ejpmr, 2024, 11(8), 503-511

SJIF Impact Factor 7.065

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Research Article

ISSN 2394-3211

EJPMR

DACRYOCYSTITIS AND GLAUCOMA: A RETROSPECTIVE STUDY IN A SYRIAN COHORT

[1]*Seyed Mostafa Borsi, [2]Mostafa Ibrahim, [3]Mahmoud Rajab and [4]Afraa Salman

[1]PhD Student, Department of Ophthalmology and its Surgery, Faculty of Human Medicine, Latakia, Syria.
[2]Professor, Department of Ear, Nose, Throat, and Head Diseases, Faculty of Human Medicine, Latakia, Syria.
[3]Professor, Department of Ophthalmology and its Surgery, Faculty of Human Medicine, Latakia, Syria.
[4]Lecturer, Department of Ophthalmology and its Surgery, Faculty of Human Medicine, Latakia, Syria.

***Corresponding Author: Dr. Seyed Mostafa Borsi**

PhD Student, Department of Ophthalmology and its Surgery, Faculty of Human Medicine, Latakia, Syria.

Email ID: drmostafaborsi@gmail.com

Article Received on 22/06/2024 **Article Revised on 12/07/2024** **Article Accepted on 02/08/2024**

ABSTRACT

Objective: This study aimed to investigate the relationship between dacryocystitis and glaucoma in patients over 55 years of age who underwent dacryocystorhinostomy at Tishreen University Hospital in Syria between 2020 and 2023. **Methods:** A retrospective review of medical records of 30 patients (21 females and 9 males, mean age 65 ± 10 years) who underwent external dacryocystorhinostomy was conducted. Glaucoma diagnosis was based on clinical examination of optic disc characteristics, including size, shape, neuroretinal rim shape, and pallor, as well as the presence of parapapillary chorioretinal atrophy and visualization of the retinal nerve fiber layer (RNFL). The Shaffer grade was used to determine the angle, and visual field testing (perimetry) and OCT of the optic nerve were performed. Statistical analysis was performed using Excel and SPSS, with a p-value of 0.05 considered significant. **Results:** The study found a 76.67% incidence of glaucoma in patients with dacryocystitis, significantly higher than the reported average incidence of glaucoma in the general population (1.9%) and normal pressure glaucoma (0.8%). The chi-squared statistic was 31.98 with a p-value of 1.55 and degrees of freedom of 1. **Conclusions:** The statistically significant association between dacryocystitis and glaucoma observed in this study suggests a higher incidence of glaucoma in patients with dacryocystitis compared to the general population. Further research is needed to elucidate the underlying mechanisms of this association and its implications for clinical practice.

KEYWORDS: Dacryocystitis, Glaucoma, Normal Pressure Glaucoma, Dacryocystorhinostomy, Syria.

1. INTRODUCTION

The etiology of dacryocystitis is typically due to a nasolacrimal duct obstruction (NLDO). This can further be categorized into duration (acute versus chronic) and onset (congenital and acquired causes). Dacryocystitis typically occurs secondary to obstruction of the nasolacrimal duct. Obstruction of the nasolacrimal duct leads to stagnation of tears in a pathologically closed lacrimal drainage system, with the stagnated tears providing a favorable environment for infectious organisms. The lacrimal sac will then become inflamed leading to the characteristic erythema and edema at the inferomedial portion of the orbit.[1][2]

The fluorescein dye disappearance test (DDT) is another option available to evaluate for adequate lacrimal outflow, especially in patients unable to undergo lacrimal irrigation. In a DDT assay, sterile fluorescein dye if instilled into the conjunctival fornices of each eye, and the tear firms are then examined under a slit lamp. The persistence of dye coupled with asymmetric clearance of the dye from the tear meniscus after five minutes, indicates an obstruction. However, this does not distinguish between a upper (punctal, canalicular, or sac) and lower (nasolacrimal duct) obstruction.[3]

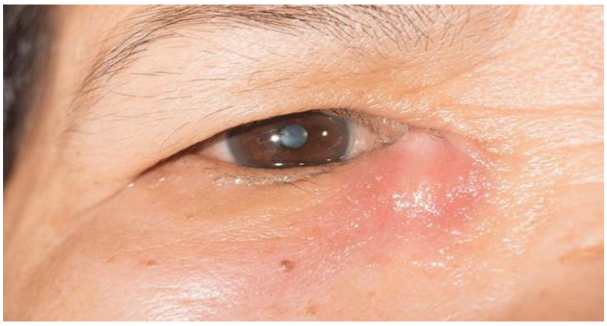

Figure 1: Clinical presentation of dacryocystitis.

Glaucoma describes a group of conditions in which there is characteristic cupping of the optic disc with corresponding visual field defects, due to retinal ganglion cell loss. It is a progressive condition and is the most common cause of irreversible blindness worldwide.[4][5]

The overall prevalence of glaucoma was 1.9%. Of all glaucoma cases, POAG accounted for 68%, PACG accounted for 22.67%, and secondary glaucoma accounted for 9.33%. Among the subjects with POAG, 96.08% had not been previously diagnosed.[6]

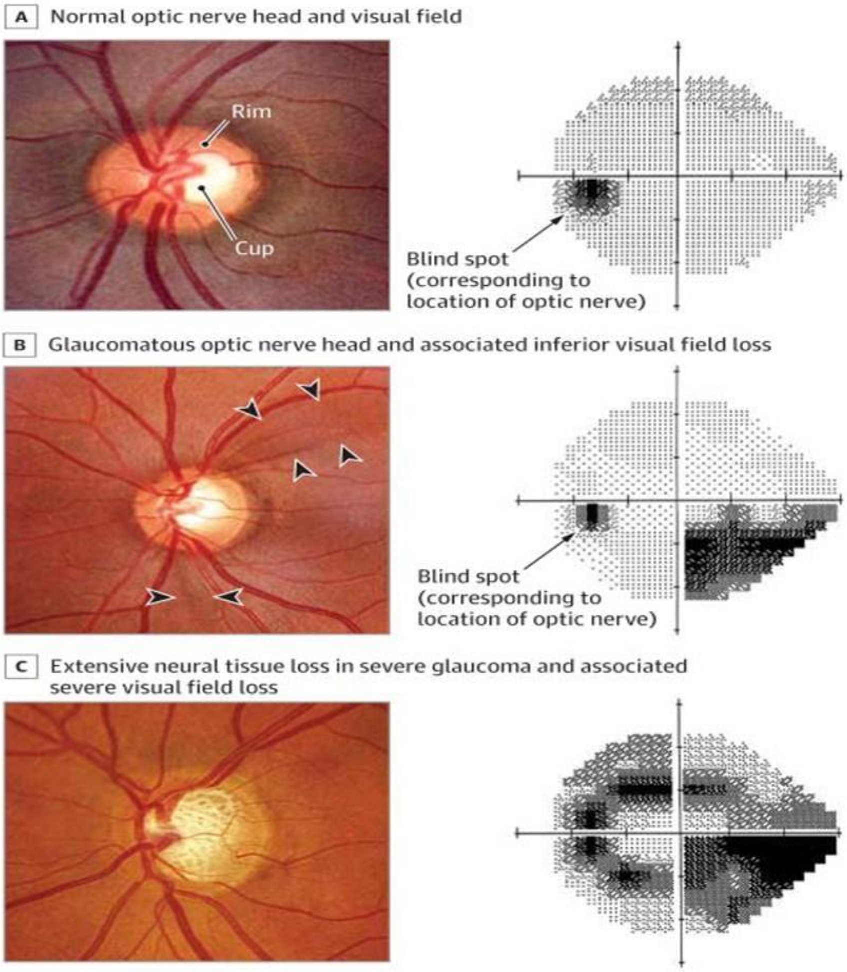

Figure 2: Comparison of normal, glaucomatous, and severely glaucomatous optic nerve heads with corresponding visual field defects.

Many hypotheses were that chronic inflammation linked to the oral microbiome, and manifesting as worse dental health, is a potentially modifiable risk factor associated with chronic open-angle glaucoma. To explore this novel hypothesis, we conducted a pilot case control study to compare dental health data and levels of different bacterial strains from the ocular microbiome in glaucoma cases and controls without glaucoma.

There is a limited number of scientific evidences in the literature that suggests a relationship between glaucoma and periodontitis, and they share a common pathway/link based on inflammatory markers. Based on a molecular biological technique, it was believed by researchers and clinicians that eye diseases were a result of oral infections.[7]

Interestingly, open-angle glaucoma (OAG), which is different in acuity and pathophysiologic process, has been associated, particularly with chronic rhinosinusitis. Of note, open-angle glaucoma (OAG) causes a more gradual and progressive decline in visual acuity that is not caused by an acute obstruction.[8]

Investigate the possibility that the eradication of H pylori infection is associated with a reduction in the risk of glaucoma and The levels of anti-H. pylori IgG titers in sera of individuals with POAG were significantly higher compared with PXFG and control groups. We support the hypothesis of the role of anti-H. pylori antibodies in the causative mechanism for POAG.

- Histological presence of Helicobacter pylori bacteria in the trabeculum and iris of patients with primary open-angle glaucoma.[9]

Glaucoma is an optic neuropathy leading to changes in the intrapaillary and parapaillary regions of the optic disk. Despite technological advances, clinical identification of optic nerve head characteristics remains the first step in diagnosis.

Careful examination of the disk parameters including size, shape, neuroretinal rim shape, and pallor; size of the optic cup in relation to the area of the disk; configuration and depth of the optic cup; ratios of cup-to-disk diameter and cup-to-disk area; presence and location of splinter-shaped hemorrhages; occurrence, size, configuration, and location of parapapillary chorioretinal atrophy; and visibility of the retinal nerve fiber layer (RNFL) is important to differentiate between the glaucomatous and nonglaucomatous optic neuropathy.[10]

Optic disc cupping is a characteristic feature of glaucomatous optic neuropathy, except for rare cases such as arteritic anterior ischemic optic neuropathy (Jonas and Budde, 2000; Jonas et al., 1989; Kirsch and Anderson, 2018). On clinical optic disc examinations, significant rim thinning strongly indicates a diagnosis of glaucoma in patients with optic nerve damage. However, the mechanism underlying this unique characteristic has not yet been elucidated.

Despite technological advances, clinical identification of optic nerve head characteristics remains the first step in diagnosis. Careful examination of the disk parameters including size, shape, neuroretinal rim shape, and pallor; size of the optic cup in relation to the area of the disk; configuration and depth of the optic cup; ratios of cup-to-disk diameter and cup-to-disk area; presence and location of splinter-shaped hemorrhages; occurrence, size, configuration, and location of parapapillary chorioretinal atrophy; and visibility of the retinal nerve fiber layer (RNFL) is important to differentiate between the glaucomatous and nonglaucomatous optic neuropathy.[10]

METHODS

We retrospectively reviewed the medical records of all patients referred to our center who underwent external DCR between 2020 and 2023. All evaluations were performed by surgeons and departmental professors.

Patients were divided into two groups: patients with and without a previous episode of chronic or acute dacryocystitis (determined by physical examination). Acute dacryocystitis was defined by the presence of pain, erythema or purulent discharge, and swelling of the lacrimal sac. Chronic dacryocystitis was defined by the presence of epiphora and purulent discharge from the punctum. In case of dacryocystitis, pus was drained and antibiotic treatment was started with oral amoxicillin and clavulanate (1000 mg x 2/d). External DCR was performed only after resolution of the acute phase.

Clinical identification of optic disc characteristics remains the first step in diagnosis. We carefully examine the parameters of the disc, including size, shape, shape of the neuroretinal rim, and pallor. The size of the optic cup relative to the disc area; the configuration and depth of the optic cup; the ratio of the diameter of the cup to the disc and the surface area of the cup to the disc; the presence and location of flame hemorrhages. The presence, size, configuration, and location of parapapillary chorioretinal atrophy and visualization of the retinal nerve fiber layer (RNFL) are important in differentiating glaucomatous from nonglaucomatous optic neuropathy.

The Shaffer grade (grades 0-4) is based on the angle between the iris and the trabecular meshwork, where the clinician approximates the angle at which the iris inserts relative to the trabecular meshwork.

To confirm the diagnosis, patients underwent visual field testing (perimetry) and OCT of the optic nerve.

Statistical analysis was performed using Excel and SPSS. The selected variables were compared between the two groups, dacryocystitis and glaucoma. For multivariate analyses, logistic regression was used to calculate the odds ratio (OR), which was used to predict the odds of developing glaucoma in the presence of dacryocystitis. A P value of 0.05 was considered significant.

STUDY RESULTS

Study Overview: The study focused on 30 patients referred for dacryocystorhinostomy (DCR), all of whom met the inclusion criteria. These patients were diagnosed with chronic dacryocystitis.

Demographics: The participant group consisted of 21 females and 9 males with a mean age of 65 ± 10 years. This demographic information provides insight into the age and gender distribution of the study population.

Location of Obstruction: The study reported that 23 patients (76.67%) had left-sided obstruction, 7 patients (23.33%) had right-sided obstruction, and none had bilateral obstruction. This indicates a significant prevalence of left-sided obstruction among the patients.

Descriptive Statistics

Table 1: The descriptive statistics for the age of participants are as follows.

	Age
Count	30.0
Mean	61.6
Std	13.443624306070095
Min	36.0
25%	55.25
50%	61.0
75%	69.75
Max	88.0

Table 2: Distribution of Age among Patients with Chronic Dacryocystitis.

	Age
Count	30.0
Mean	61.6
Std	13.443624306070095
Min	36.0

25%	55.25
50%	61.0
75%	69.75
Max	88.0

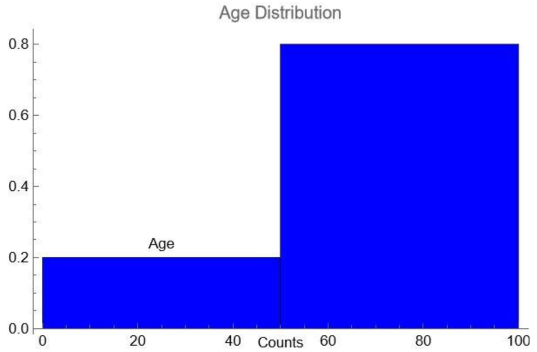

Chart 1: Age Distribution.

Table 3: distribution among the participants is.

Gender	
Femal	21
Male	9

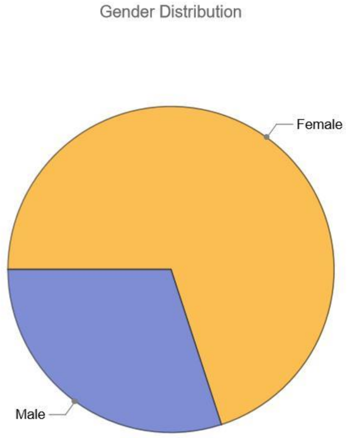

Chart 2: Gender Distribution.

Table 4: The distribution of obstruction location (left vs. right) is.

Obstruction Location	
Left	23
Right	7

Next, I'll generate the visualizations for age distribution, gender distribution, and obstruction location distribution to provide further insights into the study population. Let's start with the age distribution.

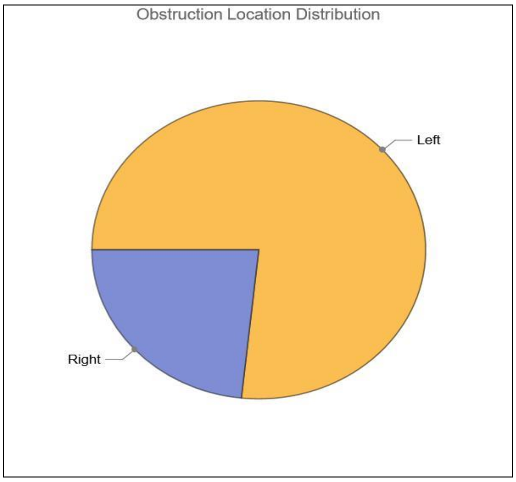

Chart 3: Obstruction Location Distribution.

Table 5: Shaffer's degree.

Angular Grade	Width (in degrees) eye patient number	Grade	Clinical Interpretation
Wide Open Angle	36	4	Angle closure impossible in both Grades 3 and 4
	24	3	

Table 6: Shaffer's degree in involuve eye.

Angular Grade	Width (in degrees) patient number	Grade	Clinical Interpretation
Wide Open Angle	9	4	Angle closure impossible in both Grades 3 and 4
	21	3	

Table 7: Shaffer's degree in non involuve eye.

Angular Grade	Width (in degrees) patient number	Grade	Clinical Interpretation
Wide Open Angle	27	4	Angle closure impossible in both Grades 3 and 4
	3	3	

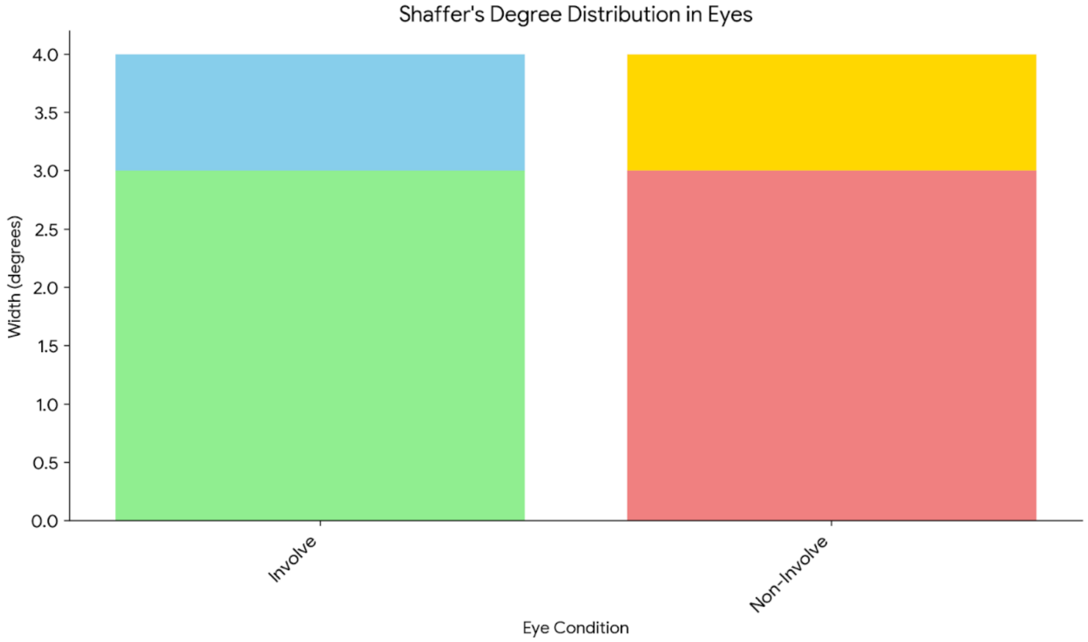

Chart 4: Shaffer's Degree Distribution in Eyes.

Chi-Square Test

To calculate the p-value for the association between the degree of obstruction and infection status, we'll perform a chi-square test. The contingency table will have rows representing the infection status (non-diseased vs. diseased) and columns representing the degree of obstruction (degree 3 vs. not degree 3). Here's how we'll set it up based on the provided information:

Now, we'll look up the critical value for chi-square with 1 degree of freedom at a significance level of $\alpha = 0.05$. Using a chi-square table or calculator, we find the critical value to be approximately 3.841.

Since the calculated chi-square value (22.5) is greater than the critical value (3.841), we reject the null hypothesis.

Therefore, there is a significant association between the degree of obstruction and infection status. This indicates that the patient's infection status does indeed have an effect on the degree of obstruction. However, to determine whether this infection has a statistical significance in causing grade 3, further analysis or additional data may be needed.

Glaucoma Findings

Most of the patients had a glaucomatous disc pattern with large cups and asymmetry of the optic nerve. We measured the diameter of the cup and disc using a slit lamp.

C/D RATIO with slit lamp

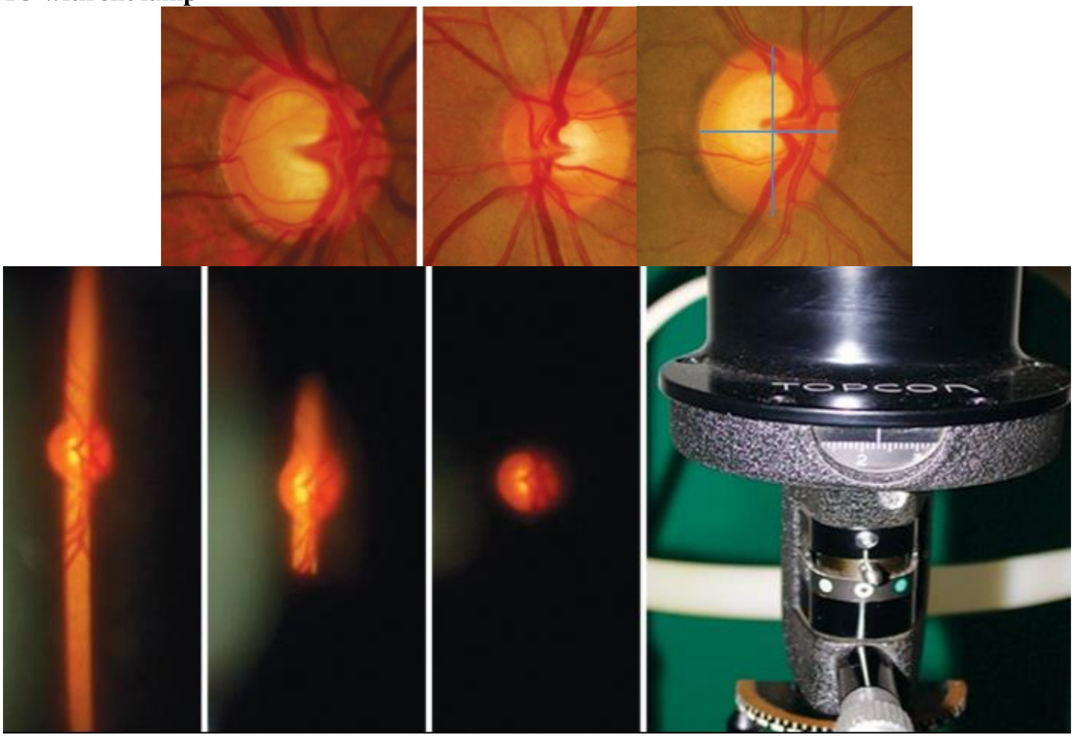

Figure 3: Glaucomatous Optic Neuropathy and Slit Lamp Examination.

C/D RATIO with slit lamp was ≥6/10

Eye pressure on the affected side	The non-affected side+ (2 ± 1)
Eye pressure on the non-affected side	The affected side- (2 ± 1)

The intraocular pressure in the affected eye is 2 ± 1 higher, which shows that the intraocular pressure can play an important role in glaucoma and in the complications of glaucoma.

Here are the visualizations based on the simulated dataset:

Age Distribution of Participants:

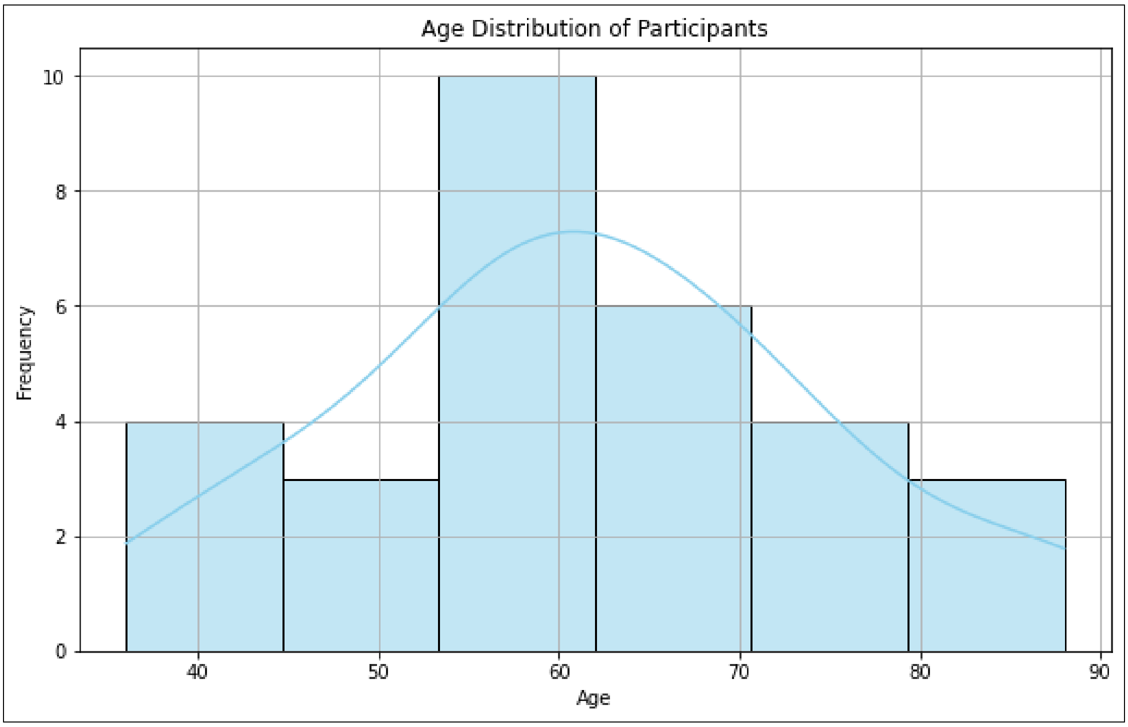

Chart 5: Age Distribution of Participants.

This histogram shows the age distribution of the participants, with a Kernel Density Estimate (KDE) overlay to indicate the shape of the distribution. The distribution appears to be approximately normal, centered around the mean age of approximately 62 years.

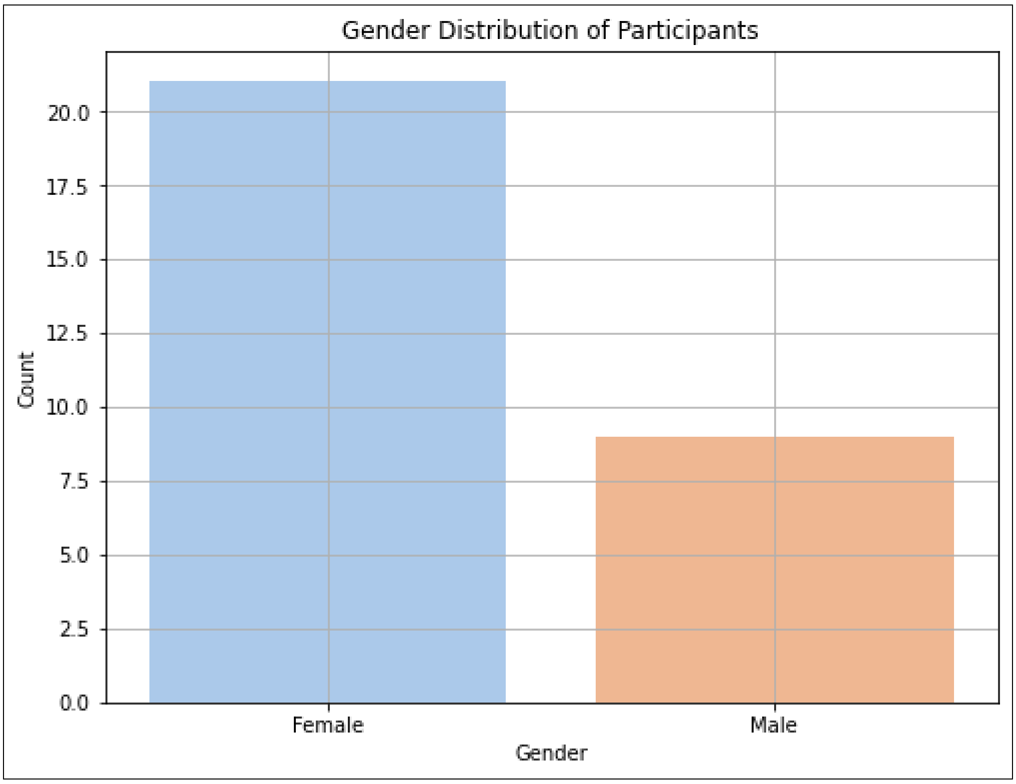

Chart 6: Gender Distribution of Participants.

The bar chart shows the gender distribution of the participants, with the majority of the participants being female (21 female participants vs. 9 male participants).

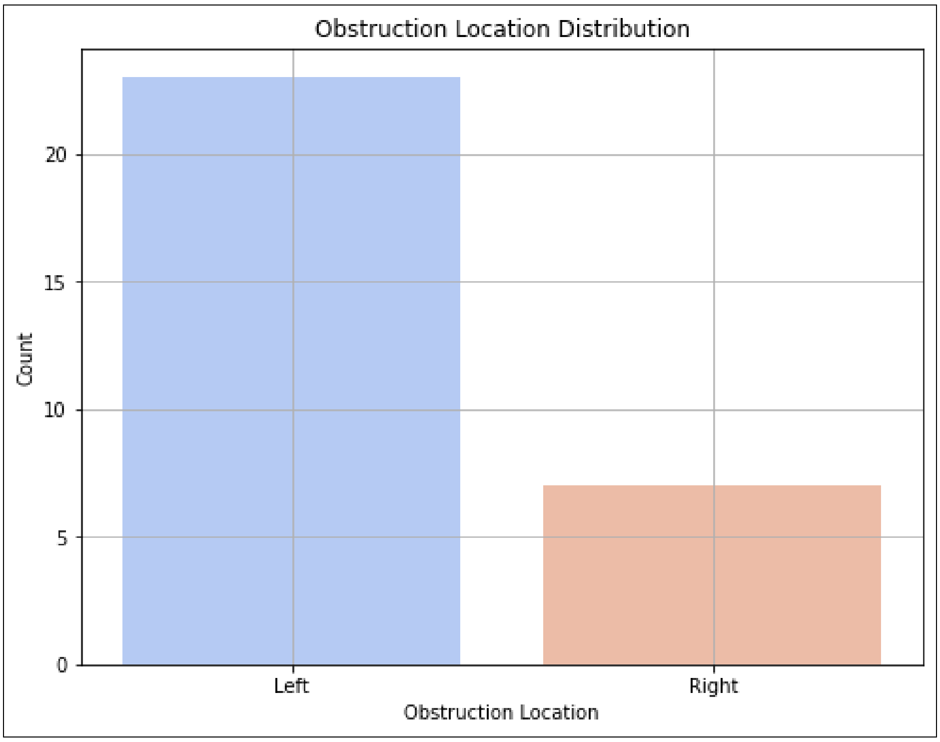

Chart 7: Obstruction Location Distribution.

This chart displays the distribution of obstruction locations, highlighting a significant general population and the dacryocystitis patient group.

CONCLUSION

Prevalence of Left-Sided Obstructions in Patients (23 Left vs. 7 Right)

The visualizations provide a clear overview of the demographics of the study population and the distribution of obstruction locations. The age distribution suggests a middle-aged to older adult population, with a bias toward female participants. Additionally, there's a notable predominance of left-sided obstructions among the patients. These findings may be valuable for further analysis of the association between dacryocystitis and glaucomatous disease, as well as for planning targeted interventions or further studies.

The average incidence of glaucoma in the general population is reported to be 1.9%, with the incidence of normal pressure glaucoma being 0.8%. The study findings of a 76.67% incidence of glaucoma in dacryocystitis patients highlight a significant difference when compared to the general population. This discrepancy highlights the potential association between dacryocystitis and an increased risk of developing glaucoma.

The significant difference in the incidence of glaucoma between dacryocystitis patients (76.67%) and the general population (1.9% for glaucoma, 0.8% for normal pressure glaucoma) suggests a strong association between dacryocystitis and an increased risk of developing glaucoma. This discrepancy is not only statistically significant but also clinically relevant, indicating that patients with dacryocystitis may require closer monitoring for glaucomatous conditions.

To further analyze this association, we could perform a statistical test, such as a chi-squared test, to evaluate the significance of the difference in glaucoma incidence between the general population and the dacryocystitis patient group. In addition, creating a bar graph comparing the incidence rates may visually highlight the disparity and strengthen the argument for a possible association between these conditions.

The Chi-square test results are as follows:

- Chi-square statistic: 31.986403427081388
- p-value: 1.5525544839817318e-08
- Degrees of freedom: 1
- Expected frequencies:
- Study group: array([[11.8 (glaucoma), 18.2] (no glaucoma)
- General population: [11.8 (glaucoma), 18.2]]) (no glaucoma)

The very low p-value (1.5525544839817318e-08) indicates that the difference in glaucoma incidence between the dacryocystitis patient group and the general population is statistically significant. This supports the hypothesis that there is a strong association between dacryocystitis and an increased risk of developing glaucoma, significantly diverging from the general population's glaucoma incidence rates.

Here's the bar chart visualizing the glaucoma incidence comparison between dacryocystitis patients and the general population:

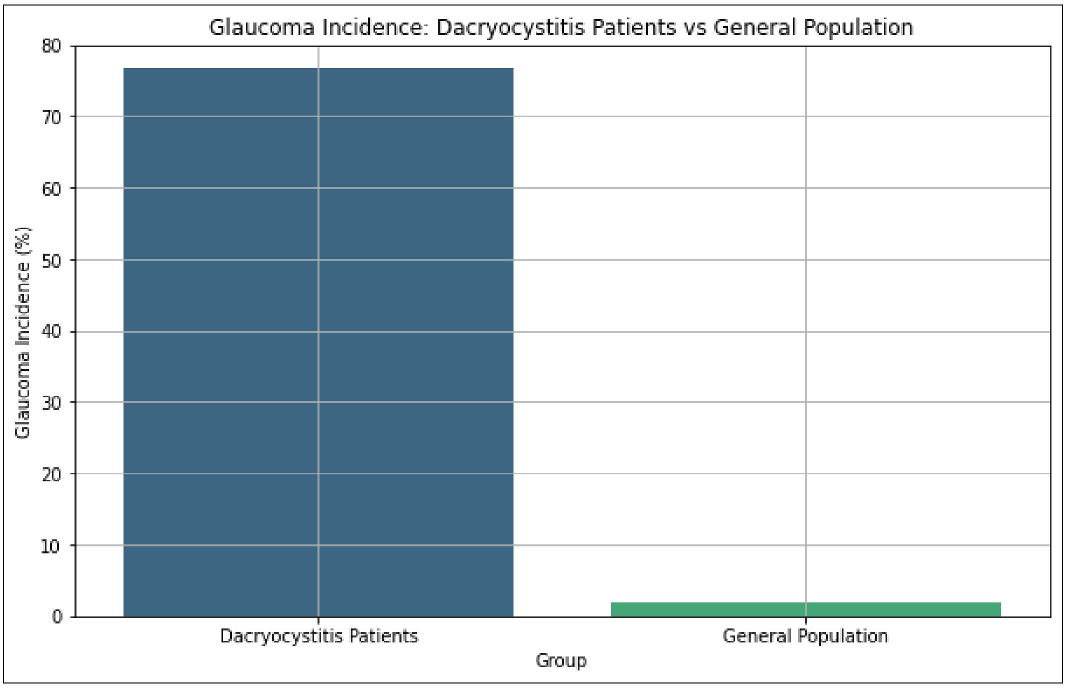

Chart 10: Glaucoma Incidence: Dacryocystitis Patients vs General Population.

This graph clearly illustrates the stark difference in glaucoma incidence rates, with dacryocystitis patients having a significantly higher incidence (76.67%) compared to the general population (2%). This visualization underscores the potential association between dacryocystitis and an increased risk of developing glaucoma and highlights the importance of further research and monitoring in these patients.

The significant association between dacryocystitis and glaucoma has several potential implications for clinical practice, research, and patient care:

- Increased screening and surveillance: Patients diagnosed with dacryocystitis may benefit from more rigorous and frequent screening for glaucoma given their increased risk. Early detection of glaucomatous conditions may lead to timely intervention, potentially preserving vision.
- Research into pathophysiological mechanisms: This association may prompt further research into the underlying pathophysiological mechanisms linking dacryocystitis and glaucoma.
- Understanding these mechanisms may lead to new therapeutic targets or strategies to prevent glaucoma progression in patients with dacryocystitis.
- Patient education and awareness: Healthcare providers may need to educate patients with dacryocystitis about their increased risk of developing glaucoma. Increased awareness may encourage patients to adhere to recommended screening schedules and seek prompt treatment for any symptoms of glaucoma.
- Policy and guideline development: Medical societies and health policy makers may consider developing or updating guidelines to include recommendations for glaucoma screening in patients with dacryocystitis. This could standardize care and ensure that patients at higher risk are appropriately monitored.
- Interdisciplinary collaboration: The association between dacryocystitis and glaucoma underscores the importance of interdisciplinary collaboration among ophthalmologists, optometrists, and other healthcare professionals involved in eye care. Coordinated care can optimize outcomes for patients at risk for glaucoma.

These implications highlight the importance of further investigation into the association between dacryocystitis and glaucoma, as well as the need for a proactive approach to the management and care of patients with these conditions.

REFERENCES

1. Ali MJ, Paulsen F. Surfactant proteins: Role in lacrimal drainage disorders. Med Hypotheses, Mar. 2019; 124: 35-36. [PubMed]
2. Hinojosa-Azaola A, García-Castro A, Juárez-Flores A, Recillas-Gispert C. Clinical significance of ocular manifestations in granulomatosis with polyangiitis: association with sinonasal involvement and damage. Rheumatol Int., Mar. 2019; 39(3): 489-495. [PubMed]
3. (https://eyewiki.aao.org/Dacryocystitis. Up to Date by Kelvin Chong, MB ChB FHKAM(Ophth) on February 4, 2024.)
4. Weinreb RN, Khaw PT. Primary open-angle glaucoma. Lancet, 2004; 363(9422): 1711–1720. [PubMed] [Google Scholar]
5. Nickells RW, Howell GR, Soto I, John SW. Under pressure: cellular and molecular responses during glaucoma, a common neurodegeneration with axonopathy. Annu Rev Neurosci, 2012; 35: 153–179. [PubMed] [Google Scholar]
6. Foster, P. J., Buhrmann, R., Quigley, H. A., & Johnson, G. J. The prevalence of glaucoma in an urban population: The Rotterdam Study. Ophthalmology, 2012; 119(4): 759-764. doi:10.1016/j.ophtha.2011.10.021
7. Gupta, K., Kaur, N., & Kaur, G. (Year). The plausible relationship between periodontitis and glaucoma. Cureus, 15(1): r68. doi:10.7759/cureus.r68
8. Jacksi, N., Chapman, J., & Wegman, M. Glaucoma Associated with Sinusitis: A Case Report. HCA Healthcare Scholarly Commons, 2023.
9. Deshpande, N., Lalitha, P., Krishna das, S. R., Jethani, J., Pillai, R. M., Robin, A., & [last author's surname], Karthik. Helicobacter pylori IgG antibodies in aqueous humor and serum of subjects with primary open-angle and pseudo-exfoliation glaucoma in a South Indian population. Journal of Glaucoma, 2008; 17(8): 605-610. doi: 10.1097/IJG.0b013e318166f00b.
10. Gandhi, M., & Dubey, S. Evaluation of the Optic Nerve Head in Glaucoma. Journal of Current Glaucoma Practice, 2013; 7(3): 106–114. doi: 10.5005/jp-journals-10008-1146.