Prevalence, Associated Factors, and Impact on Quality of Life of Migraine in a Community in Northeast China

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Aims: To validate the Chinese version of the Identification of Migraine screener (ID-Migraine), assess migraine prevalence, identify potential associated factors, and assess the impact of migraine on quality of life in a community in Harbin, PR China. **Methods:** A community-based, cross-sectional study was conducted in the Songbei district of Harbin. After excluding the people who did not usually reside in the community, 2,588 adults were invited to participate in the study. Eligible participants underwent a physical examination before completing a questionnaire addressing demographics, medical history, and other features. Additionally, the ID-Migraine was validated by using International Classification of Headache Disorders-3 criteria, with 94 participants screening positive and 100 participants screening negative for migraine as diagnosed through a telephone interview. The diagnostic accuracy of ID-Migraine was evaluated by sensitivity and specificity, and a multivariate logistic regression model was used to determine the association between migraine and associated factors. **Results:** A total of 1,143 subjects completed the questionnaire (response rate 44.2%). The prevalence of migraine was 8.9%, with a male to female prevalence ratio of 1:3.30 (3.7% versus 12.2%; $P < .001$). The sensitivity (90.6%; 95% confidence interval [CI] = 75.0% to 97.9%) and specificity (71.4%; 95% CI = 60.0% to 81.2%) of the ID-Migraine were satisfactory. Multivariate logistic regression analyses suggested female sex, depression, coronary heart disease (CHD), chronic obstructive pulmonary disease (COPD), ischemic stroke (IS), and hypertension were positively associated with migraine, whereas age and education level were negatively associated with migraine. Migraine was shown to significantly impact quality of life. **Conclusion:** Migraine is a highly prevalent disease that can significantly affect quality of life. Age, sex, education level, depression, CHD, COPD, IS, and hypertension were all associated with migraine. *J Oral Facial Pain Headache 2016;30:139–149. doi: 10.11607/ofph.1584*

Keywords: *associated factors, ID-Migraine, migraine, prevalence, quality of life*

Migraine is a highly prevalent disorder, currently estimated to occur in 10% to 18% of the population worldwide.[1] Two large-scale epidemiologic studies of the Chinese population reported a much lower prevalence of 0.6% in 1988[2] and 1990,[3] but two decades later, a national-based sampling survey estimated migraine prevalence to be 9.3% in the Chinese population. However, this study did not include the population of the Heilongjiang province in northeast China.[4]

Despite the high prevalence, migraine still remains under-recognized even in developed countries.[5] The early diagnosis of migraine has been improved by the Identification of Migraine screener (ID-Migraine),[6] but the use of this screening tool in Chinese adults is not well established. Understanding the factors associated with migraine is an essential step toward preventing it; however, very few factors are universally accepted to influence migraine. A previous study suggested that some dietary factors, such as alcohol and coffee, may trigger migraine.[7] Moreover, Critchley suggested "dietetic migraine" was a subtype of migraine in his classification.[8] Accordingly, diet may play an important role in the precipitation of migraine,[9] but the influence of diet on migraine has never been investigated before in northeast China.

A recent investigation has suggested that cold weather is associated with headache incidence,[10] and cold weather has been known as one of the trigger factors of migraine.[11] Harbin, which is located above 45 north latitude, is known for the coldest weather and longest winter among Chinese provincial cities; the mean temperature in winter is −16.8°C and can be as low as −38.1°C.[12] Therefore, subjects in Harbin may have a high risk for migraine, which has been reported to significantly affect quality of life and working capacity,[13] and it is necessary to investigate the impact of migraine on the Harbin community's quality of life to provide the basis for health policy formulation. Therefore, the aim of this study was to validate the Chinese version of ID-Migraine, assess migraine prevalence, identify potential associated factors, and assess the impact on the quality of life of a community in Harbin, PR China.

Materials and Methods

Subjects

This was a community-based, cross-sectional study conducted in the Songbei district of Harbin in the Heilongjiang province of northeast China. A total of 3,350 people (1,645 males and 1,705 females) were registered in the community at the time of the investigation. After excluding 369 people who did not usually reside in the community and 393 people under the age of 18 years, 2,588 eligible participants remained (1,285 males and 1,303 females; mean ± standard deviation [SD] age 44.84 ± 15.68 years). The study was approved by the Ethics Committee of Harbin Medical University [2012001].

Questionnaire

Participants gave their informed consent at the beginning of the questionnaire, which was divided into seven parts:

1. Demographic data: This section covered age, sex, marital status, education level, job status, and total household income.
2. Medical history: This part revealed any history of diabetes mellitus (DM),[14] coronary heart disease (CHD),[15] chronic obstructive pulmonary disease (COPD),[16] hypertension,[17] and ischemic stroke (IS).[18]
3. Life habits: Alcohol consumption (number of drinks per day over the past 30 days; a drink was defined as a glass or more of wine, 0.5 bottles of beer, 125 g fruit wine, or 40 g white spirit) and current smoking status (having consecutively or cumulatively smoked for 6 months during lifetime) were recorded.
4. Chinese version of ID-Migraine: This is a well-established migraine screener and has been translated into Chinese from the English version[6] by two Chinese-English speakers and then translated back into English by a native English speaker fluent in Chinese to confirm consistency with the original version. Participants were screened for migraine as described by Oztora and colleagues.[19] Participants were asked to complete the three-item ID-Migraine screener if they reported two or more headaches in the last 3 months and gave a positive response to one of the following questions: "Do you have headaches that limit your ability to work, study, or enjoy life?" or "Do you want to talk to your health care professional about your headaches?" Subjects who gave two or more positive responses to the three questions were diagnosed with migraine (Fig 1).
5. Three-day food records: The participants were asked to record the type and amount of all foods and beverages consumed over the past 2 weekdays and 1 weekend day with the help of an investigator.
6. Depression was measured by the Beck Depression Inventory (BDI) and the total score was divided into three grades: 0 to 9, 10 to 15, and > 16.[20]
7. Health-related quality of life (HRQoL) was estimated by the 36-item Short Form Health Survey (SF-36), which classified the HRQoL into eight domains: physical functioning (assessing whether the health conditions interfered with normal physiologic activities), physical role (evaluating functional limitations due to physical health problems), bodily pain (assessing the degree of pain and the influence of pain on daily activities), general health (self-evaluation of participant's health status), vitality (assessing the energy and subjective feeling of fatigue), social functioning (evaluating the influence of the physiologic and psychological factors on social activities), emotional role (assessing functional limitations due to emotional problems), and mental health (assessing types of mental health including motivation, depression, out-of-control emotion, and subjective psychological feeling).[21]

The full questionnaire is presented at: http://pan.baidu.com/s/1kTGm0Vt.

Body Measurement Indicators

This part measured the body mass index (BMI = weight [kg] / [height {m} × height {m}]), bone mineral density (BMD), fasting blood glucose (FBG), and waist hip rate (WHR = waistline [cm] / hipline [cm]).

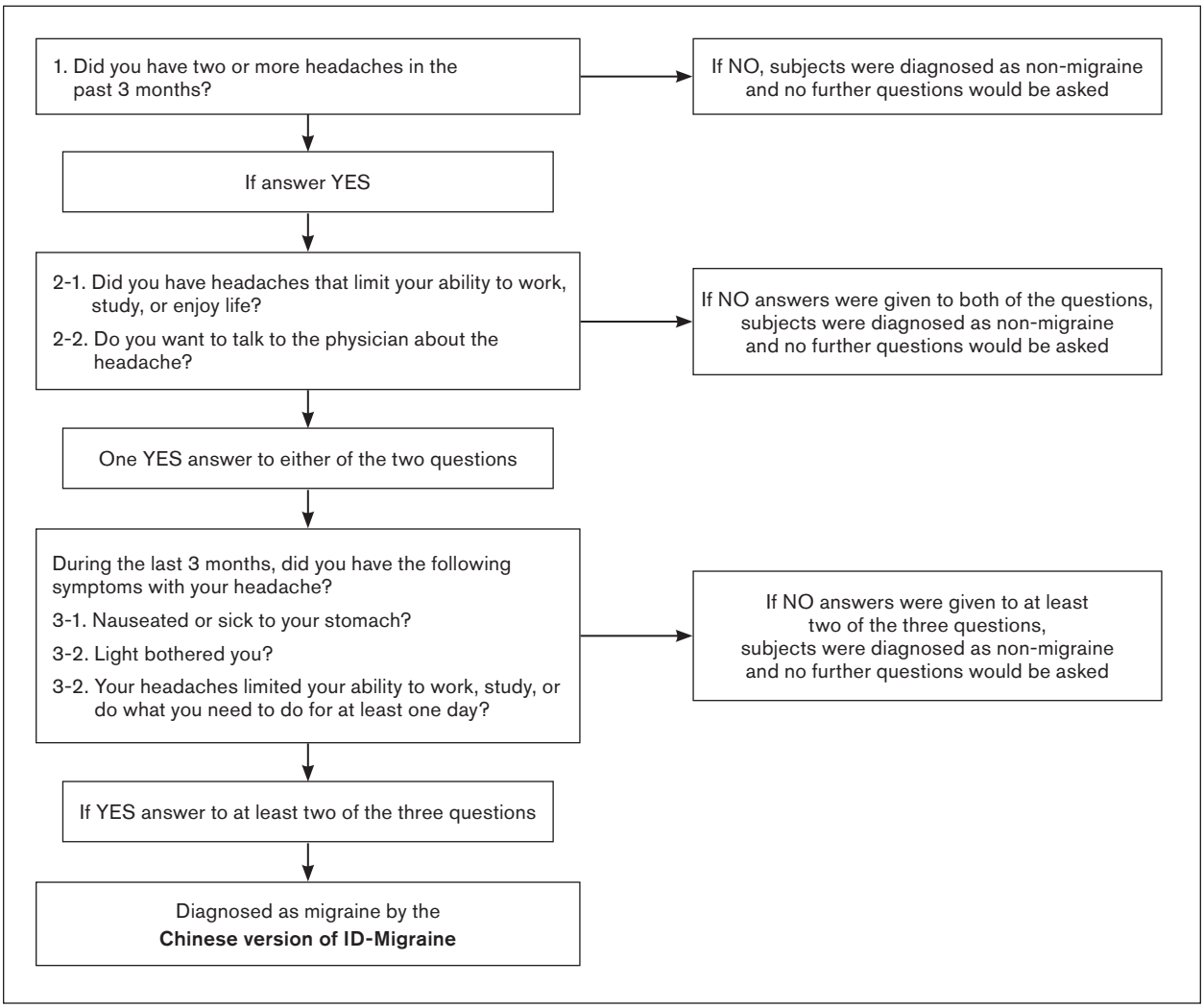

Fig 1 Flowchart of the screening procedure of the Chinese version of ID-Migraine.

Survey

The survey was carried out door-to-door by eight trained investigators between 1 July and 30 September 2013. Participants answered the questionnaire as directed by an investigator, and height, weight, waistline, hipline, and blood pressure were measured in the meantime at the participants' home. The FBG and BMD measurements were performed the following morning by one of the investigators (H.Y.) in the building of the community neighborhood committee. If no one was at home, there was a follow-up over the weekend, and if the participants were not at home for 2 consecutive weeks they were considered withdrawn from the study.

Validation of the Migraine Screening Tool

The ID-Migraine screening tool was validated by conducting telephone interviews with all 102 participants who screened positive for migraine and 100 randomly selected participants who screened negative for migraine. These participants were selected using the randomization process of SAS (SAS Institute Inc). The telephone interviews were conducted between 13 and 20 September 2014. An investigator (X.W.) made the telephone call and asked the participant for their oral consent to be questioned by a neurologist over the phone. The neurologist made a blind second diagnosis based on the telephone interview. The participants were diagnosed as suffering from migraine or not and no other diagnoses were made. Migraine was diagnosed according to the criteria of the International Classification of Headache Disorders (ICHD).[22] Results of the ID-Migraine were compared with the neurologic diagnosis made over the phone by a neurologist blinded to the ID-Migraine diagnosis in order to calculate the sensitivity, specificity, positive predictive value, negative predictive value, and kappa value (Fig 2).

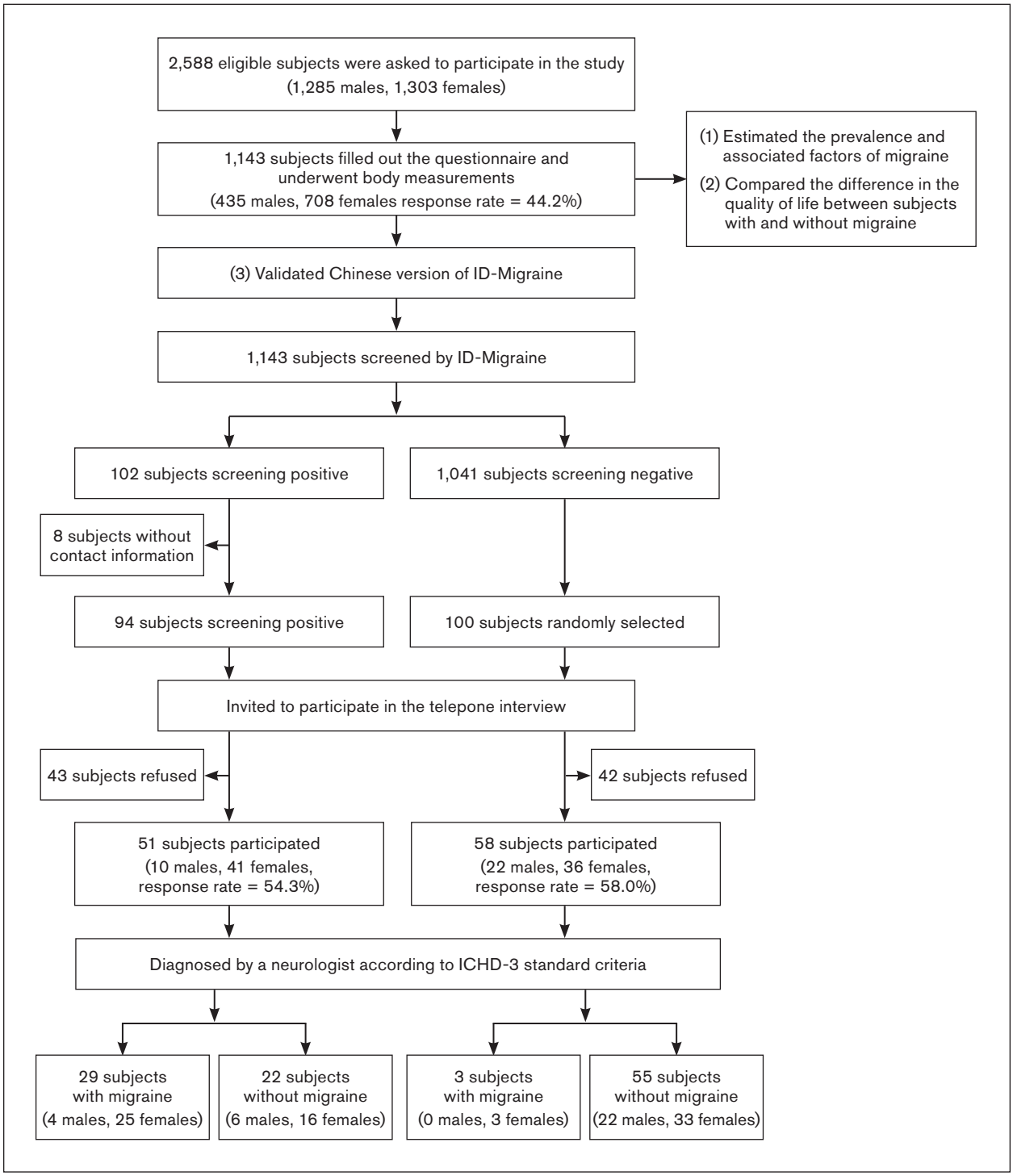

Fig 2 Flowchart of the subjects participating in different parts of the study.

Statistical Analyses

Normally distributed data were presented as mean ± SD, and differences between groups were analyzed by *t* test. The 3-day food records described the average intake of energy, protein, fat, Vitamin A, and other nutrients. Each nutritional component was summarized as median ± quartile deviations, and the differences between groups were analyzed by Wilcoxon rank sum test. Nutritional components were further categorized by quartile, and the associations between dietary factors and migraine adjusted by age and sex were analyzed by logistic regression. Pearson chi-square test was used to analyze the difference between the categorical variables.

Univariate logistic regressions were applied to calculate the odds ratio (OR) and 95% confidence interval (CI). The multivariate logistic regression model was used to determine significant associations between migraine and factors such as age and sex. For investigating the associations between migraine and CHD and IS, CHD and IS were defined as dependent variables to determine whether migraine was significantly associated with these two diseases after adjustment for age and sex.

The diagnostic accuracy of the ID-Migraine screen was evaluated by sensitivity, specificity, positive predictive value, negative predictive value, and kappa value with 95% CI. SF-36 scores were calculated according to the standard procedure,[21] and each was presented as median ± quartile deviations. Differences between migraine-positive and migraine-negative groups were compared by the Wilcoxon rank sum test. In addition, multivariate linear regression analysis was used to assess the effect of migraine on each part of the SF-36 after controlling for age, sex, CHD, COPD, DM, hypertension, BDI, and IS. Statistically significant levels were two-tailed and set at $P < .05$. Data measuring 3-day food records were analyzed using Nutrition Calculator software version 1.60 (Chinese Center for Disease Control, Beijing, China). Statistical analyses were carried out using SAS statistical software, version 9.1 (SAS Institute Inc).

Results

Subjects

A total of 1,143 participants (435 males and 708 females) successfully completed the questionnaire and body measurements (44.2% response rate). Nonparticipants were either not willing to participate or were absent during the survey. Participants were older than nonparticipants (50.70 ± 15.11 years versus 40.19 ± 16.63 years, respectively; $P < .001$) and included more females (male/female = 1/1.63) than nonparticipants (male/female = 1/0.70; $\chi^2 = 110.08$; $P < .001$) (Table 1).

Table 1 Age and Sex Distribution of the Eligible Population and the Response Rates in the Study

Age interval (y)	No. of eligible population (B/M/F)	No. of participants (B/M/F)	% Participation (B/M/F)
18–	242/132/110	70/29/41	28.9/22.0/37.3
25–	555/267/288	122/44/78	22.0/16.5/27.1
35–	493/257/236	184/69/115	37.3/26.8/48.7
45–	558/275/283	266/97/169	47.7/35.3/59.7
55–	475/231/244	308/112/196	64.8/48.5/80.3
65–	153/68/85	121/50/71	79.1/73.5/83.5
75–	112/55/57	72/34/38	64.3/61.8/66.7
Total	2,588/1,285/1,303	1,143/435/708	44.2/33.9/54.3

B/M/F = both/male/female.

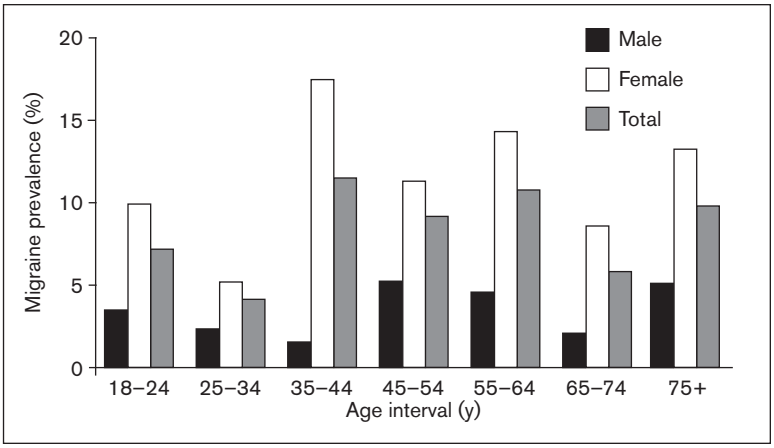

Fig 3 Prevalence of migraine by age and sex.

Report of Migraine Prevalence

Prevalence of Migraine. Of the 1,143 total participants, migraine was detected in 102 subjects (15.7% male and 84.3% female; mean age 51.54 ± 14.18 years), with a prevalence of 8.9%. Of those participants with migraine, 88.2% (n = 90) felt nauseated and 49% (n = 50) were bothered by light when the headache attacked. Additionally, 89.2% of migraine sufferers (n = 91) claimed that the headache limited their ability to work, study, or function for at least 1 day.

Prevalence in Different Demographic Indicators. Among the 1,143 participants, the lowest migraine prevalence was in the 25- to 34-years age group (4.1%). Migraine prevalence peaked in the 35- to 44-years age group in females (17.4%), and the highest prevalence in males was found in the 45- to 54-years age group (5.2%) (Fig 3).

The prevalence of migraine was significantly higher in females (12.2%) than males (3.7%) ($\chi^2 = 23.78$; $P < .001$). Subjects with a higher education level ($\chi^2 = 10.16$; $P = .006$) and higher household income ($\chi^2 = 8.26$; $P = .016$) had a significantly lower prevalence of migraine (Table 2).

Table 2 Demographic Characteristics of the Study Subjects

	Prevalence of migraine (%)[a]	Subjects with migraine, n = 102 n (%)[b]	Subjects without migraine, n = 1,041 n (%)[b]	χ^2	*P* value
Age interval (y)				1.93	.382
18–39 (n = 271)	8.0	20 (19.6)	251 (24.1)		
40–59 (n = 555)	11.2	56 (54.9)	499 (47.9)		
60– (n = 317)	8.9	26 (25.5)	291 (28.0)		
Sex				23.78	< .001
Male (n = 435)	3.7	16 (15.7)	419 (40.3)		
Female (n = 708)	12.2	86 (84.3)	622 (59.7)		
Marital status				1.90	.168
Single (n = 54)	3.7	2 (2.0)	52 (5.0)		
Married (n = 1,089)	9.2	100 (98.0)	989 (95.0)		
Education level				10.16	.006
Middle school or less (n = 854)	10.4	89 (87.3)	765 (73.5)		
High school (n = 175)	5.7	10 (9.8)	165 (15.9)		
College or more (n = 114)	2.6	3 (2.9)	111 (10.6)		
Job status				4.23	.238
Working (n = 698)	9.2	64 (62.8)	634 (60.9)		
Unemployed (n = 306)	10.1	31 (30.4)	275 (26.4)		
Retired (n = 112)	6.3	7 (6.8)	105 (10.1)		
Other (n = 27)	0.0	0 (0.0)	27 (2.6)		
Total Income (RMB)				8.26	.016
< 30,000 (n = 624)	10.7	67 (65.7)	557 (53.4)		
≥ 30,000 (n = 510)	6.5	33 (32.4)	477 (45.8)		
Others (n = 9)	22.2	2 (1.9)	7 (0.8)		
Total (n = 1,143)	8.9	102 (100.0)	1,041 (100.0)		

[a]Proportion of subjects with migraine.
[b]Percentage of subjects in this group.

Validation of the Chinese Version of ID-Migraine

Of the 102 participants screening positive for migraine, 8 gave no contact information; so, only 94 subjects screening positive for migraine together with the 100 randomly selected subjects who screened negative for migraine were invited to participate in the telephone interview. The migraine-positive group had more female subjects than the migraine-negative group (χ^2 = 17.34; *P* < .001), but no significant difference was found in the age distribution between groups (50.16 ± 13.97 versus 48.69 ± 15.00 years; *P* = .363).

A total of 51 of the 94 subjects screening positive for migraine and 58 of the 100 subjects screening negative for migraine were successfully contacted and participated in the study, and 32 of them (4 males and 28 females) were diagnosed as having migraine according to the ICHD-3 standard criteria[22] (Fig 2). The overall sensitivity, specificity, positive predictive value, negative predictive value, and kappa value of the Chinese version of ID-Migraine were 90.6% (95% CI = 75.0% to 97.9%), 71.4% (95% CI = 60.0% to 81.2%), 56.9% (95% CI = 42.3% to 70.7%), 94.8% (95% CI = 85.6% to 98.9%), and 0.53 (95% CI = 0.38 to 0.68), respectively. When stratified by sex, the sensitivity and specificity in males were shown to be 100.0% (95% CI = 40.2% to 100.0%) and 78.6% (95% CI = 59.0% to 91.7%), respectively. The sensitivity and specificity values in females were 89.3% (95% CI = 71.8% to 97.6%) and 67.4% (95% CI = 52.5% to 80.0%), respectively.

Multivariate Analysis of the Factors Associated with Migraine

The univariate logistic regression analysis of the associated factors of migraine is presented in Table 3. After adjusting for age and sex, multivariate regression analyses showed education level (OR = 0.52; 95% CI = 0.33 to 0.82) and household income (OR = 0.59; 95% CI = 0.38 to 0.93) to be significantly negatively associated with migraine, while female sex (OR = 3.64; 95% CI = 2.10 to 6.29), BDI (OR = 1.91; 95% CI = 1.45 to 2.51), COPD (OR = 4.00; 95% CI = 1.73 to 9.28), and hypertension (OR = 1.89; 95% CI = 1.19 to 3.02) were significantly positively associated with migraine.

The significant variables were incorporated into the multivariate regression analyses and age was set as a confounding factor. Afterwards, all the variables, except for household income (OR = 0.78; 95% CI = 0.49 to 1.26; *P* = .318), were significantly associated with migraine (Table 4).

The results indicated that migraine was also positively associated with CHD (OR = 2.74; 95%

Table 3 Association Between Different Factors and Migraine (n = 1,143)

	Subjects with migraine, n = 102 n (%)[a]	Subjects without migraine, n = 1,041 n (%)[a]	Unadjusted ORs		Adjusted ORs[b]	
			OR (95% CI)	*P* value	OR (95% CI)	*P* value
Age interval (y)			1.04 (0.78–1.38)	.784	1.07 (0.80–1.43)	.628
18–39 (n = 271)*	20 (19.6)	251 (24.1)	1.00	–	1.00	–
40–59 (n = 555)	56 (54.9)	499 (47.9)	1.41 (0.83–2.40)	.208	1.42 (0.83–2.43)	.202
60– (n = 317)	26 (25.5)	291 (28.0)	1.12 (0.61–2.06)	.712	1.19 (0.65–2.20)	.577
Female (n = 708)	86 (84.3)	622 (59.8)	3.62 (2.09–6.26)	< .001	3.64 (2.10–6.29)	< .001
Married (n = 1,089)	100 (98.0)	989 (95.0)	2.63 (0.63–10.94)	.185	2.22 (0.51–9.57)	.287
Education level			0.50 (0.32–0.78)	.002	0.52 (0.33–0.82)	.005
Middle school or less (n = 854)*	89 (87.3)	765 (73.5)	1.00	–	1.00	–
High school (n = 175)	10 (9.8)	165 (15.9)	0.52 (0.27–1.02)	.058	0.56 (0.28–1.12)	.102
College or more (n = 114)	3 (2.9)	111 (10.6)	0.23 (0.07–0.75)	.014	0.24 (0.08–0.79)	.019
Job status			0.88 (0.63–1.22)	.439	0.80 (0.57–1.13)	.204
Working (n = 698) (Reference)	64 (62.8)	634 (60.9)	1.00	–	1.00	–
Unemployed (n = 306)	31 (30.4)	275 (26.4)	1.06 (0.68–1.66)	.799	0.92 (0.58–1.46)	.726
Retired (n = 112)	7 (6.9)	105 (10.1)	0.55 (0.22–1.41)	.215	0.50 (0.19–1.29)	.149
Income ≥ 30,000 (RMB) (n = 510)	33 (28.0)	477 (46.1)	0.58 (0.37–0.89)	.013	0.59 (0.38–0.93)	.022
Smoking[c] (n = 351)	28 (27.4)	323 (31.0)	0.84 (0.53–1.33)	.455	1.59 (0.96–2.66)	.074
Alcohol consumption[d] (n = 316)	20 (19.6)	296 (28.4)	0.61 (0.37–1.02)	.059	1.34 (0.74–2.44)	.333
DM (n = 83)	10 (9.8)	73 (7.0)	1.44 (0.72–2.89)	.302	1.41 (0.69–2.90)	.350
Hypertension (n = 268)	35 (34.3)	233 (22.4)	1.81 (1.17–2.80)	.007	1.89 (1.19–3.02)	.008
COPD (n = 33)	9 (8.8)	24 (2.3)	4.10 (1.85–9.08)	< .001	4.00 (1.73–9.28)	.001
BMI (kg/m^2)			1.10 (0.77–1.58)	.602	1.16 (0.80–1.68)	.440
< 18.5 (n = 43)*	2 (2.0)	41 (3.9)	1.00	–	1.00	–
18.5– (n = 484)	44 (43.1)	440 (42.3)	2.05 (0.48–8.76)	.333	2.08 (0.48–9.01)	.325
24.0– (n = 616)	56 (54.9)	560 (53.8)	2.05 (0.48–8.70)	.331	2.21 (0.51–9.50)	.288
BMD			0.90 (0.64–1.26)	.536	0.87 (0.62–1.21)	.408
> −1 (n = 576)*	57 (55.9)	519 (49.9)	1.00	–	1.00	–
−2.5– (n = 488)	36 (35.3)	452 (43.4)	0.72 (0.47–1.12)	.146	0.72 (0.46–1.12)	.143
< −2.5 (n = 79)	9 (8.8)	70 (6.7)	1.17 (0.55–2.46)	.682	1.02 (0.48–2.17)	.959
FBG (mmol/L)			1.24 (0.90–1.70)	.187	1.22 (0.88–1.71)	.237
< 5.6 (n = 546)*	42 (42.0)	504 (48.6)	1.00	–	1.00	–
5.6– (n = 501)	48 (48.0)	453 (43.6)	1.27 (0.83–1.96)	.277	1.21 (0.78–1.89)	.392
7.0– (n = 91)	10 (10.0)	81 (7.8)	1.48 (0.72–3.07)	.290	1.51 (0.71–3.22)	.288
BDI[e]			2.10 (1.61–2.74)	< .001	1.91 (1.45–2.51)	< .001
0– (n = 853)*	54 (52.9)	799 (76.8)	1.00	–	1.00	–
10–15 (n = 199)	28 (27.5)	171 (16.4)	2.42 (1.49–3.94)	< .001	2.23 (1.36–3.65)	.002
16– (n = 91)	20 (19.6)	71 (6.8)	4.17 (2.36–7.35)	< .001	3.42 (1.92–6.12)	< .001

*This group used as the reference group; the *P* values for the OR and 95% CI in other groups were compared with this group.
[a]Percentage of subjects in this group.
[b]The OR and 95% CI adjusted by age and sex.
[c]Having consecutively or cumulatively smoked for 6 months during lifetime was defined as smoking.
[d]In the past 30 days, drinks per day; a drink was defined as: 0.5 bottles of beer, 125 g fruit wine or 40 g white spirit.
[e]Depression was calculated according to the BDI.
DM = diabetes mellitus; COPD = chronic obstructive pulmonary disease; BMI: body mass index; BMD = bone mineral density; FBG = fasting blood glucose; BDI = Beck Depression Inventory.

CI = 1.74 to 4.31; *P* < .001) and IS (OR = 2.76; 95% CI = 1.60 to 4.76; *P* < .001).

Three-Day Food Records. Results were compared between subjects with migraine (n = 102) and subjects without migraine (n = 1,041). Male subjects with migraine (n = 16) had a higher intake of sodium than the male subjects without migraine (n = 419) (*z* value = 2.00; *P* = .046). When data were categorized by quartile, logistic regression analysis indicated that sodium was negatively associated with migraine in male participants (OR = 1.65; 95% CI = 1.01 to 2.70; *P* = .045). Detailed results of food records are presented at: http://pan.baidu.com/s/14t4Sm.

Assessment of the Impact of Migraine on Quality of Life

HRQoL was worse (*P* < .05) in the migraine group (n = 102) in all domains of the SF-36 when compared with the subjects without migraine (n = 1,041) (Table 5). Multivariate linear regression analysis showed that migraine was significantly associated

Table 4 Multivariate Analysis of Factors Associated with Migraine (n = 1,143)

	Wald	OR (95% CI)	*P* value
Age interval (y)	4.44	0.69 (0.49–0.97)	.035
18–39 (n = 271)*	–	1.00	–
40–59 (n = 555)	0.23	0.86 (0.48–1.56)	.629
60–, (n = 317)	4.01	0.49 (0.24–0.96)	.047
Female (n = 708)	14.06	2.94 (1.67–5.15)	< .001
Education	6.92	0.53 (0.33–0.85)	.009
Middle school or less (n = 854)*	–	1.00	–
High school (n = 175)	2.15	0.59 (0.29–1.20)	.143
College or more (n = 114)	5.12	0.25 (0.08–0.83)	.024
Income ≥ 30,000 (RMB) (n = 510)	1.00	0.78 (0.49–1.26)	.318
COPD (n = 33)	8.98	3.90 (1.60–9.50)	.003
Hypertension (n = 268)	7.25	1.94 (1.20–3.15)	.007
[a]BDI	16.01	1.79 (1.35–2.38)	< .001
0– (n = 853)*	–	1.00	–
10– (n = 199)	7.14	2.01 (1.21–3.37)	.008
16– (n = 91)	13.10	3.04 (1.67–5.56)	< .001

*This group used as the reference group, the P values for the OR and 95% CI in other groups were compared with this group.
[a]Depression was calculated according to the BDI.
COPD = chronic obstructive pulmonary disease;
BDI = Beck Depression Inventory.

Table 5 Migraine and Quality of Life[a] Assessed (n = 1,143)

	Subjects with migraine, n = 102 (Median ± quartile)	Subjects without migraine, n = 1,041 (Median ± quartile)	*P* value
Physical functioning			
Male	80.00 ± 25.00	95.00 ± 10.00	.004
Female	85.00 ± 25.00	90.00 ± 20.00	< .001
Total	85.00 ± 25.00	95.00 ± 20.00	< .001
Physical role			
Male	00.00 ± 25.00	100.00 ± 0.00	< .001
Female	25.00 ± 100.00	100.00 ± 50.00	< .001
Total	15.00 ± 100.00	100.00 ± 25.00	< .001
Bodily pain			
Male	74.00 ± 40.50	90.00 ± 16.00	< .001
Female	74.00 ± 23.00	90.00 ± 16.00	< .001
Total	74.00 ± 23.00	90.00 ± 16.00	< .001
General health			
Male	65.00 ± 46.00	72.00 ± 27.00	.003
Female	45.00 ± 40.00	67.00 ± 35.00	< .001
Total	45.00 ± 40.00	72.00 ± 30.00	< .001
Vitality			
Male	70.00 ± 27.50	80.00 ± 15.00	.008
Female	70.00 ± 20.00	80.00 ± 25.00	< .001
Total	70.00 ± 25.00	80.00 ± 20.00	< .001
Social functioning			
Male	87.50 ± 25.00	100.00 ± 00.00	< .001
Female	87.50 ± 25.00	100.00 ± 12.50	< .001
Total	87.50 ± 25.00	100.00 ± 12.50	< .001
Emotional role			
Male	66.67 ± 100.00	100.00 ± 33.33	< .001
Female	66.67 ± 100.00	100.00 ± 33.33	< .001
Total	66.67 ± 100.00	100.00 ± 33.33	< .001
Mental health			
Male	78.00 ± 20.00	80.00 ± 16.00	.043
Female	68.00 ± 24.00	80.00 ± 24.00	.002
Total	70.00 ± 20.00	80.00 ± 20.00	< .001

[a]Quality of life was calculated according to the SF-36.

Table 6 Results of Multivariate Linear Regression Analyses to Test the Predictors of Each Scale of SF-36

	Physical functioning	Physical role
Intercept	131.10**	135.94**
Age	–0.48**	–0.51**
Female	–4.57**	–4.36*
Migraine	–4.04**	–25.99**
CHD	0.87	1.58
COPD	–8.63*	–0.79
DM	–4.65*	–14.82*
Hypertension	–0.90	–6.61*
IS	–5.70*	–5.17
BDI[a]	–8.82**	–17.75**

*$P < .05$; **$P < .001$.
[a]Depression was calculated according to the BDI.
CHD = coronary heart disease; COPD = chronic obstructive pulmonary disease; DM = diabetes mellitus; IS = ischemic stroke; BDI = Beck Depression Inventory.

with worse physical role functioning (–25.84 points), emotional role functioning (–17.11 points), general health (–13.02 points), bodily pain (–10.85 points), and physical functioning (–3.83 points). However, the summary measures of mental health, social functioning, and vitality were not significantly associated with migraine (Table 6).

Discussion

This study investigated the prevalence and associated factors of migraine and assessed its impact on quality of life among the population of Harbin. Age, sex, education level, depression, CHD, COPD, IS, and hypertension were all significantly associated with migraine, and migraine had a significant impact on quality of life.

The sensitivity of the Chinese version of ID-Migraine was a little higher than the original[6] (90.6% versus 81.0%), while the specificity of both versions was similar (71.4% versus 75.0%). Sensitivity was much higher in the Chinese version in males (100.0% versus 65.0%), but the specificity was comparable (78.6% versus 80.0%). For the analysis of female participants, both versions of ID-Migraine showed similar sensitivity (89.3% versus 86.0%) and specificity (67.4% versus 71.0%).

The migraine prevalence reported here is comparable to a recent population-based study,[4] but is much higher than reported in earlier studies.[2,3] This can be attributed to the fact that the criteria of ICHD[23] were not available

Bodily pain	General health	Vitality	Social functioning	Emotional role	Mental health
102.28**	107.19**	100.76**	112.10**	119.40**	87.97**
−0.13**	−0.21**	−0.02	−0.09*	−0.19*	0.14**
−1.31	−3.91**	−2.08*	−0.33	−1.68	−1.82*
−10.85**	−13.29**	−2.88	−2.56	−17.34**	−1.70
−0.29	−3.62*	0.53	2.22	1.22	−1.60
−2.52	0.08	−0.05	−0.45	−1.25	0.95
−3.77*	−4.75*	−2.87	−4.01*	−5.13	−1.10
−0.79	−4.32*	−3.00*	−1.07	−1.05	−0.75
−1.62	−6.03*	−0.18	−2.71	−3.82	0.67
−8.18**	−14.09**	−14.23**	−10.74**	−18.03**	−11.89**

when the earlier studies were published; therefore, the diagnostic criteria cannot be compared. The current study also found a lower prevalence of migraine than reported in a population in the southern part of China,[24] which may be due to differences in diet[25]—for example, food seasonings (such as monosodium glutamate) are reported to be triggers of migraine and are routinely used in the South to flavor food.[24]

The present study also found that migraine is more prevalent in females compared with males, which has also been reported in a Taiwanese population.[26] These sex differences can likely be attributed to the effects of the hormone estrogen.[27] Additionally, the results suggested the prevalence of migraine was highest at different ages in males and females, which has also been reported in other populations.[28]

The current study revealed a negative association between migraine and education level, which has been reported before.[29] It has also been shown that people who developed migraine later on in life were more likely to have achieved lower scores in examinations during their teenage years and were less likely to gain a bachelor's degree than the headache-free subjects.[30] Moreover, people with more education may be better able to gain a learned appreciation for good health and have more opportunities to avoid the trigger factors of migraine.

Migraine has previously been associated with lower household income, possibly due to limited health care, higher levels of stress, and poor living conditions.[1] This study observed an influence of income on the prevalence of migraine, but this association was not significant. Likewise, the current study was unable to confirm a significant association between migraine and job status, an association that has been demonstrated previously.[31]

Depression was associated with a higher risk of migraine, which is consistent with previous findings.[32] Previous studies have also shown that the relationship between migraine and depression is bidirectional. Both migraine and depression can be caused by a tyramine conjugation deficit,[33] suggesting that the two conditions share a common physiologic mechanism.[34] COPD and hypertension were both positively associated with migraine in the present study, which has been demonstrated previously.[16,17] Abnormal activity of the renin-angiotensin system is responsible for hypertension and may represent a common mechanism for the pathogenesis of hypertension and migraine.[35]

Migraine has previously been associated with DM, BMI, smoking, and alcohol consumption,[14,29,36] but the results in the current study did not support these associations.

This study also found that high sodium intake may increase the incidence of migraine, especially in males. Too much salt consumption results in dehydration, which could trigger migraine to some extent.[37]

Migraine was significantly associated with worse HRQoL in the current study, even after controlling for potentially confounding factors. This finding is in keeping with previous findings.[38]

Migraine was also positively associated with CHD and IS, which is consistent with previous studies.[15,18] The circulating endothelial progenitor cell (EPC) number is a known biomarker for vascular function and was reported to be negatively associated with cardiovascular risk.[39] Migraine sufferers have also been reported to have lower EPC numbers and impaired vascular function compared with normal subjects.[40]

There are some limitations to the current study. First, the response rate was low and the prevalence of

migraine was surveyed in a specific community. The study was likely to include more participants with migraine since those participants may have been more interested in the investigation, which may introduce selection bias. However, the investigators did attempt to reduce the bias by visiting the participants who did not reply twice and by recruiting only eligible participants. Second, although the participants gave details of their past medical history, response bias may have rendered this information inaccurate. Third, the cross-sectional nature of the study means it could not infer definite causal associations between the variables and migraine. Fourth, when investigating the association between smoking and alcohol consumption behaviors and migraine, this study provided only a crude dichotomous grouping, which may not fully explain the relationship between them. More studies focusing on the relationship between migraine and the time and amount of smoking and alcohol consumption should be conducted in the future. Finally, in the validation of the Chinese version of ID-Migraine, the subjects with migraine were only diagnosed by telephone interview, which may underestimate the specificity of the Chinese version of ID-Migraine.[41]

The current study validated the Chinese version of ID-Migraine in a community-based population in northeast China. The Chinese version of ID-Migraine can be used for subsequent population-based studies to study migraine prevalence in China. Moreover, this research comprehensively investigated the association between dietary factors and migraine and found that migraine may be associated with too much salt consumption, which may provide new insights into the relationship between diet and the pathogenesis of migraine.

Conclusions

The prevalence of migraine among adults in northeast China was 8.9%, and the validity of the Chinese version of ID-Migraine was found to be satisfactory. Factors such as sex, depression, COPD, hypertension, and high salt consumption may increase the chance of migraine. Migraine may be significantly associated with poor quality of life and with CHD and IS.

Acknowledgments

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