Validity and Reliability of the Turkish Migraine Disability Assessment (MIDAS) Questionnaire

Mustafa Ertaş, MD; Aksel Siva, MD; Turgay Dalkara, MD; Nevzat Uzuner, MD; Babür Dora, MD; Levent İnan, MD; Fethi İdiman, MD; Yakup Sarica, MD; Deniz Selçuki, MD; Hadiye Şirin, MD; Atilla Oğuzhanoğlu, MD; Ceyla İrkeç, MD; Mehmet Özmenoğlu, MD; Taner Özbenli, MD; Musa Öztürk, MD; Sabahattin Saip, MD; Münife Neyal, MD; Mehmet Zarifoğlu, MD; Turkish MIDAS group

Objectives.—The aim of this study is to assess the comprehensibility, internal consistency, patient-physician reliability, test-retest reliability, and validity of Turkish version of Migraine Disability Assessment (MIDAS) questionnaire in patients with headache.

Background.—MIDAS questionnaire has been developed by Stewart et al and shown to be reliable and valid to determine the degree of disability caused by migraine.

Design and Methods.—This study was designed as a national multicenter study to demonstrate the reliability and validity of Turkish version of MIDAS questionnaire. Patients applying to 17 Neurology Clinics in Turkey were evaluated at the baseline (visit 1), week 4 (visit 2), and week 12 (visit 3) visits in terms of disease severity and comprehensibility, internal consistency, test-retest reliability, and validity of MIDAS. Since the severity of the disease has been found to change significantly at visit 2 compared to visit 1, test-retest reliability was assessed using the MIDAS scores of a subgroup of patients whose disease severity remained unchanged (up to ± 3 days difference in the number of days with headache between visits 1 and 2).

Results.—A total of 306 patients (86.2% female, mean age: 35.0 ± 9.8 years) were enrolled into the study. A total of 65.7%, 77.5%, 82.0% of patients reported that "they had fully understood the MIDAS questionnaire" in visits 1, 2, and 3, respectively. A highly positive correlation was found between physician and patient and the applied total MIDAS scores in all three visits (Spearman correlation coefficients were $R = 0.87, 0.83$, and 0.90, respectively, $P < .001$). Internal consistency of MIDAS was assessed using Cronbach's α and was found at acceptable (>0.7) or excellent (>0.8) levels in both patient and physician applied MIDAS scores, respectively. Total MIDAS score showed good test-retest reliability ($R = 0.68$). Both the number of days with headache and the total MIDAS scores were positively correlated at all visits with correlation coefficients between 0.47 and 0.63. There was also a moderate degree of correlation ($R = 0.54$) between the total MIDAS score at week 12 and the number of days with headache at visit 2 + visit 3, which quantify headache-related disability over a 3-month period similar to MIDAS questionnaire.

Conclusion.—These findings demonstrated that the Turkish translation is equivalent to the English version of MIDAS in terms of internal consistency, test-retest reliability, and validity. Physicians can reliably use the Turkish translation of the MIDAS questionnaire in defining the severity of illness and its treatment strategy when applied as a self-administered report by migraine patients themselves.

Migraine is a common painful condition that affects about 20% of women and 10% of men, mostly between the age of 25 and 55 years.[1,2] In a nationwide multicenter study in Turkey, the prevalence rates were found to be 21.8% in women and 10.9% in men (16.4% in general population aged between 15 and 55 years).[3] It was characterized by headache attacks that varied in frequency, duration, and severity.[4] Migraine causes significant disability during headache attacks, which leads to serious effects on patients' quality of life and psychological profile.[5,6] The degree of the disability of the patient is known to be the most important indicator of the severity of the disease and the social impact of migraine in economic terms.[7] The 2001 statistical annex of World Health Organization (WHO), disability-adjusted life years (DALY), which is referred to as an important indicator of disability, highlights migraine as one of the most disabling disorders among all of the noncommunicable diseases in the world. In the near future, migraine as a disorder per se is expected to achieve a higher position with regard to DALY's new order of scoring.[8] Therefore, assessment of the disability of the patients with migraine is the cornerstone for physicians to define treatment need and strategies. To determine the degree of disability caused by migraine, a specific scale, the Migraine Disability Assessment (MIDAS) questionnaire has been developed and shown to be reliable and valid by Stewart et al.[9-11]

MIDAS is a self-administered questionnaire, which includes five disability-related questions covering the previous 3-month period (Figure 1). Patients score the number of lost days due to headache in

Fig 1.—English and Turkish version of the Migraine Disability Assessment (MIDAS) questionnaire.

three domains, which are school or paid work; household work; family, social, or leisure activities.[9] They also report the number of additional days with significant limitations of activity (defined as at least 50% reduced productivity) in the paid work and household work domains. The MIDAS score is sum of the scores of these five questions. The two additional questions (A and B) are not scored, but provide the physician with clinically relevant information.

MIDAS was translated to Turkish to provide the questionnaire for the benefit of patients with migraine in Turkish daily clinical practice and avail a disability assessment tool to gather valid and reliable data in clinical trials (Figure 1). The aim of this study was to assess the comprehensibility, internal consistency, patient-physician reliability, hence applicability as a patient-administered self-report, test-retest reliability, and the validity of the Turkish version of MIDAS in patients with migraine-induced headache according to International Headache Society (IHS) criteria and to determine if the Turkish translation is equivalent to its original (English) version.

METHODS

Study Population.—This study was designed as a multicenter, descriptive study to determine the reliability and validity of Turkish version of MIDAS questionnaire. A total of 306 patients of both genders, aged 15 to 55 years, with a migraine diagnosis according to the criteria of the IHS[12] were enrolled in the study from 17 Neurology Clinics in Turkey between January 2002 and January 2003.

After the baseline evaluation (visit 1), which includes recordings of sociodemographic and headache characteristics and severity of disease for the last 3 months, patients were assessed at week 4 (visit 2) and week 12 (visit 3) for the severity of disease since the previous visit. The severity-of-disease assessment covers the number of days with headache, duration and severity of headache, and visual analog scale (VAS) results. The severity of headache was assessed in a 5-point scale as (0) no pain, (1) mild, (2) moderate, (3) severe, and (4) very severe. After the first evaluation, patients were grouped as group A and group B. Patients in both groups were asked to complete the MIDAS questionnaire by themselves at the baseline

and follow-up visits. Patients in group A were additionally evaluated by the physicians who also applied the MIDAS questionnaire. A brief written explanation was given to the patients about how to answer the MIDAS questionnaire at the baseline visit.

All patients were also asked to complete the Comprehensibility Assessment Form (CAF), which scores each question of MIDAS for the comprehensibility level of the patient from score 1 (understood the question fully) to 4 (did not understand the question at all) at visits 1, 2, and 3. The physician also completed this form for the patients of group A at all visits. CAF scores of the patients at the baseline and study visits were compared to assess both the change in comprehensibility level during the study period and the correlation with CAF scores of physician assessment. The correlation between the total patient-applied MIDAS scores and the corresponding total physician-applied MIDAS scores of group A was analyzed to assess the patient-physician reliability of the questionnaire.

Internal consistency and correlation of internal consistency of patient and physician-applied MIDAS scores were also assessed.

For test-retest reliability assessment, the correlation of MIDAS scores of all patients at visits 1 and 2 was investigated. The 4-week duration between visits 1 and 2 was accepted as a period short enough to eliminate the likelihood of significant changes in the severity of the disease and long enough for the patients not to recall their answers to the questionnaire they completed at visit 1. The parameters for the severity of the disease at visits 1 and 2 were compared to ensure that there was no significant change in 4-week duration. Test-retest reliability analysis was performed on a subgroup of patients with 3 days or less of change in the number of days with headache during the month between two visits.

The validity of MIDAS was assessed using correlations between total MIDAS scores and the number of days with headache during the period between visits 1 and 2 and visits 1 and 3, as an indicator of disability due to migraine.

The study was approved by the local ethics committees of the study centers and was conducted in compliance with ICH-GCP Guidelines, the Declaration of Helsinki, and local regulatory requirements.

All patients gave written informed consent before enrollment in the study.

Statistical Analysis.—As major parameters of the study (like MIDAS scores, CAF scores) did not exhibit characteristics of normal distribution, nonparametric methods were used in the analysis of the data.

Mann-Whitney *U* and Kruskal-Wallis tests were used in the two and more than two independent subgroup comparison analysis. Between visits comparisons were performed using Wilcoxon signed rank test. The correlations between study parameters to determine test-retest reliability and validity analysis were defined by the Spearman correlation method and given as Spearman correlation coefficient (R).

The internal consistency of MIDAS scores given by the patients and the physicians was evaluated in Group A using Cronbach's α, the correlation between internal consistencies of patients' and physicians' MIDAS scores was analyzed by the split-half reliability assessment. An α, which is greater than 0.7 and 0.8 was considered acceptable and with excellent internal consistency, respectively. *P* value of $<.05$ was regarded as the level of statistical significance.

RESULTS

Patients Demographics.—A total of 306 patients (262 females and 44 males) were enrolled into the study from 17 Neurology Clinics in Turkey. Mean age ($\pm$SD) was 35.0 ± 9.8 years. Approximately 301, 257, and 227 of the enrolled patients were evaluated in the first, second, and third visit, respectively. Socio-demographic and headache characteristics of patients are summarized in Tables 1 and 2.

Comprehensibility of MIDAS by Patients.—The physicians assessed their patients via CAF as "fully understood MIDAS scores" in 56.5%, 77.6%, and 78.5% of the patients at visits 1, 2, and 3, respectively. Using this form, a total of 65.7% at visit 1, 77.5% at visit 2, and 82.0% of the patients at visit 3 reported that "they had fully understood MIDAS." Although correlation between patient and physician assessments in Group A (157 of 306 patients), in which the patients were also evaluated by the physicians via MIDAS, could not be demonstrated at visit 1 (Spearman correlation coefficient, $R = 0.16$, $P = 0.10$), significant positive correlation was obtained at the following visits (Spearman

Table 1.—Socio-Demographic Characteristics of Patients

	n	%
Study groups		
Group A	157	51.3
Group B	149	48.7
Gender		
Female	262	86.2
Male	42	13.8
Living place		
Metropolis	91	30.4
City	181	60.5
Town	23	7.7
Village	4	1.3
Income level		
Low	21	7.2
Middle	214	73.8
High	55	19.0
Education		
Illiterate	2	0.7
Literate	7	2.4
Primary school	70	23.6
Mid-school	31	10.5
High school	87	29.4
University	99	33.4

correlation coefficients: $R = 0.37$, $P < .001$ for visit 2; $R = 0.39$, $P < .001$ for visit 3).

Correlation Between MIDAS Scores Given by the Physicians and Patients.—In Group A, the total mean ($\pm$SD) scores of MIDAS, which were applied by the physicians were 33.3 ± 33.9 (median: 24 days), 27.2 ± 37.3 (median: 19.5 days), and 17.7 ± 17.3 (median: 13 days) at visits 1, 2, and 3, respectively. The corresponding total scores of MIDAS given by the patients were 33.1 ± 39.9 (median: 20 days) at visit 1, 26.8 ± 39.0 (median: 18 days) at visit 2, and 15.6 ± 15.3 (median: 10 days) at visit 3. There was no statistically significant difference between physicians' and patients' total MIDAS scores (Wilcoxon signed rank test, $P < .05$) and a highly positive correlation was found in all three visits (Spearman correlation coefficients: $R = 0.87$, 0.83, and 0.90, $P < .001$) (Table 3). Hence, this result permits further analysis of the validity and reliability of MIDAS to be performed using patients' MIDAS scores per se.

Internal Consistency of MIDAS.—The internal consistency of MIDAS, which was assessed in Group A

Table 2.—Headache Characteristics of Patients

	n	%
Frequency of headache		
Every day	10	3.3
>Once a week	104	34.3
Once a week	37	12.2
<Once a week	152	50.2
Time of headache		
Early in the morning	48	15.8
Evening	49	16.1
Others	117	38.6
Aura		
No	187	61.5
Blurred vision	61	20.1
Image of bright light	61	20.1
Others	91	29.9
Duration of headache, without treatment		
15 minutes–3 hours	15	5.1
1–2 days	209	70.6
3 days	33	11.1
>3 days	20	6.8
Continuous	19	6.4
Duration of headache, with treatment		
Few minutes	2	0.9
15 minutes–3 hours	127	59.6
1–2 days	77	36.2
3 days	6	2.8
>3 days	1	0.5

using Cronbach's α, was found at acceptable (>0.7) or excellent (>0.8) levels in both patient- and physician-applied MIDAS scores, respectively. Patients' and physicians' MIDAS internal consistency was also found to be highly correlated with the split-half method at all visits ($R = 0.84, 0.89$, and 0.81, respectively, $P < .001$) (Table 4).

Test-Retest Reliability of MIDAS.—It was observed that the severity of disease changed significantly after visit 1 regarding the number of days with headache, duration and severity of headache, and VAS scores ($P < .001$) (Table 5). Therefore, test-retest reliability was tested in a subgroup consisting of patients with 3 days or less change in the number of days with headache at visit 2 compared to visit 1, to eliminate the probable negative effect of severity change on results. The mean total MIDAS scores of this subgroup of patients were 20.6 ± 20.3 (median: 15 days) and 20.6 ± 23.7 (median: 12 days) at visits 1 and 2, respectively ($P = .47$; Spearman correlation coefficient: $R = 0.68$, $P < .001$) (Table 6).

Validity of MIDAS.—The total MIDAS score and the number of days with headache were positively correlated at each visit (Spearman correlation coefficients: $R = 0.60, 0.47$, and 0.63, respectively, $P < .001$) (Table 7). Since the sum of total number of the days with headache recorded at visits 2 and 3 covers the last 3 months, the correlation of this sum ([headache days at visit 2] + [headache days at visit 3]) and the total MIDAS score at visit 3, which quantify headache-related disability over a 3 month-period was also analyzed and found to be moderately correlated (Spearman correlation coefficients: $R = 0.54$, $P < .001$). Scatter diagrams of total MIDAS score versus the number of days with headache at visits 1, 2, 3 and 2 + 3 are shown in Figure 2.

Table 3.—The Total Scores of MIDAS Applied by the Physicians and Patients

	Visit 1		Visit 2		Visit 3	
	MIDAS (by physician)	MIDAS (by patient)	MIDAS (by physician)	MIDAS (by patient)	MIDAS (by physician)	MIDAS (by patient)
N	153	140	130	126	107	103
Mean	33.3	33.1	27.2	26.8	17.7	15.6
SD	33.9	39.9	37.3	39.0	17.3	15.3
Median	24	20	19.5	18	13	10
Z*(P)	0.21 (.83)		0.43 (.67)		1.49 (.14)	
R**(P)	0.87 (<.001)		0.83 (<.001)		0.90 (<.001)	

*Wilcoxon Signed Rank test.
**Spearman correlation coefficients.
SD, standard deviation.

Table 4.—The Internal Consistency of Patient and Physician Applied MIDAS

	Visit 1		Visit 2		Visit 3	
	MIDAS (by physician)	MIDAS (by patient)	MIDAS (by physician)	MIDAS (by patient)	MIDAS (by physician)	MIDAS (by patient)
Cronbach α	0.716	0.728	0.886	0.874	0.651	0.863
R^* (P)	0.84 (<.001)		0.89 (<.001)		0.81 (<.001)	

*Split-half method.

Table 5.—The Severity of Disease Regarding the Number of Days with Headache, Duration (Hour), and Severity of Headache in Visual Analog Scale (VAS) in Last Month

	No. of Days With Headaches			Duration of Headache (hour)			Severity of Headache					
							Five-Point Scale**			VAS***		
	Visit 1	Visit 2	Visit 3	Visit 1	Visit 2	Visit 3	Visit 1	Visit 2	Visit 3	Visit 1	Visit 2	Visit 3
n	296	243	198	276	233	192	293	239	189	203	176	131
Mean	5.8	6.3*	3.9*	13.8	10.2*	12.1*	2.8	2.4*	2.4*	7.0	6.0*	6.1*
SD	6.1	5.6	4.1	26.6	15.7	26.4	0.8	0.8	0.9	1.7	1.9	2.0
Median	4	5	2.5	6.3	6	5	3	2	2	7	6	6

SD, standard deviation.
*P <.001 visits 2 or 3 versus visit 1, Wilcoxon signed rank test.
**The severity was assessed in a 5-point scale: (0) no pain, (1) mild; (2) moderate; (3) severe; and (4) very severe.
***The VAS is a scale of 0 to 10 point.

COMMENTS

In the present study, the reliability and validity of the Turkish translation of MIDAS was evaluated in a clinical-based population. Additionally, comprehensi-

Table 6.—The Total Score of MIDAS in Group A Consisted of the Patients With 3 Days or Less Change in the Number of Days With Headache Between Visits 1 and 2

	Visit 1 (baseline) (n = 107)	Visit 2 (retest) (n = 107)
Mean	20.6	20.6
SD	20.3	23.7
Median	15	12
Z* (P)	0.72 (.47)	
R** (P)	0.68 (<.001)	

*Wilcoxon signed rank test.
**Spearman correlation coefficients.

bility of MIDAS by patients and correlations between the scores of MIDAS applied by the physicians and the patients were also studied. The comprehensibility level of patients was found to be within acceptable levels at all three study visits showing increase during the follow-up period. Correlation analysis between the scores of MIDAS applied by the physicians and the patients showed a high correlation. Therefore, the scores of MIDAS applied by the patients could be used in the reliability and validity analysis of the questionnaire.

Indeed, previous multinational studies have demonstrated the internal consistency, reliability, and validity of the English version of MIDAS.[9,10] In those studies, MIDAS exhibited good internal consistency with Cronbach's α 0.73–0.76 and test-retest reliability with correlation coefficients R = 0.80–0.83. Italian[13] and Japanese[14] translations were also found to be internally consistent and reliable with very close Cronbach's α and correlation coefficients for the

Table 7.—The Correlation Between Total MIDAS Score and the Number of Days With Headaches During the Last Month at Visits 1, 2, and 3

	Visit 1		Visit 2		Visit 3	
	Number of Days With Headaches During the Last Month	Total MIDAS Score	Number of Days With Headaches During the Last Month	Total MIDAS Score	Number of Days With Headaches During the Last Month	Total MIDAS Score
n	296	275	243	237	198	210
Mean	5.8	35.5	6.3	29.4	3.9	19.9
SD	6.1	40.3	5.6	38.6	4.1	32.7
Median	4	22	5	19	2.5	11
R^* (P)	0.60 (<.001)		0.47 (<.001)		0.63 (<.001)	

*Spearman correlation coefficients.
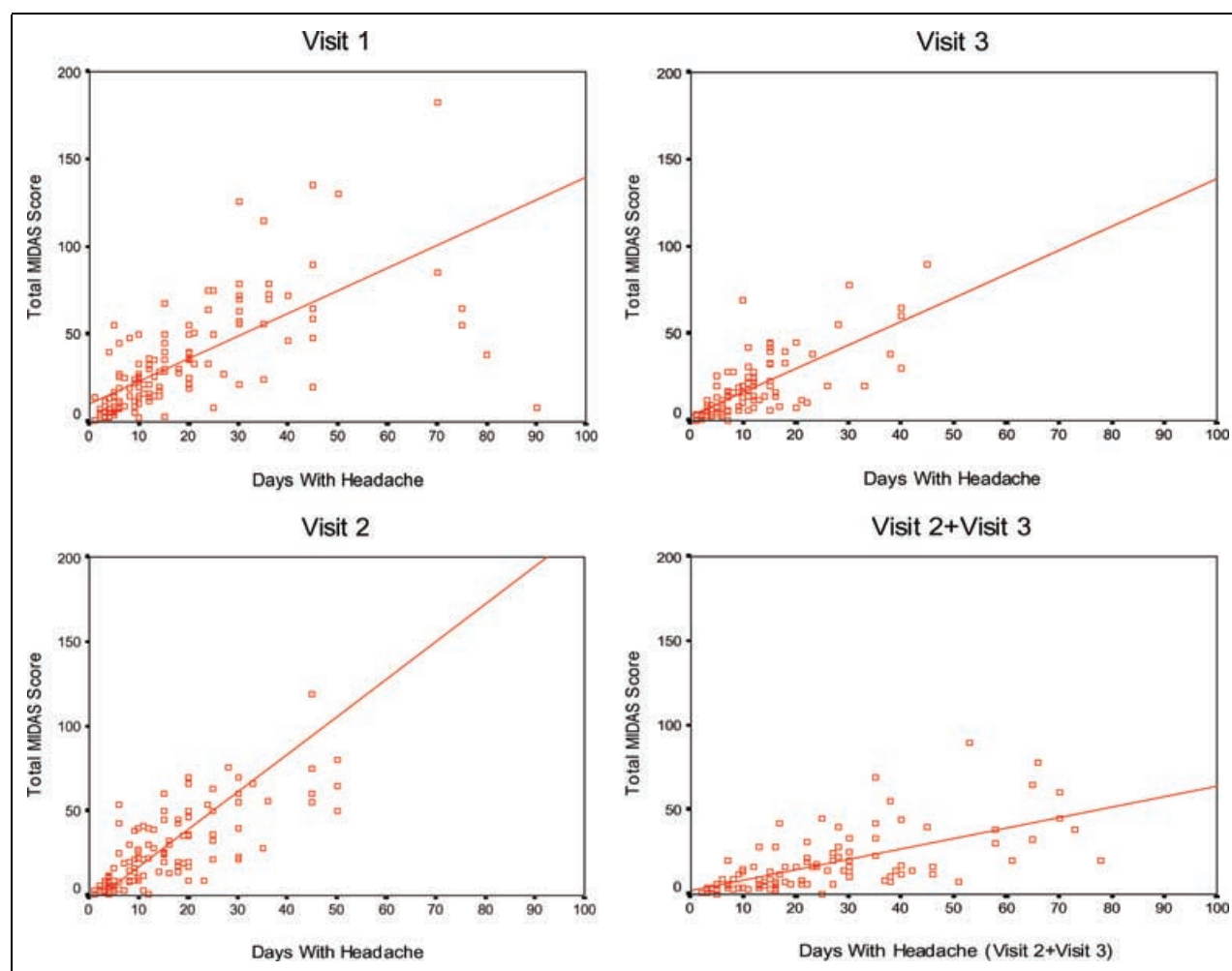
Fig 2.—Scatter diagrams of total MIDAS score versus the number of days with headache in visits 1, 2, 3 and 2 + 3.

values found in studies with the English version. Similarly, it was shown here that the internal consistency of the Turkish version of MIDAS was at acceptable or excellent levels with Cronbach's α similar to that found for the English version of questionnaire. The total MIDAS score also had good test-retest reliability ($R = 0.68$), similar to the English version.[9,10]

To assess the validity of the Turkish MIDAS questionnaire, the correlation between total MIDAS score and the number of days with headache in the last month, which is an important indicator of disability caused by migraine, was evaluated at baseline, weeks 4 and 12 of the follow-up period. The total MIDAS scores and the number of days with headache were positively correlated at all visits with correlation coefficients between 0.47 and 0.63. The correlation coefficients found in this study are very close to that of the studies in the English version of the questionnaire ($R = 0.63$).[7] There was also a moderate degree of correlation between the total MIDAS score at week 12 visit and the number of days with headache at visits $2 + 3$, which quantify headache-related disability over a 3-month period, again similar to the English MIDAS questionnaire.[7]

In conclusion, the findings of this study demonstrated that the Turkish translation is equivalent to the English version of MIDAS in terms of internal consistency, test-retest reliability and validity, and that it is applicable as a patient-administered self-report. Therefore, the Turkish version of MIDAS can be used to quantify the disability caused by migraine, providing a useful and valid tool to reliably define disease severity and treatment strategies for physicians in Turkey.

REFERENCES

1. Scher AI, Stewart WF, Lipton RB. Migraine and headache: a meta-analytic approach. In: Crombie IK, ed. Epidemiology of Pain. Seattle: IASP Press; 1999:159–170.
2. Gutteridge IF, Cole BL. Perspectives on migraine: prevalence and visual symptoms. *Clin Exp Optom*. 2001;84:56–70.
3. Siva A. Epidemiology of headache. *Türkiye Klinikleri J Neurol*. 2003;1:94–97.
4. Stewart WF, Shechter A, Lipton RB. Migraine heterogeneity. Disability, pain intensity and attack frequency and duration. *Neurology*. 1994;44(suppl 4):24–39.
5. Osterhaus JT, Townsend RJ, Gandek B, et al. Measuring the functional status and well being of patients with migraine headache. *Headache*. 1994;34:337–343.
6. Blau JN. Fears aroused in patients by migraine. *Br Med J*. 1984;288:1126.
7. de Lissovoy G, Lazarus SS. The economic cost of migraine. Present state of knowledge. *Neurology*. 1994;44(suppl 4):56–62.
8. Statistical Annex of 2001. World Health Organization, The World Health Report, p. 152.
9. Stewart WF, Lipton RB, Kolodner K, et al. Reliability of the Migraine Disability Assessment score in a population-based sample of headache sufferers. *Cephalalgia*. 1999;19:107–114.
10. Stewart WF, Lipton RB, Whyte J, et al. An international study to assess reliability of the Migraine Disability Assessment (MIDAS) score. *Neurology*. 1999;53:988–994.
11. Stewart WF, Lipton RB, Kolodner KB, et al. Validity of the Migraine Disability Assessment (MIDAS) score in comparison to a diary-based measure in a population sample of migraine sufferers. *Pain*. 2000;88:41–52.
12. Headache Classification Committee of the International Headache Society. Classification and diagnostic criteria for headache disorders, cranial neuralgias and facial pain. *Cephalalgia*. 1988;8(suppl 7):19–28.
13. D'Amico D, Mosconi P, Genco S, et al. The Migraine Disability Assessment (MIDAS) questionnaire: translation and reliability of the Italian version. *Cephalalgia*. 2001;21:947–952.
14. Ligaya M, Sakai F, Kolodner KB, et al. Reliability and validity of the Japanese Migraine Disability Assessment (MIDAS) questionnaire. *Headache*. 2003;43:343–352.