Prevalence of Eye Diseases in South Korea: Data from the Korea National Health and Nutrition Examination Survey 2008-2009

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Purpose: The aim of this study is to report on preliminary data regarding the prevalence of major eye diseases in Korea.

Methods: We obtained data from the Korea National Health and Nutrition Examination Survey, a nation-wide cross-sectional survey and examinations of the non-institutionalized civilian population in South Korea (n = 14,606), conducted from July 2008 to December 2009. Field survey teams included an ophthalmologist, nurses, and interviewers, traveled with a mobile examination unit and performed interviews and ophthalmologic examinations.

Results: The prevalence of visual impairment, myopia, hyperopia and astigmatism in participants over 5 years of age was 0.4 ± 0.1%, 53.7 ± 0.6%, 10.7 ± 0.4%, and 58.0 ± 0.6%, respectively. The prevalence of strabismus and blepharoptosis in participants over 3 years of age was 1.5 ± 0.1% and 11.0 ± 0.8%, respectively. In participants over 40 years of age, the prevalence of cataract, pterygium, early and late age-related macular degeneration, diabetic retinopathy and glaucoma was 40.2 ± 1.3%, 8.9 ± 0.5%, 5.1 ± 0.3%, 0.5 ± 0.1%, 13.4 ± 1.5%, and 2.1 ± 0.2%, respectively.

Conclusions: This is the first nation-wide epidemiologic study conducted in South Korea for assessment of the prevalence of eye diseases by both the Korean Ophthalmologic Society and the Korea Center for Disease Control and Prevention. This study will provide preliminary information for use in further investigation, prevention, and management of eye diseases in Korea.

Key Words: Epidemiology, Eye diseases, Korea, Korea National Health and Nutrition Examination Survey, Prevalence
Epidemiological studies provide information on the prevention, treatment, and minimization of the impact of diseases on society. In the past two decades, a wide range of epidemiologic studies in ophthalmology have provided important information on the pattern of visual impairment and the major eye diseases that cause such vision loss [1]. Although several epidemiologic studies of several age-related eye diseases (e.g., glaucoma, age-related macular degeneration, and cataract) have been conducted in Korea [2-4], these studies were hospital-based or were conducted primarily in urban areas. Data on the prevalence of diseases based on the number of hospital visits or surveys conducted in limited areas are easy to obtain; however, substantial differences may exist between such data and that obtained in large-scale population studies, which are more accurate and can represent entire populations.

Large-scale population-based studies conducted over the past two decades in many countries, including the United States [5-14], Western Europe [15-17], Australia [18-21], Japan [22-26], Singapore [27-30], and China [31-35], have been used to guide public health policy and plan preventive strategies. However, these studies were conducted mostly with regard to major age-related eye diseases, such as cataract, glaucoma, age-related macular degeneration, and diabetic retinopathy, which are major causes of vision loss. Nation-wide epidemiological studies of all age groups for the prevalence of common eye diseases have not been performed.

The Korea Center for Disease Control and Prevention (CDC) conducted a series of Korea National Health and Nutrition Examination Surveys (KNHANES) in 1998, 2001, 2005 and 2007-2009 for examination of the general health and nutrition status of Koreans. As of the fourth KNHANES (2007-2009), an annual total of 4,600 households were selected, and the participating household members were interviewed regarding health and nutrition and underwent a basic health examination that included blood pressure measurements, blood and urine collection, a pulmonary function test, and a dental examination. Since the Korean Ophthalmologic Society has participated in this survey since 2008, ophthalmologic interviews and examinations were also conducted with the same participants.

The purpose of this study is to investigate the national prevalence of common eye diseases in South Korea based on the survey data obtained from the KNHANES and to analyze the prevalence of diseases according to age and gender. Data obtained from KNHANES may offer further insight into the etiology, ethnic differences, and public health impact of the most common eye diseases affecting Korean people living in Asia.

Materials and Methods

Study design and population

The KNHANES is an ongoing population-based, cross-sectional epidemiological survey conducted in South Korea. Annually, 4,000 households in 200 enumeration districts were selected by a panel to represent the civilian, non-institutionalized South Korean population using the stratified, multistage clustered sampling method based on the 2005 National Census Data. In KNHANES, sample design and size are estimated so that annual survey results represent the whole population in Korea. Therefore, annual survey results can be used as statistics to represent the overall Korean population. All members of each selected household were asked to participate in the survey, and the rate of participation in the past several cycles ranged from 79% to 84%. From July 2008, ophthalmologic interviews and examinations have been conducted. All examination and health interviews were conducted by trained teams in mobile centers, while nutrition surveys were performed in individual households.

This survey is aimed to determine the prevalence of the following vision status and common eye diseases in a population-based sample of Koreans: visual impairment and blindness, refractive errors, strabismus, blepharoptosis, cataract, pterygium, diabetic retinopathy, age-related macular degeneration (AMD), and glaucoma. The ophthalmologic survey was designed to be conducted over 5 years from 2008 to 2013. The present study includes interim data from a survey conducted from July 2008 to December 2009.

Examination procedures

Examination procedures were stratified according to age group. Participants aged 3 to 4 years old underwent testing for strabismus and blepharoptosis. Autorefraction and visual acuity testing and testing for strabismus and blepharoptosis were performed among the participants ranging in age from 5 to 18 years old. The participants over 19 years of age underwent full ocular examinations, including autorefraction and visual acuity testing, testing for strabismus and blepharoptosis, slit lamp examinations, measurement of intraocular pressure (IOP), and fundus photographs. IOP was measured with a Goldmann applanation tonometer. For participants meeting the glaucoma suspicion criteria, frequency doubling perimetry (FDT) was carried out. Phamacological pupil dilatation was performed for participants who had a history of diabetes mellitus or random blood glucose level of 200 mg/dL or higher and/or fundus photograph suspected di-