	5.4	23.5	15.5
Denmark (2006)	Russell [44]	1-y	Q	28,195	12–41	13.9	24.3	19.1
France (1992)	Henry [51]	L.t.	Q	4,204	5–65	6.1	17.6	12.1
France (2002)	Henry [20]	N.s.	Q	10,585	≥15	10	23	17
France (2005)	Lantéri-Minet [9]	N.s.	Q	10,532	≥18	6.3	15.7	11.2
France (1996)	Michel [46]	3-m	Q	9,411	>18	8	18	15
Germany (1994)	Gobel [52]	L.t.	Q	4,061	≥18	22	32	27.5
Germany (2009)	Pfaffenrath [61]	6-m	P.i.	7,417	≥20			11.4
Germany (2009)	Radke [62]	1-y	T.i.	7,341	≥18	5.3	15.6	10.6
Georgia (2009)	Katsarava [12]	1-y	P.i.	1,145	≥16			15.6
Hungary (2000)	Bank [40]	1-y	Q	813	15–80	2.7	6.9	9.6
Netherlands (1999)	Launer [41]	1-y	Q	6,491	20–65	7.5	25	16.3
Netherlands (1999)	Launer [41]	L.t.	Q	6,491	20–65	13.3	33	23.2
Norway (2000)	Hagen [15]	1-y	Q	51,383	≥20	7.5	15.6	11.6
Norway (2006)	Sjaastad [82]	N.s.	P.i.	1,838	18–65	17.5	28.4	23.0
Norway (2008)	Russell [43]	L.t.	Q	21,800	20–80	18.1	34.1	
Portugal (1995)	Pereira Monteiro [53]	L.t.	Q	2,008	All			8.8
Spain (1994)	Laínez [50]	L.t.	P.i.	2,231	16–65	8	17	12
Sweden (2000)	Mattsson [83]	L.t.	Q	722	40–74		31	
Sweden (2000)	Mattsson [83]	1-y	Q	728	40–74		18	
Sweden (2001)	Dahlöf [42]	1-y	Q	1,668	18–74	9.5	16.7	13.2
Sweden (2006)	Molarius [63]	3-m	Q	43,770	18–79	2.4	5.5	4.0
Switzerland (1994)	Merikangas [39]	1-y	P.i.	379	29–30			24.6
Turkey (2005)	Boru [64]	L.t.	P.i.	1,835	15–45		15.8	
Turkey (2005)	Celik [55]	L.t.	P.i.	386	>14	9.3	29.3	19.9
Turkey (2002)	Kececi [56]	L.t.	P.i.	947	≥7	7.9	17.1	12.5
UK (2003)	Steiner [57]	1-y	T.i.	4,007	16–65	7.6	18.3	14.3
<b>Children and youth</b>								
Finland (1994)	Metsähonkala [69]	L.t.	Q	3,580	8–9	3	2.3	2.7
Germany (2007)	Fendrich [84]	3-m	Q	3,324	12–15	4.4	9.3	6.9
Germany (2009)	Heinrich [85]	6-m	Q	2,553	9–14			13.1
Greece (1999)	Mavromichalis [86]	1-y	Q	3,509	4–15	5.2	7.3	6.2
Italy (1995)	Raieli [72]	1-y	P.i.	1,445	11–14	2.7	3.3	3.0
Norway (2004)	Zwart [19]	1-y	Q	8,255	13–19	4.8	9.1	7.0
Serbia (2007)	Milanovic [73]	L.t.	P.i.	1,259	7–12	2.1	4.6	3.3
Sweden (2004)	Laurell [33]	1-y	Q	1,850	7–15	9.8	12.2	11.0
Turkey (2005)	Bugdayci [75]	N.s.	P.i.	5,777	8–16			10.4
Turkey (2004)	Zencir [87]	N.s.	Q	2,490	11–18	6.7	11.0	8.8
Turkey (2006)	Karli [76]	1-y	Q	2,387	12–17			14.5
Turkey (2007)	Akyol [88]	L.t.	Q	7,721	9–17	7.8	11.7	9.7

**Table 2** continued

Country (year)	Reference	Time frame	Method	N	Age range (years)	Migraine		
						M	F	Total
Turkey (2006)	Unalp [77]	1-y	Q	2,384	14–18			9.6
UK (1994)	Abu-Arefeh [79]	1-y	Q	2,165	5–15	9.7	11.5	10.6
Elderly								
Italy (2001)	Prencipe [16]	1-y	P.i.	833	≥65	7.4	13.8	11
Italy (2003)	Camarda [80]	1-y	P.i.	1,031	≥65	2.3	6.4	4.6

For abbreviations see Table 1

**Table 3** Studies on the prevalence of tension-type headache

Country (year)	Reference	Time frame	Method	N	Age range (years)	TTH			Chronic TTH		
						M	F	Total	M	F	Total
Adults											
Croatia (2001, 2003)	Zivadinov [49]	L.t.	P.i.	3,794	15–65	32.3	37.1	34.8			
Denmark (1991)	Rasmussen [10]	1-y	P.i.	740	25–64	63	86	74			
Denmark (1991)	Rasmussen [10]	L.t.	P.i.	740	25–64	69	88	78			3.0
Denmark (2005)	Lyngberg [36]	1-y	P.i.	207	25–36	81.5	90.4	86.5			4.8
Denmark (2006)	Russell [44]	1-y	Q	28,195	12–41	78.9	92.5	86.0	0.5	1.3	0.9
Georgia (2009)	Katsarava [12]	1-y	P.i.	1,145	≥16			37.3			3.8
Germany (1994)	Gobel [52]	L.t.	Q	4,061	≥18	37	39	38	3.0	3.0	3.0
Germany (2009)	Pfaffenrath [61]	6-m	P.i.	7,417	≥20			31.5			1.25
Germany (2009)	Radke [62]	1-y	T.i.	7,341	≥18	53.0	66.6	60.2			
Norway (2008)	Grande [22]	1-y	Q	20,598	30–44				1.6	3.7	2.8
Portugal (2005)	Pereira Monteiro [53]	L.t.	Q	2,008	All ages			48.7			4.1
Turkey (2003)	Koseoglu [89]	1-y	P.i.	1,146	45–64		18.8				6.3
Children/youth											
Finland (2002)	Anttila [90]	N.s.	Q	1,135	12			12.2			0
Germany (2007)	Fendrich [84]	3-m	Q	3,324	12–15	19.1	21.2	20.2			0.2
Norway (2004)	Zwart [19]	1-y	Q	8,255	13–19	12.5	23.2	18.0			
Serbia (2007)	Milanovic [73]	L.t.	P.i.	1,259	7–12	0.9	1.7	1.3			
Sweden (2004)	Laurell [33]	1-y	Q	1,850	7–15	7.9	11.8	9.8			
Turkey (2005)	Bugdayci [75]	N.s.	P.i.	5,777	8–16			24.7			1.5
Turkey (2004)	Kaynak Key [91]	N.s.	Q	2,226	17–21	14.3	22.7	20.35	0.8	2.8	1.9
Turkey (2006)	Unalp [77]	1-y	Q	2,384	14–18			5.7			

For abbreviations see Table 1

Questionnaires or telephone interviews were used to screen the population, and suspected cases were interviewed by a headache specialist to confirm the diagnosis. These high prevalences are also supported by recent data from a Swedish twin registry study giving a lifetime prevalence of around 0.2% [30]. In Germany, suspected cluster headache cases detected by a questionnaire and interviewed by a neurologist in a population-based study revealed a prevalence of 0.12% [31]. In Georgia, one case was found in

door-to-door survey among 1,145 individuals, which corresponds to 0.09% [32].

#### Increase in headache

By studying headache prevalence with an interval of some years in the same community and using the same method, it may be possible to study time-trends in headache prevalence. A study from Sweden indicates a marked increase of

both headache and migraine in schoolchildren over a period of 40 years [33], and in a Finnish community there was a significant increase among 8-year-old children in headache (and abdominal pain) over a 10-year period [34]. In another Finnish study, three population-based studies on migraine and other headaches among 7-year-old children conducted in 1974, 1992 and 2002 with almost identical study design indicated increased incidence rates both of headaches in general (incidence in the 3 years: 58, 156, 278/1,000 person-years) and migraine (20, 59 and 133) [35]. Among young adults (25–36 years) in Denmark, there was over a 12-year period a significant increase in TTH, particularly the frequent type. There was also a significant increase in the proportion with relatively frequent migraine, but the increase for migraine in general was not significant [36].

### Methodological analyses

To explore to which degree the method of data collection in epidemiologic studies is important for the results, we compared the mean prevalence of studies in adults using either personal interview or questionnaire. For 1-year prevalences (both sexes) of migraine, the mean of the five studies using personal interview [10, 36–39] was 15.3%, compared to 14.0% in the five studies using questionnaires [15, 40–44]. For headache in general, the total prevalence seemed to be higher in the three studies using personal interview [12, 37, 45] than in the eight studies using questionnaires [15, 18, 20, 42, 43, 46–48] (57.6 vs. 40.6%). For lifetime prevalences of headache in general, the mean prevalence was somewhat higher in the four studies using personal interview [10, 45, 49, 50] than in the four using questionnaires [51–54] (84.7 vs. 71.9%). However, for lifetime prevalences of migraine, the mean of the five studies using personal interview [10, 38, 50, 55, 56] was somewhat lower than in the four studies using questionnaires [41, 51–53] (15.9 vs. 17.9%).

As to the effect of using different timeframes in the studies, there was little difference between the migraine prevalence in those studies in which the timeframe was not stated [9, 51] compared to the studies asking about headache during the last year [10, 15, 36, 37, 40–42, 49, 57] (12.9 vs. 13.0%).

### Discussion

Aggregating studies that have used different methods of data collection and somewhat variable timeframes for headache (during the last year or less), the present survey indicates that more than 50% of the population in Europe are current headache sufferers, and almost 15% suffer from

migraine. During the last years, more attention has been drawn to the importance of TTH on the public health, and it seems that >60% suffer from this headache type. It is a paradox that the prevalence of TTH is higher than that of headache in general. Probably, this has to do with the way studies were performed. More detailed questions in studies aimed at making specific diagnoses may elicit higher positive rates than studies using only general questions about headache. Chronic headache (i.e. on more than 15 days per month) seems to affect around 4% of the adult population, and MOH 1–2%. For cluster headache, the 1-year prevalence is not known, but the lifetime prevalence seems to be around 0.2–0.3%. Other primary headaches are even rarer, and the prevalence of these has not been estimated in population-based studies. The prevalence of headache and migraine is higher among women than among men [1]. In children and youth, the migraine prevalence is lower than among adults, but the prevalence of headache in general seems to be as high. Several studies also indicate a marked increase in headache prevalence over the decades, particularly in studies on children and youth, and also in one study on adults.

In this report, we have only considered the main primary headaches. One reason for this is that reasonably certain diagnosis of secondary headache requires extensive clinical and medical investigations, and often follow-up, which is not feasible in most population-based epidemiologic studies. An exception to this is medication overuse headache (MOH) since relatively many studies attempt to estimate the prevalence of those that might have this condition (“possible MOH”), although a certain diagnosis of this requires both treatment and follow-up. Secondary headaches due to serious diseases with a grave prognosis are quite rare although secondary headaches related to more trivial causes, like fever or hangover, occur relatively often [58].

Most of the studies on headache prevalence so far stems from Western Europe. There are only a few studies from Eastern Europe (Georgia, Croatia, Serbia and Hungary). In addition, there are still relatively few studies on TTH. Most studies this far concern headache in general and migraine.

As to the methodological issues, we have tried to compare the results from the studies using different methods of data collection. Only for migraine and headache in general in adults could meaningful comparisons be made; in TTH or in children or elderly, there were too few studies available. In general, the figures obtained with personal interview were somewhat higher than those obtained with questionnaire. For migraine, the difference between the two methods was around 10% (15.4 vs 14.0%) for 1-year prevalence, but almost 30% for lifetime prevalence (22.2 vs. 15.9%). For headache in general, the difference in 1-year prevalence was 30% (57.6 vs 40.6%), but

for this category, there were only three studies using personal interview, which will make the estimates less accurate. For lifetime prevalences, the figure based on questionnaire studies was 15% lower (84.7 vs. 71.9%). These differences may also reflect variations in the how the ICHD-2 criteria are applied as most questionnaire studies use somewhat modified criteria, whereas studies based on personal interviews tend to use strict criteria. In sum, personal interview seem to be a somewhat more sensitive method for obtaining data on headache suffering, and questionnaires are likely to underestimate prevalences to some degree.

It has previously been demonstrated that the way the introductory screening question is asked makes a great difference in headache prevalence. Quite predictably, a neutral screening question (e.g. “have you had headache/migraine...”) will give markedly higher estimates than questions specifying some degree/severity/frequency of headache suffering (e.g. “have you suffered from headache/migraine”, “have you had severe headache...?”, “have you had repeated episodes of headache...?”, etc.) [1]. In order to obtain answers from as many headache sufferers as possible in epidemiologic studies, it is therefore probably better to use a neutral screening question, and then ask additional questions on headache severity, frequency, duration and impact to define groups of headache sufferers that are of clinical and economical importance [1].

The ways the ICHD criteria are applied and which diagnoses are included are also of great importance. It has been found that the prevalence of migraine almost doubles if the diagnosis probable migraine (i.e. patients fulfilling all migraine criteria except one) is included [9, 20, 51, 59]. Among the European studies, the highest migraine prevalences has been found in a yet unpublished study from Luxembourg (29%) performed by one of the authors (CA). This study has used the “ID migraine” [60] which is a screening instrument consisting of only three questions. This instrument has been validated against the ICHD-2 criteria in clinical settings, showing a high sensitivity and somewhat lower specificity. Probably, this method will include many patients with probable migraine, and thereby it will tend to show higher prevalence compared to the studies using strict ICHD criteria for definite migraine.

The problem of multiple headache types occurring in the same patient may create large problems in headache epidemiologic studies. Generally, it is considered that with personal interview and examination, many different headaches can be diagnosed. With interview performed by trained personnel, migraine and TTH can be differentiated in the same person, but with questionnaires, it is usually wise to let the patient answer the questionnaire based on the altogether most bothersome headache [4].

## Conclusions

The present study indicates that 50% of Europeans have an active headache disorder. However, there are large variations, and part of this variation is caused by methodological differences between studies. Around 15% seem to suffer from migraine, 4% have chronic headache and possibly 1–2% medication overuse headache. During their lifetime, 0.2–0.3% has had cluster headache. Headaches are prevalent in both sexes and in all age groups, but women between 20 and 50 years are those who have the highest prevalences. Data on TTH is still too scarce in Europe, and data on prevalence of any headache is lacking from most of Eastern Europe.

As to the method to be used in headache epidemiologic studies, personal interview will give the most reliable diagnoses and the highest prevalence estimates, but when the aim was to diagnose only the most bothersome of the headaches occurring in one person, questionnaires seem to perform quite well. A neutral screening question supplemented with questions on headache severity and frequency will probably be the most sensitive method.

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