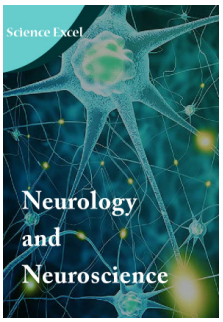
Neurology & Neuroscience

Case Report



Intranasal Infrared Light and Migraine: Case Report I

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Abstract

A case report is presented of a 79-year-old female who experienced Migraines intermittently since age 14. As noted in the report, she experienced immediate relief after using a semiconductor light-emitting diode (LED): Wavelength: 810 nm; Energy output: 10 mW/cm²; Pulse mode: 10 Hz at 50% duty cycle; Exposure: upwards of 25 minutes in each nostril. The intranasal procedure offers a distinct advantage by directing the convex light beam emitted by a single light source into the nasal cavity. The light beam from the LED illuminates the underside of the brain, including the midbrain, which specifically acts as a pain-modulating center deeply involved in Migraine generation.

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Introduction

Ancient Egyptian papyrus (1200–1500 BCE) described "sick headaches," presently referred to as Migraines. In medieval Europe, practitioners thought that an imbalance of four bodily fluids caused the “half of the skull” illness. Early European physicians used herbal remedies or sought to balance their patients’ humors through bloodletting by using leeches or a surgical knife.

It is now known that Migraines occur at three times the rate in females as compared to males. Specifically, Migraines are characterized by recurring, severely throbbing/pulsating head pain, typically one-sided, lasting from 4 to 72 hours. Symptoms often include nausea, light/sound sensitivity, dizziness, and occasional aura.

Common treatments include pain-relieving medication and lifestyle adjustments. Stress is the most common trigger of Migraines, affecting upwards of 80% of sufferers. Limited research has been conducted on infrared light therapy to remediate Migraines. It is thought that Photobiomodulation improves mitochondrial function, reduces inflammation, and supports blood flow.

Case Report

Susan, a 79-year-old married female, reported a history of intermittent Migraine attacks beginning at the age of 14. Historically, her maternal grandmother had menstrual Migraines, which, as a herbologist, she treated with peppermint aromatherapy. No other family members reported difficulties with Migraine headaches.

Initially, Susan's Migraines accompanied the onset of her monthly menstrual cycle, requiring bed rest for upwards of two days for each period. Her symptoms included nausea, vomiting, and throbbing in the head as well as extreme sensitivity to light and sound. Additionally, she had extreme blood clots vaginally. A physician described her difficulties as being due to hyperovulation, which derives from the release of multiple eggs. Additionally, the doctor determined that this was due to maternal genetic factors.

At age 19, Susan experienced a severe concussion and injury to her neck vertebrae. following a sports-related incident. Consequent to this experience, migraines occurred weekly. Over the period of a year, she also experienced menstrual headaches monthly, which were non-Migraine in nature. Her grandmother taught her to use peppermint oil for relief.

At age 42, Susan experienced another sports-related injury resulting in what appeared to be a traumatic brain injury (TBI), producing additional Migraine episodes. “I was teaching girls’ gymnastics class at one end of the gym while boys played basketball at the other end. I was struck fully in the face by an overhand basketball pass, knocking me backward over the balance beam directly behind my back. I lost consciousness for several hours and lost awareness for two days.

I appeared to function, walk, and talk, but I had no awareness or memory of the incident. The neurosurgeon could not detect nerve impulses in the right leg or arm, and my right eye was blind, yet he determined there was no way to connect to the injury or correct it based on his X-rays. As a last-ditch effort after 19 months of being bedridden, a friend took me to a chiropractor. His X-rays showed that my atlas vertebrae were twisted, putting pressure

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on my brain stem, causing loss of neuron connections in my leg, arm, and eye, plus the devastating headaches. After I received chiropractic adjustments, all of my symptoms subsided."

At the age of 62, Susan again experienced the onset of Migraines following a stroke. She recalled that her physical therapist noted that this was a fairly common occurrence among those patients with prior stroke experiences. Her neurologist concurred, advising her to live with her condition as it would be likely that the side effects of treatment would be worse than the headaches themselves. The Migraines resulting from the stroke were different from previous ones, signaling the onset. The new Migraines occurred suddenly and included disturbances such as flashing lights and blind spots, blending into a sense of looking through a diving mask underwater. Sometimes, the accompanying aura involved tingling or numbness. The aura lasted between twenty minutes and one hour. Typically, the accompanying headache required Susan to avoid light or sound and to remain in complete bed rest for upwards of two days to attain a full recovery.

At age 78, Susan was introduced to intranasal red-light therapy by a colleague psychologist. She was initially provided with a trial unit and an explanation of how the procedure might alleviate her Migraine symptoms. She was advised to use red light therapy twice daily, only during daylight hours, starting with 5 minutes per nostril and gradually increasing to 20-25 minutes per nostril.

"Amazingly, the first time I used the red-light therapy for my Migraine, it went away. Thereafter, when a Migraine struck me, with its aura, flashing lights, and visual distortions, I would immediately engage the red-light therapy, and within 10 minutes, the Migraine episode would end. I used the loaner unit provided by the psychologist for ongoing treatment for 4 weeks before I purchased my own unit. After the first week of use, I didn't suffer any Migraines. I still have a hard time believing that this simple yet complex intervention could end my years of suffering."

Comments

Susan presented with multiple contributors to her Migraine condition, including genetic factors, traumatic brain injury, and stroke. A review of the literature supports the use of intranasal light therapy as promising for neurological conditions. All of the elements of intranasal light therapy appear to have a sound scientific basis. The direct and indirect evidence suggest that the usage of this intervention poses insignificant risks and minimal side effects [1].

In regard to brain injuries, it is considered to be a major medical problem, with more than five million Americans living with TBI-related disabilities. "Nonpenetrating, mild TBI (mTBI) is the most common type (75%). mTBI is defined by loss of consciousness (LOC) lasting ≤30 min (or no LOC), and with a period of altered mental status (amnesia/confusion) lasting up to 24 hrs. Persistent cognitive problems occur in 5–22% of cases.

Sports-related concussion or mTBI, followed by cognitive dysfunction are of increasing concern both in males and females. With each successive concussion, there is a cumulative effect, including a prolonged period of recovery and progressively increased risk for re-injury. Approximately 53% of individuals with TBI also report sleep disturbances. Poor sleep disrupts the clearing of metabolites from the brain, including β-amyloid and other potentially neurotoxic waste products that accumulate during periods when a person is awake [2]."

A post-TBI decrease in memory function was found in 60 of 84 (71.43%) of studies related to head injuries sustained through athletic competition. "Visual and verbal memory were the two most studied types of memory, which were typically measured by the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT). American football and soccer were the most studied sports among the injured athletes. Only three interventional studies were identified that examined post-TBI memory rehabilitation in this population" [3].

A policy statement from the American Heart Association/American Stroke Association focuses on "(1) the provision of quality stroke rehabilitation to prevent complications, facilitate recovery, and limit disability, (2) the creation of evidence-based policies to improve equitable access, effectiveness, and efficiency of postacute care, (3) the development and use of performance measures that are aligned with the American Heart Association/American Stroke Association Guidelines for Adult Stroke Rehabilitation and Recovery to incentivize optimal patient care, and (4) identification of research priorities targeted to improve stroke rehabilitation access [4]." The intent of the above statement calls for sustained action to ensure that stroke rehabilitation treatment advances effective interventions across the continuum of care.

In the context of the above statement, the intranasal infrared light procedure is relatively affordable and can be readily applied at home for those who have experienced a stroke. "All treated patients showed faster rehabilitation with recovery after the stroke. The mechanism of the effect of ILIB on the brain is not completely clear; however, the authors indicate that, according to single-photon emission computed tomography (SPECT), the laser exposure increases regional cerebral blood flow, which improves motor, sensory, and cognitive recovery. To obtain a stable clinical effect, at least 10 sessions are required [5]."

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