

# Assessment of Dry Eye Syndrome in Postmenopausal Women: A Cross-Sectional Analysis

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## Abstract

**Background:** Dry Eye Syndrome (DES) is a common condition characterized by insufficient lubrication on the surface of the eye, leading to discomfort and visual disturbances. Postmenopausal women are particularly susceptible due to hormonal changes that affect tear production and composition. **Methods:** This cross-sectional study involved 200 postmenopausal women recruited from a tertiary care center. Participants underwent a comprehensive ophthalmologic examination including Schirmer's test and tear film break-up time (TFBUT) to assess tear production and stability. Questionnaires were used to gather subjective symptoms of dry eye. **Results:** Preliminary analysis indicated a high prevalence of dry eye symptoms among participants, with significant correlations between reduced tear production and increased symptom severity. Detailed results will explore associations between various demographic and health-related factors and the incidence of DES. **Conclusion:** The findings suggest a significant burden of dry eye syndrome in postmenopausal women, highlighting the need for targeted screening and management strategies in this population.

**Keywords:** Dry Eye Syndrome, Postmenopausal Women, Tear Film Stability.

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## INTRODUCTION

Dry eye syndrome (DES), also known as keratoconjunctivitis sicca, is a multifactorial disorder of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tear film instability with potential damage to the ocular surface. It is accompanied by increased osmolarity of the tear film and inflammation of the ocular surface. The prevalence of DES increases with age and is notably higher in postmenopausal women, suggesting a link with hormonal changes.<sup>1</sup>

The pathophysiology of dry eye involves a decrease in tear production or an increase in tear evaporation, which can be exacerbated by hormonal imbalances, particularly the decline in androgen and estrogen levels seen in postmenopausal women. These hormonal changes can affect the lacrimal glands and the meibomian glands, both crucial for maintaining a healthy tear film and ocular surface.<sup>2</sup>

Numerous studies have highlighted the impact of menopause on ocular health, pointing to a heightened risk of dry eye syndrome due to hormonal alterations. However, there remains a need for more comprehensive research to delineate the specific mechanisms and factors contributing to DES in postmenopausal women, to improve screening and management approaches.<sup>3</sup>

## Aim

To assess the prevalence and severity of dry eye syndrome in postmenopausal women.

## Objectives

1. To quantify tear production and tear film stability in postmenopausal women using Schirmer's test and tear film break-up time.
2. To evaluate the correlation between subjective symptoms of dry eye and clinical signs in this demographic.
3. To identify demographic and health-related factors associated with increased risk of dry eye syndrome in postmenopausal women.

## MATERIAL AND METHODOLOGY

The study was conducted at a tertiary care center, utilizing a cross-sectional analysis design. Data were collected from April 2023 to September 2023. The sample size comprised 200 postmenopausal women who consented to participate in the study.

### Inclusion Criteria:

- Women aged 50 years or older.
- Postmenopausal status, defined as no menstrual periods for at least 12 consecutive months.

### Exclusion Criteria:

## OBSERVATION AND RESULTS

- History of ocular surgery or trauma.
- Use of medications known to affect tear production.
- Current treatment for any ocular diseases.

**Procedure and Methodology:** Participants underwent a detailed ophthalmologic examination, including Schirmer's test to measure tear production and tear film break-up time to assess the stability of the tear film. A standardized questionnaire was administered to record subjective symptoms related to dry eye.

**Sample Processing:** All tests were performed in a controlled environment to minimize variability. Data were anonymized and coded for analysis.

**Statistical Methods:** Data were analyzed using SPSS software. Descriptive statistics were used to summarize demographic and clinical characteristics. Pearson's correlation and logistic regression analyses were employed to explore associations between variables.

**Data Collection:** Data were collected on demographics, health history, subjective symptoms, and clinical test results, compiled into a secure database for analysis. Data integrity and confidentiality were maintained throughout the study.

**Table 1: Demographic and Health-Related Factors**

Parameter	n (%)	Odds Ratio (OR)	95% CI for OR	P value
Total participants	200 (100%)	N/A	N/A	N/A
Age ≥ 65 years	80 (40%)	2.5	1.5 - 4.2	0.001
Current smoker	20 (10%)	3.8	1.9 - 7.6	0.002
Hypothyroidism	30 (15%)	3.1	1.5 - 6.3	0.002
Use of antihistamines	50 (25%)	2.2	1.2 - 4.1	0.01

Table 1 provides a detailed look at the demographic and health-related factors among 200 participants in the study. Notably, 40% of the participants were aged 65 years or older, showing a significantly higher odds ratio (OR) of 2.5 for developing dry eye syndrome, which is statistically significant with a p-value of 0.001. Current smokers, representing 10% of the sample, had a notably higher OR of 3.8 for developing dry eye syndrome, with a p-value of 0.002, indicating a strong association. Those with hypothyroidism, comprising 15% of the population, also showed a significant association, with an OR of 3.1 and a p-value of 0.002. Additionally, 25% of the participants who used antihistamines exhibited an increased risk with an OR of 2.2 and a p-value of 0.01, suggesting a significant correlation between antihistamine use and dry eye symptoms.

**Table 2: Prevalence and Severity of Dry Eye Syndrome**

Parameter	n (%)	Odds Ratio (OR)	95% CI for OR	P value
With dry eye syndrome	120 (60%)	N/A	N/A	N/A
Severity: Mild	40 (33.3%)	1 (Reference)	N/A	N/A
Severity: Moderate	50 (41.7%)	1.5	0.8 - 2.7	0.18
Severity: Severe	30 (25%)	2.2	1.1 - 4.3	0.03

Table 2 explores the prevalence and severity of dry eye syndrome among the participants. Out of 200 participants, 60% (120 participants) were diagnosed with dry eye syndrome. Within this group, the severity of the condition varied: 33.3% had mild severity, 41.7% moderate, and 25% severe. The odds of experiencing moderate severity were 1.5 times higher than those of mild severity, though this was not statistically significant (p = 0.18). However, the odds for severe dry eye syndrome were significantly higher at 2.2 times that of mild severity, with a p-value of 0.03, indicating a statistically significant increase in risk.

**Table 3: Quantifying Tear Production and Tear Film Stability**

Parameter	n (%)	Odds Ratio (OR)	95% CI for OR	P value
Normal Schirmer's test (>10 mm)	80 (40%)	1 (Reference)	N/A	N/A
Low Schirmer's test (≤10 mm)	120 (60%)	3.0	1.9 - 4.7	<0.001
Normal TFBUT (>10 sec)	100 (50%)	1 (Reference)	N/A	N/A
Reduced TFBUT (≤10 sec)	100 (50%)	2.5	1.6 - 3.9	0.002

Table 3 focuses on quantifying tear production and tear film stability using Schirmer's test and tear film break-up time (TFBUT). Of the participants, 60% showed low tear production as measured by Schirmer's test (≤10 mm), with an OR of 3.0 and a statistically significant p-value of less than 0.001. This indicates a threefold increase in the likelihood of reduced tear production compared to those with normal levels. Similarly, for tear film stability, half of the participants had a reduced TFBUT (≤10 sec), which correlated with a 2.5 times higher likelihood of instability compared to those with normal TFBUT, also statistically significant with a p-value of 0.002. These results underscore the pronounced issues with tear production and stability in this group.

## DISCUSSION

Table 1 illustrates significant associations between various demographic and health-related factors and the occurrence of dry eye syndrome. The risk associated with aging, particularly for individuals aged 65 years and older, shows a notable odds ratio of 2.5, which is consistent with findings from other studies that indicate an increased prevalence of dry eye symptoms with age due to physiological changes in tear production and ocular surface health Wang TH *et al.*(2023).<sup>4</sup> The strong association with smoking (OR = 3.8) aligns with research suggesting that smoking exacerbates ocular surface inflammation and contributes to tear film instability Machairoudia G *et al.*(2024).<sup>5</sup> The link between hypothyroidism (OR = 3.1) and dry eye syndrome is supported by studies that discuss how thyroid disorders can disrupt ocular surface homeostasis Kim JM *et al.*(2023).<sup>6</sup> Lastly, the use of antihistamines showing an OR of 2.2 is corroborated by literature reporting that antihistamines can decrease tear secretion, leading to dry eye symptoms Nijm LM *et al.*(2023).<sup>7</sup>

The findings in Table 2, indicating a 60% prevalence of dry eye syndrome among the study participants, are in line with other studies focusing on similar demographics, where the prevalence rates vary but generally show an increased risk in older populations Mateo-Orobia AJ *et al.*(2023).<sup>8</sup> The stratification of severity shows that severe cases are twice as likely as mild cases to occur, which suggests that the condition can progress in severity if not adequately managed. These findings are similar to those reported in studies which have documented the progression

of dry eye symptoms without proper intervention Malik D *et al.*(2023).<sup>9</sup>

The results from Table 3, particularly the significant difference in Schirmer's test and TFBUT scores between the groups, highlight the functional impairments in tear production and stability associated with dry eye syndrome. This observation aligns with the literature that characterizes dry eye by a decrease in tear production and an increase in tear film evaporation Warad C *et al.*(2023).<sup>10</sup> The odds ratios indicate a substantial likelihood of tear film instability in those with affected Schirmer's test and TFBUT outcomes. These findings underscore the importance of these diagnostic tests, as echoed in other research, for assessing and managing dry eye syndrome effectively Kim MJ *et al.*(2024).<sup>11</sup>

## CONCLUSION

The cross-sectional analysis provides a comprehensive evaluation of the prevalence, severity, and contributing factors of dry eye syndrome (DES) in a demographic known to be at heightened risk. The study successfully quantified the significant burden of DES among postmenopausal women, with 60% of the participants diagnosed with the condition. This high prevalence underscores the susceptibility of postmenopausal women to dry eye, likely influenced by hormonal changes associated with menopause.

The study's findings highlight several critical associations: age, smoking status, hypothyroidism, and the use of antihistamines all showed a significant correlation with increased risk of developing DES. These factors are crucial for clinicians to consider in preventative strategies and when tailoring treatments for individual patients. The severity analysis further reveals that a significant portion of those affected experience moderate to severe symptoms, which can substantially impair quality of life.

Quantitative assessments using Schirmer's test and tear film break-up time (TFBUT) illustrated that a majority of participants exhibit decreased tear production and tear film instability, conditions that exacerbate the severity of symptoms and complexity of management. These objective measures align with subjective reports of discomfort, affirming their reliability in diagnosing and assessing the severity of DES.

This study's results advocate for increased awareness and targeted screening of dry eye syndrome in postmenopausal women, especially those with identified risk factors. It also

calls for a multidisciplinary approach to managing DES, encompassing both pharmacologic treatments and lifestyle adjustments to mitigate the identified risk factors.

Ultimately, the study underscores the need for ongoing research to further elucidate the pathophysiological changes that contribute to DES in postmenopausal women, aiming to improve diagnostic accuracy and treatment outcomes. The insights gained from this research could lead to better clinical protocols that not only manage DES more effectively but also enhance the overall quality of life for this vulnerable population.

### LIMITATIONS OF STUDY

- Cross-Sectional Design:** As with all cross-sectional studies, the major limitation is the inability to infer causality. This study design provides a snapshot in time, which means it can identify associations but not establish direct cause-and-effect relationships between risk factors and dry eye syndrome.
- Selection Bias:** The participants were recruited from a single tertiary care center, which may not adequately represent the general population of postmenopausal women. This recruitment strategy could introduce selection bias, limiting the generalizability of the findings to other settings or demographics.
- Subjective Measurements:** Although the study utilized validated clinical tests such as Schirmer's test and tear film break-up time (TFBUT), the reliance on subjective symptom reporting could introduce bias. Participants' perceptions of discomfort and severity might be influenced by individual tolerance levels and other personal factors.
- Lack of Longitudinal Follow-up:** Without longitudinal data, it is challenging to understand the progression of dry eye syndrome over time. A longitudinal study would provide more comprehensive insights into how the condition evolves and responds to various interventions in postmenopausal women.
- Potential Confounders:** While the study adjusted for several known confounders, other unmeasured factors such as environmental influences, dietary habits, and genetic predispositions could also affect the development and severity of dry eye syndrome. The impact of these potential confounders was not fully explored.
- Limited Scope of Demographic Factors:** The study primarily focused on basic demographic and health-related factors. A broader range of variables, including socioeconomic status,

detailed lifestyle factors, and mental health status, could provide a more nuanced understanding of their impact on dry eye syndrome.

- Diagnostic Criteria Variability:** The diagnostic criteria for dry eye syndrome can vary, and the study's reliance on specific tests might not capture all cases of the syndrome. Variability in diagnostic thresholds could affect the prevalence rates and severity assessments reported.

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