

Key Points

- Some specialists have speculated that an increase in weight may contribute to the progression of CM-I, but the connection between the two are rather unclear.
- Out of the 1,310 original patients, 46 individuals were identified as having CM-I with an averaged overweight BMI score; 17 had a history of headaches, which was consistent with prior reporting evidence correlating headaches to elevated BMI.
- Increased intracranial pressure (ICP) levels may intensify symptoms of CM-I and contribute to syrinx development.
- Although those conducting this study did not identify a strong connection between syringomyelia and elevated BMI within their tested population, a small relationship may still exist.

Definitions

Body Mass Index (BMI) - a measure for human body shape based on an individual's mass and height

cerebellar tonsillar herniation - descent of the cerebellar tonsils into the spinal area; often measured in mm

idiopathic intracranial hypertension (IIH) - condition where a person suffers from elevated intracranial pressure with no visible cause

intracranial pressure - the pressure of the cerebrospinal fluid in the skull

pseudotumor cerebri - another name for idiopathic intracranial hypertension; not used as much anymore

syringomyelia / syrinx - neurological condition where a fluid filled cyst forms in the spinal cord

BMI and Chiari: How Much (or how little) Does BMI Affect CM-I?

April 2015 - In previous research studies, a handful of specialists have speculated that there is a possible correlation between Chiari Malformation Type I (CM-I) and increased body mass. Some even proceeded to hypothesize that elevated *body mass index* (BMI) measurements may contribute to the progression of *cerebellar tonsil herniation*, *syrinx* formation, and overall CM-I symptoms. Although there are assorted reports connecting obesity to CM-I, the relationship between the two are rather unclear.

To shed some light on the subject, Dr. Brandon Smith and his fellow colleagues from the Department of Neurosurgery at the University of Michigan constructed a study to examine the effects of BMI on cerebellar tonsil position in healthy patients versus patients with CM-I. After evaluating the MRI findings from 1,310 subjects, the team found there was **not** a significant relationship between BMI and cerebellar tonsil position; however, there was still other important information left to be uncovered.

Of the 1,310 patients, Smith and his associates reported that 776 individuals were female and 534 were male with an average BMI of 26.4, indicating overweight status. Additionally, the population was divided into those over the age of 18 -consisting of 963 adults with average BMI of 28.5 (overweight status)- and those under the age of 18, comprised of 347 children with an average BMI of 20.4 (normal weight status).

Among this substantial population data, patients with cerebellar tonsil herniations equal to or greater than 5mm were identified as having CM-I. 46 individuals who fell into this category averaged an overweight BMI score of 25.75. Tonsil herniations averaged 13.6mm in seven symptomatic subjects while the remaining thirty-nine, asymptomatic patients had herniations nearly half the size.

After reporting the cerebellar herniation measurements, the specialists then shared that 17 of the forty-six subjects had a history of headaches with a mean BMI of 27.6, denoting overweight status. Despite the small percentage of individuals with CM-I, the group's findings were consistent with prior reports investigating the correlation between elevated BMI and headaches from the University of Michigan.

Comparatively, the 1,264 remaining individuals with herniations less than 5mm had an average BMI of 26.4. From this information, Smith and his team concluded that there was no substantial correlation between BMI and cerebellar tonsil position within their patient population.

Along with examining the speculative relationship between CM-I and BMI, the study also explored another theory connecting CM-I and *intracranial pressure* (ICP). Unlike the small amount of CM-I and BMI research based on unsubstantial data, there is significant evidence linking *idiopathic intracranial hypertension* (IIH), otherwise known as *pseudotumor cerebri*, and obesity. There are also some greatly detailed theories claiming that increased ICP levels may intensify the symptoms of CM-I and contribute to syrinx development.

Through these abstract conclusions, some studies then proceed to suggest that elevated BMI may be related to an increase of ICP—promptly leading to BMI and syrinx development relationship assumptions. In the case of Smith's research assessment, most patients (89%) were considered overweight, according to the BMI scale, and did not have a past history of syringomyelia; comparatively, those recorded with a syrinx maintained normal weight ranges and had significantly lower cerebellar tonsil positions.

This data indicates that Smith's team did not identify a strong connection between syringomyelia and elevated BMI levels in their sample population. Although the specialists inferred that there was not a prominent link within the collected data, they explained that a small relationship between syringomyelia and BMI could still exist.

Overall, the steps taken to evaluate the impact of body mass on cerebellar tonsil position in CM-I patients and those without significant tonsillar descent had some limitations such as selection bias, diverse tonsil position measuring methods, and a small CM-I patient sample size. However, Smith and his associates believed that their sample size sufficiently represented clinically significant outcomes.



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Ms. Eubanks is a professional writing and researching scholar from Purdue University Northwest. After being diagnosed with a Chiari I Malformation in 2011, she quickly decided that being conquered was not an option—she was committed to fight and pursue a budding love of healthcare/medical writing. Spreading awareness and hope to others battling Chiari is her largest motivator alongside educating others who have not heard about the condition. Reporting for Ideas in Motion Media and tutoring at the Writing Center (Purdue University

North Central) has been immensely beneficial to her success as well as all the remarkable individuals who helped her become the composer and analyst she is today.

Source

[Impact of body mass index on cerebellar tonsil position in healthy subjects and patients with Chiari malformation.](#)

Smith BW, Strahle J, Kazarian E, Muraszko KM, Garton HJ, Maher CO. *J Neurosurg.* 2015 Apr 3:1-6. [Epub ahead of print]

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