



Research Article

Impact of Migraine Treatment on Economic Burden and Workplace Productivity Among Migraineurs Employed in Schools: A Prospective Study

Çiğdem ŞEN¹, Necdet KARLI¹, Mehmet ZARIFOĞLU¹, Kayıhan PALA², Meral SEFEROĞLU¹, Güven ÖZKAYA³

¹University of Uludag, School of Medicine, Department of Neurology, Bursa, Turkey

²University of Uludag, School of Medicine, Department of Public Health, Bursa, Turkey

³University of Uludag, School of Medicine, Department of Biostatistics, Bursa, Turkey

Summary

Background Less than half of migraineurs receive prescription treatment and this causes a great loss of economical resources. We aimed to evaluate the effect of migraine treatment on migraine-related economic burden among migraineurs employed in schools.

Methods Forty-two subjects with migraine with two or more attacks per month included in this study. The first three-month phase was screening phase, followed by “medication adjustment phase” and the “treatment phase”. Subjects prescribed symptomatic treatment only or preventive and symptomatic treatment. All subjects kept the records of the frequency, intensity and duration of headaches, number of days missed from work, decreased productivity at work, number of acute medication intake and referral to the emergency department during an attack.

Results Frequency, severity and duration of headache, monthly headache days, analgesic intake per month, number of days with productivity loss were found to be significantly lower during treatment phase than screening phase ($p<0.05$). Impact of treatment started on the fourth and fifth months of the study. Direct cost in the treatment phase was significantly higher compared to the screening phase ($p<0.05$).

Conclusion Our study results showed that migraine treatment significantly decreased indirect cost of migraine. Maximum effort should be made by the headache societies in order to increase the treatment rates of migraine sufferers.

Key words: Migraine, economic burden, productivity, treatment, total cost

Migrenli Okul Çalışanlarında Migren Tedavisinin Migren ile İlişkili Ekonomik Kayıp ve İşyeri Verimliliği Üzerine Etkisi: Prospektif Çalışma

Özet

Amaç Migrenlilerin ancak yarısından azı reçeteli ilaç kullanmakta olup bu durum büyük ekonomik kayıplara yol açmaktadır. Bu çalışmada migrenli okul çalışanlarında migren tedavisinin migren ile ilişkili ekonomik kayıp üzerine olan etkilerini araştırdık.

Gereç ve Yöntem Bu çalışmaya ayda iki ya da daha fazla atak geçiren 42 migrenli olgu dahil edildi. İlk 3 ay “takip dönemi”, sonraki 3'er aylarda “tedaviyi düzenleme” ve tedavi dönemleri olarak takip edildi. Olgulara ya yalnızca semptomatik tedavi ya da semptomatik ve koruyucu tedavi birlikte verildi. Tüm olgular baş ağrısının sıklığı, şiddeti ve süresi ile birlikte işe gidilemeyen gün sayısını, işte verimliliğin azaldığı gün sayısını, alınan akut medikasyon ilacının sayısını ve atak sırasında acil servise başvuru sayısını günlüklerine kaydettiler.

Bulgular Baş ağrısı sıklığı, şiddeti ve süresi, aylık baş ağrılı gün sayısı, aylık analjezik tüketimi, verimlilik kaybı ile giden gün sayısı tedavi döneminde takip dönemine oranla

anamlı olacak şekilde dūřüktü ($p<0.05$). Tedavinin etkisi alıřmanın 4 ve 5. ayında bařladı. Tedavi dōneminde dođrudan maliyet takip dōnemine oranla yūksekti ($p<0.05$)

Sonuç alıřma sonularımız tedavinin migrenin dolaylı maliyetini anlamlı şekilde dūřürdūđünü gōstermiřtir. Bařađrısı ile ilgilenen bilim insanları migrenlilerde tedavi oranlarını yūkseltmek iin azami dūzeyde aba gōstermelidir.

Anahtar Kelimeler: Migren, Ekonomik yūk, verimlilik, tedavi, toplam maliyet

INTRODUCTION

Migraine is a common and disabling disorder that affects roughly 12% of the adult population in western countries^(24,29). Lifetime prevalence of migraine have been reported to be 15-25% for women and 6-9% for men^(18,37). In Turkey, the prevalence of migraine in the general population was reported to be 25% for women and 9% for men⁽⁷⁾.

Because of the high burden of migraine to the society and the individual, its prompt diagnosis and optimal treatment are required^(4,20,27,35). World health organization has shown that migraine is in the top 20 causes of disability worldwide⁽¹⁵⁾. Studies have shown that ¾ of migraineurs have reported functional incapacity and disability during an attack and more than half of them in need for bed-rest⁽³⁸⁾.

Reduction in the frequency, duration, intensity of migraine, and migraine-related losses, improvement in the quality of life, prevention of medication-overuse, restoration of functions of migraineurs, education of patients about their illness and its treatment are the objectives of migraine management⁽⁵⁾.

Economic burden of diseases result from “direct and indirect costs”. Direct cost include all the healthcare costs caused by a disease, from its diagnosis to the patient's treatment and indirect cost impact of a disease result from loss of work due to days missed from work and decreased effectiveness at work⁽²⁸⁾.

In Turkish nationwide headache epidemiological survey, migraine-related lost work days were reported to be 5.4 days

for one year. The burden of lost work days to Turkish economy was calculated approximately \$200 million per year⁽⁹⁾. Prospective studies about the impact of migraine are few and most of them did not have a follow-up period and were not face-to-face evaluations^(11,14,30).

Here, we aimed to evaluate the effect of treatment on migraine-related economic burden among migraineurs employed in schools.

MATERIAL AND METHODS

This study was performed in state run schools in the city of Bursa. Twenty-nine primary and high schools were selected randomly. A total of 2153 teachers, white and blue collar employees were working in these schools and formed the target population of this study.

ID-Migraine screening test was distributed to the target population by the administrators⁽²²⁾. The validity and reliability of the Turkish version of ID-Migraine test has been shown in many different study populations and settings in Turkey^(6,12,33,40). In two weeks' time, answered tests were collected back and screening test positive subjects have been invited to a face-to-face interview. All the interviews was made by the first author of this study (.), a senior neurology resident at the fifth year of her residency and completed one-year headache out-patient clinic rotation. All interviews was made according to a structured form and diagnosis of migraine was based on the International Classification of Headache Disorders, 2nd edition criteria (ICHD-II)⁽¹⁰⁾.

Subjects fulfilling the diagnostic criteria for episodic migraine without aura (≥ 2

attacks/month) included in the study. Only migraine without aura patients recruited in order to analyse the effects of treatment in a unique group. Subjects who have received a diagnosis of migraine and tension-type headache together, any other primary headache disorder other than episodic migraine without aura, chronic migraine, migraineurs already on prophylactic treatment, secondary headache disorders, medication overuse headache and subjects with accompanying systemic and/or other neurological diseases were excluded from the study. The same neurology resident performed the face-to-face evaluations and follow-ups.

The study period was divided in to three phases; screening, medication adjustment and treatment phase. During the first three-month phase, “screening phase”, subjects were only given the headache diaries. No treatment was given, but they were allowed to continue their previous symptomatic medications if any. The fourth and the fifth months were “medication adjustment phase”. They were informed about the triggers and advised to avoid from them. Subjects with ≤ 3 headache days/month were given symptomatic medication (Triptans), where subjects suffering from ≥ 4 headache days/month were prescribed preventive treatment (amitriptiline, propranolol, valproic acid). Preventive treatment accepted to be effective when $\geq 50\%$ decrease in headache days/month established. For acute attack treatment pain relief or a decrement of $\geq 50\%$ in the intensity of headache in two hours accepted to be effective. All the subjects received prescribed treatments during the “treatment phase” (last three-month of the study). Subjects were told to take the triptans in the early phase of a migraine attack when the headache was still mild. All the patients were asked to record the frequency, intensity and duration of headaches, the number of days missed from work (lost work days), days $\geq 50\%$ decreased productivity at work, symptomatic medication intake if any,

number of symptomatic medication consumed and admittance to the emergency department (ED) during an attack in their headache diaries. Subjects were especially reminded to record all requested variables in 24 hours following an attack. Patients were called for follow-up and evaluation at months 3, 5 and 8. A telephone interview was made with the subjects at the fourth month and medication adjustments were made if necessary.

Intensity of pain was evaluated using Visual Analog Scale (VAS, 100 mm) and Verbal Descriptor Scales (VDS; 0-None, 1-Mild, 2-Moderate, 3-Severe). Headache intensity (mean values of VAS and VDS), duration of headache, number of days with headache, analgesic use, and number of lost work days and decreased productivity at work ($\leq 50\%$ of normal efficiency), number of days with referral to ED between screening, medication adjustment and treatment phases were compared.

The sum of symptomatic treatment and admission to ED costs made the direct cost of headache during the screening phase. At the beginning of medication adjustment phase routine laboratory tests (blood chemistry, complete blood count) of every subject was done. The total direct cost of headache during medication adjustment and treatment phases calculated as the sum of investigations', symptomatic and preventive medications' and emergency department referral costs. And this sum was compared to the direct cost of headache during screening phase. Lost work days and number of days with decreased efficiency at work due to headache compared for indirect cost. Direct cost was first calculated in Turkish Lira (TL) and then for the sake of easy comparison between studies converted in to US dollars. Central Bank of the Republic of Turkey conversion rate was used (31 December 2009, 1 USD=1.5 TL).

Statistical Package for the Social Sciences (SPSS), release 17.0 was used for

statistical analysis. Student's t-test, ANOVA and Tukey tests and Wilcoxon signed ranks test was done where necessary. Statistical significance was set to $p \leq 0.05$.

This study protocol was approved by the local ethics committee (21 November 2008, 2008-17/27).

RESULTS

This study was done between December 2008 and December 2009. The flow chart of the study was given in Figure 1. Forty-two subjects (37 female [88,1%], 5 male [11,9%]) fulfilling the inclusion criteria with a mean age of 37.8 ± 6.4 years (26–55) included in the study. Preventive and attack treatment for migraine was prescribed to 29 out of 42 subjects (amitriptiline [50-125-mg/day]), propranolol [60-120 mg/day], valproic acid [500-1000 mg/day]) while only symptomatic treatment (eletriptan, rizatriptan and frovatriptan) was given to 13 patients.

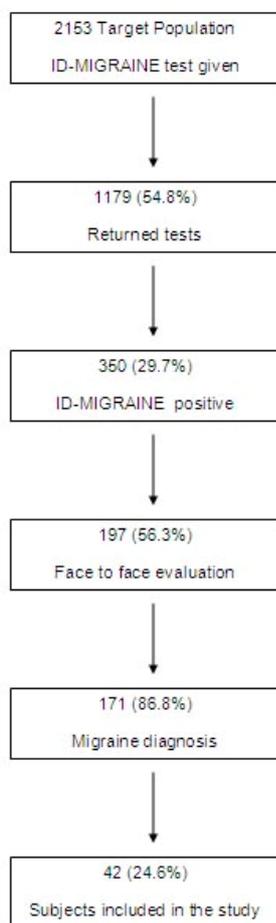


Figure 1: Flow chart of the study.

Headache variables and lost work days before and during treatment are given in Table 1. Total number of attacks and days with headache, mean headache intensity scores (VAS and VDS values), number of work days with headache, number of days missed from work and reduced productivity during treatment phase were significantly lower compared to the screening phase ($p < 0,001$).

Both the total number of headache attacks and headache days have decreased significantly in treatment phase ($p < 0.001$). The total number of days missed from work during the screening phase and treatment phase for the study population was 20 days (1,9 days/year/patient), and 5 days (0,4 day/year/patient) respectively ($p < 0.001$). Thirty-three out of 42 patients (78.5%) did not miss any work day in the screening phase while 40 out of 42 patients (95%) did not miss any work day in the treatment phase. Total number of days with decreased productivity at work decreased from 39.2 days/year/patient to 2.8 days/year/patient ($p < 0.001$).

We also compared the data of the third month of the treatment phase with the screening phase. All variables, other than lost work days and referral to the ED, were significantly lower in the third month of the treatment phase than the screening phase (Table 2).

One way ANOVA test also showed significant difference in all headache variables ($p < 0.001$), other than lost work days and emergency department admissions.

Monthly comparison of variables showed that effectivity of the treatment has begun in the fourth or fifth month of the study (Figure 2).

Direct costs and drug related costs per patient per year were significantly higher in the treatment phase than the screening phase (Table 3).

Preventive and symptomatic treatment groups were also compared before and

after the medication. Both groups showed significant difference in the treatment phase when compared to the screening phase. In symptomatic treatment group mean attack frequency ($p=0.002$), pain intensity ($p=0.001$), headache duration ($p=0.001$), work days with headache

($p=0.002$), analgesic consumption ($p=0.002$) and work days with reduced effectivity ($p=0.001$) significantly reduced in the treatment phase. In the prophylactic treatment group the same variables also reduced significantly ($p<0.001$ for all variables).

Table 1: Comparison of the screening and treatment phases (total numbers for 3 months per subject)

	Screening Phase	Treatment Phase	P value
Pain severity VAS (mean)	6.9	5.2	<0.001
Pain severity VDS (mean)	2.3	1.7	<0.001
Number of attacks	9.4	4.4	<0.001
Days with headache	18.0	5.0	<0.001
Headache duration (hour)	380.6	43.7	<0.001
Work days with headache	12.7	3.7	<0.001
Lost work days due to headache	0.5	0.1	0.042
Number of analgesics used during attacks	17.8	5.3	<0.001
Number of work days with decreased productivity	9.8	0.7	<0.001
Referral to ED due to headache	0.23	0.04	0.088

Table 2: Comparison of the screening phase (three months' mean values) and third month of the treatment phase

	Screening phase	Treatment (3 rd month)	P value
VAS	6.9	5.0	<0.001
VDS	2.3	1.6	<0.001
Number of attacks	3.1	1.6	<0.001
Days with headache	6.0	1.8	<0.001
Headache duration (hour)	126.8	15.5	<0.001
Works days with headache	4.2	1.4	<0.001
Lost work days due to headache	0.15	0.04	0.1
Number of analgesics used during attack	5.9	2.0	<0.001
Number of work days with decreased effectiveness	3.2	0.2	<0.001
Number days with referral to the ED due to headache	0.07	0.02	0.2

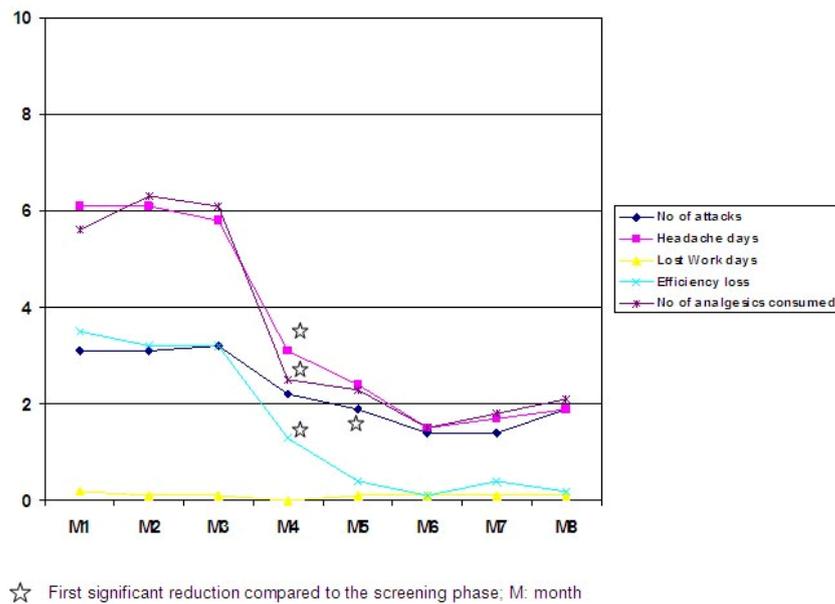


Figure 2: Monthly course of headache variables having an impact on the economic burden of migraine.

Table 3: Direct and drug related costs per patient per year (TL) during screening and treatment phases

	Screening phase	Medication adjustment and treatment phases	P value
Direct cost	76.38TL (50.6 US\$)	296.50TL (196.4 US\$)	<0.001
Drug related cost	58.07TL (38.5 US\$)	145.44TL (96.3 US\$)	0.02

DISCUSSION

Our study showed that indirect cost of migraine was significantly reduced by treatment ($p < 0.001$). Intensity, duration of headache, number of days with headache, number of analgesics consumed, number of days with headache and missed days from work and number of days with decreased productivity at work during treatment phase were also significantly lower than the screening phase.

The total number of lost work days during the screening and treatment phases for the whole study group was 20 days (1.9 days/year/patient), and 5 days (0.5 day/year/patient) respectively. In different studies lost work days for migraineurs reported to be 1.5-4.4 days/year/patient^(8,13,17,25,32,36). A study from England reported that 5.7 days were missed by migraineurs who worked or attended school⁽³⁴⁾. Another study from Turkey showed that migraineurs miss 1.5 work days/year⁽¹¹⁾. Siva et al reported that migraine sufferers were absent from the work for 2.9 work days/month in a study in workplaces⁽³³⁾. Lost work days in our study was in line with the reported studies both from Turkey and Western world. The superiority of our study was the prospective design and face-to-face evaluation. Prospective studies about the impact of migraine in the literature are few and most of them did not have a follow-up period and face-to-face doctor evaluations. Instead they were carried out by telephone, mail questionnaires or e-mails asking

questions about their previous headache histories and lost work days for a limited time interval retrospectively⁽²³⁾.

In many studies involving working migraineurs showed that productivity decreased during migraine attacks but despite this fact, majority of the migraineurs continued to their works^(16,19,21,39). In our study, the number of work days with reduced productivity in the screening and treatment phases were 3.2 and 0.2 days/month respectively. In another study about primary headaches carried out in Turkey, the number of work days with decreased productivity was reported as 8.4 days/year⁽¹¹⁾. Thirty-two out of 42 patients (76%) complained about decreased effectiveness due to migraine attack but they could not take the day off with varying reasons during both screening and treatment phases. 35% of Swedish sufferers reported no absence from school/college or work (at home or other place of work) as a result of migraine/migraine-like headaches while 54% of the patients lost 1-2 days per year⁽¹⁷⁾.

Lost work days (absenteeism) and reduced productivity decreased significantly. Lofland et al reported a similar effect of preventive treatment with topiramate at a fixed dosage on total lost productivity, absenteeism and presenteeism⁽²⁶⁾. Decrement in days with reduced productivity was much more striking compared to lost work days (93.7% to 73.7%). A similar reduction in

presenteeism was reported by Lofland et al⁽²⁶⁾. In most cases migraineurs are reluctant to take the day off when they have headache⁽¹⁷⁾. Therefore, the impact of preventive treatment on reduced productivity was more pronounced. On the other hand Schrader et al found no significant effect of preventive treatment with lisinopril on lost work days⁽³¹⁾.

Direct cost composed less than 30% of total cost of a patient in many studies reported in the literature^(1,2,28). In our study, the direct cost increased significantly in the treatment phase compared to screening phase as expected. Because, during the screening phase only ED admittance and acute symptomatic drug costs made the total direct cost. During the treatment phase physician visits, drug and investigation costs and ED admittance all made the direct cost. And one should remember that investigations were one-time cost increasing factor.

One of the striking results of our study was that the treatment of migraine showed significant efficacy even in the first month of treatment in some variables. One might think that this might be the result of a placebo effect. However, Lofland et al reported a similar result showing the significant efficacy of topiramate starting in the first month of the study compared to placebo⁽²⁶⁾. All subjects was told to avoid from trigger factors and to use acute symptomatic treatment in the early phase of an attack when the pain was still mild. These two factors might be the reason for such an early reduction in headache variables and productivity loss.

As expected, the reduction in lost days and reduced effectivity resulted from the decreased headache days/month, headache hours/month, headache attacks/month and headache severity.

The number of analgesics used during attacks in the screening and treatment phases were 5.9 and 2/month respectively. This shows that appropriate management would also prevent analgesics overuse. In a

similar study done by D'Amico et al pre-treatment analgesic use decreased from 7.4/month to 4.4/month after treatment⁽³⁾.

There are a number of superiorities of our study. Three months of prospective screening period was long enough to estimate the true frequency of migraine attacks and to evaluate the real impact of treatment. Retrospective questioning of the migraine frequency might result in lower or higher frequency than real which might also result in difficulty in estimating the real impact of treatment. The close follow-up and face-to-face evaluation of the subjects yielded a 100% follow-up rate and there was no drop-outs. As these subjects were not seeking medical help and recruited after a screening test, this study might give us an idea about the impact of migraine treatment on the general working population.

There are also some disadvantages of this study. The study population was small and the results can not be generalized. We can not rule out the placebo effect. However, one can understand the ethical and legal problems when using placebo in such a long study.

As a conclusion, management and treatment of migraine reduces economic burden significantly. Considering enormous amount of lost economical resources, benefits of migraine treatment would pay back what would be spend for the education of physicians and patients and for increasing the awareness of the society about migraine.

Correspondence to:

Necdet Karlı

E-mail: nkarli@yahoo.com

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REFERENCES

1. Berg J. Economic evidence in migraine and other headaches: a review. *Eur J Health Econom* 2004; 5(Suppl 1):S43-S54.
2. Berg J, Stovner LJ. Cost of migraine and other headaches in Europe. *Eur J Neurol* 2005; 12(Suppl 1):59-62.
3. D'Amico D, Solari A, Usai S, Santoro P, Bernardoni P, Frediani F et al. Improvement in quality of life and activity limitations in migraine patients after prophylaxis. A prospective longitudinal multicentre study. *Cephalalgia* 2006;26(6):691-6.
4. De Lissovoy G, Lazarus SS. The economic cost of migraine; present state of knowledge. *Neurology* 1994; 44 (suppl 4): 556-62.
5. Ertas M. Migren. *Türkiye klinikleri* 2003; 116-123.
6. Ertas M, Baykan B, Tuncel D, Gökçe M, Gökçay F, Sirin H et al. A comparative ID migraine™ screener study in ophthalmology, ENT and neurology out-patient clinics. *Cephalalgia* 2009;29(1):68-75.
7. Ertas M, Baykan B, Orhan EK, Zarifoğlu M, Karli N, Saip S et al. Prevalance of migraine in Turkey: a nationwide home based study. *J Neurol Sci* 2009;285: (Suppl1);S148-149.
8. Fiare I, Haugland ME, Stovner LJ, Zwart JA, Bovim G, Hagen K. Sick leave is related to frequencies of migraine and non-migrainous headache--The HUNT Study. *Cephalalgia* 2006;26(8):960-7.
9. Hayran O, Zarifoğlu M, Siva A. Başağrısı Epidemiyolojisi. *Erdine S (Ed). Ağrı* 2000;181-183.
10. Headache Classification Committee of the International Headache Society. The international classification of headache disorders, 2nd Edition. *Cephalalgia* 2004;24(suppl 1):1-159.
11. Karli N, Zarifoğlu M, Ertas M, Saip S, Oztürk V, Bıçakçı S et al. Economic impact of primary headaches in Turkey: a university hospital based study: part II. *J Headache Pain*. 2006;7(2):75-82.
12. Karli N, Ertas M, Baykan B, Uzunkaya O, Saip S, Zarifoğlu M et al. The validation of ID Migraine™ screener in neurology outpatient clinics in Turkey. *J Headache Pain* 2007;8:217-223.
13. Lamb CE, Ratner PH, Johnson CE et al. Economic impact of workplace productivity losses due to allergic rhinitis compared with select medical conditions in the United states from an employer perspective. *Curr Med Res Opin* 2006;22:1203-1210.
14. Lantéri-Minet M, Auray JP, El Hasnaoui A, Dartigues JF, Duru G, Henry P et al. Prevalence and description of chronic daily headache in the general population in France. *Pain* 2003;102:143-149.
15. Leonardi M, Steiner TJ, Scher AT, Lipton RB. The global burden of migraine: measuring disability in headache disorders with WHO's Classification of Functioning, Disability and Health (ICF). *J Headache Pain* 2005;6:429-40.
16. Lerner DJ, Amick BC 3rd, Malspeis S, Rogers WH, Santanello NC, Gerth WC, Lipton RB. The migraine work and productivity loss questionnaire: concepts and design. *Qual Life Res* 1999;8(8):699-710.
17. Linde M, Dahlöf C. Attitudes and burden of disease among self-considered migraineurs--a nation-wide population-based survey in Sweden. *Cephalalgia* 2004 Jun;24(6):455-65.
18. Linde M. Migraine: a review and future directions for treatment. *Acta Neurol Scand* 2006;114:71-83.
19. Lipton RB, Diamond S, Reed M, Diamond ML, Stewart WF. Migraine diagnosis and treatment: results from the American Migraine Study II. *Headache* 2001; 41(7):638-45.
20. Lipton RB, Stewart WF, Diamond S, Diamond ML, Reed M. Prevalence and burden of migraine in the United States: data from the American Migraine Study II. *Headache* 2001;41:646-57.
21. Lipton RB, Stewart WF, Reed M, Diamond S. Migraine's impact today. Burden of illness, patterns of care. *Postgrad Med* 2001;109(1):38-40, 43-5.
22. Lipton RB, Dodick D, Sadosky R, Kolodner K, Endicott J, Hettiarachchi J, Harrison W. A self-administered screener for migraine in primary care: the ID Migraine validation study. *Neurology* 2003; 61:375-82.
23. Lipton RB, Liberman JN, Kolodner KB, Bigal ME, Dowson A, Stewart WF. Migraine headache disability and health-related quality-of-life: a population-based case-control study from England. *Cephalalgia* 2003;23:441-450
24. Lipton RB, Bigal ME. Ten lessons on the epidemiology of migraine. *Headache*. 2007;47:S2-S9.
25. Lofland JH, Frick KD. Workplace absenteeism and aspects of Access to health care for individuals with migraine headache. *Headache* 2006;46(1):563-576.
26. Lofland JH, Gagne JJ, Pizzi LT, Rupnow M, Silberstein SD. Impact of topiramate migraine prophylaxis on workplace productivity: results from two US randomized, double-blind, placebo-controlled, multicenter trials. *J Occup Environ Med* 2007; 49(3):252-7.
27. Mathew NT. Migraine. In: Evans RW, Mathew NT, eds. *Handbook of Headache*. Philadelphia: Lippincott Williams & Wilkins, 2000: 22-60.
28. Mennini FS, Gitto L, Martelletti P. Improving care through health economics analyses: cost of illness and headache. *J Headache Pain* 2008;9:199-206.

29. Obermann M, Katsarava Z. Epidemiology of unilateral headaches. *Expert Rev Neurother* 2008;8:1313-1320.
30. Rasmussen BK. Epidemiology and socio-economic impact of headache. *Cephalalgia* 1999;19: (Suppl.) 25:20-23.
31. Schrader H, Stovner LJ, Helde G, Sand T, Bovim G. Prophylactic treatment of migraine with angiotensin converting enzyme inhibitor (lisinopril): randomised, placebo controlled, crossover study. *BMJ* 2001;6:322(7277):19-22
32. Schwartz BS, Stewart WF, Lipton RB. Lost workdays and decreased work effectiveness associated with headache in the workplace. *J Occup Environ Med* 1997;39(4):320-327.
33. Siva A, Zarifoglu M, Ertas M, Saip S, Karli N, Baykan B. Validity of the ID-Migraine screener in the workplace. *Neurology* 2008;15;70(16):1337-45.
34. Steiner TJ, Scher AI, Stewart WF, Kolodner K, Liberman J, Lipton RB. The prevalence and disability burden of adult migraine in England and their relationships to age, gender and ethnicity. *Cephalalgia* 2003;23:519-527.
35. Stewart WF, Lipton RB, Celantano DD, Reed ML. Prevalence of migraine headache in the United States: Relation to age, income, race and other sociodemographic factors. *JAMA* 1992;267: 64-70.
36. Stovner LJ, Zwart JA, Hagen K, Terwindt GM, Pascual J. Epidemiology of headache in Europe. *Eur J Neurol* 2006;13(4):333-45.
37. Stovner LJ, Hagen K, Jensen R, Katsarava Z, Lipton R, Scher A, Steiner T, Zwart JA. The global burden of headache: a documentation of headache prevalence and disability worldwide. *Cephalalgia* 2007; 27: 193-210.
38. Téllez-Zenteno JF, García-Ramos G, Zermeño-Pöhls, Velazquez A. Demographic, clinical and comorbidity data in a large sample of 1147 patients with migraine in Mexico City. *J Headache Pain*. 2005;6:128-134.
39. Von Korff M, Stewart WF, Simon DJ, Lipton RB. Migraine and reduced work performance: a population-based diary study. *Neurology* 1998;50(6):1741-5.
40. Zarifoglu M, Karli N, Taskapilioglu Ö. Can ID-Migraine be used as a screening test for adolescent migraine? *Cephalalgia* 2008;28(1):65-71.