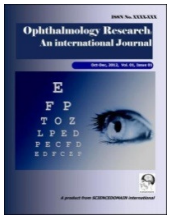

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Diplopia and Strabismus in Diabetics (Type II) and Non-diabetics in Yazd, Iran

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Authors' contributions

This work was carried out in collaboration between all authors. Author MRB designed the study, Author MDH wrote the protocol, and wrote the first draft of the manuscript, and collected the data and revised. Author EAS managed the literature searches, and revised. Author MAA did expert consultation. Author SS collaborated in collecting data, and author SB collaborated in revising. All authors read and approved the final manuscript.

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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 non-diabetics in Yazd from 2011 to 2012.Based on aims, a questionnaire was designed and data including, demographic data, duration of diabetes, presence of diplopia or strabismus,

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duration of them, and involved cranial nerves were gathered and documented. Data were analyzed by SPSS (ver. 16) using descriptive statistics, chi-square, fisher and T tests.
Results: Diplopia existed in 6(0.4%) diabetic and 13(0.9%) non-diabetic patients, without statistically significant difference (p-value=0.107). Strabismus existed in 6(0.4%) diabetic and 10(0.7%) non-diabetic patients, without statistically significant difference (p-value=0.316).Mean duration of diabetes was 11±7.42 years. There was no statistical difference between the two groups in terms of gender. Sixth nerve palsies were accounted for the majority of patients with strabismus in the two groups.
Conclusion: There was no statistically significant difference in frequency of diplopia and strabismus between diabetics and non-diabetics.

Keywords: Diplopia; strabismus; diabetics; non-diabetics.

1. INTRODUCTION

The ability to maintain visual axis alignment depends on coordination of eye movements. 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 third, fourth, or sixth cranial nerves [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 mono-neuropathy 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 long duration of diabetes [3-5]. Ophthalmoplegia is usually seen in patients with mild and long term diabetes, so it associates with complications such as retinopathy, neuropathy and lens opacity [6].

Strabismus is misalignment of eyes in any direction [7]. Paralysis strabismus is a diagnostic and therapeutic challenge in ophthalmology. Isolated sixth nerve palsy is usually 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 non-diabetic population [4]. In the present study, we have reported the relative frequency of diplopia and strabismus in diabetics (Type II) and non-diabetics in Yazd, Iran.

2. MATERIALS AND METHODS

In this cross-sectional study, we studied 3000 patients including 1500 diabetics (type II) referred to Yazd diabetes center and 1500 non-diabetics from ophthalmology clinic of Shahid Sadughi hospital, Yazd, 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, and involved cranial nerves were gathered and documented. Inclusion criteria were admitted non-diabetic patients in ophthalmology clinic of Shahid Sadughi hospital, Yazd, for any reason and type II diabetic patients referred to diabetes center for any reason. Patients with congenital strabismus were excluded. The questionnaire was completed by a general practitioner. Primary status of patients was detected and suspicious cases were referred to ophthalmologist for orthoptic evaluation.

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

3. RESULTS

In this study, 3000 patients including 1500 diabetics [639(42.6%) males and 861(57.4%) females] and 1500 non-diabetics [628(41.9%) males and 872(58.1%) females] were selected. There was no statistical difference between the two groups in terms of gender (p-value=0.684). Mean duration of diabetes was 11±7.42 years. Mean age in diabetic and non-diabetic groups was 61.04±10.84 and 36.32±12.63 respectively, with statistical difference (p-value<0.001). Overall, the mean age of patients with and without diplopia was 45±13.11 and 48.70±17.09 respectively, without statistically differences (p-value= 0.346). Also, the mean age of patients with and without strabismus was 46.5±11.72 and 48.69±17.09 respectively, without statistically

differences (p value= 0.608). The mean age of diabetic and non-diabetic patients with diplopia was 51±13.26 and 42.23±12.58 respectively, without statistically differences (p-value= 0.18). Also, the mean age of diabetic and non-diabetic patients with strabismus was 51±13.26 and 43.8±10.47 respectively, without statistically differences (p-value= 0.24). Therefore, we ignored the role of age in frequency of diplopia and strabismus in the two groups.

As indicated in Table 1, diplopia existed in 6(0.4%) diabetic patients and 13(0.9%) non-diabetics. The difference between the two groups was not statistically significant (p-value=0.107). Also, strabismus existed in 6(0.4%) diabetic patients and 10(0.7%) non-diabetics without statistically significant difference (p-value=0.316). Table 2 shows the mean age of patients with and without diplopia and strabismus in diabetic and non- diabetic groups. As indicated in Table 2, mean age in diabetic patients with diplopia was 51±13.26 while in diabetic patients without diplopia was 61.08±10.82 which shows statistically significant difference between the two groups (P-value=0.023). Mean age in diabetic patients with strabismus was 51±13.26 while in diabetic patients without strabismus was 61.08±10.82 which shows statistically significant difference between the two groups (P-value=0.023).

Mean age in non-diabetic patients with diplopia was 42.23±12.58 and in non-diabetic group without diplopia was 36.27±12.62; the difference between the two groups was not statistically significant (P-value=0.09).

Mean age in nan-diabetic patients with strabismus was 43.8±10.47and in nan-diabetic patients without strabismus was 36.27±12.63and the difference between the two groups was not statistically significant (P-value=0.06). We conclude from Table 2 that effect of diabetes on cranial nerve palsy is stronger than age. So statistical difference in the mean age between two groups don't have strong effect on result of our study.

Paralysis was the cause of strabismus in 6 diabetic patients and 7 non-diabetic patients. Sixth nerve palsy was accounted for the majority of patients with strabismus in the two groups, with 5 and 7 cases in diabetics and non-diabetics respectively.

As the frequency of diplopia and strabismus in all patients in terms of gender is shown in Table 3, the difference between the two groups was not statistically significant. Overall, 9 patients (3 diabetics and 6 non-diabetics) had systemic disease comorbidity such as hypertension (4 patients), hyperlipidemia (2 patients), thyroid disease (1 patient), hypertension and thyroid disease (1 patient), hyperlipidemia and thyroid disease (1 patient).

4. DISCUSSION

Approximately 1-14% of diabetics have ocular motor nerves palsy during the course of the disease [9,10]. Despite being a rare entity in diabetes mellitus, ophthalmoplegia is associated with great anxiety for patients, and often appears to be a serious problem from a diagnostic and therapeutic point of view [5].

Table 1. Frequency of diplopia and strabismus in diabetic and non-diabetic 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
Non-diabetics	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

Table 2. 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
Non-diabetics	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	p-value
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

In the present study, we reported diplopia in 0.4% diabetic patients and in 0.9% non-diabetics. Also strabismus existed in 0.4% diabetic patients and in 0.7% non-diabetics without any statistically significant difference.

Large randomized clinical trials on 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 retinopathy [9]. Blood sugar might be controlled in patients referred to diabetes centers so that incidence of complications such as diplopia and strabismus would be lower than expected. Moreover, among diabetic patients with diplopia and strabismus, 2 cases had hypertension and 1 case had hypertension and hyperlipidemia. Among non-diabetic patients with diplopia and strabismus, 4 cases had hypertension, 2cases had hyperlipidemia and 2 cases had thyroid disease that may be as a disturbing factor on development of cranial nerves palsy. Also, overlapping between causes of cranial nerve palsy in both groups could cause no statistically significant difference between the 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 years6. 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 were associated with ocular motor nerves palsy. All of those complaining of acute diplopia with headaches were recorded and there was a female predominance with mean age of 67±13.9 years. A long history of DM was observed in all patients, with mean duration of 16±5.8 years (ranging 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, which was more than vascular risk factors in our report.

In our study, all diabetic patients with diplopia had strabismus. In Greco study5, all patients were presented with clinical signs of affected cranial ocular nerves including double vision, loss of or impaired motility of the eyeball, and deviation of the eyeball. The frequency of strabismus in other studies is near to non-diabetics in our survey [11].

Paralysis of the sixth cranial nerve is identified as the most common type in some literature [12-14], while the third cranial nerve was the most affected in some others [5,10,15,16]. In our patients, the sixth nerve was the most frequently involved which versus Greco reports. No palsy of the fourth nerve was reported in the same period as others; this finding confirms that the trochlear nerve is the least involved in diabetic ophthalmoplegia [5].

5. CONCLUSION

According to this study, no statistically significant difference was seen in frequency of diplopia and strabismus between diabetic and non-diabetic groups.

CONSENT

Not applicable.

ETHICAL APPROVAL

Local Ethics Committee approval was obtained for this retrospective study and consent forms were not required.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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