THEORETICAL RATIONALE FOR STUDYING ENDOTHELIN-1 AND D-DIMERS IN THE BLOOD AND TEAR FLUID OF PATIENTS WITH HYPERTENSIVE ANGIORETINOPATHY

[1]Zhalalova D.Z. [2]Shernazarov Farrukh
[1]Samarkand State Medical University, associate professor at the Department of Ophthalmology
[2]Student of group 608 of the Samarkand State Medical University Faculty of Medicine
https://doi.org/10.5281/zenodo.10391207

Abstract. *Currently, to identify various ophthalmological diseases, in addition to instrumental research methods, methods of laboratory analysis of tear fluid are used for practical and scientific purposes as an informative biological medium. The profile of changes in the biochemical parameters of this fluid is, as a rule, more pronounced and different in comparison with blood serum. It is known that tear fluid is mainly secreted by the accessory lacrimal glands and the main lacrimal gland, which is supplied with blood through the lacrimal artery, which is a branch of the ophthalmic artery.*

Keywords: *ocular blood flow is particularly sensitive to changes in local endothelin-1 concentrations.*

Based on this, it can be assumed that the composition of the tear fluid reflects the processes occurring in the vascular system of the eye. Cardiovascular diseases are usually accompanied by changes in the fibrinolytic system and, as a result, impaired blood flow in the vessels. The vascular endothelium, in addition to performing barrier and hemostatic functions, is an important metabolically active organ. It produces abundant amounts of substances that affect vascular tone. Under normal conditions, when the endothelium is stimulated, it enhances the synthesis of substances that help relax the smooth muscles of the vascular walls. However, prolonged exposure to damaging factors such as hypoxia, inflammation, and hemodynamic overload can deplete the endothelium's vasodilatory capacity and shift the balance toward vasoconstriction. This process, known as endothelial dysfunction, manifests itself in the impaired formation of various biologically active substances in the endothelium. Some studies indicate that when the endothelium is damaged, an imbalance occurs between the production of nitric oxide (NO) and endothelin-1, resulting in decreased NO production and increased endothelin-1 levels. It is the excess production of this peptide that determines the development of vascular contraction, which contributes to endothelial dysfunction. At the moment, endothelin-1 is considered as a marker and predictor of the severity and outcome of many diseases associated with vascular pathology. For example, measuring ET-1 levels in the blood is recommended as a laboratory test in diabetes mellitus and in patients with angina pectoris to assess the degree of vascular complications. ET-1 is one of the most powerful vasoconstrictor agents. This oligopeptide consists of 21 amino acids and is formed from proendothelin-1 under the influence of endothelin-converting enzyme. A variety of physical (such as hypoxia) and humoral factors, including cytokines, influence ET-1 secretion. Moreover, ET-1 itself enhances the production of cytokines and can initiate inflammatory processes. The concentration of ET-1 in the blood is mainly regulated at the level of endothelin-converting enzyme mRNA with the participation of protein kinase C and calcium. ET-1 does not accumulate in endothelial cells. By interacting with vascular smooth muscle receptors,

ET-1 increases the content of intracellular calcium, which leads to activation of the actomyosin complex of smooth muscles and their tonic contraction. In addition, ET-1 has mitogenic properties, accelerating the growth of various cell types and stimulating the synthesis and secretion of various growth factors, such as fibroblast growth factor and epiregulin. Under normal conditions, the concentration of ET-1 forms a gradient from the endothelium to the vascular cells, and therefore ET-1 acts primarily as a local mediator derived from the endothelium. The concentration of ET-1 in the blood is usually low (0.26-0.5 fmol/ml). However, ET-1 plays an important role as a circulating hormone affecting hemodynamic parameters.

Ocular blood flow is particularly sensitive to changes in local endothelin-1 concentrations. Under the influence of long-term damaging factors, the ability of blood vessels to dilate decreases, and there is an increase in the production of substances that cause vasoconstriction, the most powerful of which is endothelin-1. In the eye, ET-1 and its receptors are found in various parts, including the vitreous, retina, choroid, iris and ciliary body. ET-1 is also present in the anterior chamber fluid. Therefore, endothelins and components of the fibrinolytic system, such as D-dimers, play an important role in the pathogenesis of regional microcirculation disorders in the retina and the development of optic neuropathy. However, the question of the relationship between them in ophthalmic pathologies remains unresolved. Data indicating a connection between hypertension and atherosclerosis, which are accompanied by dysfunctions of the fibrinolytic blood system against the background of endothelial dysfunction, are widely discussed in the scientific literature. Current research suggests that D-dimer is a unique indicator of fibrin degradation. Therefore, in recent years, determination of its content in blood plasma has become important as a diagnostic and prognostic test in the diagnosis and control of thrombosis of various natures. The concentration of D-dimer provides information about the processes of blood clot formation and destruction, regardless of location, size and causes of formation. Determination of the level of D-dimer in the blood is considered the most acceptable and effective method of non-invasive diagnosis in patients with suspected thrombosis. This analysis allows both to confirm the presence of thrombosis and to exclude it. It should be noted that at the moment there is no information on measuring the level of D-dimer in tear fluid, and there are no studies on this issue in both domestic and foreign literature.

Conclusion

In conclusion, the theoretical rationale for studying endothelin-1 and D-dimers in the blood and tear fluid of patients with hypertensive angioretinopathy provides valuable insights into the underlying pathophysiological mechanisms and potential diagnostic and prognostic markers for this condition. Endothelin-1 (ET-1) is a potent vasoconstrictor and plays a crucial role in regulating vascular tone. In hypertensive angioretinopathy, elevated levels of ET-1 have been observed, suggesting its involvement in the development and progression of retinal vascular changes. By studying ET-1 levels in both blood and tear fluid, researchers can gain a comprehensive understanding of its systemic and local effects, providing valuable information on the vascular dysfunction associated with hypertensive angioretinopathy.

REFERENCES

1. Zhalalova D.Z. , Makhkamova D.K. Multicomponent approach to the diagnosis of retinal changes in arterial hypertension Journal “ Problems of biology and medicine” - 2021. No. 5 C - 205-211.

2. Zhalalova D.Z. , Makhkamova D.K. OCT angiography in assessing the vascular bed of the retina and choroid Journal “ Problems of biology and medicine” - 2021. No. 6 C - 211-216.
3. Zhalalova D.Z.The content of endothelin and homocysteine in blood and lacrimal fluid in patients with hypertensive retinopathy Web of Scientist:International Scientific Research Journal Volume 3,ISSUE 2,February-2022,C. 958-963
4. Zhalalova D.Z. Modern aspects of neuroprotektive treatment in hypertensive retinopathy Web of Scientist:International Scientific Research JournalVolume 3,ISSUE 2,February-2022,C. 949-952
5. Zhalalova D.Z.Development of classification criteria for neuroretinal ischemia in hypertension Web of Scientist:International Scientific Research Journal Volume 3,ISSUE 2,February-2022,C. 972-978
6. Jalalova D.Z. Classification criteria for changes in retinal vessels in arterial hypertension Journal “ Problems of biology and medicine” - 2022. No. 1 C - 50-53.
7. Zhalalova D.Z. Diagnostic criteria for optical coherence tomography with angiography function for ischemic diseases of the organ of vision against the background of arterial hypertension Journal “ Problems of biology and medicine” - 2022. No. 5 C –73-78
8. Zhalalova D.Z. Evaluation of markers of endothelial dysfunction in tear fluid in patients with arterial hypertension . Journal of Biomedicine in Amaliet. Tashkent - 2022, Volume No., No. WITH.
9. Zhalalova D.Z. OCT angiography in the assessment of retinal and choreoretinal microcirculation in patients with uncomplicated arterial hypertension International Ophthalmological Congress IOC Tashkent 2021, P 95-96
10. Zhalalova D.Z. Modern aspects of neuroprotective treatment for hypertensive retinopathy Journal TMA - 2022. No. 4 P 84-87
11. Shernazarov Farrukh ORGANIZATION OF DIGITALIZED MEDICINE AND HEALTH ACADEMY AND ITS SIGNIFICANCE IN MEDICINE // SAI. 2023. №Special Issue 8. URL: https://cyberleninka.ru/article/n/organization-of-digitalized-medicine-and-health-academy-and-its-significance-in-medicine (дата обращения: 20.11.2023).