Original Article

wiener klinische wochenschrift
the middle european journal of medicine
Printed in Austria

Wien Klin Wochenschr (2004) 116/5–6: 176–181

Background morbidity of headache in an adult general population

Results of the Austrian SERMO (Self-Reported Morbidity) Study

Anita Rieder[1], **Ingrid Lobentanz**[2], **Josef Zeitlhofer**[2], **Nicole Mitsche**[1], **Kitty Lawrence**[1], **Bernhard Schwarz**[1], and **Michael Kunze**[1]

[1] Institute of Social Medicine, Medical University of Vienna, and
[2] Department of Neurology, University Hospital Vienna, Vienna, Austria

Hintergrund-Morbidität Kopfschmerz in der erwachsenen Bevölkerung

Zusammenfassung. *Fragestellung:* Erhebung der Perioden-Prävalenz und Punktprävalenz von Kopfschmerzen in Österreich sowie der Einfluss soziodemographischer Faktoren und jahreszeitlicher Schwankungen.

Material/Methode: Die Datenbasis der SERMO-Studie (Self-Reported-Morbidity-Study) mit den Ergebnissen von sieben repräsentativen Umfragen wurde auf Informationen bezüglich der Hintergrund-Morbidität Kopfschmerz ausgewertet. Die Studie basiert auf face-to-face Interviews. 7162 Österreicher im Alter von über 15 Jahren wurden in die Studie eingeschlossen. Die Teilnehmer wurden mittels des Quotenverfahrens ausgewählt. Kopfschmerz/Migräne war eine von 36 Erkrankungen, über die die Personen befragt wurden.

Ergebnisse: Die Einjahres-Prävalenz für Kopfschmerz betrug 20,1% (Frauen: 26,4%, Männer: 13,0%, $p < 0{,}001$), die mittlere Punktprävalenz 5,7% (Frauen: 7,7%, Männer: 3,6%, $p < 0{,}001$). Die höchste Punkt-Prävalenz (8%) wurde bei Personen im Alter von 60 Jahren und älter beobachtet. Die Prävalenz variierte zwischen 19,6% im August und 23,1% im Oktober 1995. Bei der Trendanalyse zeigte sich, dass höheres Lebensalter und niedriger Bildungsstand mit einer zunehmenden Punkt-Prävalenz einhergehen. Personen mit Kopfschmerzen hatten eine signifikant höhere Prävalenz an chronischen Erkrankungen, Stress und nahmen signifikant häufiger regelmäßig Medikamente ein.

Schlussfolgerungen: Kopfschmerz ist eines der häufigsten Symptome der österreichischen Bevölkerung. Personen mit Kopfschmerzen haben häufiger zusätzliche Beschwerden oder Krankheiten und einen höheren Medikamentenkonsum. Kopfschmerz als ein Aspekt von Multimorbidität oder als Symptom anderer Erkrankungen könnte somit ein Indikator für Befindlichkeitsstörungen und einen subjektiv schlechteren Gesundheitszustand sein.

Schlüsselwörter: Kopfschmerz, Prävalenz, Epidemiologie, selbst-berichtete Morbidität, Bevölkerung.

Summary. *Study objective:* To assess period and point prevalence of headache in Austria and the influence of sociodemographic factors and seasonal variations.

Design: Data for the prevalence of headache were drawn from the database of seven representative surveys in the SERMO study (Self-Reported Morbidity Study). The aims of the SERMO study are to describe and monitor the characteristics of background morbidity in the Austrian population. The study is based on face-to-face interviews. Headache/migraine was one of 36 disorders the interviewed persons were asked about.

Setting: The representative samples of the Austrian general population were selected by the "quota-procedure". Thus each cross sectional sample is representative for the entire Austrian population.

Participants: The study population consisted of 7,162 Austrian people over 15 years of age.

Results: About one fifth (20.1%) of the Austrian adult population reported having headaches during the year (prevalence 26.4% in women vs. 13.0% in men, $p < 0.001$). Period prevalences varied from 19.6% in August to 23.1% in October 1995. Mean point prevalence in the general population was 5.7% (3.6% in men vs. 7.7% in women, $p < 0.001$). The highest point prevalence (8.0%) was observed among people over 60. Whereas period prevalence showed no trend with age or education, we found increasing point prevalence with age and lower levels of education. In general, significantly more people with self-reported headache suffered from stress (39.1% vs. 33.7%, $p < 0.001$) and chronic diseases (33.6% vs. 23.2%, $p < 0.001$) and took drugs regularly (all kinds of medication: 44.3% vs. 26.8%, $p < 0.001$).

Conclusions: Headache is one of the most commonly experienced symptoms in Austria. The most common concomitant disease in the study population as a whole was hypertension. People with headache had a higher prevalence of hypertension, rheumatic diseases, venous diseases, diabetes and a higher consumption of drugs. Therefore, headache, as one aspect of multimorbidity or a symptom of other diseases, could be an indicator of impaired well-being and poor health.

Key words: Headache, prevalence, epidemiology, self-reported morbidity, general population.

Introduction

Data on self-reported morbidity provide useful information on the background morbidity of a general population [1–7]. With respect to headache, many prevalence data are available from studies having investigation periods ranging from one-year to lifetime. Prevalence data in the literature are highly variable, which might partly result from methodological factors. The aims of our study on the background morbidity of headache were as follows. Firstly, we wanted to assess the frequency of headaches among Austrian adults based on both period and point prevalence, focusing also on people aged +60 years. Persons over 60 are expected to constitute one third of the entire Austrian population by the year 2030, similarly to all other Western societies. This anticipated demographic development stresses the need for more information on headaches in the elderly, and so far only limited data are available.

Secondly, we aimed to obtain data on seasonal variations of headache prevalence from representative samples (no such data have hitherto been available), and thirdly, we assessed associations of point prevalence of headache with demographic (eg. age, sex, education) and general health factors.

Methodology and interviewees

Data for the prevalence of headache were drawn from the database of seven representative surveys from the SERMO study (Self-Reported Morbidity Study) and were based on 7,162 adults over 15 years of age living in private households. The surveys were conducted in March, April, May, June, August, October, and December 1995. The results of the surveys in March and April and those in May and June were pooled to obtain comparable data for two-month periods.

The aims of the SERMO study are to describe and monitor the characteristics of background morbidity in the Austrian population. The surveys in December 1994 and February 1995 served as pilot studies. The findings were intended to complement other public health surveys, e.g. health surveys (microcensus), which are performed at regular intervals (usually 10 years) by the Austrian Federal Statistic Bureau [8]. Details of the SERMO study are published elsewhere [10–12].

The scientific project group which prepared and initiated this project is a part of the Institute of Social Medicine, Medical School, University of Vienna. A structured questionnaire (based on a validated instrument, the Microcensus of Health performed by the Austrian Federal Statistic Center in 1973, 1978, 1983, and 1991) was used for the surveys. The microcensus includes both population characteristics and information on self-reported morbidity [8].

The surveys were based on face-to-face interviews, performed by 150 trained interviewers in the households of the participants. The interviewers were trained in interview techniques by the SPECTRA institute, an institute for empirical research, which was responsible for all fieldwork.

The representative samples of the Austrian general population were selected by the "quota-procedure". For this procedure, main demographic variables such as sex, age, education, living area and profession were taken from the Federal statistics. Social status was defined by level of education (five categories of diploma according to the Austrian education system) and by level of family income. The interviews were performed until the study sample met the defined distribution of population characteristics. The quota criteria for the health survey were: federal state/capital, gender, age, and occupation. (For example, Graz is the capital for the federal state of Styria, interview with three men and three women, one in each of the age groups 20–29 years, 40–49 years and over 60 years, in the occupational groups blue-collar workers and white-collar workers/civil servants, one interview each, with one woman and one man, one currently unemployed having formerly worked as a white-collar worker/civil servant and one self-employed).

The number of sample points per survey was around 150–200. The data from individual health surveys were analysed with cell weighting for population structure using the criteria of gender, age, occupation and federal state, as far as was deemed necessary based on the sample structure. The percentage in each quota was determined with the help of official statistics (microcensus 1991). The projected samples were distributed among the individual quotas, in accordance with the calculated percentages. Each interviewer then received precise instructions as to how many interviews were to be carried out within each quota group.

The samples for this type of quota-procedure are not random samples, since the interviewer is free to select which people are interviewed. For this reason small distortions in the valuations could occur, since the subjective influence of an interviewer's choice of interviewee cannot be excluded. The interviews as a whole must agree with the calculated quota percentages. The 'refusal rate' has a different meaning in quota-procedure than in other methods using random samples. With quota-procedure the quotas must be met. The refusal rate can indirectly influence the results, because of selection of interviewees. The validity of the results may only be justified in part by probability theory, limiting the quota-procedure. Thus each cross sectional sample is representative for the entire Austrian population [9].

For the purpose of the present study we did not differentiate between headache and migraine.

We asked about headache and/or migraine occurring in daily life without requiring sick leave. We excluded severe headache that did require sick leave in order to keep our data comparable to microcensus data; sick-leave data are already available in the Austrian health insurance statistics.

Headache/migraine was one of the 36 disorders the interviewees were asked about. The data on period and point prevalence of headache were based on two questions:

1) "This year did you have … (the interviewer asked a list of 36 symptoms including headache/migraine), which definitively impaired your well-being but did not cause you to go on sick leave?" (period prevalence)
2) "Are you impaired by … (the same list as above) right now, although this condition does not disturb your daily work?" (point prevalence).

Other questions concerned regular medication: "Are you taking any kind of medication regularly?" and "Are you taking pills for … regularly?" (the interviewers used a list consisting of 12 most common complaints and diseases, including headache; type of drug was not evaluated).

In all interviews we verified whether they had really been accomplished and the plausibility of responses was checked by computer.

Statistical analysis

Descriptive statistics included the prevalence of headache in the sample and in different subgroups. Univariate analysis

Table 1. Prevalence of self-reported "headache/migraine" in different periods in 1995

From beginning of the year to	Total % (n)	Women % (n)	Men % (n)
March/April	20.5 (427)	25.7 (284)	14.6 (143)
May/June	19.7 (403)	24.3 (264)	14.4 (139)
August	19.6 (200)	24.3 (131)	14.3 (69)
October	23.1 (231)	28.1 (149)	17.4 (82)
December	20.1 (202)	26.4 (140)	13.0 (62)
	r = 0.014 (p = 0.383)*	r = 0.001 (p = 0.973)*	r = 0.008 (p = 0.489)*

*Correlation coefficient of length of observed period with period prevalence.

included the chi-square test and linear trends of headache in terms of age, sex, and educational level. Both headache and education were strongly associated with the age and sex of the interviewees, therefore we also performed a multiple regression analysis of headache with sex, age, and education, for testing independent associations between these parameters.

Results

Period prevalence

In December 1995 about one fifth (20.1%) of the Austrian adult population reported having had headaches during the year. 69.5% of these persons were women (prevalence 26.4% in women vs. 13.0% in men, $p < 0.001$) (Table 1). Period prevalences in 1995 varied from 19.6% in August to 23.1% in October. Trend analysis showed, in both univariate and multivariate analysis, an association with sex but not with age or education (Table 2).

Point prevalence

Mean point prevalence in the general population was 5.7%. Point prevalence was lower among men (3.6% in men vs. 7.7% in women, $p < 0.001$). Trend analysis showed a significantly higher prevalence among women in both univariate and multivariate analysis, when age and education were controlled (Table 3).

The point prevalence ranged from 5.0% in December to 6.8% in August. Sex-specific differences were observed in each month, and the highest prevalence of headache was registered in August for both men and women (8.4% and 5.0%, respectively) (see Fig. 1).

Table 2. Linear association of self-reported "headache/migraine" within the last year with age (yrs), sex, and education

	Bivariate		Multivariate	
	r	p (r)	B	p (B)
Sex	0.134	0.000	0.109	0.000
Age	–0.001	0.600	–0.002	0.663
Education	–0.008	0.487	–0.001	0.096

Table 3. Linear association of self-reported current "headache/migraine" with age (yrs), sex and education

	r	p (r)	B	p (B)
Sex	0.089	0.001	0.036	0.000
Age	0.082	0.000	0.005	0.000
Education	–0.041	0.000	–0.001	0.046

When comparing age groups the highest prevalence (8.0%) was observed among people aged 60 or over. Sex-specific differences persisted in the highest age group (men 5.1%, women 9.8%). Seasonal variation in the general population and peak prevalence in August (12.5% among the highest age group) are mainly influenced by people aged 60 or over (see Fig. 2). In the trend analysis, age (as a continuous variable) was significantly associated with headache in both univariate and multivariate analysis (see Table 3).

Co-morbidity

In general, significantly more people with self-reported headache suffered from stress (39.1% vs. 33.7%, $p < 0.001$) and chronic diseases (33.6% vs. 23.2%, $p < 0.001$).

The most common diseases among people aged ≥60 years were hypertension, rheumatic diseases, venous diseases, and diabetes, among those both with and without headaches. But people with headaches had a significantly higher prevalence of hypertension; 38.6% vs. 19.2%, spondylarthrosis; 26.7% vs. 9.4%, coxarthrosis and gonarthrosis; 21.0% vs. 15.2%, arthrosis of the shoulder; 13.6% vs. 7.8%, venous diseases; 18.7% vs. 9.4% and diabetes; 15.8% vs. 6.3%.

A relatively high percentage of people with headaches estimated their physical health as being poor or very poor (38.9% vs. 26.4%, $p < 0.001$) and reported two, three, or more than three periods of illness during 1995 (48.5% vs. 39.7%, $p < 0.001$). This poor self-reported condition applied to all age groups.

Education

Education was also an important factor influencing the point prevalence of headache. The highest prevalence was

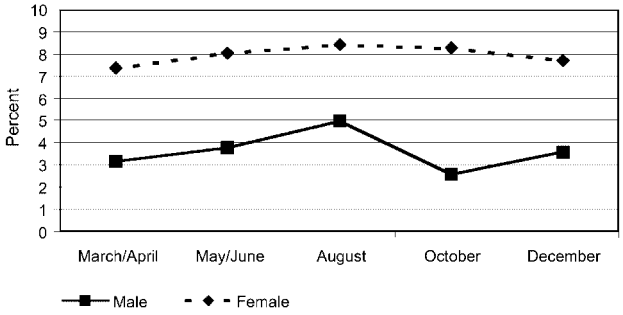

Fig. 1. Point prevalence of "headache/migraine" by sex

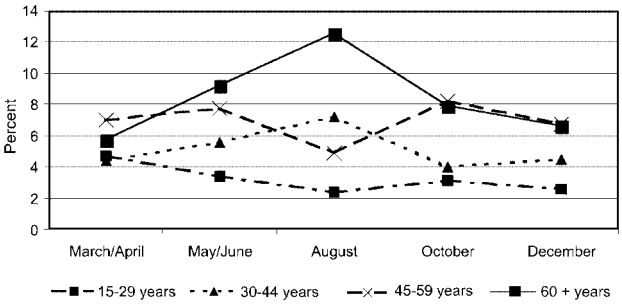

Fig. 2. Point prevalence of "headache/migraine" by age groups

observed among people with the lowest level of education and persisted in each surveyed month (see Fig. 3) and in both sexes (men 4.3%, women 9.4%). Trend analysis showed a significant association between the five categories of education and the point prevalence of headache in both univariate and multivariate analysis (see Table 3).

Drugs

In the Austrian population the most frequently reported drugs taken "often and regularly" were antihypertensive drugs and headache pills (14.3% and 13.8%, respectively). Significantly more people with headaches took drugs regularly (all kinds of medication: 44.3% vs. 26.8%, $p < 0.001$). Two thirds of people reporting at least one episode of headache in 1995 used headache pills. On the other hand, only one third of the people reporting to have a headache 'right now' (i.e. 5.9%) took headache pills. Women took headache pills significantly more often than men ($p < 0.001$). We found no significant differences in frequency of intake of headache pills between the various months.

Discussion

In a result of our survey published earlier, we reported headache as being one of the three most frequent complaints in the Austrian population, the other two being disorders of the musculosceletal system (e.g. backpain) and the common cold [11].

The present study focused on the prevalence of less serious disorders, particularly those for which treatment is commonly not requested. These impairments are usually not included in health statistics but are very important for public health. Therefore our prevalence data on headache include only those individuals whose day-to-day activities are not impaired by their headache.

During the year 1995, one fifth of the general population had had at least one attack of headache/migraine as described earlier. From the point prevalence statistics it may be estimated that every seventeenth Austrian adult is suffering from headache at any given moment. Period prevalence is about four times point prevalence. The data on women always showed higher prevalences of headache, as confirmed in the literature.

Our study shows significant differences between point and period prevalence of headache. Sex, age, general physical condition, and social status are important cofactors.

Prevalence data in the literature are highly variable. Several factors could explain the differences among study populations, including study methods (case definition, case ascertainment, survey method), sample size, sociodemographic profile (age and gender), race-related differences in genetic susceptibility, environmental risk factors, and culturally determined differences in symptom reporting [13].

Rasmussen et al. [14] reported a lifetime prevalence of headache in 96% of their study population. The one-year prevalence of headache ranged from 51% to 68% [15, 16]. Epidemiological data on the prevalence of tension-type headache have shown a range from 16% to 44.5% [15–17], of migraine from 10–25% [14, 16, 18–20], and the prevalence of frequent headache has been estimated at 27% [21].

Few previous studies have investigated point prevalence. Rasmussen et al. [14] found current tension-type headache in 9% of men and 16% of women in the Danish general population. Sakai et al. [22] found an overall point prevalence of headache of 18.3% and prevalence of tension-type headache of 15.6%.

In most studies, the prevalence of headache decreased with age [15, 16]. One-year prevalence of headache in people over 65 has been estimated at 51% [15] for headache generally, at 44.5% [15] for tension-type headache and at 11% for migraine [15].

In relation to age, we have two different findings for point and period prevalence. Firstly, period prevalence did not differ significantly across the various age groups. In contrast, point prevalence showed that a large percentage of people over 60 are affected by headaches. Furthermore point prevalence is highest in the warmer months (May, June, August), which implies that elderly people mainly suffer from headaches in the summer.

The constant period prevalence of headache irrespective of the referring time period (from the beginning of the year to March/April or to December) might be explained by the chronic course of the symptoms and by recall bias, especially in the elderly.

Previous data on the association between headache prevalence and socio-economic status are controversial. Some studies have found a fairly uniform prevalence in various social groups and at various education levels [23, 24], while others reported an increased risk for migraine among the less educated or lower income groups [25].

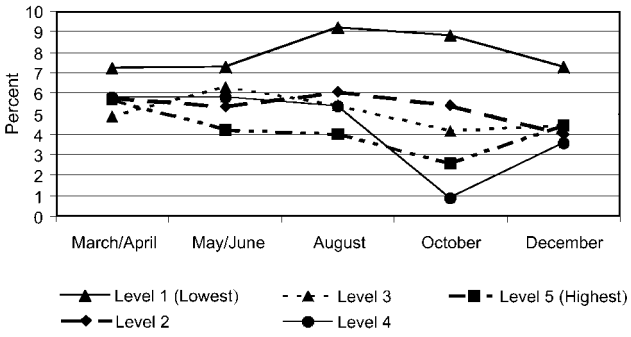

Fig. 3. Point prevalence of "headache/migraine" by educational level

Our study shows that point prevalence of headache is inversely related to education, a marker of socio-economic status. The reason for this outcome could be that level of education and socio-economic status are predictive of a tendency to consult a physician, rather than a tendency to suffer from the disorder [26]. This theory would suggest that period prevalence is particularly associated with the level of education. Since we found no significant relationship in our study population, we tend to support theories of social causation and downward drift, as a result of headaches interfering with educational and occupational function.

In addition to the varying prevalence figures in previous studies, several other aspects of epidemiology are controversial, e.g. the influence of psychological factors.

Several authors have described migraine as being linked to psychiatric co-morbidity, and in particular to major depression and anxiety disorders [27, 28]. Aromaa et al. [21] found that psychological problems (depression, stress, nervousness, insomnia), social relations, childhood experiences, hobbies and cultural differences, psychosocial stress and responsibilities at work were clear predictors of frequent headaches.

In summing up, the findings in our study on headaches were influenced by the fact that we did not use a standardised headache questionnaire. Headache/migraine was one symptom among 30 others relating to impaired well-being, and interviewees were not particularly aware of questions focusing on headache. Thus total prevalence of disease could not be estimated since the people with the most severe manifestations were least likely to be available for interview.

Another important point that may have influenced our study is that representative samples of the entire population were interviewed, including the age group of 70 years and above, which comprised 7.1% of the study group. The majority of population-based studies have excluded people over 64 years of age.

Background morbidity of headache seems to vary with season and strongly depends on age and sex, with women having higher prevalence rates.

Long-term investigations (over a period of a few years) of background morbidity will be needed to confirm our findings on the seasonal variation of headache. Furthermore, we did not investigate possible daytime variations of point prevalence or its variation during the week, which might be an important limitation of our study; this should also be addressed when seasonal variations are studied.

We also found very different results between point and period prevalence in relation to age and education. While period prevalence has shown no trend with age in some studies, including ours, and a decreasing trend in the majority of studies, we found increasing point prevalence with age. We assume that methodological factors are responsible for this difference.

It is reasonable to suggest that prevalence studies should include both period and point prevalence in order to obtain more detailed information on background morbidity.

References

1. Foppa I, Noack H, Minder CE (1995) The relation of reported symptoms to social, individual, and behavioural indicators of ill-health: is the number of reported symptoms a unique general dimension of ill-health? J Clin Epidemiol 48: 941–948
2. Noack H, Foppa I, Calmonte R (1993) Reported disease and psychological well-being in Swiss-adults. Soz Präventivmed 38: 297–312
3. Aiach P, Curtis S (1990) Social enaqualities in self reported morbidity: interpretion and comparison of data from Britain and France. Soc Sci Med 31: 267–274
4. Bormann C (1994) Sind Selbstangaben zu Krankheit zuverlässig und plausibel. Soz Präventivmed 39: 67–74
5. Heinemann L (1994) Methoden für Morbiditätssurveys, Möglichkeiten und methodische Anforderungen. In: Heinemann L, Sinnecker H (Hrsg) Epidemiologische Arbeitsmethoden. Gustav Fischer, Frankfurt
6. Ostlin P (1990) Occupational history, self reported chronic illness, and mortality: a follow up of 25,586 Swedish men and women. J Epidemiol Community Health 44: 12–16
7. Schmeiser-Rieder A, Kunze U (2000) Blood pressure awareness in Austria. A 20-year evaluation, 1978–1998 Eur Heart J 21: 414–420
8. Friedl HP (1993) Fragen zur Gesundheit: Befindlichkeit, Beschwerden und Erkrankungen. Ergebnisse des Mikrozensus Dez 1991. Statistische Nachrichten 12: 1075–1080
9. Kunze M, Rosenberger A, Mitsche N, et al (1996) SERMO-Studie ein neuer epidemiologischer Dienst. Mitteilungen der österreichischen Sanitätsverwaltung 97: 237–238
10. Schmeiser-Rieder A, Kunze U, Mitsche N, et al (1997) Health monitor (SERMO study)-concept methodology and paradigmatic result on subjective morbidity in headache. Gesundheitswesen 59: 144–149
11. Schmeiser-Rieder A, Kunze U, Mitsche N, et al (1998) Self-reported prevalence of venous diseases in the general population of Austria – Results of the SERMO (Self-reported morbidity) Study. Acta Med Austriaca 25: 65–68
12. Atteslander P (1995) Methoden zur empirischen Sozialforschung. de Gruyter, Berlin New York
13. Stewart WF, Simon D, Shechter A, Lipton RB (1995) Population variation in migraine prevalence: a meta-analysis. J Clin Epidemiol 48: 269–280
14. Rasmussen BK, Jensen R, Schroll M, Olesen J (1991) Epidemiology of headache in a general population-a prevalence study. J Clin Epidemiol 44: 1147–1157
15. Prencipe M, Casini AR, Ferretti C, Santini M, Pezzalla F, Scaldaferri N, Culasso F (2001) Prevalence of headache in an elderly population: attack freuency, disability, and use of medication. J Neurol Neurosurg Psychiat 70: 377–381
16. Roh JK, Kim JS, Ahn YO (1998) Epidemiologic and clinical characteristics of migraine and tension-type headache in Korea. Headache 38: 356–365
17. Schwartz BS, Stewart WF, Simon D, Lipton RB (1998) Epidemiology of tension-type headache. JAMA 279: 381–383
18. Lipton RB, Stewart WF, Diamond S, Diamond ML, Reed M (2001) Prevalence and burden of migraine in the United States: data from the American Migraine Study II. Headache 41:646–657
19. Merikangas KR, Whitaker AE, Isler H, Angst J (1994) The Zurich study: XXIII. Epidemiology of headache syndromes in the Zurich cohort study of young adults. Eur Arch Psychiatry Clin Neurosci 244: 145–152
20. Stewart WF, Lipton R, Celentano DD, Reed ML (1992) Prevalence of migraine headache in the United States. Relation to age, income, race, and other sociodemographic factors. JAMA 267: 64–69

21. Aromaa M, Sillanpää M, Rautava P, Helenius H (1993) Prevalence of frequent headache in young Finnish adults starting a family. Cephalgia 13: 330–337
22. Sakai F, Igarashi H (1997) Prevalence of migraine in Japan: a nationwide survey. Cephalgia 17: 15–22
23. Rasmussen BK (1995) Epidemiology of headache (Review). Cephalgia 15: 45–68
24. Cheung RTF (2000) Prevalence of migraine, tension-type headache, and other headaches on Hong Kong. Headache 40: 473–479
25. Stang P, Sternfeld B, Sidney S (1996) Migraine headache in a prepaid health plan: ascertainment, demographics, physiological, and behavioural factors. Headache 36: 69–76
26. Rasmussen BK, Olesen J (1994) Epidemiology of migraine and tension-type headache. Curr Opin Neurol 7: 264–271
27. Breslau N, Schultz LR, Stewart WF, Lipton RB, Lucia VC, Welch KM (2000) Headache and major depression: is the association specific to migraine? Neurol 54: 308–313
28. Breslau N, Schultz LR, Stewart WF, Lipton R, Welch KM (2001) Headache types and panic disorder: directionality and specificity. Neurol 56: 1124

Correspondence: Prof. Anita Rieder, MD, Institute of Social Medicine, Medical University of Vienna, Rooseveltplatz 3, A-1090 Vienna, Austria,
E-mail: anita.rieder@meduniwien.ac.at

(Received June 23, 2003, accepted after revision December 3, 2003)