

# An investigation into the causes of migraine headache nursing essay



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Migraine is a neurological disorder which affects almost 10% of the world's population (Woeber et al., 2007). In 2003, the World Health Organization (WHO) estimated the number of migraineurs worldwide at 303 million people. A similar study in 2004 found that approximately 20 million migraine attacks occur every day (Forshaw, 2003). Individuals who suffer from migraine headaches carry the burden of pain and suffering that can lead to an impaired quality of life. At a community level, migraine headaches can also be problematic because of absences from work or decreased productivity from migraine sufferers (NINDS Migraine Information Page). As a result of the problems associated with migraine headaches, there is significant interest in discovering the triggers for migraines.

A migraine is a specific type of headache characterized by altered bodily perceptions, pulsing pain in the cranial region, and nausea (Forshaw, 2003). Most migraines are unilateral, meaning they affect only one side of the head, and the pain is usually localized to a very specific area (Forshaw, 2003). A typical migraine can last anywhere from 4 to 72 hours. The most frequent symptoms of a migraine include nausea, vomiting, and increased sensitivity to sensory input (Gallagher et al., 2002). Most commonly, individuals affected by migraine headaches have increased sensitivity to light (photophobia) and sound (phonophobia) (Gallagher et al., 2002). A smaller percentage of migraine sufferers report an aura which accompanies their migraine. An aura usually consists of unusual visual, olfactory, or other sensory experiences that give the individual some forewarning that a migraine will soon occur (Gallagher et al., 2002).

The diagnosis of migraine can be difficult, especially because this specific type of headache mimics several other types. Migraines are also habitually written off by those who experience them infrequently as a result of the cold or flu (Gallagher et al., 2002). Because of these difficulties, migraines are often underdiagnosed or misdiagnosed (Lyons, 2007). The International Headache Society (IHS) has laid the foundation for the diagnosis and classification of migraine headaches. According to the IHS, there are seven different classes of migraines (Headache Classification Subcommittee, 2004). These include migraine without aura, or common migraine, migraine with aura, hemiplegic migraine, childhood periodic syndromes which are precursors of migraine, retinal migraine, complications of migraine, and probably migraine.

Although there are many classifications of migraine headaches, there are really only two methods of diagnosis, which correlate with the two main types of migraine: migraine without aura and migraine with aura. Migraine without aura can be diagnosed using the “5, 4, 3, 2, 1 criteria”: 5 or more attacks, 4 hours to 3 days in duration, 2 or more of – unilateral location, pulsating quality, moderate to severe pain, aggravation by or avoidance of routine physical activity, and 1 or more accompanying symptoms which could include nausea and/or vomiting, photophobia, or phonophobia (Headache Classification Subcommittee, 2004). In the method of diagnosing migraine with aura, only two attacks are necessary to make the diagnosis.

Although migraine headaches are experienced by individuals from many different lifestyles and backgrounds, there are some demographics in which migraine is more commonly seen. Although migraine headaches are equally

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prevalent in male and female prepubescent patients, 75% of adult patients are women (Lay et al., 2009). Migraines become more common with age, though 98% of patients experience their first migraine before the age of 50 (Forshaw, 2003). Migraines are also thought to be genetically linked, as 70% of migraine patients have some other, first-degree relative (e. g. brother) who has experienced migraine headaches (Forshaw, 2003).

Perhaps the most intriguing question pertaining to migraines is that no one knows what causes them. To date, research has not been able to definitively discern which of the suspected triggers of migraine may actually cause the headaches, nor has anyone determined which of the suspected triggers might play the largest role in producing migraines (Woeber et al., 2007). The list of suspected triggers for migraines is extensive, including, but not limited to: weather, missing a meal, stress, alcohol, various types of food and changes in sleeping patterns (Forshaw, 2003). Women have also reported menses as a trigger, and studies of both men and women have also shown that environmental factors and even certain activities, such as using a computer for too long, can bring on a migraine (Woeber et al., 2007). Because it would be impossible to investigate each and every one of these suspected triggers, the comparison of this studied has been narrowed to include sleep-related, hormonal and food triggers.

#### Sleep Disorders (Amelia Van Handel)

The role of sleep in migraine has not been fully explained (Kelman, 2005). Studies have determined that disturbed sleep patterns may trigger a migraine attack, and it is also widely accepted that sleep can alleviate and

even terminate a migraine (Blau, 1982). Although the exact relationship between changes in sleep patterns and migraine is unclear, many researchers believe there is a correlation (Woeber et al., 2007; Kelman, 2005).

Much of the argument for the relationship between migraine and sleep disorders stems from the preponderance of migraine in the morning hours (Fox, 1998). Patients with sleep disorders are far more prone to have morning headaches, and chronic migraine sufferers often experience morning migraines after interruptions in their sleep cycle. This has led researchers to speculate that the circadian clock plays a role in migraine pathophysiology, though no one has yet determined why changes in sleep pattern are a trigger for migraine headache (Cohen, 2005).

Several sleep disorders are speculated to be triggers for migraine. Insomnia, which involves difficulty getting to sleep or staying asleep, is one of the most researched causes for sleep-related migraine (Pallesen, 2001). Excessive daytime sleepiness (EDS) is also commonly associated with migraine. EDS is defined as difficulty maintaining a desired level of wakefulness, and patients diagnosed with the disorder often experience migraine headaches after dosing off during the day (Young, 2004). EDS is relatively prevalent in the general population, ranging from 10% to 20% and increasing in the very young and very old (Hasler, 2005). EDS is usually caused by poor sleep quality at night, which can sometimes be associated with insomnia (Carskadon, 1993). To a lesser extent, narcolepsy (symptoms similar to EDS) and sleep apnea (pauses in breathing during sleep which cause an individual

to wake up sporadically) have been studied to determine whether or not they might be associated with migraine (Bixler, 2005).

For more than 100 years, medical personnel and researchers alike have noticed an association between sleep problems and headaches (Sahota, 1990). One of the main causes of confusion, however, is whether the headaches are the cause or the result of disrupted sleep. While interruptions in sleep patterns can cause migraine headaches to become more prevalent, migraines can have the same affect on the sleeping disorders themselves (Paiva, 1997). The determination of which comes first, the sleep disruption or the migraine, is the subject of much current research (Woeber, 2007; Lee, 2009).

#### Hormones (Kelly Pritzl)

Previous research indicates that headaches are three times more common in adult females than adult males. (Evans et al, 2000) The reason for this staggering statistic could be due in part to differences in male and female hormones and levels of hormones. (Evans et al, 2000) The major male and female hormones are estrogens and androgens. Men produce significantly more testosterone, a type of androgen, per day than women (7 mg vs. . 5 mg), while women produce more estrogen per day than men. A woman experiences more fluctuations in hormone levels during her life than a male does. During these times of fluctuation, many women will have an increased incidence of migraine, suggesting that fluctuations in hormone levels play a role in the onset of migraine. (Lee, 2009) Some of the hormones that may be involved in the onset of migraine are estrogen, progesterin, androgens,

testosterone, and serotonin. (Glass, 2009) The mechanisms by which these hormones are involved are not clear, but there is strong evidence for the role of hormones in precipitating migraine attack. (Glass, 2009)

There is particular evidence for the role of hormones in causing migraine attacks in women. Before puberty, males and females tend to experience migraines at the same rate, there is a sharp increase in the number of girls over boys who experience migraine at the mean age that girls begin menstruating. (Dzoljic et al, 2002) Pregnancy also seems to have an effect on the occurrence of migraines. During pregnancy, there is an increased level of estrogen in the body. Many women either experience an absence of headache when they otherwise suffered from migraine on a regular basis, or they experienced an increase in frequency of headache when they typically did not have migraines. (Robbins, 2002) Another instance of the role of hormone involvement in migraine attack in women is the increase in incidence of migraine as women near menopause, a time of decreased estrogen production. (Robbins, 2002)

While there are many different hormones that may have an effect on incidence of migraine, the main focus of this research will primarily be on the mechanisms by which estrogen may induce migraine, with respect to different times in a woman's life estrogen levels fluctuate, such as during menstruation, pregnancy, and menopause. Estrogen is a type of steroid hormone and is considered the primary female sex hormone responsible for regulating the normal sexual and reproductive development in women.

(Robbins, 2002) Organ systems such as the musculoskeletal system, the cardiovascular system, and the brain are affected by estrogen. (Robbins, <https://assignbuster.com/an-investigation-into-the-causes-of-migraine-headache-nursing-essay/>)

2002) There are two approaches to the current understanding of the role of estrogen in migraines. One type is estrogen withdrawal headache. This happens after a severe drop in estrogen levels in the body, such as during menstruation, during menopause, or post-partum. The second type is exogenous hormone induced headache. This occurs during or after the use of oral contraceptives or hormone replacement therapy. (Kibler et al, 2005)

A comparison of studies that examines the correlation between levels of estrogen during certain periods of a woman's life and the incidence of migraine will allow better understanding of the function of this hormone as a cause of migraine. Very little is known about the way in which estrogen actually precipitates migraine, but with an enhanced understanding of the current research that has been done, future research will be promoted on a topic that affects such a considerable proportion of migraineurs.

#### Food (Brandon Pellerin)

Various foods have been suspected of triggering migraines for decades (Grant, 1979; Peatfield, 1984). In susceptible people, certain foods and particular compounds contained in these foods are believed to induce trigeminovascular (warning system to protect the brain from tissue injury and toxins) neurons to release neurotransmitters such as calcitonin, gene-related peptide and substance P. The release of these neurotransmitters leads to vasodilation (widening of blood vessels), mast cell degranulation (release of molecules from secretory vesicles called granules), increased vascular permeability (capacity of a blood vessel wall to allow the flow of small molecules), and meningeal edema (accumulation of fluid within the



meninges) resulting in neurogenic inflammation (release of inflammatory mediators from neurons) (Sun-Edelstein, 2009). Many common foods such as wheat, eggs, beef, and corn are documented migraine triggers (Grant, 1979). However, the most prevalent food precipitants of migraine are alcohol, chocolate, coffee, fatty foods and artificial sweeteners (Peatfield, 1984).

Various compounds present in common foods are suspected to play important roles in the triggering of migraines. Certain amines such as tyramine and phenylethylamine are thought to be precipitators of migraines and are present in alcohol and chocolate (Sun-Edelstein, 2009, Marcus, 1997). Caffeine, also present in chocolate, is believed to be the culprit of coffee's capacity of being a trigger (Sun-Edelstein, 2009). Artificial sweeteners themselves such as aspartame and more recently sucralose, have been subjects of research as to their ability to precipitate migraines (Sun-Edelstein, 2009; Bigal, 2006).

However, not all migraineurs exhibit sensitivity to food and those that do are not equally affected by each trigger. The food that affects one person may not be the same food that triggers migraine in another, while at the same time a third person may be affected by both. The inconsistency of results keeps food as a continued subject of debate and study in migraine precipitation.

The purpose of this research was to determine the role, if any, that sleep disorders, hormones, and food play in the triggering of migraine headaches. The goal of this study was to determine if there is any validity to the

conjectures that these are triggers for migraine and if so, which trigger plays the largest role in determining whether or not migraine will occur.

To answer these questions, data was gathered from primary sources by searching PubMed and Biological Abstracts. From these studies, each researcher conducted his or her own analysis of the data found within a particular subtopic to determine what correlation that specific cause might have with migraine headache. The information collected in this portion of the research was then combined to determine the relative relationship between the triggers and migraine, using correlation data and p-values to determine which was the overriding cause of migraine headaches.

## **METHODS**

### Sleep Disorders (Amelia Van Handel)

In order to find articles relating sleep disorders to migraine, the database Biological Abstracts was used. This database was chosen because Biological Abstracts includes articles from all science-based subject areas and includes many reviews and other literature forms, which proved helpful for background or supplemental information. This database was also chosen because it was a good resource for primary research sources relating to the specific subject matter.

Having chosen this database, the search was initiated using keywords relating to the topic. Initially, the subtopic for this section of the research was sensory stimuli, so the search began with the keywords “migraine headache\*” and “light”. The word “headache” was truncated so as to provide a larger base of results. This returned 31 articles, but after looking <https://assignbuster.com/an-investigation-into-the-causes-of-migraine-headache-nursing-essay/>

through them, it was determined that most of them were reviews. The lack of primary research led to a search other types of stimuli, common food triggers, and even specific symptoms of migraine associated with the senses. When none of these provided the intended results, it was determined that this subtopic should be changed. Leaving the idea of sensory stimuli behind completely, a search was performed using the words “migraine” and “sleep”, which yielded 38 articles. The number of articles and the quality of the source material fit the needs of the research, and thus the search was completed.

With a manageable number of articles, those which were most pertinent to the subtopic of sleep disorders were chosen for further analysis. The initial 38 were narrowed by removing those articles which were not primary research. Although the reviews and other literature forms would be helpful for background information, they would not be useful in making comparisons and finding correlation. The article selection was further narrowed by looking for those articles which contained the metrics the research would focus on. With these parameters in place, only 12 articles remained, a number which was determined to be appropriate for drawing conclusions about the correlation between certain triggers and migraine.

The metrics of focus chosen for this research pertained to the quality of patients' sleep and the correlation this had to the number of migraines they experienced. Epworth Sleepiness Scale scores and Pittsburgh Sleep Quality Index made it possible to measure the quality of patients' sleep. The association between migraine and sleep disorders was reported in the

chosen articles, which aided in the determination of the relationship between sleep quality and the number of migraines experienced.

### Hormones (Kelly Pritzl)

All of the primary research articles relating to hormones as a cause of migraines were found online through the search engines Biological Abstracts and PubMed. The same process for finding citations was used with both engines. The search strategy consisted of first examining the results when “migraines” was entered into the search box. This yielded far too many results; the goal was to restrict the number of articles relevant to hormones as precursors of migraines to 40 or less. In order to refine the search, the entities “migraines AND hormones” were entered into the search box. To further refine the search, “migraines AND estrogen” was entered in and results were limited to “only clinical trials” and “articles in English only”.

After gathering 40 relevant research articles, five articles within these were found containing specific criteria in order to properly conduct the meta-analysis within the topic of hormones and across the three topics of sleep-induced migraines, nutrition and migraines, and hormones and migraines. The criteria for selecting the five best articles included: relevant and useful primary data, p-values, similar subjects and number of subjects, similar methods of data collection, and recentness of publication.

### Food (Brandon Pellerin)

To find relevant articles on the subject of food triggered migraines, the electronic databases Biological Abstracts and PubMed were used. Biological

Abstracts was used using a title search for the word “ migraine\*” with a secondary title search of “ food\* or diet\*”. This search turned up 30 records. The asterisk is used to search for any result which contains the root word. More specific searches were done by a title search of “ migraine\*” with topic searches of “ chocolate\*”, “ alcohol\*”, “ caffeine\*”, “ aspartame\*”, or “ sucralose\*”. Similar methods were used using the PubMed database with the exception of the use of the asterisk and the differentiating of topic searches and title searches. General searches were done using “ migraine and diet” and “ migraine and food”. More specific searches were done using the same keywords used in biological abstracts, joined by the “ and” limiter.

The articles searched for were published in relevant scientific journals and pertained to the topic of food and its potential to precipitate migraines. Articles that were chosen contained two types of data. One set of data included the results of general surveys that were done to ascertain details of migraineur’s attacks, such as various triggers. The second type of data obtained were results from studies of specific foods documented as triggers for migraine. When an article seemed to contain useful information and was able to be accessed online, it was saved as a PDF file for future reference.

The data collected from the general surveys consisted of questionnaires asking for details of subject’s migraines. A vast amount of information was collected in these surveys such as the type of migraine (with or without aura), associated symptoms of migraine (photophobia, nausea, etc.), frequency, duration, and so on. The information important to this study was that concerning precipitants of migraines. Each survey documented the reported triggers of each subject if a trigger existed. This information is used <https://assignbuster.com/an-investigation-into-the-causes-of-migraine-headache-nursing-essay/>

to ascertain the prevalence of foods as triggers within the population that suffer from migraines.

The second data set used results from studies that sought to test whether suspected foods did indeed trigger migraines. The studies relied on correlating migraine occurrences with the consumption of particular foods. The studies analyzed diet and migraine diaries kept by the subjects. The diet records often required subjects to record all food consumption and the time at which it was consumed. Likewise, the migraine diaries required subjects to document the occurrence of migraines and details regarding them such as severity, duration, type, associated symptoms, etc. The studies analyzed the results by comparing the onset of migraine with the consumption of a particular food. If there was a significant increase in the amount of migraines after consumption of a particular food, it was reasonable to conclude it played a role in the triggering of the migraine.

## **RESULTS**

### Sleep Disorders (Amelia Van Handel)

As preliminary research, the results of five studies were analyzed. These studies were interested in finding the correlation, if one existed, between sleep disorders and migraine. Four of the five articles documented research conducted by asking patients to record the quality of their sleep and the number of migraine headaches they experienced, either in diary format or by answering questions in a comprehensive questionnaire (Woeber et al., 2007; Alstadhaug et al., 2007; Barbanti et al., 2007; Peres et al., 2005). The fifth article focused on removing the stimulus - i. e. sleep problems - by providing

targeted behavioral sleep intervention (Calhoun et al., 2007). The researchers then analyzed whether or not there was an improvement in headache frequency to determine if sleeping disorders were correlated with migraine.

In order to conduct research on the relationship between sleeping disorders and migraine, only patients who suffered from both conditions could be included in the studies. To determine the level of sleep disruption, two studies measured excessive daytime sleepiness (EDS) as a function of a score on the Epworth Sleepiness Scale (Barbanti et al., 2007; Peres et al., 2005). A score of 10 or higher on the Epworth Sleepiness Scale indicated EDS. The first study (Barbanti et al., 2007) found that EDS was more common in migraineurs than in controls (14% vs. 5%), and the second study (Peres et al., 2005) found EDS occurred in 85% of chronic migraine sufferers. In the same study, dozing off was a headache trigger in 30% of all patients and 70% of patients with EDS. In both studies, patients who presented with EDS had more frequent migraines (Barbanti et al., 2007; Peres et al., 2005).

In the same two studies, the quality of sleep was measured using the Pittsburgh Sleep Quality Index (Barbanti et al., 2007; Peres et al., 2005). An overall score of greater than 5 separated poor sleepers from good sleepers on this scale. In both studies, about 90 percent of patients diagnosed with EDS were also categorized as poor sleepers using the Pittsburgh Sleep Quality Index (Barbanti et al., 2007; Peres et al., 2005). This provided further evidence that poor or inadequate sleep and migraine headaches often occurred in the same patients.

On the subject of correlation, all of the articles chosen for analysis found a correlation between sleep disorders and migraine, though most were hesitant to state definitively that the sleeping disorders were the direct cause of the migraine. Two studies found that patients with excessive daytime sleepiness and/or insomnia experienced more migraines after a night of restless or inadequate sleep (Alstadhaug et al., 2007; Barbanti et al., 2007). These migraines were more likely to occur during the morning hours (Alstadhaug et al., 2007). Conversely, another study which focused on EDS noticed a correlation between fatigue and migraine, but they did not believe the results to be conclusive enough to state whether migraines lead to EDS or if EDS is the primary condition leading to migraine (Peres et al., 2005). One study was tracking several different sleep disorders, but found their results to be inconclusive in determining which sleep disorder was most correlated with migraine (Woeber et al., 2007). The researchers did, however, come to the conclusion that tiredness increased the risk of headache and migraine (headache ratio increased from 0.689 to 1.184 in cases where patients were tired) (Woeber et al., 2007). The final study, which attempted to remove the sleep disruptions by using behavioral sleep intervention, found a significant decrease in headache frequency and intensity after successful sleep modification (Calhoun et al., 2007). They were also able to revert chronic migraineurs to episodic migraineurs after improving the quality of sleep in their patients. By the final visit, 48.5% of those who had received behavioral sleep modification instructions had reverted to episodic migraine (Calhoun et al., 2007).

Hormones (Kelly Pritzl)

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The purpose of the individual meta-analysis was to determine when hormones were most involved in the precipitation of migraine. Two of the studies used only females as subjects. (Dezoljic, 2002 and Kibler, 2005) The subjects in two other studies consisted of males and females with medically diagnosed cases of migraine. (Kelman, 2007 and Rasmussen, 1993) The subjects in the remaining study were self-reported male and female migraineurs (Russel, 1996) All of the studies were researching adults. The mean age of subjects for all the studies was the mid-thirties. (Dezoljic, 2002; Kelman, 2007; Kibler, 2005; Rasmussen, 1993; Russell, 1996)

The methods used in all of the articles were very similar. Four of the studies conducted a clinical examination to confirm a diagnosis of migraine and were followed by a questionnaire or an interview to collect data on lifestyle of the subjects and possible causes of their migraines. One of the studies involved self report of migraine status and if the subject indicated positively, they were issued a questionnaire. (Russell, 1996)

In all of the studies, incidence of migraine caused by fluctuations in hormones was overwhelmingly more prevalent in females than by males. This indicates that female sex hormones, such as estrogen, play a significant role in the onset of migraine.

Food (Brandon Pellerin)

Four articles were used that studied triggers of migraine in various populations (Kelman, 2007; Spierings, 2001; Takeshima, 2004; Chabriat, 1999). The studies used surveys to gather information about a population.

The individuals chosen for the surveys were either random people or known  
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migraine sufferers. In the case of the random surveying, individuals that reported having migraines were instructed to complete a detailed migraine questionnaire. Three of these studies (Kelman, 2007; Spierings, 2001; Chabriat, 1999) show evidence of food as a precipitant for migraine. Of these three studies, at least 26% of individuals documented food as being a trigger. The fourth study (Takeshima, 2004) shows little evidence of this as it reports less than 1% of surveyors listing food as a trigger. Of these four studies, two (Kelman, 2007; Spierings, 2001) listed alcohol as a separate category and reported about 40% of individuals claiming alcohol as a trigger for migraine.

Alcohol, chocolate, caffeine, and artificial sweeteners are among the most often cited food triggers for migraine (Sun-Edelstein, 2009; Peatfield, 1984). The high frequency of these claims makes these subjects of particular interest. Articles were obtained that studied these particular triggers in order to ascertain whether they did indeed trigger migraine.

Two case studies were found that documented the artificial sweetener sucralose as a probable precipitant of migraine (Bigal, 2006; Rajendrakumar, 2006).

In the two studies, migraine attacks were documented at least 90% of the time after the individuals consumed a beverage containing the sweetener. In one study this was ascertained through correlating a food diary with the occurrences of migraine (Bigal, 2006). The other study (Rajendrakumar, 2006) relied on administering different sodas that contained and did not

contain sucralose. It was found that only the sodas containing the sweetener triggered migraines.