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Prevalence of Blindness and Visual Impairment due to Cataract Among Adults in the Southern Urals (according to a Population-Based Study)

S. Panda-Jonas[1, 2], G.Z. Israfilova[3], R. Bourne[4], J.B. Jonas[5–8]

[1]*Department of Ophthalmology, Medical Faculty Heidelberg, Heidelberg University, Heidelberg, Germany*
[2]*Privatpraxis Prof Jonas und Dr. Panda-Jonas, Heidelberg, Germany*
[3]*Ufa Eye Research Institute, Bashkir State Medical University, Ufa, Russian Federation*
[4]*Vision & Eye Research Unit, Anglia Ruskin University, Cambridge, United Kingdom*
[5]*Rothschild Foundation Hospital, Paris, France*
[6]*Singapore Eye Research Institute, Singapore National Eye Center, Singapore*
[7]*Beijing Visual Science and Translational Eye Research Institute (BERI), Beijing Tsinghua Changgung Hospital, Tsinghua Medicine, Tsinghua University, Beijing, China*
[8]*LV Prasad Eye Institute, Hyderabad, India*

ABSTRACT

Aim. To study the prevalence of blindness and visual impairment due to cataract among adults aged 40 years and older.
Material and methods. In 2015–2017 a cross-sectional population-based Ural Eye and Medical Study (UEMS) was conducted at Ufa Eye Research Institute, Ufa, Russia.
Results. Cataracts were the most common cause of moderate and severe visual impairment among adults of the Southern Urals aged 40 years and older (n=109; 59.9%; 95% CI: 52.7–67.1). The most frequent types of cataract observed were nuclear-cortical cataract(n=53; 29.1%), cortical (n=29; 15.9%) and nuclear cataract(n=24; 13.2%); less frequently posterior subcapsular cataract (n=1; 0.5%), mature (n=1; 0.5%) and secondary cataract (n=1; 0.5%). Cataract caused blindness in 3 cases (27.3%; 95% CI: 19.6–35.7).
Conclusions. Cataracts were the leading cause of moderate and severe visual impairment among people of the Southern Urals aged 40 years and older, cataract-induced blindness was estimated at 27.3% of all cases (95% CI: 19.6–35.7). The analysis suggests that the need for cataract surgery remains high in the population.
Key words: *population-based study, visual impairment, blindness, cataract*

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Corresponding author: Gulnara Z. Israfilova, israfilova_gulnara@mail.ru

Научная статья

Распространенность слепоты и нарушений зрения вследствие катаракты у взрослого населения на территории Южного Урала (по данным популяционного исследования)

С. Панда-Йонас[1, 2], Г.З. Исрафилова[3], Р. Борн[4], Й.Б. Йонас[5–8]

[1]*Кафедра офтальмологии, медицинский факультет Мангейма, Гейдельбергский университет, Мангейм, Германия*
[2]*Частная клиника профессора Йонаса и Доктора Панда-Йонас Гейдельберг, Германия*
[3]*Уфимский НИИ глазных болезней ФГБОУ ВО БГМУ Минздрава России, Уфа, Россия*
[4]*Институт исследования зрения и глазных болезней, Университет Англия Раскин, Кембридж, Англия*
[5]*Госпиталь Фонда Ротшильда, Французский институт близорукости, Париж, Франция*
[6]*Сингапурский институт глазных исследований, Сингапурский национальный офтальмологический центр, Сингапур*
[7]*Пекинский научно-исследовательский институт визуальной и трансляционной офтальмологии (BERI), Пекинский госпиталь Цинхуа Чангунг, медицинский центр Цинхуа, Университет Цинхуа, Пекин, Китай*
[8]*Глазной институт Л.В. Прасада, Хайдарабад, Индия*

РЕФЕРАТ

Цель. Изучить распространенность слепоты и нарушений зрения вследствие катаракты среди взрослых в возрасте 40 лет и старше.

Материал и методы. В 2015–2017 гг. на базе Уфимского НИИ глазных болезней было проведено поперечное популяционное исследование Ural Eye and Medical Study (UEMS).

Результаты. Основной причиной умеренного и тяжелого нарушения зрения у взрослого населения Южного Урала в возрасте 40 лет и старше явилась катаракта (n=109; 59,9%; 95% ДИ 52,7–67,1). При этом наиболее часто у лиц с нарушениями зрения отмечалась ядерно-кортикальная катаракта (n=53; 29,1%), кортикальная (n=29; 15,9%) и ядерная катаракта (n=24; 13,2%). Реже встречалась задняя субкапсулярная катаракта (n=1; 0,5%), зрелая (n=1; 0,5%) и вторичная катаракта (n=1; 0,5%). Катаракта явилась причиной слепоты в 3 случаях (27,3%; 95% ДИ 19,6–35,7).

Выводы. Основной причиной умеренного и тяжелого нарушения зрения среди населения Южного Урала в возрасте 40 лет и старше является катаракта, распространенность слепоты вследствие катаракты составляет 27,3% (95% ДИ 19,6–35,7). Результаты анализа свидетельствуют о том, что потребность населения в оперативном лечении катаракты остается на достаточно высоком уровне.

Ключевые слова: *популяционное исследование, нарушение зрения, слепота, катаракта*

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Автор, ответственный за переписку: Гульнара Зуфаровна Исрафилова, israfilova_gulnara@mail.ru

RELEVANCE

Cataracts remain the leading cause of blindness and visual impairment worldwide, and it is a significant health and social concern. According to the WHO data, the number of people with various visual impairments due to cataract reaches 65 million [1–3]. Recent studies have shown a higher prevalence of cataract and a tendency for cataract morbidity to increase with longevity, environmental and lifestyle changes in virtually all countries of the world [1, 4]. Epidemiological studies report that the prevalence of cataract-induced blindness was relatively low in Israel, average in Syria (34.9%) and relatively high in India [5–8].

Monitoring data on blindness and low vision due to cataract in different regions of Russia show significant diversity. For example, the highest rate was recorded in the Lipetsk region (41.1 per 10,000) and Yaroslavl region (34.3 per 10,000), and the lowest in the Tyumen region (7.9 per 10,000) and Novosibirsk region (8.2 per 10,000) [9, 10].

Unfortunately, the current forms of medical documentation and statistics do not fully reflect the true extent of blindness and visual impairment caused by cataract. In this regard, it is of particular interest to estimate the prevalence of visual impairment in the population based on data obtained in a population-based study.

PURPOSE

To assess the prevalence of blindness and visual impairment due to cataract among adults aged 40 years and older.

MATERIAL AND METHODS

This study was conducted as part of the research project "Comprehensive assessment of socially significant pathologies of the anterior and posterior segments in a population-based study" conducted at the Ufa Eye Research Institute in 2015 and 2017, based on data from Ural Eye and Medical Study (UEMS).

The study was conducted in compliance with the basic principles of the Helsinki Declaration, Good Clinical Practice (GCP) guidelines as well as current regulations. It included respondents aged 40 years and older, permanent residents of the Southern Urals. Written informed voluntary consent was obtained from all participants.

A total of 5899 participants were enrolled in the study. The study included questionnaires, general medical and ophthalmic examinations. Eye examination included: measurement of best corrected visual acuity, refractometry, biomicroscopy of the anterior and posterior ocular segment, and ophthalmoscopy.

Cataracts were diagnosed by slit lamp-based biomicroscopy. The intensity and type of lens opacity was graded in accordance with the LOCS III scale [11]. This classification system differentiates 6 classes of nuclear lens opacities based on their severity and location. Individuals with nuclear changes corresponding to stage III or higher were considered to have nuclear cataract. Retro-illumination photographs of the lens were used to evaluate cortical and subcapsular opacities.

The degree of visual impairment was defined according to the WHO criteria. Mild vision impairment – BCVA 0.4 or higher but lower than 0.5. Severe vision impairment – BCVA ≥0.05 but less than 0.3. Blindness was determined by BCVA in the better eye of 0.05 or less [2].

Statistical data processing was conducted using the IBM SPSS Statistics 23.0 software package (USA). Confidence intervals were calculated using the Wilson method with continuity correction. A p-value less than $p<0.05$ was considered statistically significant for all comparisons.

RESULTS AND DISCUSSION

A total of 5899 individuals were enrolled in the study prevalence analysis of most common causes of blindness and visual impairment. The mean age of the participants was 59.0±10.7 years (age range 40–94 years). Mild visual impairment was detected in 184 respondents (3.1%; 95% CI: 2.7–3.6), moderate and severe impairment – in 182 respondents (3.1%; 95% CI: 2.7–3.5) and 11 respondents were blind (0,19%; 95% CI: 0.10–0.34).

Cataract was the main cause of moderate to severe visual impairment in the Southern Urals population aged 40 years and older (n=109; 59.9%; 95% CI: 52.7–67.1). The most commonly

observed cataracts were nuclear cortical cataract (n=53; 29.1%), cortical (n=29; 15.9%), nuclear (n=24; 13.2%); less frequently – posterior subcapsular cataract (n=1; 0.5%), mature (n=1; 0.5%) and secondary cataracts were seen (n=1; 0.5%). Cataract led to blindness in 3 people (27.3%; 95% CI: 19.6–35.7).

According to the Vision Loss Expert Group of the Global Burden of Disease Study, in 2020, 17.01 million people were blind due to cataract (95% CI: 14.40–19.93): 6.78 million men (95% CI: 5.73–7.98) and 10.22 million women (95% CI: 8.76–11.96). We should note that cataract accounts for 39.55% (95% CI: 33.48–46.34%) of all cases of blindness worldwide. Moderate and severe visual impairment due to cataract was observed in 83.48 million people (95% CI: 71.76–96.98); including 34.59 million men (95% CI: 29.69–39.95) and 48.89 million women (95% CI: 42.05–56.06) [1].

The highest prevalence of cataract-related blindness was found in South Asia at 53.20% (95% CI: 45.00–62.11) and South-East Asia, East Asia and Oceania at 41.82% (95% CI: 35.30–49.38). The lowest prevalence was observed in high-income countries at 16.82% (95% CI: 13.66–20.60), Central Europe, Eastern Europe and Central Asia – 20.53% (95% CI: 16.50–25.15). The regions with the highest prevalence of moderate to severe visual impairment due to cataract were South-East Asia, East Asia and Oceania 34.00% (95% CI: 29.32–39.00) and South Asia 29.87% (95% CI: 25.64–34.83); the regions with the lowest prevalence were Central Europe, Eastern Europe and Central Asia – 17.64 (14.57–20.76), Latin America and the Caribbean –19.03 (16.07–22.02) *(Table)*.

Thus, the prevalence estimates for cataract-related blindness and visual impairment in the Southern Urals region showed that the proportion of people who became blind due to cataract was significantly higher compared to South-East Asia, East Asia, Oceania and South Asia. However, the proportion of individuals with moderate and severe visual impairment was closeк to that in North Africa and Middle East, higher than in high-income countries, Central and Eastern Europe and Central Asia, while it was lower than in South and South-East Asia, East Asia and Oceania.

CONCLUSIONS

Based on these findings, cataracts appear to be the most common cause of moderate and severe vision loss in adults aged 40 years and over in the Southern Urals with a prevalence of 59.9% (95% CI: 52.7–67.1), the prevalence of cataract-related blindness is estimated at 27.3% (95% CI: 19.6–35.7), indicating a significant need for cataract surgeries in the region.

Table

Prevalence of low vision and blindness due to cataract in world regions

Таблица

Распространенность слабовидения и слепоты вследствие катаракты в регионах мира

Region Регион	Percentage of people with moderate to severe visual impairment due to cataract, % (95% CI) Процент людей с умеренным или тяжелым нарушением зрения вследствие катаракты % (95% ДИ)	Percentage of blind people due to cataract, % (95% CI) Процент слепых людей вследствие катаракты % (95% ДИ)
Global Глобально	28.30 (24.32–32.54)	39.55 (33.48–46.34)
South-East Asia, East Asia and Oceania Юго-Восточная Азия, Восточная Азия и Океания	34.00 (29.32–39.00)	41.82 (35.30–49.38)
Central Europe, Eastern Europe, Central Asia Центральная Европа, Восточная Европа, Центральная Азия	17.64 (14.57–20.76)	20.53 (16.50–25.15)
High-income countries Страны с высоким уровнем дохода	26.44 (22.39–30.82)	16.82 (13.66–20.60)
Latin America and the Caribbean Латинская Америка и Карибский бассейн	19.03 (16.07–22.02)	30.11 (24.90–36.10)
North Africa and Middle East Северная Африка и Ближний Восток	24.73 (20.94–28.87)	27.31 (21.88–33.57)
South Asia Южная Азия	29.87 (25.64–34.83)	53.20 (45.00–62.11)
Sub-Saharan Africa Африка к югу от Сахары	24.69 (21.24–28.28)	31.56 (26.71–36.53)
Southern Urals Южный Урал	59.9 (52.7–67.1)	27.3 (19.6–35.7)

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Information about the authors
Songhomitra Panda-Jonas – doctor, Privatpraxis Prof Jonas und Dr. Panda-Jonas, Heidelberg, Germany, drsjonas@gmail.com, https://orcid.org/000-00300709-863X
Gulnara Z. Israfilova – Candidate of Medical Sciences, Head of 2nd Microsurgery Department, Ufa Eye Research Institute, israfilova_gulnara@mail.ru, https://orcid.org/0000-0001-6180-115X
Bourn Rupert – professor, Vision and Eye Research Institute, School of Medicine, Anglia Ruskin University, Cambridge, England, eyesecretary.cpm@gmail.com, https://orcid.org/0000-0002-8169-1645
Jost B. Jonas – Professor emer. of Ophthalmology, Medical Faculty Mannheim, of the Ruprecht-Karls-University Heidelberg, Mannheim, Germany jost.jonas@medma.uni-heidelberg.de, https://orcid.org/0000-0003-2972-5227

Информация об авторах
Панда-Йонас Сонгромитра – доктор Частной клиники профессора Йонаса и Доктора Панда-Йонас, Гейдельберг, Германия, drsjonas@gmail.com, https://orcid.org/000-00300709-863X
Исрафилова Гульнара Зуфаровна – к.м.н., зав. 2 микрохирургическим отделением, Уфимский НИИ ГБ ФГБОУ ВО БГМУ Минздрава России, israfilovagz@mail.ru, https://orcid.org/0000-0001-6180-115X
Руперт Борн – профессор Института исследования зрения и глазных болезней, Университет Англия Раскин, Кембридж, Англия, eyesecretary.cpm@gmail.com, https://orcid.org/0000-0002-8169-1645
Йост Бруно Йонас – профессор, Госпиталь Фонда Ротшильда, Французский институт близорукости, Париж, Франция, jost.jonas@medma.uniheidelberg.de, https://orcid.org/0000-0003-2972-5227

Author's contribution:
Panda-Jonas S. – writing , review & editing, methodology, investigation.
Israfilova G.Z. – writing, review & editing, Writing – original draft, Data curation.
Bourne R. – writing, review & editing, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Conceptualization.
Jonas J.B. – writing, review & editing, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

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Панда-Йонас С. – написание, рецензирование и редактирование, методология, исследование.
Исрафилова Г.З. – написание, рецензирование и редактирование, написание оригинального текста, сбор и обработка материала.
Борн Р. – написание, рецензирование и редактирование, валидация, администрирование проекта, методология, исследования, концепция и дизайн исследования.
Йонас Й.Б. – написание, рецензирование и редактирование, валидация, методология, исследование, формальный анализ, обработка данных, концепция и дизайн исследования.

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