

POOR VISION AND RISK OF FALLS AND FRACTURES IN OLDER AUSTRALIANS : THE BLUE MOUNTAINS EYE STUDY

Rebecca Ivers

*Institute for International Health
University of Sydney*

Robert Cumming

*Department of Public Health and Community Medicine
University of Sydney*

Paul Mitchell

*Department of Ophthalmology
Westmead Hospital, University of Sydney*

Falls become more frequent with increasing age, and studies have shown that around a third of elderly people living in the community have one or more falls each year. The consequences of falls are significant and include injury, physical deterioration, fear of falling, institutionalisation, and in some instances death.¹⁻¹⁰ It is well recognised that fall-related risk factors are a major contributor to hip fractures in the elderly. This article describes the Blue Mountains Eye Study, which systematically measured and graded visual function and eye disease in an older community-dwelling population. This study provides a good opportunity to examine the associations between poor vision, falls and hip fracture in an older population.

BACKGROUND

The consequences of a hip fracture for an independent living older person are great.¹¹ In a recent study, Salkeld et al. (2000) found that 80 per cent of women surveyed would rather be dead than experience the loss of independence and quality of life that results from a bad hip fracture and subsequent admission to a nursing home.¹² March et al. (1996) found that 12 months after hip fracture, among people who had been living in their own home prior to the fracture, 17.8 per cent were dead, 21.8 per cent had moved to a nursing home, and only 24 per cent were able to walk as well as they did prior to the fracture.¹³

Visual impairment

Many older people living in the community suffer from poor vision or eye disease. The prevalence of sight-threatening conditions such as cataract, glaucoma and macular degeneration all rise with age.¹⁴⁻¹⁸

Problems affecting vision are often treatable or preventable. For example, many older people could benefit from a change in their glasses' prescription. The Blue Mountains Eye Study found that 45 per cent of people would improve their visual acuity by one or more lines at testing with new glasses.¹⁹ The Melbourne Visual Impairment Project found that the number of people with visual impairment could be halved by the provision of a new spectacle correction.²⁰ Much eye disease in the

community is undiagnosed; for example, in the Blue Mountains Eye Study, 49 per cent of people identified with open-angle glaucoma were previously undiagnosed.¹⁸

Vision as a risk factor for falls and fractures

Other studies have found that contrast sensitivity,²¹⁻²³ poor visual acuity,²⁴⁻²⁶ self-reported poor vision,^{27,28} impaired depth perception,⁵ and visual field impairment,²⁹ were significantly associated with falls. There have also been several studies that have found that poor visual acuity was not related to falling;^{1,2,5,21,22} however, most of these studies evaluated only limited aspects of vision, such as visual acuity. No large community-based study has examined the relationship between falls and common ocular conditions in the elderly such as cataract, age related macular degeneration, glaucoma, or diabetes-related eye disease.

There have been three longitudinal studies that have examined the relationship between poor vision and hip fracture.³⁰⁻³² The Framingham study found that for women with poor or moderately impaired vision, the risk of hip fracture was doubled, but that neither cataract nor other common eye diseases had an independent effect on fractures of the hip after adjusting for visual acuity.³² The EPIDOS (Epidémiologie de l'ostéoporose) study found reduced visual acuity was an independent predictor of hip fractures.³⁰ However, the Study of Osteoporotic Fractures found that while poor contrast sensitivity and depth perception were associated with fractures, poor visual acuity was not.³¹

Previous studies of poor vision, falls and fractures have all lacked systematically-measured, well-validated measures of eye disease and visual function. While results of most previous studies suggest a relationship between measures of visual impairment and falls and fractures, they are also inconclusive as to which aspect of visual impairment is the most important.

METHODS

The Blue Mountains Eye Study is a population-based study of eye disease in older community dwelling people living in the Blue Mountains, west of Sydney. All residents aged 49 years and older living in two postcode areas (comprising Katoomba, Leura and Wentworth Falls) were eligible for inclusion in the study, and 3,654 individuals (82.4 per cent of the eligible population) were examined. The baseline examination consisted of an extensive eye examination and an interviewer administered questionnaire, including questions about falls in the last 12 months. Tests of vision performed included tests of

visual acuity, contrast sensitivity (a measure of the ability to differentiate between objects of high and low contrast) and visual field (peripheral vision). Details of the study have previously been described.^{16-18,33}

After five years, subjects were invited to return for further examination. Of the 3,654 participants in the baseline study, 2,326 (63.5 per cent) returned to the five year follow-up examination. Details of hip fractures were collected from self-report at the five year follow-up examination, and a search was made of radiology records and discharge summaries at the local hospital. All fractures were radiologically confirmed. Loss to follow-up was estimated to be around five per cent.

RESULTS

Analysis of baseline cross-sectional data

Of the 3,654 individuals in the baseline study, 3,299 (90.3 per cent) answered the questions about falls. Of those aged 65 years and over, 29.6 per cent reported one or more falls. Tests of visual function that had a statistically significant association with two or more falls after adjustment for confounders were visual acuity (prevalence ratio (PR) 1.9 for visual acuity worse than 20/30), contrast sensitivity (PR 1.2 for a one unit decrease at six cycles per degree) and visual field screening (PR 1.5 for five or more points missing).³³ The presence of posterior subcapsular cataract (PR 2.1), and use of non-miotic glaucoma medication (PR 2.0) had a statistically significant association with two or more falls, while presence of age-related macular degeneration, diabetic retinopathy and cortical or nuclear cataract did not.³³

Analysis of longitudinal data

Analyses were carried out after both two and five years of follow-up. We believed that stronger associations for the shorter period were to be expected because the level of visual impairment present at the time of a hip fracture would be much better reflected by a recent eye examination than an eye examination performed many years in the past. There were 59 subjects who had sustained a fracture of the hip after five years of follow-up, and 17 subjects sustained a hip fracture after two years of follow-up. As expected, visual impairment of any type did not predict risk of hip fracture during five-year follow-up.

Risk factors that were predictive of hip fracture after two years of follow-up were:

- corrected visual acuity (that is, the best visual acuity attained after refraction);
- visual field deficits;
- presence of posterior subcapsular cataract (data as yet unpublished).

No other eye disease was predictive of hip fracture, probably because of the small numbers involved.

CONCLUSION

The Blue Mountains Eye Study has confirmed that visual impairment is strongly associated with an increased risk of falls and hip fracture. Having poor visual acuity, posterior subcapsular cataract or a visual field deficit were all associated with increased risk of both falls and hip fracture. Because of the frequency of visual impairment, it seems likely that a high proportion of falls and hip fractures are due to visual impairment. Ensuring that older people have access to regular eye examinations and have timely treatment for eye diseases, such as cataract, may substantially reduce the incidence of falls and subsequent hip fracture in the community.

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REACHING THE COMMUNITY AND SPECIFIC POPULATIONS

A Community and Specific Populations Advisory Council (CASAPAC) has been formed to advise Fitness NSW on community fitness issues. CASAPAC evolved from the former National Association for Gentle Exercise (NAGE). CASAPAC will focus on two main issues in the short term:

- to determine the appropriate training requirements/ standards for fitness professionals to work with specific population groups (including older persons) and the availability of such training;
- to develop a strategy, in conjunction with the NSW Department of Health, to train fitness professionals to provide fitness services that would support NSW Health's fall injury prevention initiatives.

If you would like to become involved with CASAPAC or would like to contact members of the committee, please contact Fitness NSW on (02) 9460 6200 or email fitnessnsw@fitnessnsw.com.au.