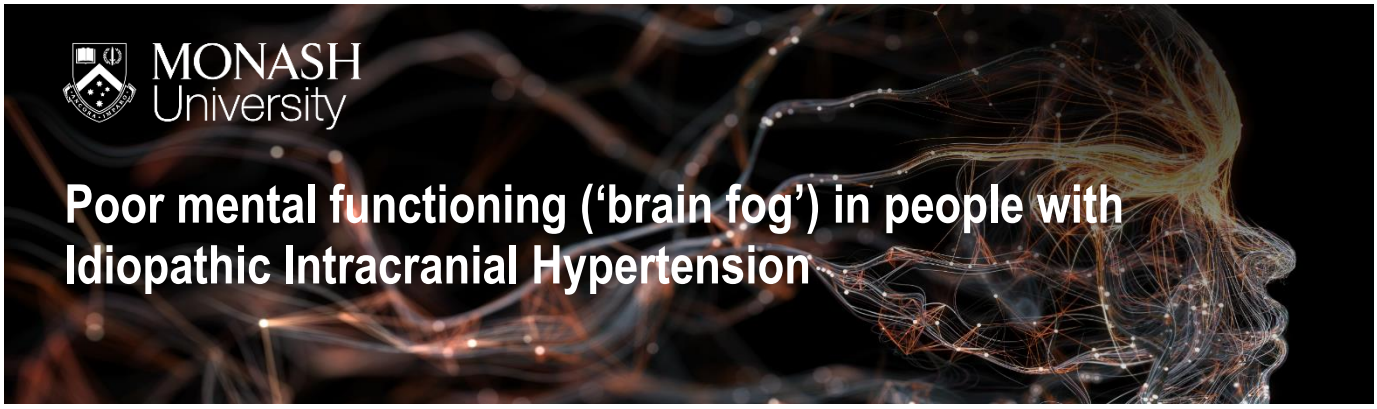

Source: Wang W, Clough M, White O, Shuey N, Van Der Walt A, Fielding J. Detecting Cognitive Impairment in Idiopathic Intracranial Hypertension Using Ocular Motor and Neuropsychological Testing. Frontiers in Neurology. 2021; 12: 2085 https://www.frontiersin.org/article/10.3389/fneur.2021.772513

What is this research about?

Idiopathic intracranial hypertension (IIH) is a rare condition, mostly seen in women, that does not have a known cause or causes. The condition results in a rise in fluid pressure around the brain. This fluid is called cerebrospinal fluid and it cushions the brain and spinal cord to protect it from injury. The fluid helps to regulate automatic blood flow around the brain. People experience disabling headaches daily, difficulties seeing, double vision, swollen optic discs (the part of the eye that transfers signals from specialised cells to the optic nerve) and loss of vision, which can be permanent. People also have difficulties with their mental function, which they describe as 'brain fog or fogginess' (cognitive changes). But these difficulties with mental function are less recognised and understood in the clinical setting. Whether these difficulties happen because of other symptoms of the condition or that they are a unique symptom of the condition is yet to be uncovered. All of these symptoms affect a person's daily living, in terms of their employment or outcomes of their treatment.

What Did the Researchers Do?

Our main goal for this research study was to show the changes in mental function in people with Idiopathic Intracranial Hypertension. We also wanted to see if any of these changes had a link to common clinical features or symptoms of the condition (e.g. weight, waist circumference, mood or headache) and if they changed over time (e.g. three and six months).

Healthcare specialists called neuro-opthalmologists or orthoptists (see figure below) provided a thorough neurological and neuro-opthalmic assessment to each person who took part in the study (a group of 22 people with a new diagnosis of Idiopathic Intracranial Hypertension).

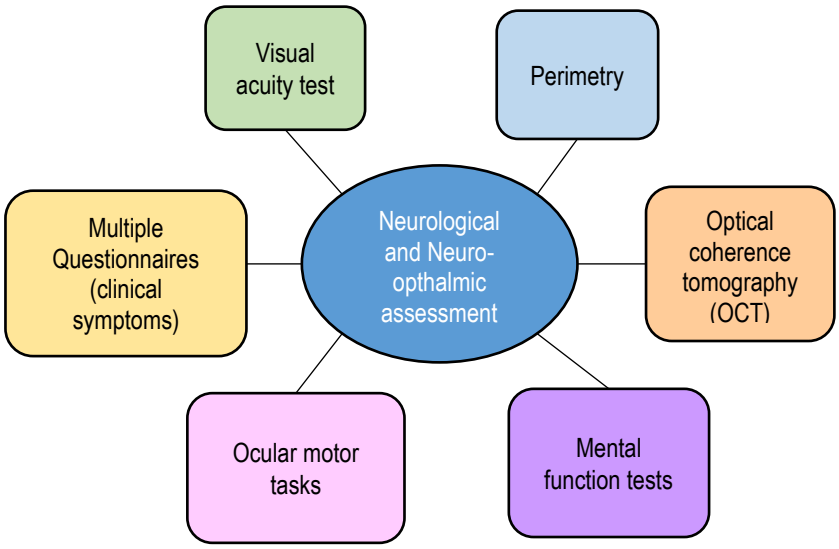

Figure 1 – Summary of the assessment clinical tests, tasks and questionnaires used in the study

Data was recorded at three different time points (at the beginning – initial point called baseline, three months and six months) using all the questionnaires and tests. To make sure that the results recorded were accurate and specific to people with Idiopathic Intracranial Hypertension, results collected from set-up, reputable databases of healthy people (controls) were used as a comparison.

What did the researchers find?

Major headaches and moderate levels of anxiety and depression were clinical symptoms found in people with Idiopathic Intracranial Hypertension at each time point studied. The number of headaches and levels of anxiety and depression were similar across the whole study period.

People with Idiopathic Intracranial Hypertension did worse on traditional tests of mental function compared to healthy people (controls). This was the same for most of the tests (apart from the working memory test) at three and six months after the first testing took place.

People with Idiopathic Intracranial Hypertension showed problems in their visual processing compared to healthy people. They had more errors and took longer time to complete two of the ocular motor tests (the antisaccade task and the antisaccade-prosaccade task) at initial testing. Errors were found at three months after initial testing for only the antisaccade task, but this pattern was not found at six months. Although patients did show visual processing problems at initial testing with the ocular motor tests, the traditional questionnaires testing this did not.

An increase in the retinal nerve fibre layer (which is a fibrous tissue containing expanded fibres of the optic nerve) measured using an OCT machine was the only clinical indication found with a relationship to visual processing problems found using the ocular motor tests.

What do these findings mean? How can you use this research?

This study shows extra evidence of the clinical symptoms (headaches and vision problems) in people with Idiopathic Intracranial Hypertension from an Australian perspective over a long time (up to six months).

People with Idiopathic Intracranial Hypertension have trouble with their mental function ('brain fog') as shown by a thorough selection of traditional tests and newer developed ocular motor tests. This can last for a period of up to six months in some people with the use of traditional tests, so is not just a brief episode. Healthcare professionals need to consider this in their practice to improve treatment and activities of daily living, e.g. work or study.

Clinical symptoms did not predict a person's performance on any of the tests, apart from an increased retinal nerve fibre layer. Use of changes in the retinal nerve fibre layer can help with management of the condition and monitoring outcomes of treatment.

A thorough assessment and monitoring of mental function in people with IIH can help healthcare professionals to provide better care and treatment to people with IIH.

Because of Covid-19, the study used small numbers, so this does affect the reliability of the findings.

Future research studies need to use larger numbers of people with Idiopathic Intracranial Hypertension, look at longer periods (time) and provide more evidence on the use of newer ocular motor tests to assess visual processing in the brain to make sure the current findings are accurate.

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Keywords

Idiopathic intracranial hypertension, brain fog, mental function, visual processing, ocular motor

Glossary

- **Questionnaires** – Questions developed and validated in clinical practice to assess changes to different aspects of health and function (e.g. Headache Impact Test 6, Penn State Worry questionnaire, Patient Health Questionnaire-9, and National Eye Institute Visual Functioning questionnaire)
- **Visual acuity test** – a common test that checks how well you see the details of a letter or symbol from a specific distance
- **Perimetry** – a test of the visual field that uses measurements of the total area where objects are seen in the peripheral vision while the eye is focused on a central point
- **Optical coherence tomography (OCT)** - to measure the thickness of the retinal nerve fibre layer of the eye
- **Traditional, established clinical tests of mental functioning –** Tests developed by clinicians to assess changes in different types of mental function, e.g. the Symbol Digit Modalities Test (SDMT) – information processing speed, the Stoop Colour and Work Test (SCWT) – mental functioning delay, the Digit Span and the California Verbal Learning Test (CVLT) – both look at working memory
- **Ocular motor tasks** (e.g. a prosaccade task, an antisaccade task and an interleaved antisaccade-prosaccade task) each places different demands on the ocular motor network of the brain, to illustrate the types of visual processing and mental functioning changes occurring in people with the condition.

https://www.monash.edu/medicine/ccs/neuroscience/research/fieldingwhite-group