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Prevalance of Functional Blindness, Visual Impairment, and Related Functional Deficits Among Elderly Mexican Americans

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Background. This report describes the prevalence and correlates of functional blindness and visual impairment among older Mexican Americans, using data on 2800 respondents from the Hispanic Established Populations for the Epidemiological Study of the Elderly.

Methods. Bivariate and multivariate logistic regression analyses were used to examine the associations between corrected bilateral distant vision and sociodemographic characteristics, selected health conditions, self-reported health status, health care utilization, and functional dependence on the basis of assistance needed for basic and instrumental activities of daily living (ADLs).

Results. Using a modified Snellen test for distance visual acuity, 5% of older Mexican Americans were found to be functionally blind, and 13.5% were found to be visually impaired. Vision loss was significantly associated with older age, lower education, hypertension, diabetes, poor self-rated health, and hospitalization during the year prior to the interview. Over 50% of functionally blind subjects required assistance with at least one basic ADL, compared with 15% of those who were visually impaired and 8% of those who were not visually impaired.

Conclusions. The prevalence of functional blindness in this sample of elderly Mexican Americans was higher than reported for the general elderly population, yet they also have higher rates of adequate vision because of the low prevalence of visual impairment. The results suggest a need for more research on the prevalence and impact of functional blindness and visual impairment on the health of older Mexican Americans.

VISUAL impairment, one of the most common conditions affecting older adults, is a leading cause of functional disability (1,2) and diminished quality of life (3). It is well accepted that visual impairment becomes more prevalent with increasing age (4,5) and can adversely affect basic and instrumental activities of daily living (ADLs). Other risk factors associated with visual impairment include occupational exposure to sunlight, cigarette smoking (6), alcohol consumption (7), and low socioeconomic status (8).

A number of population-based studies have provided detailed estimates of the prevalence, risk factors, and consequences of vision problems among older adults (4,9–11). Among the general population aged 65 and older, the prevalence of functional blindness (visual acuity worse than 20/200) ranges from 1% to 4%, with an additional 10% to 14% having visual impairment (visual acuity 20/50–20/200). Relatively few studies, however, have examined visual acuity among Hispanic populations. Data from the Hispanic Health and Nutrition Examination Survey in the early 1980's suggested that Hispanics may have a lower prevalence of impaired vision compared with non-Hispanic whites (12), with Mexican Americans experiencing severe to mild visual impairment ranging from 5% to 12%. However, these studies have been limited by small sample sizes for elderly Hispanics, and no data are available for Hispanics over 74 years of age, the age range in which visual impairment is most prevalent.

The present study examines the extent of functional blindness and visual impairment among older Mexican Americans, as well as demographic and health correlates, using data from the Hispanic Established Population for Epidemiological Studies of the Elderly (HEPESE).

METHODS

Sample

The HEPESE is the latest in a series of large-scale epidemiologic studies conducted throughout the United States, funded by the National Institute on Aging. The initial wave of the HEPESE was conducted during 1993 and 1994 in Texas, Colorado, Arizona, New Mexico, and California, with fieldwork conducted by Harris Interactive, Inc. Area probability sampling was used to select a total of 3050 Mexican Americans aged 65 and older (86% response rate). For a more detailed description of the sampling procedure, see Black and colleagues (13). The present study describes visual acuity for 2800 subjects. Data were not available for 250 subjects who were interviewed by proxy, refused visual

assessment, or were too ill or cognitively impaired to be tested.

Measures

Visual acuity was measured using both self-report and performance-based assessment. Respondents who reported being blind were not further tested for visual acuity. Corrected bilateral distant visual acuity was assessed using a modified Snellen test utilizing directional Es to estimate acuity from 20/40 to 20/200 as described by Salive and colleagues (4). This method divides distance vision into three categories: less than or equal to 20/40 designated as adequate vision, greater than 20/40 to less than or equal to 20/200 designated as visual impairment, and greater than 20/200 designated as functional blindness.

Sociodemographic measures included respondents' age, gender, years of education, and total annual household income.

Health-related measures included self-reported health status (poor, fair, good, or excellent), having an overnight hospital stay within the year prior to interview, and having a physician's diagnosis of hypertension or diabetes. Subjects reporting diabetes or hypertension were asked if they were currently taking medication for these conditions.

To measure disability, basic ADLs and instrumental activities of daily living (IADL) were assessed with a modified version of the Katz ADL and OARS IADL scales (14,15), respectively.

Analyses

Mantel-Haenszel chi-square analyses were used to evaluate differences in the prevalence of functional blindness and visual impairment across all sociodemographic and health-related measures. Logistic regression models were then constructed to assess the risk of functional blindness and visual impairment, with adequate vision as the reference category. Initial models examined the risk of functional blindness and visual impairment across sociodemographic factors, followed by models that added physician-diagnosed hypertension and diabetes. All analyses incorporated weights using SAS (16) and design effects using SUDAAN (17).

Results

Of the 2800 subjects assessed for visual acuity, 58% were women and more than 65% were younger than 75 years of age. The average level of education was only 4.9 years. Over half the sample reported a total annual household income of less than $10,000. Visual assessment results indicated that 108 (4.9%) subjects were functionally blind, including 45 (7 by proxy) who reported that they were blind. A total of 294 (13.5%) subjects were considered to be visually impaired.

Functional blindness increased significantly with age from 1.4% in subjects 65 to 70 years old to 12.4% in subjects 85 or older ($p < .001$). Visual impairment also increased with age, ranging from 10.4% in subjects 71 to 74 years old to 31% in subjects 85 and older. An inverse relationship for education and visual impairment was evident, with significantly more visual impairment among subjects with lower education ($p < .01$).

More than 5% of subjects with hypertension and 9% with diabetes were functionally blind and significantly more likely to be functionally blind or visually impaired compared with nonhypertensive subjects ($p < .05$) or nondiabetics ($p < .001$). Subjects taking insulin for their diabetes were significantly more likely to be functionally blind or visually impaired than diabetics not taking insulin ($p < .001$). Subjects reporting poor health status as well as those hospitalized overnight within the past year were more likely to be functionally blind ($p < .05$). Table 1 shows the results of logistic regressions assessing the risk of functional blindness and visual impairment associated with age, gender, education, diabetes, and hypertension. Initial analyses indicated that functional blindness and visual impairment were strongly associated with increasing age. With the inclusion of physician-diagnosed hypertension and diabetes, age and diabetes were found to be significantly associated with both functional blindness and visual impairment.

Table 2 shows the rates of disabilities across vision categories. Subjects who were functionally blind were much more likely than other subjects to have both ADL and IADL disabilities. Respondents with visual impairment did not have rates of ADL disability significantly higher than those with adequate vision, although the rates of IADL disability were more comparable to the functionally blind.

Discussion

The results of the present study suggest important differences in the prevalence of visual acuity among older Mexican Americans in comparison to the general population. A comparison of prevalence of functional blindness and visual impairment reported by Salive and colleagues (4), presented in Table 3, demonstrates these differences. Functional blindness among Mexican Americans aged 71 or older is considerably higher (8.2%) than that reported for other EPESE sites (4.6%) for the same age range. In addition, whereas the prevalence of functional blindness for all age groups except those aged 85 years or older was higher in the present study than previously reported, the prevalence of vi-

Table 1. Multiple Logistic Regression Analysis Predicting Functional Blindness or Vision Impairment for Older Mexican Americans

	Functional Blindness vs Adequate Vision	Visual Impairment vs Adequate Vision	Total Vision Impairment vs Adequate Vision
Age, y			
65–70 (reference)	—	—	—
71–74	2.3 (1.2–4.5)	1.0 (0.7–1.4)	1.2 (0.9–1.6)
75–79	7.7 (4.4–14.0)	1.6 (1.2–2.2)	2.3 (1.8–3.0)
80–84	15.2 (8.6–27.0)	2.9 (2.1–4.0)	4.3 (3.2–5.8)
85+	14.5 (7.2–29.1)	4.5 (3.0–6.7)	5.6 (3.9–8.1)
Gender			
Women	1.2 (0.8–1.7)	1.3 (1.0–1.6)	1.2 (1.0–1.5)
Education, y			
>11 (reference)	—	—	—
6–11	0.4 (0.2–0.8)	1.0 (0.6–1.5)	0.7 (0.5–1.1)
<6	0.6 (0.4–1.0)	1.4 (0.9–2.1)	1.1 (0.8–1.5)
Health Condition			
Hypertension	1.1 (0.7–1.6)	1.3 (1.0–1.7)	1.2 (1.0–1.5)
Diabetes	3.2 (2.1–4.7)	1.5 (1.1–2.0)	1.9 (1.5–2.3)

Note: Values are odds ratios (95% confidence).

Table 2. Percentage of Frequency of Assistance Needed for Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) Among Older Mexican Americans Who Are Functionally Blind, Visually Impaired or With Adequate Vision (Weighted Percentages)

	Total Sample (n = 3050)	Functionally Blind (n = 108)	Visually Impaired (n = 294)	Adequate Vision (n = 2398)
Assistance With at Least One ADL*	13.6	50.7	14.6	8.1
Assistance With at least One IADL*	56.0	89.5	70.9	49.0
Activities of Daily Living				
Walk across small room	9.1	36.9	8.8	4.5
Bathing (sponge, tub, shower)	10.8	38.6	12.9	5.5
Person grooming	6.7	27.6	5.0	2.7
Dressing	8.6	35.7	7.3	4.2
Eating	4.5	17.2	3.0	1.7
Transfer from bed to chair	7.9	30.1	5.2	4.3
Toileting	5.7	23.7	3.8	2.8
Instrumental Activities of Daily Living				
Telephone use	11.3	52.0	11.1	5.5
Drive car/travel alone	39.3	84.2	57.2	30.6
Shopping	22.6	70.0	30.6	14.6
Prepare own meals	14.0	58.9	16.0	6.9
Light housework	15.4	51.7	17.3	9.2
Heavy housework	43.9	80.9	56.1	36.4
Take medicine	9.5	45.4	8.4	4.4
Handle/manage money	12.3	51.3	14.5	6.0
Walk up/down stairs	25.1	55.9	31.2	19.0
Walk 1/2 mile	28.9	72.4	34.8	22.1

*All comparisons were significantly different at $p < .001$; Mantel-Haenszel χ^2 statistic.

sual impairment was much lower. As a result, adequate vision was more common in this group than in the general elderly population.

The inverse relationship found for education and impairment in this study was similar to that found among older non-Hispanics in the other EPESE studies (4). No relationship was found in this study for prevalence of functional blindness or visual impairment across other sociodemographic variables, including gender and level of income, results consistent with most previous reports; however, there are some exceptions (4,9). The most common explanation for differences in socioeconomical status and vision loss has been the economic burden for those who are unable to afford medical treatment to correct their vision loss. Because over 85% of the subjects in the present study were eligible for Medicare, it is possible that sufficient access to ophthalmologic care could be a factor lessening the negative effect of lower income.

The risk of functional blindness associated with increasing age was very evident in the present study. Mexican Americans 85 years of age and over were at 10 times the risk of becoming blind as those aged 65 to 70. In contrast, the risk of visual impairment associated with increasing age was much lower than the risk of functional blindness, a finding that is consistent with other EPESE findings (4).

The influence of diabetes on functional blindness and visual impairment found in this sample of older Mexican Americans was also consistent with previous studies (4). Older Mexican Americans have been shown to have a higher prevalence of diabetes compared with the general population (18), with a higher prevalence of retinopathy compared with non-Hispanic diabetics (12), which could have a direct effect on the prevalence of functional blindness.

The association of functional blindness and visual impairment with self-rated health was consistent with what

Table 3. Percentage of Best Functional Visual Acuity by Age: East Boston, New Haven, and Iowa EPESE (1988)† Compared With Hispanic EPESE (1993-94)

			Blind or Worse Than 20/200		20/200 to <20/40		20/40 or Better	
Age (y)	EPESE (n)	HEPESE (n)	EPESE (%)	HEPESE (%)	EPESE (%)	HEPESE (%)	EPESE (%)	HEPESE (%)
65–70	—	1319	—	1.4	—	10.4	—	88.3
71–74	1440	568	1.0	3.0	15.6	10.4	83.6	86.6
75–79	1885	454	3.3	9.0	25.8	14.9	70.9	76.1
80–84	1152	305	5.3	14.5	35.2	22.6	59.5	63.0
85+	858	154	12.9	12.4	47.6	31.0	39.6	56.6
Total (age 71+)	5335	1481	4.6	8.2	28.6	16.4	66.8	75.4

Note: EPESE = Established Populations for Epidemiologic Studies of the Elderly; HEPESE = Hispanic EPESE.
†*Source*: Salive and colleagues (7).

was found at other EPESE sites (4). After controlling for age, subjects in poorer health were significantly more likely to be functionally blind. It is possible that declining health could be correlated with loss of vision as a function of the physiologic changes associated with normal aging.

Overall, subjects with functional blindness reported much higher rates of ADL and IADL disability compared with subjects who were visually impaired or who had adequate vision. This level of disability among functionally blind subjects can have important clinical implications among older adults, requiring interventions and adaptive strategies to lessen the negative impact of the loss of independence.

In summary, this study provides added insight into the prevalence and risk of functional blindness and visual impairment among older Mexican Americans. Whereas many findings were consistent with previous studies, several differences were found that warrant further investigation.

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