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ScienceDirect

Journal of the Chinese Medical Association 78 (2015) 177–181

www.jcma-online.com

Original Article

The association of visual impairment and 3-year mortality among the elderly in Taiwan: The Shihpai Eye Study

Tung-Mei Kuang [a,b,c], Su-Ying Tsai [d], Catherine Jiu-Ling Liu [a,b], Shui-Mei Lee [a,b], Wen-Ming Hsu [b,e], Pesus Chou [c,*]

[a] *Department of Ophthalmology, Taipei Veterans General Hospital, Taipei, Taiwan, ROC*
[b] *National Yang-Ming University School of Medicine, Taipei, Taiwan, ROC*
[c] *Community Medicine Research Center and Institute of Public Health, National Yang-Ming University, Taipei, Taiwan, ROC*
[d] *Department of Health Management, I-Shou University, Kaohsiung, Taiwan, ROC*
[e] *Shuang Ho Hospital, New Taipei City, Taiwan, ROC*

Received January 27, 2014; accepted August 1, 2014

Abstract

Background: The association between visual impairment and mortality has been controversial. Moreover, literature on the relationship was very limited in the Asian population. The purpose of this study was to investigate whether visual impairment increases the 3-year risk of mortality in a cohort of urban Chinese elderly individuals.

Methods: Participants in the Shihpai Eye Study, who were aged ≥65 years, with a baseline examination conducted between July 1, 1999 and December 31, 2000, were recruited for the current study. The total number of possible participants identified was 4750. Of those, 3746 persons were eligible, and 2045 persons were randomly selected to be invited to participate in the study. Of those 2045 individuals, 1361 (66.6%) participated in both the questionnaire and eye examination. A follow-up of a fixed cohort was also conducted after 3 years. The death of any participants was confirmed through the household registration system.

Results: Of the 1361 participants included at baseline, 54 (3.97%) died before the 3-year follow-up. Multiple logistic regression analysis showed that mortality was significantly associated with a fall history [relative risk (RR): 2.12; 95% confidence intervals (CI): 1.08–3.98] and a history of diabetes (RR: 2.06; 95% CI: 1.03–3.95). Visual impairment was not a significant predictor of mortality after adjustment for confounders.

Conclusion: After adjustments were made for age, sex, education, marital status, lifestyle factors, depression symptoms, fall history, and history of systemic diseases, visual impairment was not a significant predictor of 3-year mortality in elderly persons.

Keywords: Chinese; mortality; urban; visual impairment

1. Introduction

The prevalence of visual impairment has been shown to increase with age[1] and has become a public health concern. According to the literature, visual impairment is the third most prevalent physical impairment among older adults.[1,2] Visual impairment often limits people's ability to perform daily tasks[2,3] and affects their quality of life.[4–6] In addition to causing morbidity, visual impairment has also been suggested as a predictor of mortality.[7–13] In the Beaver Dam Eye Study,[12] people with visual acuity <6/12 were 1.57 times as likely to die in the following 5 years. In addition, the Blue Mountains Eye Study[11] reported that visual impairment was independently associated with an increased 7-year mortality

Conflicts of interest: The authors declare that there are no conflicts of interest related to the subject matter or materials discussed in this article.

* Corresponding author. Dr. Pesus Chou, Community Medicine Research Center and Institute of Public Health, National Yang-Ming University, 155, Section 2, Linong Street, Taipei 112, Taiwan, ROC.
E-mail address: pschou@ym.edu.tw (P. Chou).

http://dx.doi.org/10.1016/j.jcma.2014.11.006

rate, with a relative risk (RR) of 1.7. Although visual impairment has been proposed to be an independent predictor of mortality, it should be noted that confounding factors, such as age, depression, etc., were not adjusted for in some studies. Other studies did not find a correlation between visual impairment and mortality.[14–16] For example, the Blue Mountains Eye Study,[14] which included an 11-year follow-up, did not find a correlation between visual impairment and mortality. A population-based study of elderly people aged ≥75 years in the United Kingdom had similar results.[15] The Beijing Eye Study[16] also noted that mortality was not significantly associated with presenting and best-corrected visual acuity.

Thus, the association between visual impairment and mortality is controversial. Moreover, most of the studies evaluating the association between visual impairment and mortality have been limited to Caucasians. Literature on the relationship between visual impairment and mortality among Asians has been limited to only three citations, namely, the Tanjong Pagar Study,[17] the Southern Harbin Eye Study,[18] and the Beijing Eye Study.[16] The first two studies noted a positive relationship between visual impairment and mortality, whereas the results of the Beijing Eye Study contradicted that finding. This study aimed to investigate whether visual impairment increases the 3-year risk of mortality in a cohort of urban Chinese elderly individuals.

2. Methods

The Shihpai Eye Study[19–21] was a community-based, cross-sectional survey of vision and eye diseases among noninstitutionalized participants aged ≥65 years in Shihpai, Taipei, Taiwan. The details of the sample selection and methods for the Shihpai Eye Study have been described previously.[19] In summary, residents aged ≥65 years were identified using the national household registration system. This system officially registers personal information, such as date of birth, sex, home address, family members, and relations. It was also designed to collate and supply demographic information and to officially recognize the personal status and relations of the ethnic Chinese public. This provides a reference for the government to develop effective administrative and socioeconomic development programs and assists scholars in academic research. The baseline examinations were conducted between July 1, 1999 and December 31, 2000. According to the official household registration conducted in 1999, the total number of residents aged ≥65 years in Shihpai was 4750. Of those, 3746 were eligible for this study, and 2045 were randomly selected to be invited to participate. Of the 2045 individuals invited to participate, 1361 (66.6%) participated in both the questionnaire and eye examination. All of the participants recruited in the baseline examination were considered eligible for a continuing fixed cohort study in 2003. After careful follow-up, 927 individuals participated (83%) in the follow-up survey, 54 individuals died, 167 individuals moved to a new household, 20 individuals were inpatients or were paralyzed or disabled, and 193 individuals refused to complete the survey. Informed consent was obtained from each participant after providing a thorough explanation of the survey and prior to enrollment in the study. The study was approved by the Institutional Review Board of the Taipei Veterans General Hospital, Taipei, Taiwan. The survey followed the tenets of the Declaration of Helsinki.

2.1. Definitions

Visual acuity was assessed using a Snellen E chart at a distance of 6 m. It was recorded separately for each eye and was defined as the lowest line for which the majority of E letters were positioned correctly. Visual acuity was measured initially without refractive correction (using the participant's glasses if worn). A sequential testing approach, including counting fingers, detecting hand motions, target fixation, and light perception, was used for all participants when visual acuity could not be assessed using a Snellen E chart. If visual acuity was <6/6, the examination was repeated with subjective refraction. If the refraction measurement could not be appropriately obtained, a pinhole-corrected acuity test was performed.

In this study, visual impairment was defined as a presenting visual acuity of <6/12 in the participant's better eye, as this reflects the visual acuity a person experiences in everyday living. The cut-off of 6/12 was used, because it is representative of the visual needs of modern life,[22–24] such as driving. In many countries and in most of the states in the US, visual acuity of ≥6/12 in the better eye is required for an unrestricted license.

The mortality status of the participants was traced through relatives or friends to provide final death status and also rechecked by research assistants using the household registration system.

The Geriatric Depression Scale-Short Form (GDS-S) was administered, and a score of ≥5 was considered to indicate depression symptoms.

A fall history was considered significant if one or more falls had occurred in the previous 12 months.

Histories of hypertension, diabetes, cardiovascular disease, and stroke were obtained by a checklist and defined as positive if one had previously been diagnosed by a physician as having the disease.

2.2. Statistical analysis

The dependent outcome in this study was all-cause 3-year mortality. The baseline profiles for the surviving participants and deceased participants in 2003 were compared using Student's t test for continuous variables and Chi-square analysis for categorical variables. The independent variables tested were age, sex, education, marital status, smoking history, alcohol intake, GDS-S scores, fall history, hypertension, stroke, diabetes, cardiovascular disease, arthritis, visual impairment, and whether one had contact eye service prior to the study examination. Independent variables associated with 3-year mortality with $p \leq 0.20$ in the univariate analysis were considered in the multivariate modelling for 3-year mortality.