

# Dry Eyes Status on Des Scale and Related Factors in Outpatients at Vietnam National Institute of Ophthalmology

Bui Thi Van Anh<sup>1</sup>, Pham Thanh Thuy<sup>1</sup>, Nguyen Thi Bich Ngoc<sup>1</sup>, Nguyen Thi Thu Hien<sup>1</sup>, Pham Hai Yen<sup>1</sup>, Do Quyet<sup>2</sup>, Than Van Thai<sup>3</sup>, Vu Thi Nga<sup>4</sup>, Nguyen Duy Bac<sup>2</sup>

<sup>1</sup>Vietnam National Institute of Ophthalmology, Hanoi, Vietnam; <sup>2</sup>Vietnam Military Medical University (VMMU), Hanoi, Vietnam; <sup>3</sup>NTT Hi-tech Institute, Nguyen Tat Thanh University, Ho Chi Minh City, Vietnam; <sup>4</sup>Institute for Research and Development, Duy Tan University, 03 Quang Trung, Danang, Vietnam

## Abstract

**Citation:** Anh BTV, Thuy PT, Ngoc NTB, Hien NTT, Yen PH, Quyet D, Thai TV, Nga VT, Bac ND. Dry Eyes Status on Des Scale and Related Factors in Outpatients at Vietnam National Institute of Ophthalmology. Open Access Maced J Med Sci. 2019 Dec 30; 7(24):4292-4296. <https://doi.org/10.3889/oamjms.2019.377>

**Keywords:** Dry eyes; Quality of life; OSDI, DES questionnaire

**\*Correspondence:** Nguyen Duy Bac. Vietnam Military Medical University (VMMU), Hanoi, Vietnam. E-mail: [nguyenduybac@vmmu.edu.vn](mailto:nguyenduybac@vmmu.edu.vn)

**Received:** 02-Jul-2019; **Revised:** 20-Nov-2019; **Accepted:** 21-Nov-2019; **Online first:** 20-Dec-2019

**Copyright:** © 2019 Bui Thi Van Anh, Pham Thanh Thuy, Nguyen Thi Bich Ngoc, Nguyen Thi Thu Hien, Pham Hai Yen, Do Quyet, Than Van Thai, Vu Thi Nga, Nguyen Duy Bac. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0)

**Funding:** This research did not receive any financial support

**Competing Interests:** The authors have declared that no competing interests exist

**BACKGROUND:** Dry eye (DE) can effect on quality of life by pain, inability to perform certain activities that require prolonged attention (driving, reading,...) and productivity at work and finally effect to QOL associated with DE. OSDI is scale questionnaire is created team to measure the quality of life related to ocular surface disease.

**AIM:** To describe the dry eye disease according to OSDI scale and related factors of this disease.

**METHODS:** A cross-sectional descriptive study was carried out on outpatients ( $\geq 16$ -year-old) who were examined and diagnosed with dry eyes at Vietnam National Institute Of Ophthalmology from April to July 2018. Data was collected using the OSDI questionnaire.

**RESULTS:** The average age of participants was 44.6 years; 80.9% of patients were female; 39.9% were identified having mild dry eye. The related factors have been identified that associated with severe dry eye, including age OR = 1.03 (95%CI: 1.01-1.05,  $p = 0.005$ ), binocular good vision OR = 0.11 (95%CI: 0.05-0.23;  $p < 0.0001$ ), medical history OR = 17.09 (95%CI: 2.24-130.25;  $p < 0.0001$ ), chronic conjunctivitis OR = 0.36 (95%CI: 0.14-0.91;  $p = 0.027$ ), refractive errors OR = 0.14 (95%CI: 0.04-0.48;  $p < 0.0001$ ), Sjogren's syndrome OR = 31.13 (95%CI: 7.08-136.76;  $p < 0.0001$ ).

**CONCLUSION:** Several related factors have been identified associated with severe dry eye, including: age, binocular good vision, medical history, chronic conjunctivitis, refractive errors, Sjogren's syndrome.

## Introduction

Dry eye (DE) is an increasing public health issue which causes the discomfort and visual disturbance and which affects the quality of life, including physical, psychological and social aspects, daily activities and labor productivity.

“Dry eye is a multifactorial disease of the ocular surface characterized by a loss of homeostasis of the tear film, and accompanied by ocular symptoms, in which tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities play etiological roles” [1]. It is the most common ocular surface disease over the world with the prevalence from 4.4% to 50% in the older and middle-aged patients [2], [3]. In the US, it is estimated from the largest studies that dry eye can affect around 5 million people over 50 years old [4]. Many studies have

shown that this disease “is a major cause of visual disturbance which can degrade the quality of daily life and affect health status” [5], [6]. On the other hand, the prevalence of DE is increasing due to the growing demands of modern life styles such as using computers, air conditioning and longevity in the last few years, which are considered as causes of dry eye. Many studies have shown that dry eye can effect on quality of life by pain, uneasy to perform certain activities that require prolonged attention (driving, reading, ...) and reducing productivity at work. Currently, therefore, the main goal of treating dry eyes is to improve eye comfort and maintain the quality of life for patients [7]. This is the main motivation for both patients and society in general and raising awareness about dry eyes in society through educational activities

In recent years, there are many questionnaires used to assess the condition of patients with dry eyes. The tools to measure QoL help

to prove scientifically about the impact of health on QoL. Some tools are widely used such as and SF-36 (Medical Outcomes Study Short Forms) and QOWBS (Quality of Well-Being Scale)... However, each of the different diseases has different characteristics, so that the questionnaire for measurement quality of life in different diseases is often developed by researchers with special tools. OSDI is the most commonly tool for frequency and severity assessment of DE in clinical. The scale consists of 12 questions divide into three categories: ocular symptoms, visual function disturbances, and environmental factors. The severity of symptoms on Likert scale is recorded on a 4-point from 1 to 4 points, the higher the score, the higher the QoL effect. If the frequency scale is zero, the scale score is also 0. We believe the score represents the burden of patients and is more exact to evaluate the severity of the disease [7], [8], [9].

In the world, there have been many studies on the quality of life on people with dry eye disease in different aspects. However, there are very few studies about this issue in Vietnam until now. We think that this issue is very important because it provides information related to DE in the aspect of quality of life. It also provides recommendations for ophthalmologists to pay more attention to the complaints in patients with dry eye and enables doctors to understand the patient's needs and offer a better treatment. Therefore, we carried out this study.

## Materials and methods

### Patient

Subjects included 175 DE outpatients who were examined in Vietnam National Institute of Ophthalmology (VNIO) from April 2018 to July 2018.

Selection criteria: Participants included DE outpatients with the age from 16 to 72 of years. Criteria of dry eye diagnosing include: OSDI > 12 points; 2 out of 3 positive dry eye tests (BUT test ≤ 5 s, Schirmer test ≤ 5 mm, Fluorescein or Rose Bengal staining).

Exclusion criteria: Patients who do not agree to participate in the study or are unable to respond (mental patients, language problems).

### Research design

A cross-sectional descriptive study was conducted. Data were collected by direct interview with patients using OSDI questionnaires. OSDI (Ocular surface Disease Index) questionnaire was used to evaluate and diagnose dry eye status. The questions in scale were grouped into 3 groups: ocular symptoms (Eyes that are sensitive to light, Eyes that feel gritty,

Painful or sore eyes, Blurred vision, Poor vision), visual disturbance (reading, driving at night, working with a computer or banking machine (ATM), watching TV), and environmental factors (windy condition, Places or areas with low humidity (very dry), Areas that are air conditioned). OSDI score was calculated and classified into Normal: (0-12 points); Mild (13-22 points); Moderate (23-32 points); Severe (33-100 points) (Figure 1) [7].

OSDI (Ocular Surface Disease Index)						
Patient name:		Date of birth:		Patient ID:		
Have you experienced any of the following during the last week?						
	All of the time	Most of the time	Half of the time	Some of the time	None of the time	
1. Eyes that are sensitive to light?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Eyes that feel gritty?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Painful or sore eyes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Blurred vision?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Poor vision?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Have you problems with your eyes limited you in performance any of the following during the last week?						
	All of the time	Most of the time	Half of the time	Some of the time	None of the time	No Answer
6. Reading?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Driving at night?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Working with a computer or bank machine (ATM)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Watching TV?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Have your eyes felt uncomfortable in any of the following situations during last week?						
	All of the time	Most of the time	Half of the time	Some of the time	None of the time	No Answer
10. Windy conditions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Places or areas with low humidity (very dry)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Areas that are air conditioned?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 1: <https://www.collinsoptometrists.com.au/wp-content/uploads/2016/01/OSDI-questionnaire.pdf>; Data entry and analysis using Epidata 3.0 and SPSS 16.0

## Results

### General information of research subjects

The study was conducted on 178 subjects and the average age of participants was 44.6 years, standard deviation was 14.65 years with a range between 16 and 72 years of age.

A number of demographic information was collected in our study including educational level, ethnic, occupation, geography and monthly average income. The majority of subjects have professional education of high school or lower (61.8%); 98.3% of subjects were Kinh people. The occupation of the subjects was distributed unevenly: the highest proportion in the farmer group (37.6%), followed by the office staff (25.3%); other occupations (19.7%), business (13.5%) and lowest proportion in worker group (3.9%). There was no stastically significant difference between geography groups. The majority of

research subjects had monthly average income per capita less than 5 million VND (63.5%).

**Table 1: Social – demographic information (n = 178)**

Characteristics		Number (n)	Proportion (%)
Age	16-39	62	38.4
	40-59	78	43.7
	≥ 60	38	21.3
Sex	Male	34	19.1
	Female	144	80.9
Highest professional/ educational level	Secondary school	14	7.9
	High school	96	53.9
	College	28	15.7
	University	36	20.2
	Postgraduate	4	2.2
Ethnic	Kinh	175	98.3
	Others	3	1.7
Occupation	Officer	45	25.3
	Worker	7	3.9
	Farmer	67	37.6
	Business	24	13.5
	Others	35	19.7
	Rural	89	50
Geography	Mountain region	01	0.6
	Urban	88	49.4
Monthly average income per capita	< 5 millions VND	113	63.5
	≥ 5 million VND	65	36.5

In our study, the majority of patients had good visual acuity with pinhole or glasses (50% of right eyes and 52.2% of left eyes), followed by moderate vision (25.8% of right eyes and 27.5% of left eyes) and low and blind vision (24.2% of right eyes and 20.3% of left eyes).

**Characteristic of medical history**

Among 178 of research subjects, 87.6% had at least one type of medical history. Types of medical history included arthritis (30.3%), allergic diseases (25.8%), Sjogren's syndrome (20.5%), chronic conjunctivitis (17.4%), refractive errors (15.5%), hypertension (5.2%), diabetes (1.3%) and other autoimmune diseases (1.9%), (Table 2).

**Table 2: Medical history of patients (n = 178)**

Medical history		Number (n)	Proportion (%)
Medical history	Yes	156	87.6
	No	22	12.4
Chronic conjunctivitis	Yes	27	17.4
	No	128	82.6
Refractive error	Yes	24	15.5
	No	131	84.5
Allergic diseases	Yes	40	25.8
	No	115	74.2
Diabetes	Yes	2	1.3
	No	152	98.7
Hypertension	Yes	8	5.2
	No	147	94.8
Sjogren's syndrome	Yes	32	20.6
	No	123	79.4
Athritis	Yes	47	30.3
	No	108	69.7
Other autoimmune diseases	Yes	3	1.9
	No	152	98.1
Chronic conjunctivitis	Yes	31	19.9
	No	125	80.1

**Description of quality of life related vision according OSDI**

According to Figure 1, regarding to the discomfort of ocular surface symptom the majority of patients complained of light sensitivity (41.1%), gritty sensation (31.5%), eye pain (43.3%), blurred vision and poor vision (29.8%).

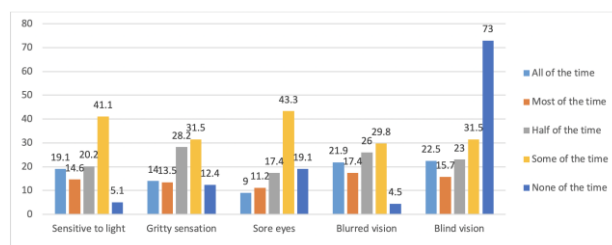


Figure 1: Symptoms of discomfort of ocular surface

On the other hand, most of patients with the symptoms of blurred vision and poor vision experienced this condition all of the time (73.0%). The mean OSDI score of discomfort of ocular surface symptom group was 48.6 ± 26.15.

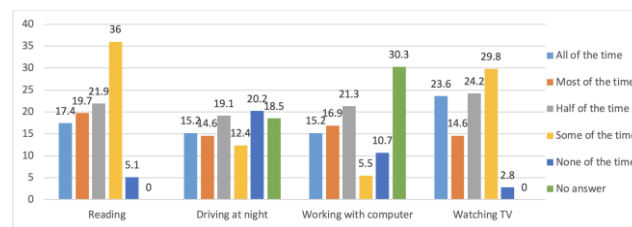


Figure 2: Symptoms of visual disturbance

According to Figure 2, regarding to visual disturbance, among patients had discomfort feeling when reading and watching TV, these symptoms occurred occasionally with the rate of 36% and 29.8% respectively. The majority of participants were farmer, therefore most of them had no answer for the question “when working with a computer or bank machine (30.3%). In patients with discomfort when driving at night, the proportion of disturbance frequency level seemed to be equal. The mean OSDI score of visual disturbance symptom group was 43.64 ± 25.29.

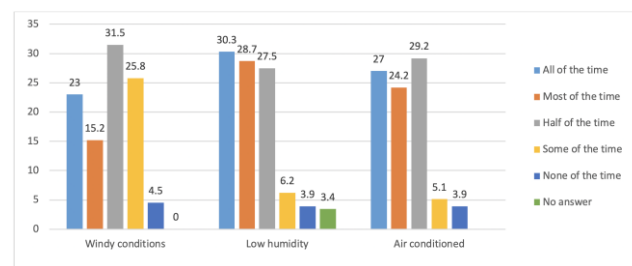


Figure 3: Symptoms of dry eyes related environmental condition

Most of participants answered that they felt uncomfortable at the frequency “half of time” in the windy conditions (31.5%) and areas that are air conditioned (29.2%). In the condition of low humidity (very dry), the prevalence of participants felt uncomfortable at the frequency “all of the time”, “most of the time” and “half of the time” was 30.3%, 28.7% and 27.5% respectively. The mean OSDI in the group of activated symptoms due to environmental factors was 53.37 ± 28.81.

**Table 3: Dry eye severity according OSDI scale**

Severity	Number (n)	Proportion (%)
Mild (13-22 points)	14	7.9
Moderate (23-32 points)	93	52.2
Severe (33 – 100 points)	71	39.9
Total	178	100

In our study, moderate dry eye accounted for the highest proportion in 3 groups (52.2%), followed by severe dry eye (39.9%) and the lowest was mild dry eye (7.9%), (Table 3).

**The relationship between some social-demographic factors and severe dry eye**

Age was one of related factors of dry eye (OR 1.03 (95%CI 1.01 – 1.05). The prevalence of dry eye in the group having higher educational level (above high school) was 58.8%, lower than that of the group having lower educational level (60.9%).

**Table 4: The relationship between some social-demographic factors and severe DE**

Factors	Yes		No		OR 95%CI	P	
	n	%	n	%			
Age					1.03 (1.01 – 1.05)	0.005*	
Sex	Male	12	35.3	22	64.7	1.27(0.59 – 2.77)	0.543
	Female	59	41	85	59		
Educational level higher than high school	Yes	28	41.2	40	58.8	1.09 (0.59 – 2.02)	0.782
	No	43	39.1	67	60.9		
Occupation	Others	24	36.4	42	63.6	1.53(0.71-3.31)	0.279
	Officer	21	46.7	24	53.3		
	Farmer	26	38.8	41	61.2		
Binocular good vision	Yes	13	15.3	72	84.7	0.11(0.05- 0.23)	0.0001*
	No	58	62.4	35	37.6		

OR: odds ratio; 95% CI: confident interval; \*: p < 0.05; P values were determined by Anova test.

The highest prevalence of severe dry eye by occupation was in farmer group (46.7%), followed by the farmer group (38.8%) and the lowest in other occupations (36.4%), (Table 4).

**Table 5: The relationship between severe dry eye and medical history**

Risk factors	Yes		No		OR 95%CI	P	
	N	%	n	%			
Medical history	Yes	70	44.9	86	55.1	17.09	0.0001*
	No	1	45	21	95.5		
Chronic conjunctivitis	Yes	7	25.9	20	74.4	0.36	0.027*
	No						
Refractive error	Yes	3	12.5	51	87.5	0.14	0.0001*
	No	67	51.1	64	48.9		
Allergic diseases	Yes	13	32.5	27	67.5	0.49	0.062
	No	57	49.6	58	50.4		
Diabetes	Yes	1	50	1	50	1.2	1
	No	69	45.4	83	54.6		
Hypertension	Yes	5	62.5	3	37.5	2.1	0.47
	No	65	14.2	82	55.8		
Sjogren's syndrome	Yes	30	93.8	2	6.3	31.13	0.0001*
	No	40	32.5	83	67.5		
Arthritis	Yes	22	46.8	25	53.2	1.1	0.786
	No	48	44.4	60	55.6		
Other autoimmune diseases	Yes	3	100	0	0	0.44	0.09
	No	67	44.1	85	55.9		

OR: odds ratio; 95% CI: confident interval; \*: p < 0.05; P values were determined by Anova test.

We did not find any statistically significant relationship between severe DE disease and group of medical history including allergy, diabetes, hypertension, arthritis and other autoimmune diseases

(Lupus) (p > 0.05). On the other hand, medical history of chronic conjunctivitis, refractive errors, Sjogren's syndrome was shown to be statistically significant association with severe dry eye disease (p < 0.05) (Table 5).

**Discussion**

**General information of research subjects**

The mean age of participants was 44.6 years and the 40-59 age group comprised the most patients among the 3 age groups (43.7%). This characteristic is similar to a study of Alyscia Cheema [8]. DE disease can occur at any age. This study revealed the significant and important effects of dry eye disease on individual health as a public health problem. The prevalence of dry eye symptoms increased with age (p < 0.05); it is consistent with the research of BOSS [9]. The proportion of female participated in our study (80.9%) was higher than of male (19.1%). It is similar to the results of previous epidemiological studies of this disease [10], [11], [12].

Among the dry eye patients, the ratio of low education, low income was higher than the others rest. In fact, people with low educational level, low average income often work in bitter environmental conditions such as overheat, cold or outdoor sunny windy conditions. That is the cause for faster evaporation of tear film, more susceptible blepharitis which affects the adhesion forces of tear film on the corneal surface leads to DE disease. The percentage of mountainous patients who suffer from DE is very low. This may be due to not only the difficulty of mountainous people to seek medical care but also cool moist environment in the living area. Fresh climate in mountainous areas may significantly reduce the rate of DE in people living here.

More than half of our patients had good correction vision. This seems to be suitable because DE disease often insignificantly reduces the visual acuity by altering the tear film layer, not impairing the transparent environment such as cornea, lens.

**Description of quality of life (QoL) related vision according OSDI**

The symptoms of ocular surface with high scores and frequent occurrences make a significant impact on the QoL of patients with DE. The mean OSDI score of discomfort of ocular surface symptom group was 48.6 ± 26.15 and 73% of patients felt uncomfortable all the time. The visual disturbance was observed with 4 activities: reading, driving, working with computer and watching TV. OSDI score regarding to these categories was also less than half of the normal person (43.64). The average score of



DE increased under the influence of dry, windy and low humidity environments. Therefore, to reduce the effects of DE on the QoL of patients, it is necessary to limit dry, low humidity and windy conditions in living environment (Figure 3).

### **Related factors with severe DE**

In logistic regression analysis with univariate model, we found an association between age and severe dry eye condition ( $p < 0.05$ ). When the age increased by one year, the risk of severe dry eye increased by 1.03 times. This can be explained by hormonal changes at older age which leads to hyposcretion of many exocrine glands of the body (including glands responsible for tear film secretion). This condition can cause the symptoms of dry eyes. Also, the effect of hormonal factors on women also makes the prevalence of severe dry eye in women higher than that of men in our study (64.7% in women compared to 59% in men) (Table 5).

There is a stastically difference in the prevalence of severe dry eye between education levels and occupations ( $p < 0.05$ ).

On the other hand, the variations of age and binocular good vision were shown to have a statistically significant with severe dry eye disease ( $p < 0.05$ ). The group with binocular good vision had lower risk (0.11 times) of dry eye disease than the group without binocular good vision.

People with a history of refractive errors are at lower risk of DE than other people due to regular examination and appropriate treatment. Sjogren's syndrome is an autoimmune disease characterized by dry mouth and signs of dry eyes due to functional impairment of exocrine glands [13]. This syndrome is the second most common autoimmune disease after rheumatoid arthritis [11]. In our study, we have not found an association with allergic diseases, arthritis. This result is similar to the study of Biljana and colleagues [6]. We also have not found the association between dry eyes and contact lenses wearers, other autoimmune diseases (Lupus), thyroid disease because the number of each type of medical history in our study was only 1-2 people [14], [15].

In conclusion, this is one of the first studies on the quality of life of patients with dry eye in Vietnam. The main result includes: dry eyes have a significant impact on visual function and it reduces the quality of daily life of patients. The factors that have been shown to be associated with severe dry eye include age, binocular good vision, medical history, chronic conjunctivitis, refractive errors, Sjogren's syndrome.

## **References**

1. Pflugfelder S, Bauerman R, Stern ME, editors. Dry eye and ocular surface disorders. Taylor & Francis US, 2004:1-428. <https://doi.org/10.1201/b14144>
2. Lee AJ, Lee J, Saw SM, Gazzard G, Koh D, Widjaja D, Tan DT. Prevalence and risk factors associated with dry eye symptoms: a population based study in Indonesia. Br J Ophthalmol. 2002; 86(12):1347-51. <https://doi.org/10.1136/bjo.86.12.1347> PMID:12446361 PMCID:PMC1771386
3. Moss SE, Klein R, Klein BE. Prevalence of and risk factors for dry eye syndrome. Arch Ophthalmol. 2000; 118(9):1264-8. <https://doi.org/10.1001/archophth.118.9.1264> PMID:10980773
4. Schaumberg DA, Sullivan DA, Buring JE, Dana MR. Prevalence of dry eye syndrome among US women. Am J Ophthalmol. 2003; 136(2):318-26. [https://doi.org/10.1016/S0002-9394\(03\)00218-6](https://doi.org/10.1016/S0002-9394(03)00218-6)
5. Paulsen AJ, Cruickshanks KJ, Fischer ME, Huang GH, Klein BE, Klein R, Dalton DS. Dry eye in the beaver dam offspring study: prevalence, risk factors, and health-related quality of life. Am J Ophthalmol. 2014; 157(4):799-806. <https://doi.org/10.1016/j.ajo.2013.12.023> PMID:24388838 PMCID:PMC3995164
6. Miljanovic B, Dana R, Sullivan DA, Schaumberg DA, et al. Impact of dry eye syndrome on vision-related quality of life. Am J Ophthalmol. 2007; 143(3):409-15. <https://doi.org/10.1016/j.ajo.2006.11.060> PMID:17317388 PMCID:PMC1847608
7. Lemp MA. Recent developments in dry eye management. Ophthalmology. 1987; 94(10):1299-304. [https://doi.org/10.1016/S0161-6420\(87\)80015-5](https://doi.org/10.1016/S0161-6420(87)80015-5)
8. Cheema A, Aziz T, Mirza SA, Siddiqi A, Maheshwary N, Khan MA. Sodium hyaluronate eye drops in the treatment of dry eye disease: an open label, uncontrolled, multi-centre trial. Journal of Ayub Medical College Abbottabad. 2012; 24(3-4):14-6.
9. Baudouin C, Creuzot-Garcher C, Hoang-Xuan T, Rigeade MC, Brouquet Y, et al. Severe impairment of health-related quality of life in patients suffering from ocular surface diseases. J Fr Ophthalmol. 2008; 31(4):369-78. [https://doi.org/10.1016/S0181-5512\(08\)71431-1](https://doi.org/10.1016/S0181-5512(08)71431-1)
10. Sakane Y, Yamaguchi M, Yokoi N et al. Development and validation of the Dry Eye-Related Quality-of-Life Score questionnaire. JAMA Ophthalmol. 2013;131(10):1331-8. <https://doi.org/10.1001/jamaophthalmol.2013.4503> PMID:23949096
11. Le Q, Zhou X, Ge L, Wu L, Hong J, Xu J. Impact of dry eye syndrome on vision-related quality of life in a non-clinic-based general population. BMC Ophthalmol. 2012; 12(1):22. <https://doi.org/10.1186/1471-2415-12-22> PMID:22799274 PMCID:PMC3437197
12. Uchino M, Schaumberg DA. Dry Eye Disease: Impact on Quality of Life and Vision. Curr Ophthalmol Rep. 2013; 1(2):51-57. <https://doi.org/10.1007/s40135-013-0009-1> PMID:23710423 PMCID:PMC3660735
13. Fox RI, Michelson P, Casiano CA, et al. Sjogren's syndrome. Clin Dermatol. 2000; 18(5):589-600. [https://doi.org/10.1016/S0738-081X\(00\)00135-8](https://doi.org/10.1016/S0738-081X(00)00135-8)
14. Markoulli M, Kolanu S. Contact lens wear and dry eyes: challenges and solutions. Clin Optom (Auckl). 2017; 9:41-48. <https://doi.org/10.2147/OPTO.S111130> PMID:30214359 PMCID:PMC6095561
15. Resch MD, Marsovszky L, Németh J, Bocskai M, Kovács L, Balog A. Dry eye and corneal langerhans cells in systemic lupus erythematosus. J Ophthalmol. 2015; 2015:543835. <https://doi.org/10.1155/2015/543835> PMID:25893112 PMCID:PMC4393942