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The validation of ID Migraine™ screener in neurology outpatient clinics in Turkey

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Abstract The aim of this study was to investigate the validity of the ID Migraine™ test in neurology outpatient clinics (NOCs), regardless of their presenting complaints. Patients admitted to 41 NOCs were screened. Eligible subjects (n=3682) were evaluated by a neurologist for headache diagnosis according to the International Headache Society criteria and asked the 3-item screening questions of the ID Migraine™ test. Of 3682 patients, 917 (24.9%) were diagnosed as migraine, whereas 1171 (31.8%) were ID Migraine™ test positive. The sensitivity of the ID Migraine™ test for neurologist's diagnosis of migraine was 91.8%, specificity was 63.4%, positive predictive value was 71.9% and negative predictive value was 88.4%. The ID Migraine™ test is easy to use and a practical test that could alert the neurologist to diagnose patients having other complaints. This test would help to increase the diagnosis and treatment rate of undiagnosed migraine patients in NOCs.

Introduction

Migraine is diagnosed in less than half of patients despite its prevalence and impact[1-3] and is more likely to be neglected in those with comorbid illnesses. The most important barriers to establishing a diagnosis of migraine are the short duration of visits to physicians and the number of complaints addressed by the physician during this visit. According to the International Classification of Headache Disorders, 2nd Edition (ICHD-2), a headache should meet 7 criteria and clinicians should ask at least 9 questions to establish a diagnosis of migraine without aura [4]. Studies of abbreviated diagnostic criteria have been reported in the literature with the intent of simplifying the diagnosis of migraine headache [5,6]. Lipton et al. developed a simple set of questions, "ID Migraine™ test" (ID MIGRAINE™ is a trademark of Pfizer Inc.), to screen migraine in primary care settings in patients with frequent and severe headaches [4]. The internal consistency of the 3-item questionnaire (ID Migraine™ test) was found to be high, and the operating characteristics of the model remained similar in clinically relevant subgroups (e.g., different age groups and genders, those with and without aura). The questions regarding nausea, photophobia and disability were found to be the most predictive factors for the diagnosis of migraine headache, with adjusted odds ratios of 3.9, 3.8 and 3.3, respectively [5].

A recent study disclosed that comorbid migraine had a negative effect on the prognosis of epilepsy, suggesting that underdiagnosis and undertreatment of migraine could negatively affect the course of some other neurological disorders as well [7]. Neurologists should play a leadership role in efforts to improve migraine diagnosis and proper diagnosis and treatment of migraine in neurology clinics is of crucial importance.

In this study, we aimed to investigate the validity and practical use of the ID Migraine™ test in neurology outpatient clinics (NOCs).

Materials and methods

We designed a nationwide, multi-centre (41 tertiary care sites) observational study to investigate about 4000 patients admitted to NOCs with any kind of neurological complaint, during one week (5 consecutive working days during June 2005). The local ethics committee has approved the study. All patients over 17 years of age and able to communicate were included in the study after giving a signed informed consent. The patients were reassured that declining to participate would in no way affect the care or treatment that would be given to them.

We recruited the patients with a systematic sample selection method. The planned sample size was 100 patients from each of the centres within the study week. Patient recruitment order was calculated for each individual centre, and on every study day a random number between 1 and 10 was chosen for determining the order of the first patient. "r" is a coefficient for calculating the recruitment order and is calculated by dividing the average burden of patients for that centre for the same day of the week in previous months by 20 to assure recruiting around 20 patients regularly distributed within that day. "z" is a random number between 1 and 10, changing every study day and indicating the recruitment order of the first patient. The recruitment order is as follows: z, $z+r$, $z+2r$, $z+3r$,...., $z+19r$. If any of these candidates did not meet the criteria for entering the study (not capable to communicate, unwilling to enter the study and/or younger than 17 years of age), the next patient was recruited without changing the following recruitment order. The recruited eligible patients were interviewed about their sociodemographic characteristics and medical histories with a structured questionnaire designed for this study. If the patient had 2 or more headaches during the past 3 months, 2 pre-test questions of the ID Migraine™ test were asked [5]. Participants were enrolled for the ID Migraine™ test and underwent examination by a neurologist combined with a semi-structured interview if they answered "yes" to at least one of the following two pre-test questions of the ID Migraine™ test : (1) Do your headaches limit your ability to work, study or enjoy life? (2) Do you want to talk to your healthcare professional about your headaches?

The 3 screening questions of the ID Migraine test were as follows: During the last 3 months (1) Did you feel nauseated or sick to your stomach with your headaches? (2) Did light bother you when you had a headache (a lot more than when you do not have headaches)? (3) Did your headache limit your ability to work, study or do what you needed to do for at least 1 day?

The cut-off point for a test-diagnosis of migraine headache was at least 2 positive responses. This test had previously been linguistically validated for Turkish [8]. Regardless of the ID Migraine™ test result, neurologists or trained neurology residents interviewed the patients who were subjected to the test using a symptom checklist based on a semi-structured diagnostic headache evaluation, according to criteria of the ICHD-2, and assigned them a clinical diagnosis of migraine, tension-type or other headaches [4].

Descriptive statistics were performed on demographic and clinical variables, and on responses to the migraine test screener. For the validity assessment of the 3-item ID Migraine™ test screener, the sensitivity and specificity of the screener against the migraine diagnosis based on IHS were evaluated. Positive and negative predictive values were calculated both for two positive and all positive answers. The sensitivity was defined as the ratio of screener-positive subjects among the subjects with migraine according to IHS criteria. The specificity was defined as the ratio of screener-negative subjects among the subjects without migraine according to IHS criteria. Positive predictive value is the ratio of subjects with migraine according to IHS criteria among all screener-positive sub-

jects; negative predictive value is the ratio of subjects without migraine according to IHS criteria among all screener-negative subjects. A chi-square test was used for nonparametric subgroup comparisons and the Spearman rank correlation test was applied to investigate the relationship between education level and migraine diagnosis by the neurologist or by the ID Migraine™ test. Data are expressed as "mean±standard deviation" or percent (%).

Local ethics committees approved the study. The study was conducted according to the Helsinki good clinical practice principles.

Results

A total of 3682 patients (62.9% female, 37.1% male), with a mean age of 45.2±17 years (43.4±16 years for females and 46.8±18 years for males) were included in the study. Patients reporting headache as their primary cause for admission composed 35.1% of the study group. Another 31.3% disclosed that they suffered from headaches but that was not the cause for their admission. Thus a total of 66.4% of all admitted patients suffered from headache. The comparative sociodemographic characteristics of these patients are shown in Table 1.

The two pre-screening questions of the ID Migraine™ test were answered positively by 1816 patients (49.3%). Of these1816 patients, 917 (24.9% of all patients) were diagnosed with migraine by the neurologists according to the ICHD-2 criteria whereas 1171 (31.8%) were found to be ID Migraine™-positive. Thus, the migraine prevalence rate was

24.9% in 3682 patients admitted to the NOCs with any kind of complaint. This prevalence rate was 33% in females and 11.8% in males. Migraine diagnosis was made in 54.2% of females and 33.8% of males who reported headache as the primary cause for admission. The final diagnoses of the patients are shown in Table 2.

The sensitivity of the ID Migraine™ test for neurologist's diagnosis of migraine was 91.8%, specificity was 63.4%, positive predictive value was 71.9% and negative predictive value was 88.4% for the main group. The positive predictive ratio increases to 85.6%, but the negative predictive ratio decreases to 70.1% with a sensitivity level of 62.7% and specificity level of 89.2% in cases that answered all three questions of ID Migraine™ test positively. In patients who gave positive answers to all three questions, sensitivity was higher for females (93.3% vs. 85.4%), whereas specificity was higher for males (72.0% vs. 58.8%).

Among the screened patients with a positive ID Migraine™ test result, 37% answered all questions positively. Among these, the highest category answered positively was related to disability, with 68.7% of all screened subjects and 33.9% of all patients answering positively.

A subgroup analysis showed that longer education is associated with a better positive predictive ratio (Table 3). We also found that the number of patients diagnosed with migraine by the neurologists showed a significant positive correlation with higher educational level (Spearman correlation value: 0.057, $p=0.001$), whereas the educational level did not show any significant relationship with positive ID Migraine™ test (Table 1) (Spearman correlation value: –0.023, $p=0.161$).

Table 1 Sociodemographic characteristics of all patients included in the study: those with headache, those admitted to the NOCs with headache, those examined and screened by the neurologists, those diagnosed with migraine and those with a positive ID Migraine™ test; n (%)

	All patients	Patients with headache	Patients admitted for headache	Examined and screened patients	Patients with migraine	Patients with positive ID Migraine™ test
Place of residence						
City	2922 (80.3)	1988 (68.0)	1018 (34.8)	1429 (48.9)	749 (25.6)	938 (32.1)
Town	484 (13.3)	325 (67.2)	186 (38.4)	255 (52.7)	121 (25.0)	160 (33.1)
Village	232 (6.4)	155 (66.8)	76 (32.8)	118 (50.9)	40 (17.2)	65 (28.0)
Total	3638 (100)	2468 (67.8)	1280 (35.2)	1802 (49.5)	910 (25.0)	1163 (32.0)
Educational status						
Illiterate	399 (11.0)	289 (72.4)	151 (37.8)	211 (52.9)	71 (17.8)	135 (33.8)
Can read and write	220 (6.1)	140 (63.6)	77 (35)	101 (45.9)	40 (18.2)	62 (28.2)
Primary school (5 yrs)	1249 (34.5)	894 (71.6)	453 (36.3)	654 (52.4)	324 (25.9)	421 (33.7)
Middle school (8 yrs)	354 (9.8)	216 (61.0)	107 (30.2)	159 (44.9)	94 (26.6)	105 (29.7)
High school	816 (22.5)	548 (67.2)	287 (35.2)	407 (49.9)	218 (26.7)	265 (32.5)
University degree	583 (16.1)	376 (64.5)	195 (33.4)	260 (44.6)	158 (27.1)	168 (28.8)
Total	3621 (100)	2463 (68.0)	1270 (35.1)	1792 (49.5)	905 (25.0)	1156 (31.9)

The total numbers differ from the real figures, as the patients with missing information for each characteristic are excluded

The size of community where the patients live (city, town or village) and the diagnosis of migraine also had a relationship at borderline level of significance with Spearman correlation test (p=0.05), but positive ID Migraine™ test did not correlate with the size of community (Spearman correlation test, p=0.628) (Table 1).

Discussion

Despite its high prevalence and proven disability for sufferers, migraine is still an underestimated condition, even in neurology practice [9-13]. Tools like the ID Migraine™ test could facilitate screening patients admitted for other neurological complaints within the often short duration of the visit, which poses an important practical problem [5].

Our sensitivity rate of the ID Migraine™ test (91.8%) was higher and the specificity rate (63.4%) was lower when compared to other studies [5, 8, 14]. Similar to the other studies, sensitivity was higher for females and specificity was higher for males [5, 8].

A meta-analysis indicated that the prevalence of headache and migraine in Europe is somewhat lower than in North America but higher than in Asia and Africa [15]. Few local epidemiological studies of headache in adults have been conducted in Turkey, a country located between Asia and Europe, which has a Caucasian population [16,19]. The prevalence of migraine in a preliminary nationwide epidemiological survey was found to be 21.8% in females, 10.9% in males and 16.4% in general [20]. Our study shows that the prevalence rate increases up to 24.9% in NOCs. The striking female preponderance in patients with migraine, which is also evident in our study, is more consistent across different

Table 2 The neurologist's diagnosis according to the criteria of the International Headache Society in all patients included in the study (n=3682), those who have headache (n=2491), those admitted to the NOCs with headache (n=1292), those with headache but admitted for causes other than headache (n=1199), those examined and screened by the neurologists (n=1816), those diagnosed with migraine (n=917) and those with a positive ID Migraine™ test (n=1171). Please note that there are patients with headaches of more than one type; n (%)

Headache diagnosis	All patients	Patients with headache	Examined and screened patients	Patients with migraine	Patients admitted for headache	Patients with, but not admitted for, headache	Patients with positive ID Migraine™ test
Migraine	917 (24.9)	917 (36.8)	917 (50.5)	917 (100.0)	631 (48.8)	286 (23.9)	842 (71.9)
Migraine without aura	695 (18.9)	695 (27.9)	695 (38.3)	695 (75.8)	468 (36.2)	227 (18.9)	627 (53.4)
Migraine with aura	222 (6.0)	222 (8.9)	222 (12.2)	222 (24.2)	163 (12.6)	59 (4.9)	215 (18.4)
Tension-type headache (TTH)	720 (19.6)	720 (28.9)	720 (39.7)	63 (6.9)	401 (31.0)	319 (26.6)	276 (23.6)
Infrequent episodic TTH	252 (6.8)	252 (10.1)	252 (13.9)	20 (2.2)	105 (8.1)	147 (12.3)	70 (6.0)
Frequent episodic TTH	227 (6.2)	227 (9.1)	227 (12.5)	15 (1.7)	126 (9.8)	101 (8.4)	87 (7.4)
Chronic TTH	241 (6.5)	241 (9.7)	241 (13.3)	28 (3.1)	170 (13.2)	71 (5.9)	119 (10.2)
Medication overuse headache	72 (2.0)	72 (2.9)	72 (4.0)	29 (3.2)	52 (4.0)	20 (1.7)	56 (4.8)
Other types of headache	306 (8.3)	306 (12.3)	306 (16.9)	48 (5.2)	193 (14.9)	113 (9.4)	148 (12.6)

The total numbers differ from the real figures, as the patients with missing information for each characteristic are excluded

Table 3 The sensitivity, specificity, negative and positive predictive ratios of the ID MigraineTM test compared with neurologists' diagnosis according to IHS criteria in all examined and screened patients and in the subgroups with different educational level

	n	Sensitivity	Specificity	Positive predictive ratio	Negative predictive ratio
All examined and screened patients	1816	91.82	63.40	0.72	0.88
Women	1142	93.3	58.8	0.74	0.87
Men	674	85.4	72.0	0.62	0.90
Patients with more than 5 years of education	826	90.64	68.54	0.79	0.85
Patients with ″5 years of education	966	93.10	49.60	0.56	0.91

studies than the overall prevalence of migraine [12,16].

The high proportion of women in our hospital-based study may not reflect the gender distribution in the general population because it was reported in several populations that men were more reluctant to seek help for their headaches than women [14, 21, 22].

We found a higher migraine prevalence rate in better educated patients. Likewise, in previous studies done in Turkey [19, 20], migraine prevalence was found to be significantly higher in university graduates living in urban areas. On the contrary, in some studies from the USA and Europe, frequent headache and also migraine were both found to be more common in patients with the lowest education and economic levels [26, 27]. Absence of vocational education was reported as one of the risk factors for migraine in a recent study in Denmark and no association with educational level was observed for tension-type headache [25]. Although the ratios of admission for headache were similar between less or more educated patients, migraine was more commonly diagnosed in educated persons by the same trained physicians in our study. Interestingly however, the ID Migraine™ test diagnosis was more or less similar between less and more educated groups (Table 1). There could be some other speculative reasons for this discrepancy such as awareness of migraine in the educated group or unknown genetic factors. It seems highly likely that there are still some important barriers to or some communication problems with taking an accurate history of headache from a patient with a limited education background. Therefore, even trained neurologists diagnose the educated patients with migraine more easily. There is some evidence suggesting that there is a communication gap between patients with migraine and their physicians [25, 26]. It was shown that only about 30% of patients with migraine spontaneously discussed headache-related disability with their physicians and physicians recorded symptoms relating to diagnosis rather than information on headache-related disability [28].

Although the ID Migraine™ screening test was shown to be a reliable tool, it could confuse migraine with all kinds of headaches, even with episodic tension-type headache, when compared to the gold standard of a physician's diagnosis (Table 2). In our study, the differential diagnosis most likely to be misclassified as migraine by the ID Migraine™ test was chronic tension-type headache (10.2%), perhaps suggesting that this type of headache causes substantial disability like migraine.

The ID Migraine™ test is easy to use and takes only a few minutes to answer. Groups from all educational backgrounds can answer the test questions easily. This easy test can be given to patients admitted to NOCs, especially those admitted for complaints other than headache. Test-positive patients can be seen in specialised headache outpatient clinics according to their disability or response to therapy.

In conclusion, headaches should be evaluated in all patients admitted to neurologists even if they have other complaints, because of its high prevalence and impact. Neurologists should have a leadership role in the diagnosis and treatment of migraine, which is the most prevalent and disabling disorder in their daily clinical practice with outpatients. Therefore, the ID Migraine™ test can be easily used as a screening test in patients admitted to NOCs, especially those who are admitted for complaints other than headache. This would help to increase the awareness and diagnosis of migraine.

Appendix MIRA Neurology Study group. The 41 centres are ordered by recruited patient count (from high to low) and the investigators are listed according to their contributions in each centre

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