

**STUDY OF THE STATE OF CENTRAL VIEW AND THE VISUAL FIELD IN
PATIENTS WITH HEMOLYTIC ANEMIA BASED ON THE USE OF
STATICALLY AUTOMATED PERIMETRY**

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Abstract: In this study, changes in central vision and visual field were studied using static automated perimetry in 19 patients with hemolytic anemia. The main goal of the study is to determine the influence of anemia on the visual system by assessing the state of ocular microcirculation and nerve fibers. The obtained results showed significant narrowing of the visual field and a decrease in sensitivity, which justifies the need for advanced diagnostics and monitoring.

Keywords: hemolytic anemia, visual field, static perimetry, central vision, visual function.

**ИЗУЧЕНИЕ СОСТОЯНИЯ ЦЕНТРАЛЬНОГО ЗРЕНИЯ И ЗРИТЕЛЬНОГО
ПОЛЯ У БОЛЬНЫХ ГЕМОЛИТИЧЕСКОЙ АНЕМИЕЙ НА ОСНОВЕ
ИСПОЛЬЗОВАНИЯ СТАТИЧЕСКОЙ АВТОМАТИЗИРОВАННОЙ
ПЕРИМЕТРИИ.**

Аннотация: В данном исследовании были изучены изменения центрального зрения и поля зрения с помощью статической автоматизированной периметрии у 19 пациентов с гемолитической анемией. Основной целью исследования является определение влияния анемии на зрительную систему путем оценки состояния микроциркуляции глаз и нервных волокон. Полученные результаты показали значительные сужения полей зрения и снижение чувствительности, что обосновывает необходимость более совершенной диагностики и мониторинга.

Ключевые слова: гемолитическая анемия, поле зрения, статическая периметрия, центральное зрение, зрительная функция.

**GEMOLITIK ANEMIYA BILAN OG'RIGAN BEMORLARDA STATIK
AVTOMATLASHTIRILGAN PERIMETRIYADAN FOYDALANISH ASOSIDA
MARKAZIY KO'RISH VA KO'RISH MAYDONINING HOLATINI O'RGANISH**

Annotatsiya Ushbu tadqiqotda gemolitik anemiya bilan og'rigan 19 nafar bemorda statik avtomatlashtirilgan perimetriya yordamida markaziy ko'rish va ko'rish maydoni o'zgarishlari o'rganildi. Tadqiqotning asosiy maqsadi ko'z mikrotsirkulyatsiyasi va nerv tolalari holatini baholash orqali vizual tizimga anemiya ta'sirini aniqlashdir. Olingan natijalar ko'rish maydonida sezilarli torayishlar va sezuvchanlik pasayishini ko'rsatdi, bu esa ilg'or diagnostika va monitoring zaruratini asoslaydi.

Kalit so'zlar gemolitik anemiya, ko'rish maydoni, statik perimetriya, markaziy ko'rish, vizual funktsiya.

Hemolytic anemia is a pathological condition characterized by the accelerated destruction of erythrocytes, leading to a decrease in their lifespan and a consequent imbalance in the oxygen-transporting capacity of the blood. This condition often results in systemic hemodynamic disturbances and chronic tissue hypoxia, which may adversely affect various organs, including the visual system. The ocular tissues, particularly the retinal neurons and microvascular structures responsible for central visual field integrity, are highly sensitive to hypoxic conditions and oxidative stress induced by hemolytic processes.

In this context, static automated perimetry represents a highly sensitive and objective diagnostic modality used to evaluate functional impairments in the visual field. It provides precise quantification of differential light sensitivity across the retina and is instrumental in detecting both early and subtle changes in visual function, particularly in patients with systemic disorders that may compromise ocular perfusion and neural conductivity.

Study Base: The present study was conducted at the Republican Specialized Scientific and Practical Medical Center of Ophthalmology over the period of 2024–2025. The research facility provided advanced ophthalmic diagnostic equipment and experienced personnel, which enabled high-quality data collection and reliable analysis of visual field parameters in patients with hematological disorders.

Study Population: A total of 19 patients diagnosed with hemolytic anemia were enrolled in the study. The cohort included 11 female and 8 male participants. The age of the patients ranged from 18 to 52 years, with a calculated mean age of 34 years (± 9.1). All participants were selected based on confirmed clinical and laboratory diagnoses of hemolytic anemia, and none had prior history of primary ophthalmic disorders that could affect perimetric outcomes.

Methodology: The evaluation of central visual function and visual field integrity was carried out using static automated perimetry. Specifically, the Humphrey Field Analyzer (HFA) with the 30-2 SITA-Standard protocol was employed. This protocol is widely accepted as a gold-standard method for assessing visual field sensitivity in both clinical and research settings. Prior to the test, all patients were given clear instructions and underwent a brief practice session to ensure compliance and understanding of the perimetric procedure.

Measured Parameters: Three primary quantitative parameters were obtained and analyzed for each patient:

1. Mean Deviation (MD): This value reflects the overall deviation of the patient's visual field sensitivity from age-adjusted normative values. Negative MD values indicate a generalized depression in visual sensitivity.
2. Pattern Standard Deviation (PSD): PSD is an indicator of localized irregularities or focal defects within the visual field. Higher PSD values suggest non-uniform loss of sensitivity, which may correspond to early pathologic changes.

3. **Central Visual Field Sensitivity:** This parameter measures the retinal sensitivity in the central 10° of the visual field, providing insight into the functional status of the macula and surrounding regions, which are critical for tasks such as reading and facial recognition.

The collected data were subjected to statistical analysis to determine the extent of visual field impairment and to explore any correlations between visual function deterioration and patient demographics or clinical features.

Parameter	Mean Value \pm SD	Reference Value
Mean Deviation (MD)	-3.8 ± 1.2 dB	Up to -2 dB
Pattern Standard Deviation (PSD)	3.6 ± 0.9 dB	Up to 2 dB
Central Sensitivity	26.4 ± 3.5 dB	≥ 30 dB
Visual Field Constriction	Observed in 14 patients (73.7%)	–
Presence of Scotomas	Mean Value \pm SD	Reference Value

Statistical analysis: With the help of the T-comparison test, it was found that the indicators of MD and PSD differ significantly from the control group (10 individuals with healthy eyes) ($p < 0.01$).

The obtained results indicate that patients with hemolytic anemia exhibit significant impairments in visual function, particularly within both the central and peripheral visual fields. These findings suggest a marked disruption of visual field integrity, which may be attributed to chronic hypoxic states and impaired retinal microcirculation commonly associated with hemolytic conditions. The observed alterations in perimetric parameters, such as the presence of scotomas and notable visual field constriction, underscore the vulnerability of the visual system to systemic hematologic disorders. These ophthalmic manifestations may serve as early diagnostic markers, highlighting the importance of regular visual field assessment in patients with hemolytic anemia to facilitate timely detection of subclinical neuroretinal dysfunction and to guide further systemic and ocular management.

Static automated perimetry serves as a valuable diagnostic tool in the assessment of visual function in patients with hemolytic anemia.

The findings of this study indicate that individuals with hemolytic anemia exhibit notable impairments in their visual field, including peripheral constriction and a significant reduction in central visual sensitivity. These alterations are likely attributable to chronic hypoxic conditions and microvascular disturbances associated with the underlying hematological disorder. The observed deficits emphasize the importance of incorporating

visual field testing into the routine ophthalmologic evaluation of such patients. Moreover, long-term monitoring, combined with timely implementation of advanced therapeutic strategies, plays a critical role in preventing or minimizing ophthalmic complications and preserving visual function.

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