

# Headaches and Food Abstinence: A Review

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Received: 11 Dec, 2017 | Accepted: 09 Jan, 2018 | Published: 15 Jan, 2018

**Citation:** Soares AA, de Vasconcelos CAC, Silva-Néto RP (2018) Headaches and Food Abstinence: A Review. J Clin Case Stu 3(1): dx.doi.org/10.16966/2471-4925.163

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## Abstract

**Objective:** This review aimed to investigate the action of food abstinence in the onset of headache.

**Method:** We reviewed the diagnostic criteria and triggering factors for all headaches described in the International Classification of Headache Disorders 3 Beta (ICHD-3β).

**Results:** Food intake and food abstinence/withdrawal are considered as eating factors involved in the onset of headache attacks. Ingestion of some foods, such as cheese and chocolate, triggers headache attacks only in primary headaches, including migraine and tension-type headache. However, abstinence or food suppression causes secondary headaches, such as headache attributed to fasting and to caffeine withdrawal. Fasting is also a trigger of migraine.

**Conclusions:** Abstinence from food is considered an important trigger of headache attacks, especially in migraine patients. In addition, this headache improves significantly after eating food.

**Keywords:** Fasting; Food abstinence; Caffeine; Headache; Migraine

## Introduction

Food abstinence (from the Latin “Abstinence”, formed by “Ab”, removal; and “Tinere”, to keep, to hold) is act of abstaining from the ingestion of a particular type of food, for the sake of some objective, such as religious, political or medical. It is important to note that the decision to abstain from food is often imposed.

Fasting (from the Latin “Jejunus”, empty, without anything) is a specific type of food abstinence, which is defined as partial or total abstinence of food, during a certain period of the day, in general by penance, hunger strike, religious or medical prescription [1,2]. To be fasting is not to eat any food for long hours.

When an individual does not eat for a long period, interrupts, postpones, or decreases the dose of a particular substance he has been using for some time, such as caffeine, he/she will have headache [3].

In relation to headache triggered by fasting, the probability of its occurrence increases with the duration of fasting and it is more common in patients suffering from migraine [4].

## Headache attributed to fasting

There is in the International Classification of Headache Disorders, Third Edition (ICHD-3β) [5] a group of headaches attributed to homeostasis disorders. Headache attributed to fasting (Table 1) is in the subgroup coded as 10.5, but it does not meet the diagnostic criteria for migraine because the latter also presents headache induced by hypoglycemia. When the diagnosis is migraine without aura, fasting will be a precipitating factor.

Headache attributed to fasting is described as being diffuse, non-pulsatile, and usually mild to moderate in intensity. It is caused by the fasting of at least 8 hours and it occurs during this period. There is an increased likelihood of developing headache attributed to fasting as the duration of fasting increases [6].

**Table 1:** Diagnostic criteria for The International Classification of Headache Disorders 3 Beta (ICHD-3β) for a headache attributed to fasting (group 10.5)

A. Diffuse headache not fulfilling the criteria for 1. Migraine or any of its subtypes but fulfilling criterion C below
B. The patient has fasted for ≥ 8 hours
A. Evidence of causation demonstrated by both of the following: <ol style="list-style-type: none"> <li>1. Headache has developed during fasting</li> <li>2. Headache has significantly improved after eating</li> </ol>
C. Not better accounted for by another ICHD-3 diagnosis.

This headache is significantly more common in individuals with a history of migraine. When there is concomitant diagnosis of migraine, this headache may resemble migraine without aura. Headache attributed to fasting does not appear to be related to duration of sleep, discontinuation of caffeine or hypoglycemia. Although headache may occur in the conditions of hypoglycemia-induced brain dysfunction, there is no conclusive evidence to support a causal relationship [7]. Headache attributed to fasting may occur in the absence of hypoglycemia, and insulin-induced hypoglycemia does not trigger headache in migraine patients. On the other hand, headache is not a common complaint of patients seeking emergency services with symptomatic hypoglycemia [7]. Religious fasting is associated with headache and one of the typical examples is the Yom Kippur headache observed during the 25-hour fast practiced by the Jews [8,9], as described in a prospective study in which 39.0% of those practicing this ritual developed headache on average 16 hours after the onset of fasting [10]. Yom Kippur, known as the Day of Forgiveness, is one of the most important dates in Judaism. Traditionally, Jews celebrate this holiday with a fasting period of 25 hours and intense prayer. In the Jewish calendar, this day begins at the twilight of the 10th day of the Hebrew month (coinciding with September, October or November of our calendar) and ends at sundown the following day [1]. Another example of headache attributed to fasting is the one observed among Muslims during the first day of Ramadan (from the Arabic “Ramida” meaning “To be fiery” because fasting is celebrated in the hottest period of the year). In Ramadan, the 9th month of the Islamic calendar, fasting for approximately one month is a mandatory practice for Muslims [11]. In Greece, there is a mountain called Mount Athos, which is an autonomous political entity governed by the Greek Orthodox Church and home to twenty Greco-Orthodox monasteries. The monks who inhabit Mount Athos usually practice fasting and are reported to have a headache attributed to fasting [12]. In most patients, headache attributed to fasting occurs with the same clinical characteristics as a tension-type headache (TTH) and their likelihood of occurrence increases as food withdrawal continues [7].

These patients who experience a headache attributed to fasting should be accompanied by a nutritionist. The treatment of this headache is based on the return to food intake [6].

### **A migraine**

A migraine is a chronic neurological disease, with prevalence in Brazil of 15.2% [13]. It is defined as an abnormal neurovascular reaction that occurs in a genetically vulnerable organism. It is externally clinically characterized by recurrent episodes of a headache and associated manifestations dependent on triggering factors [14].

These triggering factors can be identified and, in most cases, multiple for the same patient. Among them, stress, hormonal changes, deprivation or excessive sleep, physical exertion and sensorial stimuli such as luminosity, noise and odors are more

frequently mentioned [15,16]. There are also food factors, such as prolonged fasting and ingestion of certain foods or alcoholic beverage [17].

Prolonged fasting is considered when abstinence from food is greater than four hours. Usually, this occurs when the individual abstains from one of the meals [6]. Of all food factors, fasting is one of the most frequent and best characterized triggers in migraine patients and cannot always be avoided [17,18]. Its prevalence throughout life is around 4.0% [19]. One study evaluated 2,313 spontaneous attacks of headache in 1,883 migraine patients. Prolonged fasting was a precipitating factor in the headache attacks in 67.0% of those patients, but, curiously, less than 5.0% of them perceived fasting as a trigger of their headaches [20]. The effect of fasting during Ramadan on the Muslim population with migraine, we observed an increase in the frequency of migraine attacks when compared to the following month, the control group, with no attenuation in those who used prophylactic treatment [11].

It is evident that the prevention of headache is the orientation to the migraine patient so that he does not remain great periods without ingesting some food. However, there is a research on developing an effective preventive approach. Due to its long half-life, frovatriptan (trade name Frova) has been used as a preventive treatment of a migraine induced by fasting [18]. The pathophysiological mechanisms by which prolonged fasting induces a headache in migraine patients have not yet been well understood [17]. Possibly, these mechanisms have a connection with cerebral glycogen metabolism and its modulation by sympathetic activity [17]. Insufficient glucose supply, derived from glycogen at the onset of intense synaptic activity, may lead to an imbalance between the excitatory and inhibitory terminals, causing collective depolarization of the neurons. This may activate perivascular trigeminal afferents, opening pannexin 1 neuronal channels, and initiate parenchymal inflammatory pathways [17].

Prolonged fasting will lead to hypoglycemia. Hence, the brain that has glucose as the main source of energy will be unable to function properly. In response, the body will increase cerebral blood flow and nerve tissues will become more sensitive to blood vessel dilation, thus generating an attack of a migraine.

According to nutritionists, in migraine patients, where prolonged fasting is a trigger of a headache, it is imperative to feed every three to four hours with moderate meals to decrease the frequency of headache attacks. It is recommended that these patients always take a snack with them if it is not possible to have their meals on time. This snack may be a fruit or a cereal bar.

### **A tension-type headache**

A tension-type headache (TTH) is the most common type of a primary headache. According to ICHD-3 $\beta$  [5], it can be divided into three subtypes, according to the frequency of a headache: infrequent episodic TTH (<12 days of headache per year); frequent episodic TTH (12 to 180 days of headache

per year); and chronic TTH (>180 days of headache per year). The lifetime prevalence of episodic TTH is almost 80.0%, and chronic TTH is 3.0%.

It is characterized by headache attacks, predominantly bilateral, of mild to moderate intensity, generally described as being in pressure pain (non-pulsatile), lasting from hours to days and not worsening with routine physical activity, such as walking or climbing stairs. Among the known factors triggering TTH, we have stress, tiredness, an excess of physical exercises, alcoholic beverage ingestion, sleep disorders etc. There is no doubt that stress, both physical and psychological, is the most involved factor [21]. As for prolonged fasting, it is a consensus in the literature that this is a precipitant factor for migraine attacks, but it is also for TTH [4,22]. In a study in which 91 patients were prospectively followed up, 37 (41.0%) developed a headache with clinical features of a migraine (9%, 8/91) or TTH (32%, 29/91). Of the eight individuals who reported an attack of a migraine, six had a history of a migraine; of the 29 individuals who reported an attack of TTH, 26 had a history of TTH. Most of the attacks showed features similar to a headache that they generally experienced [2]. A study was carried out in India during Ramadan with 2,982 patients where 67.0% developed TTH and 14.0% migraine [23].

### Caffeine withdrawal headache

There is in the ICHD-3β [5] a group of headaches attributed to substance withdrawal. Caffeine withdrawal headache (Table 2) is in the subgroup coded as 8.3.1, which is described as a headache that develops within 24 hours after regular consumption of caffeine above 200 mg/day for more than two weeks and then discontinued. It is resolved, spontaneously, within seven days, in the absence of additional consumption.

Caffeine is a thermogenic beverage and may be used for fat reduction or weight loss [24]. Coffee is the main source of caffeine, but it is also found in other beverages like black tea, chocolate, cola, soft drinks, etc., but in smaller proportions. Some common analgesics, ergot derivatives and non-steroidal anti-inflammatory drugs (NSAID's) used in the treatment of headaches also contain caffeine, ranging from 30 to 100 mg per tablet [25].

**Table 2:** Diagnostic criteria for The International Classification of Headache Disorders 3 Beta (ICHD-3β) for a caffeine-withdrawal headache (group 8.3.1)

A. A headache fulfilling criterion C
B. Caffeine consumption of >200 mg/day for >2 weeks, which has been interrupted or delayed
A. Evidence of causation demonstrated by both of the following: <ol style="list-style-type: none"> <li>1. Headache has developed within 24 hours after last caffeine intake</li> <li>2. Either or both of the following:               <ol style="list-style-type: none"> <li>a. Headache is relieved within 1 hour by intake of caffeine 100 mg</li> <li>b. Headache has resolved within 7 days after total caffeine withdrawal</li> </ol> </li> </ol>
C. Not better accounted for by another ICHD-3β diagnosis

People who consume caffeine greater than 200 mg/day for more than two weeks and stop it abruptly develop a headache within 24 hours after their last consumption [26]. It is a vague headache and poor in associated symptoms [27]. After ingestion of 100 mg of caffeine, the pain is relieved in less than an hour and disappears within seven days after its complete discontinuation [25]. According to nutritionists [25], these patients should be instructed not to abruptly stop caffeine.

### Conclusion

Abstinence from food is considered an important trigger of headache attacks, especially in migraine patients. In addition, this headache improves significantly after eating food.

**Conflict of Interest:** None

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