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Original Article

Determine Risk Factors of Glaucoma in Adult Patients at Tikrit City

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Abstract

Background: Glaucoma, the second most common cause of blindness and the main cause of irreversible blindness, has a significant impact on people all over the world. Primary open-angle glaucoma is the most prevalent glaucoma subtype among adults (40–80 years old). Primary angle-closure glaucoma is linked to the closure of the anterior chamber angle of the eye and is known to have a higher risk of bilateral blindness, which places a severe burden on families and society.

Objectives: To determine the risk factors of glaucoma in adult patients at Tikrit city

Methodology: cross-sectional study design was adopted from 15 September 20 to 15 April 2025 at Tikrit Teaching H**ospital in Tikrit District, Salah Eden. To achieve the objectives of the present study. a purposive sample** involving 300 glaucoma patients . . Data collection tools composed from (6) parts, which includes the following: Part one demographic information of patients, Part two medical history, Part three lifestyle of patients with glaucoma , Part four signs and Symptoms of patients with glaucoma , Part five risk factors of patients with glaucoma ,Part six daily activities of patients with glaucoma .The study results were examined using both a descriptive analysis and an inferential analysis procedure (e.g., Binomial test ,Chi-Square test and Contingency Coefficients) a p-value of <0.05 was detected to be statistically significant.

Result: The results shows 143(53.0%) from sample were male and 127(47.0 %) were female. With regard to the age group high numbers at the ages falling within the third, fourth, and fifth age groups, since they are accounted 174(64.44%), most of them were a housewife, and they are accounted 106(39.3%), and of them having high numbers at the low education levels of under a primary school, since they are accounted 151(55.9%). also the results shows the common risk factors for glaucoma Diabetes Mellitus and represent 103(38.1%) from total sample , increase Blood Pressure item and represent 139(51.5%), , 120(44.4%) have previous eye surgery and 253(93.7%) have elevated of intraocular pressure (IOP),Family history indicates higher percentage of morbid population compared to what this risk factor records, and accounted 48(17.8%).Since a high significant different at P<0.01 are accounted compared within there an expected outcomes under random distribution are assumed, and rather to that result, it could be says that regarding of adults patients with glaucoma disease and their

Conclusion: This study concludes risk factors of glaucoma may increase with age and most risk factors for glaucoma were diabetes mellitus , increase blood pressure, previous eye surgery and increase intra ocular pressure .

Keywords: Determine, Risk Factors, Glaucoma, Adults, Tikrit City

Introduction:

Individuals' treatment-seeking behavior is significantly influenced by their level of awareness and understanding regarding glaucoma. In many nations around the world, there is a general lack of knowledge. It is not exclusive to any one area; earlier research conducted in Africa revealed that both Caucasians and Nigerians have low levels of awareness and knowledge regarding glaucoma. There are an estimated 11.9 million cases of glaucoma in India, and the majority are discovered when it is too late (Soqia et al., 2023) .

Elevated intraocular pressure (IOP) damages the optic nerve in glaucoma, a chronic, asymptomatic, slowly progressing eye condition. A severe and irreversible pattern of visual field (VF) abnormalities and blindness is the result of this increased IOP. The perception of the quality of life associated with health and vision has a major influence on everyday functioning, well-being, and health (Kio et al., 2020).

The two main types of glaucoma are primary and secondary. These can be divided into two major subgroups based on the underlying anatomy and pathophysiology: open-angle and angle-closure. While secondary glaucoma has a known cause of elevated IOP that results in optic nerve damage, primary glaucoma, also known as idiopathic glaucoma, is caused by open-angle and closed-angle glaucoma without a known cause (Allison et al., 2020) .

Primary open angle glaucoma and Primary angle-closure glaucoma are two different types of glaucoma. The main underlying issue with PACG is primary angle closure; high intraocular pressure (IOP) is the secondary issue that arises from angle closure. If the angle closing process can be stopped in its early phases, PACG can be prevented to some extent (Sun et al., 2017) .

IOP, ocular risk factors include ocular perfusion pressure, blood flow, myopia, central corneal thickness, and optic disc hemorrhages. Age, smoking, genetics, African ancestry, low blood pressure, atherosclerosis, lipid dysregulation, diabetes, and stress are examples of systemic risk factors(Grzybowski et al., 2020) .

A significant relationship has been observed by epidemiological research between intraocular pressure (IOP) and systemic blood pressure (BP), as high blood pressure causes an increase in venous pressure, which in turn reduces the excretion of aqueous humor. Nevertheless, current research indicates that glaucoma and IOP are independent(Nislawati et al., 2021) .

The inability to seek medical attention and treatment due to a lack of awareness of the disease's nature and risk factors is one of the major causes of late presentation. Not only can a lack of knowledge about the illness delay diagnosis, but it can also impact the use of medical services(Alqahtani et al., 2021).

The Study objectives were to determine risk factors of glaucoma at Tikrit city, and to find out the relationship between glaucoma and demographic characteristics of patients.

Methodology:

Before starting and embarking upon and conducting the steps of the study, A proposal detailing the title and methodology of the research has been submitted to the Scientific for Graduate Studies at the University of Mosul's College of Nursing. Following which the research title has received formal approval. Furthermore, the University of Mosul's collegiate council for medical research ethics granted ethical approval for the study to be carried out. Accomplishment approval was obtained from the Salah-Eden Health Directorate's (Planning Department, Section of Health Research). The permission was later forwarded to Tikrit Teaching Hospital to ensure their approval in order to obtain formal permission for data collection. The study used a descriptive cross-sectional study design to identify the risk factors for glaucoma in the adult population who are diagnosed with glaucoma. The study adopted for the period extended from 15 September 2024 to 5 January 2025. The study was conducted at Tikrit Teaching Hospital in Tikrit District, Tikrit is the capital of Salah Eden Governorate. The data of the current study were collected from one hospital in the Tikrit district for the period from 15

September 2024 to 5 January 2025 .A purposive sample for a cross-sectional study was taken, where the samples consisted of 300 cases with glaucoma disease according to the inclusion and exclusion criteria of adult populations with glaucoma disease in the Tikrit district. The study instrument was a structured interviewing questionnaire and composed of (6) parts, which included the following: Part One this part included the following items :Demographic information of patients, Part Two focuses on medical history and contains (10) items, Part Three this part focus on Lifestyle of patients with glaucoma include , Part Four this part focuses on Signs and Symptoms of patients with glaucoma , Part Five this part focuses on risk factors of patients with glaucoma ,Part six this part focuses daily activities of patients with glaucoma . The interview was conducted to fill out the questionnaire with patients with glaucoma in the Ophthalmology consultation clinic, and each participant needed approximately (15-30) minutes to complete the data collection.

The pilot study was carried out from 15 September 2024 to 25 September 2024. The pilot study was conducted before the start of the study on a convenient sample of 10 individuals who were selected among studied patients with glaucoma disease from Tikrit Teaching Hospital. The samples of the pilot study were also excluded in the current study. To determine the reliability of researcher dependency (The Reliability) compare between observer and co-observer (Inter Examiners). To determine the reliability of respondents dependency (The Reliability) compare between test-retest (Intra Examiner).Validation of the tool of the study was performed to provide confidence in the results through a panel of fourteen experts was chosen from different specialties to examine content validity for clarity, relevance, and applicability of it. Statistical Data Analysis: After data collection was complete, responses were anonymized and encoded for statistical analysis. The data was examined using Statistical Package for the Social Sciences (SPSS) version (22.0)by using Descriptive data analysis and Inferential data analysis.

Results:

Table 1: Distribution of studied sample according to (SDCv.) Observed Frequencies, Percent's and comparison's significant (N=270)

SDCv.	Classes	No.	%	C.S. (*) P-value
Gender	Male	143	53	P=0.361 (NS)
	Female	127	47	
Age Groups	20 _	12	4.4	χ^2= 69.578 P=0.000 (HS) Mean ± SD 54.23 ± 14.51
	30 _	34	12.6	
	40 _	57	21.1	
	50 _	60	22.2	
	60 _	57	21.1	
	70 _	40	14.8	
	80 _ 90	10	3.7	
Occupation	Earner	79	29.3	χ^2= 112.13 P=0.000 (HS)
	Housewife	106	39.3	
	Employee	43	15.9	
	Retired	42	15.6	
Educational level	Illiterate	77	28.52	χ^2= 30.111 P=0.000 (HS)
	Primary	74	27.41	
	Intermediate	47	17.41	
	Preparatory	36	13.33	
	University and above	36	13.33	
Marital Status	Single	21	7.78	χ^2= 30.111 P=0.000 (HS)
	Married	194	71.85	
	Others	55	20.37	

(*) HS: Highly Sig. at P<0.01, S: Sig. at P<0.05; NS: Non Sig. at P>0.05;Testing based on One-Sample Chi-Square test, and Binomial test.

Table 1: Shows most of glaucoma patients were males and constitute 143(53.0%) with regard to the age group high numbers at the ages falling within the third, fourth, and fifth age groups, since they are accounted 174(64.44%), as well as age of studied patients is estimated at the average 54.23 yrs. with standard deviation 14.51 yrs , and the majority of them were a housewife, and they are accounted 106(39.3%), and of them having high numbers at the low education levels of under a primary school, since they are accounted 151(55.9%), and finally most of them are married, and accounted 194(74.85%). All of studied adults patient's SDC has a restricted distribution, since a significant differences are accounted between the observed, and there an expected frequencies distribution at P<0.01, exceptional of gender variable, since accounted no significant different at P>0.05.

Table 2 : Distribution of the studied sample according to "Medical History-Diagnosis Periods" with comparisons significant (N=270)

Medical History	Groups	No.	%	C.S. (*) P-value
Diagnosis Periods	Less than 6 months	81	30.0	χ^2= 239.074 P=0.000 (HS)
	7 months	14	5.2	
	9 months	20	7.4	
	11 months	13	4.8	
	12 months and more	142	52.6	
	Total	270	100	

(*) HS: Highly Sig. at P<0.01;Testing based on One-Sample Chi-Square test. Red color groups denoted a measuring of failure scale(s) assessed.

Table 2: shows the diagnosis periods and appear delay in the diagnosis period, as more than half of the respondents reported having had their diagnosis after a year or more, and accounted 142(52.6%). Since high significant different at P<0.01 are accounted compared within there an expected outcomes, and according to that, it could be says that regarding of adults patients with glaucoma disease and their diagnosis periods indicated delay in the diagnosis period, as more than half of the respondents reported having had their diagnosis after a year or more, and accounted 142(52.6%).

Table 3 : Distribution of the studied sample according to "Medical History-Family History" with comparisons significant (N=270)

Medical History	Groups	No.	%	C.S. (*) P-value
Family History	No	222	82.2	P=0.000 (HS)
	Yes	48	17.8	
	Total	270	100	

(*) HS: Highly Sig. at P<0.01;Testing based on Binomial test. Red color groups denoted a measuring of failure scale(s) assessed.

Table 3: shows Family history indicates higher percentage of morbid population compared to what this risk factor records, and accounted 48(17.8%).Since a high significant different at P<0.01 are accounted compared within there an expected outcomes under random distribution are assumed, and rather to that result, it could be says that regarding of adults patients with glaucoma disease and their family history indicates higher percentage of morbid population compared to what this risk factor records, and accounted 48(17.8%)

Table 4 : Distribution of studied sample with "Medical History-Chronic Diseases" and comparison's significant (N=270)

Medical History "Chronic Diseases"	Responses	No.	%	C.S. (*) P-value
A. Heart diseases	No	210	77.8	P=0.000 (HS)
	Yes	60	22.2	
B. Kidney diseases	No	239	88.5	P=0.000 (HS)
	Yes	31	11.5	
C. Eye diseases	No	41	15.2	P=0.000 (HS)
	Yes	229	84.8	
D. Thyroid diseases	No	251	93	P=0.000 (HS)
	Yes	19	7.0	
E. Obesity	No	256	94.8	P=0.000 (HS)
	Yes	14	5.2	
F. Joint diseases (due to the use of steroid medications)	No	256	94.8	P=0.000 (HS)
	Yes	14	5.2	
G. Asthma	No	260	96.3	P=0.000 (HS)
	Yes	10	3.7	

(*) HS: Highly Sig. at P<0.01;Testing are based on the Binomial test. Red color groups denoted a measuring of failure scale(s) assessed.

Table 4: shows chronic eye diseases too highly positive responses among studied sample, since they are accounted 229(84.8%), and according to that, it could be says that regarding of chronic eye diseases, most of studied patients had been restricted towards their eye diseases, whether these diseases are the precursors to infection or whether glaucoma is the precursor to other eye diseases. All of the studied sampled due to "Chronic Diseases" has a restricted distribution, since highly significant differences are accounted between the observed at P<0.01 compared with their expected outcomes under assuming randomly distribution.

Table 5 : Distribution of studied sample with "Medical History- Injuries & Surgeries" and comparison's significant (N=270)

Medical History "Injuries & Surgeries"	Responses	No.	%	C.S. (*) P-value
Do you have any injuries or surgeries related to your eyes?	No	142	52.6	P=0.429 (NS)
	Yes	128	47.4	
Injury related to your eye ?	No	162	60.0	P=0.001 (HS)
	Yes	108	40.0	
Surgery related to your eye ?	No	241	89.3	P=0.000 (HS)
	Yes	29	10.7	

(*) HS: Highly Sig. at P<0.01; NS: No Sig. at P>0.05;Testing are based on the Binomial test. Red color groups denoted a measuring of failure scale(s) assessed.

Table5: shows about half of studied sampled had preceding medical history, since they are accounted 128(47.4%. Most of the studied adult's patients concerning of medical history - injuries & surgeries has a restricted distribution, since high significant differences are accounted between the observed, and there an expected frequencies distribution at P<0.01, exceptional for overall

responses either for who had assigned for having injuries, surgeries or both, since no significant different at P>0.05 are obtained, and according to that, about half of studied sampled had preceding medical history, since they are accounted 128(47.4%).

Table 6 : Distribution of studied sample with "Medical History-Taking Medications" and comparison's significant (N=270)

Medical History "Taking Medications"		Responses	No.	%	C.S. (*) P-value
Taking Medications	A. Steroid medications	No	238	88.1	P=0.000 (HS)
		Yes	32	11.9	
	B. Blood pressure medications	No	150	55.6	P=0.078 (NS)
		Yes	120	44.4	
	C. Diabetes medications	No	169	62.6	P=0.000 (HS)
		Yes	101	37.4	
	D. Eye drops	No	48	17.8	P=0.000 (HS)
		Yes	222	82.2	
Have you been using medications previously (Less than a year ago for glaucoma)?		No	65	24.1	P=0.000 (HS)
		Yes	205	75.9	

(*) HS: Highly Sig. at P<0.01; NS: No Sig. at P>0.05;Testing are based on the Binomial test. Red color groups denoted a measuring of failure scale(s) assessed.

Table 7 : Shows about half of the studied sampled had taking blood pressure medications , since they are accounted 120(44.4%). In addition to that, "Eye Drops" medications had reported highly significant different at P<0.01 with respect of increasing a positive responding, since they are accounted 222(82.2%), as well as who were assigned a positive responding towards whom used medications previously (Less than a year ago for glaucoma), since they are accounted 205(75.9%).Most of the studied adult's patients concerning of medical history - taking medications has a restricted distribution, since highly significant differences are accounted between the observed, and there an expected frequencies distribution at P<0.01, exceptional for "Blood pressure" medications, since no significant different at P>0.05 are obtained.

Discussion:

Discussion of Socio-demographic characteristic of patients.

according to socio demographic characteristic table 1 the result shows most of glaucoma patients were males and constitute 143(53.0%) with regard to the age group high numbers at the ages falling within the third, fourth, and fifth age groups, since they are accounted 174(64.44%), as well as age of studied patients is estimated at the average 54.23 yrs .

The result is agreement with previous study conducted by conducted by (Kyei et al., 2021) When researchers examined the clinical and socio demographic characteristics of glaucoma patients at a Zimbabwean tertiary referral facility, they discovered that 165 (38.0%) of the patients were women and 267 (61.8%) were males Women are less fortunate than men in many ways, and they typically experience worse health and more distress(Mussa et al ,2023). The average age of the patients (± SD) was 62.66 ± 15.94 years, with a range of 10 to 110 years.

According to the researcher, these findings were explained by the rising risk of glaucoma with advancing age, (Tham et al., 2014) As the frequency of glaucoma is higher with age, it is predicted that 64 million people worldwide aged 40 to 80 had the condition in 2013, and that figure may increase to 76 million by 2020 and 112 million by 2040.

(Choi et al., 2020) is agreement with our study conducted study Evaluation of the Relationship Between age and risk of Glaucoma and find patients' age group—≤40, 41–50, 51–60, 61–70, 71–80, and 81–92 years. Thereafter, the results were compared between the age groups. The mean in patients aged ≤40 years; it was 815.309 ± 75.723, 798.115 ± 66.040, 770.942 ± 52.774, 726.716 ± 63.979, and 715.968 ± 63.403 μm in patients aged 41–50, 51–60, 61–70, 71–80, and 81–92 years, respectively. As age increased, the TM height tended to decrease ($P < 0.001$). Compared to younger patients, elderly patients' TM height was significantly lower. As a result, risk factors may alter as people age and may increase the prevalence and risk of glaucoma.

With regard for occupation the results appear the majority of them were a housewife, and they are accounted 106(39.3%), explanation of this result the occupation or lifestyle of a person can influence the risk factors for glaucoma, certain environmental and lifestyle factors associated with an occupation may have an impact on eye health. For instance, housewives who spend a lot of time indoors and may have irregular sleep patterns, high stress, or insufficient physical activity might face indirect risk factors for eye conditions, including glaucoma. On the other hand, individuals with jobs that require prolonged screen time or exposure to specific chemicals or environmental factors may have an increased risk of developing eye conditions.

(Oh et al., 2019) demonstrate in their study the prevalence of glaucoma generally decreased with increasing levels of education and income, but this trend did not hold at the top two levels of education and income, wherein the prevalence was either the same or somewhat higher. Occupation types were shown to be significantly associated with glaucoma ($p < 0.0001$), and among all the occupations in the survey, farming, forestry, fishing showed the highest percentage of those with glaucoma (4.9%), and service/retail showed the lowest percentage (1.3%). In the multivariable adjusted model, the odds of glaucoma decreased with increasing income level, and increased at the highest income quartile, though the odds were significant only for the top two quartiles. The odds of glaucoma showed neither a nonlinear relationship nor statistical significance with education level when adjusted for other factors. In contrast, age and gender remained significant even after adjusting for other factors.

Also the result appear most of them having high numbers at the low education levels of under a primary school, since they are accounted 151(55.9%) , this result is agreement with result of study conducted by Lerner and (Lerner & Yankelevich, 2013) their study about what do patients know about glaucoma and find in their study 54 patients (29 males) completed the questionnaire. 42.6% completed primary school, 37% secondary school and 20.4% tertiary studies.

finally most of them are married, and accounted 194(74.85%) explanation of this result because of glaucoma more common in old age and most of them were married in our community because of our religion obligate the married .

(Berchuck et al., 2021) disagreement with our result and mention risk factors considered in the analysis were gender, race, marital status, age, income and education. Two clinical variables baseline IOP and diabetes history were included ,of the 7,621 patients with glaucoma who met the inclusion criteria, 4% were legally blind at presentation. Male gender, African American ethnicity, single marital status, older age, lower income and lower education were all risk factors. These associations remained significant in a multivariable regression.

Table2 : Discussion of descriptive statistics results for distribution of the studied sample according to "Medical History-Diagnosis Periods" . And shows the diagnosis periods and appear delay in the diagnosis period, as more than half of the respondents reported having had their diagnosis after a year or more, and accounted 142(52.6%). Early detection and treatment, which may include medications, laser therapy, or surgery, are essential to preventing significant vision loss. Regular monitoring is vital for people diagnosed

with glaucoma to track any progression and adjust treatment as needed.

Table3: Discussion of descriptive statistics results for distribution of the studied sample according to "Medical History-Family History" . And shows Family history family history indicates higher percentage of morbid population compared to what this risk factor records, and accounted 48(17.8%).

This result is agreement with (Wubet & Assefa, 2021) conducted their study was conducted in a hospital to find glaucoma and its predictors in adult patients who attend the ophthalmology outpatient department. There were 66 cases with glaucoma (26%), with a 95% CI of 17.7 to 35.4%. Age (AOR: 3.21, 95% CI: 1.92–5.99), elevated intraocular pressure (AOR: 3.09, 95% CI: 1.45–6.59), and a positive family history of glaucoma (AOR: 3.72, 95% CI: 1.03–3.53) were all statistically significant risk factors for glaucoma development.

Table 4: Distribution of studied sample with medical history-chronic diseases and shows chronic eye diseases too highly positive responses among studied sample, since they are accounted 229(84.8%), and according to that, it could be says that regarding of chronic eye diseases, most of studied patients had been restricted towards their eye diseases.

This is when another condition or event increases eye pressure, which leads to glaucoma. Conditions that can cause it include eye injuries, Pigmentary dispersion syndrome, uveitis, certain medications (especially corticosteroids and cycloplegics), eye procedures and more.

Table5: Distribution of studied sample with "Medical History- Injuries & Surgeries" and comparison's significant and shows about half of studied sampled had preceding medical history, since they are accounted 128(47.4%).

The explanation of the upper result refers to some glaucoma patients who may have had glaucoma operations such as trabeculectomy or preservation. Cataract surgery causes inflammation, which may be detrimental to these operations, as it may cause them to scar and make the trabeculectomy or the preservation less effective. Hence, all these patients should have their cataract surgery performed by a glaucoma specialist who would deliver special anti-scarring agents at the end of their surgery, monitor them closely in the post-operative period, and take steps if there are signs of scarring.

Table 6: show represent about half of the studied sampled had taking blood pressure medications , since they are accounted 120(44.4%). In addition to that, "Eye Drops" medications had reported highly significant different at P<0.01 with respect of increasing a positive responding, since they are accounted 222(82.2%), as well as who were assigned a positive responding towards whom used medications previously (Less than a year ago for glaucoma), since they are accounted 205(75.9%) .

(Hsu & Desai, 2023) mention the Certain classes of medications, such as cholinergic, anti-depressants, sulfa-based drugs, steroids, and sympathomimetic, which are used to treat systemic conditions, are known to cause acute angle closure glaucoma. Dr. McKinney says “Steroids are the main medicine that can raise eye pressure for patients with open-angle glaucoma,” Dr. McKinney says. Taking steroid drugs in any form – orally, topically, through an inhaler or IV – can worsen glaucoma for these patients. Steroids applied closest to the eye carry the highest risk. Drugs taken by mouth or through an IV enter the eye through the bloodstream — about as close to the eye as you can get. But skin creams and inhalers are also worrisome. “Steroids applied on or around the face or inhaled through the mouth or nose are usually riskier than steroids injected into joints by an orthopedist,” Dr. McKinney says. .Taking steroids at high doses or for long periods of time can further complicate open-angle glaucoma. So be sure to let your ophthalmologist know if you’re taking steroids for allergies, joint disease, asthma, autoimmune disorder, inflammatory bowel disease or any other condition.

Conclusions:

Most of glaucoma patients were males and constitute 143(53.0%) with regard to the age group high numbers at the ages falling within the third, fourth, and fifth age groups, since they are accounted 174(64.44%), as well as age of studied patients is estimated at the average 54.23 yrs . with standard deviation 14.51 yrs. Rising risk of glaucoma with advancing age, therefore, risk factors may change with age and may contribute to increased glaucoma risk and prevalence. Majority of patients were a housewife and represent 106(39.3%), high numbers from patients were at the low education levels of under a primary school, since they are accounted 151(55.9%), finally most of them are married, and accounted 194(74.85%).Prevalence of "Primary (Idiopathic) open angle glaucoma" were more than half of studied sampled and represent 138(51.1%) ,while the prevalence of "Pesudoexfoliation related open angle glaucoma" type are accounted 35(13.0%).More than half of the respondents reported having had their diagnosis after a year or more, therefor regular monitoring is vital for people diagnosed with glaucoma to track any progression and adjust treatment as needed. Diabetes mellitus , increase blood pressure, previous eye surgery and increase intra ocular pressure chronic eye diseases too highly positive responses among our studied sample, that increases eye pressure, which leads to glaucoma.

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