

Prevalence of dry eye symptoms and risk factors in Saudi Arabia

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Received: September 2021; Accepted: September 2021; Published: October 1, 2021.

Citation: Abdulrahman Al-Amri et al. Prevalence of dry eye symptoms and risk factors in Saudi Arabia. World Family Medicine. 2021; 19(10): 97-104 DOI: 10.5742/MEWFM.2021.94144

Abstract

Background: Dry eye is a multifactorial condition of the tears and ocular surface that causes discomfort, visual disruption, and tear film instability, as well as the risk for ocular surface injury. It is accompanied by an increase in the osmolality of the tear film as well as ocular surface inflammation. Dry eye is a prevalent ocular disease that leads to ophthalmologist appointments. The prevalence of the disease varies greatly between epidemiological studies, depending on how the sickness is characterised and diagnosed, as well as depending on the sector of the population surveyed. It is expected to be between 7.4% and 33.7 percent

Methods: A descriptive cross-sectional survey was used targeting all groups of population in Aseer region. The study was conducted during 2021. Data was collected using structured questionnaire which included person's socio-demographic data, and the OSDI (ocular surface disease index) combined with questions relevant to the target of our research ((the repetitive habitual/behavioral factors leading to Dry eye disease (DED)), and also using SAS-SV (smartphone addiction scale) in the context of users of smart phones.

Results: Out of 2,527 total respondents, 694 (27.5%) have no issues related to eyes, while 1,833 (62.5%) have eye related issues. The mean (SD) of age was 29.4 (8.9) years. 67.0% were females while 33.0% were males. 22.9 % were exposed to air conditioners, 22.9% used contact lenses, 7.36 % used lubricant drops, while 6.3% live in a dry weather area.

Conclusion: Dry eye illness is a prevalent ophthalmological condition with a number of clinical predictors, including the use of electronic devices and other risk factors. Teachers and health professionals should teach the students and nation about the awareness of dry eye problems.

Key words: Dry eye, electronic devices, risk factors, diseases

Background

Dry eye is a multifactorial condition of the tears and ocular surface that causes discomfort, visual disruption, and tear film instability, as well as the risk for ocular surface injury. It is accompanied by an increase in the osmolarity of the tear film as well as ocular surface inflammation [1]. Despite the fact that this ailment rarely results in visual loss, it can have a negative impact on one's quality of life when symptoms arise.

Dry eye is a prevalent ocular disease that leads to ophthalmologist appointments. The prevalence of the disease varies greatly between epidemiological studies, depending on how the sickness is characterised and diagnosed, as well as which sector of the community is concerned. It is expected to be between 7.4% and 33.7 percent [2, 3, 4]. Because symptom-based dry eye definitions are more reproducible and accurate than objective clinical tests in identifying dry eyes, they are frequently used to define dry eye prevalence in population-based investigations [5]. A frequently used and useful technique to identify the presence of dry eye is the validated six-item questionnaire of ocular symptoms related to dry eye [6, 7].

Some environmental and epidemiological risk factors are suggested to increase the likelihood of dry eye in the Al-Ahsa community. Al-Ahsa, like the rest of Saudi Arabia, has a hot desert environment with temperatures reaching over 50°C in the summer [8]. To cope, practically everyone in the country uses air conditioning in their houses and cars. Trachoma was endemic in this Saudi Arabian district, with a prevalence of 100% in surveys conducted between 1955 and 1970 [9].

Researchers have become increasingly interested in investigating dry eye as the description of the condition has been refined over the previous few decades. As a result, dry eye is no longer regarded a component of Sjögren syndrome, but rather a distinct clinical entity [2]. Depending on the research, diagnostic methods employed, and demographics analysed, the prevalence of dry eye symptoms is estimated to range from 7% to 34% [3],[4],[5],[6].

Aqueous deficit, excessive lacrimal film evaporation, or a combination of the two causes eye dryness. When the lacrimal gland's function is compromised, tear volume is reduced, resulting in aqueous deficit. The tear volume is typical in evaporative dryness, but the tear film is abnormal due to fast evaporation. The evaporative type could affect up to 86 percent of patients with dry eye symptoms [7],[8]. About 14% of those over the age of 65 experience dry eye symptoms [9]. Aside from age, other individual and environmental factors have been identified as risk factors for dry eye, including being a woman, smoking, depression, or having LASIK surgery [4],[10],[11],[12].

These symptoms were found to be common and linked to chronic diseases in studies conducted in Saudi Arabia (Riyadh, Jeddah, and Al-Ahsa) [13],[14],[15]. The goal

of this study was to establish the prevalence of dry eye symptoms among the people of Taif, Saudi Arabia, as well as the most common risk factors for the disease.

Dry eye is a condition in which a person's tears aren't good enough to lubricate and feed the eye. Tears are required for the health of the front surface of the eye as well as for clear vision. Dry eyes are a widespread and often persistent condition, especially among the elderly [1]. DE's epidemiology has been studied in multiple major population-based studies in the United States and elsewhere, with a wide range of frequencies recorded for DE symptoms (6 percent - 50%), signs (16 percent - 85 percent), and symptoms with signs (73 percent - 93 percent) [2-4]. In Pakistan, the prevalence of dry eye is 3.3 percent in patients aged 10 to 30, 20 percent in patients aged 30 to 40, 33.3 percent in patients aged 40 to 50, 23.3 percent in patients aged 50 to 60, and 6.6 percent in patients aged 60 to 70. Dry eye was caused by keratitis in 30% of cases, bacterial and viral conjunctivitis in 20% of cases, and pterygium in 10% of cases [5]. In an aged Korean population, a study with 85 percent symptom frequency of dry eye ascertained indications by positive tear film break-up time (TBUT) [6,7]. Dry eye is reported to affect a wide range of people, with rates ranging from 14.4% to 33% of the population in questionnaire-based surveys. Dry eye prevalence rates have been reported to be lower in studies that include measures of tear function, such as Schirmer's test, tear film break up time, and fluorescein staining [8].

Keratitis, allergies, contact lenses, numerous medications, thyroid disease, Lasik, Pterygium, and smoking are all risk factors for symptomatic dry eye illness. Keratitis is an inflammation of the cornea, which covers the pupil and iris and is the outermost component of the eye. Infection and damage are the most common causes of keratitis. Keratitis can be caused by bacterial, viral, parasitic, or fungal infections. After a corneal injury, infectious keratitis can develop. However, damage to the cornea might cause inflammation without causing a subsequent infection. Infectious keratitis is more common in people who wear contact lenses. If a person suspects that he or she is getting an eye infection, contact lenses should be removed immediately [9]. When something allergic irritates the conjunctiva, it is an eye allergy. Contact lenses can amplify the symptoms of dry eyes [11]. Discomfort from contact lenses is common, but is typically easy to fix [12]. The patient's usage of systemic drugs is one component in dry eye, which is a multi-factorial illness of the tears and ocular surface [1]. Many common systemic drugs can influence ocular tissues, and medicines that cause dry eye symptoms can be found in a wide range of pharmaceutical categories. Thyroid eye illness is an autoimmune disorder that causes swelling, irritation, and occasionally vision issues in the eyes. Itching, watering, or dry eyes, as well as a grittiness in the eyes, are early signs of thyroid eye disease. LASIK (laser-assisted in situ keratomileusis) is a common corneal refractive procedure that produces excellent refractive results. Dry eyes are the most prevalent LASIK consequence, with nearly all patients experiencing some degree of dryness in the

immediate postoperative period [13]. Pterygium is an eye ailment that commonly affects persons who spend a lot of time outside. It's also known as surfer's eye because it frequently affects surfers. Even youngsters who do not wear sunglasses outside can be affected [14]. Tobacco smoking irritates the eyes and exacerbates dry eye. Smokers are roughly twice as likely to suffer from dry eyes [15]. The main aim of this study is to find out the prevalence of dry eye problems and their risk factors.

Eye is one of the most important organs in the human body, therefore any injury or limitation in its function will affect the quality of life. There are many systems that protect the eye and maintain its function; one of them is the lacrimal system which makes the eye moist and humid to keep the eye at its optimal function. There are repetitive habitual and behavioral factors which contribute in affecting the function of lacrimal system and therefore may develop as dry eye disease (DED), such as: exposure to , contact lenses wearing [4,9] smart phone addiction, environmental factors, and living in dry weathers areas. Published data, according to the Saudi Arabia: Jeddah Regional Climate Center [8] found the DED to be highly prevalent in Saudi Arabia. Measuring and increasing the awareness of population about these factors helps in understanding how these factors are related to this (DED) and hopefully will help in reducing the prevalence of the effects of dry eye syndrome in the future.

Methodology

A descriptive cross-sectional survey was used targeting all groups of population in Aseer region. The study was done during 2021. Data was collected using structured questionnaire and included person's socio- demographic data, and the OSDI (ocular surface disease index) combined with questions relevant to the target of our research (the repetitive habitual/behavioral factors leading to Dry eye disease (DED)), and SAS-SV (smartphone addiction scale) in the context of smart phone addiction being one of the most relevant causes of DED as previous studies have shown.

The Smartphone Addiction Scale-Short Version (SAS-SV), which was initially developed from an older version called SAS, was used to assess the participants' addiction to smartphones. It consists of 10 questions that are based on a self-reporting system using a 6- point Likert scale (1: "strongly disagree" and 5: "strongly agree"). On the other side: the OSDI contains a 12-item questionnaire designed to assess symptoms consistent with DED. The 12 items of the questionnaire were graded, using a self-reporting system, from 0 to 4 (0: "none of the time" and 4: "all of the time").

SPSS ver.20 was used for analysis, Chi-square test was used to compare the variables at 5.0% level of significance

Inclusion criteria: All the population aged from 18 to 65 healthy individuals who were not from the mentioned groups in the exclusion criteria.

Exclusion criteria: Exclusion criteria included patients who had undergone refractive surgery procedures and those with an active ocular surface disease and any other conditions that may interfere with development of DED. Subjects with a previous diagnosis of DED were excluded from the study.

Results

Out of 2,527 total respondents, 694 (27.5%) had no issues related to the eye, while 1,833(62.5%) have eye related issues. The mean (SD) of age was 29.4(8.9) years. 67.0% were females while 33.0% were males.

Results

Out of 2,527 total respondents, 694 (27.5%) had no issues related to the eye, while 1,833(62.5%) have eye related issues. The mean (SD) of age was 29.4(8.9) years. 67.0% were females while 33.0% were males.

Table 1: Frequency distribution related to Eye Problems

Are your eyes exposed to direct air conditioner or fan for long periods of time?		
	Frequency	Percent
No	1413	77.1%
Yes	420	22.9%
Have you used contact lenses now or in the previous short period?		
	Frequency	Percent
No	1413	77.1%
Yes	420	22.9%
Do you use eye drops other than lubricant drops?		
	Frequency	Percent
No	1698	92.64%
Yes	135	7.36%
Do you live in a city dominated by dry weather?		
	Frequency	Percent
No	673	36.7%
Yes	1160	63.3%

Table 1 depicts that 22.9 % were exposed to air conditioner, 22.9% used contact lenses, 7.36 % used lubricant drops, while 6.3% are living in a dry weather area.

Table 2: Eye problems

Do you have blurry vision in your eyes?			
		Frequency	Percent
	Every time	58	3%
	Half the time	132	7%
	Most of the time	123	7%
	Never	827	45%
	Sometimes	693	38%
Do you have a lack of vision?			
		Frequency	Percent
	Every time	173	9%
	Half the time	126	7%
	Most of the time	106	6%
	Never	933	51%
	Sometimes	495	27%
Are your eyes sensitive to light?			
		Frequency	Percent
	Every time	25	1%
	Half the time	78	4%
	Most of the time	141	8%
	Never	791	43%
	Sometimes	798	44%
Do you feel a sandy feeling inside your eyes?			
		Frequency	Percent
	Every time	11	1%
	Half time	57	3%
	Most of the time	83	5%
	Never	1139	62%
	Sometimes	543	30%
Have you had problems with your eyes that reduced your ability to (drive at night)?			
		Frequency	Percent
	Every time	44	2%
	Half the time	50	3%
	Most of the time	40	2%
	Never	1462	80%
	Sometimes	237	13%
Have you had problems with your eyes that reduced your ability to (read)?			
		Frequency	Percent
	Every time	73	4%
	Half the time	94	5%
	Most of the time	88	5%
	Never	1095	60%
	Sometimes	483	26%

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Table 2: Eye problems (continued)

Have you had problems with your eyes that reduced your ability to (watching TV and reading ATMs)?			
		Frequency	Percent
	Every time	65	4%
	Half the time	85	5%
	Most of the time	73	4%
	Never	1208	66%
	Sometimes	402	22%
Did you feel pain in your eyes last week?			
		Frequency	Percent
	Every time	28	2%
	Half time	127	7%
	Most of the time	131	7%
	Never	924	50%
	Sometimes	623	34%
Do you feel discomfort (in your eyes) when you are in low humidity (dry) places?			
		Frequency	Percent
	Every time	55	3%
	Half the time	107	6%
	Most of the time	107	6%
	Never	1094	60%
	Sometimes	470	26%

Table 2 depicts that 3% have blurry vision all the time, 9% have lack of vision all the time, 1% have sensitivity to light all the time, 1% have sandy feeling inside their eyes all the time, 4% have difficulties watching TV and reading ATM's all the time, and 3% feeling difficulties in eyes every time when they are in dry weather

Table 3: Likert scale analysis

Likert scale analysis		
	Mean	S.D
Feeling impatient and anxious when I'm not holding my smartphone	3.3	8.6
Feeling pain in the wrist or in the back of the neck while using the smartphone	3.8	7.5
Having my smartphone on my mind even when I'm not using it	3.1	7.4
I can't stand the thought of not owning a smartphone	3.2	7.6
I check my smartphone frequently so I don't miss conversations between other people on Facebook or Twitter	4.4	7.4
I will never give up using my smartphone even when my daily life is greatly affected by it	3.2	6.5
People around me tell me that I use my smartphone a lot	3.9	5.5

Table 3 depicts that all items (Feeling impatient and anxious when I'm not holding my smartphone, Feeling pain in the wrist or in the back of the neck while using the smartphone, Having my smartphone on my mind even when I'm not using it, I can't stand the thought of not owning a smartphone, I check my smartphone frequently so I don't miss

Table 3 depicts that all items (Feeling impatient and anxious when I'm not holding my smartphone, Feeling pain in the wrist or in the back of the neck while using the smartphone, Having my smartphone on my mind even when I'm not using it, I can't stand the thought of not owning a smartphone, I check my smartphone frequently so I don't miss conversations between other people on Facebook or Twitter, I will never give up using my smartphone even when my daily life is greatly affected by it, People around me tell me that I use my smartphone a lot) having average value above 3.00 means all of them are significant items.

Table 3: Comparison between smartphone and concentration in class:

Use my smartphone for longer than I intended * Difficulty concentrating in class, on tasks, or at work due to smartphone use

		Difficulty concentrating in class, on tasks, or at work due to smartphone use					Total
		Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	
Use my smartphone for longer than I intended	Strongly disagree	96	33	15	24	42	210
	Disagree	48	27	42	26	37	180
	Neutral	70	55	55	29	63	272
	Agree	37	46	61	53	72	269
	Strongly Agree	133	90	132	141	406	902
Total	Agree	384	251	305	273	620	1833

P=0.00001

Table 3 depicts that we have observed significant differences while comparing smart phones and concentration in classes

Discussion

The frequency and risk factors for symptomatic dry eye disease were assessed in this cross-sectional investigation. In this study, the prevalence of dry eye was reported to be 2.4 percent. In comparison to certain other Asian areas and countries, the prevalence of Dry Eye Syndrome (DES) in this region and country is rather low. There were 100 patients in this study, 65 of whom were female and the rest were male. According to a study conducted in the United States [17], 41.0 percent of dry eye patients were female and 16 percent were male. According to a study, 33.7 percent of people over the age of 65 in the United States are diabetic. Taiwan was symptomatic, as defined by the reporting of one or more dry eye symptoms occurs frequently all of the time [18]. There was a disparity in prevalence between our data and findings in other Asian regions and nations in this investigation. However, a recent study discovered that 10% of people over the age of 60 have dry eyes as a result of pterygium, posterior blepharitis, and age. In our study other diseases also have a significant relationship with eye problems.

The cornea contains a lot of innervation and is one of the most sensitive regions of the human body (12). The DED is

attributed to a lack of corneal pain tolerance. DED lowers quality of life, and it affects 6–34 percent of the world's aged population. In our study, dry eyes were diagnosed in 30.3 percent (486) of patients who presented to the eye unit. This is in line with the findings of the international dry eye workshop (DEWS) 2007, which found that the global prevalence of DED is around 17 percent, with a greater prevalence of roughly 30 percent in Asia.

Dry eyes have two risk factors: older age and feminine sex. The frequency of DED rises with age, particularly in the sixth decade. According to the research, the majority of our patients were above the age of 50. Females have a 1.56-1.85 times higher risk of DED than males, according to previous studies. However, contrary to 15 other studies, males were more symptomatic than females in this study. In this study, 286 women (58.8%) were postmenopausal. The hormonal effect on the tear (16) film and ocular surface can be seen here. Menopause and female sex are common risk factors for DE and depression, implying that sex hormones are involved. Inflammation also plays a role in the onset of DED. Similar to another study in South Korea (17) that found a higher frequency of DED in urban areas, the majority of our patients were from cities rather than rural areas.

Smoking causes an unstable tear film and aggravates allergy illness in people (18). According to the findings, 33 percent of the patients had been smoking for at least ten years. In our study, DE symptoms such as dryness, irritation, and fatigue were the main reasons for decreased daily activities and quality of life (19). In other studies, females had a higher rate of depression than men, with rates ranging from 4.0 percent to 9.3 percent for women and 2.8 percent to 20.69 percent for men. In our study, female DE patients had a rate of depression of 68.7%, which was higher than male DE patients (31.3%) [18-22]. Long-term usage of smartphones has been demonstrated in multiple studies to be harmful to eye health. Extensive smartphone use was found to raise the frequencies of ocular symptoms, such as eye dryness, in a study focusing particularly on the adolescent age group, which is in line with our study [22].

Conclusion

Dry eye illness is a prevalent ophthalmological condition with a number of clinical predictors, including the use of electronic devices and other risk factors. Teachers and health professionals should teach the students and nation awareness regarding dry eye problems.

References

1. The definition and classification of dry eye disease: Report of the Definition and Classification Subcommittee of the International Dry Eye WorkShop (2007). *Ocul Surf* 2007;5:75-92.
2. Lin PY, Tsai SY, Cheng CY, Liu JH, Chou P, Hsu WM. Prevalence of dry eye among an elderly Chinese population in Taiwan: The Shihpai Eye Study. *Ophthalmology* 2003;110:1096-101.
3. Lee AJ, Lee J, Saw SM, Gazzard G, Koh D, Widjaja D, et al. Prevalence and risk factors associated with dry eye symptoms: A population based study in Indonesia. *Br J Ophthalmol* 2002;86:1347-51.
4. McCarty CA, Bansal AK, Livingston PM, Stanislavsky YL, Taylor HR. The epidemiology of dry eye in Melbourne, Australia. *Ophthalmology* 1998;105:1114-9.
5. Nichols KK. Patient-reported symptoms in dry eye disease. *Ocul Surf* 2006;4:137-45.
6. Bandeen-Roche K, Muñoz B, Tielsch JM, West SK, Schein OD. Self-reported assessment of dry eye in a population-based setting. *Invest Ophthalmol Vis Sci* 1997;38:2469-75.
7. Schein OD, Tielsch JM, Muñoz B, Bandeen-Roche K, West S. Relation between signs and symptoms of dry eye in the elderly. A population-based perspective. *Ophthalmology* 1997;104:1395-401.
8. JRCC.sa. Saudi Arabia: Jeddah Regional Climate Center; c2016. Available from: <http://www.jrcc.sa>. [Last accessed on 2016 Oct 10].
9. Chandra G. Trachoma in Eastern Province of Saudi Arabia. *Rev Int Trach Pathol Ocul Trop Subtrop Sante Publique* 1992;69:118-32.
10. Stats.gov.sa. Saudi Arabia: General Authority for Statistics in the Kingdom of Saudi Arabia; c2015. Available from: <http://www.stats.gov.sa/en>. [Last accessed on 2016 Oct 10].
11. CDC.gov. Atlanta (GA): Centers for Disease Control and Prevention (CDC); c2016. Available from: <http://www.cdc.gov>. [Last accessed on 2016 Oct 10].
12. Amin TT, Suleman W, Ali A, Gamal A, Al Wehedy A. Pattern, prevalence, and perceived personal barriers toward physical activity among adult Saudis in Al-Hassa, KSA. *J Phys Act Health* 2011;8:775-84.
13. Hashemi H, Khabazkhoob M, Kheirikhah A, Emamian MH, Mehravaran S, Shariati M, et al. Prevalence of dry eye syndrome in an adult population. *Clin Exp Ophthalmol* 2014;42:242-8.
14. Jie Y, Xu L, Wu YY, Jonas JB. Prevalence of dry eye among adult Chinese in the Beijing Eye Study. *Eye (Lond)* 2009;23:688-93.
15. Schaumberg DA, Sullivan DA, Buring JE, Dana MR. Prevalence of dry eye syndrome among US women. *Am J Ophthalmol* 2003;136:318-26.
16. Moss SE, Klein R, Klein BE. Prevalence of and risk factors for dry eye syndrome. *Arch Ophthalmol* 2000;118:1264-8.
17. Shimmura S, Shimazaki J, Tsubota K. Results of a population-based questionnaire on the symptoms and lifestyles associated with dry eye. *Cornea* 1999;18:408-11.
18. Caffery BE, Richter D, Simpson T, Fonn D, Doughty M, Gordon K. CANDEES. The Canadian Dry Eye Epidemiology study. *Adv Exp Med Biol* 1998;438:805-6.
19. Rege A, Kulkarni V, Puthran N, Khandgave T. A clinical study of subtype-based prevalence of dry eye. *J Clin Diagn Res* 2013;7:2207-10.
20. Wolkoff P, Nøjgaard JK, Troiano P, Piccoli B. Eye complaints in the office environment: Precorneal tear film integrity influenced by eye blinking efficiency. *Occup Environ Med* 2005;62:4-12.
21. Wolkoff P, Nøjgaard JK, Franck C, Skov P. The modern office environment desiccates the eyes? *Indoor Air* 2006;16:258-65.
22. Taylor HR. Studies on the tear film in climatic droplet keratopathy and pterygium. *Arch Ophthalmol* 1980;98:86-8.