

March 17, 2023 4 min read

Q&A: Hyperbaric oxygen therapy improves cognitive function in children after concussion

Results of a randomized, double-blind trial showed that hyperbaric oxygen therapy improved cognitive and behavioral function in children experiencing persistent post-concussion syndrome, as published in *Scientific Reports*.



Amir Hadanny

Amir Hadanny, MD, chief researcher and head of global clinical operations for Aviv Clinics and certified neurosurgeon, hyperbaric physician and chief medical research officer at the Sagol Center, and colleagues said that persistent post-concussion syndrome (PPCS) is commonly seen in children after traumatic brain injury.

Previous studies have shown adults with PPCS benefit from hyperbaric oxygen therapy (HBOT), prompting researchers to study this treatment in children aged 8 to 15 years who experienced mild to moderate TBI 6 months to 10 years prior that resulted in PPCS.

Fifteen children received HBOT daily for 60 days and 10 received sham treatments, according to the study.

Researchers reported significant increases in general cognitive score, memory, executive function, emotional score, behavioral symptoms, global executive composite score and planning/organizing. These outcomes also correlated with significant improvements in brain MRI microstructural changes.

“The study suggests that HBOT improves both cognitive and behavioral function, PPCS symptoms and quality of life in pediatric PPCS patients at the chronic stage, even years after injury,” the authors concluded.

Healio asked lead study author, Hadanny, to describe how HBOT works and the significance of the study results.

Healio: Please explain how HBOT works.

Hadanny: Before HBOT is considered or included in a patient’s personal treatment plan, each candidate goes through a comprehensive physical, psychological and physiological assessment that includes blood tests, advanced brain imaging (MRI scans and SPECT [single-photon emission computerized tomography] scans), fitness and nutritional analysis.

Once approved for the 12-week program, patients go through 2-hour sessions, 5 days a week, in the comfortable, spacious, multiplace hyperbaric oxygen chambers where they are monitored by medical professionals trained for the specialized hyperbaric environment. Each 2-hour treatment is conducted at a specific therapeutic, yet safe, pressure of 2 atmospheres absolute, equal to the pressure found at 33 feet below sea level.

During the session, the patient breathes 100% oxygen through a personal mask in a unique protocol. The inhaled oxygen fluctuates to harness the body’s regeneration processes. While in the multiplace chamber, patients are seated (as if in a first-class airplane cabin) and participate in a purposeful series of brain exercises on Aviv Clinic’s customized digital tablets.

HBOT helps reverse cognitive and physical injuries by increasing the overall oxygen supply to the body and allowing the brain to recover by triggering neuroplasticity. The method of fluctuating oxygen delivery through Aviv’s treatment program triggers the body’s inherent abilities for regeneration and repair. The body senses the relative change in oxygen and triggers a physiological response; this activates HIF-1 alpha, creating the environment for angiogenesis and stimulation of stem cell proliferation.

Studies have shown that this physiological pathway improves cerebral blood flow, brain metabolism and brain microstructure, leading to improved cognitive and physical functions.

Healio: Does this type of technology need to be FDA-approved? If so, is it?

Hadanny: While HBOT is FDA-approved for several conditions, including burns, carbon monoxide toxicity and decompression sickness, it's not yet approved for post-concussion syndrome.

Our goal is that through more than 10 years of research and the work of other hyperbaric scientists and researchers, our HBOT protocol will be recognized by the FDA as treatment for conditions like post-concussion syndrome. The same protocols used in HBOT clinical trials are duplicated precisely at Aviv Clinic's Florida-based facility.

Aviv's approach to HBOT is far safer than the mild-HBOT or monoplace HBOT chambers currently found in many non-health care facilities, which are not monitored by physicians and can be hazardous if not properly maintained or utilized without scientifically proven protocols. Mild-HBOT "beds" or monoplace chambers are not the same state-of-the-art multiplace chambers that are tested, proven and backed by our double-blinded, sham-controlled clinical studies.

Healio: Please describe how the results of this study are significant to the treatment of post-concussion syndrome in children.

Hadanny: This study is significant because not only is it the first trial that evaluates the treatment of persistent post-concussion syndrome in children, but it also is the first to do that using this unique HBOT protocol. The study provides double-blind, high-quality results suggesting the improvement of cognitive and behavioral function.

This is particularly important as it positively impacts children suffering from persistent post-concussion syndrome even years after the initial brain injury. According to the Brain Injury Association of America, about half a million children suffering from a concussion or traumatic brain injury are discharged from emergency departments in the U.S. each year. While the majority recover in the days and weeks following injury, up to 25% endure symptoms for more than 3 months after their injury and are considered in a persistent post-concussive state, although few are diagnosed accurately.

Children suffering from persistent post-concussive syndrome can experience fatigue, anxiety, irritability, headaches, dizziness and difficulty concentrating or processing words. These symptoms are greatly misunderstood and understudied and often misdiagnosed as other behavioral issues.

Current guidelines for treating concussions span only the first 2 weeks of symptoms. Leaving the brain injury untreated puts the child at a significant disadvantage, directly impacts their development into adulthood and can lead to the need for more mental health care in the future.

The findings of our trial showed a significant increase in cognitive, memory and executive function following the HBOT treatment program. The MRI scans showed improvement in brain structure post-treatment.

Healio: How accessible is such treatment to physicians across the country?

Hadanny: Variations of hyperbaric oxygen chambers are widely available to physicians across the country, but the therapy program and protocols provided at Aviv are exclusive. Aviv Clinics offer HBOT at the core of its brain performance program and involve a specialized, comprehensive approach tailored for each patient, including cognitive and physical training and ongoing medical support from experts tracking progress throughout the program.

Unlike other HBOT monoplace chambers, medical professionals join patients inside the suite during every session. In the unlikely scenario that a problem arises, the medical team is available to administer treatment immediately.

Reference:

- [Hadanny A, et al. *Sci Rep.* 2022;doi.org/10.1038/s41598-022-19395-y.](https://doi.org/10.1038/s41598-022-19395-y)

Sources/Disclosures

[Collapse](#) —

Source: Healio Interviews

Disclosures: Hadanny is chief researcher and head of global clinical operations for Aviv Clinics and chief medical research officer at the Sagol Center. Please see the full study for all authors' financial disclosures.

Read more about

hyperbaric oxygen therapy

cognitive function

post-concussion syndrome

Trending

Ads by 

Activation in Fronto-Parietal Networks Normalizes After Cognitive Therapy Findings seen for unmedicated youths with anxiety disorder who have normaliz

[HealthDay](#)

Price of Prescription Drugs Almost Threefold Higher in the United States for brand-name originator drugs 422 percent higher; price ...

[HealthDay](#)

Pulmonary Arterial Hypertension: Advances in Diagnosis and Treatment

[Healio](#)

Neurotrophic Keratitis: Improving Detection and Restoring Sensation

[Healio](#)