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Migraine headache facilitators in a population of Polish women and their association with migraine occurrence — preliminary results

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ABSTRACT

Aim of the study. The occurrence of migraine is linked with some common lifestyle activities and conditions preceding the attack. Our study presents known and presumptive lifestyle factors and activities related to migraine, and compares them to the frequency of headache attacks.

Material and methods. 40 female patients of the Headache Outpatient Clinic in Warsaw, Poland, diagnosed with migraine, mean age 44.6 years, and 40 female participants from the control group, mean age 39.5 years, were included in the study. The study employed questionnaires reporting the presence of lifestyle factors and socioeconomic predispositions as well as the Migraine Disability Assessment Test (MIDAS) as data collection methods.

Results. Correlations between some of the lifestyle factors and the frequency of migraines occurred statistically significantly.

Conclusions. Some factors and lifestyle activities such as stress, relaxation, specific dietary products, fasting, fatigue, bright light, noise, weather changes or menstruation may have an influence on migraine frequency and severity in female patients, which can have an impact on migraine prevention.

Key words: migraine, trigger factors, lifestyle, headaches

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Introduction

Migraine is a common health problem occurring in up to 12% of the Caucasian population. According to epidemiological studies in Poland, the cause of about 49% of chronic daily headaches (CDH) is chronic migraine [1]. The prevalence of migraine is up to three times more frequent among women depending on populations, and varies by age, with its peak between the ages of 35 and 45, regardless of sex [2, 3]. Stępień et al. determined the prevalence of migraine in the Polish population to be about 10%. Based on their study, 75% of Polish migraineurs were female and migraine was more common in patients over 40 years old (72%) [4]. Low household income and lower educational level can further increase migraine prevalence, significantly among women [5, 6]. Migraine can have a major impact on the patient's quality of life, affecting it directly and causing complications such as functional disability or depression [2, 7, 8].

Peroutka tried to identify the top ten migraine factors based on an analysis of 25 publications, of which stress was predominant [9]. Between 50% and 80% of migraine patients associated stress with headaches [9, 10]. Other frequently mentioned factors include sleep disturbance and dietary factors like hunger, skipping meals, alcohol intake (especially red wine and beer), caffeine, chocolate and cheese, fatigue and weather changes [9, 11, 12, 13]. Physical activity can further worsen the severity of headaches induced by alcohol intake [14]. Sleep and stress can play a greater role for patients suffering from migraine with aura, as opposed to environmental factors which may be more crucial to migraine patients without aura

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[10]. Another Polish study focused on the potential impact of body mass index (BMI) and serum lipid levels on increasing the risk of migraine [15].

Determining headache trigger factors among migraine patients could possibly help improve prevention in this group. Due to insufficient data in the Polish population, our present study was conducted to analyse the association between migraine and factors which are known to trigger, or are presumed to trigger, migraine headaches such as marital status, educational level, alcohol intake, sleep deprivation, dietary problems, stress, weather changes, exposure to flashing lights or a high noise level, staying at a high altitude, drug administration, menstruation, or working out.

Material and methods

We retrospectively evaluated the clinical data of 40 randomly selected female patients with a mean age (± SD) of 44.62 ± 10.64 years (range 21 to 66) diagnosed with episodic or chronic migraine with or without aura, based on the criteria of the International Headache Society [14]. Our control group consisted of 40 women with chronic tension type headaches (TTH) diagnosed according to the International Classification of Headache Disorders 3rd edition (ICHD-3) [14], with a mean age (± SD) of 39.5 ± 15.59 years (range 23 to 76 years). This group was adjusted to the age and gender of the study group. All individuals in our study groups (the control-TTH group and the migraine group) were Caucasians. The mean age for the study groups was not significantly different (Wald-Wolfowitz runs test – $Z = -1.350$; $p = 0.177$). The consecutively incoming migraine patients were examined in the Headache Outpatient Clinic from November 2015 to February 2017. A basic neurological and general examination was performed during planned appointments in the Clinic. Depending on individual needs, the patients were receiving either prophylactic or acute treatment. During our study, there were only a few male patients, so we excluded them from the study to avoid selection bias,deciding to pay attention only to the unified female patients group and the control group. Our study group did not omit individuals in migraine preventive treatment or those receiving medication for chronic migraine. We also did not select patients for the study on the basis of the onset of migraine or its duration.

All the patients completed a questionnaire that was created for the researchers' own use. Each set of questions was asked directly by the researchers, not over the telephone, after the confirmation of the migraine diagnosis and the examination of physical condition. All the patients agreed to their data included in the questionnaire being used for our study.

The questionnaire was divided into three parts. In the first, socioeconomic, part we assessed educational level, type of work (physical or mental), marital status and number of children. In the second part, each patient was asked about the concomitance of headaches and the following aspects of life: a stressful situation (e.g. exams, work interviews), relaxation after stress, the intake of dietary products such as chocolate, dairy, cocoa, seasonings, citrus, as well as alcohol intake, fasting, sleep deficiency or excess, workout/fatigue, exposure to bright or pulsing light, high levels of noise, staying at high altitude (e.g. in the mountains), sudden weather changes, medicine intake, and menstruation. We also asked patients if there were any other factors that they had linked with their headaches. In the final part, the Migraine Disability Assessment Test (MIDAS) [16] was used as a means to estimate patients' migraine severity and daily activity impairment. We compared triggers of headache in the migraine and in the TTH group. The complete questionnaire is set out in Table 1.

Statistical analysis

Non-parametric Wald-Wolfowitz runs test was performed for the group comparison. Null hypothesis was that the groups were independent and identically distributed, which was proved correct (p-value 0.177).

The presumptive headache trigger factors were presented as numerical variables and were analysed with chi-square tests such as Pearson's Chi-square test, Yates Chi-square test, and V-square test. The null hypothesis in this case, and for all the subsequent tests, was that a statistical correlation between the headache occurrence in the patients' group and the trigger factors existed, while the alternative hypothesis was that there was no correlation. Pearson correlation coefficients were calculated to determine if a correlation existed between the frequency of headaches and the trigger factors we had taken into account in our study, in both the migraine and the control group.

The level of statistical significance was set at a p-value < 0.05.

Results

According to the MIDAS, we categorised patients due to their migraine severity as Grade I, II, III or IV, which amounted respectively to 10%, 10%, 22.5% and 57.5% of the patients. 34 patients (85%) were diagnosed as patients with migraine without aura, and only two patients (5%) had attacks of migraine with aura. Four patients (10%) had chronic migraine. The demographic and clinical data of patients is set out in Table 2 and Table 3 respectively.

There were non-uniform sample sizes in terms of educational level, type of work, number of children, aura and no-aura migraine, marital status and the MIDAS test groups, which made it impossible to obtain reliable data.

Some of the patients from both groups were post-menopausal and so could not associate menstruation with headaches. For this reason, we excluded such patients from the study and the control group, and for this specific factor the number of females in the compared groups has changed.

The results of the tests revealed a weak connection between the occurrence of headaches and trigger factors such as alcohol

Table 1. Patients' questionnaire

Please answer the following questions:		
First name:	……..	
Last name:	……..	
Age:	……..	
Education:	Primary / Secondary / Higher	
Type of work:	Physical / Mental	
Marital status:	……..	
Number of children:	……..	
Do you associate the occurrence of headaches with the following situations? Please circle the correct answer (YES or NO).		
After a stressful situation?	YES	NO
After relaxation, holidays or other forms of rest?	YES	NO
After eating products like chocolate, dairy, cocoa, seasonings or citruses? If yes, please state which products exactly ……	YES	NO
After alcohol consumption?	YES	NO
After fasting?	YES	NO
After sleep deficiency?	YES	NO
After excessive sleeping?	YES	NO
After workout/fatigue?	YES	NO
After exposure to bright or pulsing light?	YES	NO
After exposure to noise?	YES	NO
After staying at a high altitude (e.g. in the mountains)?	YES	NO
After sudden weather changes?	YES	NO
After medicine intake? If yes, please state which medicines exactly …….	YES	NO
After menstruation?	YES	NO
Do you find any other situations that trigger headaches? If yes, please describe them. ……..	YES	NO
Please answer the following questions:		
On how many days in the last 3 months did you miss work or school because of your headaches?	……..	
How many days in the last 3 months was your productivity at work or school reduced by half or more because of your headaches?	……..	
On how many days in the last 3 months did you not do household work because of your headaches?	……..	
How many days in the last 3 months was your productivity in household work reduced by half of more because of your headaches?	……..	
On how many days in the last 3 months did you miss family, social or leisure activities because of your headaches?	……..	
On how many days in the last 3 months did you have a headache?	……..	
On a scale of 0–10, on average how painful were these headaches? (where 0 = no pain at all, and 10 = pain as bad as it can be)	……..	

intake, sleep deficiency, excessive sleeping, staying at high altitudes, or medicine intake.

On the other hand, in the following situations: stress exposure, relaxation after stress, intake of dietary products, fasting, workout/fatigue, exposure to bright or pulsing light, high noise level, sudden weather changes and menstruation, the results of the chi-square tests showed statistically significant differences, and the null hypothesis cannot be rejected.

The results are set out in Table 4.

Discussion

Our study shows that we can identify headache-triggering factors in migraineurs which have been many times reported as acknowledged migraine trigger factors in previous research studies [9–13, 17]. Kelman retrospectively evaluated 1,750 patients and showed that acute migraine attacks were triggered in around 75% of patients, with different frequencies, and no triggers were seen in around 25%. The most common triggers included stress (79.7%), hormones in women (65.1%), fasting (57.3%), weather (53.2%), sleep disturbance (49.8%), perfume or odour (43.7%), neck pain (38.4%), light(s) (38.1%), alcohol (37.8%), smoking (35.7%), sleeping late (32.0%), heat (30.3%), food (26.9%), and exercise (22.1%) [17].

Stress (82.5%) was the most frequent migraine headache-triggering factor in our study, which corresponds to the results of other researchers [9, 10, 12, 17, 18]. Stress is said to trigger headaches in 50-80% of migraineurs [9, 10, 17]. Moreover,

Table 2. Demographic data

		Migraine group (n = 40)	TTH group (n = 40)
Age range		21–66	23–76
Age (years)	Mean	44.62	39.5
	SD[1]	10.64	15.59
Gender	Female	n = 40	n = 40
	Male	n = 0	n = 0
Type of work	Physical	5	0
	Mental	35	40
Education	Primary	0	0
	Secondary	13	15
	Higher	27	25
Marital status	Single	12	21
	Married	25	14
	Divorced	1	2
	Widowed	2	3
Number of children	0	12	22
	1	9	10
	2	17	7
	3+	2	1

[1]standard deviation

chronic migraine can increase perceived stress and further lower patients' quality of life [12]. Comparing this trigger in other populations, the frequency of stress as a trigger was similar in Spanish and Pakistani populations (46.3% and 44%), and slightly higher in Brazilian migraineurs (73%) [19]. Similar results have been noted in Caucasians (87% recognised stress as a trigger) and African-Americans (84%) in a questionnaire study focused on identifying ethnic disparities, involving 131 migraine patients [20].

Sudden weather changes (75%) — our next most frequent trigger, consist of many variables, such as barometric pressure

Table 3. Clinical data

		Number of migraine patients (n = 40)	
		n	%
MIDAS grade	I	4	10
	II	4	10
	III	9	22.5
	IV	22	57.5
Migraine without aura		34	85
Migraine with aura		2	5
Chronic migraine		4	10

Table 4. Patients with headaches triggered by the researched factors

	Migraine group n = 40		Control group n = 40		P value[2]	Type of chi-square test
	n	%	n	%		Pearson Chi-square
Stress	33	82.5	15	37.5	**0.00004**	
Relaxation after stress	17	42.5	5	12.5	**0.003**	
Alcohol intake	20	50.0	16	40.0	0.369	
Fasting	26	65.0	15	37.5	**0.014**	
Sleep deficiency	25	62.5	25	62.5	1.000	
Excessive sleeping	24	60.0	17	42.5	0.117	
Workout/fatigue	21	52.5	6	15.0	**0.0004**	
Exposure to bright or pulsing light	25	62.5	6	15.0	**0.00001**	
High noise level	23	57.5	12	30.0	**0.013**	
Sudden weather changes	30	75.0	20	50.0	**0.021**	
Medicine intake	3	7.5	4	10.0	1.000	
Menstruation[1]	26 (n = 39)	66.67	5 (n = 26)	19.2	**0.0002**	
Dietary products intake	15	37.5	3	7.5	**0.001**	**V-square**
Staying at high altitudes	11	27.5	5	12.5	0.096	
Medicine intake	3	7.5	4	10.0	1.000	**Yates Chi-square**

[1]numbers in brackets state the total number of patients in groups due to excluding females after the menopause
[2]p-values in bold are statistically significant < 0.05

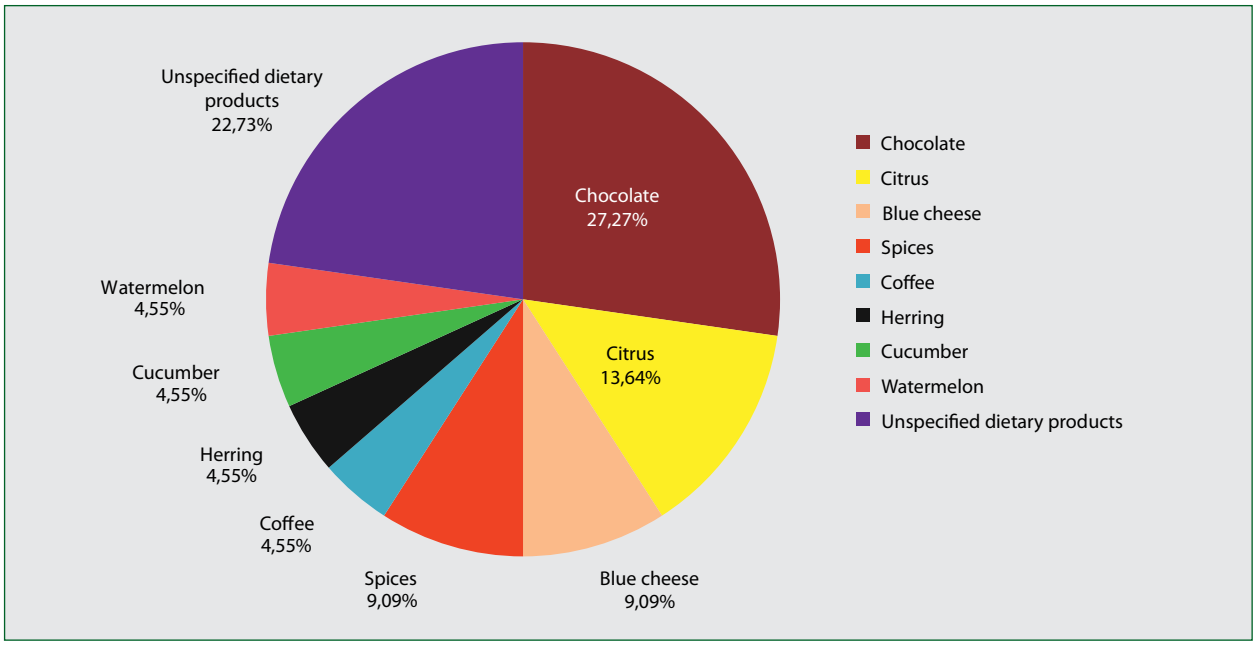

Figure 1. Percentage frequency distribution of dietary products associated with headaches in migraine patients

fluctuations, humidity, temperature, or weather pattern. Prince et al., in a study of 77 patients with migraine, found 39 (50.6%) to be sensitive to weather changes [21]. Regional weather conditions, like the presence of Chinook winds in Canada, may affect migraine occurrence. Prince et al. wrote: "For the patient group (75) as a whole, headache probability was significantly increased on pre-chinook days, and also on chinook days with high-velocity wind (top quartile of chinook days)" [22]. Other researchers have observed that different air mass types in central North Carolina have an influence on migraine attacks as well: "We found statistically significant differences in ED migraine visits between air mass types. Tropical (i.e. warmer) air masses generally resulted in the highest frequency of ED visits, while polar (i.e. colder) air masses resulted in the lowest frequency" [23].

Fasting (65%) is among the best studied and the most reliable natural migraine triggers. Out of all the dietary triggers of migraine attack, fasting is very frequently reported, with percentages ranging from 39% to 66% depending on the study [24]. Our questionnaire did not define the duration of fasting nor did it include questions about how much food a patient ate before or during fasting or what kind of food it was. Objective research studies tend to concentrate on specifically defined periods of fasting such as that encouraged by religions. In one study focused on the month of Ramadan, patients identified 9.4 ± 4.3 migraine days on average (range 3–20) as compared to 3.7 ± 2.1 migraine days on average (range 1-10) during the control month ($p < 0.001$) [25]. Researchers investigating the phenomenon of Yom Kippur headache reported that in a population including 211 who fasted, 39% of the fasters developed headaches, compared to only 7% of non-fasters ($p < 0.000001$). Also, the number of headache sufferers increased in direct correlation to the duration of the fast [26].

Chocolate was the most common dietary product associated with headaches. Food triggers frequency is similar to many others studies [27, 28]. Tai et al. in their study involving 319 (46.6%) Malaysian migraine patients, pointed out that the most common dietary trigger factors were coffee (136 patients, 19.9%), followed by chocolate (51 patients, 7.5%) [29]. The comparison of the migraine and the TTH group in Tai's study showed a statistical significance of their findings — chocolate (OR 2.16, 95% CI 1.06–4.41, $p = 0.035$) and coffee (OR 1.73, 95% CI 1.12–2.68, $p = 0.014$). Peatfield et al. found that 19.2% of 490 migraine patients reported sensitivity to chocolate, 18.2% to cheese, and 11.1% to citrus fruit [30]. The percentage frequency distribution of different dietary products associated with migraine headaches of our patients is presented in Figure 1.

Our study has some limitations. The study group was relatively small, and all the patients came from a single headache clinic. This study was conducted according to patients' perceived headache triggering factors and observations. The questionnaire did not implement objective scales for said trigger factors. We did not measure noise level, altitudes, or weather parameters such as air pressure or temperature. Furthermore, some patients were on preventive medication, which could have affected the analysed data. All these factors could have an impact on the study's results.

Conclusion

Although our study presented statistical significance and stated specific trigger factors, which are consistent with studies

from other countries such as Canada, USA, Turkey, Spain and Korea, we cannot generalise the results to the whole Polish population, due to the study group being too small [10, 13, 17, 29, 31]. In our opinion, this study could prove useful for clinical practice in non-pharmacological preventive treatment in migraine patients, although it should be verified by other studies evaluating the Polish population. Future studies should include larger study groups that would allow the gathering of cross-sectional population data, possibly including additional factors.

Conflict of interest: *All authors have no conflict of interest to disclose.*

Abbreviations:
MIDAS — Migraine Disability Assessment Test
TTH — Tension type headache
ICHD-3 — The International Classification of Headache Disorders 3rd edition
CDH — Chronic daily headache
BMI — Body mass index

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