

Impact of Epiphora on Modified Ocular Surface Disease Index Questionnaire

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ABSTRAK

Epifora (pengeluaran air mata yang berlebihan) adalah gangguan okular utama, terutama di kalangan pesakit pertengahan umur dan yang telah berumur. Ia boleh berlaku disebabkan oleh kerosakan fungsi saluran lakrimal (saluran air mata). Tujuan kajian ini adalah untuk menilai kesan epifora dengan jalan penyelesaian yang baik terhadap pengairan lakrimal dengan menggunakan soal selidik Indeks Penyakit Permukaan Ocular (OSDI) yang telah diubah suai. Seramai 101 pesakit (53 lelaki/48 wanita) telah melibatkan diri di dalam kajian ini. Soal selidik OSDI yang diubahsuai mempunyai 11 item mengenai gejala okular yang mempengaruhi aktiviti harian. Hubungan antara skor soal selidik untuk setiap soalan dan gambaran klinikal merangkumi usia, jantina dan pembedahan katarak sebelumnya. Aktiviti yang paling terjejas menurut OSDI yang diubah adalah menonton televisyen, keadaan berangin dan cuaca sejuk (masing-masing dengan 3.36 ± 0.82 , 3.42 ± 0.86 dan 3.40 ± 0.88). Epifora dilihat mempunyai pengaruh yang signifikan secara statistik terhadap kehidupan seharian, kecuali berkaitan dengan hubungan interpersonal ($p=0.493$) dengan bertambahnya usia. Wanita didapati mengalami lebih banyak masalah mata ($p=0.0001$), semakin teruk semasa membaca ($p=0.027$), pada iklim panas/kering ($p=0.0001$) dan dipercayai epifora mempunyai kesan penting pada hubungan interpersonal dan kebahagiaan umum ($p<0.0001$). Pesakit pseudophakic juga menunjukkan peningkatan ketidakselesaian yang signifikan secara statistik dalam soalan kehidupan harian dalam 7 daripada 11 soalan ($p<0.0001$). Kajian ini menunjukkan kesan simptom berkaitan epifora subjektif terhadap OSDI yang telah diubahsuai. Soal selidik ini mudah dikendalikan dan cepat dilengkapkan sambil menunjukkan hasil yang serupa dengan yang dirancang khusus untuk epifora dengan penyumbatan nasolakrimal. Kami yakin hasil dapatan ini akan dapat membantu meningkatkan pengurusan terapi keseluruhan pesakit dengan epifora.

Kata kunci: kekeringan mata, nasolacrimal stenosis, teknik diagnosis oftomologi, air mata

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ABSTRACT

Epiphora (excessive tear production) is a major ocular disturbance, especially among middle aged and older patients. It can be due to lacrimal drainage malfunction of any kind. The aim of this study was to evaluate the effects of epiphora with good passage on lacrimal irrigation on a modified Ocular Surface Disease Index (OSDI) questionnaire. A total of 101 patients (53 males/ 48 females) were included in the study. The modified OSDI questionnaire had 11 items concerning ocular symptoms that affects daily activities. The relationships between the questionnaire score for each question and the clinical features included age, gender and previous cataract surgery. The most affected activities according to modified OSDI were watching television, windy conditions and cold weather (average means of 3.36 ± 0.82 , 3.42 ± 0.86 and 3.40 ± 0.88 , respectively). Epiphora was found to have a statistically significant effect on daily life, all except with regard to interpersonal relations ($p=0.493$) with increasing age. Women were found to be experiencing more eye grittiness ($p=0.0001$), getting more affected during reading ($p=0.027$), at hot/dry climates ($p=0.0001$) and believed epiphora has an important impact on interpersonal relations and general happiness ($p<0.0001$). Pseudophakic patients also showed statistically significant increase of discomfort in daily life questions in 7 of the 11 questions ($p<0.0001$). This study showed the subjective epiphora related symptoms impact on a modified OSDI. This questionnaire was easy to manage and quick to complete while showing similar results to those that were specifically designed for epiphora with nasolacrimal obstruction. We believe that the results could help to improve overall therapeutic management of patients with epiphora.

Keywords: dry eye, nasolacrimal stenosis, ophthalmological diagnostic techniques, tears

INTRODUCTION

Tear film stability is necessary for maintaining optics and functioning of the eye. Symptomatic epiphora (excessive tear production) occurs when secreted tear drainage is malfunctioning. This condition is reported to be as high as 30.47/100.000 (Woog 2007).

Generally, there are two main reasons for epiphora, excess tear

formation and inadequate lacrimal outflow. The underlying reason, affects the symptoms. For instance, worsening of epiphora by cold or windy weather, suggests reflex tearing. Likewise reading, computer use and air conditioning suggest reflex tearing. Several factors can also contribute to epiphora. Patient has reflex tearing epiphora that gets worse on reading/computer use, and the tear over formation overwhelms the lacrimal

drainage systems. An additional reason is previous cataract surgery, that can affect the corneal anatomy. There is also a subgroup of patients with epiphora exhibiting epiphora with normal pump function and normal lacrimal system on nasolacrimal irrigation (Simsek et al. 2015). Hence, there is no anatomical malfunction that is necessary to be treated; treatment of this condition is determined by the effects of the symptoms on the patient. The underlying cause of epiphora is almost never life or sight threatening - the major exception being tumor blockage in lacrimal drainage system areas. Epiphora is mainly a symptom that has impact on a patient's quality of life. Impact of epiphora on the daily lives of the patients has previously been reported by using the Glasgow Benefit Inventory and Nasolacrimal Duct Obstruction Symptom Score questionnaire (Bakri et al. 1999). Ocular Surface Disease Index (OSDI) questionnaire, on the other hand, is specifically used for dry eye diseases and asks patients the frequency of specific symptoms and their impact on vision-related functioning. It is shown that OSDI has good to excellent reliability, validity, sensitivity, and specificity (Schiffman et al. 2000). Nasolacrimal Duct Obstruction Symptom Score questionnaire was specifically formed to evaluate the patients prior and after endoscopic dacryocystorhinostomy surgery. Glasgow Benefit Inventory is also a surgery-based questionnaire, as a measure of change related to a specific surgical or medical intervention (Hendry et al. 2016). Lacrimal Symptom Questionnaire was

developed for patients undergoing nasolacrimal surgery, with the purpose of quantifying symptom severity (Mistry et al. 2011). OSDI, one of the easiest to perform, was already modified for epiphora once by Shin et al. (2015). However, in that questionnaire eye sensitivity, blurriness, gritty feeling, and effect of climate of the environment were not included. Hence, in this study, we modified the original OSDI questionnaire with regards to Shin et al. (2015) modified OSDI and aimed to establish the effect of epiphora with good nasolacrimal passage using this modified form of OSDI and evaluate correlations of the presented clinical factors.

MATERIALS AND METHODS

This study targeted epiphora patients who visited the Hitit University Ophthalmology Department. Ethical approval was given by the Hitit University Ethics Committee and written consent was obtained from participants. This study abided with the Declaration of Helsinki. Sample size was calculated with G power (Wilcoxon-Mann-Whitney test) and found to be 33 subjects in each group for comparisons.

The inclusion criterion was symptomatic epiphora with good passage in nasolacrimal irrigation test. Patients with other ocular diseases that could affect visual acuity (glaucoma, cataracts, Schirmer test under 10 mm) were excluded from the study. A total of 101 patients (53 males/ 48 females) were included in the study with the age range of 41 to 82 years (mean age

Table 1: Average symptom scores of the epiphora patients (mean \pm S.D.)

Item	Symptom score
Have you experienced eye sensitivity to light in the last week	1.66 \pm 1.41
Have you experienced eye grittiness in the last week	2.27 \pm 1.33
Have you experienced blurred vision in the last week	2.40 \pm 1.34
Have you experienced any problems while reading in the last week	2.57 \pm 1.29
Have you experienced any problems while watching TV in the last week	3.36 \pm 0.82
Have you experienced any problems with housework or household repairs in the last week	2.97 \pm 1.24
Have your eyes felt uncomfortable during windy conditions in the last week	3.36 \pm 0.82
Have your eyes felt uncomfortable in hot or dry conditions in the last week	2.27 \pm 1.33
Have your eyes felt uncomfortable in cold weather in the last week	3.36 \pm 0.82
Are your interpersonal relations affected by your watery eyes	2.90 \pm 1.10
Score the effect of your eye watering to your general happiness	2.58 \pm 0.89

Table 2: Comparison of symptom scores according to age groups (mean \pm S.D.)

Item	Group	Mean	P value
Have you experienced eye sensitivity to light in the last week	45 - 64 years old	1.72 \pm 1.44	p=0.707
	\geq 65 years old	1.60 \pm 1.40	
Have you experienced eye grittiness in the last week	45 - 64 years old	1.48 \pm 1.03	p<0.0001
	\geq 65 years old	3.05 \pm 1.12	
Have you experienced blurred vision in the last week	45 - 64 years old	1.48 \pm 0.99	p<0.0001
	\geq 65 years old	3.31 \pm 0.96	
Have you experienced any problems while reading in the last week	45 - 64 years old	1.72 \pm 1.06	p<0.0001
	\geq 65 years old	3.41 \pm 0.89	
Have you experienced any problems while watching TV in the last week	45 - 64 years old	2.76 \pm 0.77	p<0.0001
	\geq 65 years old	3.96 \pm 0.19	
Have you experienced any problems with housework or household repairs in the last week	45 - 64 years old	2.10 \pm 1.19	p<0.0001
	\geq 65 years old	3.82 \pm 0.43	
Have your eyes felt uncomfortable during windy conditions in the last week	45 - 64 years old	2.76 \pm 0.77	p<0.0001
	\geq 65 years old	3.96 \pm 0.19	
Have your eyes felt uncomfortable in hot or dry conditions in the last week	45 - 64 years old	1.48 \pm 1.03	p<0.0001
	\geq 65 years old	3.05 \pm 1.12	
Have your eyes felt uncomfortable in cold weather in the last week	45 - 64 years old	2.76 \pm 0.77	p<0.0001
	\geq 65 years old	3.96 \pm 0.19	
Are your interpersonal relations affected by your watery eyes	45 - 64 years old	2.82 \pm 1.24	p=0.470
	\geq 65 years old	2.98 \pm 0.96	
Score the effect of your eye watering to your general happiness	45 - 64 years old	2.62 \pm 1.02	p=0.693
	\geq 65 years old	2.54 \pm 0.75	

62.98 ± 10.01).

The modified OSDI questionnaire included 11 items concerning common ocular symptoms that affect performing of daily activities. The questions are shown in Table 1. Frequency of discomfort was given on a scale of 0 (never) to 4 (always). The participants were asked the questions by a blind technician after ophthalmologic examination and answers were noted. The relationships between the questionnaire score for each question and the clinical features included age, gender and previous cataract surgery. SPSS for Windows, version 24 (IBM Corp., Armonk, NY) was used for statistical analysis with a p-value of <0.05 considered statistically significant. Mann-Whitney test was used for two groups comparisons and Spearman's rank-order correlation was used for continuous variable analysis for age.

RESULTS

There were 53 male patients, age ranging from 45-80 years (mean age of 63.35±10.11). The 48 female patient ages ranged from 46-82 years (mean age of 62.56±10.31). A total of 77 patients had no prior cataract surgery and 25 patients had unilateral or bilateral uncomplicated cataract surgery.

The averaged symptom scores of the epiphora patients are shown in Table 1. Of the questions, the most affected daily activity scores were watching television (3.36±0.82), windy conditions (3.42±0.86) and cold weather (3.40±0.88). Age were

grouped as 45-64 years (lower age group) and higher age group (≥65 years old) in order to have easier criteria during ophthalmological exams. Results are shown in Table 2. Continuous age analysis was also performed for a broader understanding for the effects of age. Eye sensitivity and general happiness showed negative correlation; however, these results were not statistically important (p values 0.447 and 0.395, respectively). On the age analysis, epiphora was seen to have a statistically significant effect on daily life, except with regard to interpersonal relations (p=0.493). Results are shown in Table 3. Both age grouping and continuous analysis showed same conclusions.

When scores were compared by gender, females were found to experience more eye grittiness (p=0.0001); getting more affected during reading and hot/dry climates (p=0.027 and p=0.0001) and to believe eye watering has an important impact on interpersonal relations and general happiness (both p<0.0001) compared with males. Results are shown in Table 4.

When scores were compared according to previous cataract surgery - having unilateral or bilateral pseudophakia - pseudophakic patients showed a statistically significant increase of discomfort in 7 of the 11 questions. The questions and results are shown in Table 5.

DISCUSSION

Epiphora is commonly seen among patients in ophthalmology clinics and

Table 3: Correlation of questionnaire scores with age

Item	Spearman's rank correlation	P value
Have you experienced eye sensitivity to light in the last week	(-0.077)	0.447
Have you experienced eye grittiness in the last week	0.611	p<0.001
Have you experienced blurred vision in the last week	0.721	p<0.001
Have you experienced any problems while reading in the last week	0.723	p<0.001
Have you experienced any problems while watching TV in the last week	0.834	p<0.001
Have you experienced any problems with housework or household repairs in the last week	0.791	p<0.001
Have your eyes felt uncomfortable during windy conditions in the last week	0.834	p<0.001
Have your eyes felt uncomfortable in hot or dry conditions in the last week	0.611	p<0.001
Have your eyes felt uncomfortable in cold weather in the last week	0.834	p<0.001
Are your interpersonal relations affected by your watery eyes	0.069	0.493
Score the effect of your eye watering to your general happiness	(-0.086)	0.395

Table 4: Comparison of questionnaire scores by gender (mean \pm S.D.)

Item	Gender	Mean	P value
Have you experienced eye sensitivity to light in the last week	Male	1.509 \pm 1.43	p=0.247
	Female	1.83 \pm 1.38	
Have you experienced eye grittiness in the last week	Male	1.86 \pm 1.17	p=0.0001
	Female	2.72 \pm 1.36	
Have you experienced blurred vision in the last week	Male	2.32 \pm 1.25	p=0.437
	Female	2.50 \pm 1.44	
Have you experienced any problems while reading in the last week	Male	2.32 \pm 1.25	p=0.027
	Female	2.85 \pm 1.30	
Have you experienced any problems while watching TV in the last week	Male	3.37 \pm 0.83	p=0.809
	Female	3.35 \pm 0.81	
Have you experienced any problems with housework or household repairs in the last week	Male	3.03 \pm 1.30	p=0.084
	Female	3.04 \pm 1.23	
Have your eyes felt uncomfortable during windy conditions in the last week	Male	3.37 \pm 0.83	p=0.809
	Female	3.35 \pm 0.81	
Have your eyes felt uncomfortable in hot or dry conditions in the last week	Male	1.86 \pm 1.17	p=0.0001
	Female	3.37 \pm 0.83	
Have your eyes felt uncomfortable in cold weather in the last week	Male	3.35 \pm 0.81	p=0.809
	Female	4.0 \pm 0.00	
Are your interpersonal relations affected by your watery eyes	Male	2.49 \pm 1.17	p<0.0001
	Female	3.35 \pm 0.83	
Score the effect of your eye watering to your general happiness	Male	2.18 \pm 0.83	p<0.0001
	Female	3.02 \pm 0.75	

Table 5: Comparison of symptom scores in relation to previous cataract surgery - having unilateral or bilateral pseudophakia (mean ± S.D.)

Item	Gender	Mean	P value
Have you experienced eye sensitivity to light in the last week	Normal	1.66 ± 1.42	p=0.990
	Uni/Bilateral Pseudophakia	1.66 ± 1.40	
Have you experienced eye grittiness in the last week	Normal	2.01 ± 1.30	p=0.054
	Uni/Bilateral Pseudophakia	3.1 ± 1.07	
Have you experienced blurred vision in the last week	Normal	2.064 ± 1.29	p<0.0001
	Uni/Bilateral Pseudophakia	3.50 ± 0.83	
Have you experienced any problems while reading in the last week	Normal	2.25 ± 1.27	p<0.0001
	Uni/Bilateral Pseudophakia	3.58 ± 0.77	
Have you experienced any problems while watching TV in the last week	Normal	3.16 ± 0.84	p<0.0001
	Uni/Bilateral Pseudophakia	4.0 ± 0.01	
Have you experienced any problems with housework or household repairs in the last week	Normal	2.66 ± 1.27	p<0.0001
	Uni/Bilateral Pseudophakia	3.95 ± 0.20	
Have your eyes felt uncomfortable during windy conditions in the last week	Normal	3.16 ± 0.84	p<0.0001
	Uni/Bilateral Pseudophakia	4.0 ± 0.00	
Have your eyes felt uncomfortable in hot or dry conditions in the last week	Normal	2.01 ± 1.30	p<0.0001
	Uni/Bilateral Pseudophakia	3.12 ± 1.07	
Have your eyes felt uncomfortable in cold weather in the last week	Normal	3.16 ± 0.84	p<0.0001
	Uni/Bilateral Pseudophakia	4.0 ± 0.00	
Are your interpersonal relations affected by your watery eyes	Normal	2.77 ± 1.14	p=0.054
	Uni/Bilateral Pseudophakia	3.29 ± 0.90	
Score the effect of your eye watering to your general happiness	Normal	2.55 ± 0.95	p=0.608
	Uni/Bilateral Pseudophakia	2.66 ± 0.70	

causes discomfort due to blurring of vision, a result of an irregular tear film (Kafil-Hussain & Khooshebah 2005). The most common reason for this is nasolacrimal duct obstruction (Nemet 2016). This is commonly seen in middle-aged and older female patients (McNab 1998). It is thought that narrow bony nasolacrimal canals in women cause inflammatory responses in the nasolacrimal drainage system (Shigeta et al. 2007). In the case of epiphora due to lacrimal passage obstruction, there are effective surgical treatment

options with 80-85% success rate (Marcet et al. 2014).

Dry eye can also cause reflex tearing, hence epiphora formation. Other reasons include punctal stenosis, lower eyelid malposition, laxity of the eyelid and blepharitis (Nemet 2016). We specifically tested patients with good passage in nasolacrimal irrigation tests and 10 mm wetting in Schirmer test in order to find out the effect of epiphora in patients without major lacrimal drainage or reflex tearing problems.

Eye related discomfort can be assessed by various questionnaires such as National Eye Institute Vision Functioning Questionnaire, the Impact of Dry Eye on Everyday Life Questionnaire, VF-14, Catquest-9SF, NLDO-SS and OSDI (Shin et al. 2015). Many of these questionnaires are routinely used in ophthalmology clinics to assess patient symptom severities in various diseases. Jutley et al. (2013) showed improved quality by using Glasgow Benefit Inventory questionnaire in nasolacrimal obstruction patients after endoscopic dacryocystorhinostomy. Kafil-Hussein et al. (2005) used VF-14 questionnaire, showing epiphora patients have difficulty in reading small print, newspapers and books, seeing steps and stairs, reading signs, doing fine work, playing table games and sports, watching TV and driving during the day. We also found similar results with watching TV and showed that elderly patients are affected more when across a TV screen. However, neither of those questionnaires were developed through consultation with study population relevant to epiphora (Schulz et al. 2018).

Bakri et al. (1999) combined Glasgow Benefit Inventory with ocular symptom questions and came up with their own modified form. However, they used it to compare different surgery forms, not pre-treatment symptoms. Cheung et al. (2007) used their own questionnaire and found patients had difficulties in relation to visual tasks, driving, mood and work and were embarrassed by tearing eyes. They argued that difficulties with

visual tasks were most often reported due to the visual distortion induced by the raised tear meniscus. We have -expectedly- found similar results and also shown that epiphora's effect on general happiness inversely correlates with age.

The OSDI, which comprises of vision-related functions, eye symptoms, and environmental risk factors, is widely used to assess the discomfort of dry eye syndrome (Barber et al. 2018). Usually, patients with nasolacrimal duct obstruction are older than patients with dry eye syndrome and OSDI is not routinely used for epiphora management. When using our modified OSDI, we excluded questions specifically pertaining dry eye symptoms and age inappropriate computer related questions. Modified OSDI results showed that epiphora mostly hindered watching television, windy conditions and cold weather. This correlates with previous studies that show epiphora symptoms increase at outdoor activities, which might be due to reflex tearing from wind and external stimuli (Shin et al. 2015). In fact, one of the common complaints in male group was having teary eyes while going in between their homes and the mosques – which is presumably due to windy or cool weather conditions. We believe symptom increase during watching television is also an important and visual debilitating problem while evaluating epiphora patients, considering that it was found that hours spent television watching increases up to threefold in elder age groups (Depp et al. 2010).

In the age analysis, older patients

had lower scores in interpersonal relations and general happiness. This might be due to declining social life and a constricted social environment that has fewer unknown people. After all the complaint of "being embarrassed by leaky teary eyes" - another common epiphora complaint - does not matter as much when there are not many to witness this symptom. When scores were compared by gender, females had more eye grittiness, getting more affected during reading and hot/dry climates. Females also tended to believe eye watering has an important impact on interpersonal relations and general happiness more. The first three can be explained by females showing dry eye symptoms more than their male counterparts. Even though our patients all had Schirmer test values over 10 mm, it was shown that dry eye patients with epiphora can have normal Schirmer test values (Shen et al. 2016). Interpersonal happiness also tended to have been affected more in women in previous studies, which in turn affects general happiness (Shin et al 2015).

When scores were compared according to previous cataract surgery, those that had undergone surgery showed higher scores in blurred vision, reading, watching television, housework and all outdoor conditions. This can be due to multiple reasons. First is the aspect of contrast sensitivity. It was shown that contrast sensitivity is diminished in patients with intraocular lenses compared with age matched controls (Vivekanand & Kamath 2019). In addition to this, Tasaki et al. (2020) also found a reduction of contrast

sensitivity in eyes with epiphora. It is possible that this double reduction in seeing contrast is worsening the already present epiphora symptoms. It can also be the result of decreased ocular surface stability after cataract surgery, hence aggravating the discomfort (Cetinkaya et al. 2015). One study explained this with worsening of dry eye symptoms with reflex tearing due to corneal exposure during surgery and irregular corneal surface caused by cataract surgery incisions (Ruiz-Calvo et al 2016). They also hypothesised that povidone iodine or mechanical damage caused by the speculum might result in delayed injury.

We admit few limitations. We did not have a study to validate and standardise our questionnaire. The patients included in our questionnaire could also be increased, and thus it would allow the sub-specification of epiphora causes.

CONCLUSION

In the present study, we showed that the subjective epiphora related symptoms impact on our modified OSDI. The results were similar to previous quality of life questionnaire studies. Our modified OSDI questionnaire was easy to manage and quick to complete while showing similar results to those that were specifically designed for epiphora with nasolacrimal obstruction. Since, there is a questionnaire that specifically can assess the quality of life in epiphora patients, we believe our questionnaire can be used and the overall therapeutic management of patients with epiphora

can be improved.

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