

# REVIEW OF THE LITERATURE

■ **Marc B. Taub, O.D., M.S.**  
Southern College of Optometry  
Memphis, TN

## Abstract

*A Review of the Literature is a new feature of the Journal of Behavioral of Optometry that will serve to bring to light numerous studies that have been published recently. Most optometrists find it hard to keep up with the mountains of articles in the four to five journals and magazines received regularly. There is so much out there like 'nuggets of gold' waiting to be unearthed. A few articles on a specific topic will be shared in each issue of this Journal. It is hoped that readers will find this helpful in daily practice, and are encouraged to contact the JBO with recommendations for future topics. This review topic is traumatic brain injury.*

**McKenna K, Cooke DM, Fleming J, Jefferson A, Ogden S. The incidence of visual perceptual impairment in patients with severe traumatic brain injury. Brain Injury 2006;20:507-18.**

Visual perceptual deficits can have adverse effects on the quality of life of any patient but for those that have suffered a traumatic brain injury (TBI), it can be devastating. Academics, work, social interaction and emotional well being can all be harmed to some degree. Imagine being a successful business person such as an accountant and you can no longer follow columns on the page or remember the numbers that you are trying to calculate. This can alter your ability to perform your job, but can also impact how you interact with clients if for example, you could no longer socialize in large crowds. While the broad aim of rehabilitation is to achieve the best functional outcome for the patient, the problems that occur must be investigated and recognized by the multi-disciplinary treatment team. This study investigated the incidence of visual perceptual impairment in a population of patients with TBI versus a healthy sample.

Thirty one patients with TBI and 195 healthy subjects were recruited to the study. The patients in the TBI group were inpatients or outpatients, over 15 years of age, who were sampled from the brain injury unit of a major metropolitan hospital in Brisbane, Australia between September 2003 and March 2004. To be included, participants were required to: 1) have a diagnosed TBI and have emerged from post-traumatic amnesia, 2) be able to speak, read and understand English well enough to give informed consent, under-

stand test instructions and complete the tests items or have an interpreter available to assist with these tasks, 3) be able to hold a pen, and 4) be in stable medical condition. Exclusion criteria included having a visual impairment interfering with functional reading ability, receptive aphasia, previous psychiatric history and memory or cognitive deficits unrelated to the TBI. Sociodemographic characteristics and clinical information of both groups were recorded for analysis.

The Occupational Therapy Adult Perceptual Screening Test (OT-APST) was used in this study as the primary outcome measure. It is a standardized test used to screen for visual perceptual impairment and apraxia in adults. It takes approximately 20-25 minutes to complete and includes 25 items in seven sub-scale areas including: agnosias, visuospatial relations (unilateral neglect and body schema), constructional skills, apraxia, acalculia, and functional skills. Also performed were the Functional Independence Measure (FIM), the Barry Rehabilitation Inpatient Screening of Cognition (BRISC) and the Riverhead Behavioral Memory Test (RBMT).

There was a significant difference between the TBI and normative samples for age ( $p < 0.001$ ), education level ( $p = 0.011$ ) and employment type ( $p < 0.001$ ). Compared to the normative sample, the TBI group was significantly younger, more had 11-12 years of trade certificate education, fewer had tertiary education and more were employed as a tradesperson, laborer or student. Using chi-square analysis, significant differences were found between the groups on the OT-APST in the following areas: agnosia, unilateral neglect, body schema, constructional skills and apraxia.

The incidence of impairment was higher in the TBI group for each sub-scale. The areas of acalculia and functional skills were not found to be significantly different between the groups studied. In looking closely at the number of impairments each participant had, 88.2% of those in the normative group, and only 35.5% of those in the TBI group reported no impairment. Those with two or more sub-scale impairments made up 11.8% and 35.5% in the normative and TBI groups respectively. In comparing the three sub-scales with incidence impairment greater than 25% (body schema, constructional skills and unilateral neglect) to the FIM, RBMT, BRISC and length of post-traumatic amnesia, no significant differences were found between the groups.

While the authors caution using this study to generalize people with TBI living in others areas, and with different socioeconomic and cultural backgrounds, those that treat patients with TBI know that impairments do not understand these study limitations. While the TBI group studied is admittedly small, and was culled from one rehabilitation facility during a seven month period, this study clearly demonstrates differences in performance using a valid test of visual perception and agnosia in adults (OT-APST). The authors provided explanation as to why the OT-APST did not correlate with the other measures in terms of several of the measures being only screening tools and not full assessments. To the doctors that perform neuro-rehabilitation, the fact that patients with TBI suffer from visual perceptual deficits might not come as a surprise. This study, while small in scope, does provide yet more evidence as to the need for evaluation and treatment in this population. Further investigation in the form of multi-site, double blinded study is warranted in this area to gain greater acceptance concerning the impact, and need for evaluation and treatment for those that suffer from visual perceptual deficits related to TBI.

**Doble JE, Feinberg DL, Rosner MD, Rosner AJ. Identification of binocular vision dysfunction (vertical heterophoria) in traumatic brain injury patients and the effects of individualized prismatic spectacle lenses in the treatment of postconcussive symptoms: a retrospective analysis. Physical Medicine and Rehabilitation 2010;2:244-253.**

While there are a multitude of studies beginning to enter the literature regarding the visual problems associated with TBI, lagging behind are those showing possible treatments and success rates. Patients with TBI commonly suffer from defects in visual field, accommodation, fusion, and information processing which can have a severe impact on their quality of life. Vertical heterophoria (VH), a form of binocular vision function, is associated with a set of symptoms that overlaps with those common with TBI, and according to the authors of this article, the association between the two is lacking. This retrospective study investigated the incidence of VH in a TBI population as well as the effect of individualized prismatic lenses on postconcussive symptoms.

A retrospective search of the database of patients at one of the author's optometry practice between January 2005 and April 2008 identified 83 patients with TBI that had been referred by a second author of the article. These patients had remained symptomatic with postconcussive symptoms following standard treatments and medications as directed by this physician and assorted specialists. About half of the patient records (n=43) were selected for analysis while the remaining 40 patients were eliminated due to incomplete records, and lack of follow up. Treatment in the form of prismatic spectacles were issued based on "a process developed by the optometrist," in which prism was added to the baseline prescription in small amounts until symptoms were maximally reduced and the greatest amount of comfort was achieved. The primary and secondary outcome measures were mean improvement on the Vertical Heterophoria Symptom Questionnaire (VHS-Q) and the mean percentage of subjective improvement in symptoms relative to baseline. The VHS-Q is a 25 question Lickert scale type survey that queries the frequency of visual and physical symptoms such as dizziness, neck and shoulder discomfort and

tiring easily with close work. A total of 75 points is possible; each question receiving a score ranging from 0 to 3.

The most common symptoms reported included: headache/face pain/eye pain or strain (33 responses), dizziness/vestibular symptoms (21 responses), and vision symptoms such as blurred vision, diplopia or reading difficulties (20 responses). The mean baseline VHS-Q score was 34.8 ( $\pm 16.1$ ) on a scale of 0 to 75 points. The mean difference in score from before to after prism treatment was 16.7 points ( $\pm 12.8$ ) with a range of -1 to 52 points ( $p < 0.01$ ). The relative percent reduction in VHS-Q score was 48.1. The mean subjective improvement in symptoms was 71.8% ( $\pm 25\%$ ) with a range of 5% to 100%. The relative improvements in the outcome measures showed a small to medium correlation ( $r = 0.31$ ,  $p = 0.04$ ).

This study has significant limitations, some acknowledged by the authors and others not. The fact that a little under half of the patients were excluded from the study, the lack of a placebo control group and the patients knowing their treatment were points put forth by the authors. The major weakness was related to the primary outcome measure. The VHS-Q has not been studied in a published study and there is no indication of reliability or validity. There is also no indication as to what a high or low score might be. While these flaws exist, this study does in fact show that there is a significant improvement in subjective symptoms with correction of vertical heterophoria using prismatic spectacles. The question remains as to the long-term impact of this treatment approach and if treatment with neuro-rehabilitation, either concurrently or in place of the prismatic correction, might prove as or more effective.