

The prevalence of headache in a population of health care workers and the effects on productivity costs

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KEY WORDS

Headache; health care workers; productivity; health promotion

SUMMARY

Background: Headache is reported as one of the most frequent causes of lost work time and reduced work efficiency. **Aims:** The aim of this study was to determine the impact of headache and its consequences as regards absence from work among health care workers and reduced work efficiency. **Methods:** The prevalence of headache and its effects on ability in daily activities and work productivity were studied and assessed on occasion of the periodic health examination of 3,620 health care workers of the Provincial Health Care Trust, Trento, by means of the MIDAS disability scale and parameters derived from criteria established by the International Headache Society. **Results:** In the previous three months 27.1% had suffered from at least one episode of headache. The prevalence of migraine was 9.9%, with a significantly higher percentage among women (12.9%). The total administrative costs estimated per working year were about € 136,836 for migraine and about € 44,614 for tension-type headache (TTH). The prevalence and features of migraine and TTH were studied. **Conclusions:** Data regarding the prevalence of migraine were similar to the results reported in other studies. The vast majority of the individuals reported no absenteeism over the previous three months. The study confirmed that we should continue to manage the presumed job-related trigger factors in the best possible manner, counselling should be made available to health care workers during the periodic health examinations or upon request, and if needed, the patient should be sent to a neurology specialist for a free examination and appropriate pharmacological treatment.

RIASSUNTO

«Prevalenza ed effetti sulla produttività della cefalea in una popolazione di lavoratori della sanità». La cefalea viene riferita da vari autori come una delle più frequenti cause di assenza dal lavoro e di ridotta produttività lavorativa. Lo scopo di questo studio era di determinare la ricaduta della cefalea sui lavoratori, in termini di disabilità e il conseguente tasso di assenteismo e presentismo. Nel corso degli accertamenti sanitari periodici di 3.620 lavoratori sanitari della Azienda Provinciale per i Servizi Sanitari della Provincia Autonoma di Trento è stata valutata la prevalenza di cefalea e le sue conseguenze sulla qualità di vita e sulla produttività sul lavoro tramite la scala di disabilità MIDAS ed alcuni parametri derivati dai criteri della International Headache Society. Il 27,1% dei pazienti riferiva di aver sofferto, nei tre mesi precedenti, di almeno un episodio di cefalea. La prevalenza di emicrania è risultata pari al 9,9%, con una percentuale significativamente più alta tra le donne (12,9%). I costi totali

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per l'amministrazione stimati sull'anno lavorativo sono stati di circa € 136.836 per l'emicrania e di circa € 44.614 per la cefalea tensiva. La prevalenza di emicrania non era molto diversa da quella trovata in altri studi. La larga maggioranza dei soggetti non ha riferito giorni di assenteismo nei precedenti tre mesi. Le indicazioni dello studio sono di continuare a gestire al meglio i presunti fattori scatenanti correlati al lavoro, offrire un'attività di counseling ai lavoratori nel corso della sorveglianza sanitaria periodica o a richiesta e, al bisogno, indirizzare il paziente al neurologo per una visita specialistica gratuita ed un trattamento farmacologico adeguato.

INTRODUCTION

Headache is the most common type of pain experienced by almost everyone.

Headache is a symptom in many illnesses, but primary (idiopathic) headache disorders account for the large majority of all headaches.

A classification of headache disorders was defined by the International Headache Society (IHS) in 1988 and revised in 2004 with the International Classification of Headache Disorders (ICHD), which distinguishes primary headache from secondary headache disorders (8).

The most frequent primary headache disorder is a tension-type headache (TTH), which can be episodic or chronic.

The episodic form is characterized by the onset of recurrent events, lasting from a few minutes to several days. Pain is typically compressive-constrictive, of mild to moderate intensity, with bilateral location. It does not worsen with physical activity and there is no nausea, phonophobia or photophobia.

The characteristic of the chronic form of headache is that it occurs at least 15 days each month for at least 6 months. Pain is generally bilateral, weight-like or constrictive, of mild or moderate intensity. It does not worsen with physical activity and nausea and phonophobia can occur.

Migraine, another type of primary headache, manifests with periodic monolateral pain, of moderate-to-heavy intensity, starting often in youth and decreasing in frequency and intensity in mature age. It may present neurological, usually transient, symptoms like scotomata and hemi-paresthesia (aura). Migraine without aura, that is, without neurological symptoms, is more frequent and it is usually characterized by phono-photophobia, nausea, and throbbing unilateral pain.

Tension-type headache and migraine are classified as separate disorders (26). Migraine is far more disabling than a tension-type headache, but it is rarely diagnosed and treated by the physician (9).

In a random sample taken in Denmark, with a response rate of 75.9%, Rasmussen and co-workers (18) found a lifetime prevalence of headache (all types) of 93% in males and 99% in females, a prevalence of migraine of 8% in males and 25% in females, a prevalence of tension-type headache of 69% in males and 88% in females.

Headache is a frequent complaint among workers and is most prevalent among persons in the 25-55 age group.

Already in 1700 Ramazzini identified 12 occupations in which headache was directly related to working conditions (28).

Furthermore, headache was also reported as a symptom in many occupational exposures to chemical, physical and psychophysical risks.

The most common trigger factors of both migraine and tension-type headache, besides alcohol, weather changes and menstruation, are stress and mental tension (19) and both physical and mental work stress (2).

In health organizations some chemical agents are anecdotally referred to as trigger factors for headache (anaesthetics, aldehydes, chemotherapeutics), but no causal nexus has been proved.

Durham and co-workers (7) carried out a random survey on the register of the North Carolina Board of Nursing; a sample of 10,000 nurses were asked to fill out a mail questionnaire on headache and its consequences for quality of life and productivity. With a response rate of 29.5%, 17% were classified as having migraine, 25% as having severe headache; those suffering from migraine had significantly reduced work productivity and quality of life.

It is difficult to objectively evaluate a symptom

like pain. An objective parameter is its interference with efficiency at work and in social life (27).

The different types of headache have an important impact on lost work time and decreased work efficiency.

Schwartz et al (21) contacted 19,840 households, completing a telephone interview with 13,343 subjects (response rate 77.4%), and found that an annual estimate of 9,922 subjects actually lost workdays because of headache (57% due to migraine and 43% due to tension-type and other types of headache) and an annual estimate of 23,287 subjects suffered reduced efficiency per workday equivalent (64% due to tension-type and other headache types and 36% due to migraine).

Burton et al (3) projected established prevalence data on the employees of a large financial services corporation (with over 80,000 employees) and estimated corporate costs resulting from migraine-related absenteeism and reduced on-the job productivity as at least \$21.5M and \$24.4M respectively.

D'Amico et al reported the results of two Italian experiences regarding workplace disability due to migraine (4, 5).

A study on the prevalence of headache in a cohort of health workers was carried out between 2000 and 2002 in the Provincial Health Care Trust of Trento (Italy), which is a member of the WHO International Network of Health Promoting Hospitals (HPH) and is particularly active in health promotion at the workplace.

The wellbeing of workers is regarded as an essential component of a high quality system, leading to better services to patients.

The aim of this study was to describe the prevalence of migraine and TTH in a selected working population, and relate it to age, gender, severity, frequency, disability and reduced productivity. Other types of primary headache or secondary headache were excluded from the study.

METHODS

The prevalence of headache was investigated during the periodic health examinations of workers employed in the Provincial Health Care Trust of

Trento (Italy), which includes seven hospitals and several health care facilities.

A total of 3,620 health care workers were interviewed by an occupational physician using a questionnaire based on the Italian version (6) of the Migraine Disability Assessment Scale (MIDAS) (25), which considers all headache-related events during the previous three months.

MIDAS has five questions assessing headache-related disability over the preceding three months. Question 1 asks the number of paid days off work or school; question 2 asks the number of days during which productivity at work or school was reduced by 50% or more; question 3 asks how many days of housework were completely missed due to headache; question 4 asks the number of days during which housework was reduced by 50% or more; and question 5 asks the number of days during which family, social and leisure activities were missed. Two additional questions investigate headache frequency (number of days with headache during the previous three months, question A) and intensity (average pain intensity of headache on a 0-10 scale, question B). MIDAS provides two global measures, the MIDAS score and the MIDAS grade. The MIDAS score is the sum of the scores for the first five questions and corresponds to the number of days with total or significant disability due to headache. The MIDAS grade corresponds to intervals of the MIDAS score, thereby classifying patients according to four disability levels: grade I (score range 0 to 5) corresponding to little or no disability, grade II (score range 6 to 10) corresponding to mild disability, grade III (score range 11 to 20) corresponding to moderate disability, and grade IV (score above 21) corresponding to severe disability.

The workers reporting at least one episode of headache in the last three months were asked to give information about:

- Results derived from MIDAS questionnaire: days of headache in the last three months, average pain intensity scale (on a scale from 0 to 10), days of absenteeism, days of less than 50% reduced efficiency at work (presenteeism), MIDAS disability grade.

- Results derived from direct interview: characteristics of headache and associated symptoms

(based on IHS criteria), frequency and duration of episodes, use of drugs, degree of relief after using drugs, trigger factors.

Every worker in the study underwent an anamnestic and clinical investigation in order to exclude secondary headache (trauma, brain diseases, high blood pressure, sinusitis, drug abuse). If necessary and whenever requested, workers underwent a further neurological examination by a specialist.

For primary headaches, sex-specific prevalence (3-month period) estimates of migraine and of tension-type headache were calculated. Confidence intervals for the prevalences were calculated as described in Agresti and Coull (1). Logistic regression was used to quantify sex and age differences by means of odds ratios. Comparisons of groups were performed using the chi-squared test.

The mean daily wage of each professional employee, as provided by the administrative offices, was used to quantify the cost of one day of absenteeism. The cost of one day of presenteeism was calculated as half of the mean daily wage.

RESULTS

Three thousand six hundred and twenty subjects (1202 males, 2418 females) participated in the study. Males were older than females (mean: 42.3 vs 37.6 years; standard deviation: 8.3 years).

Table 1 shows the prevalence of headache (and migraine) in males and females. The overall prevalence of headache (as well as the prevalence of migraine and of TTH) was significantly higher ($p < 0.001$) among females than among males.

Table 2 shows both crude and age-adjusted odds ratios (females vs males) according to headache type.

Table 2 - Odds ratios (females vs males) for headache in the previous three months according to headache type

Tabella 2 - Odds ratio (femmine vs maschi) per cefalea nei tre mesi precedenti in rapporto al tipo di cefalea

	Crude			Age-adjusted		
	OR	95% C.I.		OR	95% C.I.	
Migraine	3.64	2.66	4.99	3.73	2.71	5.14
Tension type	2.10	1.71	2.58	2.11	1.71	2.61
Overall	2.88	2.40	3.45	2.92	2.43	3.52

The prevalence of migraine showed a quadratic trend with age, with a maximum (11.1%) in subjects aged 35-44 and lower values among subjects aged 55-64 and under 25; the prevalence of TTH, however, showed a slight decrease in the five age groups, from 19.3% to 14.8% (figure 1).

Pain, frequency and disability

Pain was more severe among migraine sufferers. The median of the pain scale was 7 among migraine sufferers and 6 among patients with TTH; mean values were respectively 6.9 (s.d.: 1.7) and 5.7 (s.d.: 1.9). Ten migraine sufferers (7.1%) reported the highest value on the pain scale (10) compared to 20 (3.3%) subjects with TTH.

Table 3 reports the patterns of pain severity, headache frequency and disability according to headache type. As reported in the MIDAS questionnaire, disability was classified according to 4 categories on the basis of the sum of the responses to five questions on the frequency of days with reduced efficiency. Migraine sufferers had more severe pain ($\chi^2=74.9$; $p < 0.001$) and increased disability ($\chi^2=127.2$; $p < 0.001$) when compared to subjects with TTH; however, headache frequency was similar ($\chi^2=4.79$; $p=0.188$). Twenty-two percent of the

Table 1 - Prevalence of headache in the previous three months according to sex and headache type

Tabella 1 - Prevalenza della cefalea nei tre mesi precedenti in rapporto al genere ed al tipo di cefalea

	Males				Females				All			
	N	%	95%CI		N	%	95%CI		N	%	95%CI	
Headache (overall)	177	14.7	12.8	16.8	803	33.2	31.4	35.1	980	27.1	25.6	28.5
Migraine	47	3.9	3.0	5.2	312	12.9	11.6	14.3	359	9.9	9.0	10.9
Tension type	130	10.8	9.2	12.7	491	20.3	18.8	22.0	621	17.2	16.0	18.4

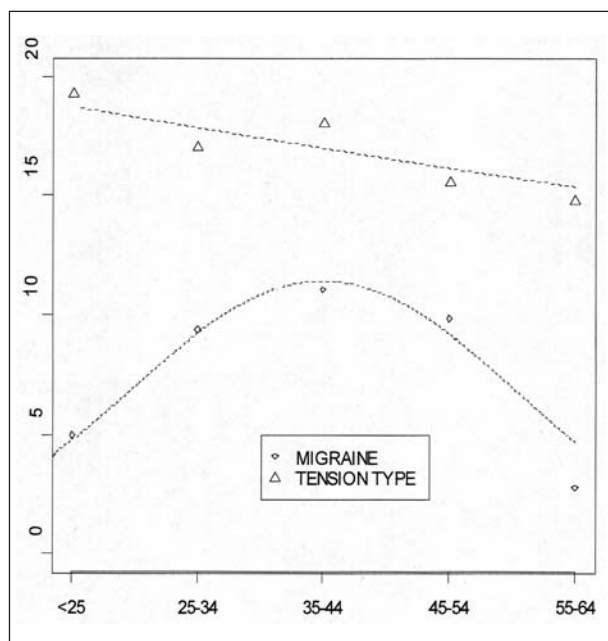


Figure 1 - Prevalence of migraine and TTH in the previous three months according to age

Figura 1 - Prevalenza dell'emicrania e delle cefalee tensivo nei tre mesi precedenti in rapporto all'età

migraine sufferers also showed associated aura.

Costs

About 17% of individuals of the migraine group (95% C.I.: 13.5%-21.6%) and 3% (95% C.I.: 1.9%-4.8%) of the TTH group reported one or more days of absenteeism/presenteeism over the previous three months.

Number of lost workdays, number of workdays

with reduced productivity and costs associated with headache in the previous three months are shown in table 4.

The ratio between mean number of lost workdays in migraine sufferers and the number in subjects with TTH was 4.4; we found a similar ratio between mean number of workdays with decreased productivity in migraine sufferers and the number in subjects with TTH (5.5).

The total costs estimated per working year were about € 136,836 for migraine and about € 44,614 for TTH, which altogether account for 0.069% of the total budget for the employees.

Trigger factors

The main trigger factors were related to the menstrual cycle for 279 women (105 with migraine and 174 with TTH), stress and work overload in 97 workers with headache (68 females and 29 males), in 43 with migraine and in 54 with TTH, weather changes in 36 workers and diet-related factors in 45 workers. An additional work-related factor, besides stress and work overload, was night work (46 workers); other factors were not relevant.

Drug consumption

The use of non-prescription drugs was reported in 90.9% of the subjects with headache, with good control of the symptoms in 88.0%. Triptans were used by 19 migraine sufferers, with good results in 16. Three migraine sufferers were undergoing pre-

Table 3 - Pattern of pain severity, headache frequency and disability (MIDAS score) in the previous three months according to headache type

Tabella 3 - Andamento della intensità del dolore, della frequenza degli episodi e della disabilità (punteggio MIDAS) nei tre mesi precedenti in rapporto al tipo di cefalea

	Pain severity			Frequency				Disability			
	0-3	4-7	8-10	<1/month	1/month	2-4/month	>1/week	0-5	6-10	11-20	>20
Migraine											
N.	12	192	149	56	91	166	42	203	60	59	37
%	3.4	54.4	42.2	15.8	25.6	46.8	11.8	56.5	16.7	16.4	10.3
Tension type											
N.	75	426	112	112	185	254	60	547	34	23	17
%	12.2	69.5	18.3	18.3	30.3	41.6	9.8	88.1	5.5	3.7	2.7

Table 4 - *Lost workdays, number of workdays with reduced productivity and costs associated with headache in the previous three months***Tabella 4** - Numero di giornate perse, numero di giornate con ridotta produttività e costi associati con la cefalea nei tre mesi precedenti

	Migraine			Tension type			Overall		
	Absenteeism	Presenteeism*	Total	Absenteeism	Presenteeism*	Total	Absenteeism	Presenteeism*	Total
Days	54	218	272	21	68	89	75	286	361
Cost (€)	11936	22273	34209	4430	6723	11153	16366	28996	45362

* perceived efficiency less than 50%

ventive treatment but reported suffering from migraine in the previous three months.

DISCUSSION

All the subjects eligible for this study were interviewed during a periodic compulsory health examination; therefore they all answered each question. Furthermore, they did not know in advance that they would be asked about headache.

The main results of this study are a relatively low prevalence of both migraine and TTH, a low percentage of subjects with severe disability in working and social activities and a low rate of absenteeism.

There are many studies which report higher values than those found in this study.

Steiner et al (24) found an overall prevalence of migraine of 14.3% (7.6% in males and 18.3% in females). Lipton et al (11) found that migraine affects about 11% of the adult population in Western countries. Lipton et al in the American Migraine Study II (10) found a crude prevalence of migraine of 18.2% among females and 6.5% among males. Lyngberg et al (12) in a survey carried out in Denmark over a 1-year period found a 15.5% prevalence of migraine in 2001. Manzoni and Torelli (13) in a review article published a table with 1-year prevalence of migraine in the general population for studies performed between 1991 and 2002. In males, the estimates of prevalence ranged from 4.0% to 9.5%, while in females the estimates ranged from 11.2% to 25.0%. However, Morillo et al (14), evaluating the 1-year prevalence of mi-

graine in Latin America, found estimates not very different from those found in this study.

While most of the previous studies reported estimates of 1-year prevalence, in this study a 3-month prevalence of migraine was estimated. A 1-year prevalence would be higher. Furthermore, if we consider the confidence intervals of prevalence estimates shown in table 1, our data do not differ from those reported above.

Data reported in figure 1 are quite consistent with a meta-analytic summary of the prevalence studies (20), which showed that prevalence increases throughout early adult life until approximately age 40, after which it declines.

The use of questionnaires adapted to local culture reduces the possibility of bias due to misunderstanding and the direct interview (which is possible during periodic compulsory health examinations) reduces bias due to over-reporting. Therefore, the type of approach can justify the low prevalence both for migraine and TTH found in this study.

In other, company-wide-based studies, headache prevalence was higher, which could possibly be due to the fact that workers were recruited to participate in a "headache" study (17).

In our study, the majority of headache sufferers preferred to use non-prescription drugs, and few took triptans.

The cost to the employer was equivalent to 0.069% of the total employee budget.

Like Pradalier et al (16), who also used the MIDAS questionnaire in the GRIM2000 study, we found that the vast majority of the individuals reported no absenteeism over the previous three months.

However, in the American Migraine Study II (11) approximately 31% of all migraine sufferers missed at least 1 day of work or school in the 3 months prior to the survey because of migraine, 51% reported that work productivity was reduced by at least 50%.

In two Italian studies, D'Amico et al reported absenteeism (as an absence from work during the previous three months) in 22-25% of migraine sufferers (4, 5), a figure not very different from that found in the present study. A similar concordant result was found regarding the cost burden of presenteeism; in fact, like D'Amico et al (4, 5), we found that the cost burden of presenteeism was higher than that due to absenteeism. We did not find any substantial correlation between wards, tasks and headache.

Stang et al (23) reported that reduced efficiency on the job may actually have a considerably greater impact on productivity across the work force and can totally elude detection. This is particularly true for migraine where time missed at work due to reduced efficiency may exceed time missed due to absenteeism. The data in table 4 are consistent with this hypothesis. In fact, both workdays with decreased productivity and relative costs are greater than lost workdays and related costs. This finding is more evident for migraine.

The impact of headache on workplace productivity is related to the fact that effective treatment may not always be achieved, as the motivation to seek treatment may be discouraged due to resolution of the symptoms between attacks; productivity losses are likely to be increased because the episodic nature of the disorder leads to lower consultation rates, which result in inadequate or no treatment.

The published estimates of migraine prevalence have varied widely.

From an epidemiological point of view our research was conducted on a highly selected population and cannot be extended to the general population

Migraine has a great social impact due to both direct and indirect costs. In this study we considered only the productivity losses (which are probably the largest component of indirect costs) that take the form of absenteeism and reduced productivity while at work.

By providing counselling to the patient, an occupational physician can help him/her to investigate the characteristics of headache in order to avoid under-assessment of symptoms, avoid prescribing incorrect treatment and to enable the patient to improve his/her quality of life and job productivity.

By listening to the suffering worker, the occupational physician can identify headache trigger factors (stress, fatigue, weather changes, estrogen cycle, diet, smoking, sleep loss), and suggest changes in organisation to supervisors, whenever useful and possible, and also educate the patient on how to recognise and avoid such triggers (such as following proper eating and sleeping habits, regular physical exercise, relaxation techniques as biofeedback training, avoidance of medication overuse) (15, 22).

Counselling can help in understanding when to seek medical care and the occupational physician can refer more serious cases to a neurology specialist for an examination and appropriate treatment.

NO POTENTIAL CONFLICT OF INTEREST RELEVANT TO THIS ARTICLE WAS REPORTED

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