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Re-evaluating the Incidence of Idiopathic Intracranial Hypertension in an Era of Increasing Obesity

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Purpose: To re-evaluate the population-based incidence of idiopathic intracranial hypertension (IIH) and to determine if it mirrors the rise in obesity.

Design: Retrospective, population-based cohort.

Participants: All residents of Olmsted County, Minnesota, diagnosed with IIH between January 1, 1990, and December 31, 2014.

Methods: All cases of IIH were identified using the Rochester Epidemiology Project, which is a record-linkage system of medical records for all patient−physician encounters among Olmsted County, Minnesota, residents. All medical records were reviewed to confirm a diagnosis of IIH. The incidence rates of IIH were compared against the incidence of obesity in Minnesota over the same period.

Main Outcome Measures: Incidence of IIH, lumbar puncture opening pressures, and body mass index.

Results: There were 63 new cases of IIH, yielding an overall age- and gender-adjusted annual incidence of 1.8 per 100 000 (95% confidence interval, 1.3−2.2) between 1990 and 2014. It increased from 1.0 per 100 000 (1990−2001) to 2.4 per 100 000 (2002−2014; $P = 0.007$). The incidence of IIH was 3.3 per 100 000 in women and 0.3 per 100 000 in men ($P \leq 0.001$). In obese women 15 to 44 years of age, the incidence was 22.0 per 100 000 compared with 6.8 per 100 000 among all women in the same age group. A strong correlation was observed between IIH incidence rates and obesity rates in Minnesota ($R^2 = 0.70$, $P = 0.008$).

Conclusions: The incidence of IIH has increased since 1990, which is highly correlated with the rise in obesity during the same period. *Ophthalmology 2017;■:1−4 © 2017 by the American Academy of Ophthalmology*

Idiopathic intracranial hypertension (IIH) is a condition of increased intracranial pressure of unknown cause, often producing papilledema and visual loss.[1−3] Idiopathic intracranial hypertension typically occurs in obese women in the childbearing years. The incidence of obesity has been increasing rapidly since the 1970s.[4] Because obesity is a major risk factor for IIH, the incidence of IIH conceivably could rise in parallel with the current epidemic of obesity, but there have been no studies to evaluate this possibility. Much of the knowledge on the incidence of IIH came from a prior epidemiologic study from the Rochester Epidemiology Project, which demonstrated an incidence of 1.0 per 100 000 persons from 1976 through 1990.[5] The goal of this study was to re-evaluate the population-based incidence of IIH using the Rochester Epidemiology Project data and to determine if the incidence of IIH mirrors the large rise in obesity over the past 20 years.

Methods

The medical records of all patients diagnosed in Olmsted County, Minnesota, with IIH, intracranial hypertension, pseudotumor cerebri, or papilledema from January 1, 1990, through December 31, 2014, were reviewed. Potential participants were identified using the Rochester Epidemiology Project, a multicenter medical records database designed to capture data on all patient−physician encounters in Olmsted County, Minnesota.[6,7] This study was approved by the Institutional Review Board of the Mayo Clinic and the Olmsted Medical Center, Minnesota. It conformed to the requirements of the United States Health Insurance Portability and Accountability Act and adhered to the tenets of the Declaration of Helsinki.

A total of 427 patients were diagnosed with at least 1 of the above conditions during the 24-year study period. Patients were classified as having IIH if they met the modified Dandy criteria, which included signs and symptoms of increased intracranial pressure, no localizing neurologic finding except cranial nerve VI palsies, normal neuroimaging results, lumbar puncture opening pressure of more than 250 mmH_2O with normal cerebrospinal fluid constituents, and no other apparent cause. Patients with papilledema and borderline opening pressures (200−250 mmH_2O) also were included in the study.[3,8] Patients without papilledema were excluded from this study.

Data on the patient gender, ethnicity, age at diagnosis, body mass index (BMI), ocular and medical histories, risk factors, presenting signs and symptoms, and treatments were obtained from the medical records. Obesity was defined as a BMI of 30 kg/m^2 or more. Continuous data were presented as a mean and

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Table 1. Historical and Clinical Characteristics of the 63 Patients with Idiopathic Intracranial Hypertension

Characteristics	No. (%)
Female gender	58 (92.1)
Ethnicity	
White	56 (88.9)
Black	1 (1.6)
Native American	0 (0.0)
Asian	0 (0.0)
Other	4 (6.3)
Unknown	2 (3.2)
Body mass index (kg/m^2)	
<30	8 (17.4*)
30–40	18 (39.1*)
≥40	20 (43.5*)
Unknown	17

*Percentage of patients with a known body mass index.

standard deviation, and categorical data were presented as counts and percentages. Incidence rates and confidence intervals were calculated using population figures in Olmsted County. Age- and gender-adjusted rates were based on the total United States white population in 2000. Yearly gender- and age-specific incidence rates were determined by dividing the number of IIH cases within each group by the estimated total Olmsted County resident population. The exact number of obese individuals in Olmsted County was unknown; an estimate of 20% was used based on available statewide rates during the study period. Population figures for 1990, 2000, and 2010 came from the United States census data and population; figures for intercensus years were estimated using linear interpolation. Poisson regression models were used to test for trends over time, across age groups, and between genders. Correlation between age- and gender-adjusted IIH incidence and Minnesota obesity rates in 2-year categories were estimated using Pearson's correlation coefficient.

Results

From 1990 through 2014, 63 patients were diagnosed in Olmsted County with IIH, 92.1% of whom were women (Table 1). Among patients with available BMI data, 36 of 48 (82.6%) were obese, more than half of whom were morbidly obese (52.6%). Body mass index was unknown for 17 patients.

The incidence rates of IIH in the Olmsted County population are summarized in Table 2. The overall age- and gender-adjusted incidence rate was 1.8 per 100 000 persons. The IIH incidence increased significantly over the study period from 1.0 per 100 000 persons between 1990 and 2001 to 2.4 per 100 000 persons between 2002 and 2014. The incidence of IIH was significantly higher in women than in men, with an overall age-adjusted incidence rate of 3.3 per 100 000 persons in women in contrast to 0.3 per 100 000 persons in men ($P < 0.001$). From 2002 through 2014, the incidence rate had risen to 4.2 per 100 000 persons in women and 0.5 per 100 000 persons in men.

Table 3 shows the age- and gender-specific incidence rates of IIH in Olmsted County over the study period. The incidence rate peaked at 11.7 per 100 000 persons for women between the ages of 25 and 34 years, whereas the rate peaked for men between the ages of 0 and 14 years at 0.8 per 100 000 persons. Based on Centers for Disease Control and Prevention data for obesity in Minnesota among 15- to 44-year-olds in 2000, the incidence among obese 15- to 44-year-olds was 11.1 per 100 000 persons compared with 3.5 per 100 000 persons among all patients in the same age group. The incidence rate among obese female patients in this age group was 22.0 per 100 000 persons compared with 6.8 per 100 000 persons among all the female study patients in the same age group. Comparing IIH incidence rates with obesity rates in Minnesota from 1990 through 2014 (Fig 1), there was a strong correlation observed between obesity and the age-, gender-, and year-adjusted IIH incidence rates ($R^2 = 0.70$, $P = 0.008$).

Discussion

A prior study using the Rochester Epidemiology Project data to evaluate the epidemiologic features of IIH before 1990

Table 2. Idiopathic Intracranial Hypertension Incidence Rates and Body Mass Index by Year, Gender, and Age in Olmsted County, Minnesota, from 1990 through 2014

Group	Total No.	Incidence Rate (95% Confidence Interval) per 100 000 Persons
Years (age- and gender-adjusted incidence rate)		
1990–2014	63	1.759 (1.324–2.194)
1990–2001	17	1.046 (0.559–1.575)
2002–2014	46	2.359 (1.676–3.042)
P value		0.007
Gender 1990–2014 (age-adjusted incidence rate)		
Men	5	0.290 (0.035–0.544)
Women	58	3.277 (2.432–4.121)
P value		< 0.001
Gender 1990–2001 (age-adjusted incidence rate)		
Men	0	0.000 (0.000–0.000)
Women	17	2.129 (1.115–3.143)
P value		< 0.001
Gender 2002–2014 (age-adjusted incidence rate)		
Men	5	0.530 (0.064–0.997)
Women	41	4.247 (2.945–5.549)
P value		< 0.001

Adjusted to the total United States white population in 2000. The calculated *P* values compare the crude incidence rates. The age-, gender-, and year-adjusted rates are presented to generalize idiopathic intracranial hypertension incidence to the United States white population.