WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 9, Issue 14, 579-585. Review Article ISSN 2277– 7105

RESTRICTION OF CAFFEINE INTAKE FOR THE TREATMENT OF MENIERE'S DISEASE

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Article Received on
16 Sept. 2020,

Revised on 06 Oct. 2020,
Accepted on 27 Oct. 2020

DOI: 10.20959/wjpr202014-19151

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ABSTRACT

Meniere's disease (MD) is a condition that causes hearing loss, dizziness/vertigo, ear pressure/fullness, and tinnitus (ringing in the ears). MD is an idiopathic disorder of the inner ear. Endolymphatic dropsy (EO) of the inner ear is currently considered to be the pathophysiological mechanism underlying typical symptoms of MS. First-line treatment usually includes dietary changes, such as a low-salt diet and reduced daily intake of alcohol and caffeine. Although some studies have shown a positive effect of these dietary restrictions, even in preventing recurrence, there is currently no uniform consensus on their usefulness. The studies on restriction of caffeine intake for MD therapy are still conducting inorder to determine the exact mechanism.

KEYWORDS: Meniere disease(MD), vertigo, hearing loss, tinnitus.

INTRODUCTION

Meniere's disease is a balance disorder that is caused by abnormally large amounts of fluid collecting in the semi-circular canals of the inner ear. It is also known as "Endolymphatic Hydrops." Meniere's disease usually affects one ear, but it can also happen in both ears at the same time.

Meniere's disease is characterised by recurrent attacks of vertigo accompanied by fluctuating sensorineural hearing loss, tinnitus and a sense of aural fullness. Prosper Meniere in 1861 correctly attributed the attacks to a disorder of the inner ear, suggesting that the mechanism of causation could be similar to migraine or inner ear vasospasm, a differential diagnosis which is still relevant for the disease today.[1] Meniere's disease can develop at any age, but it is more likely to happen to adults between 40 and 60 years of age.

The exact cause and reason why Meniere's disease starts is not yet known. Many theories have been proposed over the years. They include: circulation problems, viral infection, allergies, an autoimmune reaction, migraine, caffeine use and the possibility of a genetic connection.[2]

The American Academy of Otolaryngology - Head and Neck Surgery (AAO-HNS) has produced diagnostic guidelines (Alford 1972), which have since been revised twice. The guidelines state that a diagnosis can be made if the following criteria are met.

- at least two spontaneous episodes of rotational vertigo lasting at least 20 minutes;
- audiometric confirmation of a sensorineural hearing loss;
- tinnitus and/or a perception of aural fullness

When patients meet the AAO-HNS criteria and the symptoms are attributed to a specific cause they are classified as having Meniere's syndrome.[3]

Both alcohol and caffeine can result in vasoconstriction and a reduction in the blood supply to the inner ear, which may make patients' symptoms worse.[4] Caffeine is the most consumed psychoactive substance in the world and is found in many different products such as coffee, tea, chocolate, soft drinks, mate, guarana powder, diuretics, stimulants, analgesics, and anti- allergic.[5] Caffeine (1, 3, 7-trimethylxanthine) is a stimulant of the central nervous system belonging to the group of methylxanthines. Caffeine is a recognised ergogenic aid even at physiological levels and enhances concentration and alertness whilst reducing fatigue. A reduction in the intake of caffeine may lead to withdrawal effects in individuals who are accustomed to its effects, which can result in symptoms ranging from mood disturbance to headaches.[6]

Meniere's disease is characterized by episodes of spontaneous vertigo, usually associated with unilateral fluctuating sensorineural hearing loss (SNHL), tinnitus, and aural fullness.[7] It is believed that there is an association between the use or caffeine abstention with complaints of vertigo and tinnitus. However, the evidence supporting this claim is conflicting and sparse.[8,9]

Pharmacokinetic and Pharmacodynamic actions of caffeine

It is believed that, with regard to pharmacokinetics, caffeine has rapid absorption, 99% absorbed within 45 minutes after its ingestion.[10,11] It is fat-soluble, being able to overcome all biological barriers.[10] The plasma concentration in humans is achieved between15 and 120 minutes after intake.[12] In humans, doses below 10 mg/kg have half-life by 2.5–4.5 hours and was not related difference in young and elderly subjects.[11]

Caffeine mechanism of action for the production of these effects has not been fully elucidated. However, it is known that the caffeine molecule is chemically similar to other metabolically important compounds such as purines (adenine, guanine), adenosine, xanthine, and uric acid. Due to the structural similarity of caffeine molecule with adenosine, caffeine connects itself to adenosine A1 and A2A receptors, blocking them. Thus, adenosine cannot perform their inhibitory effect, which occurs through the release of several neurotransmitters, such as glutamate, acetylcholine, monoamines, and gamma-aminobutyric acid.[13]

Other effects such as the inhibition of phosphodiesterase (cAMP enzyme inactivating) and release of intracellular calcium are also described, however, occur only at high doses of caffeine, which cannot be achieved only with the coffee intake. It is suggested that the mechanisms are unrelated to the central effects of caffeine.[14] Studies suggest that caffeine also has a vasoconstrictor effect, especially when binds to A2 receptors.

The most common symptoms of the withdrawal of caffeine are headache, fatigue, lethargy, flu-like symptoms, and mood disorders.[15] These effects appear 12–14 hours after discontinuation of caffeine consumption and dissipate between 4 and 7 days after their occurrence.[16]

Caffeine and Meniere's disease

Meniere's disease is characterized by recurrent vertigo, fluctuating hearing loss, and persistent tinnitus.[17] The traditional treatment for Meniere's disease involves, in addition to medication and surgical procedures when indicated, a diet that restricts sodium, caffeine, and alcohol.[18]

Some authors argue that the treatment of Meniere's disease is empirical and propose foodrestriction as an initial treatment step, not justifying the need to abstain from caffeine.[19] The recommendation of a diet free of caffeine for Meniere's disease is based on the professional's experience, without scientific evidence. It was believed that sodium restriction followed the same idea of the use of diuretics, or reduced fluid retention in the inner ear. However, it was proved that the critical feature is the sodium level constant.[20] The justification for the recommendation given to Meniere's disease patients to avoid salt is the same to avoid caffeine. It is based on the theory that considers Hydrops as a cause, not symptoms of the disease. They believed that this substance causes large fluid shifts through physiologic compartments and hence result in inner ear instability.[09]

Three systems (vestibular, visual, and proprioceptive) interact with each other to ensure the body balance. The vestibular system has three functions: to provide information about body position, correct body movements that deviate from its center of mass, and control eye movement to keep the visual motor while the individual or the environment is in motion.[22] The posterior labyrinth is a highly sensitive organ to changes in other organs and systems, and many of these changes manifest themselves primarily with vestibular symptoms. It is related to cervical problems, cardiovascular problems, migraine, metabolic and/or hormonal changes, psychiatric disorders, neurological diseases, and the use of medications such as antibiotics, anti-inflammatories, diuretics, and psychotropic substances with labyrinthine disorders.[23]

STUDIES

The effectiveness of cessation of caffeine consumption in remission of dizziness was investigated previously. For this purpose, patients received this orientation, only being used drug treatment if symptoms persist 4 weeks after the initiation of restriction. Only 14% of participants reported some improvement in symptoms in the period in which it was only oriented diet.[23] Investigating the vestibulocochlear findings in patients with Type 1 diabetes mellitus was found large percentage of vestibular disorders in these patients (60%). Regarding the complaints and harmful eating habits, caffeine abuse was the most prevalent of them, reported by 20% of patients.[24]

In 2005, a comparative study was conducted, in which the study group and the control group were formed by the same patients in normal habits and caffeine restriction. Patients received as instruction for the first vestibular test (vectoelectronystagmography): fast 3 hours before the test, suspension of nonessential drugs and alcohol (72 hours before the test), and cigarette and products containing caffeine (24 hours before). The second test had the same guidelines except the restriction of the use of products containing caffeine. Most participants (68.4%) chose to undergo the examination with the habitual intake of caffeine. The most frequent complaints during the examination caffeine abstention were anxiety (92.3%), headache (69.3%), nausea and/or vomiting (38.5%), and more intense vertigo during the test (38.5%). As the result of the examination, no abnormality was found in the oculomotor tests and there was no statistically significant change between the responses found in the caloric test.[25]

A study performed with 30 healthy young individuals aimed to investigate the influence of caffeine on vectoelectronystagmography and VEMP. For this, they performed the tests twice,

once with 24-hour restriction of the use of caffeine and other after drinking a cup of coffee. The results showed that moderate caffeine consumption did not influence the test results.[26]

Sanchez-Sellero observed that caffeine should be considered as a precipitating factor for the onset of symptoms in people predisposed to developing Menière's disease. The authors suggested that it should be recommended to reduce caffeine intake in those population groups with higher risk of Menière's disease.[27]

A larger number of studies have been found attempting to investigate the effects of caffeine in the auditory system. It is believed that caffeine affected the peripheral and central auditory pathways.[28]

CONCLUSION

Apart from pharmacotherapy physicians recommend to reduce the intake of salt, caffeine and alcohol for the therapy of Meniere's disease. Caffeine despite being widely consumed has no mechanism of action fully elucidated. The vestibular and auditory systems may be influenced by substances that alter the homeostasis of the organism. Thus, while the interaction of caffeine with cochlea and the posterior labyrinth is not better elucidated, the diet recommendations for evaluation and therapy of patients with vertigo and tinnitus remain based on clinical experience. It will be finally necessary more studies to elucidate these questions aiding in driving the most effective treatment for the patient with Meniere's disease.

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