The First-of-Ramadan Headache

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This study was designed to estimate the frequency and characteristics of headaches occurring on the first day of Ramadan (Moslems' fasting month) and to determine possible causes. One hundred fifty copies of a specially designed questionnaire were distributed on the second day of fasting to a random sample of hospital staff. Completed questionnaires were obtained from 116 subjects (77%). Headaches were reported by 37 (41%) of the 91 persons who had fasted as compared to 2 (8%) of those 25 who did not fast (P=.002). The headache was of tension type in 78% of the cases. Headache frequency increased with the duration of fasting and affected mainly those prone to have headaches, more particularly of the tension type and the most important exogenous-associated factor was caffeine withdrawal. Other factors such as lack of sleep, hypoglycemia, and dehydration may have been contributory in a small number of cases. A progressive reduction of caffeine consumption in the weeks preceding the month of Ramadan and a cup of strong coffee just before the start of the fast may prevent the occurrence of first-of-Ramadan headache.

Key words: Ramadan, fasting, headache, caffeine withdrawal

Abbreviations: FRH first-of-Ramadan headache

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Fasting during the month of Ramadan is one of the five pillars of Islam. The Moslem should abstain from eating, drinking, and smoking from dawn to sunset for 29 to 30 days. For these reasons, people tend to sleep for a few hours during the daytime and stay awake very late at night. This change in sleep pattern, hunger with possible hypoglycemia, thirst and consequent dehydration, and changes in smoking, coffee, and tea drinking habits may result in headaches.[1-3] Previous works on perioperative headaches[4] and headaches occurring on the Jewish fasting day of Yom Kippur[5] have confirmed the relationship between fasting and headache.

This study was designed to estimate the frequency of headaches occurring on the first day of Ramadan, as well as the types of headache and how they are relieved. Another objective was to determine the subjects at risk, the risk factors of the first-of-Ramadan headache (FRH), and suggest ways for prevention.

METHODS

This study was based on a questionnaire that was distributed to a random sample of physicians and paramedical staff working at the King Fahad National Guard Hospital, Riyadh. One hundred fifty copies were distributed on the second of Ramadan 1418 H (December 31, 1997), and the subjects were asked to return them to the authors after completion. Fasting and nonfasting subjects were included. The questions included demographic data such as age, sex, and background information on smoking, and coffee and tea drinking habits. The amount of daily caffeine consumption was calculated according to published figures.[6] The subjects were also asked if they suffered from headaches and if so what were the features, and if they had headaches on the first of Ramadan. If the answer to the latter was positive, they were asked to describe the features of that headache, its time of occurrence, duration, and how it was relieved.

The frequency of headache in the fasting subjects' group was compared with the frequency in the nonfasting group. In a second step, fasting subjects with headache

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Comparison of Fasting Subjects Who Experienced Headache Versus Those Who Did Not

	No. (%) of Subjects		
	Headache (n=37)	No Headache (n=54)	Odds Ratio (95% CI)
No. of women	16 (43)	16 (30)	1.8 (0.7-4.3)
Coffee drinkers	28 (76)	25 (46)	3.6 (1.4-9.1)*
Tea drinkers	32 (86)	30 (56)	5.1 (1.7-15.1)*
Smokers	6 (16)	7 (13)	1.3 (0.4-4.2)
Previous headaches	35 (95)	31 (57)	12.9 (2.8-39.6)*
Previous migraine	13 (35)	11 (20)	2.1 (0.8-5.4)
Previous tension headaches	30 (81)	26 (48)	4.6 (1.7-12.3)*

* Significant at less than the 5% level, $P<.05$.

were compared to those fasting who did not experience headache to determine the risk factors of the FRH. The headaches were classified according to the International Headache Society criteria.[7] The two-tailed Student test and odds ratios with 95% confidence intervals were used for statistical analysis.

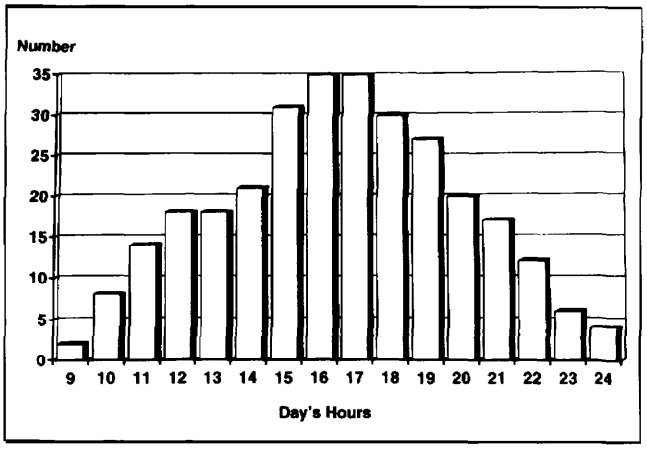
RESULTS

Completed questionnaires were obtained from 116 subjects (77%). Twenty-nine did not return the questionnaire, and 5 were excluded because of incomplete or contradictory answers. The 116 responders included 65 men and 51 women. Their mean age was 35 years (range 20 to 60 years). Ninety-one were fasting and 25 were not. Thirty-seven subjects (41%) had headache in the fasting group, as compared to 2 (8%) in the nonfasting group ($P=.002$). This headache was of migraine type in 8 cases and of tension type in the 29 other cases. Six of the 8 subjects who had migraine were migraineurs, and 26 of the 29 with tension headache had this type of headache previously. The headache started on average at 1 PM (ranged from 9 AM to 6 PM) and lasted from 1 to 14 hours (average 6.25 hours). The cumulative number of participants suffering from headache according to time is shown in the Figure. Their number increased with the duration of fasting in a linear fashion. Thirty-five of the 37 sufferers had headache in the 2 hours preceding breakfast, which was at 5:30 PM on that particular day. Surprisingly, in 2 cases, the headache started just after eating. Relieving methods were drinking coffee or tea in 19 cases (51%), sleeping in 16 (43%), eating in 15 (41%), lying down in 10 (27%), drinking water in 7 (19%), simple analgesics (paracetamol) in 7, and smoking cigarettes in 2 cases. However, in many cases, more than one relieving method was used.

Comparison of the 37 fasting subjects who had headaches with the 54 who did not is shown in the Table. The main risk factors for FRH appeared to be a previous history of headaches, especially tension headache, and coffee and tea drinking habits. Not only did the headache sufferers more frequently consume caffeine-containing beverages, but the average amount of caffeine they drank daily (517 mg) was also significantly higher than the amount consumed by the nonsufferers (296 mg, $P=.002$). In addition, two subjects in the no-headache group wrote that they used to have headaches at each first-of-Ramadan day; one of them stopped drinking coffee and the headaches disappeared, while the other prevented the headache by drinking a double strong coffee at dawn, just before the beginning of the fast. Women (50%) tended to have relatively more headaches than men (36%), but this did not reach statistical significance ($P=.18$). A history of migraine and of smoking were more frequent in the headache group, but the differences were not statistically significant.

COMMENTS

Analysis of our data showed that FRH was common, and its frequency increased with the duration of fasting.



Cumulative number of patients with headache according to the day's hours (fast ended at 5:30 PM).

Our figure of 41% is probably low as it was calculated during a time of the year when days (and subsequently fasting periods) were the shortest in the northern hemisphere, and temperatures were cool enough not to provoke significant dehydration. The increasing frequency of headache with the duration of fasting has been previously reported with perioperative headache[4] as well as with the headache occurring on Yom Kippur.[5] It is probable that more of our subjects would have suffered from headache if fasting had been in the summer months when days are longer. The headache was of the tension type in 29 (78%) of our subjects, but 32 (86%) experienced the same type of headache they had previously experienced in other circumstances. Tension headache was also the most frequent type in the Yom Kippur headache.[5] As in that study,[5] a history of previous episodes of headache was the strongest determinant of the FRH with an estimated 13-fold increased risk. Thirty-five persons (53%) from the 66 persons who were prone to headaches had a headache as compared to 2 (8%) of the 25 who were not prone ($P<.001$). Nikolajsen et al found similarly that a previous history of headache increases the risk of perioperative headache by 15-fold.[4] However, when the chronic headache was analyzed by subtypes, the association between FRH and previous headaches remained strong with the tension type (OR=4.6) but not with the migraine type. Although previous migraine appeared to increase the risk of FRH by twofold, the numbers were too small to reach statistical significance.

Another important finding was the association of FRH with tea and coffee consumption. Drinking coffee or tea relieved the headache in more than half of the cases. Thirty-two (52%) of the 62 tea drinkers had FRH as compared with 5 (17%) of the 29 nondrinkers. Similarly, 28 (53%) of the 53 coffee drinkers had headache as compared to 9 (24%) of the 38 nondrinkers. Surprisingly, tea consumption (with an OR of 5.1) appeared to be a stronger risk factor for FRH than coffee (with an OR of 3.6). Although a cup of tea contains only half of the caffeine contained in a cup of coffee (50 mg versus 90 to 120 mg),[6] Saudis tend to be heavy tea drinkers (up to 2 liters per day) and tea is usually their main daily source of caffeine. Caffeine withdrawal is incriminated as the cause of headaches occurring in many circumstances, including perioperative headaches[4,8] and weekend headaches.[9] Surprisingly, Mosek and Korczyn did not find any association between caffeine intake and the Yom Kippur headache.[5] They could not, however, suggest any other plausible explanation. The major role of caffeine withdrawal in the genesis of FRH is also suggested by the following: caffeine withdrawal headache usually starts 12 to 24 hours after the cessation of caffeine-containing beverages and peaks at 20 to 48 hours,[3] which is compatible with the pattern observed in our subjects. It is more frequent in the context of high caffeine intake (more than 600 mg/day) but can also occur with an intake as low as 100 mg/day.[3] The average daily caffeine intake in our headache sufferers was 517 mg with extremes of 120 and 1440 mg.

Caffeine produces diverse pharmacological responses including central nervous system stimulation, relaxation of smooth muscles, release of catecholamines, etc.[10] It has also an analgesic effect that may result from several mechanisms: (1) blockade of peripheral pro-nociceptive action of adenosine, (2) activation of central noradrenergic pathways that constitute an endogenous pain-suppressing system, and (3) central nervous system stimulation with a consequent modulation of the affective component of pain.[10] Hence, it is not surprising that caffeine withdrawal may result in headache. Both migraine and tensionlike headache have been described after caffeine withdrawal,[1,3,9] and caffeine has been shown to be an effective adjuvant treatment for both headache types.[10] However, tensionlike headache is the most common type.[3] This was also the case in our subjects, as well as in the perioperative headaches.[4] Those who had migraine attacks were migraine sufferers in general, as previously mentioned.

Although caffeine withdrawal appeared to be the main exogenous factor implicated in FRH, other factors appeared to play a role in some subjects. Lack of sleep was probably a determinant factor in some, in whom headache was relieved by sleep. Although 15 subjects claimed that headache was relieved by eating, hypoglycemia remained a very improbable cause. Nine of these 15 had coffee or tea at breakfast, and hypoglycemia is extremely unlikely in persons fasting less than 24 hours as glycogen stored in the liver is sufficient to maintain a normal glycemia for such a period.[11] In 2 subjects, the headache developed after the meal, which may suggest a possible reactive hypoglycemia. Finally, the headache was relieved in 10 subjects by lying down. This may suggest that relaxation relieved the tension headache or that these individuals were dehydrated, resulting in intracranial hypotension. Dehydration was also possible in the 7 subjects whose headaches were relieved by drinking water. Dehydration was the explanation advanced by one author to explain his own Yom Kippur headache[12] and may have been a contributory factor in some cases.

In conclusion, FRH is frequent and affects at least 40% of the fasting individuals. It affects mainly those prone to headaches, more particularly of the tension type and its characteristics suggest tension headache in about 80% of the cases. Its frequency increases with the duration of fasting. The main exogenous factor associated with it is caffeine withdrawal. Other factors such as lack of sleep, hypoglycemia, or dehydration may be contributory in a small number of cases. First-of-Ramadan headache should be added to the list of the other headaches due to caffeine withdrawal such as weekend and perioperative headaches. A progressive reduction of caffeine consumption in the weeks preceding the month of Ramadan associated with a cup of strong coffee just before the start of the fast may prevent its occurrence.

REFERENCES

1. White BC, Lincoln CA, Pearce NW, Reeb R, Vaida C. Anxiety and muscle tension as consequences of caffeine withdrawal. *Science*. 1980;209:1547-1548.
2. Rasmussen BK. Migraine and tension-type headache in a general population: precipitating factors, female hormones, sleep pattern and relation to lifestyle. *Pain*. 1993;53:65-72.
3. Silverman K, Evans SM, Strain EC, Griffiths RR. Withdrawal syndrome after the double-blind cessation of caffeine consumption. *N Engl J Med*. 1992; 327:1109-1114.
4. Nikolajsen L, Larsen KM, Kierkegaard O. Effect of previous frequency of headache, duration of fasting and caffeine abstinence on perioperative headache. *Br J Anaesth*. 1994;72:295-297.
5. Mosek A, Korczyn AD. Yom Kippur headache. *Neurology*. 1995;45:1953-1955.
6. Rall TW. Central nervous system stimulants. In: Gilman AG, Goodman L, Rall TW, Murad F, eds. The Pharmacological Basis of Therapeutics. New York: The Macmillan Publishing Co; 1985:589-603.
7. Headache Classification Committee of the International Headache Society. Classification and diagnostic criteria for headache disorders, cranial neuralgias and facial pain. *Cephalalgia*. 1988;8(suppl 7):1-96.
8. Weber JG, Ereth MH, Danielson DR. Perioperative ingestion of caffeine and postoperative headache. *Mayo Clin Proc*. 1993;68:842-845.
9. Couturier EG, Hering R, Steiner TJ. Weekend attacks in migraine patients: caused by caffeine withdrawal? *Cephalalgia*. 1992;12:99-100.
10. Sawynok J. Pharmacological rationale for the clinical use of caffeine. *Drugs*. 1995;49:37-50.
11. Service FJ. Hypoglycemic disorders. In: Wyngaarden JB, Smith LH, Bennet JC, eds. Cecil's Textbook of Medicine. Philadelphia: WB Saunders; 1992:1310-1317.
12. Kundin JE. Yom Kippur headache. *Neurology*. 1996;47:854.