ORIGINAL ARTICLE

The Prevalence of Visual Impairment in Retirement Home Residents

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SUMMARY

Background: Elderly persons often have eye diseases causing either reversible or irreversible visual loss. The prevalence of such problems among retirement home residents is unknown.

Methods: 203 residents of retirement homes in and around Würzburg, Germany, were examined. Clinical histories were taken, including information on prior ophthalmological care, and ophthalmological examinations were performed, including visual acuity, slit-lamp examination of the anterior segment of the eye, funduscopy (with optical coherence tomography), and measurement of the intraocular pressure.

Results: 119 women and 84 men aged 55 to 101 were examined in 6 retirement homes. 44 (21.7%) had ophthalmological findings that required acute treatment. The most common diagnoses in the anterior segment of the eye were keratoconjunctivitis sicca (160; 78.8%), cataract (88; 43.3%), secondary cataract (15; 7.4%), glaucoma (33; 12.3%), and eyelid malpositions (25; 12.3%). In the fundus, 45 residents (22.2%) had dry age-related macular degeneration (AMD), 7 (3.4%) had fresh wet AMD, and 7 (3.4%) had epiretinal gliosis. 81 (39.9%) could give no information about earlier ophthalmologic examinations, and 42 (20.7%) had not been to an ophthalmologist for at least 5 years. After correction of refractive errors, their mean decimal visual acuity improved from 0.25 to 0.33.

Conclusion: The retirement home residents that we examined were not receiving adequate ophthalmological care; in particular, some of them had irreversible eye diseases that were not being treated. The ophthalmological care of retirement home residents needs to be improved through better collaboration of all types of personnel taking care of them.

► Cite this as:

Thederan L, Steinmetz S, Kampmann S, Koob-Matthes AM, Grehn F, Klink T: The prevalence of visual impairment in retirement home residents. *Dtsch Arztebl Int* 2016; 113: 323–7. DOI: 10.3238/arztebl.2016.0323

The rise in age-related eye diseases in Germany is driven by increasing life expectancy and demographic change. While visual impairment due to age-related eye diseases can be reversible, irreversible damage may also occur and lead to blindness. Examples of these potentially blinding disorders include macular degeneration, diabetic retinopathy and glaucoma (1, 2). With these eye conditions, early diagnosis and initiation of treatment are critical to ensure that good vision is maintained well into advanced old age.

Severe visual impairment in the elderly limits the ability to read which, at a later stage, may be completely lost. Due to impaired vision, the frequency of social interaction decreases and managing the activities of daily living becomes more difficult (3). In addition, mobility may be significantly reduced, while the risk of falling increases (4–7). Frequently, elderly people also suffer from depression as the result of their visual impairment (3).

Studies have shown that in Germany 1.6% of the population aged 80 years and older (1556/100 000) is already blind (8, 9). The proportion of retirement home residents with visual impairment remains unknown. Epidemiological data on common eye diseases and the provision of visual aids have not been collected as yet to a satisfactory extent. The aim of this study was to establish a set of objective data to serve as a basis for answering these questions.

In addition to vision and existing eye disease, our study analyzed the structure of ophthalmological service provision in retirement homes. The study-related eye examinations were performed in the premises of the retirement homes, allowing both mobile and immobile residence to participate in our research. This study was designed to provide information about the state of optometric and ophthalmological service provision in retirement homes. To this end, we evaluated whether the way in which ophthalmological care for residents in retirement homes is organized needs to be improved. In addition, we assessed whether interdisciplinary collaboration as well as professional networks including all groups involved in the care of visually impaired elderly residents can be initiated and established on site in the retirement homes.

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Methods

The project managers of the Blindeninstitutsstiftung ("Blind Institute Foundation") and the Department of Ophthalmology, University Hospital of Würzburg, recruited the participants of this study. Exclusively residents of retirement homes of the Caritas Association for the Diocese of Würzburg were examined, both in urban and rural settings. All residents of the respective retirement homes were invited to participate in our study. Participation in this project was on a voluntary basis.

There were no exclusion criteria, such as dementia or bed confinement status. Once the residents or their family or their guardians had provided their written informed consent to voluntary participation in our study, the participants residing in the respective facilities were included in our research.

Of the 391 residents from 6 retirement homes of the Caritas Association for the Diocese of Würzburg, 206 were interested in participating in our study. Between June 2014 and December 2014, 203 residents were included in our descriptive prevalences study and examined. The 3 residents who did not participate because of absence, illness or subsequent withdrawal were not included in the analysis. A positive vote of the Ethics Committee of the Medical Faculty of the University of Würzburg approving the conduction of our study is available.

The examinations were performed by staff of the Blindeninstitutsstiftung and the Department of Ophthalmology, University Hospital of Würzburg, in the premises of the retirement homes. Data on the following parameters were collected:

- Ophthalmological history
- Topical and systemic medications
- Previous refraction / correction with glasses
- Present best-corrected visual acuity
- Tonometry using a rebound tonometer
- Slit-lamp examination of the anterior segment
- Undilated funduscopy
- Examination of the macula and the peripapillary retinal nerve fiber layer through an undilated pupil using optical coherence tomography (OCT).

In addition, the structure of ophthalmological service provision in retirement homes was documented.

In addition, the visual aids available to the residents were reviewed on an individual basis and magnifying visual aids were tested by staff of the Blindeninstitutsstiftung, where appropriate.

All ophthalmological parameters were determined only once; no follow-up examinations were performed. The software used for statistical analysis was WinSTAT for Excel. Measurements were reported as means with standard deviation ($M \pm SD$). The paired-samples t-test was used to demonstrate improvements in vision after refractive correction had been adjusted. A p-value ≤ 0.05 was considered significant. For the frequency distributions, absolute and percentage values were reported (n [%]).

Results

Altogether, 119 women and 84 men aged between 55 and 101 years (82.4 ± 9.2 years) participated in our study. In each retirement home, between 9 and 72 (mean: 33.8) residents were examined. Of these, 64.5% had lived in a retirement home for more than 2 years.

Eighty-one residents (39.9%) were unable to precisely answer the question when their eyes were last checked by a community-based ophthalmologist. Forty-two residents (20.7%) had last been examined by an ophthalmologist more than 5 years ago. Twenty-nine residents (14.3%) had been treated by an ophthalmologist within the last 2 to 5 years, 11 (5.4%) within the last 1 to 2 years and 13 (6.4%) within the last year. Twenty-seven residents (13.3 %) had been examined by an ophthalmologist within the last 6 months (*Figure*). The name of their treating ophthalmologist was remembered by 105 residents (51.7%).

When the history was taken, the residents were first asked about their current eye problems. Multiple answers were allowed. 145 (71.4%) residents reported that they did not experience any eye problem. Twenty-nine residents (14.3%) reported reduced visual acuity and blurred vision as their primary complaints. Nine residents (4.4%) reported watery eyes and 12 (5.9%) red and sticky eyes. Other reported symptoms include double vision, floaters or a sensation of pressure.

Asked about previous eye diseases and eye surgery, 12 residents reported glaucoma (5.9%), 4 residents (2.0 %) dry macular degeneration and 1 resident (0.5%) wet age-related macular degeneration (AMD) (*Table*). Nineteen residents (9.4%) received tear substitutes. The *Table* shows the previous eye diseases and the number of treatments and eye surgeries performed so far.

On ophthalmological examination, new diagnoses and diagnoses requiring treatment were established (*Table*) which are described in the following.

Anterior segment

Eighty-one residents (39.9%) had an advanced cataract and 6 residents (3.0%) an almost mature cataract. One resident (0.5%) had a mature cataract. Recommendations for cataract surgery were discussed with these residents. Taking into consideration each patient's general condition and level of cataract-related distress, we recommended that 45 residents should undergo cataract surgery.

In 105 residents (51.7%), pseudophakia was present (status post cataract surgery with artificial lens implantation). Eighty-two residents had undergone bilateral and 23 unilateral cataract surgery. Posterior capsule opacity (secondary cataract) was found in 15 residents (7.4 %); we recommended that they should undergo capsulotomy.

In 160 residents (78.8%), an untreated dry eye (conjunctivitis sicca) and in 50 (24.6%) a blepharitis was diagnosed. Twenty-five residents (12.3%) had eyelid disorders, such as eyelid malpositions and eyelid skin changes, for which we recommended appropriate treatment.

Ocular fundus

In addition to examining the fundus through an undilated pupil, OCT imaging of macula and optic disc was performed. However, OCT examination could not be performed in 68 residents (33.5%) as they were unable to maintain the required position at the scanner due to bed confinement status or immobility. OCT imaging of macula and optic disc was normal in 83 residents (40.9%). In 45 residents (22.2%), dry macular degeneration was detected, requiring regular follow-up by an ophthalmologist. The following previously unknown, fundus-related diagnoses in need of treatment were established during the study examinations: wet macular degeneration in 7 residents (3.4%), cystoid macular edema in 2 residents (1.0%), and macular pucker in 7 residents (3.4%) (Table).

Vision

The mean uncorrected visual acuity of the retirement home residents examined by us was 0.81 ± 0.56 logMAR (logarithm of the Minimum Angle of Resolution in minutes of visual angle), corresponding to a mean decimal visual acuity of 0.16. Eighty-seven residents (42.9%) had a visual acuity of 0.63 ± 0.54 logMAR with their existing correction with glasses (mean decimal visual acuity of 0.25). After objective and subjective refraction, a best-corrected visual acuity of 0.54 ± 0.57 logMAR was achieved (mean decimal visual acuity 0.32). The improvements in visual acuity after refractive correction was statistically significant ($p < 0.0001$). In 32 cases (15.8%), visual acuity was improved by two or more ETDRS steps (ETDRS, Early Treatment Diabetic Retinopathy Study).

In 11 residents (5.4%), vision could only be tested using a non-verbal method. In these cases, visual acuity of 0.94 ± 0.26 logMAR (mean decimal visual acuity 0.1) was measured. In 7 resident (3.4%), it was not possible to test visual acuity. Altogether, 28 residents (14%) had a visual acuity of ≥ 0.8 with their previous correction. After the best-possible correction provided by us, 55 residents (27 %) succeeded to achieve a visual acuity ≥ 0.8 . With their previous correction, 75 residents (37%) had a moderate visual impairment (visual acuity of >0.32 and <0.8). After providing the best-possible correction, the proportion was reduced to 49 residents (24%). Thus, the criteria for reading vision were met by 53 study participants before correction adaption and 72 after correction adaption. Altogether, 116 residents (57.1%) felt reading was less tedious thanks to improved illumination of their living spaces.

Sixteen of the residents examined (8%) were blind (visual acuity of ≤ 0.02 in the better-seeing eye). In these cases it was not possible to improve visual acuity by refraction adaption. The scatter diagram (eFigure) depicts the best uncorrected visual acuity (logMAR) compared with the visual acuity with the subject's own glasses and best corrected visual acuity, respectively.

In 120 residents (59.1%), optical measures, such as fitting of glasses, fitting of magnifying visual aids or furnishing the living space in line with the resident's

FIGURE

Retirement home residents' most recent visit to an ophthalmologist (in years)

visual needs, were recommended. Of these, 37 residents (30.8%) had not been treated by an ophthalmologist for more than 5 years. Eighty-seven residents (72.5 %) refused to receive this type of care, as they felt they had not experienced improvement by it.

Intraocular pressure

Each resident's intraocular pressure was measured using rebound tonometry. Intraocular pressures ranged between 6.6 and 40.0 mm Hg. 25 residents (12.3%) had a previously unknown or previously untreated intraocular pressure of 21 mm Hg or higher; in 6 residents (3.0%), the intraocular pressure was higher than 30 mm Hg. Twelve residents (5.9%) had an already known glaucoma; of these, 11 residents (91.7%) were treated with topical medications designed to reduce intraocular pressure. Three residents with known glaucoma (25.0%) were not adequately controlled, despite receiving treatment aimed at lowering the intraocular pressure (intraocular pressure >21 mm Hg).

Summary of results

Altogether, 44 residents (21.7%) were diagnosed with previously undiagnosed eye diseases in acute need of treatment. In 91 residents (44.8%), we recommended regular ophthalmological follow-up.

Discussion

Our study shows that adequate ophthalmological care of the residents is not ensured in the studied nursing homes of the Caritas Association for the Diocese of Würzburg. More than half of the examined residents had lived for more than 2 years in a retirement home. Just under a quarter of these had not been examined by an ophthalmologist for more than 5 years. Only about a quarter of the residents examined by us reported to

TABLE

Already known and treated as well as newly diagnosed eye conditions of the retirement home residents

Diagnoses	Known diagnoses	Already performed treatment/surgery	New diagnoses (number of residents)	New diagnoses (%) [confidence interval; 5% significance level]
Cataract	–	105 (51.7 %)	88	43.3 [36.5; 50.1]
Posterior capsule opacity	–	–	15	7.4 [3.8; 11.0]
Eyelid malposition/tumors	–	–	25	12.3 [7.8; 16.8]
Glaucoma/ocular hypertension	12 (5.9%)	11 (5.4 %)	25	12.3 [7.8; 16.8]
Dry age-related macular degeneration	4 (2.0%)	–	45	22.2 [16.5; 27.9]
Wet age-related macular degeneration	1 (0.5%)	4 (2.0 %)	7	3.4 [0.01; 5.9]
Macular pucker	–	–	7	3.4 [0.01; 5.9]
Retinal vascular disease	1 (0.5%)	2 (1.0 %)	2	1.0 [–0.4; 2.4]
Herpes virus infection Aphakia with congenital cataract Facial nerve palsy Endothelial dystrophy Status post retinal detachment	1 (0.5%)	1 (0.5 %)	–	–
Strabismus	2 (1.0%)	1 (0.5 %)	–	–

have an eye problem when asked. Above all, impaired vision was named as the main reason for eye-related complaints. After providing best possible refractive correction, a statistically significant improvement in the visual acuity of the examined residents was achieved.

In our study, one in five residents had a previously unknown ophthalmological diagnosis in acute need of treatment. Approximately half of the residents should regularly be examined by an ophthalmologist.

In almost half of the residents, fitting of glasses, fitting of magnifying visual aids or adaption of the living spaces to the resident's visual abilities were recommended. In more than half of the residents, their reading ability could be improved by optimizing the lighting conditions. Our results are consistent with those of a study by Sadowski et al. in 2000 (10), in which 77 residents of 3 retirement homes were examined. In their study, 45% of patients did not achieve reading vision with their existing visual aid.

According to the literature, the majority of people age 60 years and older rely on visual aids (11–14). The prevalence of age-related eye diseases will rise along with increasing life expectancy and more and more affect the mobility and social interactions of those affected (3, 7, 11).

In our project, direct collaboration between the various disciplines (ophthalmology, orthoptists,

ophthalmological rehabilitation) enabled us, on the one hand, to detect eye conditions and initiate treatment and, on the other hand, to offer rehabilitative and social support as well as individual vision-appropriate furnishings in the living space. In addition, our research raised awareness of the issue of “visual impairment in the elderly” among nursing staff and facility management.

To date, insufficient data is available on the ophthalmological, orthoptic and ophthalmological rehabilitative care provided to elderly people living in nursing and retirement homes in Germany. The number of people with visual impairments (visual acuity of ≤ 0.3 in the better-seeing eye) is roughly estimated by the Professional Association of German Ophthalmologists (BVA, Berufsverband der Augenärzte) to be between 0.5 and 1 million people, while the number of blind people (visual acuity of ≤ 0.02 in the better-seeing eye) is reported as approximately 160 000. Half of all visually impaired people are older than 70 years (12). 80% of all people requiring nursing care are older than 65 years and approximately one third of them receive care in nursing homes.

The SÄVIP study (“Medical Care in Retirement and Nursing Homes”) found that ophthalmological care was significantly underrepresented (32% of the facilities had recorded no ophthalmologist's visit in the previous year) and was the second lowest in the ranking

of specialist visits (15, 16). In comparison, 72% of the facilities surveyed in the SÄVIP study reported visits by general practitioners at least once a week (15).

A study on 13 nursing home residents in Lower Saxony, which was already conducted in 2013, found that 3 residents were still able to read; in 2 of them, it was possible to improve their visual acuity with glasses. Five residents had advanced cataract (17).

A study by Crews et al. (18) showed that visual impairment may lead to an increased rate of comorbidities. Furthermore, those living with visual impairment had limited social interactions and reduced activity levels. In addition, impaired vision in the elderly may increase the risk of falling and resulting complications (4, 19, 20).

The provision of ophthalmological care to retirement home residents cannot be ensured in an adequate quality outside of ophthalmologists' offices or outpatient departments of hospitals, i.e. not in the premises of the retirement or nursing home. In our study, we were able to perform the necessary examinations using diagnostic devices, which are not normally mobile (slit lamp and OCT), and in collaboration with an orthoptist. Thus, Wulf-Homilius (17) recommends to take residents with visual impairments and/or diagnoses requiring regular follow-up, such as diabetes, jointly to an ophthalmologist. Visits of ophthalmologists to the retirement home should only be arranged for residents not fit enough to travel or those with dementia.

Conclusion

Our prevalence study highlights the great need for ophthalmological services in retirement homes which is currently not met. By means of interdisciplinary collaboration and professional networks including all professional groups involved in the care of visually impaired elderly people, sustainable organizational structures should be established to improve the care of residents in retirement homes.

Acknowledgement

We would like to thank the Caritas Association for the Diocese of Würzburg, the Bavarian Blind and Visually-Impaired Association (BBSB, Bayerische Blinden- und Sehbehindertenbund e.V.), the LowVision Foundation (LowVision-Stiftung gGmbH), and the Johann Wilhelm Klein Akademie GmbH for sponsoring this project.

This project is under the auspices of the emeritus Secretary of State Walter Kolbow.

The project received funding from the Bavarian State Ministry of Health and Nursing Care as well as the "Daheim im Heim" Foundation and the Edith-Mühlschlegel Foundation. Furthermore, it was supported by Heidelberg Engineering (Heidelberg, Germany) which provided an spectral-domain optical coherence tomography (SD OCT) scanner free of charge.

Conflict of interest statement

The authors declare that no conflict of interest exists.

Manuscript received on: 26 November 2015, revised version accepted on: 15 February 2016

Translated from the original German by Ralf Thoene, MD.

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Supplementary material

eFigure:

www.aerzteblatt-international.de/16m0323

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Dtsch Arztebl Int 2016; 113: 323–7. DOI: 10.3238/arztebl.2016.0323

Diagram of the improvement in visual acuity uncorrected or with existing correction and best-corrected visual acuity in logMAR