AJHAS

https://albalqajournal.ammanu.edu.jo/SC.aspx
Vol.(1) No.1 Jan 2022

Recived: 5th May 2021
Accepted: 30 Aug 2021
Published online: 30 Nov 2021

Al-Balqa Journal
for Health & Applied Sciences

Dry Eye Assessment in Jordan during COVID-19 Pandemic

Bahaa Al-din Jaber [1,*]

[1] Al-Ahliyya Amman University, Faculty of Allied Medical Sciences, Department of Optometry Science, ORCID: 0000-0002-7785-1220

* Corresponding author email address: b.jaber@ammanu.edu.jo, Al-Ahliyya Amman University-Amman-Jordan-Zip code: (19328), Phone number: +962 5 3500211

Abstract

The study aims at assessing the dry eye profile in a cohort of the Jordanian population using an online questionnaire-based survey. From March to May 2020, an online was conducted questionnaire-based survey to assess dry eye in the community of Al-Ahliyya Amman University for optometry students and their family members with dry eye who spent more time at home in front of digital devices due to the COVID-19 pandemic. The questionnaire consisted of demographic profile along with questions based on: (a) Frequently occurring symptoms of dry eyes, (b) frequency and severity questions, (c) environmental triggers and medications used, and (d) the ocular Surface Disease Index (OSDI). Out of 200 online questionnaires, 185 responses were received. The mean age was 35.08 ±12.13 years. There were 89 (48.1%) men and 96 (51.9%) women. The male: female ratio was nearly 1:1. The mean OSDI in the population cohort was 11.69 ± 8.16. The mean scale of various dry eye symptoms ranged from 10.5 to 11 approximately. There was a significant gender difference regarding the frequency of dry eye (p= 0.005), where 58 (60.4%) of women had dry eye compared to 36 (40.4%) of men. There was no significant age difference regarding dry eye (p=0.295). Due to COVID-19 pandemic, the conclusion was that the dry eye disease escalated among the Jordanian population of optometry students and their families. This will impact the symptom profile, day to day performance, and add to the burden of dry eye in society.

Keywords

Dry eye, Jordan, COVID-19, Pandemic, Ocular Surface Disease Index, Dry eye syndrome.

Author Biographies

Dr. Bahaa Al-din Jaber: Ophthalmologist (MD) (FRCS) was born in Amman, Jordan on 18/07/1980. Graduated from the faculty of medicine and health sciences Sana'a University Yemen in 2004. Completed his ophthalmology residency program at King Hussein Medical City, Royal Medical Services Amman Jordan, Jordanian Board in Ophthalmology 2011, Fellow of The Royal College of Surgeons Glasgow since 2013, Consultant Cornea, external eye disease, anterior segment, cataract, and refractive surgery.

1. Introduction

Dry eye syndrome is a multifactorial ocular surface disease that is characterized by instability of tear film, inflammation of ocular surface, hyperosmolarity, loss of homeostasis, and neurosensory abnormalities along ocular signs and symptoms (Gurnani et al., 2021). The varied risk factors of dry eye include older age, female sex, hormonal imbalance, computer vision syndrome, smoking, thyroid eye disease, watching television for prolonged hours, extended contact lens wear, refractive surgery, cataract surgery, ocular tumour therapy, graft versus host disease and changes in local environment (Lamberts et al., 1979). It has been classified as aqueous deficient dry eye and evaporative dry eye (Gipson et al., 2007). The approximate prevalence of dry eye varies from 5 % to 35% in different age groups (Wolffsohn et al., 2017). One of the previous studies reported an increased prevalence in females of about 78% (Lin et al., 2003). The prevalence of dry eyes increases with increased age as has been evidenced by the Beaver Dam study with a prevalence of 14% in adults aged 48-91%.6 The high incidence of dry eye has been reported in China, Canada, Japan, Indonesia and Taiwan, Hispanics, Asians, and Pacific Islanders (Moss et al., 2000). The signs and symptoms of dry eye include tearing, irritation, burning sensation, photophobia, excessive itching, heaviness around the eyes, and blurred vision (Javadi & Feizi, 2011). The mechanism of the dry eye involves an afferent limb from the ocular surface and adnexa, conjunctiva, cornea, and meibomian glands to the central nervous system and an efferent limb from the central nervous system to main and accessory lacrimal unit (Lemp et al., 2017).

There is no gold standard test to diagnose dry eye and diagnosis is based on subjective evaluation and objective evaluation methods. The suggested sequence for dry eye assessment includes meticulous history, detailed ophthalmic evaluation along with symptom questionnaire, fluorescein staining assessing any erosion, tear film break up time (TBUT), Schirmer's test, lid, and meibomian gland assessment (Craig et al., 2017).

The objective evaluation methods include conjunctival staining, corneal staining, TBUT, tear film evaluation, tear osmolarity, Schirmer's test, tear film instability, and inflammation assessment. While the subjective evaluation is usually done with the help of validated questionnaires to maintain uniformity. The various questionnaire available to us includes Ocular surface disease index (OSDI), Dry eye questionnaire (DEQ), Symptoms' analysis in dry eye (SANDE), National Eye Institute's visual function questionnaire (NEI VFQ-25), Impact of dry eye on everyday living (IDEEL) and Dry eye-related quality-of-life score (DEQS) (Javadi & Feizi, 2011; Craig et al., 2017; Lemp et al., 2017; Gurnani et al., 2021).

Since dry eye is a multifactorial aetiology, the treatment is highly complicated. The treatment can be divided into medical and surgical management based on the dry eye severity grading system. The medical management is copious lubricants along with steroids and cyclosporine to suppress inflammation and ocular surface remodelling for acute exacerbations (Craig et al., 2017). The surgical treatment modalities are punctual occlusion, salivary gland procedures, and amniotic membrane grafting.

Due to the rowing COVID-19 pandemic, daily life was disrupted, and the majority of the people were stuck in the house glued to the screens (Gurnanin & Kaur, 2021). This led to the epidemic of digital eye strain and increased reports of computer vision syndrome (Kaur et al., 2020). Hence we thought of assessing the same in our population cohort.

Although varied questionnaires have been tried to assess dry eye in various geographical regions and population cohorts, none of the previous studies highlighted OSDI in a Cohort of Jordanian Population. This study was aimed at detailing the dry eye profile of the Jordanian population using an online OSDI questionnaire during the COVID-19 pandemic lockdown from March 2020 to May 2020 in Jordan.

2. Materials and Methods

2.1 *Study design and population*

This was an online questionnaire-based cross-section survey conducted in the community of Al-Ahliyya Amman University of optometry students and their family members. The study approval was obtained from the Institutional Review Board of the Institutional Ethics committee. The study adhered to the tenets of the Declaration of Helsinki. Informed consent was obtained from all the participants while filling the survey on the initial page.

We designed an online questionnaire for our survey. It consisted of (a) Frequently occurring symptoms of dry eyes in the form of dryness, discomfort (irritation), grittiness, burning, stinging, ocular fatigue, itching, and light sensitivity. (b) Frequency and severity questions (or some combination) to gain perspective on the regularity and impact of the symptoms. (c) Environmental triggers and other associated factors, such as medication use promoting dry eye. (d) The Ocular Surface Disease Index (OSDI), Allergan Inc. (Irvine, CA). The Ocular Surface Disease Index is a 12-item score, which consists of questions graded on a scale of 0 to 4, where 0 indicates none; 1, some of the time; 2, half of the time; 3, most of the time; and 4, all of the time. The total OSDI score was then calculated based on the following formula: OSDI= [(sum of scores for all questions answered) × 100]/ [(total number of questions answered) × 4] (Schiffman et al., 2000). Thus, the OSDI is scored on a scale of 0 to 100, with higher scores representing greater disability. A cut-off value of 20 was previously used where patients

with a score below 20 can be considered normal, and patients with a score of more than 20 are considered to have dry eye disease (Zeev et al., 2014). The questionnaire highlighted a brief initial introduction and informed consent on the first page. This was followed by participant's details and mandatory questions. The questionnaire was validated by 2 researchers in terms of simplicity, clarity, and relevance. The questionnaire was further pilot tested with 10 volunteers who are fluent in English as well as the Arabic language for comprehensive understanding.

We used voluntary response sampling for this study which is a type of non-probability sampling. The questionnaire in the English and Arabic language was then circulated using Google forms. The study was conducted by circulating an online survey from March 2020 to May 2020 during the lockdown period in Jordan due to the COVID-19 pandemic. A reminder to take the survey was sent intermittently. The survey was completed with the help of a response link after entering the email address. The responses were collected, and data was extrapolated on the excel sheet.

2.2 *Data analysis*

We used SPSS version 21.0 (Chicago, USA) in our analysis. We used to mean (± standard deviation) to describe continuous variables (e.g. age). We used to count (frequency) to describe other nominal variables (e.g. gender). We used the chi-square test to analyse the difference in the dry eye between men and women. We performed an independent sample t-test to analyse the mean difference between age and dry eye, and we presented data in mean (standard deviation). All underlying assumptions were met unless otherwise indicated. We adopted a p-value of 0.05 as a significant threshold.

3. Results

A total of 200 online questionnaires were sent to the Jordanian cohort, out of which 185 responses were received. Hence, the data of 185 participants were taken for analysis in this study. The response rate was 92.5%. The mean age was 35.08 ±12.13 years (range 22-56). There were 89 (48.1%) men and 96 (51.9%) women. The confidence interval was 3.02 taking into account confidence level of 95%. The male: female ratio was nearly 1:1. The mean OSDI in the population cohort was 11.69 ± 8.16 (Table 1).

The mean scale of various dry eye symptoms and predisposing factors like light sensitivity, gritty sensation, stinging, blurred vision, reading, driving, computer use, television use, wind, dry weather, and air condition ranged from 10.5 to 11 approximately. The scale variance ranged from 55-63, with a minimum of 55.436 for blurred vision and a maximum of 63.758 for driving. The corrected total item correlation ranged from 0.250 to 0.700 with a minimum of 0.269 for driving and a maximum of 0.701 for gritty sensation (Table 2).

The majority of the included patients didn't undergo laser refractive surgery or at least a year passed since the surgery (85.9%). We found a significant gender difference regarding the frequency of dry eye (p= 0.005), where 58 (60.4%) of women had dry eye compared to 36 (40.4%) of men. No significant age difference regarding dry eye (p=0.295). A total of 300 (169 males and 131 females) ophthalmologists participated in the study; all data collected were included in the analysis.

4. Discussion

Dry eye syndrome is a known entity with several risk factors promoting the incidence and prevalence of dry eyes among various population cohorts (Moss et al., 2000). The recent COVID-19 pandemic had a profound impact on promoting digital eye strain, computer vision syndrome, dry eye disease, and other chronic ocular pathologies (Bhattacharya et al., 2020; Saldanha et al., 2021). The dry eye pandemic escalated due to excessive electronic device usage in the form of mobile use, laptops, desktops, and televisions. This can be attributed to excessive work commitments in the IT sector or excessive free time for leisure and entertainment (Bahkir & Grandee, 2020; Giannaccare et al., 2020).

We thought on similar lines and conducted an online questionnaire-based survey for dry eye assessment in Optometry students and their families in the Jordanian cohort during the COVID-19 pandemic lockdown. The questionnaire is an effective means of self-evaluation and preliminary screening of DED. This helped us in screening and diagnosing DED and simultaneously assess various risk factors in this Jordanian cohort. We also used the OSDI questionnaire which is frequently used in clinical studies. It includes 6 questions on vision, 3 on ocular signs and symptoms, and 3 on environmental factors.

In our study, the mean age was 35.08 ±12.13 years (range 22-77) which is comparable to previous studies. The mean OSDI in the population cohort was 11.69 ± 8.16 which aligns with previous studies. We found a significant gender difference regarding the frequency of dry eye (p= 0.005), where 58 (60.4%) of women had dry eye compared to 36 (40.4%) of men. No significant age difference regarding dry eye (p=0.295). The major risk factors for dry eye as per previous studies are female gender, old age, contact lens use, refractive surgery, cataract surgery, systemic diseases, medication intake, and environmental variations (Moss et al., 2008; Schaumberg et al., 2009; Uchino et al., 2013; Tan et al., 2015; Wang et al., 2015). In our study environmental factors and digital device use were the most common risk factors. In contrast, our population cohort was younger. Prevalence of dry eye is significantly higher in Tokyo compared to other Japanese cities which was

attributed to the high urbanization and elevated air pollution (Hikichi et al., 1995). However, the study was conducted in an indoor environment conditions rather than the outdoor environment that was the major cause of dry eye, particularly in those workers using video display terminals in air-conditioned workplaces.

Table 1 The demographic profile and Ocular Surface Disease Index

		N	%	Mean	Standard Deviation
Gender	Male	89	48.1		
	Female	96	51.9		
Age				35	12
Ocular Surface Disease Index				11.69	8.16

Table 2 The detailed reliability analysis for each item

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Light sensitivity	10.584	56.646	.523	.871
Gritty sensation	11.000	55.880	.701	.861
Stinging	10.714	55.771	.607	.866
Blurred vision	10.681	55.436	.673	.862
New variable	10.681	55.436	.673	.862
Reading	10.762	57.215	.550	.869
Driving	11.092	63.758	.269	.881
Computer use	10.768	57.560	.524	.871
Television use	10.800	56.552	.597	.867
Wind	10.519	53.925	.638	.864
Dry weather	10.568	56.149	.507	.873
Air condition	10.443	55.183	.577	.868

*Reliability analysis showed high score reliability with Cronbach's alpha of 0.878

4.1 *Limitations and conclusions*

There is a lack of data regarding the prevalence of dry eye among the Jordanian population and this was a major research question in our study. However, due to varied COVID-19 challenges, we were not able to compare the statistically significant differences of dry eye in the population cohort before and after lockdown. Despite these challenges, we assessed the individual symptoms of dry eye mainly eye pain, blurry (fluctuating) vision, burning sensation, dryness, discomfort (irritation), foreign body sensation, grittiness, itching, ocular fatigue, photophobia (light sensitivity), congestion, sticky tears, stinging, heaviness and watering and the impact of lockdown and its associated environmental changes were also highlighted in our study. There were a few limitations of our study like we didn't perform a detailed examination of the patients for dry eyes. Our population cohort was limited to optometry students and the sample and study period were small. However, the strength of our analysis includes dry eye assessment despite COVID-19 challenges and the use of a detailed online questionnaire. According to our knowledge, this is one of few questionnaire-based analysis of dry eyes in the Jordanian cohort during the COVID-19 pandemic and we believe this will give useful insights to all ophthalmologists and optometrists regarding digital eye strain and dry eye in the Jordanian population.

Conflict of interests:

The authors declare that there is no conflict of interest.

Acknowledgments

This study was facilitated by Bahaa Eye Clinic, Amman, Jordan.

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Citing the article:

Jaber. B.A (2022). Dry Eye Assessment in Jordan during COVID-19 Pandemic. Al-Balqa Journal for Health and Applied Sciences. 1 (1), 21- 25.