

Original article

Diplopia and strabismus in diabetics (Type II) and non diabetics in Yazd, Iran

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Abstract:

Purpose: To describe the frequency of diplopia and strabismus in diabetics (Type II) and non diabetics in Yazd, Iran.

Methods: This is a cross sectional study on 3000 patients including 1500 diabetics (type II) and 1500 nondiabetics in Yazd from 2011 to 2012. Demographic data, duration of diabetes, presence of diplopia or strabismus and duration of them, involved cranial nerve were gathered and documented. Data was analyzed by SPSS (ver. 16) using descriptive statistics, chi-square, fisher and T tests.

Results: Mean age in diabetic and nondiabetic groups was 61.04 ± 10.84 and 36.32 ± 12.63 respectively with statistical difference ($p\text{-value} < 0.001$). Mean duration of diabetes was 11 ± 7.42 years. There was no statistical difference between two groups based on gender. Diplopia exists in 6(0.4%) diabetics and 13(0.9%) nondiabetics; Strabismus exists in 6(0.4%) diabetic patients and 10(0.7%) nondiabetics without statistically significant difference. Sixth nerve palsy accounted for the majority of patients in groups.

Conclusion: There was no statistically significant difference in frequency of diplopia and strabismus between diabetics and nondiabetics.

Key words: diplopia, strabismus, diabetics, nondiabetics

Introduction:

The ability to maintain the alignment of visual axis depends on Coordination of eye movement. Diabetes mellitus (DM) is a rare benign cause of cranial neuropathy. Extra ocular motility disorders may occur in diabetic patients, secondary to diabetic neuropathy, involving the third, fourth, or sixth cranial nerve ¹. Many factors cause disruption of alignment and lead to diplopia or eye deviation. Cranial nerve palsy is one of them that may be precipitated by diabetes ². Diabetic mononeuropathy appears to be a serious problem from a diagnostic and therapeutic point of view. Cranial neuropathies in diabetic patients are extremely rare and occur in older individuals with a long duration of diabetes ³⁻⁵. Often ophthalmoplegia is seen in patients with mild and long term diabetes, so it associated with complications such as retinopathy, neuropathy and lens opacity ⁶.

Strabismus is misalignment of eyes in any directions ⁷. Paralysis strabismus is one of the diagnostic and therapeutic challenges in ophthalmology. Often isolated sixth nerve palsy is associated with diabetes, hypertension and atherosclerosis ⁸.

Different incidences of cranial nerve palsies in diabetic patients have been reported. Patients with diabetes have a 10-fold increase in the incidence of cranial nerve palsy, with an incidence of 1% among diabetics compared with an incidence of 0.1% for the nondiabetic population ⁴. In the present study we report the relative frequency of diplopia and strabismus in diabetics (Type II) and non diabetics in Yazd, Iran.

Materials and Methods:

In this cross-sectional study, we studied 3000 patients including 1500 diabetics (type II) referred to Yazd diabetic center and 1500 nondiabetics from ophthalmology clinic of Yazd Shahid Sadughi hospital from 2011 to 2012.

Based on aims, a questionnaire designed and data including, demographic data, duration of diabetes, presence of diplopia or strabismus and duration of them, involved cranial nerve were gathered and documented. Inclusion Criteria were admitted nondiabetic patients by ophthalmology clinic of Yazd Shahid Sadughi hospital for any reason and type II diabetic patients referred to diabetic center for any reason. **Patients with congenital strabismus or diplopia excluded.** The questionnaire was completed by general practitioner. Primary status of patients was detected and suspicious cases referred to ophthalmologist for orthoptic evaluation.

Collected data analyzed by SPSS (version 16) based on aims, using descriptive statistics, chi-square, fisher and T tests. Statistically significance level set at 0.05.

Results:

In this study 3000 patients including 1500 diabetics [639(42.6%) male and 861(57.4%) female] and 1500 nondiabetics [628(41.9%) male and 872(58.1%) female] were selected. There was no statistical difference between two groups based on gender ($p\text{-value}=0.684$).

Mean age in diabetic and nondiabetic group was 61.04 ± 10.84 and 36.32 ± 12.63 respectively with statistical difference ($p\text{-value}<0.001$). Mean duration of diabetes was 11 ± 7.42 years.

Based on table 1, diplopia exists in 6(0.4%) diabetic patients and 13(0.9%) nondiabetics. The difference between two groups was not statistically significant. Also strabismus exists in 6(0.4%) diabetic patients and 10(0.7%) nondiabetics without statistically significant difference.

Because of age disagreement, the groups were studied based on age separately. Table 2 shows the mean age of patients with and without diplopia and strabismus in diabetic and nondiabetic groups.

In all of diabetic patients and 7 nondiabetics paralysis was the cause of strabismus. Sixth nerve palsy accounted for the majority of patients in groups, 5 and 7 cases in diabetics and nondiabetics respectively.

The frequency of diplopia and strabismus in all patients based on gender is shown in table 3 and the difference between two groups was not statistically significant.

Overall 9 patients (3 diabetics and 6 nondiabetics) had systemic disease comorbidity such as hypertension (4patients), hyperlipidemia (2patients), thyroid disease (1patient), hypertension and thyroid disease (1patient), hyperlipidemia and thyroid disease (1patient).

Discussion:

Approximately 1-14% of diabetics have ocular motor nerves palsy during the course of the disease^{9, 10}. ophthalmoplegia, despite being a rare entity in diabetes mellitus, is associated with great anxiety for the patients and often appears to be a serious problem from a diagnostic and therapeutic point of view⁵. In the present study, we report 0.4% Diplopia in diabetic patients and 0.9% in nondiabetics. Also Strabismus exists 0.4% in diabetic patients and 0.7% in nondiabetics without statistically significant difference.

Large, randomized clinical trials of individuals with type 1 or type 2 DM have conclusively demonstrated that reduction in chronic hyperglycemia prevents or delays microvascular complications. Genetic and Other unknown factors may affect the development of complications. For example, despite long-standing DM, some individuals never develop nephropathy or retinopathy⁹. Probably in patients referred to diabetic centers, blood sugar is controlled, so incidence of complications such as diplopia and strabismus was lower than expected amount. Moreover from diabetic patients with diplopia and strabismus, 2 cases had hypertension and 1 case had hypertension and hyperlipidemia. From nondiabetic patients with diplopia and strabismus, 4 cases had hypertension, 2cases had hyperlipidemia and 2 cases had thyroid disease that may be as a disturbance factor on development of cranial

nerves palsy. Also, overlapping between causes of cranial nerve palsy in both groups can rationalize that no statistically significant difference was seen between two groups.

The frequency of diplopia and strabismus (cranial nerve palsy) in diabetic patients in our study was 0.4%. According to Greco's study, 0.75% of 8150 diabetic patients had cranial nerve palsy during 12 years ⁶. Also based on another study by Greco ⁵, 0.4% of 6765 diabetic patients had ophthalmoplegia that is consistent with our results. In Chebel study 16 patients with DM associated ocular motor nerve palsies, all complained by acute diplopia with headaches, were recorded and there was a female predominance with a mean age of 67 ± 13.9 years. A long history of DM was observed in all patients, with a mean duration of 16 ± 5.8 years (range from 5-27 years) ¹⁰. Mean duration of diabetes in our study was 11 ± 7.42 years too. Other vascular risk factors or chronic diseases in Chebel reports were arterial hypertension in 9 patients, and hyperlipidemia in 4 cases, was more than vascular risk factors in our reports.

In our study all diabetic patients with diplopia had strabismus. In Greco study ⁵ all the patients presented with clinical signs of the affected cranial ocular nerves such as: double vision, loss of or impaired motility of the eyeball and deviation of the eyeball too. The frequency of strabismus in other studies is near to nondiabetics in our survey ¹¹.

Paralysis of the sixth cranial nerve is identified as the most common type in some literature ¹²⁻¹⁴ even though, the third cranial nerve was the most affected in some series ^{5, 10, 15 and 16}. In our patients, the sixth nerve was the most frequently involved versus Greco reports. No palsy of fourth nerve was reported in the considered period similar to others; this finding confirms that the trochlear nerve is the least often involved in diabetic ophthalmoplegia ⁵.

Conclusion: According to this study, no statistically significant difference was seen about frequency of diplopia and strabismus between diabetic and nondiabetic groups.

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Table 1: Frequency of diplopia and strabismus in diabetic and nondiabetic group

cases groups	With diplopia	Without diplopia	P value	With strabismus	Without strabismus	P value
diabetics	6(0.4%)	1494(99.6%)	0.107	6(0.4%)	1494(99.6%)	0.316
nondiabetics	13(0.9%)	1487(99.1%)		10(0.7%)	1490(99.3%)	
total	19(0.6%)	2981(99.4%)		16(0.5%)	2984(99.5%)	

Chi-square test

Table2: The mean age of different groups

* groups	With diplopia	Without diplopia	P value	With strabismus	Without strabismus	P value
diabetics	51±13.26	61.08±10.82	0.023	51±13.26	61.08±10.82	0.023
nondiabetics	42.23±12.58	36.27±12.62	0.09	43.8±10.47	36.27±12.63	0.06

T test

*Mean age±SD

Table 3: The frequency of diplopia and strabismus in all patients based on gender

gender patients	male	female	pvalue
With diplopia	8(0.6%)	11(0.6%)	0.991
Without diplopia	1259(99.4%)	1722(99.4%)	
With strabismus	7(0.6%)	9(0.5%)	0.902
Without strabismus	1260(99.4%)	1724(99.5%)	

Chi-Square test