Prevalence of Macular Holes in Rural Central India – The Central India Eye and Medical Study

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**Purpose:** It was the purpose of our study to determine the prevalence of full thickness macular holes and their possible associations in a population based study. **Methods:** The Central India Eye and Medical Study is a cross sectional study on 4771 subjects of 30+ years. All subjects underwent an ophthalmic evaluation, including retinal evaluation with the 78D, indirect ophthalmoscope and colour photographs. **Results:** The mean age was 48.8±13.0 yrs. Mean refractive error was -0.09±0.17D. Full thickness macular holes were detected in 18 eyes (0.2±0.05%) of 13 subjects with a mean age of 57.4±15.2 years and a mean refractive error of -1.27±4.42D. The macular holes occurred bilaterally in 5 patients, and unilaterally in 8 patients. In univariate analysis, macular hole was significantly associated with higher age (p=0.048), lower visual acuity (p=0.04) and higher prevalence of pseudophakia (P=0.002; OR: 9.72; 95% CI: 3.17, 29.7). Presence of macular holes was not significantly associated with gender, refractive error, axial length, central corneal thickness, anterior chamber depth, lens thickness, intraocular pressure, degree of nuclear cataract or level of education. In binary logistic regression analysis presence of macular holes was significantly associated with pseudophakia (p<0.001; OR 6.1; 95% CI 1.7, 22.1) but not with age. **Conclusions:** Full thickness macular holes occurred in about two out of 1000 eyes. Calculated for the whole population in India, the figure would be about 1.1 million patients. Cataract surgery may be a marked risk factor for macular holes.

Since the report by Kelly and Wendel on the successful surgical closure of macular holes,1 macular hole surgery has widespread. Despite of this significant progress in their surgical management, knowledge regarding the prevalence of macular holes and the factors associated with macular holes has remained limited in literature. It was the purpose of our study to determine the prevalence of full thickness macular holes and its possible associations in a population-based study.

**MATERIALS AND METHODS**

The Central India Eye and Medical Study is a population based cross sectional study performed in rural Central India.2 The Medical Ethics Committee of the Medical Faculty Mannheim of the Ruprecht-Karls-University Heidelberg approved the study and all participants gave informed consent. Inclusion
criterion was an age of 30+ years. Out of 5885 subjects, 4711 (80.1%) people with a mean age of 49.5±13.4 years (range: 30-100 years) participated. A questionnaire was administered on parameters of socioeconomic background, life style and related parameters. The ophthalmic evaluation included refraction, biometry and photography of the lens, optic disc and macula. Participants were included on the availability of assessable fundus photographs. Statistical analysis was performed using the SPSS software (version 19.0. IBM-SPSS, Chicago, IL).

RESULTS

Out of the 4711 subjects included in the study, assessable fundus photographs were available for 8943 (94.9%) eyes of 4542 (96.4%) participants. Mean age was 48.8±13.0 years and mean refractive error was -0.09±1.77 diopters (range: -21.12 diopters to +8.75 diopters). Full-thickness macular holes were detected in 18 eyes (0.2±0.05% (mean ± standard error) (95% confidence interval (CI): 0.1, 0.3) of 13 subjects (0.3±0.08%; 95%CI: 0.1, 0.4) (8 women) with a mean age of 57.4±15.2 years (32-86 years). The macular holes occurred bilaterally in 5 patients, and unilaterally in the 8 patients. In univariate analysis, presence of full-thickness macular hole was significantly associated with higher age (P=0.048), lower visual acuity (P=0.04) and higher prevalence of pseudophakia (P=0.002; odds ratio (OR): 9.72; 95%CI: 3.17, 29.7). Presence of macular holes was not significantly associated with gender, refractive error, axial length, central corneal thickness, anterior chamber depth, lens thickness, intraocular pressure, degree of nuclear cataract, and level of education (Table). In a binary logistic regression analysis with presence of macular holes as dependent parameter, and age and lens status as independent variables, pseudophakia was significantly (P<0.001; OR: 6.1; 95%CI: 1.7, 22.1) associated with the presence of macular holes, while age was no longer significantly associated (P=0.19; OR: 1.03; 95%CI: 0.99, 1.07).

The prevalence rate of 0.3±0.08% per person for macular holes as found in our study agreed with results from other population-based studies such as the Beaver Dam Eye Study, Blue Mountains Eye Study, Baltimore Eye Study and Beijing Eye Study, which reported figures of about 0.3% for the populations examined. As in our study, the majority of the affected patients had unilateral macular holes in those investigations. Calculated for the whole population in India (389 million subjects with an age of 30+ years), the figure found in our study would transfer into a figure of 685,000 patients with unilateral macular holes and 458,000 patients with bilateral macular holes. After adjusting for age, pseudophakia increased the risk for full-thickness macular holes about 10 times. Limitations of the present study included that as in any population-based investigation, the study did not include all eligible subjects (response rate: 80.1%), so that a selection bias could have accentuated the estimates and masked others; that assessable fundus photographs were available for 95% of
the subjects only; and that optical coherence tomography was not performed for detection of macular holes in their earlier stages.

In conclusion, full-thickness macular holes occurred in about 2 out of 1000 eyes or in about 3 out of 1000 participants in the study. Calculated for the whole population in India, the figure would be about 1.1 million patients with unilateral or bilateral full-thickness macular holes. Cataract surgery may be a marked risk factor for macular holes.

REFERENCES