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Research Article

IMPACT OF WEATHER CONDITIONS ON MIGRAINE HEADACHE IN NORTH-EASTERN NIGERIA

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ABSTRACT

Migraine is a markedly disabling condition and exerts a significant burden on the sufferer in terms of pain, suffering and impaired quality of life. This study aimed to assess the impact of weather changes in migraine attack. One hundred consecutive adult migraineurs that attended the Neurology Clinic of the Department of Medicine, University of Maiduguri Teaching Hospital from May, 2008 to December, 2009 and met the inclusion criteria were evaluated using structured questionnaire. Eighty four percent (84%) and 16% of the studied migraineurs usually found dry period (November - May) and wet period (June - October) unfavourable respectively. Fourty six gets their migraine triggered during the warmest months (February - May), whereas the remaining 38 mostly experienced migraine attack during harmattan (November - January) dry period. Wet weather period (high humidity plus high or low temperature) was found to triggered migraine attack in 16% of the studied migraine patients. There was statistical significant difference in migraine head pain due to wet and dry period ($p<0.05$). Therefore, Weather changes especially during harmattan and heat period was found to triggered migraine attack significantly higher than during rainy season ($p<0.05$). The higher humidity and harmattan winds normally experienced during dry period may be responsible for an increase in positive ions or gases in the air triggering migraine head pain.

Keywords: Migraine, Impact, Weather conditions,

INTRODUCTION

Migraine is a common, chronic, incapacitating neurovascular disorder, characterized by attacks of moderate to severe headache, autonomic nervous system dysfunction and in some patients an aura involving neurologic symptoms [1, 2]. The disorder may also be described as a vascular headache associated with changes in the size of arteries within and outside the brain [3]. Migraine may be triggered by a lot of factors such as behavioural, environmental, infectious, dietary, chemical or hormonal which leads to the development of an acute migraine attack [4]. Migraine can be complex to avoid, but keeping an accurate migraine diary and making suitable lifestyle changes can have a positive effect on the sufferer's quality of life. Some trigger factors are virtually impossible to avoid (weather, emotions), but by limiting the avoidable trigger factors, the unavoidable ones may have less of an impact on the sufferer [5]. Several studies have associated acute migraine attack with weather changes [6-9]. A number of studies have also suggested that weather changes can cause a considerable burden in term of mortality, especially in the elderly and in persons affected by chronic respiratory or cardiovascular diseases [10-16]. The absence of literature reports on the effects of weather changes on migraine in the North-Eastern sub region of Nigeria / Chad Basin establishes the significance of this work. It was embarked upon in order to assess the impact of weather changes in migraineurs attending Neurology Clinic, University of Maiduguri Teaching Hospital, Maiduguri, Nigeria.

METHODOLOGY

From May, 2008 to December, 2009, one hundred (100) consecutive adult (18 years and above) migraine patients that attended the Neurology Clinic of the Department of Medicine, University of Maiduguri Teaching Hospital (UMTH), Maiduguri were prospectively studied with their consents. The study protocol has been approved by the UMTH's ethics committee on human research. Pregnant women, patients with clinical evidence of an organic disease known to cause migraine and those that have a socioeconomic factor (culture and poverty) were excluded. Personal interviews using a structured questionnaire were conducted individually with the 100 patients. The socio-demographic profiles of each patient, clinical presentation, aggravating / relieving factors, history of drug use (within one year) and the effects of weather changes were obtained. Migraine disability assessment scale (MIDAS) questionnaire [17] was also administered to individual migraineurs. Those patients that did not meet the inclusion criteria were given analgesics and were not enrolled for the study. Seventy (70) and thirty (30) patients enrolled in this study were given sumatriptan and (dihydroergotamine + caffeine) cafergot^R tablets respectively which was followed with appropriate prophylactic drug after two weeks. Responses to acute migraine therapy including improvement in the general well-being (returning to normal function), productivity and satisfaction of migraine patients to therapy as well as effect of migraine triggers were noted and recorded after the drug's administration using the general quality of life instrument and the pain specific questionnaire.

Statistical analysis

The data was analyzed using statistical analysis software (SAS) system version 16. Chi-square and Fisher's Exact Test were used to determine significance of association between categorical variables. P values less than 0.05 were considered significant, less than 0.01 highly significant and less than 0.001 very significant.

RESULTS AND DISCUSSION

In this study 28% of the studied populations were males and 72% were females. The mean ages for male and female were 32.50 ± 9.89 and 31.79 ± 10.13 years respectively (Table 1). The predominance of females over males observed in this study agrees with reports of several other studies [18-20] in which females were afflicted more with the disease. The changes in the level of oestrogen in female subjects during menstruation, ovulation and pregnancy may be the underlining cause. It is noteworthy that approximately three quarter of the patients (74%) were in their 20s and 30s which correspond to a large segment of the productive age; while another 11% were in their 40s (Table 1). The data showed that few migraineurs were in their 50s (4%) and 60s (4%) which is in agreement with other studies that migraine tends to decrease with age [18, 21]. The absence of the patients aged 70 and above may be a reflection of the age distribution in the general population. The average life span in Nigeria is approximately 46.9 years (46.16 and 47.76 years for male and female respectively) [6].

There were few patients who smoked cigarette (18%) or drank alcohol (20%) observed in this study.

Table 1: Age and sex distribution of study migraine patients

Age (years)	Number / Percentage		
	Male	Female	Total
10 – 19	1	6	7
20 – 29	12	33	45
30 – 39	11	18	29
40 – 49	1	10	11
50 – 59	2	2	4
60 – 69	1	3	4
Total	28	72	100

This study showed that smoking cigarette and drinking alcohol might not be a significant predisposing factors in migraine head pain among the study subjects ($p<0.05$). Thus, it is difficult to associate these social habits with migraine (Table 2). This observation is in agreement with a report from Priya and Seema [22] in which alcohol was found not to be a migraine-provoking chemical, although the tyramine and histamine contained in many red wines and beer might provoke migraine head pain in susceptible individuals. However, Panconesi [23] and Dyson [24] had implicated alcohol as a potential migraine trigger. Religious and cultural influences might have contributed to low alcohol and tobacco intake among study subjects, especially the females. Sixty-four patients (64%) of the migraineurs studied reported a positive family history of their condition at their first visit (Table 2).

Table 2: Social and family history of the migraine patients studied

Social and Family History		Number (Percentage)			
		Male	Female	Total	P-value
Smoking					
	Yes	15 (83.3)	3 (16.7)	18 (100)	0.021*
	No	13 (15.9)	69 (84.1)	82 (100)	
Alcohol intake					
	Yes	14 (70)	6 (30)	20 (100)	0.024*
	No	14 (17.5)	66 (82.5)	80 (100)	
Family history					
	Yes	14 (21.9)	50 (78.1)	64 (100)	0.038*
	No	14 (38.9)	22 (61.1)	36 (100)	
Socio-economic status					
	Low	3 (15)	17 (85)	20 (100)	0.07
	Medium	5 (27.8)	13 (72.2)	18 (100)	
	High	20 (32.3)	42 (67.7)	62 (100)	

* = Significant P-value ($p<0.05$) (chi-square)

There was a statistical significant difference between those migraineurs having traits of the disease with those that lacks the traits ($p<0.05$). This agrees with most literature reports that people with migraine usually have a strong family history which may vary in frequency, intensity, duration, pattern of associated symptoms and degree of disability [25-27]. The data from this study revealed that migraine head pain is inversely related to socioeconomic status. The predominance of patients with higher income (62%) over those individuals in a medium (18%) and lower (20%) income bracket in this study could be as a result of their increase accessibility to medical care especially in the tertiary health institutions where this study was conducted. However, there was no statistical significant difference between male and female migraineurs with low, medium and high socio-economic status ($p>0.05$). This did not agree with the results of several recent population-based studies that associate migraine with low income and education [28, 19, 29]. Stewart *et al* [19] attributed the higher prevalence of migraine among low-income groups to longer duration of the disorder due to poverty, stress and diet. High income groups tend to have wider access to medical care and also tend to seek medical consultation more readily than individual in lower income groups.

Physical exertion ($p>0.05$), emotional stress ($p>0.05$), and hypoglycaemia ($p<0.05$) were the commonly observed aggravating factors among the migraineurs studied with either common or classic migraine (Table 3). Diet, drugs/chemicals and herbal remedies aggravate migraine head pain with no statistical significant differences ($p>0.05$) among different types of migraine headache. The result of these findings agrees with the report of Dyson [24] in which almost all the above risk factors were implicated as a potential trigger of migraine with the exception of herbal remedies. The diversity in people's diet could have contributed to the significant difference observed among hunger (hypoglycaemia) induced migraine among patients with common and classic migraine ($p<0.05$).

Table 3: Distribution of migraine triggers among study subjects

Migraine Triggers	Number (Percentage)		P-value
	Common migraine (N = 67)	Classic migraine (N = 33)	
Physical exertion	67 (100)	33 (100)	0.064
Emotional stress	64 (96)	33 (100)	0.095
Hypoglycaemia	60 (90)	24 (73)	0.024*
Diet	12 (18)	5 (15)	0.642
Drugs / Chemicals	29 (43)	9 (27)	0.126
Herbal	10 (15)	5 (15)	0.063

* = Significant P-value ($p<0.05$) (χ^2)

Some trigger factors are dose dependent in nature especially in susceptible individual. In addition, being exposed to more than one trigger factor simultaneously will more likely cause a migraine than a single trigger factor in isolation [5].

Resting, regular sleep, presence of food in gastrointestinal lumen, effect of drugs/chemicals and herbal remedies relieved migraine symptoms in both group of patients with either common or classic migraine, even though this is not statistically significant ($p>0.05$). This also agrees with the report of Jung [30] that in other to avoid migraine triggers, one needs to watch what he or she eat and drink, regular meals, regular exercise, regular sleep and reduced stress. Exercise did not relieve any migraine head pain among the studied patients (Table 4).

Eighty four percent (84%) found dry period unfavourable while 16% of the studied migraineurs normally found wet period unfavourable. Fourty six gets their migraine triggered during the warmest months (February-May), whereas the remaining 38 mostly experienced migraine attack during harmattan (November - January) dry period. Table 5 showed wet period (high humidity plus high or low temperature) that is usually experienced between June to October, triggered migraine attack in 16% of the studied migraine patients. There is statistical significant difference in migraine head pain due to wet and dry period ($p<0.05$). The higher percentage of migraine patients having their migraine head pain triggered during hot weather ($\geq 42^0$C) observed in this study could be attributable to heat exhaustion (profuse sweating, lethargy and reduced mental function) and heat stroke (high body temperature, confusion and rapid pulse).

The result of this study also agrees with the report of Mary [6] that sustained lower temperature during harmattan (cold period) may leads to the development of frostbite that might provoke migraine head pain. Again, the presence of positive ions, carbonmonoxide, ozone, sulphodioxide and nitrogen dioxide in the air [11] can alter the cerebral arteries to provoke migraine attack. The higher humidity and harmattan winds normally experienced during dry period may be responsible for an increase in positive ions in the air triggering migraine head pain among 84% of migraineurs observed in this study. Several studies have associated acute migraine attack with weather changes [6, 7, 24, 8, 9]. A number of studies have also implicated weather changes as a potential migraine triggers in chronic respiratory and cardiovascular diseases [10-16].

Table 4: Distribution of migraine relievers among study subjects

Migraine Relievers	Number (Percentage)		P-value
	Common migraine (N = 67)	Classic migraine (N = 33)	
Rest	67 (100)	33 (100)	P>0.05
Regular sleep	62 (93)	32 (97)	P>0.05
Regular food intake	60 (90)	28 (85)	P>0.05
Exercise	0 (0)	0 (0)	-
Drugs / Chemicals	10 (15)	5 (15)	P>0.05
Herbal	18 (27)	6 (18)	P>0.05

$p>0.05$ (χ^2)

Table 5: Effect of weather conditions as migraine trigger among migraineurs

Seasonal period	Number / Percentage
Wet period (June - September)	
• Rainfall (cold)	16
Dry period (October-May)	
• Harmattan (October -January)	38
• Warmest months (Feb - May)	46
Total	*100*

$p<0.05$) (χ^2)

CONCLUSION

The migraine head pain was found to be triggered by physical exertion, emotional stress, hypoglycaemia, diet, some drugs, herbal remedies and weather changes among the migraineurs studied. Weather changes especially during harmattan and heat period was found to triggered migraine attack significantly higher than during rainy season ($p<0.05$). The higher humidity and harmattan winds normally experienced during dry period may be responsible for an increase in positive ions or gases in the air triggering migraine headache among migraineurs studied.

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