Consulting, diagnosis and treatment patterns in migraine: results from the Migraine in Poland cross-sectional survey

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Abstract

Background: The Migraine in Poland study is a cross-sectional survey that assesses symptomatology, consulting, diagnosis, treatment and impact of migraine in Poland.

Objectives: The purpose of this article is to define patterns of care for migraine in Polish patients.

Methods: The survey was conducted from August 2021 to June 2022. Participants were recruited through various channels, targeting mostly persons suffering from headaches. The web survey included questions allowing for diagnosis according to the International Classification of Headache Disorders. A detailed questionnaire evaluated healthcare system utilization, history of diagnosis, as well as the use of acute or preventive treatment, including non-pharmacological methods.

Results: In total, 3225 individuals aged 13–80 (mean age 38.9) responded to the questionnaire (87.1% were women). Migraine without aura (MwoA) diagnosis was confirmed in 1679 (52.7%) of subjects, and 1571 (93.6%) of them consulted a medical professional for their headaches in the past. Among those who consulted for headache, 91% reported having received a medical diagnosis of migraine. 92.5% of MwoA participants declared the current use of some form of treatment. Non-steroidal anti-inflammatory drugs and acetaminophen were the most frequently used acute medications ($n = 1318$, 78.5%) followed by combination analgesics, especially those containing codeine ($n = 991$, 59%). Triptans/ergots were used by 57.1%. A total of 22.8% of subjects used acute treatment with a frequency indicating medication-overuse. Prophylactic treatment was at some point used by 35.68%, while 11.49% were currently on preventive medications. The most frequently prescribed preventives were iprazochrome (8.99%), followed by flunarizine (8.10%) and topiramate (5.90%). A total of 23.28% subjects used nutraceuticals for migraine prevention (most frequently magnesium).

Conclusion: Despite high consultation and diagnosis rates among Polish patients with migraine, there is a need for improving standards of care, especially in regard to choice of treatment. There is also a need to raise public awareness of the dangers of codeine-based medications (available over-the-counter in Poland).

Plain language summary

Consulting, diagnosis and treatment patterns in migraine: results from the Migraine in Poland study

The Migraine in Poland study is a cross-sectional survey that assesses symptomatology, consulting, diagnosis, treatment, and impact of migraine in Poland. The purpose of this paper is to define patterns of care for migraine in Polish patients. The survey was conducted

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Keywords: acute treatment, codeine, iprazochrome, migraine, preventive treatment

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Introduction

Migraine is a chronic neurological disease and the third most common cause of years lived with disability worldwide.[1,2] The global prevalence of migraine is 15.2%–18.9% among women and 11.4% among men.[3] The burden of this disease occurs both during and between attacks which negatively affect the patient's ability to function optimally but also results in significant social costs.[4,5] Lost productivity increases in relation to headache frequency and pain intensity in migraine patients.[6] Suboptimal acute and preventive treatment may lead to an uncontrolled migraine and medication overuse headache (MOH), potentially further compounding the disability and burden of migraine.[7]

Identifying and monitoring patterns of consultation, diagnosis and treatment provides a method for assessing the quality of ongoing medical care and identifying barriers to better outcomes and improved patient care.[8,9] Online questionnaires provide a tool for effective data collection, especially considering that the proportion of people participating in such studies has increased significantly over the past 30 years.[10] Collected this way, experiences of large groups of patients with migraine may help in amending unfavourable trends in treatment and diagnosis. This in turn is particularly significant in rapidly evolving landscape of headache management.

The Migraine in Poland study was the first large-scale study of Poles with migraine. Poland is the European Union's fifth most populous country, and it is estimated that more than 4 million people may suffer from migraine. This causes a significant burden, both socio-economically and individually. The survey web-survey was conducted in a convenience sample of people recruited through a multichannel campaign using social media, mass media and a variety of organizations as previously described.[11] The previous report focusing on migraine symptoms, healthcare resource utilization and disease burden has been published previously.[11] The primary objective of this manuscript was to identify patterns of consultation, diagnosis, acute and preventive treatment of migraine at a time when new classes of treatment are entering wider use.[12] The second

objective was to evaluate the unmet needs among Polish people with migraine. We hypothesized that the current state of acute and preventive treatment for migraine may prove to be suboptimal.

Methods

This study was designed as a national cross-sectional online survey of people with migraine, and data collection was scheduled from August 2021 until June 2022. The protocol description for the Migraine in Poland study was presented in detail in the previous publication.[11]

The methodology in brief was as follows: Respondents were invited to participate in the study through social media, national mass media, secondary schools and universities, scientific societies, state and religious institutions, trade unions and non-governmental organizations, employees of Poland's largest state-owned and private companies and outpatient service providers in primary and secondary care. The questionnaire was designed based on the American Migraine Prevalence and Prevention (AMPP) Study,[13] taking into account differences between the United States (US) and Poland in terms of, among other things, access to various forms of therapy. In the context of the current study, the questionnaire assessed history and characteristics of headache, use of health care including medical consultation and received diagnoses, acute and preventive treatment used and use of non-pharmacological methods. The type of headaches including MOH were determined according to the International Classification of Headache Disorders-3 (ICHD-3) criteria.[14]

The study was registered as 'Migraine in Poland – a Web-based Cross-sectional Survey' in the ClinicalTrials.gov database under the number: NCT05087420. All data were kept confidential and in accordance with data protection regulations, while the anonymity of respondents was maintained.

Statistical methods

The statistical analysis was performed using 'Statistica 13' statistical software (StatSoft Polska, Cracovia, Poland). We used descriptive statistics to present survey-calculating means and standard deviations for continuous outcomes (age, BMI, migraine headache days) and proportions (%) for binary and multinomial outcomes (gender, headache symptoms and features, consulting status and use of preventive and over-the-counter (OTC) medications). The results for qualitative variables are presented as percentages. For independent qualitative variables, the Chi-square test of maximum likelihood was used for further analysis. The results at the level of $p < 0.05$ were considered statistically significant. At the stage of statistical analysis, the potential influence of age and BMI as confounding variables on the obtained relationships was checked using regression analyses. Since no statistical significance of age and BMI was obtained in any of the regression models, due to the limitation of the manuscript volume, these models were not included in the text of the article.

Results

General data

During the study, 2809 (87.1%) women, 411 (12.7%) men and 5 (0.2%) non-binary participants (mean age 38.9, median 39) submitted their answers via a structured online questionnaire.

Migraine without aura (MwoA) diagnosis, according to ICHD-3 criteria, was confirmed in 1679 (52.7%) of respondents, and this group of patients was included in further analysis. Patients with aura symptoms who did not fulfill MwoA diagnostic criteria were excluded out of concern for group homogeneity and discrepancies between adopted AMPP questionnaire and ICHD-3 migraine with aura (MwA) diagnostic criteria. Other diagnoses included probable MwoA, $n = 961$ (30.8%), probable MwA, $n = 690$ (21.7%) and isolated tension-type headache $n = 210$ (6.5%).

Consultation and diagnosis

In total, 1571 (93.6%) respondents with MwoA consulted a medical professional for headache in the past. The first consultation took place when subjects were on average 20.8 years old (median 20), a median 2 years after symptoms onset. Most recent headache-related consultation with a medical professional took place in the last month for 475 (28.3%) participants. For 534 (31.80%)

Table 1. Medical professional consulted for headache by participants with MwoA.

Profession/speciality	Seen on a regular basis, *n* (%)	Ever consulted, *n* (%)
Neurologist	755 (44.9)	1450 (83.4)
General practitioner	355 (21.1)	1319 (78.6)
Ophthalmologist	171 (10.2)	987 (58.8)
Emergency department physician	69 (4.1)	706 (42.1)
Physical therapist/osteopath/chiropractor	191 (11.4)	704 (41.9)
Internist	176 (10.5)	694 (41.3)
Obstetrician/gynaecologist	144 (8.6)	603 (35.9)
Pharmacist	176 (10.5)	593 (35.3)
Otorhinolaryngologist	66 (3.9)	546 (32.5)
Pain/headache specialist	205 (12.2)	523 (31.2)
Dentist	100 (5.9)	435 (25.9)
Psychiatrist	123 (7.3)	396 (23.6)
Paediatrician	28 (1.7)	368 (21.9)
Nurse/nurse practitioner	58 (3.5)	286 (17.0)
Traditional Asian medicine therapist	36 (2.1)	231 (13.8)
Allergist	34 (2.0)	201 (11.9)
Orthopaedist	30 (1.8)	197 (11.7)
Naturopath/homeopath	18 (1.1)	162 (9.7)
Other	46 (2.7)	160 (9.5)

MwoA, migraine without aura.

subjects last consultation took place 2–6 months ago, for 180 (10.7%) 7–12 months ago and for 382 (22.8%) more than 12 months ago.

A total of 1482 (88.3%) participants fulfilling diagnostic criteria for MwoA were ever diagnosed with migraine by a medical professional. This took place on average at the age of 21.4 (median 22), so 4 years after symptoms onset and 2 years after first headache-related consultation with a medical professional.

Neurologists were most often (83.4%) consulted medical professionals for headache. A primary care physician (general practitioner (GP), internist or paediatrician) have ever been consulted for headaches by 1393 (82.9%) of respondents with MwoA, while 398 (23.7%) have been seeing one these professionals on a regular basis. Third most often consulted specialists for headache were ophthalmologists (Table 1).

Neurology outpatient centres were the most often visited clinics by the respondents – almost 63% had at least one visit in the previous 12 months (Table 2). However, only 15.5% of patients with migraine consulted with neurologists for conditions other than headache disorders. GPs were visited by almost half of the patients for headache and by 68.5% for complaints other than headache. Of participants with MwoA, 175 (10.4%) participants were hospitalized in the previous year because of their headache, for a median length of stay of 2 days.

Table 2. Number of consultations in the last 12 months.

Type of healthcare provider	Headache-related visits frequency, *n* (%)			Other visits frequency, *n* (%)		
	1–4	4–12	>12	1–4	4–12	>12
General practice	552 (32.88)	141 (8.40)	70 (4.17)	934 (55.63)	185 (11.02)	31 (1.85)
Emergency medicine department	243 (14.47)	18 (1.07)	24 (1.43)	219 (13.04)	11 (0.66)	13 (0.77)
Out-of-hours medical care	178 (10.60)	16 (0.95)	20 (1.19)	133 (7.92)	5 (0.30)	10 (0.60)
Neurologist office	855 (50.92)	153 (9.11)	49 (2.92)	216 (12.86)	24 (1.43)	20 (1.19)
Pain clinic	120 (7.15)	23 (1.37)	26 (1.55)	19 (1.13)	6 (0.36)	15 (0.89)
Other	134 (7.98)	34 (2.03)	36 (2.14)	376 (22.39)	121 (7.21)	46 (2.74)

Treatment patterns

Acute medication. The current use of some form of treatment was reported by 1553 (92.5%) participants with MwoA. This included acute physician prescribed pharmacotherapy ($n=1188$; 70.7%) and OTC medications ($n=938$, 55.9%). Women were significantly more likely than men to use some kind of treatment for their most severe headache (94.2 vs 88.5%, $\chi^2=8.339$, $p=0.004$) and were also more likely than men to use prescription drugs (43.5% vs 23.2%, $\chi^2=146.963$, $p=0.001$).

Among acute medications, non-steroidal anti-inflammatory drugs (NSAIDs) or acetaminophen were used by 1318 (78.5%) of respondents. The most often used NSAID was ibuprofen (46.6%), while acetaminophen was reported by 37.0% of respondents. Triptans/ergots, opiates or combined pharmacotherapy was used by 959 (57.1%), 91 (5.4%) or 991 (59.0%) subjects, respectively (Table 3). From among combination abortive medications, the most frequently used was a mixture of acetaminophen, caffeine and codeine (38.6%).

In total, 383 (22.8%) of the participants took their acute treatments with frequency indicating medication-overuse – of whom 81.2% were women. However, medication overuse (MO) was most prevalent in patients taking combination analgesics ($n=231$, 13.7%), followed by triptans ($n=212$, 12.6%) and NSAIDs/acetaminophen ($n=92$, 5.5%; Table 4).

Preventive. Preventive treatment at any point in a lifetime was used by 599 (35.7%) of respondents. However, only 193 (11.5%) were currently taking any preventive medication. Among people with at least 4 monthly migraine days this percentage was higher ($n=803$, 24.0%). Median duration of preventive treatment among currently treated was 12 months (mean 22.7). Advantages of preventive therapy reported by patients are presented on Figure 1.

The most frequently prescribed medications in migraine prophylaxis was iprazochrome ($n=151$, 9.0%) followed by flunarizine ($n=136$, 8.1%) and topiramate ($n=99$, 5.9%). In the group using iprazochrome, 82% were middle-aged women corresponding to the study cohort. Overall, antiepileptic medications were at some point prescribed for 204 (12.2%) of participants with MwoA, antidepressants for 171 (10.2%) and beta blockers for 57 (7.4%). 400 (23.3%) participants at some point used nutraceuticals for migraine prevention, with magnesium as the most frequently taken supplement (Table 5).

One hundred fifty (8.9%) participants stopped taking prophylactic treatment in the preceding 3 months and an additional 78 (4.7%) in 12 months before the study. From among MwoA subjects who stopped using prophylactic treatment in the last year, 69 (30.7%) did so after achieving improvement. In this group, 50.7% discontinued therapy without consulting their physician.

Reasons for discontinuation are presented on Figure 2. Despite being most frequently prescribed medication, iprazochrome had the highest discontinuation rate (relation of discontinued to current users) – 17.8. In other words, only 1 in

Table 3. Acute medications used by MwoA respondents.

Medication	Frequency (days) of acute medication use in the previous month				
	0	1–4	5–9	10–14	>14
Acetaminophen (OTC)	1058 (63.01%)	366 (21.80%)	158 (9.41%)	62 (3.69%)	35 (2.08%)
Naproxen (OTC + Pr)	1506 (89.70%)	121 (7.21%)	40 (2.38%)	14 (0.83%)	5 (0.30%)
Acetylsalicylic acid (OTC)	1416 (84.34%)	190 (11.32%)	45 (2.68%)	19 (1.13%)	9 (0.54%)
Ibuprofen (OTC)	896 (53.37%)	456 (27.16%)	225 (13.40%)	71 (4.23%)	31 (1.85%)
Ketoprofen (OTC + Pr)	1351 (80.46%)	226 (13.46%)	60 (3.57%)	27 (1.61%)	15 (0.89%)
Diclofenac (OTC + Pr)	1542 (91.84%)	103 (6.13%)	22 (1.31%)	12 (0.71%)	2 (0.12%)
Tolfenamic acid (OTC)	1469 (87.49%)	128 (7.62%)	57 (3.39%)	21 (1.25%)	4 (0.24%)
Nimesulide (OTC + Pr)	1435 (85.47%)	185 (11.02%)	37 (2.20%)	14 (0.83%)	8 (0.48%)
Meloxicam (OTC + Pr)	1646 (98.03%)	23 (1.37%)	6 (0.36%)	4 (0.24%)	0 (0.00%)
Lornoxicam (Pr)	1670 (99.46%)	7 (0.42%)	2 (0.12%)	0 (0.00%)	0 (0.00%)
Acemetacin (Pr)	1669 (99.40%)	8 (0.48%)	2 (0.12%)	0 (0.00%)	0 (0.00%)
Indomethacin (Pr)	1662 (98.99%)	9 (0.54%)	4 (0.24%)	3 (0.18%)	1 (0.06%)
Metamizole (OTC + Pr)	1447 (86.18%)	151 (8.99%)	60 (3.57%)	15 (0.89%)	6 (0.36%)
Almotriptan (Pr)	1483 (88.33%)	124 (7.39%)	43 (2.56%)	26 (1.55%)	3 (0.18%)
Eletriptan (Pr)	1608 (95.77%)	48 (2.86%)	16 (0.95%)	6 (0.36%)	1 (0.06%)
Sumatriptan (Pr)	1068 (63.61%)	264 (15.72%)	198 (11.79%)	85 (5.06%)	64 (3.81%)
Zolmitriptan (Pr)	1300 (77.43%)	227 (13.52%)	87 (5.18%)	37 (2.20%)	28 (1.67%)
Ergotamine (Pr)	1658 (98.75%)	14 (0.83%)	5 (0.30%)	2 (0.12%)	0 (0.00%)
Tramadol (Pr)	1595 (95.00%)	58 (3.45%)	20 (1.19%)	3 (0.18%)	3 (0.18%)
Oxycodone (Pr)	1660 (98.87%)	13 (0.77%)	5 (0.30%)	1 (0.06%)	0 (0.00%)
Acetaminophen + Ibuprofen (OTC)	1431 (85.23%)	151 (8.99%)	63 (3.75%)	21 (1.25%)	13 (0.77%)
Acetaminophen + Acetylsalicylic acid + Caffeine (OTC)	1268 (75.52%)	257 (15.31%)	106 (6.31%)	34 (2.03%)	14 (0.83%)
Acetaminophen + Propyphenazone + Caffeine (OTC)	1479 (88.09%)	132 (7.86%)	49 (2.92%)	10 (0.60%)	9 (0.54%)
Acetaminophen + Codeine (Pr)	1527 (90.95%)	97 (5.78%)	37 (2.20%)	11 (0.66%)	7 (0.42%)
Acetaminophen + Codeine + Caffeine (OTC)	1031 (61.41%)	282 (16.80%)	201 (11.97%)	103 (6.13%)	62 (3.69%)
Ergotamine + Caffeine (Pr)	1586 (94.46%)	61 (3.63%)	24 (1.43%)	6 (0.36%)	2 (0.12%)
Ergotamine + Phenobarbital + Tropane alkaloids (Pr)	1647 (98.09%)	17 (1.01%)	13 (0.77%)	2 (0.12%)	0 (0.00%)
Acetaminophen + Tramadol (Pr)	1543 (91.90%)	95 (5.66%)	27 (1.61%)	10 (0.60%)	4 (0.24%)

(Continued)

Table 3. (Continued)

Medication	Frequency (days) of acute medication use in the previous month				
	0	1–4	5–9	10–14	>14
Dexketoprofen + Tramadol (Pr)	1615 (96.19%)	41 (2.44%)	18 (1.07%)	2 (0.12%)	3 (0.18%)
'Sinus' medications (OTC)	1435 (85.47%)	187 (11.14%)	39 (2.32%)	12 (0.71%)	6 (0.36%)
'Common cold' medications (OTC)	1542 (91.84%)	110 (6.55%)	19 (1.13%)	5 (0.30%)	3 (0.18%)
Other (OTC + Pr)	1507 (89.76%)	119 (7.09%)	32 (1.91%)	12 (0.71%)	24 (1.43%)

MwoA, migraine without aura; OTC, over-the-counter medication; Pr, prescription medication.

Table 4. MOH in MwoA respondents.

Medication caused MOH	*n*	%	Women, *n* (%)
Opioids	6	0.36	6 (100.00)
NSAIDs and acetaminophen	84	5.00	79 (94.05)
Triptans and ergots	212	12.63	170 (80.19)
Combination analgesics	221	13.16	173 (78.28)
Opioids and combination analgesics with codeine	174	10.36	128 (73.56)

MOH, medication-overuse headache; MwoA, migraine without aura; NSAID, non-steroidal anti-inflammatory drugs.

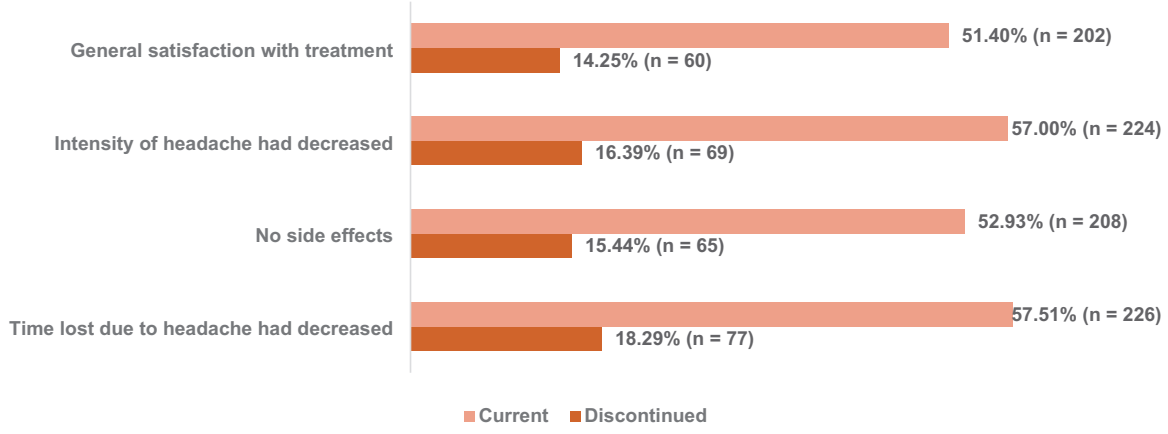

Figure 1. Patients-reported positive observations on preventive treatment by use status (current vs discontinued).

18 patients who received prescription for iprazochrome still used this medication.

According to preference analysis, the most important goal of therapy was effective attack cessation ($n = 1599$, 95.2%), followed by lack of side effects in the form of cognitive impairment ($n = 1408$, 83.9%) and reduction in headache frequency. In this study, 72.9% experienced at least a 50% reduction in monthly migraine days and 21.1% experienced at least a 75% reduction in monthly migraine days.

Table 5. Methods used for in migraine prophylaxis among with MwoA.

Medication	Current	Discontinued
Iprazochrome	8 (0.48%)	143 (8.52%)
Flunarizine	9 (0.54%)	127 (7.56%)
Topiramate	14 (0.83%)	85 (5.06%)
Propranolol	14 (0.83%)	84 (5.00%)
Valproic acid	2 (0.12%)	61 (3.63%)
Amitriptyline	11 (0.66%)	47 (2.80%)
Botulinum toxin	10 (0.60%)	47 (2.80%)
AntiCGRP monoclonal antibodies	12 (0.71%)	40 (2.38%)
Opipramol	8 (0.48%)	25 (1.49%)
Pregabalin	4 (0.24%)	21 (1.25%)
Fluoxetine	6 (0.36%)	16 (0.95%)
Venlafaxine	5 (0.30%)	16 (0.95%)
Gabapentin	1 (0.06%)	16 (0.95%)
Metoprolol	4 (0.24%)	14 (0.83%)
Sertraline	7 (0.42%)	13 (0.77%)
Duloxetine	2 (0.12%)	7 (0.42%)
Lithium	4 (0.24%)	5 (0.30%)
Paroxetine	3 (0.18%)	5 (0.30%)
Bisoprolol	1 (0.06%)	5 (0.30%)
Candesartan	1 (0.06%)	5 (0.30%)
Verapamil	4 (0.24%)	4 (0.24%)
Lisinopril	0 (0.00%)	3 (0.18%)
Non-pharmacological methods		
Magnesium	48 (2.86%)	54 (3.22%)
Riboflavin	31 (1.85%)	51 (3.04%)
Pyridoxine	34 (2.03%)	48 (2.86%)
Feverfew	13 (0.77%)	45 (2.68%)
Coenzyme Q10	23 (1.37%)	33 (1.97%)
Peripheral nerve blocks	7 (0.42%)	30 (1.79%)
e-TNS	9 (0.54%)	26 (1.55%)
Butterbur	4 (0.24%)	16 (0.95%)

CGRP, calcitonin gene-related peptide; MwoA, migraine without aura.

Medications effect on weight gain and appetite reduction were deemed less important (65.2% and 36.7%, respectively). Also dosing convenience was of a lower value to respondents – 875 (52.1%) considered it to be important or very important in choosing a preventive treatment. For women, it was significantly more important than for men that prophylactic treatment did not cause weight gain and memory/cognitive impairment (47.1 vs 40.2%, $\chi^2 = 12.700$, $p = 0.043$ and 47.8 vs 40.1%, $\chi^2 = 17.984$, $p = 0.003$).

Discussion

Migraine in Poland is to our knowledge the largest survey of migraine patients in Poland to date and provides insight into sociodemographic characteristics, symptom patterns, diagnosis, treatment as well as impact and burden on people with migraine in a large representative sample of Poles. The current manuscript focuses on patterns of consulting, diagnosis and treatment for migraine.

In comparing the present report with findings in the literature, differences in sample selection should be kept in mind. Many studies in other countries recruited a truly representative sample of the general population independent of migraine or headache status and screened them to identify people with migraine. The current report used a multichannel campaign social media, mass media, employers, state and religious institutions, schools, scientific societies, NGOs and through the delivery system. This may well have increased the proportion of people enrolled in the study who prove to have migraine and may have inflated rates of consultation diagnosis and treatment. As we compare this study with others, the potential for selection bias should be kept in mind.

Women constituted the vast majority of respondents in this study (87.1%) which is in line with other large migraine surveys.[5,10,13,15,16] To some extent, this is associated with higher prevalence of migraine among women. Moreover, women are more likely to actively participate in online surveys.[11] Similarly, the mean age, which was 39 years in our sample, and the age group distribution was similar to other surveys.[16,17]

Compared to other population-based studies, both European and worldwide, a significantly higher percentage of our participants consulted a physician for

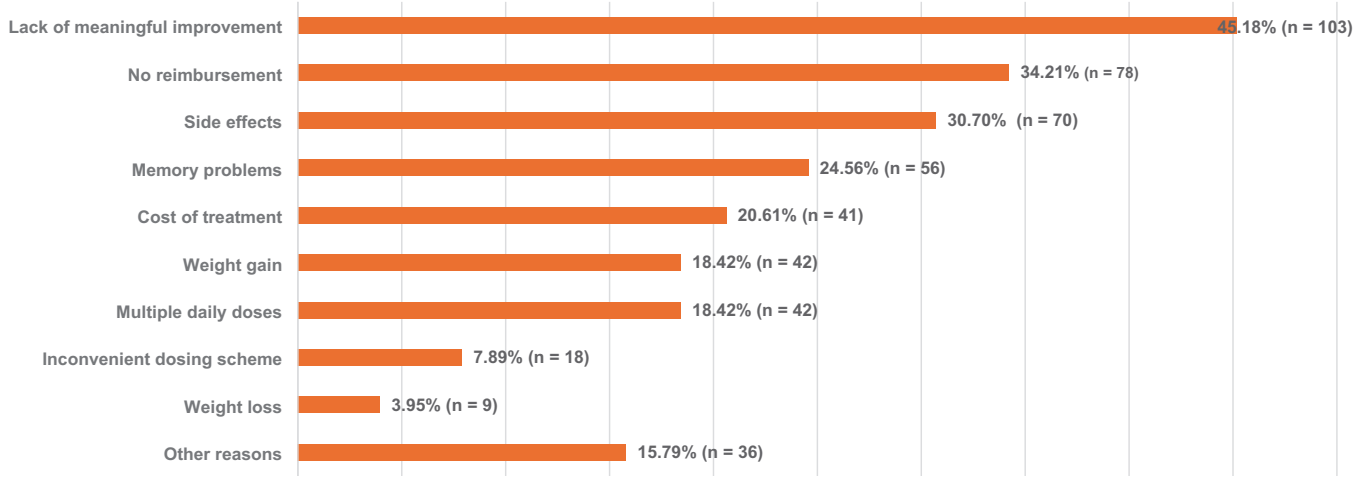

Figure 2. Reasons for prophylactic therapy discontinuation.

headache (93.6%).[13,18] For example, almost 25% of patients in Denmark have never consulted a doctor for their headache, despite the fact that they consider headache a clear burden on their daily activities.[19] Only one out of seven in Italy, one out of five in Greece, one out of four in Luxembourg and one out of three headache patients in Spain have seen a neurologist, and that was mostly in private care.[9,18–20] The Chronic Migraine Epidemiology and Outcomes-International Study, a cross-sectional, web-based survey completed in 2022, examined consultation rates and migraine in six countries: Canada, France, Germany, Japan, the United Kingdom and the US.[21] Focusing on the nearly 15,000 respondents with migraine, 8330 had Migraine Disability Assessment Scale scores of ⩾6, were deemed in need of medical care and were included in this analysis. Current (within the past year) headache consultation was reported by 35.1% (2926/8330) of respondents. Consultation rates and diagnosis rates were higher in the United States than in the other countries with the exception of France where they were statistically significantly higher than in other analysing countries. Total appropriate treatment rates were also statistically significantly lower in all other countries compared with the United States except France, which did not differ from the United States.[21]

There are also large geographical differences related to the choice of doctor with whom patients consult. In our study, patients most often consulted a neurologist (83.4%) followed by a primary care physician (83%) – GP, internist or paediatrician. The organization of the Polish health care system encourages early consultation with neurologists. Currently, more than 90% of Poles are entitled to free health care under social insurance. On the one hand, a neurologist in this system can only be consulted only after referral by the patient's GP. However, the waiting time for a neurology consultation in the national health care system can be long. This leads many patients to seek private neurology or other specialized consultations to which access is high in Poland.[11]

However, in the vast majority of available population-based studies, the most often seen consulting physician is the primary care provider and neurology consultations are rare – 28.1% in theUnited States, 7.1% in Japan.[10,17,22,23] Also of concern is the fact that Polish patients consult the emergency department very often (42%). This is much higher than in the United States or Japan, where 24% and 2.6% of patients, respectively, consulted an emergency department.[10,23] Rates of hospitalization for migraine – more than 10% of patients – is relatively high in Poland.

When analysing the choice of specialists, it is important to note how multifaceted and diagnostically difficult migraine still is. Indeed, in our survey, the high percentage of consultations with an ophthalmologist, gynaecologist, otolaryngologist, dentist or psychiatrist is noteworthy. On the one hand, this may be due to comorbidities or complications of migraine such as endocrine disorders or mental illness. But on the other hand, it seems that symptoms of the disease such as visual aura, pain in the area innervated by the trigeminal

nerve during an attack are being misdiagnosed and attributed to other conditions.[11,24–26] In our study, we noted a relatively high percentage of patients consulting a pharmacist (35.3%), which is well above similar consultations in the world – in Japan, for example, only 3.6%.[23] This indicates the opportunity to educate pharmacists in migraine treatment standards, with special attention to acute OTC drugs, the misuse of which may carry serious risks.

Polish patients waited an average of 2 years after headache onset before consultation with a doctor and definitive diagnosis took another 2 years. Despite the significant percentage of patients consulting a doctor about their headache, correct diagnosis of migraine can be problematic. Viana et al.[27] in a large transcontinental cohort study showed that only 8% of GPs and 35% of specialists (of whom 51% were neurologists and/or headache specialists) consulted for migraine formulated the correct diagnosis. Overeem et al.[28] revealed a significant degree of diagnostic agreement across different levels of care according to the ICHD-3 guidelines at Berlin's tertiary headache centre. In China, nearly 33% of migraine patients are misdiagnosed, and nearly half are not diagnosed at all.[29] This suggests that better education about headaches is needed for clinicians, patients and other stakeholders.[8,9] It should be underlined that in our study high percentage of neurologist consultations coincided with high percentage of correct diagnoses.

More than 92% of respondents reported using some sort of acute treatment. These percentages are similar to results from the United States (94%), Japan (87%) or other European countries.[10,17,18,29] OTC medications were used by 56% of patients. In Poland, NSAIDs, acetaminophen and some combination analgesics containing caffeine and codeine are available without a prescription. If OTC medications meet the patient treatment needs and medication use is appropriate, these patients may well not need prescription medications.[11] On the other hand, in some circumstances self-medication without medical consultation poses risks of MO and of suboptimal treatment. Combination analgesics containing paracetamol 500 mg + codeine 8 mg + caffeine 30 mg are available OTC in Poland. In addition, as our data's shows, this combination product was used by 59% of Poles living with migraine and is strongly associated with MO. In this context, it seems that percentage of patients using opioids to treat migraine in Poland is one of the largest in the published literature even though Polish migraine treatment guidelines do not recommend such acute treatment. Paracetamol and codeine preparations are used by 47.7% of Greeks and 14.4% of Colombians, while in the United States19% of migraine patients still use opioids but with a downward trend noted. In Canada, almost 41% people with migraine still use opioids.[13,30–33] The Dutch study found that 13% of migraine patients have ever used opioids, including 2.4% OTC. These were more often chronic migraine (CM) patients, and the drugs were dominated by tramadol (58%), oxycodone (20.5%) and morphine (19.5%).[34] In China, combination formulations containing caffeine and opioids accounted for 22.15% and 16% of all used medications, respectively.[35]

Our observations on the use of codeine by Polish patients with migraine are of concern. These findings show how important it is to educate the public and healthcare professionals about the dangers of unwarranted use of this group of drugs. Indeed, it has been documented that regular use of opioids increases the risk of headache exacerbation and is also a factor in migraine chronicity.[36] Measures to prevent access to OTC opioid medications should be considered in this context.

A fairly high percentage of Polish patients use triptans (57%) compared to other population-based studies. The use of specific medications such as triptans varies considerably from country to country. In previous European population-based studies, 3.4%–68.2% of people with migraine used triptans.[18] In China 26.1%, in the US 22.7% and in Japan only 14.8% of migraine patients use triptans.[10,35,37] However, it seems that these rates are still modest given the effectiveness of this group of drugs. Although the study using the US claims database found that 52.9% of patients were triptan users, a significant geographic variation in triptan use was observed.[38]

Overall, 11.5% of our respondents were currently using a migraine preventive medications, although as much as 47.8% were deemed prevention eligible. In the Eurolight study conducted in 2018, prophylaxis use ranged from 1.6% in Italy to 13.7% in Spain.[18] OVERCOME (EU) study from 2023 revealed that still less than 15% of migraine patients used prophylaxis.[39] In the United States, it has been shown that more than

40% of patients require prophylaxis, only 16.8% are treated, and this percentage has increased compared to the results of the AMPP study (12%–13%).[10] In Japan, prophylactic treatment has only ever been used in 10.2% of patients, and currently 9.2% of CM patients used it, including more than 81% of CM patients who have never received prophylactic treatment.[17,23]

Another interesting observation was the choice of prophylaxis. The most commonly used drug was iprazochrome (Divascan, 1-isopropylnoradrenochrome-5-monosemicarbazone). Our literature search revealed that it was popular in the 1970s, mainly in Germany.[40] However, there were no reliable clinical studies for it on large groups of patients and only a few with a high risk of statistical error. Consequently, iprazochorme is not currently referred in any recommendations for prophylactic treatment of migraine worldwide, also in Poland.[41,42] It seems only proper considering a very high level of discontinuation when compared to every other preventive treatment in this study.

At the time of this study, gepants were not available and anti-calcitonin gene-related peptide monoclonal antibodies (erenumab and fremanezumab) and botulinum toxin A were commercially available in Poland. Reimbursement of these therapies for CM began in our country in late 2022. Despite this, the percentage of patients using these therapies (3.1%) is rather high compared to other drugs. The most common reason for discontinuing treatment with these drugs was the high price and lack of reimbursement.

In our study, 31% of respondents stopped prophylactics after achieving improvement but more than a half did so without consulting a physician. This could be a potential risk of using such treatment too briefly. The most common reasons for discontinuing prophylaxis were lack of improvement, no reimbursement and side effects. These observations are similar to other migraine patient populations. Studies show that up to 55% of migraine patients discontinue oral pharmacological preventive approaches because of modest response, poor adherence and compliance of such prophylactic therapies.[24,43] In the OVERCOME EU study, only 33.2% of traditional preventive users reported 'a lot' or 'complete' satisfaction with their current medication.[39] From the patient's perspective, efficacy was more important than safety or form of drug administration. This is in line with other population-based findings.[33,44,45]

Our study has some limitations primarily due to the survey-based methodology, which we described in detail in the main publication.[11] First of all, our patient cohort is not a representation of the general population. Internet access was a key factor favouring respondents who could participate in our online survey. Hence, the percentage of patients living in villages, unemployed or studying is much lower than in the general Polish population.[46] The second limitation stems from the survey design, which was retrospective, structured and patients were asked to recall their complaints. The results may therefore be subject to error due to recall bias and misunderstanding of some of the questions asked in the survey. There may also be a tendency towards greater severity of migraine in the subjects who have completed the survey. Another limitation regarding medication adherence and overuse is the reliance on self-reported intake rather than objective measures, for example, pharmacy records. The sample size selected for this study was not previously estimated. Nevertheless, our findings address patterns of consultation, diagnosis and treatment of migraine in Poland in a large sample.

Conclusion

Despite high consultation and diagnosis rates in this sample of Poles living with migraine, there is a need for improving the standards of care. There is a need to raise public awareness of the dangers of codeine-based medications. Propagating migraine prophylaxis is one of the major challenges to headache community, especially when currently low (5%–20%) prevention rates are considered.[8,9] As this study shows changing paradigms should also include patients in their choice of acute medications, and medical professionals in respect to selection of prophylaxis. This will be especially important when a shift to migraine-specific therapies is expected due to their better chance to contain migraine progression.[47]

Declarations

Ethics approval and consent to participate

The study was registered as 'Migraine in Poland – a Web-based Cross-sectional Survey' in the ClinicalTrials.gov database under the number:

NCT05087420. The Commission of Bioethics at the Wroclaw Medical University waived the need for prior ethical approval given the nature of the study. Providing an informed consent was an inclusion criterion for the study and constituted the first part of the web-based survey. All data were kept confidential and in accordance with data protection regulations, while the anonymity of respondents was maintained.

Consent for publication

Not applicable.

Author contributions

Marta Waliszewska-Prosół: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Supervision; Writing – original draft.

Marcin Straburzyński: Data curation; Formal analysis; Methodology; Writing – review & editing.

Sławomir Budrewicz: Writing – review & editing.

Karol Marschollek: Writing – review & editing.

Magdalena Nowaczewska: Writing – review & editing.

Paweł Gać: Formal analysis; Software.

Richard B. Lipton: Conceptualization; Writing – review & editing.

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Competing interests

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Availability of data and materials

The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

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Appendix

Abbreviations

AMPP	American Migraine Prevalence and Prevention
CGRP	calcitonin gene-related peptide
GP	general practitioner
ICHD	International Classification of Headache Disorders
MO	medication overuse
MOH	medication-overuse headache
MwA	migraine with aura
MwoA	migraine without aura
NSAIDs	non-steroidal anti-inflammatory drugs
OTC	over-the-counter
US	United States