

Visual dysfunction and work invalidity in patients with diabetes and hypertension

Poremećaji vidne funkcije i radna invalidnost oboljelih od dijabetesa i hipertenzije

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ABSTRACT

Objective. Diabetes mellitus and arterial hypertension are chronic, mass non-communicable diseases that are global health problems with characteristics of epidemiology where complications of these diseases are the common reason for visual handicap and disability in the work productive population. The primary aim of this paper was to analyze the frequency of visual dysfunction, and behavioral habits in diabetic and hypertensive patients and the second aim was to analyze the occurrence of work disability in patients with these diseases.

Methods. The research is a cross-sectional study made in two Health Centers in the City of Eastern Sarajevo in a period of July 2018 to July 2019 (12 months). 192 patients with diabetes and 100 patients with hypertension were selected using the random sampling method. A special questionnaire was created for this purpose, and statistic analysis was made by SPSS (IBM, Chicago version 19). Statistical significance was tested with χ^2 test.

Results. Diabetic patients significantly have more visual disturbances than hypertensive patients according to subjective assessment ($\chi^2=14,21$, $p < 0.001$). Worsening of visual acuity is presented more in diabetic than in hypertensive pa-

APSTRAKT

Cilj. Dijabetes melitus i arterijska hipertenzija su hronične, masovne nezarazne bolesti koje su globalni zdravstveni problem sa karakteristikama epidemije, a komplikacije ovih bolesti su čest razlog oštećenja vidne funkcije i invaliditeta u radno produktivnoj populaciji. Primarni cilj rada je analiza učestalosti poremećaja funkcije vida i navika ponašanja kod oboljelih od dijabetesa i hipertenzije, a sekundarni cilj je bio da se istraži pojava radne invalidnosti kod pacijenata sa ovim oboljenjima.

Metode. Istraživanje je sprovedeno kao studija presjeka u dva Doma zdravlja u Gradu Istočno Sarajevo u periodu od jula 2018 godine do jula 2019 godine (12 mjeseci). Metodom slučajnog uzorka izabrano je 192 pacijenta sa dijabetesom i 100 pacijenata sa hipertenzijom. U tu svrhu kreiran je poseban upitnik, a statistička analiza je urađena u programu SPSS (IBM, Chicago verzija 19). Statistička značajnost je ispitivana χ^2 testom.

Rezultati. Pacijenti sa dijabetesom prema subjektivnoj procjeni imaju značajno više smetnji vida od hipertoničara ($x^2=14,21$, $p < 0,001$). Pogoršanje vidne funkcije je izraženije kod obolelih od dijabetesa nego kod hipertoničara ($x^2=16,17$, $p < 0,001$). Nije nađena značajna razlika u navici pušenja ($x^2=1,778$, $p=0,411$) i konzumaciji alkohola ($x^2=2,158$, $p=0,142$). Ispitanici sa dijabe-

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tients ($\chi^2=6.17$, $p<0.001$). There is no significant difference in behavioral habits between diabetic and hypertensive patients for smoking ($\chi^2=1.778$, $p=0.411$) and alcohol consumption. ($\chi^2=2.158$, $p=0.142$). Patients with diabetes are more frequent in the status of work disability than those with hypertension ($\chi^2=13.46$, $p<0,001$).

Conclusion. Mass non-communicable diseases are a common cause of visual dysfunction. Diabetes mellitus is the main reason for visual disability in the adult population from the region of Eastern Sarajevo. Behavioral habits like smoking and alcohol consumption have a serious impact on the prognosis of those patients.

Key words: diabetes mellitus; hypertension; visual acuity; vision disorders; work performance.

INTRODUCTION

Today, diabetes mellitus and arterial hypertension are common and serious social-economic problems in the developed and developing world and their complications are an important financial burden for individual as well as for society¹⁻⁵. Diabetes is one of the main reasons for premature death and one of the four mass non-communicable diseases which the World Health Organisation (WHO) recognized as a priority for prevention and in 2011 declared "The Declaration for prevention and control for mass non-communicable diseases"⁶. Aims of this research were to analyze the frequency of visual dysfunction in diabetic and hypertensive patients and the occurrence of work disability in two groups.

SUBJECTS AND METHODS

The research was conducted as a cross-sectional study carried out in two health centers in East Sarajevo, from July 2018 to July 2019. The sample that is randomized was taken from the population suffering from diabetes and hypertension, and included 192 diabetics and 100 hypertensive patients. A special original questionnaire was created for the research. The questionnaire contained 53 questions about lifestyle, behavioral habits and subjective visual assessment functions. The respondents, before the ophthalmological examination, gave their consent to use their data for scientific purposes and filled out this questionnaire themselves. Twelve months later, the respondents were tested again based only on their acuity vision and function. χ^2 was used for statistical analysis of the collected data test, and the value $p<0.05$ was taken as the limit value of statistical significance. Data were analyzed using the SPSS statistical program (IBM, Chicago, version 19). All research was done in accordance with the principles of the Helsinki Declaration and approved by the ethical authorities of the institution.

som su češće u statusu radne invalidnosti nego oni sa hipertenzijom ($\chi^2=13,46$, $p<0,001$).

Zaključak. Masovne, nezarazne bolesti su čest uzrok oštećenja vida, a dijabetes melitus je jedan od glavnih uzroka gubitka vidne funkcije u odrasloj populaciji sa područja Istočnog Sarajeva. Navike ponašanja poput pušenja i konzumiranja alkohola imaju ozbiljan uticaj na prognozu ovih pacijenata.

Ključne riječi: dijabetes melitus; hipertenzija; oštrina vida; poremećaji vida; radna produktivnost.

RESULTS

Study included 292 patients, 192 diabetics or 65.6% and 100 (34.4%) hypertensive patients. The average age was for the diabetics 55 ± 8 and, for the hypertensive 55 ± 7 (no statistical significance). In both groups- the diabetic and hypertensive, the majority were males (63% vs 53%) (Table 1).

Table 1. Gender structure of sample.

Variable	Diabetic patients (n=192)		Hypertensive patients (n= 100)	
	N	%	N	%
Gender				
Male	122	63,4	53	53,0
Female	70	36,6	47	47,0
All	192	100,0	100	100,0

($\chi^2 = 2,925$, $p = 0,087$)

Average duration of diabetes was 12 ± 7 years. Average glucose concentration was 9,3 in mmol/l (Table 2).

Table 2. Basic parameters for diabetic patients

Parametar	N	Minimum	Maximum	The mean	SD
Duration of diabetes mellitus	150	1.0	41.0	11.9	7.2
Age baseline 2018	192	25	67	55.1	8.3
Fasting blood sugar values	192	5.00	17.00	9.3	2.2
Duration of smoking status	62	4	45	23.2	9.2

SD - Standard Deviation

ANOVA test showed that according to years of duration of diabetes and glycemic control values were worst in the group of patients who had diabetes for longer than 15 years (Figure 1).

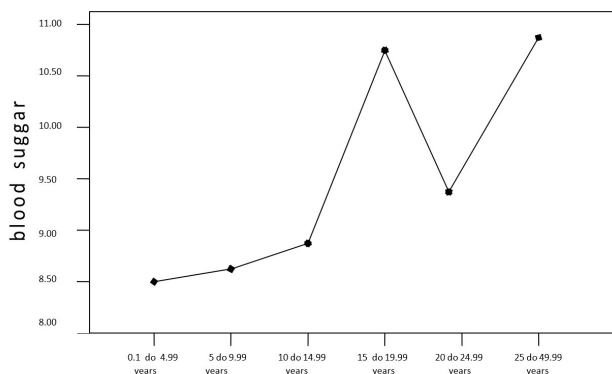


Figure 1. Value of blood glucose concentration compared to duration of diabetes mellitus (x-axis: duration of diabetes in years).

According to a subjective assessment of their own visual function in the diabetic group, 72% of them were not satisfied, while 50% responded positively in the hypertensive group (Table 3).

Table 3. Subjective assessment of own visual function (good/bad).

Variable	Diabetic patients (n=192)		Hypertensive patients (n= 100)	
	N	%	N	%
Good	53	27,7	50	50,0
Bad	138	72,3	50	50,0
All	192	100,0	100	100,0

($\chi^2 = 14, 21, p < 0,001$)

One-third of participants were smokers in the diabetic group, while in the control group were the one-fourth of them (Table 4).

Table 4. Habit of smoking in diabetic and hypertensive patients

Variable	Diabetic patients (n =192)		Hypertensive patients (n=100)	
	N	%	N	%
Smoker	51	26,7	21	21,0
Non smoker	129	67,5	75	75,0
Ex - smoker	12	5,8	4	4,0
All	192	100,0	100	100,0

($\chi^2 = 1,778, p = 0,411$).

Alcohol consumption is registered in 26% diabetics and 19% in control group with arterial hypertension (Table 5).

Table 5. Alcohol consumption in diabetic and hypertensive patients

Variable	Diabetic patients (n =192)		Hypertensive patients (n =100)	
	N	%	N	%
Alcohol consumption				
Consumer	24	12,6	19	19,0
Non consumer	168	87,4	81	81,0
All	192	100,0	100	100,0

($\chi^2 = 2,158, p = 0,142$)

Subjective assessment of worsening of visual acuity was dominant in the diabetic group 67% and it was a significant difference compared to the control group, ($p < 0,001$) (Table 6)

Table 6. Visual acuity worsening during 12 months

Variable	Diabetic patients (n =192)		Hypertensive patients (n =100)	
	N	%	N	%
Visual worsening				
Present	127	66,5	42	42,0
Absent	65	33,5	58	58,0
All	192	100,0	100	100,0

($\chi^2 = 16,17, p < 0,001$)

Patients with diabetes are more frequent in the category of work disability and the difference was significant compared to the control group (Table 7).

Table 7. Occurrence of work disability in diabetic and hypertensive patients

Work disability	Diabetic patients (n =192)		Hypertensive patients (n =100)	
	N	%	N	%
Lost work ability	13	6,8	1	1
Partial work disability	35	17,8	6	6
Without work disability	144	75,4	93	93

($\chi^2 = 13,46, p < 0,001$)

DISCUSSION

Diabetic retinopathy is a common cause of blindness in the registered blind population of the regions of Eastern Sarajevo and Eastern Herzegovina⁷. It affects the work productive population and could be the cause of frequent absenteeism. In our sample, 68,1 % of diabetics were between 20-59 years old. Subjective assessment was highly correlated to objective ophthalmic assessment. The strength of the association between duration of diabetes and incidence of diabetic retinopathy increased rapidly during a period of 5 to 10 years duration of diabetes⁸. Longer diabetes duration, hyperglycemia, and elevated blood pressure are risk factors for Diabetic retinopathy (DR) as one of the foremost causes of blindness in the age of the working population. As the prevalence of diabetes

mellitus (DM) increases globally and patients live longer, the development of DR as a microvascular complication of DM also rises.⁹⁻¹¹ Hyperglycemia was a strong risk factor for DR. In pre-diabetic subjects, DR was also associated with hypertension and obesity. In one study in China, increased blood pressure besides elevated plasma glucose concentrations was highly significantly associated with diabetic retinopathy in Chinese. It suggests that in Chinese as also in whites, blood pressure control, besides control of plasma glucose levels is important to prevent the development or progression of diabetic retinopathy¹². In some other studies, the main risk factors for diabetic retinopathy are also high blood pressure, obesity and poor glycoregulation.¹³⁻¹⁴

We have registered that 72,3% of diabetics had some degree of subjective visual disturbance, and 66,5% had worsening and drop in visual acuity during 12 months of follow-up. It could be easily explained that their glycoregulation was not satisfying and their behavioral habits like smoking and alcohol consumption were present in one-third of cases (smokers 27%, ex-smokers 6%, and alcohol consumption present in 13%). Poor glycoregulation, present risk factors and non-healthy lifestyle are consequences of rural population structure and due to the poor financial resources, the efficacy of preventive programs did not reach all¹⁵⁻¹⁷. Incidence and prevalence of diabetic retinopathy in visual disabled population does not differ from findings recently published elsewhere in the region of Eastern Sarajevo¹⁸⁻²⁰.

In the control group with only arterial hypertension, 50% of patients had some level of visual acuity disturbances, but they stated that their visual acuity stayed stable during 12 months of follow-up. In the 42% control of cases with arterial hypertension, we have found a worsening of visual function. The reason for that was retinal venous occlusion, vitreous hemorrhage, presbyopic condition, and unstable arterial hypertension. We have found that despite recommendations for changes in lifestyle, promotion of taking regular medications, and regular blood pressure checkups, smokers were registered in 21%, ex-smokers in 4% alcohol consumption is registered in 19%. If we compare our findings with the recommendations given by WHO 6, there is a need for more activities that promote changes in behavioral habits and health promotion. There is evidence that behavioral habits have an influence on visual disturbances and the development of microvascular complications²¹.

Prevention of visual disturbances caused by diabetes mellitus and arterial hypertension must include a multi-team approach that includes general practitioners, public health, internal medicine, ophthalmic, physiotherapeutic, and vascular specialists. It is already defined by recommendations given by WHO, and other health associations⁶ but is not practically implemented everywhere. In all preventive and screening programs, it should be necessary to put a questionnaire or screening visual acuity test. Even if a patient is satisfied with his/her visual acuity, ophthalmic eye exams are mandatory for assess-

ment of the severity of those conditions and it is recommended by all existing medical literature and standard.

In conclusion, mass non-communicable diseases are the common cause of visual dysfunction in general population. Diabetes mellitus is the main reason for visual disability in the adult population from the region of Eastern Sarajevo. Behavioral habits like smoking and alcohol consumption have a serious impact on the prognosis of those patients.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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