DATA IN BRIEF

Contents lists available at ScienceDirect

Data in Brief

journal homepage: www.elsevier.com/locate/dib

Eye hemodynamic data and biochemical parameters of the lacrimal fluid of patients with non-proliferative diabetic retinopathy

Guzal Kangilbaeva a,*, Fazilat Bakhritdinova a, Iroda Nabieva b, Aziza Jurabekova c

a Department of Ophthalmology, Tashkent Medical Academy, Tashkent, Uzbekistan
b Clinic of Research Institute of Endocrinology, Tashkent, Uzbekistan
c Nazar Medical Eye Clinic, Tashkent, Uzbekistan

This paper presents a data from examinations of patients treated in clinic of Tashkent medical academy, Uzbekistan. 165 Patients (305 eyes) with NPDR were randomly allocated to receive standard treatment as the control group, in addition to the standard treatment daily tablets of EGb 761 (Tanakan, Beaufour Ipsen Industrie, Paris, France) 120 mg as the 1st main group, or daily endonasal electrophoresis of Tanakan 40 mg as 2nd main group, within 10 days. All of the patients underwent baseline ophthalmologic examinations, definition of biochemical parameters of the lacrimal fluid and Doppler ultrasound imaging of the eye. Moreover, correlation between tear fluid and hemodynamics was calculated. This data is essential for researchers to develop diagnostic criteria for diabetic retinopathy stages. Data are also beneficial to practitioners in determining the diabetic retinopathy severity and choosing appropriate treatment.

© 2020 Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license. (http://creativecommons.org/licenses/by-nc-nd/4.0/)

Article history:
Received 8 July 2020
Revised 15 August 2020
Accepted 25 August 2020
Available online 27 August 2020

Keywords:
Diabetic retinopathy
Antioxidant system in the tear
Doppler ultrasound imaging
Correlation coefficients

Abstract

This paper presents a data from examinations of patients treated in clinic of Tashkent medical academy, Uzbekistan. 165 Patients (305 eyes) with NPDR were randomly allocated to receive standard treatment as the control group, in addition to the standard treatment daily tablets of EGb 761 (Tanakan, Beaufour Ipsen Industrie, Paris, France) 120 mg as the 1st main group, or daily endonasal electrophoresis of Tanakan 40 mg as 2nd main group, within 10 days. All of the patients underwent baseline ophthalmologic examinations, definition of biochemical parameters of the lacrimal fluid and Doppler ultrasound imaging of the eye. Moreover, correlation between tear fluid and hemodynamics was calculated. This data is essential for researchers to develop diagnostic criteria for diabetic retinopathy stages. Data are also beneficial to practitioners in determining the diabetic retinopathy severity and choosing appropriate treatment.

© 2020 Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license. (http://creativecommons.org/licenses/by-nc-nd/4.0/)
Specifications Table

| Subject                          | Ophthalmology                                      |
|---------------------------------|----------------------------------------------------|
| Specific subject area           | Diabetic retinopathy, human retina, Biochemical parameters of the lacrimal fluid, antioxidant system in the tear, Doppler ultrasound imaging of the eye, hemodynamic parameters, correlation coefficients |
| Type of data                    | Table                                              |
| How data were acquired          | slit-lamp fundus examinations using 60, 90D (Volk) lenses, Goldman three-mirror lens, and Mainster Standart fundus lens, ultrasound system HD 11X (Philips) and HI VISION Preirus (Hitachi). mass spectrometry, spectrofotometr SF-46 |
| Data format                     | Raw                                               |
| Parameters for data collection  | hard exudates, cotton wool spots, retinal hemorrhages, microaneurysms, venous anomalies, and macular edema |
| Description of data collection  | Fundus images, Mean peak systolic velocity (PSV) in ocular vessels, antioxidant system of the lacrimal fluid |
| Data source location            | The data under investigation was obtained from Tashkent Medical Academy, Tashkent, Uzbekistan. 41.350526°N, 69.174250°E |
| Data accessibility              | Repository name: Features of clinical and functional indicators of the eye with diabetic retinopathy. Data identification number: http://dx.doi.org/10.17632/d56n7mmr2t.3 Direct URL to data: https://data.mendeley.com/datasets/d56n7mmr2t/3 |

Value of the Data

- These data show changes in the biochemical composition of the tears of patients with non-proliferative diabetic retinopathy.
- These data show, that blood flow velocity changes with increasing severity of diabetic retinopathy.
- These data can help ophthalmologists to make the correct diagnosis and stage of the disease.
- Correlation coefficients between diabetic retinopathy severity, the level of antioxidant protection system in the tear, and blood flow velocity valuable for the development of disease prognosis.

1. Data Description

Table 1 shows, that mean diabetic retinopathy severity (DRS) reduction in the 2nd main group was statistically significant compared with the baseline value \( p < 0.01 \) after treatment and remained at low values for 6 months [1]. On the contrary, in the control group, the decrease in DR severity after treatment was not statistically significant \( p > 0.05 \), and an increase in the severity of DR was observed at month 6.

The antioxidant system in the tear of eye with DR is changed [2,3]. Our studies have shown a gradual decrease in NO levels as DRS increases. Table 2 show statistically significant \( p < 0.05 \) NO reduction and MDA increases from healthy group.

Table 3 shows progressive decrease in blood flow in the second Ib and third Ic stage of NPDR in the central retinal artery (CRA) at baseline [4,5]. Also, a progressive decrease in blood flow by stages was detected in the short posterior ciliary artery (SPCA). Peak systolic velocity (PSV) reduction in Ib and Ic stage was statistically significant \( p < 0.05 \) from healthy.

In the correlation analysis (Table 4), a strong positive correlation was found \( r = 0.71 \) between PSV in the CRA and the level of NO in the eyes with the NPDR Ia stage. Moderate positive correlation was found between the PSV of the CRA and the level of NO in the eyes of NDR Ib and NPDR Ic, as well as between EDV in the CRA and the level of NO in the eyes of NPDR Ia \( r = 0.67 \). In addition, moderate positive correlations were found between RI CRA and catalase activity in NDR Ia \( r = 0.45 \), SOD activity in NDR Ib \( r = 0.46 \), between PSV in CRV and the level...
Table 1
Change in mean diabetic retinopathy severity during observation. (Mean±SD).

| NPDR Stage | Groups       | Baseline | Day 10   | Month 1 | Month 3 | Month 6 |
|------------|--------------|----------|----------|---------|---------|---------|
| NPDR       | Control (n=32) | 26.03±5.5 | 22.5±10.2 | 22.5±9.3 | 26.5±11.6 | 30.5±9.5 |
| la         | 1st main (n=31) | 27.3±5.5  | 20.2±7.1∗∗ | 19.4±7.9∗∗ | 20.6±7.5∗∗,# | 23.2±8.6∗∗,# |
|            | 2nd main (n=33) | 27.1±6.3  | 21.8±8.1∗∗ | 20.9±9.3∗∗ | 21.4±9.5∗∗,# | 21.5±9.6∗∗,# |
| NPDR       | Control (n=46) | 42.9±10.9 | 38.2±10.4∗ | 38.8±10.6 | 43.9±11.7 | 52.7±15.3∗ |
| lb         | 1st main (n=46) | 40.2±8.3  | 32.8±8.7∗∗,# | 31.1±10.1∗*,# | 32.6±8.3∗∗,# | 34.9±8.1∗∗,# |
|            | 2nd main (n=44) | 41.6±9.4  | 30.9±7.6∗∗,# | 29.5±8.5∗∗,# | 29.2±9.1∗∗,# | 30.9±8.94∗∗,# |
| NPDR       | Control (n=23) | 67.0±7.2  | 64.5±10.6 | 64.5±8.8 | 70.0±10.5 | 83.5±5.8∗∗ |
| lc         | 1st main (n=23) | 62±13.7   | 54.8±15.0,*# | 52.4±17.9,*# | 55.7±17.6,*# | 60.4±22.0,*# |
|            | 2nd main (n=28) | 66.4±17.7 | 49.3±14.4∗∗,# | 46.6±12.1∗∗,# | 46.1±12.3∗∗,# | 45.7±12.8∗∗,# |

NPDR= non-proliferative diabetic retinopathy.
* p < 0.05.
** p < 0.01 – significant differences from baseline.
# p < 0.05 – significant differences from control group.
^ p < 0.05 – significant differences from 1st main group; SD= Standard deviation.

Table 2
Biochemical parameters of the lacrimal fluid of patients with NDR by stages. (Mean±SD).

| parameters                  | Healthy n=10 | NPDR stages | Correlation with stage. |
|-----------------------------|--------------|--------------|-------------------------|
|                             | 1–a, n=27    | 1–b, n=31    | 1–c, n=12               | r= –0.65 |
| NO, nmol/ml                 | 3.54±0.8     | 2.82±0.85∗   | 1.86±0.62∗∗             | r= –0.65 |
|                            |              |              | 1.17±0.42∗∗,#           | p=0.0001 |
| MDA, nmol/ml                | 1.48±0.2     | 3.86±0.44∗   | 4.13±0.41∗              | r= 0.37  |
|                            |              |              | 4.64±1.34∗             | p=0.07   |
| catalase activity, MU/l     | 0.19±0.04    | 0.11±0.06∗   | 0.09±0.05∗             | r= –0.22 |
|                            |              |              | 0.08±0.03∗             | p=0.27   |
| superoxide dismutase       | 6.8±0.6      | 3.71±0.68∗   | 3.63±0.76∗             | r= –0.23 |
| (SOD) activity, nmol/min/ml |              |              | 3.08±0.39∗∗,#          | p=0.25   |

NO= Nitric oxide; MDA=malondialdehyde.
* P<0.05 – from healthy.
# P<0.05 – from NPDR la.
^ P<0.05 – from NPDR lb (P<0.05). SD= Standard deviation.

Table 3
Baseline hemodynamic parameters of eyes with NDR (Mean±SD).

| CRA PSV | CRA RI | CRV PSV | CRV RI | SPCA PSV | SPCA RI | OA PSV | OA RI |
|---------|--------|---------|--------|----------|---------|--------|-------|
| Healthy | 13.7±2.0 | 0.68±0.01 | 7.48±1.02 | 14.8±3.0 | 0.67±0.01 | 41.7±0.7 | 0.76±0.01 |
| NPDR la | 14.8±5.64 | 0.72±0.05∗∗ | 6.8±1.53 | 11.4±6.38 | 0.66±0.04 | 30.1±16.5∗ | 0.73±0.13 |
| NPDR lb | 7.3±1.54∗∗,# | 0.73±0.04∗ | 4.58±1.94∗ | 10.6±2.4∗ | 0.71±0.03∗,# | 44.4±12.3∗ | 0.73±0.09 |
| NPDR lc | 5.1±1.18∗∗,# | 0.66±0.05∗∗ | 3.97±1.64∗ | 10.2±2.1∗ | 0.72±0.05∗,# | 36.7±8.1∗ | 0.77±0.08 |

NPDR=nonproliferative diabetic retinopathy, PSV =peak systolic blood flow velocity. CRA=central retinal artery, CRV=central retinal vena, SPCA=short posterior ciliary artery, OA=ophthalmic artery, RI =resistive index.
* P < 0.05.
** P < 0.01 – from healthy.
# P<0.05 – from NPDR la, ^P<0.05- from NPDR lb; SD= Standard deviation.

of NO (r=0.44 and r=0.32) in the NPDR la and the NDR lb stages. Moderate negative correlations were found between the level of MDA and PSV in the CRA (r=−0.44, r=−0.56), CRV (r=−0.34), the EDV in the SPCA (r=−0.41) and OA (r=−0.31).

Strong and moderate correlations coefficients are marked as underlined text in the table.
Table 4
Pearson’s correlation coefficients between hemodynamic parameters and biochemical parameters of the lacrimal fluid.

| NPDR Ia     | CRV | CRA | SPCA | OA   |
|-------------|-----|-----|------|------|
|             | PSV | EDV | RI   | PI   | PSV | EDV | RI   | PI   | PSV | EDV | RI   | PI   |
| NPDR Ia     | NO  | 0.71| 0.67 | –0.09| –0.29| 0.44| 0.11| 0.15| –0.13| –0.17| –0.02| –0.19| 0.10| 0.08| 0.11|
| MDA         | –0.44| –0.41| 0.02| 0.13| –0.22| –0.22| –0.28| 0.24| 0.29| –0.05| 0.21| –0.24| –0.27| –0.23|
| Catalase    | –0.24| –0.27| 0.45| 0.04| –0.13| 0.23| 0.19| 0.20| 0.35| 0.25| 0.12| 0.20| –0.12| 0.02|
| SOD         | 0.32| 0.32| 0.06| –0.13| 0.02| 0.04| 0.05| –0.09| –0.12| –0.02| –0.17| 0.10| –0.10| 0.07|
| NPDR Ib     | NO  | 0.35| 0.33| 0.01| 0.38| 0.32| 0.07| 0.01| –0.14| –0.24| –0.23| –0.42| 0.52| 0.44| 0.49|
| MDA         | 0.16| 0.26| –0.15| 0.16| –0.01| 0.10| 0.03| 0.17| –0.23| 0.19| 0.02| 0.12| 0.18| 0.18|
| Catalase    | 0.11| 0.01| 0.10| –0.02| 0.14| –0.21| –0.15| –0.09| 0.10| –0.07| 0.09| 0.08| 0.21| 0.03|
| SOD         | 0.20| 0.32| 0.18| 0.46| 0.32| 0.04| –0.14| –0.29| 0.27| 0.52| 0.06| 0.20| 0.33| –0.13| 0.49|
| NPDR Ic     | NO  | 0.43| 0.34| 0.10| 0.34| –0.24| –0.36| –0.30| 0.17| 0.15| 0.25| 0.13| 0.03| 0.37| 0.07|
| MDA         | –0.56| –0.25| –0.30| –0.26| –0.34| –0.27| –0.41| –0.47| 0.31| –0.21| –0.31| 0.33| 0.38| 0.48|
| Catalase    | –0.20| –0.09| 0.06| –0.06| –0.03| 0.07| 0.05| 0.03| 0.05| 0.08| 0.19| –0.20| –0.21| –0.21|
| SOD         | –0.29| –0.22| –0.15| –0.21| –0.27| –0.21| 0.25| 0.27| 0.27| 0.01| 0.07| 0.08| 0.05| 0.03|

NPDR=nonproliferative diabetic retinopathy, PSV=peak systolic blood flow velocity, EDV=end-diastolic velocity; CRA=central retinal artery, CRV=central retinal venous, SPCA=short posterior ciliary artery, OA=ophthalmic artery, RI=resistive index; PI=pulsatility index; NO= Nitric oxide; MDA=malondialdehyde; SOD=superoxide dismutase.

2. Experimental design, materials and methods

This data is collected from examinations of 165 patients (305 eyes) in the clinic of Tashkent medical academy. Patients had non-proliferative diabetic retinopathy (NPDR). Age ranged from 18 to 79 years, women were 94, men 71. The exclusion criteria were eye diseases such as glaucoma, inflammatory eye diseases, pigmented and other retinal dystrophies, retinal detachments, a period not earlier than 6 months after an eye injury or eye surgery, as well as severe somatic diseases such as kidney or liver failure, glucose-galactose malabsorption (GGM), hypertensive crisis.

Patients with NPDR were randomly allocated to receive standard treatment (hypoglycemic treatment, nootropil, statins, fenofibrates, angiotensin) as the control group, in addition to the standard treatment daily tablets of EGB 761 (Tanakan, Beaufour Ipanse Industrie, Paris, France) 120 mg as the 1st main group, or daily endonasal electrophoresis of Tanakan 40 mg as the 2nd main group, within 10 days. The patients underwent anterior segment slit-lamp and fundus examinations using 60, 90D (Volk) lenses, Goldman three-mirror lens, and Mainster Standart fundus lens, the antioxidant activity of tears examinations, and Doppler ultrasound imaging of the eye.

The stages of DR were determined according to the severity scale of the Early Treatment Diabetic Retinopathy Study (ETDRS), the “gold” standard for a detailed assessment of the fundus condition in scientific studies worldwide. All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) software version 23. P values < 0.05 were considered statistically significant.

Ethics statement

Permission of the National Ethics Committee of the Ministry of Health of the Republic of Uzbekistan No. 11 of 2.11.2010.

All patients signed informed consent for treatment and examination.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
Acknowledgments

This work is carried out with the collaboration of Tashkent medical academy, Department of Ophthalmology and Department of Medical and Biological Chemistry, especially prof. Inoyatova Feruza.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.dib.2020.106237.

References

[1] J.K. Sun, P.W. Wang, S. Taylor, Z. Haskova, Durability of diabetic retinopathy improvement with as-needed ranibizumab: open-label extension of RIDE and RISE studies, Ophthalmology 126 (5) (2019) 712–720, doi: 10.1016/j.ophtha.2018.10.041.
[2] D.A. Antonetti, R. Klein, T.W. Gardner, Mechanisms of disease: diabetic retinopathy, New Engl. J. Med. 366 (13) (2012) 1227–1239.
[3] S. Kusuhara, Y. Fukushima, S. Ogura, N. Inoue, A. Uemura, Pathophysiology of diabetic retinopathy: the old and the new, Diabetes Metab. J. 42 (2018) 364–376.
[4] F.A. Bakhritdinova, G.E. Kangilbaeva, S.S. Mirrahimova, A.Z. Jurabekova, Development of Dopplerographic criteria for the progression and prognosis of diabetic retinopathy, Eur. Sci. Rev. 1–2 (2018) 113–117.
[5] Guzal Kangilbaeva, Features of clinical and functional indicators of the eye with diabetic retinopathy, Mendeley Data, v3, 2020. [Dataset] 10.17632/d56n7mmr2t.3