Original Article

Hospital anxiety and depression scale assessment of 100 patients before and after using low vision care: A prospective study in a tertiary eye-care setting

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Purpose: Assessment of anxiety and depression in patients attending low vision care (LVC) using Hospital Anxiety and Depression Scale (HADS). **Methods:** In this prospective, observational study, 100 patients with best-corrected visual acuity (BCVA) worse than 6/18 in the better eye or limitation of field of vision to <10° from center of fixation were assessed on the depression and anxiety subscales of HADS questionnaire before and after LVC. HADS is a 14-item scale with seven items each for anxiety and depression subscales. Scoring for each item ranges from zero to three. A subscale score >8 denotes anxiety or depression. **Results:** Mean age at presentation was 38.2 years. Mean duration of symptoms was 9.6 years. Underlying etiology of visual impairment included retinal dystrophy/degeneration (n = 35), disorders of the optic nerve (n = 17), glaucoma (n = 10), diabetic retinopathy (n = 9), age-related macular degeneration (n = 5), uncorrected refractive errors (n = 5), and miscellaneous diseases (n = 19). Mean presenting BCVA in the better eye was 0.83 (±0.64) which improved significantly to 0.78 (±0.63) after LVC (P < 0.001). The HADS-Depression subscale score was comparable for severity of visual impairment for both distance (P = 0.57) and near vision (P = 0.61). Similarly, HADS-Anxiety scores were also comparable for severity of distance (P = 0.34) and near-visual impairment (NVI; P = 0.50). At baseline, mean HADS-Depression and HADS-Anxiety scores were 8.4 (±3.7) and 9.6 (±4.3) points, which improved significantly to 6.0 (±3.4) and 6.7 (±3.7), respectively, after low-vision correction (P < 0.001). **Conclusion:** Low vision correction can significantly improve anxiety and depression indicators in visually impaired patients.

Key words: Anxiety, depression, eye, hospital anxiety and depression scale, low vision care, low vision devices, visual impairment

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According to the World Health Organization, 285 million people are visually impaired worldwide, of which 62 million reside in India. Results from a number of population- and hospital-based studies indicate that visual impairment is associated with higher rates of depression.[1,2] Approximately one-third (range 22–42%) of visually impaired older adults experience mild but clinically significant depressive or anxiety symptoms, also known as subthreshold depression or anxiety.[3] Depression and anxiety are important indicators of increase in disability and represent a social and economic health burden on society.

The Hospital Anxiety and Depression Scale (HADS) is a self-assessment questionnaire that has been found to be a reliable instrument for detecting states of anxiety and depression in the setting of hospital outpatient clinic [Fig. 1]. The HADS questionnaire has seven items each for depression and anxiety subscales. Scoring for each item ranges from zero to three, with three denoting highest anxiety or depression level. A total subscale score of >8 points out of a possible 21 denotes considerable symptoms of anxiety or depression. This prospective observational study reports the anxiety and depression levels of 100 consecutive patients requiring low vision care (LVC) in a tertiary eye-care hospital in India and the effect of low-vision enhancement on their psychological status. To the best of our knowledge, this is the first of its kind study from India.

Methods

In this prospective, observational study, we enlisted patients visiting the LVC clinic for the first time to answer the HADS questionnaire with an aim to facilitate detection and grading of anxiety and depression levels. One hundred consecutive patients with best-corrected visual acuity (BCVA) worse than 6/18 in the better eye, or limitation of the field of vision to <10° from the center of fixation, were included. In our tertiary care hospital, low vision services are routinely offered to patients meeting the criteria mentioned above. Our experience shows that approximately two-third of the patients referred to the LVC clinic avail of these services. Individuals under 18 years of age and those with subnormal intelligence were excluded. Patients were enrolled from October 2016 to January 2017. We aimed at evaluating the role of LVC on the psychological status of the patient. HADS is a fourteen-item scale with seven

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items each for anxiety and depression subscales. Scoring for each item ranges from zero to three. A subscale score >8 denotes anxiety or depression. HADS scoring was done before and after low-vision consultation to see whether there was a change in the scoring. The original HADS questionnaire in English [Fig. 1] was translated into Hindi and Tamil languages

Hospital Anxiety and Depression Scale (HADS)

Tick the box beside the reply that is closest to how you have been feeling in the past week.
Don't take too long over you replies: your immediate is best.

D	A		D	A	
		I feel tense or 'wound up':			**I feel as if I am slowed down:**
	3	Most of the time	3		Nearly all the time
	2	A lot of the time	2		Very often
	1	From time to time, occasionally	1		Sometimes
	0	Not at all	0		Not at all
		I still enjoy the things I used to enjoy:			**I get a sort of frightened feeling like 'butterflies' in the stomach:**
0		Definitely as much		0	Not at all
1		Not quite so much		1	Occasionally
2		Only a little		2	Quite Often
3		Hardly at all		3	Very Often
		I get a sort of frightened feeling as if something awful is about to happen:			**I have lost interest in my appearance:**
	3	Very definitely and quite badly	3		Definitely
	2	Yes, but not too badly	2		I don't take as much care as I should
	1	A little, but it doesn't worry me	1		I may not take quite as much care
	0	Not at all	0		I take just as much care as ever
		I can laugh and see the funny side of things:			**I feel restless as I have to be on the move:**
0		As much as I always could		3	Very much indeed
1		Not quite so much now		2	Quite a lot
2		Definitely not so much now		1	Not very much
3		Not at all		0	Not at all
		Worrying thoughts go through my mind:			**I look forward with enjoyment to things:**
	3	A great deal of the time	0		As much as I ever did
	2	A lot of the time	1		Rather less than I used to
	1	From time to time, but not too often	2		Definitely less than I used to
	0	Only occasionally	3		Hardly at all
		I feel cheerful:			**I get sudden feelings of panic:**
3		Not at all		3	Very often indeed
2		Not often		2	Quite often
1		Sometimes		1	Not very often
0		Most of the time		0	Not at all
		I can sit at ease and feel relaxed:			**I can enjoy a good book or radio or TV program:**
	0	Definitely	0		Often
	1	Usually	1		Sometimes
	2	Not Often	2		Not often
	3	Not at all	3		Very seldom

Please check you have answered all the questions

Scoring:
Total score: Depression (D) _____ Anxiety (A) _____
0-7 = Normal
8-10 = Borderline abnormal (borderline case)
11-21 = Abnormal (case)

Figure 1: The standard Hospital anxiety and depression scale questionnaire in English

by an independent observer, each. To assess the validity of these translated versions, English backtranslation from Hindi and Tamil were done by different individuals, i.e., other than the ones who translated the questionnaire from English to vernacular versions. Prior Institutional review board approval was sought. Each individual signed a written informed consent form agreeing to participate in the study. This study adhered to the tenets of Declaration of Helsinki.

The HADS questionnaire was administered by a coinvestigator (SG) to the participants, face to face, in the waiting room of the LVC clinic before and 2–3 days after the low vision consultation. Except for the individual and the interviewer, there was no one else present during the interview. The interviewer confirmed that the individual understood all the questions before answering them. If the individual did not understand a question, the interviewer explained it to them. A single interview lasted for approximately 20–25 min. The participants did not have prior knowledge about the researcher or their interest in the study. None of the individuals refused to participate in the study. The questionnaire was not returned to the participants for comment or correction. The participants did not provide feedback on the findings of the study.

Descriptive statistics was performed for continuous variables, and frequency distribution was used to define the distribution of categorical variables. Independent sample *t*-test was used to find the difference in means between two groups; paired *t*-test was used to find the difference in means within groups. One-way analysis of variance was used to determine whether there is any significant difference in mean among various groups. Pearson correlation test was used to determine the relationship between duration of symptoms and HADS scoring. SPSS V.14.0 (IBM Corporation, 1 New Orchard Road, Armonk, New York 10504-1722, United States) was used to perform the statistical analysis and any test with $P < 0.05$ was considered as statistically significant.

Results

Of 100 patients enrolled, 69 were males and 31 were females. Seven patients had a family history of low vision. Thirty-eight patients had congenital disorders of the eye while the remaining had acquired disorders. The mean presenting BCVA (±standard deviation [SD], range) in the better eye was 0.83 (±0.64, 4-0) logMAR which improved significantly to 0.78 (±0.63, 4-0) logMAR after low-vision correction ($P < 0.001$). Baseline patient data are presented in Table 1. The change in levels of near-vision impairment following low vision aids is provided in Table 2. At baseline, the mean HADS-Anxiety score was 9.6 (±4.3), which significantly improved to 6.7 (±3.7) after low-vision correction ($P < 0.0005$). Likewise, the mean HADS-Depression score (±SD) was 8.4 (±3.7) which significantly improved to 6.0 (±3.4) after low-vision correction ($P < 0.0005$).

The mean HADS-Depression subscale score was calculated for varying severity of distance visual impairment (DVI). For severe DVI (n = 26), it was found to be 7.9 ± 3.9, moderate DVI (n = 50) 8.7 ± 3.3, mild DVI (n = 15) 8.9 (±3.3), and for no DVI (n = 9), 8.8 (±6.1). There was no significant difference in the HADS-Depression score between these groups ($P = 0.75$). Similarly, mean HADS-Anxiety subscale score for severe DVI (n = 26) was 9.0(±4.4), moderate DVI (n = 50) 9.8 (±3.9), mild DVI (n = 15) 10.9 (±5.5), and no DVI (n = 9) 9.0 (±4.9). There was no significant difference in the HADS-Anxiety score in between groups ($P = 0.58$). In the same way, the mean HADS-Depression subscale score was calculated for varying severity of NVI. For severe NVI (n = 20), it was found to be 8.6(±3.5), moderate

Table 1: Baseline characteristics of 100 patients with low vision assessed using hospital anxiety and depression scale

Sociodemographic characteristics	Subgroups	*n*=100
Duration of symptoms (years)	≤10	73
	11-20	12
	>20	15
Occupation	Business	15
	Professional	27
	Worker	21
	Homemaker	20
	Student	11
	Retired	3
	Unemployed	3
Clinical diagnosis	ARMD	5
	Retinal dystrophy/degeneration	35
	DR	9
	Optic nerve disorders	17
	Glaucoma	10
	Uncorrected refractive error	5
	Miscellaneous	19
Low-vision device used for near*	Nonoptical devices†	27
	Higher add	39
	Hand-held magnifier 2x	0
	Stand magnifier 3x	6
	Dome	17
	Fresnel sheet magnifier	0
	Bar magnifier	0
	Pocket magnifier 3x	3
	Half eyes + 5.00 ds/6 bi	17
	Aspherics + 10.00 ds	4
	CCTV	0

*Total>100 as more than 1 device has been prescribed to a few patients, †Nonoptical devices included clip on filters, notex, signature guide and ET 22 pink filter. Patients also motivated to increase task illumination. ARMD: Age-related macular degeneration, DR: Diabetic retinopathy CCTV: Closed-circuit television, ds: Diopter spherical, bi: Base in, ARMD: Age-related macular degeneration

Table 2: Change in levels of near-visual impairment before and after low-vision correction

Near-visual acuity	Grades of NVI	Level of NVI before low-vision correction (*n*)	Level of NVI after low-vision correction (*n*)
N6 or better	No NVI	52	81
N7, N8	Mild NVI	7	5
N10-N18	Moderate NVI	20	6
N20 or worse	Severe NVI	21	8

NVI: Near-visual impairment

NVI (n = 22) 8.9 (±3.0), mild NVI (n = 8) 7.8 (±3.5), and for no NVI (n = 50), 8.3 (±4.1). There was no significant difference in the HADS-Depression score between these groups (P = 0.88). Similarly, mean HADS-Anxiety subscale score for severe NVI (n = 20) was 9.3(±4.0), moderate NVI (n = 22) 10.4(±3.8), mild NVI (n = 8) 9.8 (±3.6), and no NVI (n = 50) 9.3 (±4.8). There was no significant difference in the HADS-Anxiety score in between groups (P = 0.79).

Mean age at presentation was 38.2 years (range: 18–59 years). For the sake of analysis, the patients were arbitrarily divided into 3 age groups. Group A comprised of patients <25 years of age (n = 17). Group B had patients between 25 and 50 years of age (n = 61), and Group C comprised of patients older than 50 years of age (n = 22). In group A, the mean HADS-Depression score improved with low-vision correction by 1.6 ± 2.4 (P = 0.01) points whereas the mean HADS-Anxiety score improved by 1.3 ± 2.3 (P = 0.03). In Group B, the mean HADS-Depression score improved by 2.8 ± 2.8 (P < 0.0005), whereas the mean HADS-Anxiety score improved by 3.4 ± 3.0 (P < 0.0005). In group C, the mean HADS-Depression score improved by 2.0 ± 2.5 (P < 0.0005) while the mean HADS-Anxiety score improved by 2.8 ± 2.7 (P < 0.0005). In all groups, improvement after low-vision correction was statistically significant.

A gender-wise analysis revealed that males (n = 69) showed a significant mean improvement of 2.4 ± 2.9 (P < 0.0005) and 2.9 ± 3.1 (P < 0.0005) in the HADS-Depression and HADS-Anxiety scores, respectively, following low-vision correction. The 31 female individuals in the study also showed a mean improvement of 2.4 ± 2.2 (P < 0.0005) and 2.8 ± 2.7 (P < 0.0005) in the HADS-Depression and HADS-Anxiety scores, respectively. The mean duration of symptoms was 9.6 ± 12.2 years (range = 2 months to 56 years). The duration of symptoms showed a very weak negative correlation with baseline HADS-Depression (r =–0.025) and HADS-Anxiety (r =–0.075) scoring.

When analyzed according to occupation, the anxiety and depression scores decreased significantly ($P \leq 0.05$) across all categories except the HADS-Depression subscale among students (P = 0.06) and for both HADS-Depression and Anxiety subscales among retired individuals (P = 0.09 [HADS-D], P = 0.30 [HADS-A]) and unemployed individuals (P = 0.09 [HADS-D], P = 0.30 [HADS-A]). Details are presented in Table 3. Patients were also classified according to the underlying etiology [Table 4] as retinal dystrophy/degeneration (n = 35), disorders of the optic nerve (optic atrophy, coloboma, hypoplasia; n = 17), glaucoma (n = 10), diabetic retinopathy (DR; n = 9), age-related macular degeneration (ARMD; n = 5), and uncorrected refractive errors (n = 5). Nineteen patients were classified as having miscellaneous ocular disorders such as retinochoroidal coloboma (n = 5), active or healed choroiditis (n = 4), status post vitreoretinal surgery (n = 4), retinal pigment epithelium atrophy (n = 2), familial exudative vitreoretinopathy (n = 1), chronic central serous retinopathy (n = 1), posterior staphyloma (n = 1), and parafoveal telangiectasia (n = 1). At baseline, the mean HADS-Depression scores (±SD) for retinal dystrophy/degeneration, optic nerve disorders, glaucoma, DR, ARMD, uncorrected refractive errors, and miscellaneous disorders were 9.0 (±3.5), 8.5 (±3.7), 10 (±3.6), 6.9 (±4.3), 8.6 (±2.6), 6.2 (±5.6), and 7.8 (±3.2), respectively. Following low-vision correction, the improvement in scoring was statistically significant ($P \leq 0.05$) for all groups except for uncorrected refractive errors (P = 0.17) [Table 4]. The mean HADS-Anxiety score (±SD) at baseline was 10.7 (±4.6), 9 (±2.9), 7.7 (±4.7), 9.2 (±5.4), 11.2 (±2.8), 5.4 (±3.4), 10.1 (±4.1) which improved by a significantly after low-vision correction in all but two groups (glaucoma [P = 0.19], uncorrected refractive errors [P = 1.00]). Details are presented in Table 4. Patients with acquired ocular disorders (n = 62) experienced

Table 3: Comparison of anxiety and depression scores by occupation; before and after low vision correction

Occupation	Paired samples test			
	Paired differences			95% CI
		Mean change in scores post LVC±SD	P	
Business (n=15)	HADS-depression	2.9±3.0	0.00	1.2-4.5
	HADS-anxiety	3.1±3.7	0.01	1.0-5.1
Professional (n=27)	HADS-depression	2.4±3.2	0.00	1.2-3.6
	HADS-anxiety	3.2±3.6	0.00	2.0-4.6
Worker (n=21)	HADS-depression	2.8±2.7	0.00	1.5-4.4
	HADS-anxiety	3.2±2.7	0.00	1.7-4.4
Homemaker (n=20)	HADS-depression	2.4±2.2	0.00	1.4-3.4
	HADS-anxiety	2.9±2.4	0.00	1.7-4.0
Student (n=11)	HADS-depression	1.5±2.3	0.06	–0.1-3.0
	HADS-anxiety	1.5±1.5	0.01	0.4-2.5
Retired (n=3)	HADS-depression	2.7±1.5	0.09	–0.5-3.2
	HADS-anxiety	1.7±2.1	0.30	0.4-4.9
Unemployed (n=3)	HADS-depression	2.7±1.5	0.09	–0.5-3.2
	HADS-anxiety	3.7±2.1	0.30	0.4-4.9

CI: Confidence interval, LVC: Low vision care, HADS: Hospital anxiety and depression scale, SD: Standard deviation

Table 4: Comparison of anxiety and depression scores by etiology, before and after low vision correction

Diagnosis	Paired samples test			
	Paired differences			CI
		Mean change in scores post LVC±SD	P	
ARMD (n=5)	HADS-depression	4.6±3.4	0.04	0.3-8.9
	HADS-anxiety	5.2±3.8	0.04	0.4-10.0
Retinal dystrophy/ degeneration (n=35)	HADS-depression	2.5±3.1	0.00	1.4-3.5
	HADS-anxiety	3.7±3.3	0.00	2.5-4.8
DR (n=9)	HADS-depression	1.3±1.6	0.04	0.1-2.5
	HADS-anxiety	2.1±1.7	0.01	0.8-3.4
Optic nerve diseases (n=17)	HADS-depression	2.4±3.0	0.00	0.9-3.9
	HADS-anxiety	3.4±2.6	0.00	2.1-4.7
Glaucoma (n=10)	HADS-depression	3.0±2.2	0.00	1.4-4.6
	HADS-anxiety	0.9±2.0	0.19	–0.5-2.3
Uncorrected refractive error (n=5)	HADS-depression	2.4±3.2	0.17	–1.6-6.4
	HADS-anxiety	0.0±3.3	1.00	–4.1-4.1
Miscellaneous (n=19)	HADS-depression	1.8±2.0	0.00	0.9–-2.8
	HADS-anxiety	2.5±1.9	0.00	1.6-3.5

SD: Standard deviation, CI: Confidence interval, ARMD: Age related macular degeneration, DR: Diabetic retinopathy, LVC: Low vision care

Table 5: Comparison of studies analyzing anxiety and depression among individuals with low vision

Author	Year	*n*	Etiology of low vision	Study design	Mean HADS-D±SD	Mean HADS-A±SD	Mean HADS total (±SD)
Kempen *et al*.	2011	148	Multifactorial	RCT	5.80±4.04	5.55±4.34	11.34±7.70
Augustin *et al*.	2007	120	ARMD	Cross-sectional, prospective, observational, multicenter	6.24	6.10	NA
Šiaudvytytė *et al*.	2012	70	ARMD	Cross-sectional, prospective, observational	6.44±3.2	6.84±3.0	NA
Kong XM *et al*.	2014	500	Glaucoma	Cross-sectional, prospective, hospital-based	7.29±4.18	6.12±3.64	13.41±6.59
Current study	2017	100	Multi-factorial		8.44±3.7	9.60±4.3	NA

*HADS: Hospital anxiety and depression score, HADS-D: HADS-depression, HADS-A: HADS-anxiety, SD: Standard deviation, RCT: Randomized control trial, ARMD: Age-related macular degeneration, NA: Not available

a significant decrease in the mean (±SD, *P*) HADS-Depression and HADS-Anxiety scores of 2.4 (±2.6, $P < 0.0005$) and 3.2 (±2.6, $P < 0.0005$) points, respectively. Furthermore, patients with congenital ocular disorders ($n = 38$) had their HADS-Depression and HADS-Anxiety score improved significantly by a mean of 2.5 (±2.9, $P < 0.0005$) and 2.4 (±3.4, $P < 0.0005$), respectively.

Discussion

While little is known about the biological links between ocular pathology and anxiety, there is some evidence that reduced absorption of light due to retinal damage in degenerative diseases may lead to disturbed synthesis of melatonin, which in turn increases the risk of sleep disturbance, depression, and anxiety.[4] In addition, chronic conditions such as diabetes and heart disease are known to be risk factors for the development of AMD, cataract, and glaucoma and are also independently associated with depression.[5] Anxiety and depression are also the most important predictors of developing a full-blown depressive or anxiety disorder according to the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-V).

The HADS questionnaire was originally developed by Zigmond and Snaith (1983).[6] They created this outcome measure specifically to avoid reliance on aspects of these conditions that are also common somatic symptoms of illness, for example, fatigue and insomnia or hypersomnia. A summary of published literature is provided in Table 5. Bjelland *et al*., through a systematic review of a large number of studies identified a cutoff score of 8/21 for anxiety or depression. For anxiety (HADS-A), this gave a specificity of 0.78 and a sensitivity of 0.9. For depression (HADS-D), this gave a specificity of 0.79 and a sensitivity of 0.83.[7] In a prospective study, Augustin *et al*. studied 120 German individuals with wet-ARMD as a subgroup analysis and found the mean HADS-Depression and HADS-Anxiety scores to be 6.24 and 6.10, respectively. They concluded that depression in these patients was associated with the severity of impairment in distance VA.[8] However, in our study, neither depression ($P = 0.57$) nor anxiety ($P = 0.34$) was associated with severity of impairment in distance VA.

Šiaudvytytė *et al*. evaluated the quality of life of 70 ARMD patients compared to 70 controls using the Visual Function Questionnaire (VFQ) and HADS. They found a significant difference in the quality of life between the groups ($P < 0.0001$) and concluded that vision impairment caused by ARMD affects patients' mental health, dependency, and role difficulties.[9] However, in our study, we did not use VFQ because the lifestyle pattern in India is quite different, considering it to be a developing country. Kong *et al*. studied 500 patients with glaucoma in a Chinese population and found the mean HADS-Depression, HADS-Anxiety, and HADS-Total scores to be 7.29 (±4.18), 6.12 (±3.64), and 13.41 (±6.59) points, respectively. The prevalence of patients with glaucoma experiencing anxiety and depression was found to be 11.2% and 26.0%, respectively.[10] In our study, the highest prevalence of depression was found in patients with glaucoma (80%; $n = 10$) and ARMD patients (80%; $n = 5$) and anxiety in ARMD patients (100%; $n = 5$). Kempen *et al*., as part of a randomized control trial, assessed psychological distress using HADS in 148 patients (age ≥57 years) seeking vision rehabilitation services. They found mean HADS-Depression score of 5.80 (±4.04) and mean HADS-Anxiety score of 5.55 (±4.34) with a total of 11.34 (±7.70), which was comparable to the general older population and to older patients with chronic systemic conditions. They concluded that professionals working at vision rehabilitation services may improve their quality of care as they take such information into account in their intervention work.[11]

It should be noted that the demographic profile of patients with visual impairment in the study group obviously differs from that of the community since the study was conducted in a tertiary care eye hospital. Similarly, more than half of the individuals in our study had visual impairment due to retinal dystrophy/degeneration or optic nerve disorders. There are relatively fewer patients with uncorrected refractive error, diabetic retinopathy, and AMD in the present study although the latter are the leading causes of blindness and visual impairment in the general population. This is likely due to the study group being a self-selected group of individuals who were provided LVC services.

Indeed, the preferred practice guidelines for ARMD from the American Academy of Ophthalmology advice that the ophthalmologist may inquire about symptoms of clinical depression and when appropriate suggest that the patient seek professional advice, as depression may exacerbate the effects of AMD.[12]

Conclusion

LVC appears to significantly improve levels of depression and anxiety scores in visually impaired patients. Hence, it appears

only logical that LVC services be integrated into routine care pathways of ophthalmic care.

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Conflicts of interest

There are no conflicts of interest.

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