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*Source / Izvornik:* **Collegium antropologicum, 2005, 29 - Supplement 1, 107 - 110**

**Journal article, Published version**

**Rad u časopisu, Objavljena verzija rada (izdavačev PDF)**

*Permanent link / Trajna poveznica:* <https://um.nsk.hr/um:nbn:hr:184:146945>

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*Download date / Datum preuzimanja:* **2024-05-02**



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# Quality of Screening for Diabetic Retinopathy in the Rijeka Region of Croatia

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## ABSTRACT

*The aim of this study was to compare the quality of screening for diabetic retinopathy in cities of Rijeka and Zagreb, Croatia. Review of a random sample of 500 diabetic patient records and prospective ophthalmologic survey of 466 randomly selected diabetic patients in a secondary level diabetologic service in Rijeka (coastal region of Croatia). The main outcome measures were proportion of diabetic patient records with notes on ophthalmologic examination; rate of diabetic patients involved with screening for diabetic retinopathy; comparison with rates in Zagreb (Croatian capital). A total of 67% patients visited the ophthalmologist at least once after diagnosed with diabetes, and notes on ophthalmologic examination were found in only 28% patient records. Fifty percent of patients underwent an ophthalmologic examination within two years. Only one third of patients diagnosed with DM in last two years visited the ophthalmologist within this time, and 14% of patients older than 50 years never visited the ophthalmologist. Model of screening for diabetic retinopathy in Croatia works better in Zagreb than in Rijeka region, and needs certain improvements. The authors suggested modern methods of screening, the incorporation of the mechanisms of quality control, the obligatory reporting of newly diagnosed diabetic patients to the national registry, and the direct referral from diabetologist to ophthalmologist.*

**Key words:** diabetic retinopathy, screening, quality control

## Introduction

All facts on diabetic retinopathy are well known and repeated in countless papers: it is the leading cause of blindness in working age persons in industrialised countries; a substantial proportion (90% in proliferative retinopathy) of the visual loss caused by diabetes is preventable; screening and subsequent treatment of diabetic retinopathy not only reduces needless vision loss but also will provides a financial return on the investment of public funds; and at last but not the least, many diabetic patients are not appropriately screened for diabetic retinopathy<sup>1</sup>. This issue is present even in highly developed countries, and represents serious public health problem in transitional European countries<sup>2–4</sup>. Screening for early signs of retinopathy is clearly beneficial for some people, but there is no established consensus about who should be screened, by whom, by what technique and with what frequency, especially for NIDDM<sup>5,6</sup>.

Health care for diabetic patients in Croatia is based on »Croatian model« which comprises three levels of health care and national referral centre on their top. This model includes examination by diabetologist three times a year for consultation, and screening for chronic complications once a year, as a part of secondary level care. Exceptionally, eye examination by ophthalmologist is biannual<sup>7</sup>.

An accurate list of diabetics is essential for planning a screening service [8]. Croatian National Registry of diabetic patients includes Croatian Registry for Diabetic Retinopathy, but only patients from the region of Zagreb (Croatian capital, approx. 1 mill. citizens) are included in it<sup>7</sup>.

The aim of this study was to inquire if »Croatian model« and Croatian National Registry of diabetic pa-

tients really provide a good base for national screening programme for diabetic retinopathy in order to initiate the public debate on organised and systematic ophthalmic care for diabetic patients in Croatia.

## Patients and Methods

Rijeka is a coastal district of Croatia, comprising 15% of Croatian population. Primary level of care for diabetic patients in Rijeka is provided by 145 general practitioners who refer the diabetics to the secondary level provided by two diabetologists in Rijeka Diabetologic Outpatient Service<sup>9</sup>. This service does not have any list of diabetic patients, but only patient records sorted by name. Written permission from the authorities was obtained to access the records in this service and random sample of 500 patient records was scrutinised for any notes on ophthalmologic examination in order to estimate the proportion of records with the notes.

After patient records sampling and scrutinising, both diabetologists were asked to refer to ophthalmologic examination the four randomly selected patients who came to their ordinary consultations, each day during the next six months. Total number of 466 (92%) diabetic patients out of 504 referred were examined.

All ophthalmologic examinations were performed by the same ophthalmologists (L. K. and F. T.), in the Retinal service of Department of Ophthalmology in Rijeka Clinical Hospital Centre. Every two weeks one of authors contacted the diabetologists to encourage their participation.

Retinopathy levels and maculopathy were assessed by biomicroscopic indirect ophthalmoscopy with mydriasis, fundus photography and, if necessary, by fluorescein angiography. Randomisations of patient records and patients were made using a computer random number generator. Descriptive statistics was done with software package Statsoft STATISTICA 6.0 for MS Windows.

## Results

We found the notes on ophthalmologic examination in only 83 (28%) patient data records from Rijeka Diabetologic Outpatient Service. Following results we obtained from the examinations of 466 diabetic patients. There were 41.5% females and 58.5% males (sex ratio 1.4:1, female preponderance). Age, diabetes duration and age of onset were 61 (51–69), 10 (4–16), and 52 (42–59) years respectively (median [percentile 25–75]).

Diabetes mellitus was treated by insulin in 223 (48%) of patients, by hypoglycaemic agents in 197 (42%), and by diet in 46 (10%) of patients. There were 32 (7%) patients with diabetes type I and 432 (93%) patients with diabetes type II.

Thirty-four percent of patients visited the ophthalmologist within one year, as recommended by most studies on screening of diabetic retinopathy, and total of

232 (50%) of patients visited the ophthalmologist within two years, as recommended by the Croatian model (table 1). Of 36 (8%) patients who were diagnosed with DM one year ago or sooner, 14 patients visited an ophthalmologist within this period, and eight patients never visited an ophthalmologist. Three hundred twelve (67%) patients visited the ophthalmologist for any reason after diagnosed with diabetes mellitus. Among the patients who claimed that never visited the ophthalmologist, the lowest age was 52 years.

**TABLE 1**  
TIME FROM THE LAST VISIT TO THE OPHTHALMOLOGIST

Time (years)	% of patients
≤1	34%
1–2	16%
3–5	16%
6–9	6%
10–14	6%
>15	8%
Never before	14%
Total	100%

Visual acuity lower than 20/40 in the better eye (insufficient for driving license) was detected in 37 (8%) patients, and lower than 20/200 in 9 (2%) patients. None of them was legally blind according to Croatian laws.

Diabetic retinopathy was detected in the total of 224 (48%) patients: 206 (44%) with background, 14 (3%) with high-risk nonproliferative, and 4 (<1%) with proliferative retinopathy. Diabetic maculopathy was detected in 93 (20%) patients, and in 168 (18%) of eyes respectively. Some other causes of preventable blindness were also detected: cataract in 84 (18%) patients, newly diagnosed primary glaucoma in 19 (4%) patients, and age-related macular degeneration in 93 (20%) patients. Normal fundi were observed in 129 (28%) patients.

## Discussion

There were no available data on age, sex ratio, and the average duration of diabetes for patients screened for diabetic retinopathy in Croatia to be compared with our findings. While notes on ophthalmologic examination were found in only 28% patient records from Diabetologic outpatient service, the total of 67% patients visited the ophthalmologist at least once after diagnosed with diabetes. These findings indicate that patient records were not regularly updated for ophthalmologic data.

In 1996, Croatian National Registry for Diabetes stated that 40% of the registered patients were treated by diet, 40% by hypoglycaemic agents and 21% by insulin therapy. In our study diabetes mellitus was treated by diet in 10% patients, by hypoglycaemic agents in 42%, and by insulin in 48% patients. This ratio can be

explained in two ways. One possible explanation is that patients treated only with diet visited the diabetologist less frequently than recommended by the Croatian model. In this case there is more possibility for diet-treated diabetics to be omitted by screening for diabetic retinopathy (and probably other chronic diabetic complications) conducted by diabetologist. Other explanation is that diabetic care and screening for complications for mild diabetic patients is concentrated in primary health care teams in Rijeka. Both explanations rise the question how to control the quality of screening for DR in this part of diabetic population. The most important part of »Croatian model« should be the three-dimensional net of continuous two-way communication between all levels of care, e.g. primary care practitioner, diabetologist and ophthalmologist, but does not have any implemented system of quality control of screening for chronic complications. Low rate of patient records updated for ophthalmologic findings confirms that communication between all the levels of care is not as good as it could be and that quality control could improve it. Our results also indicate that diabetologic service concentrate the patients with higher risk for diabetic retinopathy and that diabetologist should be the one who refers the patient to ophthalmologist.

As far as we know, there is only one ophthalmic service specialised for diabetic eye disease and is a part of Institute for Diabetic Disease in Zagreb, where the National Registers for Diabetes and for diabetic retinopathy were placed. Moreover, the equipment for stereoscopic fundus examination is not available in all ophthalmic practices in Croatia. Ophthalmic care is not available on primary level of medical care in Croatia. It means that patient cannot be referred directly to the ophthalmologist by diabetologist, but only by primary care practitioner; diabetologist could only give a recommendation to primary care practitioner for patient referral.

Our rates of 44% patients with background, 3% with preproliferative, <1% with proliferative retinopathy, and diabetic maculopathy 20% patients are comparable to those from Croatian Registry for Diabetic Retinopathy (44% of patients with background retinopathy, 7% with proliferative retinopathy, and 18% with maculopathy on first ophthalmologic examination).

Only 34% of study patients visited the ophthalmologist during last year. Only one out of three patients diagnosed with DM in the last two years visited the ophthalmologist within this time. Rate of patients in our study who underwent an ophthalmologic examination within two years was 50%. As »Croatian model« assumes biannual screening, our rate is roughly comparable to other studies, as annual screening rates generally range from 18% to 65% and broad-based population surveys suggest the rates of approximately 50%<sup>10</sup>. As Croatian registry for diabetic retinopathy is not population-based but collects data from the district of Zagreb and rate of patients biannually screened was 73%, one could conclude that »Croatian model« works better in Croatian capital than in other districts.

Blindness occurred in 2% of patients registered in National Register for Diabetic Retinopathy (i.e. district of Zagreb). None of study patients was legally blind. As we were not able to analyse the reasons why the study patients sent by diabetologists did not reach the ophthalmologist, we could propose two explanations. It is possible that blind patients visited the diabetologist and omitted the recommended eye examination. Other explanation is that blind patients visited the diabetologist less frequently than seeing patients.

Rate of 14% of study patients older than 50 years who never visited the ophthalmologist deserve more attention as this finding rises the question on screening for other causes of preventable low vision/blindness in the whole population. Although annual screening for diabetic retinopathy is normally desirable, biannual screening could be considered where patient compliance and screening sensitivities are both high<sup>11</sup>; to the best of our knowledge, there was no study on these subjects or screening programme in Croatia.

Croatian model does not define the ophthalmoscopic method of screening and considers the direct ophthalmoscopy as suitable for this purpose. It is well known that direct ophthalmoscopy is inferior to all other methods of screening for diabetic retinopathy<sup>12</sup>. Obviously, this study rose more questions than answers.

»Croatian model« definitely needs certain improvements. We suggest some, and the incorporation of the mechanisms of quality control should be the first one. Diabetologists should be enabled to refer the patient directly to the ophthalmologist, omitting the primary care physician as a mediator. It should be stated who is entitled to report the newly diagnosed diabetic patient to the Croatian national registry of diabetic patients (we suggest the diabetologist). Patient records should be regularly updated for ophthalmic examinations and control on the updating should be established. Replacing the paper evidencing system with the electronic data processing system could bring significant improvement in this way<sup>13</sup>. Indirect ophthalmoscopy methods should be officially recommended instead of direct ophthalmoscopy. Moreover, survey on cost effectiveness of ophthalmoscopy as a present method of screening should be performed and compared to retinal photography methods<sup>14</sup>.

Obligatory reporting of newly diagnosed diabetic patients should be implemented because this is the first step from institution-based registry, as it is now, towards the national one which can be used to predict and plan the national and the local-regional needs and to provide the consistent diabetic eye care in every part of the country<sup>8</sup>.

## Acknowledgement

The authors gratefully acknowledge Drs. Ljiljana Jović-Paškvalin and Ranka Šulc from Rijeka Diabetologic Outpatient Service for their cooperation.

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## KVALITETA SKRININGA DIJABETIČNE RETINOPATIJE NA PODRUČJU RIJEČKE REGIJE

### SAŽETAK

Cilj rada bio je usporediti kvalitetu skrininga dijabetične retinopatije u gradovima Rijeci i Zagrebu. Pregledano je nasumično izabranih 500 povijesti bolesti pacijenata, te izvršeno prospektivno oftalmološko istraživanje 466 nasumično izabranih dijabetičara. Mjesto istraživanja bila je sekundarna dijabetološka zdravstvena služba u Rijeci (obalna regija Republike Hrvatske). Glavni parametri ishoda bili su udio povijesti bolesti pacijenata dijabetičara sa naznakom o učinjenom oftalmološkom pregledu; udio pacijenata dijabetičara sa provedenim skriningom dijabetične retinopatije, usporedba sa navedenim udjelima u Zagrebu (glavni grad Republike Hrvatske). Ukupno 67% pacijenata posjetilo je oftalmologa barem jednom nakon postavljene dijagnoze dijabetesa, u samo 28% povijesti bolesti nađena je bilješka o oftalmološkom pregledu. 50% pacijenata pregledano je oftalmološki unutar dvije godine. Samo jedna trećina pacijenata kod kojih je dijagnosticiran diabetes mellitus unutar zadnje dvije godine u tom razdoblju je posjetila oftalmologa, a 14% pacijenata starijih od 50 godina nikada nije posjetilo oftalmologa. Model skrininga dijabetične retinopatije u Republici Hrvatskoj bolje funkcionira u gradu Zagrebu no u riječkoj regiji, i traži određena poboljšanja. Autori predlažu suvremene metode skrininga, uključivanje mehanizama kontrole kvalitete, obavezno prijavljivanje novootkrivenih dijabetičara nacionalnom registru, i izravno upućivanje pacijenata oftalmologu od strane dijabetologa.