

Prevalence, pattern, and compliance with spectacles use among the elderly in homes for the aged in South India: The Hyderabad Ocular Morbidity in Elderly Study (HOMES)

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Purpose: This study was conducted to report on the pattern of spectacles use and compliance among the elderly (aged ≥ 60 years) in homes for the aged in Hyderabad region in Telangana State, India. **Methods:** Participants were recruited from 41 homes for the aged centres for comprehensive eye health assessments. A questionnaire was used to collect information on current and past use of spectacles, type of spectacles, spectacles provider and amount paid for the spectacles. For those that reported using spectacles in the past, information was collected on the reasons for their discontinuation. Compliance with spectacles use was assessed after eight months of provision of the spectacles. **Results:** A total of 1182/1513 participants were examined from 41 homes for the aged in Hyderabad, India. The mean age of the participants examined was 75 years (standard deviation (SD): 8.8 years; range: 60–108 years); 764 (64.6%) of them were women and 240 participants (20.3%) had no formal education. The prevalence of spectacles use was 69.9% (95% confidence interval [CI]: 67.1–72.4; $n = 825$). Bifocals were the most commonly used type of spectacles (86.7%) followed by single vision glasses for distance vision (7.4%). Private eye clinics were the largest service provider (85.5%) followed by local optical outlets (6.9%) and other service providers (7.7%). The prevalence of spectacles compliance was 81.5% (211/259). **Conclusion:** Use of spectacles and compliance are high among the elderly living in residential care homes in the Hyderabad region. Spectacles use can be further improved by periodic eye assessments along the lines similar to school eye programs, which can immensely benefit this vulnerable, aged population.

Key words: Elderly eye health, homes for the aged, India, spectacles compliance, spectacles use, Telangana

Uncorrected refractive errors and near vision impairment due to presbyopia are common challenges that can be addressed with a pair of spectacles.^[1] Reaching out to people for the provision of refraction and dispensing a pair of spectacles remain the mainstay in addressing this challenge. The prevalence and pattern of spectacles use can be considered as a surrogate measure of the availability and uptake of services in a given region.^[2] Several studies have reported the prevalence and pattern of spectacles use in the populations in rural and urban areas in India.^[3–6] However, only a limited number of studies reported the prevalence of spectacles use in the elderly population, and very few reported on the elderly in the residential care settings.^[7] Studies on compliance with spectacles use are often restricted to children and not reported in elderly populations.^[7] To our knowledge, no study has reported on spectacles compliance in the elderly in residential care settings in India.

The proportion of the elderly population is on the rise in India and an increasing number of them are moving from their residences to residential care centers (homes for the aged) due to societal changes in India. Understanding the prevalence, pattern of spectacles use and its compliance in this vulnerable population can provide vital insights to plan strategies to correct refractive errors and near vision impairment. The longitudinal Hyderabad Ocular Morbidity in Elderly Study (HOMES) was conducted in homes for the aged in the Hyderabad region in Telangana state.^[8] The earlier publications from this study reported the prevalence of vision impairment, near vision impairment, and uncorrected refractive errors.^[9–11] In this paper, the prevalence and pattern of spectacles use are reported. In addition to this, compliance to spectacles use among the elderly in residential care is also presented.

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Methods

Study population

The HOMES project enrolled elderly individuals (≥ 60 years) living in residential homes for the aged in Hyderabad, India. The study protocol has been published previously.^[8] The study design and procedures were approved by the Institutional Review Board of the Hyderabad Eye Research Foundation, L V Prasad Eye Institute, India. The study was conducted in adherence to the Declaration of Helsinki. All participants provided written, informed consent expressing their willingness to participate in the study.

Eye examination

The HOMES examination protocol has been described in detail in our previous publication.^[8] In short, make-shift clinics were setup and eye examinations were conducted in the homes. These included monocular visual acuity (VA) assessment for distance and near, refraction, slit-lamp biomicroscopy, intraocular pressure (IOP) measurement, undilated fundus examination, and fundus photography. Monocular presenting visual acuity was recorded in all individuals using a logarithm of the minimum angle of resolution (logMAR) chart with English letter or tumbling E optotypes at a distance of three meters under ambient lighting conditions.^[8] The VA was tested with the participant's spectacles if used. All subjects underwent objective refraction (manual and autorefractometry) and subjective refraction; and the best-corrected visual acuity (BCVA) was recorded.^[8] A lensometer was used to assess the power of the spectacles that the participant was using at the time of the eye examination.

Questionnaire for spectacles use

Trained interviewers collected detailed personal and demographic information prior to the eye examination. This included age, gender, and level of education. Ocular history including utilization of eye care services and history of cataract surgery were also recorded. A questionnaire was used to collect information on past and current use of spectacles.^[3-5,7] For the participants who reported use of spectacles at the time of the eye examination, information was collected on the type of spectacles, spectacles provider, duration of spectacles use, and amount paid for procuring the spectacles. The participants who were not using spectacles at the time of eye examination were asked if they had used them in the past and the reasons for their discontinuation. This procedure was similar to that used in the previous studies in the region.^[3-5,7]

Similar to previous publications in the region,^[3-5,7] the spectacles providers were classified as (a) private eye clinics, where services are provided either by an ophthalmologist or other trained eye care providers such as ophthalmic assistants either on daily or weekly visits and services include eye examinations and surgical services in a few instances; (b) optical shops, which are typical business establishments where no formally trained eye care personnel are available and the services are restricted to providing spectacles based on the prescriptions from other providers and include dispensing of ready-made near vision spectacles in a few cases; (c) eye camps, which are makeshift screening camps where spectacles are given at no cost to the participants. The eye camps could be conducted in homes or in a nearby location.

All the participants were provided with intervention in the forms of spectacles, cataract surgery, ophthalmic laser, and other treatments as required. All services including spectacles were provided at no cost to the participants. Follow-up assessment was done to assess the impact of interventions on visual functioning after a median period of eight months.^[12-14] The spectacles use questionnaire was used at the follow-up visit to assess the compliance to spectacles use.

Data analysis

The data were entered into a database created in Microsoft Access. Data analysis was conducted using Stata version 14 for Windows, (StataCorp, College Station, TX).^[15] The prevalence of spectacles use was calculated and presented with 95% confidence intervals (CIs). Multivariable logistic regression analysis was used to assess the factors associated with spectacles use. Adjusted odds ratios (ORs) with 95% CIs were calculated. A two-tailed *P* value of < 0.05 was considered statistically significant; however exact *P* values were reported.

Results

Study participants

A total of 1,182 (78.1%) participants were examined out of 1,513 participants enumerated from 41 homes for the aged in Hyderabad, India. The mean age of the participants examined was 75 years (standard deviation (SD): 8.8 years; range: 60–108 years); 764 (64.6%) of them were women and 240 (20.3%) participants had no formal education. Among those examined, 501 (42.4%) were from private homes, 491 (41.5%) were from aided/subsidized homes, and 190 (16.1%) were from free homes. In terms of systemic health, 331 (28%) participants reported having diabetes and 679 (57.5%) reported hypertension, 108 (9.1%) were bedridden, 378 (32%) needed assistance for their mobility, and 696 (58.9%) had independent mobility. In all, 703 (59.5%) participants had cataract surgery in at least one eye. Cataract (46.3%; $n = 165$) and uncorrected refractive errors (27.0%; $n = 96$) were the leading causes of vision impairment in these participants.^[9]

Prevalence of spectacles use

The prevalence of spectacles use was 69.8% (95% CI: 67.1–72.4; $n = 825$). It did not vary with age group ($P = 0.062$) and gender ($P = 0.57$). The participants with higher levels of education had a higher prevalence of spectacles use compared to those with any education ($P < 0.01$). The use of spectacles was higher among those with a self-report of diabetes (76.1% versus 67.3%; $P < 0.01$) and hypertension (75.6% versus 61.0%; $P < 0.01$). Similarly, compared to the participants who were bedridden (41.7%), the prevalence of spectacles use was higher among those who needed assistance for mobility (69.6%) and those with independent mobility (74.3%), ($P < 0.01$). The prevalence of spectacles use was also higher among those who had cataract surgery in at least one eye (77.1% versus 59.1; $P < 0.01$) [Table 1].

Table 2 shows the association of spectacles use with personal, demographic, and systemic health variables. On multiple logistic regression analyses, the age group, gender, and self-report of diabetes were not associated with spectacles use. Compared to those without any education, participants with school education (OR: 2.31; 95% CI: 1.66–3.22) and higher education had higher odds (OR: 5.04; 95% CI: 3.04–8.36) for

Table 1: Characteristics of the participants and spectacles use variables (univariable analysis)

	Total in the Sample	Spectacles Use n (%) [†]	P
Age group (years)			0.062
60-69	329	214 (65.0)	
70-79	453	330 (72.8)	
80 and above	400	281 (70.3)	
Gender			0.57
Male	418	296 (70.8)	
Female	764	529 (69.2)	
Education			<0.01
No schooling	240	123 (51.3)	
School education	717	516 (72.0)	
Higher education	225	186 (82.7)	
Type of home			<0.01
Free	190	109 (57.4)	
Aided/Subsidized	491	354 (72.1)	
Paid	501	362 (72.3)	
Hypertension			<0.01
Yes	679	513 (75.6)	
No	503	312 (62)	
Diabetes			<0.01
Yes	331	252 (76.1)	
No	851	573 (67.3)	
Mobility score			<0.01
Immobile/Bedridden	108	45 (41.7)	
Mobile with support	378	263 (69.6)	
Independently mobile	696	517 (74.3)	
Cataract surgery in either eye			<0.01
Yes	703	542 (77.1)	
No	479	283 (59.1)	
	1182	825 (69.8)	

[†]Row totals and percentages presented

spectacles use. Compared to participants who were bedridden, those who needed assistance for mobility (OR: 3.71; 95% CI: 2.3–6.0) and those who were independently mobile had higher odds (OR: 4.87; 95% CI: 3.04–7.79) for spectacles use. Having had cataract surgery in at least one eye (OR: 2.64; 95% CI: 1.97–3.55) and self-report of hypertension (OR: 1.88; 95% CI: 1.42–2.50) were also associated with spectacles use. Spectacles use was not associated with the type of home for the aged the participants were residing in [Table 2].

Pattern of spectacles use

The pattern of spectacles use is shown in Table 3. Bifocals were the most commonly used type of spectacles (86.7%) followed by single vision glasses for distance (7.4%), progressive addition lenses (PALs) (3.0%), and single vision glasses for near vision (2.9%). Private eye clinics were the largest service providers (85.5%) followed by local optical outlets (6.9%) and other service providers (7.7%). Data on the amount paid for purchasing spectacles was available from 519/825 participants (62.9%). Among these, most participants paid Rs. 501–2000 (45.7%; n = 237) followed by Rs. 500 or less (27.0%; n = 140), and 14.1% (n = 73) of the participants

Table 2: Effect of personal, demographic, and systemic health variables on spectacles use (multiple logistic regression analysis)

	Odds Ratio	P
Age group (years)		
60-69	Reference	
70-79	1.1 (0.77-1.56)	0.61
80 and above	0.9 (0.61-1.34)	0.61
Gender		
Male	Reference	
Female	1.27 (0.93-1.72)	0.13
Education		
No education	Reference	
School education	2.31 (1.66-3.22)	<0.01
Higher education	5.04 (3.04-8.36)	<0.01
Type of home		
Free	Reference	
Aided/Subsidized	1.37 (0.93-2.02)	0.11
Paid	1.42 (0.94-2.14)	0.10
Diabetes		
No	Reference	
Yes	1.13 (0.81-1.57)	0.47
Hypertension		
No	Reference	
Yes	1.88 (1.42-2.5)	<0.01
Mobility score		
Immobile/Bedridden	Reference	
Mobile with support	3.71 (2.3-6)	<0.01
Independently mobile	4.87 (3.04-7.79)	<0.01
Cataract surgery in either eye		
No	Reference	
Yes	2.64 (1.97-3.55)	<0.01

received free spectacles from different sources including screening camps. In total, 710/825 (86.1%) could recall and provide information on the time since the last change of their spectacles. Most participants had the last change of spectacles 1–3 years ago (42.5%; n = 302) followed by less than a year ago (30.7%; n = 253) and over three years ago (21.8%; n = 155) [Table 3].

Past spectacles use

At the baseline assessment, 185 participants (15.6%; 95% CI: 13.6–17.8) reported using spectacles in the past. One third of the participants discontinued using spectacles due to discomfort (33%; n = 61) followed by broken/damaged spectacles (18.9%; n = 35) and those who reported no improvement in vision with spectacles (15.7%; n = 29).

Compliance to spectacles use

In total, 331 participants were provided with spectacles at the baseline examination. These included 316 (95.5%) custom-made prescription spectacles and 15 (4.5%) single vision spectacles for near vision. After a median follow-up period of eight months, 259/331 participants (78.2%) were available for assessment at the follow-up visit. In this, 211 participants were using the spectacles dispensed during the baseline examination visit.

Table 3: Patterns of spectacles use

	<i>n</i> (%)
Type of spectacles	
Single vision - Distance	61 (7.4)
Single vision - Near	24 (2.9)
Bifocals	715 (86.7)
Progressive addition lenses (PALs)	25 (3)
Spectacles providers	
L V Prasad Eye Institute (NGO)	23 (2.8)
Private eye clinics	705 (85.5)
Local optical shop	57 (6.9)
Eye screening camp	26 (3.2)
Others	14 (1.7)
Cost of spectacles (INR)	
Unaware of the amount paid	306 (37.1)
Free spectacles	73 (8.8)
≤500	140 (17)
501-2000	237 (28.7)
>2000	69 (8.4)
Last change of spectacles	
Unaware of the date/Cannot recall	115 (13.9)
<1 year	253 (30.7)
1-3 years	302 (36.6)
>3 years	155 (18.8)

The prevalence of spectacles compliance was 81.5% (211/259). Among the 48 participants who discontinued spectacles, 15 (31.3%) reported that they had misplaced their spectacles, 12 (25%) reported that their spectacles were broken or uncomfortable to use them, and 8 (16.7%) reported that they no longer found their spectacles to be useful.

Discussion

Over two-thirds of the elderly people living in homes for the aged were using spectacles at the time of eye examination. Bifocals were the predominant type of spectacles and private clinics were the leading service providers of spectacles in this elderly cohort of participants.

The population-based studies from this region reported a lower prevalence of spectacles use but the pattern of spectacles use was similar.^[3-5] Bifocals remain the most commonly used type of spectacles across the studies similar to the current study.^[3-5] The higher prevalence of spectacles use in this study could be attributed to the older age of the participants enrolled in the present study compared to 40 years and older individuals in earlier studies.^[3-5] Another reason for the higher prevalence of spectacles use could be attributed to comparatively higher education levels of the participants in the current study and possibly its urban location.

The proportion of spectacles provided by the private clinics varied across the studies, but it was consistently higher compared to other service providers.^[3-5] Though similar questionnaires were used in these studies, younger participants (40 years and older) from the community were included and hence the results may not be directly compared to the current study. One study that was conducted among

the elderly in residential care in the neighbouring state of Andhra Pradesh reported that the prevalence of spectacle use was 38.5% compared to 70% in the current study.^[7] The homes included in the previous study were from rural areas compared to the urban region in the current study and also previous study was conducted more than a decade ago.^[7]

The association between spectacles use with age and gender has been inconsistently reported across studies.^[3-5,7,16,17] In the current study, age and gender were not associated with increased prevalence of spectacles use. Consistent with other studies, the participants with higher levels of education had higher odds for spectacles use. Those with higher levels of education may have had a higher visual demand and hence were likely to spend a considerable amount of time reading books for leisure. Earlier papers reported that reading was the most important leisure activity in this cohort.^[11] Higher education could be a surrogate indicator of better socio-economic status and hence increased access and affordability for seeking services and spectacles. This is further corroborated by higher odds for spectacles use among those in private homes compared to those in subsidized and free homes, though this was not statistically significant.

Those with independent mobility were likely to have a more active lifestyle with higher visual demands and hence a higher prevalence of spectacles use was reported in this group. It is also possible that those with better mobility status are more likely to actively seek eye care services. This is corroborated by a higher prevalence of spectacles use among those who had cataract surgery in at least one eye. Previously, we reported a higher prevalence of avoidable vision loss among the participants who were bedridden. It is likely that other health conditions take precedence over eye care among participants who are bedridden.

Though spectacles use is frequently reported, reporting on spectacles compliance is often limited to children.^[18,19] This study uniquely reported spectacles compliance among the elderly in residential care. The compliance to spectacles use was high in this cohort of elderly individuals. Good compliance at a median period of eight months after dispensing spectacles suggests the immense potential of providing spectacles and also the likely benefit of spectacles in this age group. Positive impact on visual functioning among those who were provided with spectacles is also reported.^[13]

Felt need and visual demands were the drivers of the compliance with spectacles use. Unfortunately, a few participants were not using spectacles as they had misplaced them. This is an expected finding in this age group. Discontinuation of spectacles after cataract surgery probably suggests that they no longer needed spectacles due to improved vision or a changed prescription post cataract surgery. Also, a large proportion of them discontinued their spectacles as they no longer saw the improvement in vision with their spectacles, most likely due to progression of cataract which is common in this age group. Personal, behavioral, and cultural factors may also influence elderly people's compliance with spectacles use. Identifying reasons for non-compliance with spectacles use and addressing these issues by generating awareness is critical for good vision. Moreover, the onset of cataract could bring substantial difference in the compliance rate. There are

no studies reporting on spectacles compliance in the elderly age group for direct comparisons.

The strengths of this study include a large sample selected from homes for the aged from the Hyderabad region and comprehensive assessments done by trained personnel. The longitudinal nature of the study provided an opportunity to understand the compliance to spectacles use which was otherwise not possible from cross-sectional studies. However, as this study was done in homes for the aged, the results could not be extrapolated to other populations such as the elderly living in the community or those living in homes for the aged in rural areas. Future studies may include these to provide more insights on spectacles use and compliance in the elderly. Also, the use of spectacles cannot be directly considered as indicative of the burden of uncorrected refractive errors. In earlier publications, a high prevalence of correctable vision impairment for distance and near vision, even among those who were using spectacles, was reported.^[10,11] This suggests that a more frequent change of spectacles is required in this age group. The present study reported that over 70% of the elderly had spectacles that were procured more than a year ago. Effective spectacles coverage is a better indicator than spectacles use, which was not assessed in the current study.^[2]

Conclusion

In conclusion, use of spectacles is common in this population. Spectacles compliance was also high. Frequent eye examinations, dispensing good quality of spectacles, and provision of a second pair of spectacles wherever possible, can go a long way in continued spectacles use and compliance for adequate correction of refractive error in this vulnerable population.

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Conflicts of interest

There are no conflicts of interest.

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