

**Original Article**

**A RETROSPECTIVE STUDY TO ASSESS THE PREVALENCE OF DRY EYES AND DRY SKIN AMONG THE RURAL POPULATION ATTENDING OUTPATIENT DEPARTMENT AT TERTIARY CARE TEACHING HOSPITAL IN WESTERN INDIA**

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**ABSTRACT**

**Objective:** Assess the prevalence of dry eyes and dry skin in the rural population attending OPD and determine the association between dry eyes and dry skin.

**Methods:** The study utilized a non-experimental descriptive analytical design with a quantitative retrospective approach. Patient records from the eye and skin OPDs at a designated tertiary teaching hospital were included in the analysis. The study period spanned from January 1, 2018, to December 31, 2022. A total of 2000 patients meeting the inclusion and exclusion criteria were included in the study. Descriptive and inferential statistics were employed to analyze the data.

**Results:** The prevalence rate of dry eyes was found to be 67.8%, while the prevalence rate of dry skin was 79%. There was a strong positive correlation between dry eyes and dry skin ( $r = 0.74, p < 0.05$ ). The study also identified a significant association between dry eyes and dry skin ( $\chi^2 = 8.34, p = 0.0038$ ). Gender showed a significant association with dry eyes ( $\chi^2 = 4.76, p < 0.05$ ), and age showed a significant association with dry skin ( $\chi^2 = 52.57, p < 0.05$ ).

**Conclusion:** The study concluded that there is a higher prevalence of dry eyes and dry skin among the rural population attending OPD at tertiary teaching hospital in Western India. There is a significant positive association and correlation between dry eyes and dry skin. Gender and age were identified as demographic factors associated with dry eyes and dry skin.

**Keywords:** Prevalence, Dry eyes, and dry skin

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**INTRODUCTION**

While the primary function of the eye is vision, it is often overlooked that the ocular surface is an integral part of the overall body surface, which is predominantly composed of skin. Notably, both the eye and the skin play a crucial role in protecting themselves from drying and maintaining proper hydration. This shared responsibility highlights the parallel function performed by these two components of the body surface.

Dry eye is a significant medical issue with a growing prevalence worldwide. Over the past three decades, awareness of dry eye disease (DED) has substantially increased [1]. This condition poses a considerable public health concern as it leads to fatigue, ocular discomfort, and visual disturbances that greatly impact individuals' quality of life. DED has an impact on everyday activities, occupational productivity, as well as numerous areas of physical, social, and psychological functioning [2, 3].

Geographical location, climatic circumstances, and lifestyle factors do have an impact on the occurrence of DED. DED has a reported prevalence that ranges from 5% to 35%. In a recent study in North India, the DED prevalence was reported to be 32%, with 81% of cases being classed as severe based on symptoms. In contrast, a study from South India reported an incidence rate of 1.46% for DED. These variations in prevalence highlight the importance of considering regional factors when studying and managing dry eye disease [4, 5].

Skin disorders are prevalent among the general population and can vary in severity and duration. They encompass a wide range of conditions, from mild and temporary ailments to chronic disorders. These skin disorders can have a substantial impact on individuals, leading to significant disability that is comparable to the effects seen in diseases

affecting other vital organs. The appearance and severity of skin disorders may be impacted by the everyday usage of skin care products [6, 7]. According to age-standardized years lived with disability, skin diseases placed 10th and cardiovascular diseases 12th, respectively, in the 2017 global burden of illness survey [8]. The most prevalent skin condition is dry skin (xerosis cutis), which is more prevalent in women and elderly persons. Prevalence ranges from 5.4% to 85.5% [9].

Additionally, a large number of individuals, particularly women, experience dry skin and often resort to using cosmetics to alleviate the associated discomfort. DS, although not classified as a disease, is commonly perceived as a condition rather than an illness. It is characterized by insufficient hydration in the outermost skin layer, known as the epidermis, resulting in a lack of the appropriate amount of water. To prevent the outer layer of skin from losing water, sebaceous glands on the skin generate an oily substance known as sebum at the same time that meibomian glands produce meibum. Skin that doesn't produce enough sebum dries out and loses water, giving off a DED-like feeling. The new definition describes the dry eye as a multifactorial disease that is brought on by various interconnected factors that affect the tear film's homeostasis, including age, sex, gender, hormonal imbalance, environmental factors, inflammation, iatrogenic, neurogenic, lid disorders, low blink rate, allergies, vitamin A deficiency, and psychological factors. Many of them also contribute to dry skin. Age causes a reduction in sebum production. Additionally, too much sebum may be removed from the skin by excessive bathing, showering, or scouring. The same illness can also be brought on by dry indoor air, exposure to the wind and sun, diabetes or skin allergies, thyroid gland diseases, Sjogren's syndrome, or other drugs. Consequently, the two diseases have a lot of characteristics [10, 11].

The fact that women experience DED and dry skin more commonly than males and older individuals is one of the conditions' most salient characteristics. Furthermore, just being a woman increases your risk of developing DED significantly [2]. The goal of the current study is to comprehend how dry eyes (DE) and dry skin (DS) are related.

## MATERIALS AND METHODS

### Study type

Non-experimental descriptive analytical design with a quantitative retrospective approach.

### Study period

Outpatient department (OPD) data were extracted from the database from the period spanning 1 Jan 2018 to 31 Dec 2022. Demographic characteristics, Case reports, and clinical data were assessed among the cohort of patients with a diagnosis of Dry eyes and Dry skin in the respective calendar year.

### Study population

The researcher identified patients with a diagnosis of dry eyes and dry skin at any time during the study period. A diagnosis of dry eyes and dry skin was based on a clinical evaluation of the doctors documented in the patient's medical record.

### Sample selection criteria

The study comprised the medical data of individuals between the ages of 18 and 60 who were attending skin and eye OPD. However, records of patients in the pediatric age range and records of individuals who were attending OPDs other than the skin and eye OPDs were not included in the study.

### Data source

This retrospective observational study used clinical data from approximately two thousand hospital patients. In accordance with ethical guidelines and to ensure the protection of participant's rights, this study received formal approval from the institutional review board (IRB)-IRC/Fac/Res/10/2019. The patients who were attending to the eye and skin OPD of the selected hospital of the selected area were taken in the study. The records of the selected eye and skin OPD patients were used to achieve the study objective.

The data includes the demographic characteristics (i.e., Age and Gender of the patients), Case reports, and clinical data, which shows dry eyes and dry skin conditions.

## Statistical analysis

### Prevalence calculations

The prevalence calculation was based on approximately two thousand patients' data who were attending the selected hospital OPD, as the number of people with confirmed dry eye and dry skin per 2000 (1000+1000) patients recorded during the study period.

Demographic Variables, an association of demographic variables with dry eyes and dry skin, and a relationship between dry eyes and dry skin.

The analysis of the demographic variables is done by the use of descriptive statistics i.e., with the frequency and percentage.

The core study objective is to find out the relationship between dry eyes and dry skin is evaluated by using inferential statistics i.e., by using Spearman correlation calculation and by using the Chi-Square test. The association of demographic variables with dry eyes and dry skin is evaluated by using the Chi-square test, too.

## RESULTS

### Study population

Of 2000 (1000+1000) individuals registered in the database during the period of 1 Jan 2018 to 31 Dec 2022, were identified 678 patients (n=1000) with dry eyes and 790 patients (n=1000) with dry skin as the hospital eye and skin OPD records between the study duration.

### Prevalence of dry eyes and dry skin

The prevalence of Dry eyes and Dry Skin was calculated by using the formula of,

$$\text{Prevalence} = \frac{\text{No. of people in sample with characteristic}}{\text{Total no of people in sample}} \times 100$$

The dry eyes and dry skin prevalence based on the recorded data in the hospital OPD in the study duration (i.e., 1 Jan 2018 to 31 Dec 2022) evaluated that 67.8% was the prevalence rate of dry eyes and 79% was the dry skin.

**Table 1: Distribution of respondents according to demographic characteristics, n=2000 (1000+1000)**

Demographic characteristics	Ophthalmic group		Dermatology group	
	Frequency	Percentage	Frequency	Percentage
1. Age in years				
≤ 20 y	94	9.4	60	6
21-40 y	835	83.5	742	74.2
≥40 y	71	7.1	198	19.8
2. Gender				
Male	519	51.9	612	61.2
Female	481	48.1	388	38.8

In the ophthalmic group Majority of 835 (83.5%) respondents belonged to the 21-40 y of age followed by 94 (9.4%) belonging to ≤ 20 y and 71 (7.1%) belonging to ≥40 y. In the dermatology group, the majority of 742 (74.2%) belong to 21-40 y of age followed by 198 (19.8%) belonging to ≥40 y and 60 (6%) belonging to ≤ 20 y of age group (table 1). In the ophthalmic group, the majority of 519(51.9%) respondents were male and 481(48.1%) were females. in the dermatology group, the majority of 612(61.2%) were male and 388(38.8%) were females (table 1).

**Table 2: Assessment of the relationship between dry eyes and dry skin, n=2000 (1000+1000)**

Spearman correlation	r value	p-value
Dry eyes Vs dry skin	0.74	<0.05

Spearman correlation  $p < 0.05$ , there is a strong positive correlation between dry eyes Vs dry skin i.e.,  $r = 0.74$  with a p-value is  $< 0.05$  (table 2).

**Table 3: Association of dry eyes and dry skin, n= 2000 (1000+1000)**

Particulars	Dry skin		Chi-square value	Df	p-value	Result
	Yes	No				
Dry Eyes						
Yes	553	125	8.34	1	0.0038	S
No	237	85				

Chi-square test S =Significant Association  $p < 0.05$ , the dry eyes and dry skin have a significant association with each other, reflecting a chi-square value of (8.34) with a p-value of 0.0038 (table 3).

**Table 4: Association of demographic variables with dry eyes, n=1000**

Demographic variables	Distribution of respondents	Dry eyes		Chi-square value	Df	p-value	Result
		Yes	No				
1. Age in years				1.63	2	0.44	NS
≤ 20 y	94	59	35				
21-40 y	835	568	267				
≥40 y	71	51	20				
2. Gender				4.76	1	0.029	S
Male	519	368	151				
Female	481	310	171				

Chi-square test S =Significant NS= non-significant p=<0.05

Association of level of dry eyes with selected demographic variables in the ophthalmic group, the chi-square value of the demographic variables such as gender (4.76) showed a significant association

with dry eyes at 0.05 level of significance; it depicted that there is an association between dry eyes with selected demographic variables (table 4).

**Table 5: Association of demographic variables with dry skin, n=1000**

Demographic variables	Distribution of respondents	Dry Skin		Chi-square value	Df	p-value	Result
		Yes	No				
1. Age in years				52.57	2	0.0000	S
≤ 20 y	60	37	23				
21-40 y	742	627	115				
≥40 y	198	126	72				
2. Gender				1.84	1	0.1746	NS
Male	612	492	120				
Female	388	298	90				

Chi-square test S =Significant NS= non-Significant p=<0.05

Association of level of dry skin with selected demographic variables in dermatology group, the chi-square value of the demographic variables such as age (52.57) showed significant association with dry skin at 0.05 level of significance, it depicted that there is an association between dry skin with selected demographic variables (table 5).

## DISCUSSION

Dry eyes and dry skin are two conditions that often occur together and may share underlying causes. While they are separate conditions, there is evidence to suggest an association between them. Several studies have explored the connection between dry eyes and dry skin, highlighting common pathophysiological factors and risk factors.

Dry skin, also known as xerosis, is characterized by a deficiency of water in the stratum corneum, the skin's outermost layer [15]. Recent investigations into the pathophysiology of dry skin have shed light on its lipid structure and stratum corneum organization, as well as natural moisturizing substances and the peripheral nervous system [15]. These findings have emphasized the importance of physiological lipids and carefully selected humectants in emollients designed for dry skin [15]. The reduced presence of these components in dry skin can lead to impaired barrier function and water loss, contributing to the development of dryness and itchiness. In the present study, the enrolled sample was of dry skin 790 (79%) and 210 (21%) do not have dry skin.

DE is a multifactorial condition of the ocular surface marked by a loss of the tear film's homeostasis, which can cause eye discomfort and possible ocular surface damage [13, 14]. Inflammation and increased tear film osmolarity are key elements in the diagnosis of DE [13, 14]. While DE has various risk factors, including age, gender, environmental factors, and systemic diseases, the association with dry skin suggests a potential shared mechanism involving impaired barrier function and inflammation [11, 12]. In the present study, the enrolled sample was of dry eye 678(67.8%) and 322(32.2%) do not have dry eyes.

DE disease is a common condition worldwide, affecting approximately 11.59% of the global population [16]. The prevalence

of symptomatic DE disease, characterized by DE symptoms, is estimated at 9.12%, with a higher prevalence in women (9.5%) compared to men (6.8%) [12]. Additionally, the prevalence of signs of DE disease, such as ocular surface abnormalities, is estimated to be 35.2% globally [12]. These prevalence rates indicate a significant number of individuals experiencing DE symptoms and signs. Based on the prevalence, the present study finds the relationship in the form of an association between DE and DS. The observed prevalence of dry eyes is higher than the reported prevalence in the study conducted.

The association between DE and DS highlights the importance of maintaining proper hydration and barrier function in both the skin and ocular surface. The association between dry eyes and dry skin can be attributed to several factors. One of the primary causes is the dysfunction of the meibomian glands, responsible for producing the lipid layer of tears that prevents excessive evaporation. In both dry eyes and dry skin, this lipid layer may be compromised, leading to increased water loss and dryness [12].

Dry eyes and dry skin have been associated with each other in various studies. A clinical-based survey conducted on undergraduate students found a significant association between subjective DE symptoms and certain clinical examinations [12]. The study assessed various DE tests, including meibomian gland assessment, fluorescein staining, Schirmer test, and tear break-up time. The findings revealed weak to moderate relationships between the outcomes of various clinical tests and the symptoms of dry eyes [12]. Another cross-sectional research involving participants with and without DE symptoms revealed a positive correlation between dry eyes and dry skin [13]. The study utilized self-perceptions of skin dryness and objective measurements, including sebumeter readings. It was found that subjects without dry eye symptoms reported oilier facial skin and had higher sebumetry scores compared to those with dry eyes [13]. Furthermore, logistic regression analysis confirmed the independent association between dry eyes and dry skin. These findings suggest that individuals experiencing dry skin may also have ocular dryness and vice versa. For the early diagnosis and treatment of both ocular and skin dryness, paying close attention to these symptoms may be essential, improving the patient's quality of

life [13]. Understanding the shared mechanisms and addressing both dry eyes and dry skin concurrently can lead to more effective management strategies and improved patient outcomes. The above citations are further supported by the results obtained in the present study, in this retrospective study, we observed the positive association between dry eyes and dry skin among the selected population of OPDs in a selected hospital. Level of dry eye severity and some demographic factors in the ophthalmology group, At the 0.05 level of significance, the chi-square value of the demographic variables, such as Gender (4.76), demonstrated a significant link with dry eyes. This indicated that there is a relationship between dry eyes and certain demographic variables.

Association of level of dry skin with selected demographic variables in dermatology group, the chi-square value of the demographic variables such as age (52.57) showed significant association with dry skin at 0.05 level of significance, it depicted that there is an association between dry skin with selected demographic variables.

The findings of the current research support the existing evidence regarding the prevalence of DE and DS. The study provides additional confirmation that these conditions commonly occur and coexist. By examining a larger sample size or a specific population, the research reinforces the understanding that dry eyes and dry skin are prevalent issues that warrant attention and comprehensive management. These findings contribute to the growing body of knowledge on the prevalence of dry eyes and dry skin, further emphasizing the need for proactive measures and appropriate interventions to address these common conditions.

The study is limited to records of persons between the age group of 18 to 60 y and who were attending skin and eye OPD at selected hospital.

## CONCLUSION

Within our study, which focused on selected OPDs, we discovered a significant and noteworthy positive association between dry eyes and dry skin. The research findings indicated that individuals experiencing dry skin were more likely to also exhibit symptoms of dry eyes, suggesting a potential connection between these two conditions. The study involved careful examination and analysis of data collected from the selected population, allowing us to establish a clear correlation between dry eyes and dry skin within this specific group of patients. These findings contribute to a growing body of evidence supporting the existence of a link between dry eyes and dry skin, emphasizing the importance of considering both conditions when assessing and managing patients.

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## AUTHORS CONTRIBUTIONS

Kiran Dange has planned the study, collected the data, and wrote the manuscript. Kanchan Rathore has analyzed the data and reviewed the manuscript. Gaurav Patil has analyzed the data.

## CONFLICT OF INTERESTS

Declared none

## REFERENCES

1. Neha Srivastava NS, Lalit Sachdeva, Swati Agarwal, Neha Pednekar, Srivastava AK. Correlation of dry eyes with on-

- screen time among medical students. *Asian J Pharm Clin Res.* 2023 May 8;16(9):87-90. doi: 10.22159/ajpcr.2023v16i9.47956.
2. Petricek I, Pauk SV, Tomic M, Bulum T. Dry eye and dry skin-is there a connection? *Ophthalmic Epidemiol.* 2023;30(1):7-16. doi: 10.1080/09286586.2021.2021539, PMID 34965195.
3. Patel A, Dave H. A systemic review on ocular disease due to virtual environment. *Int J Curr Pharm Sci.* 2022 May 15;14(3):9-16. doi: 10.22159/ijcpr.2022v14i3.1970.
4. Titiyal JS, Falera RC, Kaur M, Sharma V, Sharma N. Prevalence and risk factors of dry eye disease in North India: ocular surface disease index-based cross-sectional hospital study. *Indian J Ophthalmol.* 2018 Feb;66(2):207-11. doi: 10.4103/ijjo.IJO\_698\_17, PMID 29380759.
5. Donthineni PR, Kammari P, Shanbhag SS, Singh V, Das AV, Basu S. Incidence, demographics, types and risk factors of dry eye disease in India: electronic medical records driven big data analytics report I. *Ocul Surf.* 2019 Apr 1;17(2):250-6. doi: 10.1016/j.jtos.2019.02.007, PMID 30802671.
6. Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ezzati M. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet.* 2012 Dec 15;380(9859):2163-96. doi: 10.1016/S0140-6736(12)61729-2, PMID 23245607.
7. Naldi L, Cazzaniga S, Gonçalo M, Diepgen T, Bruze M, Elsner P. Prevalence of self-reported skin complaints and avoidance of common daily life consumer products in selected European regions. *JAMA Dermatol.* 2014 Feb 1;150(2):154-63. doi: 10.1001/jamadermatol.2013.7932, PMID 24369385.
8. GBD 2017 Disease and injury incidence and prevalence collaborators global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet.* 2018 Nov 10;392(10159):1789-858. doi: 10.1016/S0140-6736(18)32279-7, PMID 30496104.
9. Hahnel E, Lichtenfeld A, Blume Peytavi U, Kottner J. The epidemiology of skin conditions in the aged: a systematic review. *J Tissue Viability.* 2017 Feb 1;26(1):20-8. doi: 10.1016/j.jtv.2016.04.001, PMID 27161662.
10. Craig JP, Nichols KK, Akpek EK, Caffery B, Dua HS, Joo CK. TFOS DEWS II definition and classification report. *Ocul Surf.* 2017 Jul 1;15(3):276-83. doi: 10.1016/j.jtos.2017.05.008, PMID 28736335.
11. Bron AJ, de Paiva CS, Chauhan SK, Bonini S, Gabison EE, Jain S. Tfos dews ii pathophysiology report. *Ocul Surf.* 2017 Jul 1;15(3):438-510. doi: 10.1016/j.jtos.2017.05.011, PMID 28736340.
12. Kyei S, Dzasimatu SK, Asiedu K, Ayerakwah PA. Association between dry eye symptoms and signs. *J Curr Ophthalmol.* 2018 Dec;30(4):321-5. doi: 10.1016/j.joco.2018.05.002, PMID 30555964.
13. Dry eye associated with dry skin; 2022. Available from: <https://www.reviewofoptometry.com/article/dry-eye-associated-with-dry-skin>. [Last accessed on 14 Jul 2023]
14. Dandotiya DD. Effects of computer vision syndrome on tear film quality of individuals across various age groups and occupations. *Asian J Pharm Clin Res.* 2023 Jul 24;16(8).
15. Proksch E, Berardesca E, Misery L, Engblom J, Bouwstra J. Dry skin management: a practical approach in light of latest research on skin structure and function. *J Dermatolog Treat.* 2020 Nov;31(7):716-22. doi: 10.1080/09546634.2019.1607024, PMID 30998081.
16. Papas EB. The global prevalence of dry eye disease: a Bayesian view. *Ophthalmic Physiol Opt.* 2021 Nov;41(6):1254-66. doi: 10.1111/opo.12888, PMID 34545606.