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Trigger Factors Associated with Migraine: Recognition and Prevalence in the North Indian Populace of Jammu and Kashmir

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ABSTRACT Migraine is a multifactorial neurological condition that can be triggered by number of extrinsic and intrinsic factors such as stress, menstruation, fasting, sleep disturbances, alternate light and shade, bright lights and pollution. The aim of the present study is to recognise and to evaluate the prevalence of several risk factors that trigger migraine in the population of Jammu and Kashmir. A total of 252 study subjects (102 migraine patients and 150 healthy controls) were enrolled for this investigation. After critical perusal of literature, a detailed health questionnaire covering socio-demographic and clinical parameters was designed for the study. The results so obtained revealed that systolic blood pressure (SBP) was significantly higher in migraineurs than controls (p=0.004). The incidence of migraine was more in females (82%) than males (18%). Noise (93%), stress (88%), physical exhaustion (80%), sedentary lifestyle (79%), travelling (77%), sleep disturbances (76%), change of weather (69%), fasting (63%), odours (60%) and pollution (53%) were found to be the leading migraine triggers in the present investigation. Trigger (pain provoking) factors are common in patients of migraine, and its avoidance may decrease headache frequency and also improve a patient's quality of life.

INTRODUCTION

Migraine is one of the most common neurological disorders that affects the central nervous system causing painful attacks of headache with a wide variety of additional symptoms such as nausea, vomiting, photophobia, phonophobia and sensory visual disturbances (Joshi et al. 2009; Kundal et al. 2016; Jasrotia et al. 2018). It affects about fifteen percent of the general population across the world (Kaur et al. 2019). Migraine is a chronic neurovascular disorder that is associated with significant unilateral head pain, disability at workplace and reduced quality of life. It is classified into two main types, that is, migraine without aura (MO) and migraine with aura (MA) by the International Headache Society (IHS) on the basis of presence and absence of an electrophysiological event called aura (Headache Classification Committee of the International Headache Society 2004). The prevalence of migraine was reported to be 25.2 percent in south India and 14.12 percent in east India in 2014 (Kulkarni et al. 2014; Ray et al. 2017; Gaur 2018).

Its aetiology is complex and involves an interaction of both genetic and environmental risk factors in its development. There are certain specific factors whose exposure or withdrawal leads to the development of an acute migraine attack in the susceptible individuals. Such factors are called *migraine triggers* (Chakravarty et al. 2009; Fraga et al. 2013). These may commence a neuroelectric and metabolic event like the cortical spreading depression, which may ultimately lead to initiation of several phases of migraine episode. Migraine attacks can be elicited by several trigger factors such as stress, certain foods, travelling and many more. These factors may differ from individual to individual and even between attacks in any specific migraine patient. The recognition of the pain provoking factors is

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very essential because their avoidance may lessen the frequency and severity of the migraine attacks thereby playing a crucial role in migraine management (Kutlu et al. 2010).

Objectives

Various cross-sectional studies from different states of India showed high prevalence and association of risk factors with migraine. However, there is scarcity of data on the prevalence, incidence and association of the risk factors with migraine phenotypes in the north Indian inhabitants of Jammu and Kashmir. Therefore, an attempt was made to analyse the several non-genetic and trigger factors linked with migraine in the people of Jammu and Kashmir.

MATERIAL AND METHODS

A total of 102 clinically confirmed migraine patients and 150 healthy controls were enrolled for the present study. Subjects were recruited from the outpatient Department of Neurology, Government Superspeciality Hospital, Jammu (Jammu and Kashmir) and the University's premises during the study period of one year. Migraine was diagnosed by one of the authors (neurologist) according to the criteria of the International Headache Society. An informed written consent was obtained from each subject before enrolment in the study and the current study was ethically approved.

Socio-demographic (sex, marital status, education level, dwelling and religion) and clinical variables (age, age of onset of migraine, duration of illness, family history, body mass index, blood pressure, location of pain and severity of pain) were examined in detail. A pre-determined list of trigger factors included stress (at home and school or college), dietary (ice-cream, chocolate, cheese, sausage, alcohol, coffee and soft drinks), fasting, hormonal alterations related to menstrual cycle, sleep disturbances, travelling, changes in weather, odours, bright lights, pollution, noise and cigarette smoking.

Statistical Analysis

Categorical variables were presented as frequencies and percentages, and continuous variables, as mean and standard deviation. The χ^2 test was used to test the association between categorical variables. Data was analysed using the Statistical Package for Social Sciences (SPSS) 20.0 and results were considered statistically significant when the p value was ≤ 0.05.The univariate risk provided by trigger risk factors for migraine (as odds ratio (OR)) was also estimated.

RESULTS

Socio-demographic Parameters of Study Subjects

In the present investigation, the patient group consisted of 84 (82%) females and 18 (18%) males, whereas the control group comprised of 95 (63%) females and 55 (37%) males showing that the prevalence of migraine was higher in females as depicted in Table 1. Majority of the study subjects were Hindus (patients 68%, controls 74%), followed by Muslims (patients 26%, controls 23%) and Sikhs (patients 6%, controls 3%). On observing the dwelling of participants under study, the frequency of migraine cases reported from urban areas was higher (64%) than their rural counterparts (36%). The education level of most migraine patients was higher (Graduate and above (57%)) followed by middle (up to 8th standard (18%)) and uneducated group (26%). Regarding marital status, majority of migraineurs were married (78%) followed by unmarried (22%) as shown in Table 2 along with different socio-demographic characteristics among participants under study.

Table 1: Gender wise prevalence among migraine patients

Sex	*Migraine without aura (n = 75)*	*Migraine with aura (n = 27)*	*Total*
Females	58 (77.3 %)	26 (96.2 %)	84
Males	17 (22.7 %)	1 (3.8 %)	18
Total	75		102

Clinical Variables of Study Participants

The several clinical parameters of migraine taken up in the present study were age, age at onset of disease, duration of illness, body mass

Table 2: Social and demographic characteristics of migraine patients

S. No.	Parameters	Patients (n=102)	Controls (n=150)
1	*Gender*		
	Females	84 (82%)	95 (63%)
	Males	18 (18%)	55 (37%)
2	*Religion*		
	Hindu	69 (67.6%)	111 (74%)
	Muslim	27 (26.4%)	34 (23%)
	Sikh	6 (6%)	5 (3%)
3	*Education Level*		
	Uneducated	26 (25.4%)	42 (28%))
	Primary or Middle	18 (17.6%)	38 (25%))
	Higher	58 (57%)	70 (47%))
4	*Dwelling*		
	Urban	65 (63.7%)	126 (84%)
	Rural	35 (36.2%)	24 (16%)
5	*Marital Status*		
	Married	80 (78.4%)	106 (71%)
	Unmarried	22 (21.6%)	44 (29%)

index (BMI), systolic blood pressure (SBP), diastolic blood pressure (DBP), location of pain, severity of pain and family history of migraine. The mean age of migraine patients was found to be 35.28 ± 12.16 years and those of controls was 37.23 ± 13.56 years. Majority of migraineurs belonged to the age group of 20-35 years (48%) as depicted in Table 3. It was observed that the mean age at onset of migraine in the studied patient group was 30.28 ± 11.84 years and the average duration of illness (in months) was found to be 60.19 ± 72.39 as shown in Table 4.

Table 3: Prevalence of age group among the studied patients

Age group (in years)	Females (n = 84)	Males (n = 18)
Below 20	5	2
20-35	37	12
35-45	27	3
Above 45	15	1

The Systolic Blood Pressure (SBP) was found to be higher in patients (124.43 ± 11.58) than controls (120.76 ± 7.0) with p-value = 0.004 showing high SBP as a significant risk factor of migraine unlike DBP. About thirty percent of the patients reported positive family history of migraine. It was also observed that sixty-five percent of migraineurs complained about the pain on one side of the head (hemicranial) and thirty-five percent showed the location of pain to be holocranial. About seventy-three percent of patients reported severe type of pain during migraine attack.

Trigger Factors among Migraine Patients

Various environmental, dietary, hormonal and psychological (emotional) factors, which commonly trigger the head pain in migraine patients, were studied. It was found that noise (93%) and emotional stress (88%) were the most frequent triggers of pain in migraine patients followed by tiredness (80%) and travelling (77%). Also, study

Table 4: Clinical variables in Migraine patients

S.No.	Clinical variables	Patients (n=102)	Controls (n=150)	p-value
1	Age (in years)	35.28 ± 12.16	37.23 ± 13.56	0.234
2	Age of onset (in years)	30.28 ± 11.84	-	
3	Duration of illness (in months)	60.19 ± 72.39	-	
4	Body mass index (BMI)	23.64 ± 4.41	22.71 ± 4.2	0.09
5	Systolic Blood Pressure (SBP)	124.43 ± 11.58	120.76 ± 7.0	0.004*
6	Diastolic Blood Pressure (DBP)	80.91 ± 7.45	80.07 ± 4.5	0.311
7	*Location of Pain*			
	Hemicranial	66 (64.7%)	-	
	Holocranial	36 (35.3%)		
8	*Severity of Pain*			
	Mild	2 (2%)	-	
	Moderate	26 (25.5%)		
	Severe	74 (72.5%)		
9	Family history of migraine or headache	31 (30%)	35 (23%)	

*Significant value

participants reported sleep deprivation (76%), change of weather (69%), fasting or missed meals (63%), smells (60%), flickering lights (54%) and pollution (53%) as significant provoking factors of pain. About twenty-seven percent of migraine patients reported menstruation as a pain provoker. Particular food stuff such as spicy snacks, chocolate, tea or coffee (8%), cigarette smoking (3%) and alcoholism or alcohol withdrawal (3%) were not found as significant provokers of pain in studied patients of Jammu region. Considering the diet preference of study participants, it was observed that sixty-seven percent of migraine patients were keen for a non-vegetarian diet and thirty-three percent for a vegetarian diet. The prevalence of a sedentary lifestyle, that is, less physical activity was common in migraineurs (79%). The lower prevalence of cigarette smoking and alcohol intake or withdrawal as a migraine trigger in study participants might be attributed to the fact that eighty-two percent of the studied patients were females who do not consume either of these things in their day-today life.

Logistic regression analysis of the study population revealed a significant association of migraine with noise, stress, sedentary lifestyle, change of weather, flickering lights and alternate light and shade. Noise, stress, lesser physical activity, flickering lights, alternate light and shade were adding a risk of about 5 folds (p=0.0002), 3.7 folds (p=0.0002), 0.37 folds (p=0.0007), 1.7 folds (p=0.04) and 2.4 folds (p=0.0028) respectively, towards migraine. Weather changes also showed an increased risk of developing or triggering migraine with an odds ratio of 7.18 (CI-4.1-12.6, p<0.0001) as shown in Table 5.

The enrolled patients were also having different health problems in addition to migraine. The present study disclosed that hypertension and thyroid gland malformations were most commonly associated health ailments present in migraine patients followed by cervical problems and insomnia. Also, cardiovascular disorders (CVDs), hypotension, gall bladder complications, kidney stone and hyperuricemia were reported in the studied migraine patients as depicted in Table 6.

Table 6: Associated health ailments in migraineurs

Health ailments	*Percentage*
Hypertension	6
Thyroid complication	6
Cervical problem	4
Insomnia	3
Hypotension	3
Cardiovascular disease	2
Gall bladder complication (operated)	2
Kidney stone, uric acid	1

DISCUSSION

Migraine is a global neurological condition affecting almost all races, cultures and geographical locations. Migraine puts a significant burden on society financially as well as socially through direct and indirect costs. The former includes direct medical costs to individuals, families and communities and the latter includes the cost of absenteeism and reduced productivity at work. It is estimated that the productivity losses caused by migraine cost American employers 13 billion dollars per year (Hu et al. 1999).

It is crucial to study triggers because they may provide some clues to the pathogenesis of migraine and by avoiding them, migraine headache drug therapy may be obviated (Knezevic-Pogancev et al. 2014). The awareness and avoidance of trigger factors forms the basic and significant part of migraine management plan.

In the present study, several pain-provoking factors were studied in the migraine patients and controls of Jammu and Kashmir and it was found that noise (93%) and stress (88%) were cited as migraine triggers by maximum number of patients followed by physical exhaustion (80%) and travelling (77%). Sleep deprivation (76%), change of weather (69%), fasting or missed meals (63%), smells (60%), flickering lights (54%) and pollution (53%) were also reported as triggers. Menstruation (27%), particular food stuff such as spicy snacks, chocolate, tea or coffee (8%), cigarette smoking (3%) and alcoholism or alcohol withdrawal (3%) were found as pain triggers in very less number of patients of Jammu region. In another study of migraine triggers in the Indian population by Yadav et al. (2010), various migraine triggers

Table 5: Univariate association analysis of different trigger risk factors associated with migraine

S. No.	*Migraine triggers*	*Migraine patients (n=102)*	*Controls (n=150)*	*Odds ratio*	*P value*
1	*Noise*				
	Yes	95 (93%)	110 (73%)	4.9 (2.1-11.6)	0.0002*
	No	7 (7%)	40 (27%)		
2	*Physical Activity*				
	Performers	21 (21%)	62 (41%)	0.37 (0.20-0.65)	0.0007*
	Sedentary	81 (79%)	88 (59%)		
3	*Stress*				
	Yes	90 (88%)	100 (67%)	3.7 (1.8-7.5)	0.0002*
	No	12 (12%)	50 (33%)		
4	*Tiredness*				
	Yes	82 (80%)	130 (87%)	0.63 (0.32-1.25)	0.18
	No	20 (20%)	20 (13%)		
5	*Travelling*				
	Yes	79 (77%)	120 (80%)	0.85 (0.46-1.59)	0.62
	No	23 (23%)	30 (20%)		
6	*Sleep Deprivation*				
	Yes	78 (76%)	103 (69%)	0.86 (0.46-1.58)	0.62
	No	24 (24%)	47 (31%)		
7	*Change of Weather*				
	Yes	70 (69%)	35 (23%)	7.18 (4.1-12.6)	<0.0001*
	No	32 (31%)	115 (77%)		
8	*Diet Pattern*				
	Non-Veg.	68 (67%)	89 (59%)	1.37 (0.81-2.3)	0.23
	Veg.	34 (33%)	61 (41%)		
9	*Fasting/Missed Meals*				
	Yes	64 (63%)	102 (68%)	0.79 (0.467-1.34)	0.3882
	No	38 (37%)	48 (32%)		
10	*Smells*				
	Yes	61 (60%)	82 (55%)	1.24 (0.74-2.05)	0.41
	No	41 (40%)	68 (45%)		
11	*Flickering Lights*				
	Yes	54 (53%)	60 (40%)	1.69 (1.01-2.80)	0.04*
	No	48 (47%)	90 (60%)		
12	*Pollution*				
	Yes	54 (53%)	70 (47%)	1.28 (0.77-2.13)	0.32
	No	48 (47%)	80 (53%)		
13	*Alternate Light and Shade*				
	Yes	38 (37%)	30 (20%)	2.38 (1.34-4.19)	0.0028*
	No	64 (63%)	120 (80%)		
14	*Menstruation*				
	Yes	28 (27%)	46 (31%)	0.85 (0.49-1.5)	0.58
	No	74 (73%)	104 (69%)		
15	*Particular Food Stuff*				
	Yes	8 (8%)	20 (13%)	0.55 (0.23-1.30)	0.17
	No	94 (92%)	130 (87%)		
16	*Tea/Coffee*				
	Yes	5 (5%)	16 (11%)	0.43 (0.15-1.21)	0.11
	No	97 (95%)	134 (89%)		
17	*Cigarette Smoking*				
	Yes	3 (3%)	13 (9%)	0.31 (0.088-1.15)	0.08
	No	99 (97%)	137 (91%)		
18	*Alcoholism/Alcohol Withdrawal*				
	Yes	3 (3%)	13 (9%)	0.31 (0.088-1.15)	0.08
	No	99 (97%)	137 (91%)		

*Significant value

found were emotional stress (70%), physical exhaustion and travelling (52.5%), fasting (46.3%), sleep deprivation (44.4%), menstruation (12.3%) and change in weather (10%). The results of present investigation were in accordance with the study by Yadav et al. (2010) in many aspects like emotional stress, physical exhaustion or travelling, sleep deprivation as most common triggers. Also, menstruation and particular foodstuffs as triggers were reported in least number of migraine patients in both the studies. Another study on Indian population by Balakrishnan et al. (2019) reported stress, travelling and sleep deprivation as leading trigger risk factors similar to the current findings. In a study of migraine triggers in western population by Fukui et al. (2008), it has been found that the most common trigger factors reported by migraineurs were di-etary (84.5%), sleep (75.5%), environmental (68.5%), stress (65%), hormonal factors (43.5%) and exertion activities (15.5%). The current findings are in accordance with this study except for dietary factors. In a recent study from north India by Gaur (2018), it was found that the precipitating factors, which are responsible for migraine were physical activity, humidity, dust (pollution), sleep disturbances and depression or stress similar to this investigation.

The present work reveals that the occurrence of migraine is more in females than males, which is consistent with findings of Jena et al. (2015) and Balakrishnan et al. (2019). Other clinical studies in India (Panda and Tripathi 2005) and Japan (Okumura et al. 2010) also disclosed higher migraine prevalence among females. The marked prevalence of migraine in females is attributed to the fact that females are more susceptible to migraine than men because of the hormonal fluctuations during menstruation, ovulation, pregnancy and menopause (Madsen et al. 2018). The most prevalent age group among patients in the current study was found to be 20-35 years, which is consistent with the findings of Balakrishnan et al. (2019). However, another study from Karnataka by Kulkarni et al. (2014) reported that the incidence of migraine was higher in the age group of 35-45 years. In the present work, migraine patients with a positive family history of headaches or migraine attacks was found to be thirty percent, which is nearly similar as the study by Agarwal et al. (2013) in which twenty-six percent patients reported a positive family history of migraine. The prevalence of migraine without aura was more in the study subjects than migraine with aura, which is consistent with the study on Indian population by Ravishankar (2010). Comorbidity refers to the presence of one or more extra diseases co-occurring with a primary disease (Lipton and Silberstein 1994). Though comorbid diseases found were very less in the present study, hypertension, depression and thyroid complications were most prevalent among them. The present results are consistent with the findings of Bera et al. (2014) and Balakrishnan et al. (2019).

CONCLUSION

The present study was a preliminary work to generate data on various extrinsic and intrinsic factors, which trigger migraine in the population of Jammu and Kashmir. Common migraine triggers found were noise, stress, change in weather and travelling. High blood pressure, sedentary lifestyle, flickering lights were found to be the potent risk factors for migraine in the studied population.

RECOMMENDATIONS

Psychological management, meditation and a healthy lifestyle could be the alternative solutions for migraine prophylaxis over pharmacological options. As stress was found to be a major risk factor for migraine, physical fitness and yoga practices may help in combating depression in day-to-day life.

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