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The epidemiology of epiphora in a tertiary care hospital in Dubai: A retrospective study

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Abstract

Aim: The study aims to investigate the epidemiology of epiphora at one of the largest tertiary care hospitals in Dubai. This is the first study in the United Arab Emirates investigating the epidemiology of epiphora and its associated factors in patients referred to oculoplastic clinic.

Methods: This retrospective study includes all patients referred to oculoplastic clinic from January 2012 to September 2015. A full ophthalmic examination was performed to assess dry eye syndrome, ocular surface.

Results: A total of 116 patients were included in the study, with females comprising 61.2% of the sample size and a mean age of 34 years. Around 54.3% had bilateral epiphora, while unilateral tearing was more prevalent among the younger male patients with a mean age of $(11.05 \pm 17.04, p < 0.05)$. Congenital Nasolacrimal Duct Obstruction (NLDO) was the most common cause of epiphora in children ($p < 0.001$). In the older population, other identified causes included eyelid malposition, reflex tearing and punctal stenosis. Congenital NLDO was found to be unilateral in a ratio of (4:1). In contrast, eyelid malposition was the most common observed in the elderly population with a ratio of (8:1, $p < 0.001$).

Conclusion: Although the prevalence of epiphora increases with age, it is also notably prevalent in the pediatric population as congenital NLDO. The increased incidence of dacryocystitis and reflex tearing can be attributed to the hot, humid, and dry geographic area selected for the data collection. Management of epiphora depends on the underlying etiology.

Keywords: Epiphora, etiology, lacrimal obstruction, congenital nasolacrimal duct obstruction, dacryocystitis, primary acquired nasolacrimal duct obstruction

Introduction

Epiphora, also known as excessive tearing, can result from multiple etiologies, and significantly affects quality of life and social interactions [1]. Broadly, epiphora can be categorized into two main types: hypersecretion and obstruction of the lacrimal drainage system [2]. Hypersecretion, also known as “reflex tearing,” usually occurs as a secondary response to dry eye disease and other ocular surface diseases. Abnormalities in tear drainage may arise due to factors such as eyelid malposition, eyelid laxity, induced lacrimal pump dysfunction, or obstruction in the lacrimal drainage system. Nasolacrimal Duct Obstruction (NLDO) can be classified as either congenital or acquired, although epiphora can sometimes be multifactorial.

Epiphora is a principal concern for a significant proportion of patients visiting oculoplastic clinics [4]. Such patients are usually referred by general ophthalmology and general physicians for potential surgical treatment. Nonetheless, it is important to note that not all cases require surgical intervention. Acquired nasolacrimal obstruction has been reported to be the leading cause of epiphora in many studies, often requiring surgical correction by dacryocystorhinostomy [2, 3, 5]. Similarly, conditions such as punctal stenosis and canaliculus obstruction may require less intensive surgical intervention [2, 6]. Recently, Bukhari *et al.* demonstrated that punctal stenosis was the most frequent cause of excessive tearing among Saudi population, with 50% of patient improving through simple punctoplasty [7]. On the contrary, Manville and Jordan reported that 40% of their patients with epiphora experienced excessive tearing due to dry eyes, which can be easily managed by simple lubrication [8]. Similarly, another study found that about 21% of patients had meibomitis as the primary cause for epiphora, improving after proper medical treatment [9]. However, the presence of comorbid conditions such as dry eye disease can exacerbate the disease symptoms making the treatment harder. In Dubai, which our study is based, around 63% of the population has dry eye disease [10], which exacerbates the burden of epiphora.

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Dry eye is a common ophthalmological condition affecting up to 14.6% of individuals aged 65 years or older [11]. It has also been reported to have higher prevalence among postmenopausal women. Patients with ocular surface inflammation may have ocular surface irritation that stimulates reflex tear secretion as a compensatory mechanism. Consequently, many of these patients may present with watery eyes or frank epiphora rather than the classical symptoms associated with dry eye. Therefore, accurate diagnosis, along with an extensive history, is necessary for designing the appropriate treatment regime.

Subjects and Methods

This retrospective cross-sectional study examined patients with epiphora who were referred to the oculoplastic department in a tertiary care hospital between January 2012 and September 2015. The electronic patient records were used to collect the data. The study was carried out according to the Declaration of Helsinki and was approved by the institutional ethics committee.

Inclusion criteria included all patients referred to the oculoplastic clinic with complaints of tearing who were later diagnosed with epiphora clinically. Exclusion criteria included patients with a history of previous lacrimal or eyelid surgery, facial nerve palsy, and patients receiving treatment for symptom-related conditions.

Variables in the data collected included laterality, duration, and frequency of symptoms, symptoms related to dry eyes, symptoms related to lacrimal obstruction (including tearing, discharge, and crusting). The routinely performed tests in patients with suspected epiphora at our clinic include Schirmer test, tear break up time, corneal and conjunctival staining, along with lacrimal irrigation to evaluate the patency of the nasolacrimal duct

In pediatric patients, the history was mainly obtained from the mother or the most responsible person accompanying the child. Slit-lamp examination findings included an evaluation of the eyelids and adjacent structures to rule out other factors that could contribute to tearing (i.e., ectropion/entropion, blepharitis, trichiasis, punctal aperture size and position, blink rate, etc.). Tests such as Schirmer test were not performed.

The etiology of epiphora was categorized into the following: reflex tearing, hypersecretion of tear, ocular surface disease (e.g., pterygium, pinguecula), eyelid pathology (e.g., entropion, ectropion), abnormalities in the proximal lacrimal system (e.g., punctal stenosis, canalicular block), and in the distal lacrimal system (e.g., dacryocystitis, dacryostenosis, nasolacrimal duct obstruction). If more than one etiology was identified then it was considered multifactorial (for example, patients with punctal stenosis and eyelid laxity).

Statistical analysis

Statistical analysis was performed using SPSS 21.0 (SPSS Inc, Chicago, IL, USA). Descriptive statistics were presented as frequency and percentage for nominal variables and as mean standard deviation for continuous data. Differences between groups were examined using Pearson's Chi-squared test for categorical factors and t-test or 1-Way ANOVA for continuous variables, each when appropriate. A p-value <0.05 was considered statistically significant.

Results

A total of 116 patients with a primary complaint of epiphora were identified. Among them, 54.3% (N=63) had bilateral epiphora, while 45.7% (N=53) had unilateral epiphora, with 60.3% (N=32) of unilateral cases mainly affecting the right eye. The mean age of the study population was 34.31±29.2 years (range 1-80 years). The number of females (61.2%, N= 71) was significantly higher than males (p<0.05) (Table 1).

Table 1: Characteristics of study population

Characteristics	N (%)	Chi-square	P value
Age			
0-14 years	51 (43.9%)	10.569	<0.001
21-65 years	42 (36.2%)		
65-80 years	23 (19.8%)		
Gender			
Male	45 (38.7%)	5.828	<0.05
Female	71 (61.2%)		
Laterality			
Unilateral	53 (45.6%)	0.862	0.403
Bilateral	63 (54.3%)		
Etiology			
Congenital NLDO	42 (36.5%)	28.870	<0.001
Lacrimal obstruction	30 (25.8%)		
Reflex tearing	16 (13.7%)		
Eyelid abnormalities	17 (14.6%)		
Multifactorial	10 (8.6%)		

The mean age of male and female patients was comparable (30.33±29.6 years vs. 36.84±28.8 years, p=0.244). The distribution of unilateral and bilateral epiphora was approximately in the ratio of 1:1 in both the genders. Unilateral epiphora was more prevalent in the younger population than bilateral epiphora (Figure 1A). Men with unilateral epiphora (11.05±17.04) were significantly younger as compared to women (24.27±25.9, p<0.05) with the same conditions (Figure 1B).

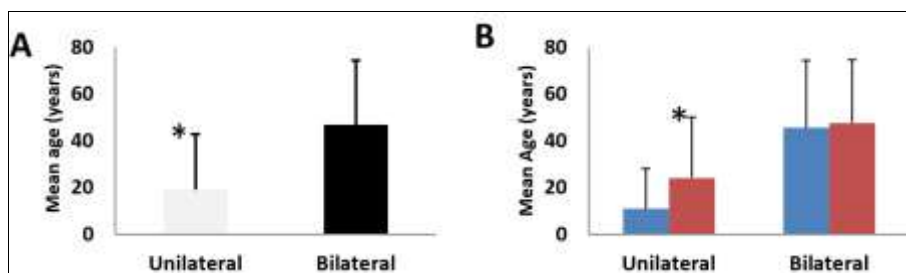


Fig 1: Differences in laterality in epiphora

(A) Unilateral epiphora was common in younger population and bilateral epiphora in older.
 (B) The mean age of bilateral epiphora was comparable

between males and females while, for unilateral, males were considerably younger than females (*p<0.05).
 The most common cause of epiphora in the studied

population was lacrimal obstruction occurring in 72 out of 116 patients (62.06%). This was followed by eyelid malposition (N=17, 14.7%), reflex tearing (N=16, 13.8%), and multifactorial causes (N=10, 8.6%). Among the cases of lacrimal obstruction, 58.3% were attributed to congenital NLDO, while 31.94% occurred in the lower lacrimal system (21 cases of primary acquired nasolacrimal duct obstruction (PANDO) and 2 cases of NLDO). Additionally, 9.7% of cases occurred in the upper lacrimal system including 6 cases of punctual stenosis and 1 case of canalicular obstruction. Although unilateral epiphora was equally prevalent as bilateral epiphora in both lower and upper lacrimal obstruction (60% vs. 40%, respectively), unilateral epiphora was significantly more common in congenital NLDO with a ratio of 4:1 compared to other etiologies. Epiphora occurred bilaterally in all the cases of reflex tearing and multifactorial causes, and was more frequent in

eyelid malposition with a ratio of 8:1 ($\chi^2=50.46, p<0.001$) (Table 2).

Table 2: Epiphora diagnosis according to laterality

	Unilateral	Bilateral	Chi-square	P value
Congenital NLDO	33 (78.6%)	9 (21.4%)		
PANDO	18 (60%)	12 (40%)		
Eyelid malposition	2 (11.8%)	15 (88.2%)	50.460	<0.001
Reflex tearing	0 (0%)	16 (100%)		
Multifactorial	0 (0%)	10 (100%)		

There was no significant difference in the etiologies of epiphora observed between genders ($\chi^2=3.107, p=0.561$) (Figure 2). The study population was categorized into three age groups, 0-13 years, 14-65 years, and 65-80 years. There were significant differences in etiologies of epiphora among the three age groups ($\chi^2=100.004, p<0.001$).

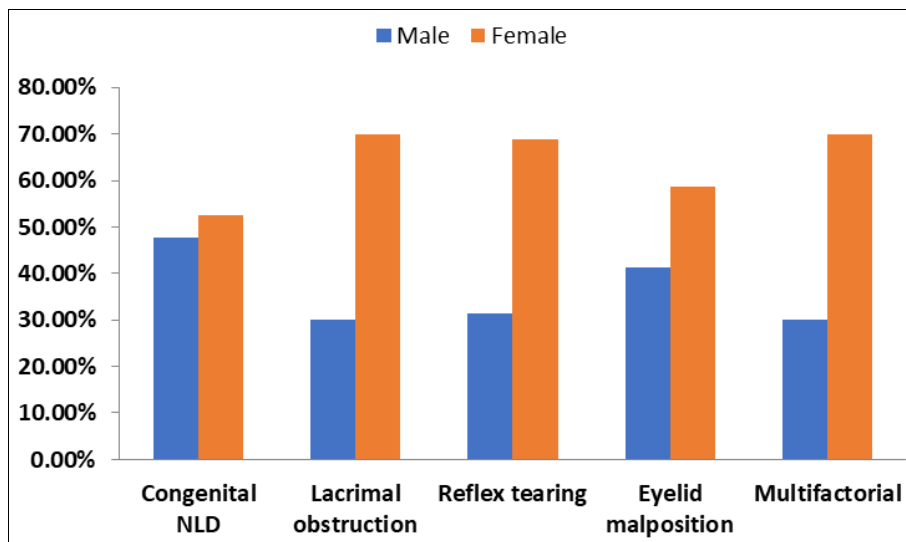


Fig 2: Gender distribution of different etiologies of epiphora

Equal dominance of different causes of excessive tearing was seen between different sexes ($p=0.561$). In elderly patients, eyelid malposition was the most common cause of epiphora, whereas congenital nasolacrimal duct obstruction was most frequent cause in

children. In the age group of 14- 65 years, lacrimal obstruction was observed as the primary cause. The highest incidence of reflex tearing and multifactorial epiphora were noted in the elderly (Figure 3).

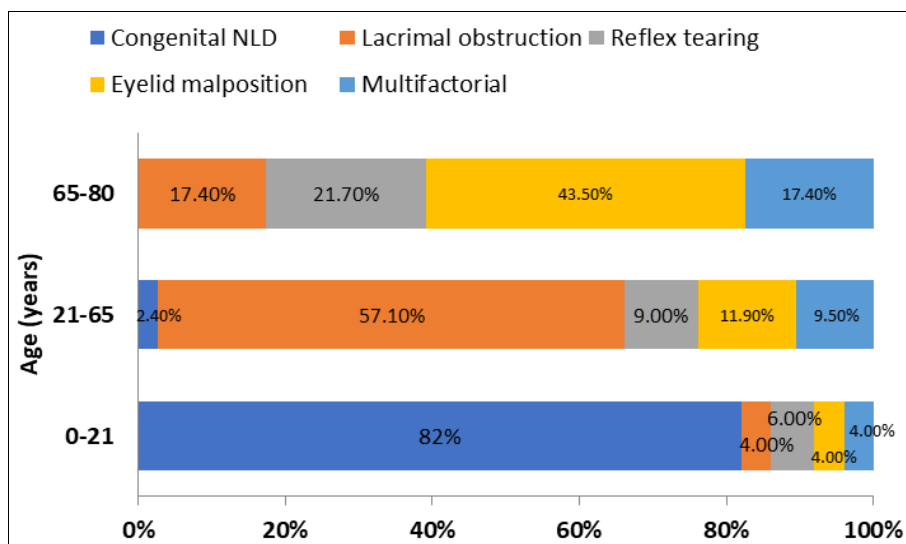


Fig 3: Distribution of causes of epiphora according to age groups

In the younger age group (0-14 years), occurrence of congenital NLDO was highest, in middle age group (21 - 65) percentage of lacrimal obstruction was most prevalent. In the elderly population (65-80), the frequency of eyelid malposition was maximum ($p < 0.001$).

Discussion

Epiphora is a common presentation to the oculoplastic clinic and can result in great discomfort and impaired quality of life for patients. Despite the prevalence of epiphora, there are few studies observing the prevalence and etiology of epiphora, particularly in relation to gender and age group. In our study, NLDO was the most common cause of epiphora, followed by PANDO. On the other hand, cases of punctal stenosis and canalicular obstruction were infrequent. Prompt diagnosis of epiphora is essential for tailoring a suitable management plan for the patient's symptoms.

Similar to our study, Mainville et reported abnormalities in the lacrimal drainage system as the main cause of epiphora in 48.7% of the cases, [8]. In a study by Williams *et al.*, NLDO (33%) was identified as the most frequent cause for epiphora [5]. On the other hand, Bukhari *et al.* found punctal stenosis (37.8%) to be the leading cause for epiphora followed by hypersecretion (27.7%) [7]. Sibley *et al.*, established that multifactorial epiphora was the predominant etiology in the studied patients [2]. While eyelid malposition was the second most common cause of epiphora in our study, Nemet *et al.* found eyelid malposition (33.3%) to be the most frequent cause of epiphora [13].

An important cause of epiphora that should always be considered is lacrimal gland hypersecretion associated with dry eyes [14]. Studies have demonstrated that epiphora due to hypersecretory causes ranges between 22-52% of cases [1, 2, 14]. Ulosoy *et al.* demonstrated that 38.7% of patients had dry eye-related epiphora, while 25.8% had punctal stenosis [1]. This prevalence is slightly higher than the 13.7% observed in our study, which can be attributed to the fact that dry eyes and blepharitis are often treated in general ophthalmology and cornea clinic prior to referral to oculoplastic clinic. Furthermore, given that the population of Dubai is relatively young and that dry eye disease is more common in the elderly [10], it is expected that the rate of reflex tearing as an etiology for epiphora would be lower in this age group. Epiphora due to dry eyes or other causes of reflex tearing typically does not require surgical intervention and can be effectively managed with medical treatment [2, 8]. Despite this, many patients are still being referred to the oculoplasty department. Previous studies have indicated that although the majority of cases requiring surgical intervention were correctly referred to an oculoplastic clinic, a significant number of reflex epiphora are also being referred unnecessarily. This increases the patient load in specialty clinics, and causes undue inconvenience to the patient.

Furthermore, consanguinity has been linked to the occurrence of congenital anomalies [15, 16]. In the United Arab Emirates, particularly in Dubai, there has been a gradual increase in consanguineous marriages [17]. Therefore, we speculate that the rise in consanguinity may have contributed to the rising incidence of congenital epiphora. However, it is important to consider that other factors, including environmental factors can also contribute to the increased incidence of congenital NLDO.

In our study, the mean age of patients was around 35 years, with the majority being under 50 years of age. This findings

contrasts with other previous studies that found w epiphora to be prevalent among the elderly, with mean ages ranging from 60 to 70 years [1, 3, 5, 13]. This may be attributed to the young population of Dubai compared to other countries, and the fact that congenital epiphora is the leading cause of epiphora in our sample.

Various studies have shown that gender differences exist between different etiologies of epiphora, with lacrimal obstruction being more common in females than in males [3, 13, 18]. Those studies found NLDO to be more frequent in females, and gender being an independent predictor of punctal stenosis. Bartley *et al.* found NLDO to be 3 times more frequent in female patients [19]. Although females made up the majority of our sample group, the distribution of different etiologies within gender was the same, indicating no gender association with the disease.

Many studies have observed that some causes of epiphora exhibit unilateral presentation, while others are more likely to occur bilaterally. Reflex tearing, punctal stenosis, and eyelid malposition tend to occur bilaterally. Contrarily, NLDO is more likely to present as unilateral epiphora [13]. The ratio of occurrence of unilateral obstruction to bilateral obstructions was 6:1 [20]. In our study, unilateral tearing was mostly associated with congenital NLDO, while bilateral epiphora was observed in all the cases of reflex tearing, multifactorial epiphora, and eyelid malfunction. A comparable number of cases of unilateral and bilateral epiphora were found in our study.

One of the most important limitations of our study is the sample size, with only 116 patients identified over a three-year period. A study by Das *et al.* identified around 20 000 patients with lacrimal drainage disorder over a 5-year period in a tertiary care hospital [21]. Additionally, our study included only patients referred to the oculoplastic clinic, which may introduce referral bias. Given the retrospective nature of the study, some patients were lost to follow-up, and the diagnosis was based on the initial assessment, which could potentially lead to an inaccurate diagnosis.

Conclusion

Epiphora is one of the most common presentations in the oculoplasty clinic and affects patients of different age groups, significantly impacting quality of life. In our study, NLDO was identified as the most prevalent etiology of epiphora, however, other etiologies should also be considered. Among these, unilateral congenital nasolacrimal duct obstruction (NLDO) was the most common, followed by abnormalities in the lower nasolacrimal duct. Our results did not indicate any gender differences in the etiology of epiphora within our study population. It is crucial to emphasize that appropriate assessment and treatment of epiphora cases can yield complete recovery and enhanced quality of life for patients, often accomplished solely through medical intervention.

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