

“Abnormalities in MRI with MRV in Idiopathic Intracranial Hypertension Patients and its relationship with BMI”

Md. Pervez Amin¹, Quamruddin Ahmad², Md Munzur Alahi³, Mausumi Amin⁴

¹Assistant Professor (Neurology), Pabna Medical College, Pabna, Bangladesh

²Professor & Head, Neurology Department, Holy Family Red Crescent Medical College, Dhaka, Bangladesh

³Assistant Professor (Neurology), Rajshahi Medical College, Rajshahi, Bangladesh

⁴ Public health specialist and PhD student, Bangladesh University of Professionals (BUP), Dhaka, Bangladesh
Corresponding Author; Md. Pervez Amin

Abstract: Idiopathic Intracranial Hypertension is a disease of unknown etiology common in obese females and presents with headache, papilledema, raised CSF opening pressure and no abnormality on CT scan or MRI of the Brain. Sino venous abnormalities are commonly detected in patients of IIH by different neuroimaging techniques. But the exact role of these Sino venous abnormalities in the causation of the disease or whether they are an effect of the disease is not yet known. The aim of the study was to assess abnormalities in MRI with MRV in Idiopathic Intracranial Hypertension Patients and its relation with BMI. All 33 patients of IIH who presented to Rajshahi Medical College Hospital during the study period from June 2009 to May 2010 were included in the study. There were 30 females and 3 males with having Female and Male ratio were 10:1. 91% and they were between 20 and 35 years of age and most of them were married housewives. 63.64% patients had history of use of oral contraceptives. Unusually 51.52% of the patients had a BMI less than 25 indicating that they were not even overweight (BMI 25 to 30). Only 6% of the patients had BMI > 30 indicating that they were obese. Headache and papilledema were present in all patients but visual difficulties were present only in 54.54% of the patients. MRV abnormalities were detected in 27.27% (9/33) of the patients and transverse sinus hypoplasia was the commonest finding (88.89% - 8/9 patients). There was no statistically significant difference in the findings of MRV abnormalities between the males and females among the patients having BMI less or more than 25. Abnormalities in MRI with MRV in Idiopathic Intracranial Hypertension Patients and its relationship with BMI is not statistically significant.

Key words: Idiopathic Intracranial Hypertension (IIH), MRI, MRV, BMI

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I. Introduction

Idiopathic intracranial hypertension has had a number of different names in the century since it was first described by Quincke under the name of ‘meningitis serosa’ (Quincke, 1897). The most commonly used synonyms are ‘pseudotumour cerebri’ (Nonne 1904) and ‘benign intracranial hypertension’ (Foley, 1955). However, there are problems with both these names because the condition is not always benign (some patients go blind), and ‘pseudotumor’ is an archaic word dating from pre-imaging days and which is potentially frightening to patients. The label ‘idiopathic’ was therefore suggested in 1969 (Bucheit et al, 1969). Having said that, there is still considerable confusion in the literature because the clinical picture of ‘IIH’ has in some cases been associated with a number of potential underlying factors (e.g. sagittal sinus thrombosis and vitamin A toxicity), in which case the term ‘idiopathic’ obviously becomes inappropriate. However, IIH seems to be the generally preferred name at the moment (Miller, 1998). IIH is defined as raised intracranial pressure without ventricular enlargement or intra cranial mass on imaging, with normal cerebrospinal fluid constituents (Miller, 1998). It often presents with headaches, and is usually associated with bilateral papilledema. The overall incidence is 1–3/100 000 population/year (Radhakrishnan et al, 1994). It is somewhere between four and 10 times as common in women as in men, particularly women between the ages of 15 and 44 when it is strongly associated with obesity (the incidence rises to 21/100 000 population/year in this group).



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It is well described in children, where the gender difference is much less obvious and obesity is a considerably less strongly associated factor (Digre & Corbett, 2001). Regarding the cause of raised intracranial pressure, various pathogenic mechanisms have been considered, including increased cerebrospinal fluid (CSF) production, decreased CSF absorption, idiopathic brain swelling, and idiopathic intracranial venous hypertension (Fishman RA, 1984). None appears satisfactory on its own but with reference to the last it is well known that IIH can be mimicked by cerebral venous sinus thrombosis and venous outflow obstruction (Janny P, 1981). In practice, however, this is diagnosed infrequently (Lee AG, 2000). The pathophysiologic mechanism of the elevated intracranial pressure in idiopathic intracranial hypertension (IIH) remains unknown (Friedman DI, Jakobson DM 2002). Contributing to the confusion associated with IIH is the recent evidence suggesting that there is a functional obstruction to outflow in the venous sinuses. It was documented by the several groups that the cerebral venous pressure was consistently elevated in pseudotumor cerebri; in half of their patients were revealed with venous outflow obstruction demonstrated by MR venography, often with a pressure gradient across the site (Karahalios et al, 1996). Many authors proposed that venous hypertension increases the resistance to CSF absorption and is the proximate mechanism underlying pseudo motor (Binder DK et al, 2004). Venous sinus narrowing in patients with IIH can be found regularly (in 27 of 29 patients and in 4 of 59 control subjects) on MR imaging and may cause venous outflow obstruction (Farb et al, 2003). In a case of IIH where the usual investigations failed to reveal a cause of raised intracranial pressure, catheter venography showed high pressures in the superior sagittal sinus proximal to stenotic lesions in both lateral sinuses (Higgins JNP et al). Sometimes these raised pressures seem to be secondary to raised central venous pressure, but more often they appear to be the result of focal stenotic lesions in the lateral sinuses obstructing cerebral venous outflow. There is a question whether these lesions might be the cause or an effect of raised intracranial pressure (Corbett JJ, Digre K, 2002). Dilatation of one of this stenosis with a stent effected a reduction in intracranial venous sinus pressures which was accompanied by an immediate and sustained clinical improvement supports a causal relation between venous sinus disease and IIH (King JO et al, 2002).

Objectives

General objective:

- To assess abnormalities in MRI with MRV in Idiopathic Intracranial Hypertension Patients

Specific Objectives:

- To assess the relationship between BMI and Abnormalities in MRI with MRV in Idiopathic Intracranial Hypertension Patients.

II. Methodology and Materials

We conducted a cross sectional descriptive study in the Department of Neurology, Rajshahi Medical College Hospital, Rajshahi, Bangladesh during the period from July 2009 to June 2010. All patients of Idiopathic Intracranial Hypertension presenting to the hospital during the study period were enrolled in the study. Thirty three (33) patients fulfilled the inclusion criteria and enrolled as study participants. Data collection had done after a pretesting by a set of questions. After collecting data, it was transferred to statistical software SPSS then analyzed. Chi-test performed for drawing association between the variables. Informed written consent was taken from the participants. Ethical clearance was taken from ethical review committee of Rajshahi Medical College Hospital.

III. Results

This is a descriptive cross sectional study in which all patients, meeting the criteria for diagnosis of Idiopathic Intracranial Hypertension, who came to the different departments of Rajshahi Medical College Hospital during the period June 2009 to May 2010, were studied. Thirty three (33) patients fulfilled the inclusion criteria (which was described in the study) and enrolled as study subjects. We found that 88% of the patients were female and only 12% patients were male and age distribution of the patients. Majorities (63.64%) of the patients were between 20 and 30 years, and 09.09% were below 20 years of age. We also observed there was history of drug intake in 63.64% of the patients prior to the development of the disease. Regarding drug intake it was observed those taking drugs which may precipitate IIH, all the patients were taking oral contraceptives. There was no history of any of the other patients taking any of the other culprit drugs. Table shows that 82.35% of the patients had a BMI within 30 and only 17.65% of the patients were obese (BMI > 30). Majority of the patients (52.38%) had a BMI less than 25 indicating that they were not even obese. The study shows that more than half the patients of this study were not obese. Our findings demonstrate that the associations of the clinical features with MRV abnormality. All the patients who had MRV abnormality had headache and papilloedema as these were the inclusion criteria for patients of this study. MRV abnormalities were not common in patients who had visual disturbances (33.33%), tinnitus (11.11%) and sixth nerve palsy (33.33%). The MRI with MRV findings in the study patients, 9 (27.27%) patients out of the 42 had some abnormality in their MRV study. In four (4) patients the right transverse sinus was not detected in any of the views and was diagnosed as hypo plastic right transverse sinus and for similar findings on the left side in 4 patients it was diagnosed as hypo plastic left transverse sinus. One patient had hypoplasia of the rostral superior sagittal sinus.

Table I: Background characteristics of the study participants (n=33)

Characteristics	n	%
Gender		
Male	03	12.12
Female	30	87.88
Age in Years		
< 20 yrs.	03	09.09
20 to 30 yrs.	21	63.64
> 30 yrs.	09	27.27
Drug Intake		
Yes	21	63.64
No	12	36.36
Type of Drug		
Oral Contraceptives	21	100.00 %
Other drugs	00	00
Body Mass Index (BMI)		
< 25	17	51.52
25 to 30	14	42.42
> 30	02	06.06

Table II: Associations between the clinical features and MRV abnormality in study patients with IIH & MRV abnormality (n=09)

Clinical features	MRV abnormality		No MRV abnormality	
	n	%	n	%
Headache	09	100	0	0
Visual disturbances	03	33.33	06	66.66
Tinnitus	01	11.11	08	88.88
Papilledema	09	100	0	0
Unilateral Sixth nerve palsy	01	11.11	08	88.88
Bilateral Sixth nerve palsy	02	22.22	07	77.77

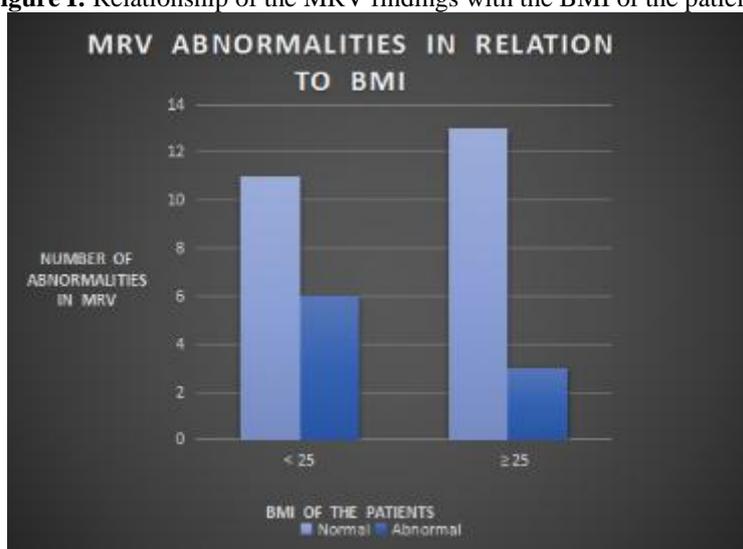
Table III: MRI with MRV findings in the patients (n=33)

MRI with MRV	n	%
Normal	24	72.73
Abnormal	09	27.27
Pattern of Abnormality(n=9)		
Left transverse sinus hypoplasia	04	44.44
Right transverse sinus hypoplasia	04	44.44
Hypoplasia of the rostral superior sagittal sinus	01	11.11

Table IV: Abnormalities in MRI with MRV and its relationship to BMI

BMI	MRI with MRV		x ² value	d f	P value	Inference
	Normal	Abnormal				
< 25	11	06	1.134	1	< 0.005	Not significant
≥ 25	13	03				

Figure I: Relationship of the MRV findings with the BMI of the patients.



IV. Discussion

In this study carried out in Rajshahi Medical College Hospital, all patients of Idiopathic Intracranial Hypertension presenting to the hospital during the study period were enrolled in the study. This study is therefore not a truly community based study and does not exactly reflect the demographic pattern of all IIH patients. But on the other hand IIH is a neurological disease whose evaluation definitely requires hospitalization as lumbar puncture is invariably done for all patients. Thirty three (33) patients fulfilled the inclusion criteria as described for this study during the study period of July 2009 to June 2010. All these patients had been admitted in Rajshahi Medical College Hospital with the diagnosis of IIH. 91% of the patients were female and 9% were male having Female: Male ratio of 9:1. The female: male ratio as described in the literature varies from 4.3: 1 to 15: 1 in different studies (Durcan FJ et al, 1988; Radhakrishnan K et al, 1993; Radhakrishnan K et al. 1993; Kesler A & Gadoth N, 2001). Thus the result in our study is at the middle of the range found in studies described elsewhere. In this study 63.64% of the patients are between 20 to 30 years of age, 27.27% above 30 years and 9.09% below 20 years. Idiopathic intracranial hypertension is a diagnosis of exclusion. All secondary causes of intracranial hypertension (e.g. intracranial mass, hydrocephalus, venous fistulas and venous sinus thrombosis) are to be ruled out mainly with the help of neuroimaging. However, in almost all patients with IIH, neuroimaging shows narrowing of the transverse sinuses, (Higgins JNP, Cousins C, Owler BK et al, 2003) not reflecting acute thrombosis. With the recent advancements of various neuroimaging techniques a promising hope is emerging to address the IIH patients with definitive approach in terms of management. Using a technique of magnetic resonance venography (MRV) developed at our institution since December 2005; we undertook the current study to evaluate the frequency of structural abnormality of cerebral venous sinuses of patients with IIH. In our country patients of IIH are usually treated by conservative methods. This study will help to clarify to some extent the role of cerebral venous sinus structural abnormality in the pathogenesis of IIH and may provide a useful guideline for definitive management of IIH. Such kind of study has not been done in

Bangladesh yet and the exact prevalence of IIH in Bangladesh is not yet known. So, the present study tried to estimate the abnormalities in MRI with MRV in Idiopathic Intracranial Hypertension Patients and its relationship with BMI. By testing the statistical significance, it was seen that MRV abnormalities have no relationship with the BMI of the patient.

Limitations of the study

It was a cross-sectional study in a single centre with small sample size, which doesn't reflect the scenario of the whole country.

V. Conclusion and recommendations

Obesity is very common in patients of IIH, but in our study only 6% of the patients were obese. More than one third of American women are obese while in our country this percentage would be much less. As obese persons are much less in number in our community, so obesity is less in our IIH patients also. Symptoms and signs found in our patients are very similar to what has been found in IIH patients elsewhere, though visual defects were found in less of our patients as perimetry was not done. Sino venous abnormalities in MRI and MRV were found in 27.27% of our patients which is somewhat less than what has been reported elsewhere. MRV had not been done here before and there are no specialist neuroradiologists for reporting the neuroimaging studies. Idiopathic Intracranial Hypertension is a disease of unknown aetiology. This study shows that MRV can be useful for the detection of Sino venous abnormalities in patients of IIH though expert radiologists are needed for accurate reporting. Since MRV abnormalities are so common in patients of IIH, we recommend that MRV study should be done in all patients of IIH to exclude any Sino venous abnormality. Abnormalities in MRI with MRV in Idiopathic Intracranial Hypertension Patients and its relationship with BMI is not statistically significant.

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