

Bidirectional Relationship Between Nanoarteritic Ischemic Optic Neuropathy with Diabetes Mellitus: A Cross Sectional Study

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ABSTRACT

Background: Diabetes, low nighttime blood pressure, and nonarteritic ischemic optic neuropathy may be associated. Not too many studies present whether this relationship applies to patients.

Objective: Diabetes mellitus, low blood pressure at night, and nonarteritic ischemic optic neuropathy were studied in a group of individuals.

Methods: The ophthalmology clinic will conduct a cross-sectional research on patients with nonarteritic ischemic optic neuropathy from March 2019 to December 2021. Nonarteritic ischemic optic neuropathy patients were tested for diabetes. Some participants wore ambulatory blood pressure monitors during the trial. Nighttime blood pressure drops are typical, muted, severe, and reverse.

Results: Nonarteritic ischemic optic neuropathy was identified in 67 individuals. 587 of 67 patients were selected. 34 patients (50.7%) had diabetes, while 39 (58.2%) had hypertension. 32 people's blood pressure dropped during sleep. Only four (5.9%) saw substantial drops.

Conclusions: Diabetes may be linked to nonarteritic ischemic optic neuropathy, but not nocturnal blood pressure declines.

Keywords: Optic Neuropathy, Diabetes Mellitus, Hypertension

INTRODUCTION

Nonarteritic ischemic optic neuropathy affects the elderly most often. Typical symptoms include afferent pupillary abnormalities, fast vision loss, and diminished visual field. The fundus may disclose diagnostic features. Even though NAION's exact origins are unknown, experts have found some risk factors. Systemic ailments like hypertension and diabetes are examples (DM). Hypothesized contributory factor: overnight blood pressure decline. Diabetes mellitus (DM) is characterized by chronic hyperglycemia caused by insulin resistance, insufficiency, or both. Diabetes type 1 is DM. Long-term high plasma glucose affects several organs and bodily systems. Diabetes can cause diabetic retinopathy, cataracts, and macular edema. DM's affiliation with NAION is still debatable. Diabetes mellitus enhances the risk of NAION, according to several researches. Several studies haven't found a correlation between the two. Circadian blood pressure drops late at night. This mutation affects optic nerve circulation. At night, optic nerve circulation drops. DM and nocturnal blood pressure decline are not linked to NAION. This study aims to determine if diabetes and low blood pressure overnight are linked to NAION in a group.

MATERIALS AND METHODS

Cross-sectional study of NAION patients was carried out. Primary care facilities directed patients with visual difficulties to the Ophthalmology clinic. A consultant ophthalmologist evaluated each patient at the clinic. After the cross-sectional design, an ambulatory blood pressure monitor was used for one day to measure nightly blood pressure drops. Ophthalmologist diagnosed NAION based on patient complaints and OCT findings (bloated, hyperemic optic disc or peripapillary haemorrhages). Documentation contained anthropometric and demographic data. The patients' medical histories documented their diabetes mellitus (DM), antidiabetic medication usage, and diabetes duration. Diagnosis of diabetes was determined using the American Diabetes Association's fasting plasma glucose and glycated haemoglobin criteria. Diabetes patients' lipid profiles and random blood glucose levels were also collected. People with a history of hypertension or who take antihypertensive medicines also have hypertension. Those who didn't satisfy the standards sat quietly for five minutes while their blood pressures were taken. After three readings, a mean was

calculated. The patient's hypertension was diagnosed using 8th JNC criteria. Each participant wore a 24-hour ambulatory blood pressure monitor. The monitor's report was analyzed the next day to determine nighttime dipping, which is categorized as normal (dipper, 10–20 percent reduction in nocturnal blood pressure), blunted (non-dipper, 10 percent reduction), reverse (riser, increase in nocturnal blood pressure), and severe (extreme dipper, reduction >20 percent). After establishing that the data are normally distributed, mean and standard deviation are used to summarize descriptive statistics. A p value of less than 0.05 was judged significant in a chi-square analysis. The study used SPSS version 23.

RESULTS

In this study 67 NAION patients were studied. The average age of the participants was 49.82, with a standard deviation of 8.6 years. Most people had a healthy body mass index, 27.2 5.2 kg/m² on average. Table 1 describes the participants' additional traits. 34 patients (50.7%) had diabetes, while 39 (58.2%) had hypertension. 32 people's blood pressure dropped during sleep. Only four (5.9%), seems substantial drops.

Table 1: Characteristics of Participants

Characteristic	Count	P value
DM, n (%)	50.7%	
Gender, n (%)		0.4
Male	57	
Female	43	
Age, mean ± SD (years)	59.4 ± 10.9	
BMI, mean ± SD (kg/m ²)	29.7 ± 4.8	
FPG, mean ± SD (mmol/L)	6.9 ± 2.6	
RPG, mean ± SD (mmol/L)	10.8 ± 5.5	
Retinopathy,		0.001
NPDR	5	
PDR	2	
Maculopathy,		0.001
Moderate	4	
Severe	2	

DISCUSSION

In adults, the nonarteritic anterior ischemic optic neuropathy (also known as NAION) is the kind of optic neuropathy that occurs second most often. The actual pathogenesis process that causes NAION is not fully understood at this time. The dropping of blood pressure during sleep and diabetes has both been suggested as potential risk factors. In this work, we aimed to shed light on the possible connections between NAION and the aforementioned illnesses. We were able to show a significant link between DM and NAION by the fact that 50.7% of the participants had DM. This percentage is significantly higher than the results of earlier research, which found that only 6–30% of people had DM. In addition, a meta-analysis that was carried out by Chen et al. indicated that the odds ratio of having diabetes and NAION was 1.64 (95 percent confidence interval = 1.17–2.30), as compared to those who did not have diabetes. The fact that people with diabetes and NAION are less likely to have suffered retinopathy and/or maculopathy is an intriguing discovery that came out of our research. According to the findings of another study, however, thirty percent of individuals who have diabetes and NAION also have coexisting retinopathy. One possible cause of NAION is poor circulation in the area of the optic nerve head, as this has been hypothesized. Individuals who are relatively younger and who have NAION have a greater connection with diabetes, hypertension, and hypercholesterolemia than patients who are older and who have this condition. Diabetes is a well-known risk factor for ischemia, and there is some speculation that NAION is a microvascular consequence of diabetes. In addition, hyperglycemia can cause circulatory failure through many pathways, including the polyol pathway, residual oxygen species, and glycation end products. An blockage of the capillaries may occur as a consequence of hyperglycemia-induced leukostasis. In addition, in order to cause persistent hypoperfusion, there must be a malfunction in the autoregulatory system that controls the blood flow in the head of the optic nerve. Diabetes-related autonomic neuropathy may be a factor in the development of this autoregulatory dysfunction.

The results of our investigation were unable to establish a connection between a drop in blood pressure throughout the night and NAION. who reported that there was a significant influence of nocturnal blood pressure falling on NAION and, as a result, advocated that antihypertensive medicine should not be used at night. On the other hand, Landau et al. came to a conclusion that was comparable to ours and showed that there is no substantial correlation between the two situations. In comparison to the findings of other research, which found a prevalence of hypertension ranging from 35–50 percent, our study found a rate of hypertension that was 58.2 percent. In accordance with the findings of earlier research, we did not find any differences between the sexes. In a similar vein, our research has shown that those in their sixties and seventies are most likely to be affected. This is consistent with the findings of other investigations. The following are some of the problems with our research: First, there was a lack of controls, which makes it impossible to conduct a test of connection and significance. Second, there wasn't a huge amount of people in the sample. Third, the research was carried out at a single location throughout its entirety. Fourth, we did not identify the particular kind of DM that was used. In conclusion, we were unable to demonstrate that there is a direct cause-and-effect relationship between DM and NAION. Our research is notable for the fact that it is the first to focus on NAION in patients of Arab descent. It would appear that race plays a role in the incidence of NAION, with Caucasians being more likely to be afflicted than African-Americans in the United States.

CONCLUSIONS

This study found that NAION patients have a higher frequency of diabetes but a lower prevalence of overnight blood pressure drops.

Endocrinologists and diabetologists should be aware of this link and refer patients for a comprehensive eye exam as soon as NAION symptoms appear. Ophthalmologists should emphasize the need of maintaining optimal glycemic management in patients with both DM and NAION, as well as assess people with NAION but no history of diabetes for the illness. NAION individuals without a diabetes background are more likely to develop diabetic retinopathy. Large-scale case-control studies are needed to determine if the two diseases are linked.

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