American University of Armenia

Public Health Department

Case-Control Study of Glaucoma Patients in Yerevan

A THESIS Project

Prepared by Naira Khachatrian

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Abstract

Glaucoma is a leading cause of blindness throughout the world .Although it more afflicts the elderly ,glaucoma occurs in all segments of our society with significant health and economic influences.No epidemiological studies have been done before in Armenia concerning glaucoma.This is the first case-control study of glaucoma patients in Armenia.It has been done in order to determine the risk population for glaucoma by defining the risk factors for glaucoma in Armenia..Case defenition:All patients from Yerevan ,who has been diagnosed POAG(Primary Open Angle Glaucoma) in the Eye Clinic # 8 during the time period January 1997-October 1997 for the first time . Control defenition:The patients from the Eye Clinic # 8 ,who had any eye diseases except glaucoma and who were having the treatment in the time period of survey(September 1997-October 1997) It has been chosen 25 cases and 50 controls .

It has been measured the influence of such factors as socio-demografic,family history, health status and emotional status on developing glaucoma .Following a definition of the variables of interest a questionnaire was developed and used in face to face interviews.

Results from this study showed the statistically significant association between glaucoma and cataract .The other result was an association between the hypertension in anamnesis of patient and glaucoma. There were found out positive but not statistically significant association between spring catarrh in childhood ;regular usage of medicine, especially antihypertensive drugs ;emotional status and POAG.

No association was found out between family history and POAG .Such bad habits as alcohol consumption ,smoking and coffee drinking don't have any statistically association with development of glaucoma.No association was established between glaucoma and economic status ,which was measured by monthly income per person .

The main conclusions which were drown from this survey mentioned that the risk population for

glaucoma in Armenia must include people with systematic blood hypertension and cataract in anamnesis and that it could be expected some increase in the prevalence of glaucoma due to emotional stress as a result of difficult socio-economical situation in Armenia .

Introduction

Glaucoma is a leading cause of blindness throughout the word [1,2,3,4,]. Although it more commonly afflicts the elderly, glaucoma occurs in all segments of our society, with significant health and economic consequences.[1]. The most fundamental fact concerning glaucoma is that it is not a single disease process.It is a large group of disorders that are characterized by widely diverse clinical and histopathologic symptoms. A definition that would encompass all the glaucomas can be the following "those situations in which the intraocular pressure (IOP) is too high for the normal functioning of the optic nerve head"[1].The damage to the optic nerve head brings to a progressive loss of the visual field ,which can lead to total incurable blindness if the condition is not diagnosed and treated properly.These three denominators (IOP,optic nerve damage,and visual field loss) represents the common pathway to blindness in all forms of glaucoma .[1]

Once the blindness from glaucoma has occurred,no known treatment will restore the lost vision .However, in nearly all cases,blindness from glaucoma is preventable. Research has shown that preventing blindness is often less expensive ,in simple economical terms, than paying for costs a blind individual occurs [5].The prevention requires early detection and proper treatment. Detection depends on the recognizing the early clinical manifestations of the different types of glaucoma. Appropriate treatment requires an understanding of the pathogenic mechanisms and the detailed knowledge of the drugs and operations that are used to control the IOP.It includes antiglaucoma medications, laser treatment and filtration surgery [7,8].

IOP, optic nerve damage and visual field are the main parameters by which glaucoma is detected

and followed during therapy.These basic features can be used in various screening programs for the early detection of glaucoma.Some forms of glaucoma are associated with symptoms ,which can appear in the early stages of the desorder.But in the majority of cases there are no early warning signs. So it is necessary to do screening programs not only to those ,who are seeking care ,but to do mass screening program.   The Public Health Service suggests that any medical screening programs must detect at least 2% pathology in the general population be a cost-effective measure[9].The group of glaucomas according to the statistics on the overall prevalence of glaucoma would not meet these criterion. The prevalence of glaucoma is less than 1% in most studies[1,2,3,4,7,8,10,11,12,14]So, become cost-effective, glaucoma screening programs must be directed at the high-risk segment of a population. Although ,according to some authors ,"The main value of community programs for the early detection of glaucoma appears to be the public awareness they create for the danger of glaucoma".[1]

Primary open-angle glaucoma(POAG)is the most common single form of glaucoma which is the mostly studied in glaucoma screening programs .[3,7,15,16,17,18,19,20] .Primary open-angle glaucoma is defined by the following three criteria:

1) IOP constantly more then 21 mm Hg in at least one eye;

2) An open, normal appearing anterior chamber angle

3) Typical glaucomatous visual field

4) Optic nerve head damage.[21]

 Theories of Mechanism

As the mostly all studies mentioned the control of IOP is the function of :(1)production of aqueous humor;(2)resistance to aqueous humor outflow (3)episcleral venous pressure Any significant changes in each of this function can lead to increasing of IOP to that level on which the intraocular pressure (IOP) is too high for the normal functioning of the optic nerve head[1].

As in all forms of glaucoma ,increasing the IOP in POAG is mostly due to obstruction of aqueous outflow.Increased resistance to aqueous outflow in POAG according to some studies [1,22] may be due to a collapse of *Schlemm's canal* ,alterations of the *intrascleral outflow channels,* some changes in *the trabecular meshwork.* Although POAG has been studied more then any type of glaucoma , the precise mechanism of outflow obstruction in this condition has not been fully explained.

Some studies showed the increased level of gamma globulin and plasma cells in the trabecular meshwork of eyes and a high percentage of patients with positive antinuclear antibodies reactions. Those reports suggested a possible *immunological mechanism* in the pathogenesis of POAG[23,24].

There was shown the possible *hormonal* influence in IOP .Some studies suggested that IOP may increase in response to ACTH ,glucocorticosteroids, and growth hormone,and may decrease to progesterone,estrogen ,etc[25].The IOP has also been reported to be higher with patients with hypothyroidism[26]

The knowledge of mechanisms helps to predict the possible risk factors which can influence the development of glaucoma.

There were done some Epidemiological studies concerning glaucoma .The most important among the epidemiological studies ,which have been done during the last years were the following :the Rotterdam Study ,the Baltimore Eye Survey ,the Beaver Dam Eye Study, the Casteldaccia Eye Study,the Barbados Eye Study ,the African Caribbean Eye Survey,etc.The *Rotterdam Study* was the a single-center prospective cohort study of a total population of more then 10,000 people , 55 or more age years old .The overall prevalence of POAG in this study was 1.10%. Age-specific prevalence increased from 0.2% in the age group of 55 -59 years to 3.3% in the age group 85-89 had more than three times higher risk of having POAG then the women(odds ratio 3.6).On the same data-base has been done the survey in order to investigate the association of POAG, IOP and systematic blood pressure. The relation between them was studied by means of regression analysis

.The main result from this survey was that systematic blood pressure and hypertension were associated with POAG with an IOP of more then 21 mmHg [19,40].

On the data-base of the *Baltimore Eye Survey* there has been done a survey in order to define an association between family history and POAG .It was a population -based prevalence survey which identified 161 cases of POAG among 5308 black and white residents of east Baltimore,who were 40 and more years old.Family history was measured by interview and emphases the presence of first degree relatives with glaucoma .The main conclusion that has been drown from this study was that family history was an important risk factor for POAG .Subjects from the Baltimore Eye Study were used for the another study in order to find an association of diabetes and POAG .A stratified sample of residents in 16 cluster areas of east Baltimore was chosen and had a detailed ophthalmological examination . 161 participants from 5308 were diagnosed POAG .

10.6% of white people and 17.2% of black had diabetes in anamnesis .There was not found from the analysis of the data of this survey an association between POAG and diabetes(OR=1.7 ,95% confidence interval 1.03<OP<2.86)[20,28].

The *Beaver Dam Eye Study* was performed in Wisconsin(n=4926) in 1992 .It was determine the prevalence of glaucoma in the population participating in this study .The results were the following :the overall prevalence of POAG was 2.1% .The prevalence increased with age from 0.9% in the age group 43-54 year to 4.7% in people 75 years and older .There was no effect of sex after adjusting for age.The other population-based survey was performed on the people from the Beaver Dam Eye Study in order to evaluate a possible association between alcohol usage ,cigarette-smoking behavior and glaucoma. Alcohol intake and smoking history was measured by using the questionnaire .The results from this study showed that there were no statistically significant association between drinking alcohol and glaucoma ,also there were no statistically significant association between cigarette-smoking and glaucoma[39,41] .

The *Barbados Eye Study* was the largest glaucoma study ever conducted in a black population was population based prevalence study.The sample was drown from Barbarian-born citizens 40-84 years old (4709 participants).According to the results of this survey, the prevalence of POAG was 7.0% in black, 3.3% in mixed -race and 0.8% in white .In black and mixed -race participants the prevalence reached 12% at the age 60 years and more and was higher in men than in women .The age adjusted male-female ratio was 1.4 .In order to evaluate risk factors for POAG among black participants in the Barbados Eye Study it was done population-based study of demographic, medical, ocular, familial and other factors.The results from this study were the following:age,male,gender, high intraocular pressure were the main risk factors for glaucoma. Association was stronger in male than in female. Lean body mass and cataract in the anamnesis also were other factors related to glaucoma .No association between POAG and hypertension and diabetes[18,33] .

In 1993 in Germany it was done a study concerning psychiatric manifestations in patients with POAG.In a comparative study ,21 in-patient and 27 out-patient with POAG and 18 cataract patients were used in order to determined whether psychiatric symptoms were more frequent in patients with POAG.The results were the following:two-third of the glaucoma inpatient showed psychiatric symptoms,had higher scores for depression and psychosomatic complaints and had reduced emotional stability .The glaucoma out-patients had statistically significantly high scores for psychosomatic complaints.The control group showed normal scores in all tests[42].

According to the results of these studies and others the main risk factors could be determined .

Risk factors for POAG .

*Age.*All studies agree that the prevalence of primary open-angle glaucoma increases with the age[2,5,6,18,27,28].It is unusual for the disorder to have clinical manifestation before the age of 40, and the most cases are seen after the age 65.[4,6,15,21]

*Gender.*The prognostic significance of sex is less than that of age, although several studies suggest a

higher prevalence among men.[1,30] Although ,other studies does not found any differences in the prevalence of glaucoma among different genders[6,7,13,31]

*Race.*There are many works ,which are mentioning the differences in the prevalence of glaucoma among different races .It is mostly common among blacks [1,2,4,5,32,33]

*Diabetes Mellitus.*The prevalence of POAG (primary open-angle glaucoma) is several times higher in the diabetic population, according to the most surveys.[1,6,21,34]

Cardiovascular and Hematological Abnormalities. In the most epidemiological studies of glaucoma [22,23,35,36]it has been mentioned the association between these systemic disorders and POAG.The association of these abnormalities are not enough clear.Some investigators found an association with hemodynamic crises and low diastolic ophthalmic artery pressure or diastolic blood pressure[1].The other studies showed an association with increased systematic blood pressure, and yet others mentioned no significant difference from the general population[1]. While most patients do not experienced optic nerve damage following some loss in blood pressure, there is evidence that this may increase the risk of further nerve damage among glaucoma patients. These individuals should be examined carefully for the evidence of changes in the optic nerve head or visual field during situations such as the adjustment of medication for systemic hypertension or general surgery.[1]

Family history Family history is considered to be a significant prognostic indicator.POAG is believed to have a genetic base[1,6,17,21,28,37,38]." Although the exact hereditary mode is unknown, indirect evidence suggests that it is most likely poligenic or multifactorial"[15]. So, it could be said definitely that it is the increased prevalence of POAG among close relatives of glaucoma patients.

Behavioral Factors Exercising is presumed to decreased IOP .Glaucoma patients had a greater drop and longer duration of postexercise recovery as compared to normal subjects[32]

Caffeine may cause a light rise in IOP[1].

Tobacco may cause a transient rise in IOP.Some studies showed that smoking one cigarette can increase IOP more then 5 mm Hg in 37% of POAG patients [1,39]

Alcohol has been shown to lower the IOP ,although more so in patients with glaucoma.[1,39]

Situation in Armenia:

There are no available information concerning the prevalence of glaucoma in Armenia in the Ministry of Health. No epidemiological studies have been done before in Armenia concerning glaucoma . Only now there are some research works doing in this topic[6]. There are two big eye clinics: Eye Clinic #8 and Republic Eye Clinic .In the each clinic there is a glaucoma department. In this study the information was used from the Eye

 Clinic #8. According to some research works there are some decreasing tendency in the numbers of incidence cases of glaucoma during last 5 years in Armenia [6] .This can be due to difficult socio-economic situation in Armenia and the decreasing of the payment level of population which was expressed in low accessibility of medical services .These factors can also explain the increasing of disability from glaucoma .People have to blind from glaucoma , because they cannot pay for treatment .This makes glaucoma the important Public Health problem particularly in Armenia .

This case-control study is the first case-control study of glaucoma patients in Armenia It was done in order to determine the main risk factors for glaucoma in Armenia and define the risk population group .As it was mentioned above ,the early detection of glaucoma can help to prevent the blindness from glaucoma [1] .Armenia have not enough money to do screening programs for the hole population ,so it could be done only for the particular group of people who have the highest risk to develop glaucoma .So , this case-control study is very actual and useful for Public Health in Armenia .

Methods:

For this case-control study the research questionnaire the following:

What are the main risk factors for glaucoma?

According to literature and the work experience of the doctors from the Eye Clinic # 8, it has been chosen the main variables:

A.Socio-Demografic ,which included age, gender, place of residence, occupation, place of birth

B. Family History .This variable was chosen in order to determine the persons who had the relatives with glaucoma

C. Personal History ,which includes the currant ophthalmological diagnosis, previous eye diseases, other diseases ,such as systematic blood hypertension ,diabetes mellitus,other endocrine disorders ,cardiovascular diseases ,renal diseases ,etc.

D. Stress Factor,which was measured on the bases of the emotional status of the person during the year preceding the year of the first manifestation of the eye problems

As the main *objective* for this study was the determination of the risk population for glaucoma by defining the risk factors for glaucoma in Armenia.

In order to define the risk population it has been done the case-control study .This type of analytical design was chosen because of efficiency in time and expense. This type of study was very useful because of necessity in testing a variety of exposure factors among the diseased and controls.It was particularly suitable for such an early investigation of the risk factors of the glaucoma.

Case definition: All patients from Yerevan ,who has been diagnosed Primary Open Angle Glaucoma(POAG) in the Eye Clinic # 8 during the time period January1997-October1997 for the first time.

Control definition **:** The patients from the Eye Clinic # 8 ,who had any eye diseases except glaucoma and who were having the treatment in the time period of survey(September 1997-October

1997).Drawing the controls from the same source as the cases provides convenience as well as possible theoretic benefit: the cases and controls can often be presumed drown from the same segment of the population and therefore, matched on social, economic, and environment factors.

Sample Size: It was taken all available sample due to shortage of time and small number of patients in the Eye Clinic # 8 during 1996-1997 time period.

It has been chosen 25 cases and 50 controls.As cases it was used the patients with POAG who were diagnosed and having a treatment in the glaucoma department of the Eye Clinic # 8 during the time of survey(September 1997-October 1997).The medical records were used to identify the incidence cases of POAG from the time period January1 ,1997-October1,1997.The patients were contacted by telephone and asked to come to the Clinic to talk about their disease . Response Rate :70%(25 from 36).

Controls has been chosen from the patients of the Eye Clinic # 8 ,who were having the treatment during the time of survey(September 1997-October 1997) and who had not glaucoma.It has been taken the patients from this clinic ,because the examination for glaucoma is obligatory for each eye patient .So , it was high level of probability that this patients had not glaucoma.

Following a definition of the variables of interest a questionnaire was developed and pretested in the Republic Eye Clinic .After pretest there were done some changes in the questionnaire .[see appendix].All interviews were conducted in the Eye Clinic # 8.All of them were face-to-face. Each interview was 15-20 minute long. Medical records were used for checking the diagnoses. Each of questionnaires was coded and entered into a computer format for analysis.

Database was created in Microsoft Access program.Then it was transformed to dbf format in order to conduct analysis in Epi Info .Then data cleaning was done .After that analysis has been done .

Analysis:

Differences between cases and controls were checked by different exposure status .

Age:The youngest person with glaucoma was 52 years old,the oldest was 80 years old. The mean age for cases is 64.84.Only 12% of cases are less then 60 .For controls -the youngest person was 27 years old ,the oldest 82.The mean age for controls was 63.4 .

It was done 2 by 2 tables for cases and controls for the age more and less then 60 years old.OR=0.72 .Confidence interval:0.90<OR<3.10. So there is no association between the age and the disease

Table 1.The age distribution of cases and controls .

Age	Case	Control
< 50 years old	0(0%)	7(14%)
50-59 years old	3(12%)	5(10%)
60 and more years old	22(88%)	38(76%)
Total	25(100%)	50(100%)

Gender:For cases :44% are male and 56% are female .For controls: 50% are males and 50% are females.From 2 by 2 tables it has been calculated OR=0.79

Cornfield 95% confidence limits for OR 0.27<OR<2.3

So there is no evidence from this study that the gender and glaucoma are associated.

Table 2. The distribution on gender among cases and controls .

Gender	Case	Control
Male	11 (44%)	25 (50%)

Female	14 (56%)	25 (50%)
Total	25 (100%)	50 (100%)

Place of residence:

Yerevan as divided in 8 districts and each district was given a number .After analysis the frequency was the following:

60% of cases were from Chorurdain and Arabkir districts.

58% of controls were from Chorurdain and Arabkir districts.

This can be explained by the fact that Eye Clinic # 8 is close to these districts of Yerevan

And there is no difference between cases and controls .So it can be said that cases and controls are from the same population .

As for the previous address there are also approximately no difference between cases and controls.

25% of cases and 28% of controls were from the two mentioned above districts of Yerevan .There were also high numbers for the people who came from different villages of Armenia :25% for cases and 30% for controls

Level of Education :

For cases :32% had high level of education ;for controls 44% had high level of education

It was done 2 by 2 table for those who had the high education and others The results are the following:OR=1.67 (0.90<OR<3.10)

These analyses showed that there were positive association with the factor and the disease but there were not statistically significant associations.

Table 3. Educational Level of Cases and Controls .

Education	Case	Control
Secondary School	10 (40%)	17 (34%)

College	7 (28%)	11 (22%)
Institute(University)	8 (32%)	22 (44%)
Total	25 (100%)	50 (100%)

Work place: no one from both cases and controls worked in such types of factories that could influence the health .

Nationality: 100% of cases and 100% of controls were Armenians.

Ophthalmological diagnosis:

The diagnosis of controls included such eye diseases as diabetic retinopathy, different types of keratitis, atrophy of nervus opticus, iridocyclitis, retrobulbar neuritis, etc.

Cases: 58% of cases had POAG in both eyes ;only32% had POAG in one eye

There also has been found that 40% of cases glaucoma was accomplished with cataract.

Controls:Only 12% of controls had cataract.

It has been done 2 by 2 table.Results were the following:

OR=3.33(1.09<OR<10.25)-Statistically significant association between cataract and glaucoma .

The time period when the glaucoma patients had the first manifestation of the eye problems varies from 1993-1997 .40% of the cases had the first manifestation of the eye problems earlier 1996 and 60% of cases had the first manifestation of the eye problems in 1996 -1997.

It has been found positive association with glaucoma and having spring catarrh in childhood.7% of cases had it comparing only with 8.2% of controls. Using

2 by 2 table it was calculated that :OR=2.25(OR>1 -positive association) but 0.42<OR<12.25 so there were no statistically significant association between glaucoma and having spring catarrh in childhood:

Therapeutical diseases:

It has been analyzed the presence of the therapeutical diseases in cases and controls. Special

attention was made to the following diseases: Hypertension ,diabetes, other endocrine disorders

,renal diseases ,etc.

It was found out the strong association between hypertension and glaucoma .The results from 2 by 2

table for those who had hypertension and others:

OR=6.09

Cornfield 95% confidence limits for OR   1.22<OR<34.00

Table 5.Therapeutical diagnosis for cases and controls .

Therapeutical Diagnosis	Case	Control
Systematic Blood Hypertension	7(28%)	3(6%)
Cardio-Vascular Diseases	1(4%)	1(12%)
Diabetes Mellitus	0(0%)	6(12%)
Other Endocrine Disorders	0	0
Renal Diseases	1(4%)	2(4%)
Other Diseases	5(20%)	10(20%)
No Disease	11(44%)	28(56%)
Total	25(100%)	50(100%)

During the analysis of family history it was found out that 32% of cases had the first degree relatives with eye diseases and only 26% of controls had the first degree relatives with eye diseases.But there were no strong association between the factor and the disease according 2 by 2 table: OR=1.34

Cornfield 95% confidence limits for OR   0.41<OR<4.3

There were no differences for cases who from their relatives had eye diseases.

4 cases had mothers with eye disease and 4 of them had fathers with eye diseases.

For controls it can be seen the following picture :9 had mother and mother's relatives with eye disease and only 4 had father and father's relatives with eye diseases

Table 6.Family History of Eye Diseases for Cases and Controls .

Patients	Relatives with Eye Diseases		No Relatives with Eye Diseases	Total Number of Patients
	Mother and Mother's relatives	Father and Father's relatives		
Case	4(16%)	4(16%)	17(68%)	25(100%)
Control	9(18%)	4(8%)	37(74%)	50(100%)

There were some data from the research works in the Eye Clinic # 8 that glaucoma has strong association with family history of mother's relatives .But according 2 by 2 table in this case - control study there were even some negative association of glaucoma and mother's relatives with eye

diseases :

 OR=0.44

Cornfield 95% confidence limits for OR   0.05<OR<3.81

These could be explained by small sample size ,and need more detailed research.

Behavior :

Exercising: 88% of cases and 86% of controls did not do physical exercising . There were no association between this factor and the disease .

Smoking :

The big attention in the questionnaire was given to the problem of smoking and POAG.

Table 7.Frequency of smokers and non-smokers among cases and controls.

Patients	Case	Control
Smokers	5(20%)	12(24%)
Non-Smokers	20(80%)	38(76%)
Total	25(100%)	50(100%)

Table 8.The smoking practice among cases and controls.

Patients	Smokers	Non-Smokers	
		Ever smoke	Never Smoke

	20 and less cig. Per day	> 20 cig. per day	10 years and less	> 10 years	20 and less cig. Per day	> 20 cig. per day	10 years and less	> 10 years	
Case	2	3	0	5	0	3	3	0	17
Control	5	7	1	11	1	8	4	5	29

From frequency table it has been found out that 20% of cases were smokers and 24% of controls were smokers. 40% of smokers among cases and 41% of smokers among controls were smoking 11-20 cigarette per day on average .100% of them among cases were smoking more then 10 years ,91 % of smokers among controls were smoking more then 10 years . 15% among non-smokers of cases and 24 % among non-smokers of controls have been smokers in the past . So, 68% of cases and 58% of controls never smoke.It can be concluded from these data that there were no big differences in habits though we can conclude that the influence of smoking can not be appropriate measured in this study .

Coffee-using:84% of cases and 90% of controls are coffee-users and did not change their habits after diagnosing the eye disease .

Alcohol-using:

Table 9.Alcohol Usage Among Cases and Controls .

Frequency of Alcohol Usage	Case	Control
Every Day	1(4%)	4(8%)

Every Other Day-Once a Week	5(20%)	5(10%)
Once in Two Weeks-More Rarely	10(40%)	28(56%)
Never	9(36%)	13(26%)
Total	25(100%)	50(100%)

24% of cases and18% of controls use alcohol more often then once in two weeks. It was done 2 by 2 table for those who use alcohol more often then once in two weeks and others.The results from it showed that there were no association between alcohol usage and glaucoma :

OR=1.44

Cornfield 95% confidence limits for OR   0.38<OR<5.31

Data about alcohol usage before diagnosing eye disease were approximately the same .So it can be added also that after being diagnosed an eye disease patients did not change strongly their behavior

Medicine usage :

Table 10.Frequency of regular medicine using for cases and controls.

Regular using of medicine	Case	Control
Yes	7(28%)	7(14%)
No	18(72%)	43(86%)
Total	25(100%)	50(100%)

It was positive association according our data between using different medications and development of glaucoma .

OR=2.39

 But the association was not statistically significant because :

Cornfield 95% confidence limits for OR   0.38<OR<5.3

The more often using were antihypertensive drugs for cases(28.6%) and insulin for controls(22.2%).

Stress:

Stress factor was measured by a group of questions . They all were about the year before the first

symptoms of eye disease .The first question was about the absence of anyone from family members

from Armenia during that time period . 36% of cases and only 16% of controls answered positively

on that question .It was found out some positive association with this factor according to OR=2.95

But the association was not statistically significant due to confidence limits:

Cornfield 95% confidence limits for OR   0.84<OR<10.42

The next question was about having any big financial lost . The positive answer gave12% of cases

and 6% of controls .The OR=2.14 .This suppose positive association ,but

Cornfield 95% confidence limits for OR   0.31<OR<14.99

So ,the association was not statistically significant.

For the next question about living in their own apartments 84% of cases and 92% of controls

answered positively .So there were not establish any association between this factor and the disease.

On the next question about close relatives taking part in the Karabach war 8% of cases and 2% of

controls said "Yes".OR =4.25 Although the odds ratio has enough high number and positive

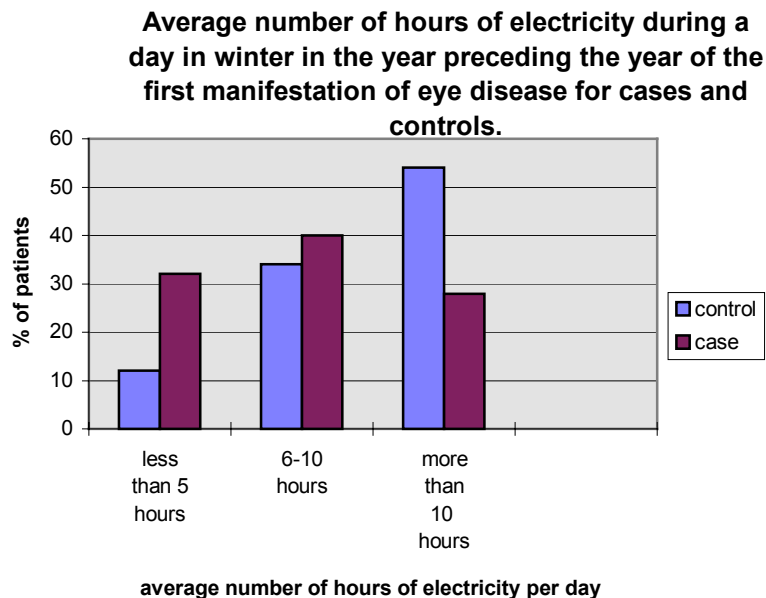association can be establish but the confidence interval

 included 1(0.28<OR<127.83) ,so the association is not statistically significant .

The other Stress-questions (accidents ,injuries or deaths which were /were not war related)did not

had any statistically association with glaucoma .

It was developed a score for stress factor :every "Yes" answer was given 1 score,every "No" answer

was given 0 score.The maximum score was 4 for both cases and controls From 2 by 2 table for

persons who had score more then 2 it was found positive association between stress factor and

glaucoma(OR=2.24) although the association was not statistically significant(0.72<OR<6.96)

Taking in account the difficulties during winter time it was measured in this study average number

of hours when the patient had electricity during a day .

Chart 1

Average number of hours of electricity during a day in winter in the year preceding the year of the first manifestation of eye disease for cases and controls.

average number of hours of electricity per day

62% of cases and 46% of controls had electricity less then 10 hours a day during the winter time in

the year precise to the year of the first manifestation of eye problems.It was found the positive

association between this factor and glaucoma .OR=3.02 .But

Cornfield 95% confidence limits for OR   :   0.31<OR<14.99 ,so the association is not significant .

It was taken in account that during winter the people used different sources of heating , so it was

measure the influence of different sources of heat(oil ,wood ,electricity) on glaucoma .

Chart 2

**Source of heating during winter time in the
year preceding the year of the first
manifestation of eye disease for cases and
controls.**
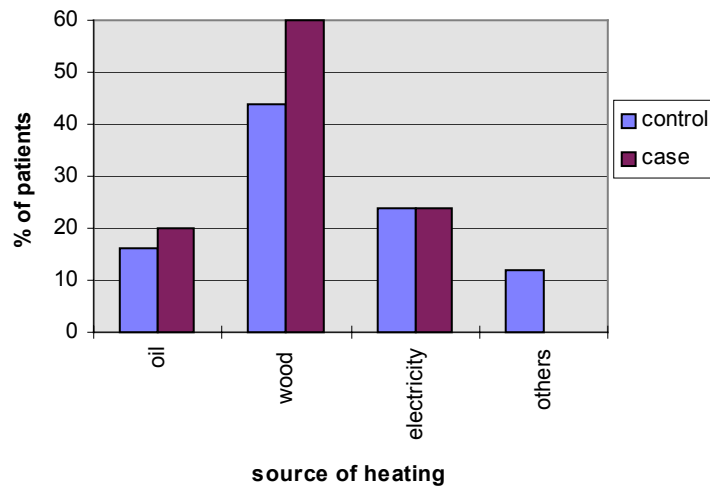
Due to the Chart 2 16% of glaucoma patients and 20 % of controls used oil;

60% of cases and 44% of controls used wood;24% of cases and 24% of controls used electricity

;12% of controls used other sources of heat .From 2 by 2 table it was found out positive association

(OR=2.05) but not statistically significant :(0.58<OR<7.44) between using wood as a source of

heating and POAG.

There were no association found between glaucoma and financial help(from any source).

It was also measured the influence of family monthly income. All patients were divided in 4

groups:1)who had the income less then 50$; 2) who had the income from 50$ to 100$

3) who had the income from 101$ to 200$; 4) who had the income more then 200$

It was counted the income per capita by dividing the monthly family income on number of people in

family.

**Graph 1.Monthly income per person for cases
and controls,$**
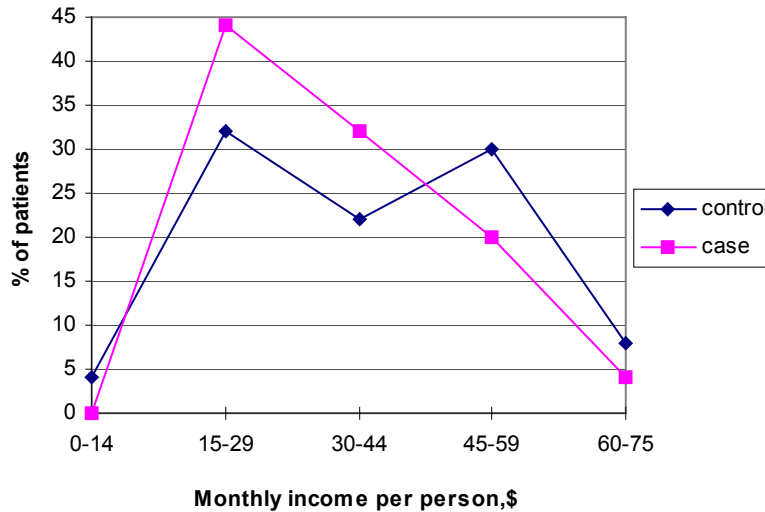
24% of cases and 19% of controls had the income per capita less then 50$ .Then it was developed

the 2 by 2 table There were no association between income(which measures in some sense socio-

economic status of person)and glaucoma:

OR=0.52 ; Cornfield 95% confidence limits for OR : 0.58<OR<7.44

In order to be sure that all this results was the reality ,it must be done the multivariate analysis in

order to exclude the effects of cofounders and interaction factors.

Results:

The case-control study of glaucoma patients showed that POAG is age related disease because no

one from the sample were less then 50 years old ,although no statistical association was established

between age and disease.

The most interesting results from this survey was the determination of a strong statistically

significant association between glaucoma and cataract .

The other result which was statistically significant it was an association between the hypertension in anamnesis of patient and glaucoma .So hypertension can be determined as a risk factor for future development of glaucoma .The patients who have the hypertension disease must be included in high risk population for POAG .

There were found out positive but not statistically significant association between spring catarrh in childhood ;regular usage of medicine, especially antihypertensive drugs ;stress factor and POAG. No association was found out between family history and POAG .

Such bad habits as alcohol consumption ,smoking and coffee drinking don't have statistically significant association with development of glaucoma.

No association was established between glaucoma and economic status ,which was measured by monthly income per person .

According to data from this survey the socio-economical difficulties which experienced Armenia the last 5 winters influenced the development of POAG.There were established positive association between average number of hours when the patient had electricity during a day in a winter time in the year precise to the year of the first manifestation of eye problems and using wood as a source of heating and developing POAG .

Discussion:

This case-control study is the first case-control study of glaucoma patients in Armenia .It was done in order to determine the main risk factors for glaucoma in Armenia . It would be interesting to mention the following point .In this case-control study it was

determined the association between glaucoma and cataract . It is impossible to determine what was the first developed in patients glaucoma or cataract ,because the patients often did not know due to what they experienced eye problems .So ,it is difficult to say what was the risk factor :cataract for

glaucoma, or glaucoma for future development of cataract One of the possible explanations for this results could be the following :this data corresponds to the new research works of Dr.Bunin [21]and works of Dr.Kuppens [43] about the changes in the chemical compounds of the aqueous of the anterior chamber of eye after POAG development .So it seems to be like glaucoma is the risk factor for cataract .There is another possible explanation for this result .Both glaucoma and cataract may be explained as the part of the sclerotic process of the organism. This result need more detailed analysis and it would be interesting to do future research work .

The other important result from this study is the statistically significant association between blood hypertension and POAG .In literature hypertension is mentioned as a risk

factor for having glaucoma .The exact physiological mechanisms have not determined yet. There were different theories .They all and the results of this study, as it was mentioned above , supported some theories ,developed recently that glaucoma was not a single process ,but a part of a big sclerotic process in the hole organism .The normal human trabecular meshwork undergoes several changes with age .It becomes more shorter ,more rhomboidal form. The local closures in Shlemm's canal become more common . So ,if there were a sclerotic process in vessels and the outflow from the eye becomes more difficult these both could have synergistic effect and decreases outflow in a such level that it may bring to glaucoma   [43,44].According to the theory of Dr.Prigojin, the glaucoma is a part of the vascular disease of the hole organism[21].

There were some immunological theories explaining the POAG .Increased gamma globulin and plasma sells in the trabecular meshwork of the eyes with POAG has been reported and high percentage of patients with POAG have positive antinuclear antibodies reactions [22,23,35].In order to establish any association between POAG and immunological status of the organism it has been tried to defined spring catarrh in childhood . Spring catarrh has been known as an allergy disease ,so it is an abnormal immunological reaction to some reagents If the person experienced any

immunological problems in the past it may influences the development POAG in future . Analyses of this study showed some positive association between this factor and POAG ,but association was not statistically significant. This may be due to small sample size ,so this need to be more detailed studied

There were not found any statistically significant association between behavioral factors such as smoking ,coffee drinking ,alcohol usage and exercising .But taking in account the small sample size it would be difficult to absolutely reject the possible influence of this factors on the development and manifestation of glaucoma .Especially exercising ,because approximately no one both from cases and controls did the exercising.

Due to survey data it has been determined some influences of life conditions such as source of heating and time of lightning during winter time .It has been determined positive but not statistically significant association between this factors and glaucoma.

There were also been analyzed the influence of regular medicine usage in regular base.It was defined the association between usage of antihypertensive drugs and glaucoma. It may be due to statistically strong association between hypertension and developing glaucoma .So it was not the influence of drugs but the influence of the disease .

There were found out positive but not statistically significant association between stress-factors and glaucoma .Especially it must be mentioned the questions about the absence of family members from Armenia and military service in the Karabach of the close relatives These relation must be analyzed in the future works .

Although ,there were determined in the literature the influence of family history on glaucoma and the relatives of glaucoma patients were defined to be a risk group for glaucoma ,but there were not established statistically significant association between family history and glaucoma in this study .This may occur due to limitations of the study and need further multivariate analysis .

The *limitations* of this study were the following:

- The fact that must mentioned primarily was the small sample size.It was impossible to have larger sample size due to shortage of time and small number of patients in the Eye Clinic # 8 during 1996-1997 time period .So ,it was taken all available sample.

- The other limitation which need to be more detailed analyzed was that the cases were only from Yerevan . This was due to that fact that it would be impossible to contact with the patients who were not from Yerevan .This may create selection bias .

- The other limitation exists due to taking the cases from the time period from January 1997 to October 1997 and taking the controls from much more shorter time period September1997-October 1997.So maybe cases may influence some impact during this time period.

- As all the analytic studies ,the case control study has the greatest potential for biases in the ascertain of the historical information.The patient may remember the information that on his own opinion has had the connection with the disease .

Recommendations:

Taking in account the results from this case-control study and glaucoma literature it could be recommended for the ophthalmological services of Armenia the following interventions.

- As it was mentioned above early detection and treatment of glaucoma is the only way to prevent blindness .The lack of early warning signs with most forms of glaucoma necessitates the use of screening programs to direct the disease in its initial stage .It must be developed the community based screening programs .Glaucoma screening programs must be directed at the high risk segments of population .The results of this study showed the possible connection between stress-factor and glaucoma .Taking in account that the hole Armenian population has been stressed during the last years of economical difficulties and the war in Karabach it would be perfectly to do mass screening programs for the population aged more then 50. According to the

results of this study the special attention must be given to the following population group which includes patients with blood hypertension and other vascular diseases, people who have already been diagnosed cataract ,and who experienced spring catarrh in childhood.The one way is to do once a year in-house screening in industrial settings, using employee health clinics ,although it is limited to those individuals who are in position to take advantage of it .The other way is to encourage nonophthalmologist physicians (e.g., family physicians , internists ,etc) to include glaucoma screening as part of their routine examination .Although this examination will be only the first step to the diagnosing glaucoma ,because the final diagnoses must be set only after examination in specialized eye department.The main purpose for this examination is not to split glaucoma .

- In order to have possibility to implement this screening programs it is necessary to establish an educational programs for family doctors and physicians of the industrial factories and their nurses .It can be done in the base of the National Institute of Health of Armenia .

- For the ophthalmology department it can be recommended to do obligatory screening for glaucoma all eye patients(although it has been already implemented in the Eye Clinic #8). To take special attention to those patients who have cataract and those eye patients who have blood hypertension in anamnesis

All these actions may help to decrease the level of disability from glaucoma .

Conclusions:

The main conclusion which was made from this case-control study was the strong association between glaucoma and cataract ,which need to be more analyses and studied The mechanism of developing that association need more research work.So people with cataract must be determined as the possible risk group for glaucoma and vice versa .

The other big risk group was determined by the people who has had blood hypertension in the anamnesis .This was mentioned in the literature concerning glaucoma earlier but the mechanisms of that connection was not known for sure yet .

The influence of socio-economical difficulties in Armenia and the war in Karabach on the health of people of Armenia was not studied yet .So ,as this case-control study showed , it can be expected some increase in prevalence of glaucoma due to emotional stress-factor .

In order to avoid the increase of disability from glaucoma it is necessary to do screening programs for the high risk population including patients with blood hypertension and patients with cataract.

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Appendix

Questionnaire for the project "Case-Control Study of Glaucoma Patients".

Place of interview_____
Date of interview (dd/mm/yy)_____
Interviewer_____
Group _____
Data Entry #_____

Introduction:I am a student of Public Health Department from American University of Armenia.I am going to do this survey for my individual project .I would like to ask you a few questions about your health, habits and your life in general.Your individual experience,cooperation, and participation in this survey will be valuable in my project.Duration of this interview will be about 15 minutes.

Socio-Demografic Information

1.Name:_____

2.Age:_____

3.Gender: 1.male
              2.female
4.Adress: current_____

            for how long do you live here?_____

        previous_____

            for how long do you live there?_____

5.Phone:_____

6.Education: 1.Secondary school
               2.Colledge
               3. institute (university)
7.Occupation: current (how long?)_____
previous(how long?)_____ 8.Nationality:_____

_____

Health Status

9.Diagnoses (Ophthalmologic):_____

_____
10.When the first time you have been diagnosed glaucoma?_____

11.When you first feel eye problems?_____
12.Other eye diseases: 1.Trauma
                     2.Vascular eye diseases
                     3.Cataract
                     4.others (please,mention what disease)_____
                     5. no disease
13.Did you have spring catarrh in your childhood?
                 1.Yes
                 2.No (skip to # 17)
                 99.Don't know
14.If yes,did you use any treatment for it?
        1.Yes
                 2.No (skip to #17)
                 99.Don't know
16.If yes,what type of treatment did you use?
                 1.Corticosteroids
                 2.Antibiotics
                 3.others (please,mention what did you use)

17.Other diseases:
                 1.Hypertension
                 2.Vascular diseases
                 3.Diabetes
                 4.other endocrine disorders
                 5.Rinal diseases
                 6.others(please,mention what diseases)
                 7.no disease

Family History

17.Place of birth_____

18.Parents place of birth_____

19.Eye diseases in first degree relatives:
                 1.Yes
                 2.No (skip to # 22)
                 99.Don't know

20.If yes,mention who :
        1.Mother
        2.Father
        3.Brother
        4.Sister
        5.Mother's relatives
        6.Father's relatives
21.If yes,mention the type of their disease:
        1.Glaucoma.
        2.Cataract.
        3.vascular eye disease
        4. others

Life Style

22.Do you do any type of exercising?
        1.Yes.
        2.No.

23.Do you smoke?
        1.Yes
        2.No. (skip to #26)
24.If yes,how many cigarettes per day do you smoke on average?
        1.less than 10.
        2.11-20
        3.more than 20.
25.For how long do you smoke?
        1. less than 5 years
        2.6-10
        3.more than 10 years
(skip to # 29)
26.If no, have you ever smoke?
        1.Yes
        2.No. (skip to # 30)
27.For how long did you smoke?
        1. less than 5 years
        2.6-10
        3.more than 10 years

28. How many cigarettes per day did you smoke on average?
        1.less than 10
        2.11-20
        3.more than 20
29.When did you begin to smoke?
        1.10-20 years old

2.21-30 years old

3.elder than 30

30.Do you drink coffee?

     1.Yes. (skip to #32)

     2.No.

31.If no,did you use it?

     1.Yes.

     2.No. (skip to #33)

32.How many cups during a day on average?

     now_____

     before diagnosing glaucoma_____

33.How often do you use alcohol ?

     1.every day

     2.once in two days-once a week

     3.once in two weeks-more rarely

     4.never

34.How often did you use alcohol before diagnosing glaucoma?

     1.every day

     2.once in two days-once a week

     3.once in two weeks-more rarely

     4.never

35.Did you use any type of drugs regularly before diagnosing glaucoma?

     1.Yes.

     2.No.

36.If yes, please mention the type of drugs:

     1.Antihypertensive

     2.Corticosteroids

     3.Analgetics

     4.Narcotics

     5.Insulin

     6.others

Stress (I am going to talk about the year before you first time had any eye problems)

37.Does anyone from your family work outside of Armenia during the year before you first time had any eye problems?

     1.Yes.

     2.No.

38.During the year before you first time had any eye problems,did you have any big financial lost?

     1.Yes.

     2.No.

39.Do you live in your own flat or you rent one?

     1.Yes.

     2.No.

40.During the year before you had any eye problems did you loose or change the job?
       1.Yes.
       2.No.
41.Did anyone from your close relatives take part in the war in Kharabach during the year before you had any eye problems?
       1.Yes
       2.No.
42. During the year before you had any eye problems, has anyone from your close relatives been hurt or injured by a war-related event?
       1.Yes.
       2.No.
43. During the year before you first time had eye problems,did anyone from your close relatives have accident or injure,that wasn't war-related?
       1.Yes.
       2.No.
44.Did you have deaths among your close relatives during the year before you first time had eye problems?
       1.Yes.
       2.No.
45.On average how many hours per day did you have electricity on winter months a year before you first time had eye problems?
       1.less than 4 hours
       2. 4-8 hours
       3. 9-12 hours
       4. more than 12 hours
46.What was the source of heating in your house in that year?
       1.Oil
       2.Wood
       3.Electricity
       4.others (please, mention the source)

47.Have you anyone who help you financially?
       1.Yes.
       2.No.
48.How much does your family spend monthly on average?
       1.less than 50$
       2.50-100$
       3.101-200$
       4.more than 200$
49.How many people are in your family?

(Thank you very much for your co-operation with us!)