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ORIGINAL ARTICLE

Clinical characterization, imaging and response to treatment in a sample of Egyptian patients with idiopathic intracranial hypertension

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Abstract

Background: Increased intracranial pressure with normal brain parenchyma and no evidence of a secondary cause, such as a mass lesion or hydrocephalic alterations, is known as idiopathic intracranial hypertension (IIH). **Objective:** This study aims to examine the clinical manifestation and therapeutic response in a cohort of adult patients. **Patient and methods:** The Neurology Department of Zagazig University Hospitals conducted our prospective cohort study from March 2022 to February 2023. eighteen patients with idiopathic intracranial hypertension participated in the study (15 females and 3 males). Their age range from 19-42 year with a mean age (±SD) of 30.6 (± 6.2).A thorough neurological and ophthalmological examination was performed, including tests for contrast sensitivity, colour vision, assessment of visual acuity (VA) and visual field. After three months, follow-up was conducted. **Results:** IIH was more prevalent among obese females. Headache with blurring of vision without nausea or vomiting was the most important symptom. Papilledema was the obvious sign for diagnosis. Treatment had significant improvement regarding headache and degree of papilledema and can be used as predictor for improvement. **Conclusions:** In this study we found that clinical assessment of headache severity and papilledema grade are important findings in evaluating improvement in patients with IIH.
Keywords: Idiopathic Intracranial Hypertension; headache; papilledema; visual assessment.

INTRODUCTION

There is no known secondary cause of idiopathic intracranial hypertension (IIH), which is defined as an increase in intracranial pressure with normal brain parenchyma.as mass lesion, hydrocephalic changes or abnormal CSF composition **[1]**. The most common complaint among IIH patients was headache (94%), followed by temporary visual obscurations (68%), double vision (38%), retrobulbar pain (44%) and tinnitus (58%) in that order **[2]**. IIH typically occur among adult females with female: male ratio 5:1. Since 1990, the incidence has risen, and this incidence is closely tied to the rise in obesity during that same period **[3]**. Papilledema is the most crucial diagnostic sign for diagnosis of IIH **[4]**. The main aim of treatment is to prevent vision deterioration and to minimize the headache severity **[5]**. Patients with advanced grade papilledema along with affected visual acuity at presentation are more likely to experience treatment failure **[6]**. Objective clinical and ophthalmologic predictors may aid in early assessment of patients requiring aggressive medical/surgical intervention **[6]**. This study was attempted to describe the demographic, health characteristics, imaging profile of patients with IIH and to recognize effectiveness of treatment regimens given in patients after 3 months follow up.

PATIENTS AND METHODS

This study was a prospective cohort study carried out between March 2022 and February 2023 in the neurology outpatient clinics of Zagazig University

Hospitals. Eighteen patients between the ages of 19 and 42 were enrolled in this investigation. According to the modified Dandy criteria. Written informed consent was obtained from all participants, the study was approved by the research ethical committee of Faculty of Medicine Zagazig University. The study was done according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

All patients had IIH symptoms at the time of their initial visit **[7]**. Our patients were subjected to complete history taking (including age, sex, headache intensity, associated symptoms, e.g., nausea, vomiting, tinnitus, visual complaints, e.g., blurring of vision, visual obscurations, diplopia, and visual loss). The headache intensity was evaluated by self-assessment of the patients using numerical rating scale (NRS). Patients graded their headaches on a scale of 0 to 10 for severity. Scores of 1 to 3 were regarded as mild headaches in patients, and 4 to 7 as moderate headaches and scores from 7 to 10 were considered as severe headache **[4]**. Moreover, past drug usage was reviewed, paying particular attention to hormonal contraception. Routine laboratory tests for chemistry, hemoglobin, coagulation profile, and lipid profile were performed on our patients. All patients underwent a thorough neurological examination and had their body mass index assessed. Patients were considered overweight when BMI is more than 25kg/m^2 and were considered obese when BMI is above 30 kg/m^2. Body mass index was calculated by weight in kilograms divided by height in meters squared. Fundus examination was done to assess the presence and grade papilledema using modified Frisén scale **[8]**. Lumbar puncture was done and CSF opening pressure was measured by using manometer in lateral decubitus position with the patients' legs relaxed and partially extended.

MRI brain and MRV were performed to exclude intracranial causes of elevated intracranial pressure, cerebral venous thrombosis.

Patients were followed up for 3 months regarding clinical improvement of symptoms of headache severity, visual symptoms, and fundus examination (modified Frisén scale), visual acuity, contrast sensitivity and visual field to assess treatment response. All Patients received medical therapy and lumbar puncture. Selected patient underwent lumbo-peritoneal shunt operation. Patients' data were tabulated and statistically analyzed.

STATISTICAL ANALYSIS

All data were collected, tabulated and statistically analyzed using (IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.2015). Quantitative data were expressed as the mean ± SD & median (range), and qualitative data were expressed as numbers and percentage. T test was used to compare between normally distributed variables of two groups. Mann whitnney U test was used to compare between not normally distributed variables of two groups. Spearman' correlation coefficient was calculated to assess relationship between various study variables, (+) sign indicate direct correlation & (-) sign indicate inverse correlation, also values near to 1 indicate strong correlation & values near 0 indicate weak correlation. Marginal Homogeneity Test was used to compare paired ordinal variables. Mc Nemar test was used to compare paired categorical variables. Percent of categorical variables were compared using Chi-square test of fisher exact test when appropriate. All tests were two sided. P-value < 0.05 was considered statistically significant (S), and p-value ≥0.05 was considered statistically non-significant (NS).

RESULTS

The study was conducted on 18 patients (15 females and 3 males). The mean age of the patients was 30.6 ± 6.2 years with a range from 19 to 42 years. 44.4% of patients were overweight and 55.6% of the patients were obese. Their CSF pressure opening pressure ranged from 25-60 with a mean of 36.7±11.5 (cm H2O).

Headache was reported as the most frequent complaint with 89.9 % of our cases. Blurring of vision was found in 15 patients (83.3%), tinnitus was stated by 14 patients (77.8%). Nine female patients (60%) reported use of hormonal contraception, (Table 1). The most important finding on the examination was papilledema which was seen in all the patients. Symmetrical papilledema was found in 13 patients (72.2%) while asymmetrical papilledema was found in 5 patients (27.8%). Color vision was intact in all patients (Table 2).

On reviewing the patient's imaging, partial empty sella was found in (56.6%) of patients followed by slit shaped ventricle (50%) and transverse sinus stenosis (44.4%), (Table 1)

Table (1): Demographic data, clinical presentation, imaging and treatment among our studies patient (n=18)

Age (Years)	**Mean ±SD Median (range)**	**30.6±6.2 28.5 (19-42)**	
Gender		**N.**	**%**
	Females	15	83.3
	Males	3	16.7
BMI (kg/m^2)	Mean ±SD median(range)	31.6±5.2 30.1(25.1-44.06)	
	overweight (25-29.9) obese (30 or above)	8 10	44.4 55.6
CSF opening pressure (cm H_2O)	Mean ±SD Median (range)	36.7±11.5 31(25-60)	
History of using O.C.P among females	Yes	9	60
Headache	Yes	16	89.9
Nausea and vomiting	Yes	5	27.8
Blurred vision	Yes	15	83.3
Diplopia	Yes	2	11.1
Tinnitus	Yes	14	77.8
MRI Abnormality finding			
Partial empty slit shape ventricle	Yes Yes	10 9	56.6 50.0
Transverse sinus stenosis	Yes	8	44.4
Treatment			
Medical Treatment + lumber puncture		18	100
Shunt operation		6	33.3

Table (2): Basic ophthalmological examination of studied patients

Variables		**N.**	**%**
Visual acuity in right eye	Normal vision (6/6) Mild visual impairment (from 6/9 to less than 6/36) Severe visual impairment (from 6/36 to 6/60)	8 10 0	44.4 56.6 0
Visual acuity in left eye	Normal vision (6/6) Mild visual impairment (from 6/9 to less than 6/36) Sever visual impairment (from 6/36 to 6/60)	8 8 2	44.4 44.4 11.2
VA in worst eye	Normal vision (6/6) Mild visual impairment (> 6/9 <6/36) Severe visual impairment (6/36, 6/60)	8 8 2	44.4 44.4 11.2
Papilledema grade	• I	1	5.6
	• II	3	16.7
	• III	4	22.2
	• IV	10	55.6
Symmetry	• Symmetrical • Asymmetrical	13 5	72.2 27.8
Visual field	• Normal or enlarged blind spot	9	50.0
	• bilateral scattered central and Para central scotoma	6	33.3

	• generalized constriction	3	16.7
Color vision	• Intact	18	100.0
Contrast Sensitivity	**Right**		
	normal	12	66.7
	impaired	2	11.1
	Disable	4	22.2
	Left		
	normal	10	55.6
	impaired	5	27.8
	Disable	3	16.7

Concerning the treatment, all patients were given medical therapy and serial lumbar puncture. Six patients (33.3%) required CSF diversion procedures, (table 1). CSF opening pressure was positively correlated with triglyceride level, (Table 3).

Our study illustrated that patients who did shunt operation showed lesser degree of field affection of statistically significant value than those who received medical treatment only, (Table 4). During follow-up after 3 months, patients improved significantly in headache and papilledema grade with P value 0.013 and 0.001 respectively, (Table 5).

Table (3): Correlation between CSF open pressure and age, BMI, headache severity, papilledema grade and laboratory measures of studied.

Variable	**CSF open pressure**	
	r	**P**
Age per years	0.35	0.16
BMI	0.112	0.657
Headache	0.16	0.52
papilledema grade	-.008	0.975
Inr	0.03	0.904
Pt	-.094-	0.711
Pc	0.07	0.782
Ptt	-.119-	0.639
Total cholesterol	0.223	0.374
Triglyceride	0.499*	0.035
HDL	-.182-	0.47
LDL	0.172	0.495
HB	0.314	0.205
WBCs	0.068	0.79
Plt	0.116	0.645
AST	0.215	0.391
ALT	-.062-	0.807
Urea	0.254	0.309
Creatine	0.194	0.44
CRP	-.102-	0.686

ESR(mm)	-.084-	0.74
S.Na	0.153	0.545
S.k	0.268	0.282
S.ca	-.001-	0.998
LDH	0.37	0.131

(r) correlation coefficient * Correlation is significant at the 0.05 level.

Table (4): Comparison between shunt operated and medically treated patients regarding improvement of some clinical and ophthalmological parameters.

Parameters	Shunt operation				χ^2	p-value
	done n.6		No done n.12			
	No.	%	No.	%		
Headache					3.5	0.18
Severe	0	0.0	2	16.7		
Mild	0	0.0	3	25.0		
No	6	100.0	7	58.3		
Papilledema					5.7	0.13
No	6	100.0	5	41.7		
II	0	0.0	3	25.0		
III	0	0.0	2	16.7		
IV	0	0.0	2	16.7		
Visual field					14.1	0.003*
0-Normal and enlarged spot	6	100.0	5	41.7		
1-bilateral scattered central and paracentral scotoma	0	0.0	5	41.7		
2-generalized constriction	0	0.0	2	16.7		
Visual acuity improvement					F	0.57
Improved	2	33.3	2	16.7		
The same	4	66.7	10	83.3		

Table (5): Effectiveness of treatment regimens used in patients after 3 months follow up.

	Study phases				p
	Pretreatment		At follow up		
	No.	%	No.	%	
Headache					0.013*
Mild	8	44.4	3	16.7	
Moderate	3	16.7	0	0.0	
Severe	5	27.8	2	11.1	
No	2	11.1	13	72.2	
Visual field					
0 Normal or enlarged blind spot	9	50.0	11	61.1	
1 bilateral scattered central and paracentral scotoma	6	33.3	5	41.7	0.37

2 generalized constrictions	3	16.7	2	16.7	
Visual acuity worst eye					
6/6	8	44.4	8	44.4	
6/9	2	11.1	3	16.7	
6/12	3	16.7	2	11.1	0.78
6/18	3	16.7	4	22.2	
6/60	2	11.1	1	5.6	
Papilledema grade					
No	0	0.0	11	61.1	
I	1	5.6	0	0.0	0.001*
II	3	16.7	3	16.7	
III	4	22.2	2	11.1	
IV	10	55.6	2	11.1	

DISCUSSION

IIH is primarily a disorder of young obese women with a worldwide incidence around 12-20 per 100.000 people per year in obese females at childbearing period **Al-Hashel et al. [9]**.

The majority of IIH patients in this study were found to be females in the childbearing years, with a mean age of 30.6 6.2 years. On the other hand, IIH in children is rare. On a study done by **Soiberman et al. [10]**, Children under the age of 18 were enrolled in every class in a row (range 20 months–17 years). High body mass index (>30) was seen 100% of our patients, either overweight or obese signifying a strong association of the disorder with obesity.

In this study, with a mean of 36.7±11 cm H2O, the opening pressure ranged from 25 to 60 cm H2O.There was correlation between CSF opening pressure and triglyceride levels. To our knowledge, no prior study has demonstrated correlation between higher triglyceride level and CSF opening pressure. This correlation can be explained by dietary habits in obese patients.

In present study we found that 60% of our female patients were using contraceptive pills. This was compatible with the result of Sultan et al **[4]** that multiple comorbidities and drug use commonly oral contraceptive pills were reported to be associated with IIH.

Symptoms in our cohort were like those found in other previous studies **[4, 9]**. Headache was the most frequent complaint with 89.9 % of our cases having headache of different degrees of severity. Blurred vision was the second most reported symptom of 83.3% followed by tinnitus of 77.8%.

Papilledema was found in all our patients. It was symmetrical in 72.2% and only 27.8% showed asymmetrical papilledema. This asymmetry may be due to optic nerve sheath defects and loss of lamina cribrosa compliance **Swinkin et al. [11]**.

Papilledema can lead to permanent visual loss if the condition is not treated appropriately in a timely manner **[12, 13]**. Often IIH patients are unaware of peripheral visual field dysfunction. In our study bilateral scattered central and Para central scotoma was detected in (33.3%), and generalized constriction was detected in (16.7%) of patients. These findings go in the same line with **Baheti et al. [14]** who found that visual field defects were observed in 80 eyes (93%).

Testing solely Snellen visual acuity imparts only limited knowledge about visual function loss **Rehman et al. [15]**. Spatial vision loss may be assessed by testing visual contrast sensitivity (CS). The Pelli Robson chart was employed for CS testing in our study which showed that right eye normal contrast sensitivity was detected in 66.7% of patients and in 55.6% of patients in left eye.

Radiological investigations (MRI and MRV) were done to all patients to exclude space-occupying lesions, cerebral venous sinus thrombosis, meningeal enhancement and inflammation **[16, 17]**. In the present study we found that abnormal MRI finding was found in 56.6% of patients, these abnormalities were distributed between partial empty (56.6%), slit shape ventricle in (50%), and transverse sinus

stenosis was detected in (44.4%) of patients. In our study all patients were treated medically and with lumber puncture. Lumbar puncture with CSF removal was done for our patients for the purpose of both measuring CSF opening pressure and also for possible therapeutic value. Those patients suffering from worsening grading of papilledema was referred for lumbo-peritoneal shunt. In our study we illustrated that Shunt operation was done for 6 patients (33.3%) who had severe papilledema.

In the present study we found that post shunt surgery all patients significantly became cure from headache and with normal visual field. Also, there is significant improvement headache grade at follow up period of studied patients $p<0.05$. This is in accordance with **kalyvas et al. [18]** who stated that Lumb peritoneal shunting are very effective in relieving headaches, achieving pain relief in 72.1% and 69.8% of the patients, respectively and resulted in 66.8% improvement of both visual fields and visual acuity. In our study we cleared that there is significant improvement papilledema grade at follow up period of studied patients $p<0.05$. This is match with **Hendrix et al. [19]** who showed a significant reduction in papilledema grade ($p <0.001$) and improvements in visual acuity ($p = 0.012$) and RNFL thickness ($p <0.001$), with less improvement in the mean deviation in visual fields ($p = 0.119$) after a median follow-up period of 8 months after shunt operation..

CONCLUSIONS

In conclusion, IIH is more prevalent in females and strongly associated with obesity. Our study highlights that basic ophthalmological evaluation including visual acuity, visual field and contrast sensitivity are important to avoid potential visual loss related to papilledema.

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