Chapter 2:

Major depressive and anxiety disorders in visually impaired older adults

Published as:
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Invest Ophthalmol Vis Sci 2015; 56:849–54. DOI:10.1167/iovs.14-15848

Abstract

Objectives
To assess the prevalence of subthreshold depression and anxiety, and major depressive, dysthymic, and anxiety disorders (i.e. panic disorder (with or without agoraphobia), agoraphobia (without history of panic disorder), social phobia, and generalized anxiety disorder) in visually impaired older adults and to compare these estimates with those of normally sighted peers.

Methods
Cross-sectional data were analysed based on telephone interviews with visually impaired older adults aged ≥60 years (*n*=615) with a visual acuity of 0.30 logMAR (20/40 Snellen) or worse in the best eye from outpatient low vision rehabilitation organisations, and face-to-face interviews with community-dwelling normally sighted peers (*n*=1,232). To determine prevalence rates, the normally sighted sample was weighted on gender and age to fit the visually impaired sample. Logistic regression analyses were used to compare samples and correct for confounders.

Results
The prevalence of major depressive disorder (5.4%) and anxiety disorders (7.5%), as well as the prevalence of subthreshold depression (32.2%) and subthreshold anxiety (15.6%), were significantly higher in the visually impaired sample compared to their normally sighted peers (*P*<0.05). Agoraphobia (without a history of panic disorder) and social phobia were the most prevalent anxiety disorders in visually impaired older adults.

Conclusions
This study shows that depression and anxiety are major problems in older adults with visual impairment. Therefore, research on psychotherapeutic and psychopharmacologic interventions to address depression and anxiety in this population is warranted.

Introduction

Vision loss is an important cause of disability in older adults,[1] and is associated with reduced health-related quality of life[2-4] and increased depressive and anxiety symptoms.[4–8] In turn, depression and anxiety may aggravate disability caused by visual impairment,[9] and may cause a further decline in health-related quality of life.[10-11] The prevalence of visual impairment in developed countries is growing due to demographic ageing.[1] Therefore, the burden on eye care and mental healthcare for visually impaired older adults is expected to increase.

Studies aimed at determining the prevalence of subthreshold depression and anxiety in visually impaired older adults using screening questionnaires show that approximately one third of older adults with visual impairment experience clinically significant symptoms of depression and/or anxiety (also called subthreshold depression and/or anxiety).[5-8,12–16] This is twice as high as the prevalence found in the general elderly population (approximately 16%).[17–19] Only a few studies assess major depressive and anxiety disorders according to the criteria of the diagnostic statistical manual (DSM) in visually impaired older adults.[12,20,21] And none of these studies give a complete picture of threshold and subthreshold symptoms, and distinguish between different anxiety disorders.

This study aims to determine the prevalence of threshold and subthreshold symptoms of depression and anxiety in a large population of visually impaired older adults, and to compare these prevalence estimates with those of normally sighted peers. The outcomes may offer important information on the extent of these problems in older adults with irreversible vision loss, and may direct researchers, decision makers, and clinicians on choosing specific interventions to address these problems in this vulnerable population.

The aims of this study are: 1) to determine the prevalence of subthreshold depression and anxiety, and the prevalence of major depressive disorder, dysthymic disorder, panic disorder (with and without agoraphobia), agoraphobia (without history of panic disorder), social phobia, and generalized anxiety disorder according to the DSM-IV in visually impaired older adults (aged ≥60 years), and 2) to investigate whether these estimates of prevalence are significantly higher than those of normally sighted peers (aged ≥60 years).

Methods

Visually impaired sample
Cross-sectional data in 615 visually impaired patients from low vision rehabilitation organisations in the Netherlands and Belgium were collected from September 2012 to July 2013 as part of the baseline measurement of a randomised controlled trial (RCT, trial registration: http://www.trialregister.nl, identifier: NTR3296).[22] The RCT was approved by the Medical Ethics Committee of the VU University Medical Centre Amsterdam and the University Hospital Leuven, and performed according to the standards of the Declaration of Helsinki (1964) and its later amendments. Patients were eligible if they: a) had a visual acuity of 0.30 logMAR (20/40 Snellen) or worse in the best eye, b) were ≥60 years, c) had sufficient knowledge of the Dutch language, d) had no severely impaired cognitive functioning as measured with the six-item screener, a short version of the Mini Mental State Examination (MMSE),[24] and e) gave written consent to participate after explanation of the nature and possible consequences of the study. A total of 3,000 patients were invited to participate, of whom 914 gave their written consent (response rate, 30.5%) and 615 were eligible to participate in the present study. Data were collected by means of telephone interviews performed by trained personnel.

Normally sighted sample

Cross-sectional data in 1,232 community-dwelling normally sighted older adults were collected as part of the Longitudinal Ageing Study Amsterdam (LASA; available in the public domain at http://www.lasa-vu.nl).[25] This ongoing population-based cohort study was approved by the Medical Ethics Committee of the VU University Medical Centre Amsterdam, and conducted according to the principles of the Declaration of Helsinki (1964) and its later amendments. A random sample of older adults, stratified for gender, age, and level of urbanization, from population registers in 11 municipalities in the Netherlands were invited to participate. Data collection started in 1992 and was followed by data collection cycles every three years. For the present study, data from the seventh measurement cycle (2008-2009) were used. Data were collected by means of face-to-face interviews. Interviewers were fully trained by certified staff. Participants were eligible for the current study if they: a) had a visual acuity of 0.29 logMAR or better (indicating normal vision), b) were ≥60 years, and c) gave their written consent to participate. Additional information on the LASA response details and sampling are described elsewhere.[25]

Measures

Visual acuity

In the visually impaired sample, decimal visual acuity values (Snellen) were retrieved from patient files at low vision rehabilitation organisations and supplemented with answers that visually impaired older adults themselves gave. In the normally sighted sample, visual acuity was determined with the Colenbrander 1-meter chart,[26] measuring visual analogue scale (VAS) scores. Visual acuity scores for both samples were converted into logMAR values ($-\log_{10}$ visual acuity) to be able to compare the samples. A logMAR visual acuity of 0.00 to 0.29 indicated normal vision, 0.30 to 0.51 indicated mild vision loss, and 0.52 to 2.00 indicated low vision or blindness

Somatic comorbidity

In both samples, patients were asked about their somatic comorbidity based on seven large condition groups: asthma or chronic obstructive pulmonary disease, cardiac disease, peripheral arterial disease, diabetes mellitus, cerebrovascular accident or stroke, osteoarthritis and rheumatoid arthritis, and cancer.

Subthreshold depression and anxiety

The Centre for Epidemiologic Studies Depression scale (CES-D) was used in both samples to assess the 1-week prevalence of subthreshold depression. The CES-D is considered a valid and reliable instrument to use in Dutch older adult populations. It consists of 20 items covering depressive and anxiety symptomatology experienced in the past week with four response categories; scores range from 0 to 60 with a score of ≥16 indicating subthreshold depression.[27,28] The anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A) was used in both samples to assess the 4-week prevalence of subthreshold anxiety. This is a valid and frequently used instrument in Dutch older adult populations and consists of 7 items with four response categories; scores range from 0 to 21 with a score of ≥8 indicating subthreshold anxiety.[29,30]

Depressive and anxiety disorders

The Dutch Mini International Neuropsychiatric Interview (MINI Plus 5.0.0) developed in clinician-rated format was used in the visually impaired sample to assess the 2-week prevalence of major depressive disorder, the 2-year prevalence of dysthymic disorder, the 1-month prevalence of panic disorder (with and without agoraphobia), agoraphobia (without history of panic disorder), and social phobia, and the 6-month prevalence of generalized anxiety disorder. The MINI has proven to be an appropriate tool to diagnose DSM-IV mood and anxiety disorders by telephone in Dutch clinical practice.[31]

In the normally sighted sample only participants with a CES-D score of ≥16 were approached to participate in a diagnostic interview in which the official Dutch translation of the Diagnostic Interview Schedule (DIS) and the Composite International Diagnostic Interview (CIDI) were used. With the DIS the 2-week prevalence of major depressive disorder according to the DSM-IV was assessed,[32] and with the CIDI the 1-month prevalence of panic disorder (with and without agoraphobia), agoraphobia (without history of panic disorder), and social phobia, and the 6-month prevalence of generalized anxiety disorder was determined. The CIDI is a fully standardized, comprehensive interview, which has proven to be an appropriate tool to assess mental disorders according to the definitions of the DSM-IV.[33] Dysthymic disorder was not diagnosed in the normally sighted sample.

The MINI and CIDI are comparable instruments as the κ coefficients, sensitivity, and specificity were shown to be acceptable for all diagnoses.[34,35] The DIS has not previously been compared to the MINI; however, it has acceptable agreement with the CIDI on measuring major depressive disorder (κ 0.66).[36]

Sensitivity of the CES-D

Because the cut-off score of ≥16 on the CES-D was used in the normally sighted sample to determine if a diagnostic interview would be conducted (i.e. based on the DIS and the CIDI), it was necessary to determine the sensitivity of this scale. This was determined based on the visually impaired sample in which diagnostic interviews were conducted in all participants based on the MINI. We found that all participants who were diagnosed with a major depressive disorder in the visually impaired sample also had a score of ≥16 on the CES-D (sensitivity 100%). In addition, for participants who were diagnosed with an anxiety disorder (i.e. panic disorder (with or without agoraphobia), agoraphobia (without history of panic disorder), social phobia and/or generalized anxiety disorder), the sensitivity of the CES-D with a cut-off score of ≥16 was 80%.

Statistical analysis

Demographic and clinical characteristics of the visually impaired and normally sighted sample were compared based on χ^2 tests, independent sample *t*-test, and non-parametric tests in case of not normally distributed data.

Women and participants in higher age groups were underrepresented in the normally sighted sample compared to the visually impaired sample. To be able to determine comparable prevalence estimates of depression and anxiety, this bias was corrected by sample weights based on the degree of underrepresentation. A weight was attached for each male and female, and for each age group in the normally sighted sample, that adjusted any estimate to achieve the same expected value.

To allow correction for possible confounders (gender, age, education, and comorbidity), logistic regression analyses were performed on the unweighted dataset to compare the visually impaired and normally sighted sample on threshold and subthreshold depression and anxiety. In addition, the influence of visual acuity on the outcomes in the visually impaired sample was determined with logistic regression analysis. SPSS for Windows version 20 (SPSS IBM, New York, USA) was used to perform the analyses.

Results

Patient characteristics

In the visually impaired sample, no significant difference was found between non-responders and responders with respect to gender. However, non-responders were significantly older than responders (mean difference, 4.6 years; *P*<0.001). Of the non-responders (*n*=2,086), 75.5% did not state a reason for not participating (in most cases because they were not reached by telephone to explain their non-response). Of those who did provide a reason (*n*=511), the most common reasons for non-participation were unable due to physical or cognitive reasons (34.6%) and too great a burden to participate (22.9%).

There were significantly more females in the visually impaired sample, and mean logMAR visual acuity and mean age were significantly higher compared to the normally sighted sample (Table 1). In the visually impaired sample, more than 50% had macular degeneration and the median time of onset of visual loss was more than 8 years ago. Years of education and the number of somatic comorbidities were similar in the two samples.

TABLE 1. Patient characteristics in the visually impaired (***n***=615) and normally sighted sample (***n***=1,232)

Patient characteristics	Visually impaired	Normally sighted	Estimate	*P*
Female gender (*n* (%))	377 (61%)	658 (53%)	10.4	0.001
Age in years (mean (*SD*))	77.6 (9.3)	71.96 (7.9)	-13.6	<0.001
Education in years (mean (*SD*))	10.0 (3.6)	10.19 (3.4)	1.3	0.195
Somatic comorbidity (mean (*SD*))	2.0 (1.4)	2.00 (1.3)	-0.1	0.906
Visual acuity logMAR (mean (*SD*))	0.04 (0.07)	0.89 (0.6)	-47.2	<0.001
Categories (*n* (%)):				
0.00-0.29 normal visual acuity	0 (0%)	1232 (100%)		
0.30-0.51 mild vision loss	137 (22%)	0(0%)		
0.52-2.00 low vision/blindness	478 (78%)	0(0%)		
Eye disease (*n* (%)):				
Macular degeneration	340 (55%)			
Glaucoma	96 (16%)			
Cataract	89 (15%)			
Diabetic retinopathy	27 (4%)			
Other/ unknown	63 (10%)			
Time of onset in years (median [25-75% percentiles])	8.0 [3.0-20.0]			

Means and standard deviations (*SD*) are reported for continuous variables, median and 25-75% percentiles are provided when the variable has an asymmetric distribution.

Prevalence of Depression and Anxiety

Table 2 shows a significant difference in subthreshold depression and anxiety as well as major depressive and anxiety disorders according to the DSM-IV between the two samples. Of the visually impaired sample, more than 32% had subthreshold symptoms of depression based on the CES-D, compared to 12% in the normally sighted sample (odds ratio (OR) 4.5; 95% confidence interval (CI) 3.4 to 5.9). Approximately 16% had subthreshold symptoms of anxiety based on the HADS-A, as opposed to 11% in normally sighted peers (OR 2.8; 95% CI 2.0 to 4.0). In addition, 5.4% of the visually impaired sample were diagnosed with a major depressive disorder and 7.5% with an anxiety disorder according to the DSM-IV, compared to 1.2% and 3.2% in the normally sighted sample (OR 5.6; 95% CI 2.8 to 11.1 and OR 2.9; 95% CI 1.8 to 4.6, respectively). Particularly, agoraphobia (without a history of panic disorder) and social phobia were significantly more prevalent in the visually impaired sample (OR 3.6; 95% CI 1.9 to 7.0 and OR 3.3; 95% CI 1.4 to 7.6, respectively).

More than 10% of the visually impaired sample was diagnosed with a major depressive and/or anxiety disorder, compared to 4.3% of their normally sighted peers (OR 3.1; 95% CI 2.1 to 4.8). Of the visually impaired sample 2.3% had a major depressive and anxiety disorder; 42.4% of the participants with a depressive disorder also had an anxiety disorder and 30.4% of the participants with an anxiety disorder also had a major depressive disorder. Of the visually impaired sample, more than 11% had a major depressive disorder once in their lifetime, compared to 4% of their normally sighted peers (OR 3.9; 95% CI 2.6 to 5.9). Visual acuity did not prove to be a predictor of either threshold or subthreshold depression, or anxiety in the visually impaired sample (*P*>0.05).

TABLE 2. Prevalence of depression and anxiety in the visually impaired (***n***=615) and normally sighted sample (***n***=1,232), and (un)adjusted odds ratio's based on logistic regression analyses

Symptoms	Visually impaired (95%CI)	Normally sighted* (95%CI)	OR uncorrected (95% CI)	OR corrected† (95% CI)
CES-D score ≥16	32.2% (28.5 – 36.0)	12.0% (10.3 – 13.7)	**4.4 (3.4 – 5.7)**	**4.5 (3.4 – 5.9)**
HADS-A score ≥8	15.6% (12.7 – 18.5)	10.7% (9.1 – 12.3)	**2.3 (1.7 – 3.1)**	**2.8 (2.0 – 4.0)**
Major depressive disorder	5.4% (3.6 – 7.1)	1.2% (0.7 – 1.8)	**5.3 (2.8 – 10.2)**	**5.6 (2.8 – 11.1)**
Dysthymic disorder	1.0% (0.2 – 1.8)	not measured		
Anxiety disorder				
Panic disorder without Agoraphobia	0.2% (-0.2 – 0.5)	0.5% (0.2 – 0.9)	0.3 (0.03 – 2.0)	0.4 (0.04 – 2.9)
Panic disorder with Agoraphobia	0.3% (-0.1 – 0.8)	0.3% (0.0 – 0.5)	1.0 (0.2 – 5.5)	1.7 (0.3 – 10.3)
Agoraphobia without history of Panic disorder	4.2% (2.6 – 5.8)	1.3% (0.7 – 1.9)	**3.2 (1.7 – 5.9)**	**3.6 (1.9 – 7.0)**
Social phobia	2.4% (1.2 – 3.7)	0.9% (0.4 – 1.4)	**2.8 (1.3 – 6.1)**	**3.3 (1.4 – 7.6)**
Generalized anxiety disorder	1.8% (0.7 – 2.8)	1.0% (0.4 – 1.5)	2.0 (0.9 – 4.7)	2.2 (0.9 – 5.4)
Total	7.5% (5.4 – 9.6)	3.2% (2.2 – 4.3)	**2.3 (1.5 – 3.5)**	**2.9 (1.8 – 4.6)**
Depressive and anxiety disorder	2.3% (1.1 – 3.5)	0.3% (-0.04 – 0.6)	**9.5 (2.7 – 33.3)**	**12.9 (3.6 – 46.4)**
Depressive and/or anxiety disorder	10.6% (8.1 – 13.0)	4.3% (3.1 – 5.5)	**2.7 (1.8 – 3.9)**	**3.1 (2.1 – 4.8)**
History of major depressive disorder	11.4% (8.9 – 13.9)	4.0% (2.9 – 5.2)	**3.2 (2.2-4.6)**	**3.9 (2.6 – 5.9)**

Bold is significant at *P*≤0.05; CI confidence interval; CES-D Centre for Epidemiologic Studies Depression; HADS-A Hospital Anxiety and Depression Scale – Anxiety.

* Weighted on age and gender based on the visually impaired sample

† Corrected for gender, age, education and comorbidity

Discussion

To our knowledge this is the first study to investigate the prevalence of both threshold and subthreshold depression and anxiety in a large population of visually impaired older adults, and to compare these estimates with those of normally sighted peers. The study clearly indicates that depression and anxiety are major problems in visually impaired older adults.

The 1-week prevalence of subthreshold depression of 32% was consistent with other studies,[5-8,12–16] and significantly higher than the prevalence found in the normally sighted sample. The 4-week prevalence of subthreshold anxiety of 16% was also significantly higher than that found in normally sighted peers. Our findings are consistent with the few other studies that, to date, have examined the association between anxiety and visual impairment. For example, Soubrane et al.[37] and Kempen et al.[12] also found significantly higher symptoms of anxiety in a visually impaired older population compared with normally sighted peers (based on the HADS-A); however, they did not report prevalence rates based on the cut-off score. Augustin et al.[6] found that 30% of older adults with age-related macular degeneration met the criteria for subthreshold anxiety (HADS-A score ≥8). In contrast, Evans et al.[5] found little evidence for an association between visual impairment and anxiety based on the General Health Questionnaire.

We found a 2-week prevalence of major depressive disorder of 5.4%, which was significantly higher than that in the normally sighted sample. Only a few studies have determined the prevalence of major depressive disorder in a visually impaired population. Brody et al.[21] and Horowitz et al.[13] found a prevalence of approximately 7% of major depressive disorder in visually impaired older adults based on the DSM-IV criteria. Our findings are similar; the small difference may be explained by the fact that our sample was slightly younger and that Brody et al.[21] only included patients with advanced macular degeneration, whereas we included older adults with various eye diseases and differing stages of the disease.

In addition, we found that the prevalence of anxiety disorders of 7.5% was significantly higher in the visually impaired sample compared to the normally sighted sample. Particularly, agoraphobia (without a history of panic disorder) and social phobia were significantly more prevalent in this group compared to their normally sighted peers. This indicates that visually impaired older adults are especially vulnerable to develop anxiety disorders related to specific places or situations (such as being on a bus or in a crowd) and social situations (such as speaking in public or eating in the company of others). Specific interventions may help these individuals to deal with these problems.

A limitation of our study is the lack of a non-response analysis in the normally sighted sample. In addition, missing values on decimal visual acuity were supplemented with self-reports, which may have been less reliable than visual acuity retrieved from patient files at the low vision rehabilitation organisations. Furthermore, the sensitivity of the CES-D was 80% for anxiety disorders. Although this is an acceptable percentage, some anxiety disorders may have been missed in the normally sighted sample, thereby introducing an underestimation of the results. In addition, differences in prevalence rates may be due to differences in the assessment methods (i.e. a telephone interviews versus a face-to-face interview)[40] and diagnostic instruments used. Although the MINI, CIDI and DIS all use the same DSM-IV criteria to diagnose disorders, it is unclear whether some of the differences between cases and controls might be explained by differences between these instruments. Furthermore, the estimates of prevalence reported in this study imply that it is applicable beyond the subset of individuals that were investigated. However, people who volunteered and were selected for this study might differ from other eligible individuals in the total population, thereby reducing the generalisability of the results. In the visually impaired sample, responders were significantly younger than non-responders and may have been relatively healthier as they were able to take part in the interviews and were not cognitively impaired. This may have led to an underestimation of depression and anxiety rates in this sample.

Moreover, it should be noted that, internationally, concerns remain about the validity of the DSM manual as it uses a medical model and a categorical classification, rather than considering a dimensional approach regarding the understanding of psychological experiences.[38,39] However, the DSM is used internationally and relied upon by researchers, clinicians, health insurance companies, pharmaceutical companies and policymakers and makes an important contribution to the uniformity of diagnostics and consistency within clinical practice.[39] Therefore, in the present study, we believe that the use of the DSM manual, and the inclusion of dimensional models of depression and anxiety (measured with the CES-D and HADS-A), is appropriate.

Our results strongly indicate that depression and anxiety are major problems for visually impaired older adults. Moreover, as the prevalence of visual impairment in developed countries is increasing,[1] the pressure on eye care and mental health care is expected to increase. Healthcare providers should anticipate on this growing demand by screening for symptoms of depression and anxiety to prevent these symptoms from deteriorating, and offering specific evidence-based interventions to reduce the symptoms in these individuals. In addition, because evidence on effective treatment of depression and anxiety in visually impaired older adults is scarce,[41–43] more research on psychotherapeutic and psychopharmacologic interventions is warranted.

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