

学位論文の要旨

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学位論文名 Epidemiological Study of Glaucoma in Residents of a Rural Community: Analysis of Data Obtained From Resident Health Screenings in the Town of Sakurae in Shimane Prefecture, Japan

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論文内容の要旨

INTRODUCTION

Glaucoma is one of the major causes of blindness, early detection of glaucoma and prevention of disease progression are important in preventing blindness. But its prevalence varies with respect to gender, age and ethnicity. While the increased intraocular pressure of glaucoma damages the optic nerve and creates vision defects, recent studies have also begun to examine “normal” tension glaucoma.

The current study analyzed the data gathered in glaucoma screenings, and determined the prevalence of glaucoma for various age and gender groups. At the same time, we assessed the relationship between intraocular pressure and fundus test findings in order to clarify the severity of optic nerve damage in individuals with normal intraocular pressure. We also think that we carry out this research during the long period as baseline about these data.

MATERIALS AND METHODS

Sakurae is a town surrounded by mountains, and has a large elderly population (currently contained in Gotsu city). Over a 5-year period from 1989 to 1993, the town of Sakurae, in collaboration with the Shimane Medical University (currently, the Faculty of Medicine, Shimane University) and local doctors, conducted a resident health survey (resident health screenings).

Glaucoma screenings were performed on examinees who underwent the resident health screenings over a 2-year period, from 1990 to 1991. These screenings consisted of a medical history, tonometry and fundus test. The medical history interview covered past history of glaucoma, and symptoms such as visual field defects, eye pain, severe headaches and stiff shoulders. Intraocular pressure was measured in both eyes. Initially, intraocular pressure was

measured using a non-contact tonometer (NCT). If NCT pressure was 18 mmHg or higher, or if subjective symptoms associated with glaucoma were noted, an ophthalmologist used a hand-held Perkins applanation tonometer (PER pressure). Residents were diagnosed with increased intraocular pressure when PER pressure was 21 mmHg or higher.

For the fundus test, a funduscope and a nonmydriasis camera were used in both eyes. Residents were diagnosed as having glaucomatous changes when one or more of the following findings were seen: 1) cup:disc ratio (c/d ratio) of 0.6 or larger, or a left-right difference of 0.2 or larger; 2) notching; 3) retinal nerve fiber layer defect; and 4) papillary splinter hemorrhage.

With increased intraocular pressure or glaucomatous changes, residents were classified as belonging to a positive screening group. In addition to this group, residents with NCT pressure of 18 mmHg or higher, but with PER pressure of less than 21 mmHg, were recommended to undergo thorough examinations. Thorough examinations consisted of slit-lamp exams, gonioscopy, and perimetry. Ophthalmologists made diagnoses based the results of these tests. Thorough examinations were conducted from 1990 to 1993.

The prevalence of glaucoma was calculated for different age and gender groups by dividing the number of residents who underwent screening by the number of residents diagnosed with glaucoma, based on the results of thorough examinations plus the number of residents with a past history of glaucoma. In statistical analyses, the χ^2 test, Fisher's direct probability approach, and the Mantel-Haenszel method were used. The 95% confidence interval of prevalence was estimated based on Poisson distribution.

In the present study, we handled epidemiological data in the same manner as civil servants to ensure privacy and access to the data was limited to those involved in the study.

The study protocol was approved by the Ethics Committee of Shimane University and written informed consent was obtained from all subjects.

RESULTS AND DISCUSSION

3,244 residents of Sakurae were aged 20 years or older. Of these, 1,899 residents (58.5%) underwent resident health screenings. As a result of 13 refuse to the glaucoma screening, a total of 1,886 residents underwent the glaucoma screenings. Twelve residents (three men and nine women) had a past history of glaucoma, and thus tonometry and/or fundus test was performed in the remaining 1,874 residents (770 men, 1,104 women).

The proportion of increased PER pressure in residents who underwent glaucoma screenings was 3.2%: 4.0% for men, and 2.6% for women. There was no significant difference between increased PER pressure and gender. The proportion of glaucomatous fundus change for residents who underwent glaucoma screenings was 10.5%, and ranged from 1.6% in those aged 20–29 years to over 15% in those 70 years or older. In both men and women, the higher the age,

the higher the prevalence of glaucomatous change (trend, $p < 0.001$ men; $p < 0.01$ women). Of residents who underwent glaucoma screenings, the ratio of individuals with increased PER pressure or glaucomatous change was 12.9%.

There were 241 residents in the positive screening group. Of these, 126 saw a specialist for a thorough examination. In addition, of 389 residents with PER pressure of less than 21 mmHg but NCT pressure of 18 mmHg or higher, 10 saw a specialist. A total of 251 residents met the criteria to undergo thorough examinations, and 136 residents underwent these exams.

Sixty-eight residents were diagnosed with glaucoma. Therefore, of 1,886 residents, a total of 80 residents had glaucoma, and prevalence was 4.2% (95% confidence interval: 3.4-5.3%). The prevalence of glaucoma among men was 4.5% (95% confidence interval: 3.2-6.3%) and among women was 4.0% (2.9-5.4%). There were no significant gender differences, and no residents in their 20s were diagnosed with glaucoma. Higher ages were associated with significantly higher glaucoma prevalence (trend, $p < 0.001$). Moreover, this trend was observed for both men and women (trend, $p < 0.001$). Similarly in many studies both of Japan and the other countries, prevalence of glaucoma tended to increase with age. In the present study, while 58.5% of total Sakurae residents underwent health screenings, only 32.3% of residents over the age of 80 years underwent these screenings. Therefore, the prevalence of glaucoma observed in the present study may be somewhat lower than the actual figure.

Both tonometry and fundoscopy were performed in 3,555 eyes. The proportion of glaucomatous fundus change for high-pressure eyes was significantly higher than lower intraocular pressure eyes at 11.2% ($p < 0.001$). Nevertheless, the incidence of glaucomatous change for lower intraocular pressure eyes, with NCT pressure of less than 18 mmHg or PER pressure of less than 21 mmHg, was 7.8% (221/2841). The results of the interventional study of glaucoma patients in USA suggested that untreated intraocular pressure could exacerbate glaucoma in patients with normal intraocular pressure. In brief, it seems important to consider the intraocular pressures in diagnosis and therapy of glaucoma.

CONCLUSION

The prevalence of glaucoma increases significantly with age, but no significant gender differences were observed in the present study.

In the future, it will be necessary for epidemiological studies on glaucoma to clarify the correlation between intraocular pressure and glaucoma.

論文審査及び最終試験又は学力の確認の結果の要旨

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論文審査の結果の要旨

緑内障は失明の主たる原因の一つであるが、有病率は性、人種によって様々である。また、眼圧上昇によって眼底や視野に悪影響がある一方で「正常眼圧緑内障」の研究が進められつつある。そこで、本研究は地域住民における緑内障のスクリーニングと精密検査による診断から性や年齢別の有病率を明らかにすると共に、眼圧と眼底所見の関連を調べ考察した。緑内障スクリーニングは、中山間農村である島根県旧桜江町において20歳以上の住民を対象に住民健康診断調査の中で、1990年、1991年に実施した。スクリーニングには問診（緑内障の既往と自覚症状）、眼圧測定（ノンコンタクト眼圧計及び圧平式眼圧計）、眼底検査（眼底鏡、眼底写真等）を行った。圧平式眼圧値21mmHg以上の高眼圧、または眼底有所見とノンコンタクト眼圧値18mmHg以上の者に眼科専門医による精密検査受診を勧奨した。なお、精密検査については1993年まで行った。スクリーニング受診者は1,886人、受診率は58.5%で、そのうち12人が緑内障の既往を有した。既往の無い1,874人のうち精密検査で緑内障と診断された68人と合計すると、緑内障の有病率は4.2%(男性4.5%、女性4.0%)を示し、性差は無く、年齢と共に高くなる傾向は男女とも有意であった。眼圧測定と眼底検査を行った3,555眼において眼底の緑内障性変化の見られる割合は、眼圧閾値以上眼で有意に高率であったが、閾値未満眼においても7.8%存在し、緑内障において眼圧閾値はさらに検討が必要であることが示唆された。本研究は1990年代の結果であるが、長期経過後の観察・研究を今後検討していくにあたり、そのベースラインとしても有用であるものと考えます。

最終試験又は学力の確認の結果の要旨

申請者は島根県旧桜江町における20歳以上住民の健康診断調査から、主として問診、眼圧測定および眼底検査等から緑内障関連に関する統計学的知見を得て、今後将来に比較参考できる一助とし得た。質疑応答も的確で、さらなる応用や今後の発展性についても明確であり、博士の学位に値すると判断した。
(主査：竹下治男)

申請者は、旧桜江町における地域住民健康診断におけるスクリーニングと精密検査から、緑内障の有病率を明らかにし、眼圧との関係についても検討して、長期的疫学研究の基礎となり得る一定の知見を得た。関連領域の知識も豊富であり、博士の学位に値すると判断した。
(副査：大谷 浩)

申請者は、1つのコミュニティーにおける年代別の緑内障有病率を健康診断のツールを用いて報告した。もとなるデータは1990年～1991年であるが、20年後の現在の有病率の増加を見事に示唆したものである。緑内障に関する知識も豊富で、質疑応答も的確で博士号に値するものである。
(副査：石橋 豊)

(備考) 要旨は、それぞれ400字程度とする。