A Canadian Population Survey on the Clinical, Epidemiologic and Societal Impact of Migraine and Tension-Type Headache

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ABSTRACT: Trained telephone interviewers contacted 1,573 adults across Canada about the nature and frequency of headaches suffered by them or by others in their households. Using a table of pain symptoms and other characteristics abstracted from the International Headache Society (IHS) classification, the headaches were assigned to migraine headache, tension-type headache or other diagnostic groups. Of the households sampled, 59% had at least one headache sufferer in residence. The proportion of headache sufferers with migraine was 14%; with tension-type, 36%; and with both, 14%. Migraine headache caused more disability than tension-type headache, with nearly 20% of migraine sufferers taking time off work and disability lasting for a mean of 1 day. It is concluded that the current prevalences of migraine and tension-type headache in Canada fall around the mean of previous studies, that the IHS criteria can form a basis for diagnostic classification and that the functional impact of migraine has been seriously underestimated in the past.

RÉSUMÉ: Étude de population sur l'impact clinique, épidémiologique et social de la migraine et de la céphalée de tension au Canada. Des intervenants entraînés dans les techniques d'entrevue téléphonique ont contacté 1,573 adultes à travers le Canada au sujet de la nature et de la fréquence des maux de tête dont ils souffraient eux-mêmes ou dont souffrait leur entourage immédiat. Les céphalées étaient classifiées comme céphalée migraineuse, céphalée de tension ou appartenant à d'autres groupes de diagnostics, selon une table de symptômes de la douleur et d'autres caractéristiques obtenues à partir de la classification de la Société Internationale de la Céphalée (SIC). Parmi les ménages échantillonnés, 59% comptaient au moins un individu souffrant de céphalée et résidant avec la personne faisnat l'objet de l'entrevue. La proportion des individus souffrant de céphalée était de 14% pour le type migraineux, 36% pour la céphalée de tension et de 14% pour les deux types chez le même individu. La céphalée migraineuse cause plus d'invalidité que la céphalée de tension: près de 20% des individus atteints de migraine s'absentent du travail et l'invalidité dure en moyenne une journée. Nous concluons que les prévalences actuelles de la migraine et de la céphalée de tension au Canada sont en accord avec la moyenne établie par des études antérieures, que les critères de la SIC peuvent servir de base pour une classification diagnostique et que l'impact fonctionnel de la migraine a été sérieusement sous-estimé dans le passé.

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Reports in the literature have suggested that migraine headaches occur in 1-19% of adult men and 3-29% of adult women,[1] but these studies have suffered from a lack of accepted diagnostic criteria. Moreover, methodologies have differed from one study to another, as have populations and study designs. As a result, the frequency, duration and severity of various headache types have been variably estimated.

We report three separate studies, each conducted to obtain information on headache prevalence or frequency in adults or on headache patient attitudes and behaviour. The new classification system of the International Headache Society[2] (IHS) was used in this population survey to improve validity and to allow consistency in future studies. In this paper, we provide the methodology of all three studies but the clinical and epidemiologic results of only the first. Results on the societal impact of migraine, gathered primarily from the second and third studies, will be published separately.

Methodology

A population-based study of headache prevalence in adults (i.e., individuals 15 years of age and older) was conducted between August 1989 and April 1990 using a telephone survey procedure. A second study involved detailed telephone interviews with a subsample of the headache sufferers who had been identified in the prevalence study. A third study used daily

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diaries to collect data on headaches and on the behaviour of a further subsample of the sufferers identified in the prevalence study.

For validation, overall headache prevalence was compared to the findings of the biannual National Angus Reid Poll (NARP), in which 1,505 households with 4,410 individuals were interviewed. Participants in the NARP were asked the same questions regarding headache that were asked in the migraine prevalence study. The questions were: How many people are there in this household? and How many people in this household ever have headache? The NARP interview was carried out in its entirety regardless of how these questions were answered.

Sample

(i) Prevalence Study

Telephone calls were made to 24,159 households using a modified random-digit-dial telephone sampling procedure, which selected existing prefix codes for the first three digits of a telephone number and used a computer to generate the last four digits. Persons answering the telephone were screened for age (to ensure that they were 15 years or older) and asked if there were any headache sufferers in their household. If a household included more than one headache sufferer, only one (the person with the most recent birthday) was interviewed.

No contact was made at 16,674 numbers despite four callback attempts, and 983 that were contacted were ineligible because some parents of headache sufferers aged 15 to 17 did not permit an interview with their teenagers; there was a language or other communication barrier (e.g., deafness); or the number belonged to a business or facsimile machine. Of the remaining numbers contacted, 3,597 refused an interview, and 2,905 agreed to an interview. Among this latter group, there were 1,164 households with no headache sufferers and another 168 with none 15 years of age or older, leaving 1,573 households in which there were one or more headache sufferers who were eligible and who completed the interview (Figures 1 and 2).

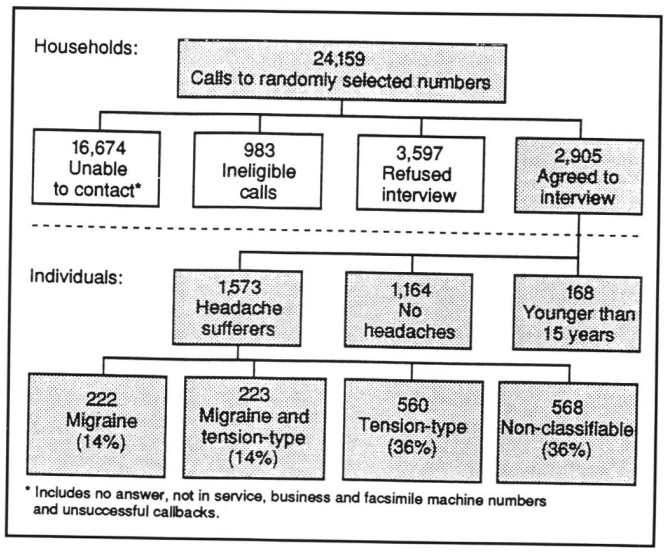

Figure 1 — Telephone survey prevalence results with extrapolation (%) to Canadian population. Subjects who were non-classifiable did not fulfill the strict diagnostic criteria which require a score of 3 or 4 points on the IHS scales for migraine or tension-type headache.

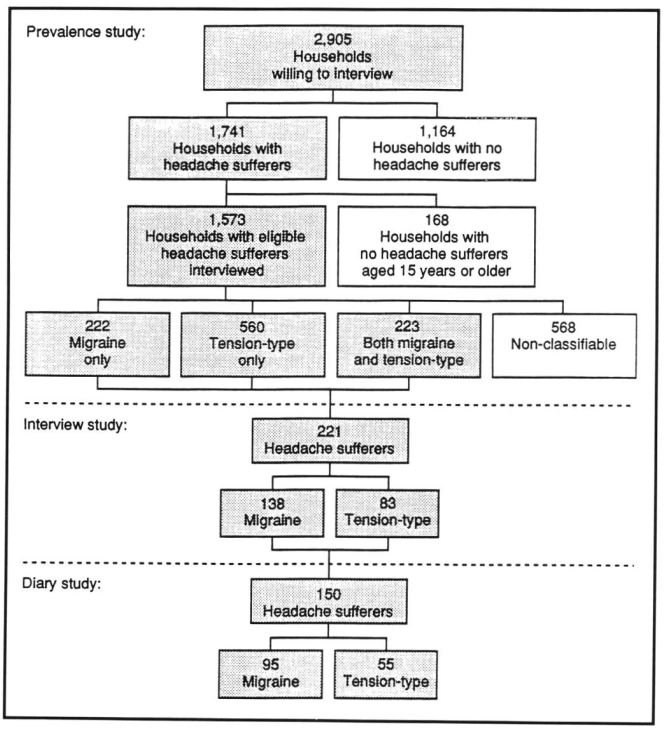

Figure 2 — Study samples (note: numbers are not weighted).

(ii) Interview Study

Using a computerized program, 138 migraineurs and 83 tension-type headache sufferers were randomly selected from the 445 migraineurs and 783 tension-type headache sufferers identified within the 2,905 households contacted in the first survey. A telephone survey was conducted with these 221 subjects.

(iii) Diary Study

During the random selection of subjects for the interview study, 150 subjects were consecutively recruited to complete a daily diary. Quotas were set to terminate recruiting at 95 migraineurs and 55 tension-type headache sufferers.

Demographics

The survey demographics on sex, age, education, income, employment and language were compared to standard demographic figures for Canada derived from the most recent Statistics Canada Census (1986).[3]

Data Collection

(i) Prevalence Study

The major descriptive characteristics of migraine headache and of tension-type headache were distilled from the published criteria of the IHS and tabulated (Table 1) to allow the derivation of criteria for the diagnosis of each condition. These criteria were then rephrased in layman's language. They were derived from the following IHS categories:

- Migraine headache: categories 1.1 and 1.2 of the IHS classification, excluding the sections requiring neurological examination to rule out underlying pathology, and excluding migraine variants, such as retinal migraine

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Table 1: Headache Descriptions and Classification

Descriptions	Diagnostic classification (1 point each)
Migraine: ***Pain symptoms***	***Classify as migraine if score is ≥ 3***
Painful on only one side of head (left or right)	Two or more migraine pain symptoms experienced
Pulsating or throbbing type of pain	Two of these symptoms occurring more than five times with this headache type
Pain worsens upon normal movements (e.g., bending down or climbing stairs)	Any of the following symptoms always or often experienced with this headache type: nausea, vomiting or photophobia *and* phonophobia
Moderate to severe pain which makes it more difficult or impossible to get through your normal day.	This headache type lasting 4 to 72 hours if untreated or treated unsuccessfully
Tension-type: ***Pain symptoms***	***Classify as tension-type if score is ≥ 3***
Painful on both sides of, or right across, front or back of head	Two or more tension-type pain symptoms experienced
Pressing or tightening type of pain, like a band around head	Two symptoms occurring 10 or more times previously
Pain which remains practically unchanged whether standing, climbing stairs or moving	This headache type lasting 30 minutes to 7 days
Mildly or slightly painful, but does not prevent normal daily work.	Neither nausea nor vomiting *ever* experienced with this headache type
	Photophobia *and* phonophobia not experienced concurrently.

- Tension-type headache: categories 2.1 and 2.2, excluding the sections requiring neurological examination to rule out underlying pathology, and excluding tension-type headache associated with disorders of cranial muscles.

Our diagnostic classification was based on a point system. Only those subjects who responded positively to 3 or more of the headache classification points set out in Table 1 were considered to suffer from definite migraine or tension-type headache; those subjects who scored only 1 or 2 points in either category were considered not to conform strictly to the criteria and thus remained unclassified. Subjects scoring 3 or more of the 4 migraine points or of the 5 tension-type headache points were regarded as suffering, respectively, from migraine or tension-type headache conforming to the IHS diagnostic criteria and were classified accordingly.

The order of the headache descriptions was randomized, and time windows included "ever," "within the last year" and "within the last month." If the respondents said that their headaches matched one of the descriptions, they were asked to complete separate, detailed interviews to obtain the following information: 1) Presence or absence of each IHS pain symptom 2) Presence or absence of nausea, vomiting, photophobia and phonophobia 3) Headache duration 4) Headache frequency 5) Degree of disability 6) Presence or absence of warning symptoms 7) Headache type.

The degree of disability was measured on a 4-point scale of "none," "somewhat limited," "moderately limited" and "severely limited," defined as follows: a) Somewhat limited: able to continue daily activities, but at a reduced capacity b) Moderately limited: unable to continue daily activities, but not requiring bed rest c) Severely limited: requiring bed rest.

Information was also collected on consulting behaviour, medication use and family history.

(ii) Interview Study

Three months after the prevalence study had been completed, detailed telephone interviews were conducted to obtain information on the randomly selected 221 headache sufferers' attitudes toward their conditions, treatment options, medications used, the impact of migraine on their lives and consulting behaviour. This study also attempted to identify the subjects' reasons for deciding whether or not to consult a physician or to seek information about the nature and treatment of headaches.

Respondents were asked whether they agreed with specific statements about their headaches, doctors and headache remedies. Standardized questions were asked regarding headache history, consulting behaviour and current medication usage.

(iii) Diary Study

The 150 headache sufferers selected during the interview study were asked to record answers to specific questions each day for the 3 months immediately following completion of the interviews. The first question was, "Did you have a headache today? Yes or no?" If the answer was "yes," the respondent was asked for further details corresponding to the IHS criteria for migraine or for tension-type headache (see Table 1). Additional questions were then asked regarding the impact of the headache on the subject's activities and use of medication.

Data Analysis

(i) Prevalence Study

The nationwide prevalences of migraine and tension-type headache were calculated for the sample and weighted by age, sex and geographical regions, using the weighting program from the Statistical Package for the Social Sciences (SPSS). The results relate to subjects who met the IHS criteria for migraine or tension-type headache as outlined in Table 1. Those subjects with other headache types, including cluster headache and mixed or unclassifiable headache, are not discussed here. The chi-square test was used where appropriate to compare demographics to Statistics Canada data.[3] Summary statistics (i.e., means and medians) and confidence intervals are used to present the remaining data.

(ii) Interview Study

Attitudinal research data were analyzed using the SPSS "Quick Cluster" program.[4] The algorithm used in this program is based on nearest centroid sorting. Data on consulting behaviour and medication use are presented by summary statistics (i.e., means and medians).

(iii) Diary Study

Results from the patient diaries are presented by headache type using summary statistics (i.e., means and medians).

RESULTS

Prevalence of Headache by Type

Of the 1,573 headache sufferers who completed telephone interviews, 14% suffered only from migraine, 36% had tension-type headache and about 14% met the criteria for both headache types (Figure 1). The remaining 36% of the sample could not be classified as migraine or tension-type headache sufferers using this system.

Age and Sex Distribution

More females than males were found to suffer from both migraine and tension-type headache, and headaches of each type were especially common in the 25- to 44-year-old age groups (Table 2). A comparison of prevalence by sex showed a male: female ratio of 1:2.57 for IHS-defined migraine, and 1:1.78 for IHS-defined tension-type headache.

Frequency of Attacks

The mean annual number of headache attacks was 20 (median = 7) for migraine and 22 (median = 6) for tension-type headache (Table 3). In the 12 months prior to the interview, the frequency of all headache types ranged from none to 365. Further, 11% of all headache sufferers in the study sample reported one or more headaches per week.

Duration of Headaches

The mean duration of untreated or unsuccessfully treated headaches suffered by migraineurs was 31 hours (range 1 hour to 14 days [median = 24 hours]). The mean duration of tension-type headache was 24 hours (median = 4 hours) with a range of 15 minutes to 7 days.

Disability

Of the IHS migraineurs, 50% had to discontinue normal activities because of their headaches, in comparison to 18% of the tension-type headache subjects. Migraine was shown to have a much greater impact than tension-type headache on cancellation of work and family or social activities (Figure 3).

The mean duration of debilitation due to migraine was 22 hours (median = 8 hours). Limited ability to function during the last headache attack was reported by 77% of migraineurs; 30% required bed rest. Debilitation due to tension-type headache lasted a mean of 18 hours (median = 4 hours). Tension-type headache was associated with limited ability to function in 44%; bed rest was required by 7% of the subjects.

Warning Signs

The frequencies of symptoms preceding headaches in migraineurs, including visual disturbances (auras), numbness, pins and

Table 2: Demographics of Headache Sufferers: Comparison with National Population Distribution

		Tension-type (%)	Migraine (%)	National[3] (%)
Sex	Male	36	28	48
	Female	64	72	52
Age	15-24	20	14	21
	25-34	33	34	23
	35-44	23	28	18
	45-54	12	12	13
	55-65	7	8	12
	>65	5	4	14
Language	English	71	71	63*
	French	29	29	25*
Education				
Grade school/high school		50.5	48.5	60
Technical/some university		30.5	32.5	30
Completed university		18.5	18.5	10
Employment				
Employed outside home		65	70.5	67
Not employed		35	29.5	33
Family income				
<10,000		5.5	5	6
10,000-19,999		8	10	16
20,000-29,999		12	15	20
30,000-39,999		15.5	19	19
40,000-49,999		18	16	16
50,000-59,999		8	8.5	10
>60,000		16.5	13	13

*12% of Canadian population speaks languages other than English and French.

Table 3: Number of Headaches in the Last 12 Months Among All Confirmed Sufferers

Number of Headaches	Tension-type	Migraine
0-3	33%	27%
4-12	37%	40%
13-52	20%	26%
More than 52	10%	7%
Don't know/not sure	1%	1%
Mean	22.2	20.5
Median	6	7

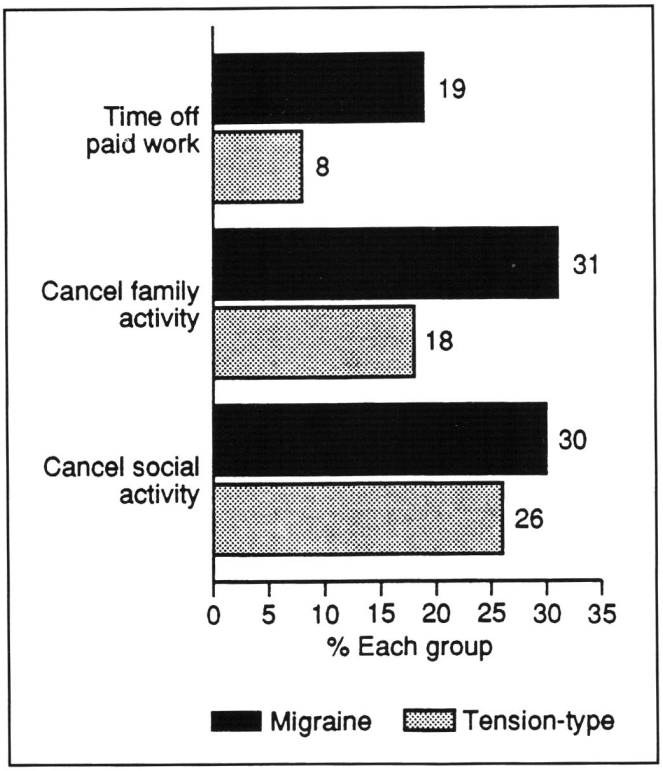

Figure 3 — Impact of last migraine or tension-type headache on activities.

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needles, weakness and speech difficulties, are shown in Figure 4. Visual disturbances were the most common symptom reported. Of the subgroup of respondents with IHS migraine, 46% reported experiencing auras.

Concomitant Symptoms

The frequency of concomitant symptoms, including vomiting, nausea, and light and sound sensitivity among migraineurs, is shown in Figure 5. Phonophobia was the symptom most commonly reported.

Discussion

Validity of the Survey Methodology

Of the 24,000 calls made, just under 75% were to numbers at which no contact was made, numbers belonging to a business or facsimile machine or households that were contacted but ineligible (e.g., due to language). Some of the unsuccessful callbacks may be interpreted as refusals, but the number of these cannot be determined. That only 45% of successful contacts led to interviews is probably explained in part by the caution given by the interviewer that the process would take more than 30 minutes.

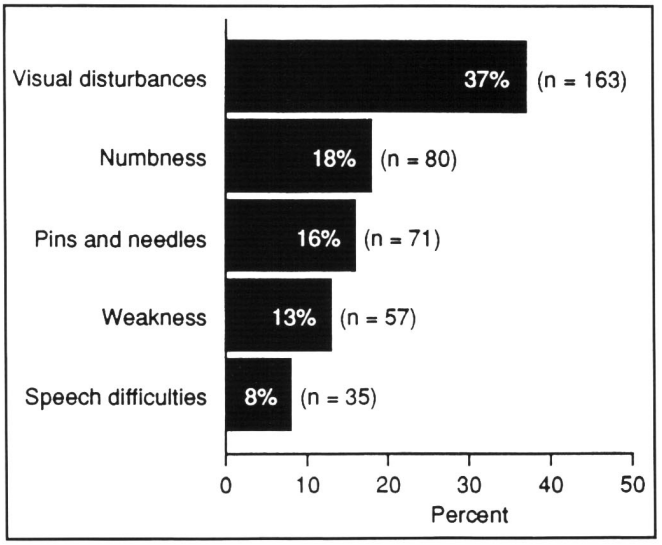

Figure 4 — Proportion of migraineurs experiencing symptoms prior to headaches. (ξ = 46%).

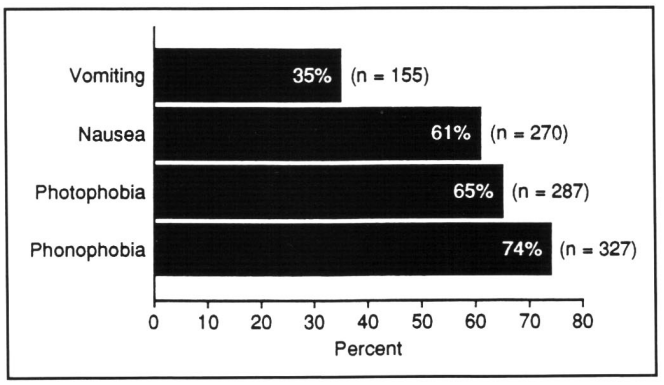

Figure 5 — Proportion of migraineurs experiencing concomitant symptoms.

As a result of this refusal rate, the prevalence figures obtained may have been inappropriately low, as is suggested by the substantially higher rate determined when questions about headache were put in the middle of a completely separate interview (the NARP, on a different subject), which was already ongoing. However, we know of no reason to suppose that people with any particular types of headache would refuse or accept interviews more often than those with any other type. Therefore, we consider that the data concerning our demographics of headaches and the responses of sufferers to them are unlikely to be affected by the refusal rate.

Use of IHS Diagnostic Criteria

In the past, definitions of migraine and of tension-type headache used in epidemiologic studies have varied, reducing the reliability of the prevalence rates and of other demographic data published to date. Our study is unusual in that diagnosis has been based solely on the leading clinical features specified in the IHS criteria, without any attempt at a definition of the headache entities. A further advantage of the IHS classification system is its neglect of any subjective estimate of the severity of pain, a factor that is correlated with but overshadows the presence of other headache symptoms.[5-11] Thus, in our study, a dichotomous decision-making system was employed in which a "yes" or "no" answer was required regarding each criterion, denying latitude in individual judgment, as compared to previous studies in which idiosyncratic responses to questions about pain severity were assessed in making a diagnosis.

That the approach is workable is suggested by our ability to classify 64% of the subjects interviewed among the categories migraine, tension-type headache or both. We believe that our estimates of prevalence afford a measure of consistency and of validity hitherto unavailable.[12-19] In the case of migraine, our results fall generally within the middle range of estimates published by others.

Prevalence of the Various Types of Headache

The methodology employed in this study precludes any comment on the features of migraine or of tension-type headache, because we used specific symptom patterns to assign a diagnosis in the first place. However, the relative prevalences of migraine and of tension-type headache in men and women and the age-specific prevalence rates that we report are comparable with other figures generally quoted.[1,10,13,20] We found no correlation between the prevalence of migraine or of tension-type headache and family income, supporting the views of Linet and Stewart.[21]

Proportions Assignable to the IHS Groups

Clinicians relying upon published definitions or descriptions of migraine and tension-type headache find that precise categorization is often difficult; some subjects describe headache symptoms that together do not allow confident diagnosis of either headache type. In this study, also, 36% of all reported headaches could not be labelled with confidence, since features of both types were described as components of a single headache. Another 14% of subjects described having headaches of both varieties, as has been described by Ziegler and Hassanien.[22] However, we believe that to be able to assign a diagnosis to 64% of the study sample on the basis of a telephone interview indicates that the IHS criteria are valid and that the distillate of the described features, which we employed as questions in this

study, might serve as the reliable basis of a clinical interview technique.

Demographic Data

The age, sex and socioeconomic status of the subjects with migraine show increased prevalence rates among females and among subjects in the 25- to 44-year-old age groups, as has frequently been reported before. No correlation with income could be demonstrated in the case either of migraine or of tension-type headache, but in each group there was a tendency for more subjects to have completed university education.

Preceding symptoms were not a diagnostic factor, but among subjects with IHS migraine headaches, visual disturbances, sensory, motor and speech disturbances were common. One of these symptoms occurred in nearly half the subjects, thus suggesting that the IHS categories of migraine with and without aura are roughly equal in frequency. The frequencies of occurrence of migraine and of tension-type headache were similar at a mean of about 21 per subject per year.

Issues concerning management, including patterns of abortive and interval treatments and their effectiveness; the use of non-medical treatments; the consulting behaviour of subjects; self-diagnosis; and the results of an attitude survey will be reported in a subsequent communication.

Non-assignable Subjects

As a result of the use of published descriptive criteria, the categorization of migraine has been formalized in the past to allow greater diagnostic certainty at the expense of universal application. We cannot be certain what disorder is suffered by the 36% of our subjects whose symptoms did not allow assignment to the IHS migraine or IHS tension-type headache categories by virtue of their scores of only 1 or 2 headache "points" in each category (when 3 or 4 were required by us for diagnostic labelling). However, we reject this as evidence that there is necessarily a spectrum of headache, with migraine and tension-type headache representing merely the two ends thereof, for the following reasons: it is reasonable to suppose that all grades of severity of migraine and of tension-type headache exist, so even if the two conditions were entirely different, early or mild cases of each would still remain unclassifiable; 14% of the subjects experienced both types of headache; there were qualitative differences in the nature of the symptoms between the two headache types, such as the presence of auras, the degree of disability and the associated non-pain symptoms (although the latter was also an original defining point); and the clinical features of migraines vary among people and between attacks.[22,23]

Subjective Disability

Pain is but one feature of the migraine attack; aversion to sensory stimuli, nausea and vomiting were (in descending order of frequency) characteristic of migraines experienced (Figure 5), while general malaise was not ascertained. Our figures are slightly lower than those found by others.[24,25]

To assess the magnitude of the impact of headache, our findings may be extrapolated to the Canadian population aged 15 years and older, introducing the prevalence of headache as a weighting factor. This figure was calculated by determining the number of people in the respondents' households and the number of people who admitted having headaches (Figure 6). Using this method, we estimated that 67% of people in the households suffered from headaches. Comparing the number of headache sufferers to the total estimated population resulted in a headache prevalence of 40%.

The methodological bias that would have been introduced if interview subjects had denied that anyone in their households had headaches at all as a way of escaping the interview was assessed by introducing the same introductory questions into the middle of the NARP with identical structure and methodology. In the 1,505 households contacted, 2,606 people of a total of 4,410 suffered from headache, a prevalence of 59% (all types), which may be a truer estimate than 40% because of the reduction in bias and the increase in size of the sample studied.

Extrapolation from this figure of 59% suggests a population prevalence rate for migraine of 16.5% (indicating that 3.2 million people in Canada suffer from migraine) and 29.5% for tension-type headache (so that 5.8 million people in Canada would suffer from tension-type headache). These groups include an estimated 1.6 million people who suffer from both headache types. A further 5.8 million people in Canada would be expected, on the basis of these figures, to suffer from headaches that are not reliably classified into either type on the basis of our use of the IHS criteria.

Previous population-based studies have shown a wide range of migraine prevalence rates. Clarke and Waters[13] reported a rate of 28% among females and 19% among males, closely relating to our respective estimates of 23% and 10% in our sample. For tension-type headache, our estimates would be 36% of women and 22% of men. Waters[10] more recently found migraine prevalence rates of 30% and 17% in females and males. Linet and Stewart[21] considered that the prevalence of migraine in the United States remained uncertain because of the lack of objective diagnostic parameters. We suggest that a careful application of the

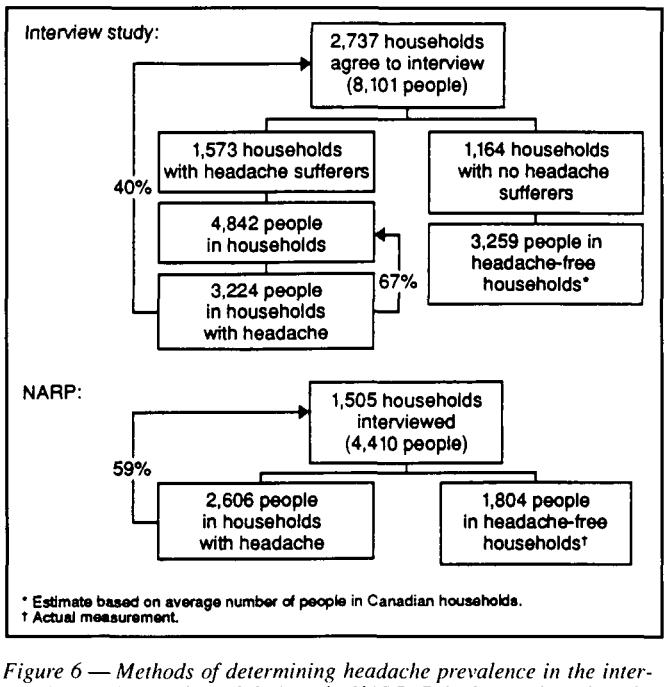

Figure 6 — Methods of determining headache prevalence in the interview study and, for validation, the NARP. Calculations based on the interview study led to an estimated prevalence of 40%. The NARP, which was less prone to methodological bias for this calculation, found a prevalence of 59%.

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IHS criteria allows a measure of confidence that Waters' figures may be considered reasonable.

The data presented on frequency of headaches and on the subjects' ability to function during them demonstrate the scale of the impact of migraine on the lives of those afflicted. Half the migraineurs we interviewed discontinued normal activities during their headache attacks; nearly one-third required bed rest. In three-fourths of the subjects with migraine there was at least a limiting degree of disability. In comparison, only one-fourth of those with tension-type headache defined by the IHS criteria had to discontinue their usual activities. We suggest that any perception that headaches are not especially serious nor a reasonable cause for repeated absences from work would be incorrect and that migraine is indeed recurrently, if temporarily, disabling. Given a mean annual frequency of migraine of 21 days (or 14 working days per year), 20% of 3.2 million migraine subjects unable to function at work on those days and 20% non-employment, it can be calculated that some 7 million working days are lost annually in Canada as a result of migraine alone. The socioeconomic burden that the condition imposes is thus profound.

Acknowledgement

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