

INCIDENCE OF FALLS IN THE ELDERLY POPULATION WITH EYE DISEASES: A SYSTEMATIC REVIEW

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ABSTRACT

Background: Eye diseases are highly prevalent in the elderly population and have a significant impact on number of falls and fall risk. The aims of this systematic review are 1) to report the number of falls/fallers in the elderly population with eye diseases 2) to explore the factors which most significantly impact risk of falls and 3) to examine the effectiveness of cataract surgery in reducing falls in the elderly population. **Methods:** Pubmed and Embase were accessed between November 2017 and September 2018. Articles were included based on the following criteria: 1) participants were identified as elderly individuals aged 65 and older; 2) participants included patients with eye diseases; 3) studies were observational by design; and 4) assessed number of fallers or falls experienced. Number of falls, number of fallers, and measures of risk were extracted from the included studies and presented in tabular format. Included studies were assessed for bias using the Newcastle-Ottawa Scale. **Results:** Nine studies fit the criteria and were thus included in the systematic review. Five of the nine studies involved surgical interventions. Of the five studies involving surgical interventions, three demonstrated a decreased number of falls after surgery as opposed to before surgery. Of the five studies involving surgical interventions, two demonstrated an increase in the number of falls after surgery as opposed to before surgery. Increased age and history of falls are associated with increased risk of falling. **Discussion:** The findings of our systematic review indicate further research is needed to determine the impact of eye disease on risk of falls as well as the effectiveness of surgical interventions on reducing number of falls. Despite the author's attempts to control several confounding variables, the observational design of the included studies made it difficult to directly relate the presence of eye disease with the risk of falling in the elderly population. A future study could initially control for age, gender, and history of falls within the selected population.

Keywords: elderly, eye disease, falls, glaucoma, macular degeneration, cataracts

INTRODUCTION

Visual impairment is a widespread issue that impacts older adults and is often underreported. Behind arthritis and heart disease, visual impairment is the third most commonly occurring chronic condition in the elderly population.[1,2] Visual characteristics such as visual acuity, depth perception, contrast sensitivity, and visual fields are important to the proper functioning of the visual system. Impairment in any of these characteristics results in an increased risk of falls.[3] The development of visual impairments and ocular pathologies drastically increases with age.[4,5] After age 50 these visual characteristics, especially visual acuity, decline even in the absence of ocular pathologies. Age-related eye diseases also influence these visual characteristics and thus are associated with an increased risk of falls.[3] The most prevalent age-related ocular pathologies in the elderly population are glaucoma, macular degeneration, and cataracts[1,6]

Falls exert an exceptionally, negative impact on quality of life and health in the elderly population and are a major determinant of mortality and morbidity.[7-12] Nearly one-third of community-dwelling elderly individuals experience a fall each year.[10-12] Furthermore, as age increases so does the risk of falling with 50% of those aged 75 and older enduring a fall each year.[7-9] Falls are the fifth leading cause of mortality in the elderly population and directly result in 388,200 hospitalizations as well as 1.6 million visits to the emergency department each year.[8,9,13] Thus, falls are an issue of utmost significance in the elderly population and fall prevention measures should be assumed by all healthcare professionals.

An intact visual system is imperative to plan and adjust to external factors, especially hazards in the immediate environment, as well as to maintain balance and postural stability.[14-16] Visual information becomes progressively more important to the maintenance of balance as individuals age. In fact, in a measure of postural stability individuals in the 85 and older age group demonstrated 38% more sway with eyes closed than those in the 50 and 60 year old age groups.[17] Thus, if the visual system is impaired or cannot adjust to this need for increased reliance to maintain postural stability and balance, then falls occur.[18,19] Visual impairments, including ocular pathologies, have been identified through extensive research to play a large role in falls in the elderly population.[3,20-23]

There are several previously published systematic reviews that have investigated visual impairment in the elderly population. The majority of these reviews have focused on visual characteristics such as visual acuity, contrast sensitivity, depth perception, and visual fields.[24] One systematic review examined fear of falling in an elderly population with general vision loss and eye diseases.[25] Two systematic reviews have examined expedited cataract surgery versus routine cataract surgery on reduction of falls in the elderly.[26,27] To our knowledge, a systematic review reporting the incidence of falls in elderly patients with eye diseases has yet to be conducted. The aims of this systematic review are 1) to report the number of falls/fallers in the elderly population with eye diseases 2) to explore the factors which most significantly impact risk of falls and 3) to examine the effectiveness of cataract surgery in reducing falls in the elderly population.

METHODS

Reporting of this systematic review was modeled using the 2009 preferred guidelines for systematic reviews and meta-analyses (PRISMA). The PRISMA guideline is a 27-item checklist that consists of essential items for manuscript development and transparent reporting.[28]

Eligibility Criteria

Articles were included based on the following criteria: 1) participants were identified as elderly individuals aged 65 and older; 2) participants included patients with eye diseases; 3) studies were observational by design; and 4) assessed number of fallers or falls experienced. Articles were excluded if they were not available in English or in full text.

Information Sources/Search

Pubmed and Embase were the online databases utilized. They were accessed between November 2017 and September 2018. The following search was used in each database ((eye diseases) AND (aged OR aged, 80 and over) AND (accidental falls)). There were no limits placed on this search. Assistance with the computerized searches was provided by the university librarian.

Study Selection

In order to identify articles to be included in this review, a stepwise process was followed in which titles were screened, followed by abstracts, and finally full-text. In each stage of the process, two authors independently screened for inclusion. In the case of discrepancies, a third author was utilized as a tie-breaker.

Data Collection Process/Data Items

The following items were extracted from each included study: age and description of the eye disease; exclusion criteria of each included study; time period over which falls were measured; number of fallers (both pre-surgery and post-surgery if surgical interventions were included in the study); as well as odds ratio, risk ratio, rate ratio, and fall incidence.

Since we were interested in the impact of eye disease/vision loss on incidence of falls in the elderly population, any measure of risk (odds, risk, and rate ratio) that compared risk in people with eye disease to those without or those with eye disease pre and post-surgery was included.

Risk of Bias in Individual Studies

The Newcastle Ottawa Scale (NOS) was used to assess risk of bias of the observational study designs.[2] Each study was independently assessed by two reviewers, scored using the NOS, and is presented in tabular format (Table 2). Any discrepancies were solved by discussion to reach consensus. The NOS was developed to assess the quality of non-randomized studies to be used in a systematic review, particularly case-control and cohort studies. The NOS contains 8 multiple choice items with a total of 9 possible points scored. There are no cutoff scores that designate categorically whether a study is low, moderate, or high quality, but higher scores indicate a higher quality study with lower bias.[29]

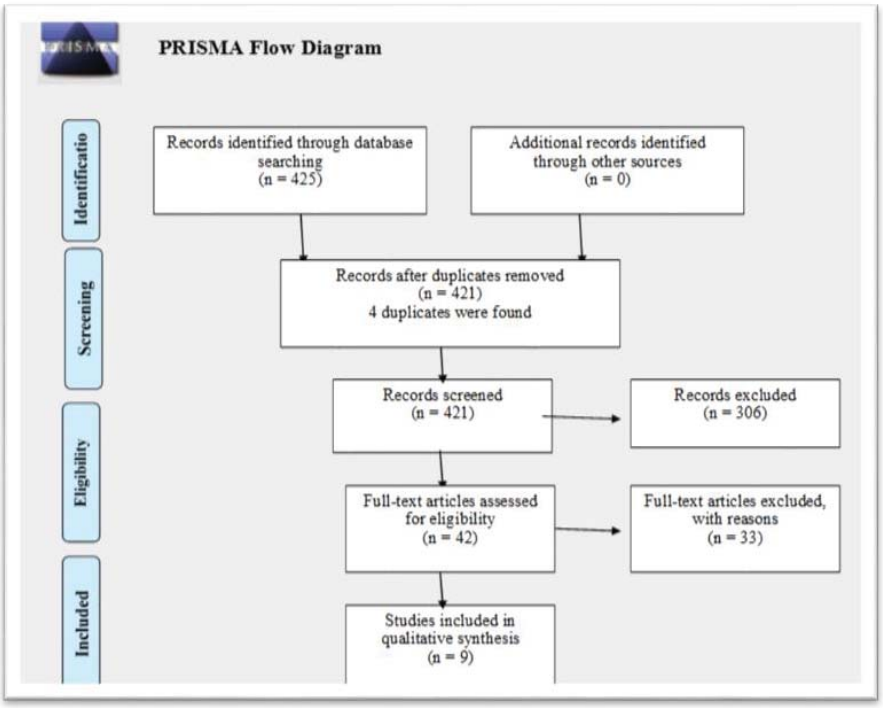
Summary Measures

The principal summary measures included number of falls or fallers and measures of risk of falls (odds ratio, risk ratio, and rate ratio). Percentage of fallers was calculated from the total sample of participants with eye disease for five of the studies. Four of the studies included participants outside the age range of the project, thus the percentage of fallers was calculated within each provided age group.

RESULTS

Study Selection

Through the online database searches a total of 425 articles were obtained. There were 4 duplicates. Following title review, 152 articles remained, and after abstract screening, 42 full-text articles remained for review. After full-text review, a total of 9 articles fit the inclusion criteria and were included in this review (Figure 1).



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(6): e1000097. doi:10.1371/journal.pmed1000097

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Study Characteristics

The description of the participants, eye diseases, exclusion criteria, and time periods of recorded falls were extracted from the included studies (Table 1). Six articles included participants with cataracts,[30-35] two included participants with age-related macular degeneration (AMD),[36,37] and one included participants with glaucoma.[38] One study recorded number of falls only prospectively[36], and two studies recorded falls only retrospectively.[37,38] Six of the studies recorded number of falls prospectively and retrospectively.[30-35] Five of the six studies, previously mentioned, involved surgical interventions and thus the number of falls retrospectively and prospectively were recorded as pre-surgical and post-surgical.[30-32,34,35] The studies exhibited a wide array of time periods over which falls were recorded. Four studies recorded falls over a 12 month time period either prospectively and/or retrospectively.[32,36-38] One study recorded falls over a two-year time period pre-surgery, between 1st and 2nd eye surgery, and two years post-surgery.[31] Three studies recorded falls over different time periods retrospectively and prospectively: 18 months pre-surgery and six months post-surgery;[30] 12 months retrospectively and two years prospectively;[33]

and one week pre-surgery, one to three months post-surgery, and finally 12 months post-surgery.[35] One study recorded falls six months pre and post-surgery.[34]

Table 1: Summary of Articles

Author, Year	Population (n)	Exclusion Criteria	Outcome Measure Administration
Brannan S, et al. (2003)	≥ 65 years; Age related cataract, scheduled to undergo cataract surgery. (97)	Postural hypotension symptoms or drop in systolic BP of > 20 mmHg on standing.	Number of falls over 6 months.
Glynn RJ, et al. (1991)	≥ 65 years; Glaucoma or suspected glaucoma. (489)	Non-English speaking.	Number of falls over past 12 months.
Meuleners LB, et al. (2012)	≥ 60 years; Undergoing first eye cataract surgery. (15,295)	Previous cataract surgery.	Number of falls 1 week prior to surgery, 1-3 months after surgery, 1 year after surgery.
Meuleners LB, et al. (2014)	≥ 60 years; Bilateral cataract surgery. (28,396)	Previous cataract surgery.	Number of falls 2 years prior to surgery, between first and second surgery, 2 years after surgery.
Palagyi A, et al. (2016)	≥ 65 years; cataracts before first eye surgery. (329)	Cognitive impairment, non-English speaking, ocular comorbidities, planned combined ocular surgery, residence outside metropolitan area, living in long term care facility, unable to walk.	Number of falls in past 12 months and prospective over 2 years.
Supuk E, et al. (2015)	≥ 65 years; cataract waiting list. (287)	Specific exclusion criteria not stated.	Number of falls in past 6 months.
Szabo SM, et al. (2008)	≥ 70 years; Female; Exudative AMD, no exudative AMD. (169)	Neurodegenerative disease, WC or walker use, or other cause of poor vision.	Number of falls over past 12 months.
Szabo SM, et al. (2010)	≥ 70 years; Female; NV-AMD, mild cataracts, or history of cataract surgery, and normal. (246)	Neurodegenerative disease, WC or walker use, or other cause of poor vision.	Number of injurious falls prospectively over 12 months.
To KG, et al. (2014)	≥ 50 years; bilateral cataract scheduled to undergo first-eye surgery. (413)	Previous cataract surgery, injury or diabetes related cataract, glaucoma or other significant ocular disease, dementia, Parkinson's disease, schizophrenia, WC bound.	Number of falls in past 12 months.

Risk of Bias Within Studies

Scores on the NOS scale ranged from 4 to 7 for the studies included in the systematic review. Two studies recorded a score of 4 which indicates greater bias and lower quality. Four studies recorded a score of 7 which indicates less bias and higher quality (Table 2).

Table 2: Risk of Bias Assessment

Study, year	Selection				Comparability	Outcome			Total Score
	Representativeness of exposed cohort	Selection of non-exposed cohort	Ascertainment of exposure	Outcome not present at baseline		Assessment of outcome	Sufficient follow-up duration	Adequate follow-up	
Brannan et al, 2003	(*)	(*)	(*)	-	(*) (*)	-	(*)	(*)	7/9
Glynn et al, 1991	-	-	(*)	-	(*) (*)	-	-	(*)	4/9
Meuleners et al, 2012	(*)	(*)	(*)	-	(*) (*)	(*)	(*)	-	7/9
Meuleners et al, 2014	(*)	(*)	(*)	-	(*)	(*)	(*)	(*)	7/9
Palagyi et al, 2016	-	(*)	-	-	(*)	-	(*)	(*)	4/9
Supuk et al, 2015	(*)	(*)	-	-	(*) (*)	-	(*)	(*)	6/9
Szabo et al, 2008	(*)	-	(*)	-	(*) (*)	-	-	(*)	5/9
Szabo et al, 2010	(*)	(*)	(*)	-	(*) (*)	-	(*)	(*)	7/9
To KG et al, 2014	(*)	(*)	(*)	-	(*)	-	(*)	-	5/9

Risk of Bias scores are based on the Newcastle-Ottawa Scale (NOS) and are scored out of a total of 9 possible points.

Results of Individual Studies

To promote better interpretation, studies are arranged in tabular format. Both tables report number of falls/fallers as well as any measures of risk. Five of the studies included surgical interventions (Table 4), while the other four studies did not (Table 3).

Table 3: Number of Falls/Fallers and Measures of Risk in Non-Surgical Studies

Author, Year	n (%)	Measures of Risk
Glynn RJ, et al. (1991)	65-74 yo (participants, n=289): Fallers: 26 (9.00)* 75-93 yo (participants, n=200): Fallers: 21 (10.50)*	Rate Ratio: Age: 65-74 yo: 1.0 75-93 yo: 1.2 (0.68, 2.0) Sex: 2.0 (1.0, 3.7) Estimated Odds Ratio: Older Age: 0.90 (0.50, 1.6) Female sex: 2.3 (1.1, 4.7)
Palagyi A, et al. (2016)	(participants, n=329) Fallers: 101 (30.70) Multiple falls: 49 (14.89) (falls, n=267) Injurious falls: 138 (51.70)	Incidence Rate Ratio: Age, per 5 year increase: 0.87 (0.69, 1.08) Female: 1.03 (0.64, 1.66) Fallen in prior 12 months: Multivariate model (adjusted for final age & sex): 2.48 (1.57, 3.93)⧫ Fall Incidence: 1.2 per person-year (1.0, 1.3) Injurious Falls Incidence: 0.60 per person-year (0.51, 0.71)⧫
Szabo SM, et al. (2008)	One-year fall history (participants, n=115): Any falls: 32 (27.83) ≥ 2 falls: 9 (7.83)	
Szabo SM, et al. (2010)	(participants, n=114) Falls: 76 (66.67) Injurious falls: 42 (36.84) ≥ 1 fall: 47 (41.23) ≥ 1 injurious fall: 32 (28.07) Annual Risk of Falls: Mean fall: 0.67 falls per person-year Mean injurious falls: 0.37 injurious falls per person-year	(Unadjusted Incidence Rate Ratio) faller: 1.43 (1.01, 2.03)⧫ (Unadjusted Incidence Rate Ratio) injurious faller: 2.06 (1.22, 3.46)⧫ (Adjusted Incidence Rate Ratio) Injurious falls over a year: 1.77 (1.07, 3.20)⧫ adjusted for age

Percentages represent the percentage of fallers within the entire sample of participants with eye disease in the study. *Denotes the percentage of fallers within the number of participants in an age group. ⧫Denotes a significant value.

Table 4: Number of Falls/Fallers and Measures of Risk in Studies Including Surgical Interventions

Author, Year	n (%) Pre-surgery	Measures of Risk Pre-surgery	n (%) Post-surgery	Measures of Risk Post-surgery
Brannan S, et al. (2003)	Falls (participants, n=89): 31 (34.83)		Falls (participants, n=89): 8 (8.99)	Odds Ratio (odds of falling post operation compared to the odds of falling before): 0.08 (0.0092, 0.32) ⧫

Meuleners LB, et al. (2012)	70-79 yo (participants, n=6652): Involved in a fall: 213 (3.20)* Year before, number of falls: 109 ≥ 80 yo (participants, n=4406): Involved in a fall: 331(7.51)* Year before, number of falls: 135	70-79 yo (participants, n=6652): Involved in a fall: 213(3.20)* Year after, number of falls: 112 ≥ 80 yo (participants, n=4406): Involved in a fall: 331(7.51)* Year after, number of falls: 210	
Meuleners LB, et al. (2014)	65-69 yo (participants, n=3864): Fall: 44 (1.14)* 70-74 yo (participants, n=6184): Fall: 122 (1.97)* 75-79 yo (participants, n=7936): Fall: 264 (3.33)* 80-84 yo (participants, n=5860): Fall: 359 (6.13)* 85+ yo (participants, n=2594): Fall: 286 (11.03)*		Age (adjusted risk ratio): 65-69 yo: 1.10 (0.59, 2.04) 70-74 yo: 1.67 (0.95, 2.94) 75-79 yo: 2.56 (1.47, 4.44) ⧫ 80-84 yo: 4.25 (2.45, 7.36) ⧫ 85+ yo: 6.84 (3.93, 11.93) ⧫
Supuk E, et al. (2015)	Falls 6 months prior to surgery (participants, n=287): 66 (23.00)	Falls 6 months after surgery (participants, n=283): 56 (19.79)	Odds Ratio (risks for post-operative falls (6 months)): preoperative falls, multivariate (adjusted for postoperative dizziness, change into/from multifocal spectacles) 7.28 (3.48,15.21)⧫
To KG, et al. (2014)	70+ Baseline (participants, n=157): Falls: 23 (14.65)*	70+ 2nd assessment (participants, n=87): Falls: 1 (1.15)* 3rd assessment (participants, n=139): Falls: 10 (7.19)*	

Percentages represent the percentage of fallers within the entire sample of participants with eye disease in the study. *Denotes the percentage of fallers within the number of participants in an age group. ⧫Denotes a significant value.

Falls – Eye disease with no surgical intervention

Within the single study that evaluated patients with glaucoma,[38] number of falls were reported retrospectively over 12 months: 26 fallers (9.00%) in the 65 to 74-year-old age group and 21 fallers (10.50%) in the 75 to 93-year-old age group. This study was of lower quality and demonstrated an increased risk of bias with a score of 4 out of a possible 9 points. Older age was not statistically significant for indicating an increased rate or odds of falling. Female sex was not significantly associated with falls. However, female sex did indicate an increased rate of falls (rate ratio [RR] 2.0 95% CI 1.0-3.7) and a greater odd (estimated odds ratio [OR] 2.0 95% CI 0.96-4.0) of experiencing a fall than their male counterparts.

One study evaluated patients with cataracts and recorded falls 12 months retrospectively and two years prospectively.[33] In a population of 329 participants, 101 (30.70%) experienced a fall and 49 (14.89%) experienced multiple falls. Out of 267 falls, 138 (51.70%) proved to be injurious. The incidence of falls reported in this study was 1.2 per person-year and 0.60 per person-year for injurious falls. This study was of lower quality and demonstrated an increased risk of bias with a score of 4 out of a possible 9 points. Neither age nor female sex demonstrated statistical significance for increasing rate of falls. The biggest indicator of an increased rate of falls was a fall in the previous year (incidence rate ratio [IRR] 2.48, 95% CI 1.57-3.93).

Two studies evaluated patients with AMD. The first AMD study reported falls retrospectively over 12 months.[37] In a population of 115 participants, 32 (27.83%) experienced a fall and 9 (7.83%) experienced two or more falls. This study was of low to moderate quality and demonstrated an increased risk of bias with a score of 5 out of a possible 9 points. The second AMD study reported falls prospectively over 12 months: 76 (66.67%) falls and 42 (36.84%) injurious falls were experienced by

participants.[36] The annual risk of falls reported in this study was 0.67 falls per person-year and 0.37 injurious falls per person-year. This study was of higher quality and demonstrated a decreased risk of bias with a score of 7 out of a possible 9 points. The unadjusted incidence rate ratio for fallers and fallers who experienced injurious falls (IRR 1.43 95% 1.01-2.03) and (IRR 2.06 95% CI 1.22-3.46), respectively, demonstrated statistical significance compared to the non-AMD condition. The age adjusted incidence rate ratio for injurious falls over a year demonstrated statistical significance (IRR 1.77 95% CI 1.07-3.20) compared to the non-AMD condition.

Falls – pre- and post-surgical intervention for eye disease

Five studies involved surgical intervention for participants with cataracts (Table 4). Within the first study, patients were evaluated for falls 18 months pre-surgery and 6 months post-surgery.[30] In a population of 89, 31 (34.83%) fell pre-surgically and only 8 (8.99%) fell post-surgically. This study was of higher quality and demonstrated a decreased risk of bias with a score of 7 out of a possible 9 points. The odds of falling after the operation compared to before the operation was significantly reduced (OR 0.08 95% CI 0.0092-0.32).

A second study reported falls occurring 12 months pre-surgery and 12 months post-surgery.[32] In a population of 6652 participants, 213 (3.20%) were involved in a fall in the 70 to 79-year-old age group, and 331 (7.51%) were involved in a fall in the 80 and above age group. In the 70 to 79-year-old age group, 109 falls were reported pre-surgery and 112 post-surgery. In the 80 and above age group, 135 falls were reported pre-surgery and 210 post-surgery. This study was of higher quality and demonstrated a decreased risk of bias with a score of 7 out of a possible 9 points.

A third study reported falls two years pre-surgery, between first and second cataract surgery, and two years post-surgery.[31] Number of falls for the different age groups are as follows: 65 to 69-year-old age group experienced 44 (1.14%) falls, 70 to 74-year-old age group experienced 122 (1.97%) falls, 75 to 79-year-old age group experienced 264 (3.33%) falls, 80 to 84-year-old age group experienced 359 (6.13%) falls, and the 85 and above age group experience 286 (11.03%) falls. This study was of higher quality and demonstrated a decreased risk of bias with a score of 7 out of a possible 9 points. Risk of injurious fall increased with advancing age with the 85 and above age group (risk ratio [RR] 6.84 95% CI 3.93-11.93) at a risk of almost 7 times that of the 65 to 69-year-old age group (RR 1.10 95% CI 0.59-2.04).

A fourth study reported falls 6 months pre-surgery and post-surgery.[34] Six months prior to surgery 66 (23.00%) participants experienced a fall, while six months post-surgery only 56 (19.79%) participants experienced a fall. This study was of moderate quality and demonstrated a decreased risk of bias with a score of 6 out of a possible 9 points. In this study, the greatest risk factor for a fall in the 6 months post-surgery was a pre-operative fall (OR 7.28 95% CI 3.48-15.21).

A fifth study reported falls 12 months pre-surgery (baseline), 1 to 3 months post-surgery, and 12 months post-surgery.[35] Twenty-three (14.65%) participants experienced falls pre-surgery, one participant reported a fall (1.15%) at the second assessment (1 to 3 months), and 10 (7.19%) participants reported falls at the third assessment. This study was of low to moderate quality and demonstrated an increased risk of bias with a score of 5 out of a possible 9 points.

DISCUSSION

All of the studies contained in this review included some measure of risk for factors associated with falls such as age, sex, previous history of falls, comorbidities, and medications. Four studies included participants outside of the age range of the systematic review, however, as number of falls/fallers was broken down into appropriate ages to fit the inclusion criteria they could be included. Factors associated with falls from these four studies could not be extracted and utilized as they were not broken down by age. Across these five studies, the most common factors measured for impact on risk of falls were age, sex, and previous history of falls. Of the five articles, three studies looked at previous history of falls.[30,33,34] All demonstrated that a previous history of falls significantly increased the odds of experiencing another fall. Of these three studies one was of high quality, one of moderate quality, and one of poor quality as scored by the NOS. The association of prospective fall risk and previous fall history is well established in the literature and supported by these three studies in this review.[30,33,34]

Three studies reported the impact of age on the risk of falling.[31,33,38] However, only one demonstrated an increased risk of falling as age increased and was rated as high quality by the NOS.[31] The two studies which demonstrated no significance were rated as poor quality by the NOS warranting that their results be accepted with caution.[33,38] With advancing age, the possibility of developing visual impairments and ocular pathologies, such as glaucoma, macular degeneration, and cataracts, rises.[4,5] Furthermore, as an individual ages they become increasingly reliant on visual information to maintain postural stability and

balance.[17] Thus, increased age results in an increased likelihood of visual impairment plus an increased reliance on visual information which compounds substantially to increase an individual's risk of falling. With due consideration to the results and quality of the studies, these results are consistent with the established literature that advancing age increases the risk of falling.[39-41]

Two studies examined female sex as a potential risk factor for falls,[33,38] but neither demonstrated a significant association.[38] However, both studies were rated as poor quality by the NOS warranting that their results be accepted with caution. These results are inconsistent with the current literature which suggests that females are at a higher risk of falling. This higher risk is presumed to be linked to the increased likelihood of living alone as well as high-heel footwear use, increased physical activity levels, and psychotropic drug usage.[39,42] Again, research indicates that as individuals age they become increasingly reliant on their visual system.[17] This increased reliance may occur as early as 50 years of age in females.[43] This unfortunate combination of female sex, increased visual reliance, and an increased risk of visual impairment could result in an increased risk of falls.

There were conflicting results regarding fall incidence pre to post cataract surgery. Three studies demonstrated a decrease in the number of falls post-surgery with only two of these studies reporting a significant decrease.[30,34,35] The two studies which showed a significant decrease in falls were rated high quality[30] and low to moderate quality[35] by the NOS. The study that was not significant was rated moderate quality by the NOS.[34] Two studies demonstrated a significant increase in the number of falls and risk of falling post-surgery.[31,32] Both studies were rated high quality by the NOS.[31,32] Possible reasons for this discrepancy may include: 1) cataract surgery resulted in greater physical activity participation leading to an increase in risk-taking behaviors that could result in a fall, 2) visual differences between eyes as most of the falls observed by patients occurred in the waiting period for their second-eye cataract surgery, and 3) hospital records were utilized in these studies versus the self-reported data utilized in the other three studies which provided a more objective measure of falls. This finding suggests that there is inconclusive evidence surrounding the effectiveness of cataract surgical intervention related to fall risk.

Limitations

There were several limitations to this systematic review. Relevant studies may have been omitted as this review was limited to studies published in English. The observational design of the included studies made it difficult to directly relate the presence of eye diseases to the risk of falling in the elderly population. Furthermore, there was a high possibility of reporting bias within the included studies due to the self-reported collection of the primary outcome, history of falls. Selection bias was also a limitation as 7 of the 9 articles enrolled patients via voluntary participation from eye clinics or appointment-based hospital visits.

CONCLUSIONS

This review is the first of its kind to gather the number of falls or fallers in a population of elderly individuals with eye disease, to explore the factors that increase the risk of falls, and to evaluate the effectiveness of surgical intervention for cataracts. Among these studies of people with eye diseases, the single biggest predictor of falling was a previous history of falls. Furthermore, the findings of the articles which involve surgical intervention present inconclusive evidence on the effectiveness of cataract surgery on fall incidence. Further evidence is needed to determine the impact of eye disease on risk of falls and the effectiveness of surgical interventions on reducing number of falls. A future study could control for age, gender, history of falls within the selected population, as these factors had the greatest impact on fall risk across each of the included studies.

DISCLOSURES

The Authors have no financial or other conflicts of interest.

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