ASSOCIATION OF DEPRESSION WITH DRY EYES IN PRE-MENOPAUSAL WOMEN

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ABSTRACT

OBJECTIVE: *Purpose of this study was to check the proportion and severity of depression in women aged 18 to 45 years. Also to find out the association between depression and dryness of eyes.*

METHOD: *This cross-sectional study was done using pre-tested self-designed questionnaire for diagnosing dry eyes and determining severity of depression at College of Ophthalmology and Allied Vision Sciences, Mayo hospital, Lahore. Clinical signs were assessed by Schirmer test-1 and tear breakup time (TBUT). Sample included 66 women selected via non-probability convenient sampling. After evaluation for symptoms of dry eyes and depression, the association of depression with DED signs and symptoms was assessed by Spearman's correlation.*

RESULTS: *Among 66 women enrolled in this study depression was diagnosed among 31 (47%). Mild, moderate and severe depression was found among 29%,15% and 3% of women with dry eyes respectively. Depression among dry eye patients was more prevalent among married (40%) and non-working women (32%, housewives). About 63 women had TBUT value <10sec and approximately 20 had Schirmer test-1 <5 mm indicating presence of dry eyes and their significance was determined by one sample t-test. Significant association was found between DED symptoms including feeling of ocular pain, worsening of ocular pain on blinking, worsening of burning under hot climate, presence of discharge on lashes early in the morning and feeling intolerable in air-conditioned areas and depression ($p < 0.05$). Among these only worsening of ocular pain on blinking has moderate association with depression($rs = 0.40$) while others have weak association.*

CONCLUSION: *A weak association was found between dry eyes and depression in pre-menopausal women. However, Schirmer test-1 and TBUT were not associated with depression. Multidisciplinary coordination is required to ensure quality care.*

KEYWORDS: *Dry eye disease, Depression, Pre-menopause, Menopause, Women, Tear break up time, Schirmer test.*

INTRODUCTION

Dry eye is an ocular surface disease that results in abnormal changes in normal functioning of the surface of eye and tear film. These alterations produce the symptoms of irritability, visual disturbance, burning and discomfort.[1]

In ophthalmology, it is a serious health concern. The global prevalence of dry eye ranges from 5% to 50%.[2] DED is more common in women than men. Its symptoms compel the patient to seek eye health care.[3] Dry eye disease (DED) results in instability of the tear film either caused by decreased tear production or increased evaporation of tears. Patients of dry eyes also experience pain, redness, grittiness, dryness, stinging sensation, fatigue, heavy eyes, light sensitivity and reflex tearing.[4] Stability of tear film, anatomy and physiology of eyelids, cornea and conjunctiva, health of meibomian glands, functioning of nerves and nociceptors are important consideration in DED patients.[5]

DED significantly influences daily activities of the patient and also affects his or her workplace productivity. Various environmental factors also adversely affect existing dry eye condition or may elicit a new inflammatory response.[6] Factors include extreme temperature, high altitude, reduced humidity, wind,[7] pollen, dust and exposure to ultraviolet radiations can result in dry eye due to excessive tear evaporation and tear film instability.[8]

The major risk factors for DED are reported to be aging and female sex. The irregularities in the surface of cornea significantly affect visual functions by reducing visual acuity and contrast sensitivity.[9] Other than that imbalanced diet, use of exogenous estrogen, insufficient levels of androgen,[10] smoking, diabetes mellitus and hypercholesterolemia also contribute to dry eyes.[1]

DED has negative impact on psychological health of patient and believe to be associated with depression and anxiety. Pathological alteration in composition of tears, decreased tear production, pain and use of anti-depressive agents are considered to be associated with development of depression in dry eye patients.[11]

Depression is a heterogeneous condition resulting in symptoms ranging from dysphoria, lack of interest and motivation, being low in mood to severe intellectual impairment.[12] Depression is twice as prevalent in women than men.[13] The prevalence of depression ranges from 4.4-20% globally.[14] Previously, Pakistan had prevalence rate of 34%. The prevalence rate of significant depression was 8.5% in Europe with women affected more than men. In Qatar, reported prevalence was 27.8%. In Saudi-Arabia it was claimed to be 49.9%.[15]

Poverty, misuse of alcohol and drugs, negative attitude towards life, imbalance in brain neurotransmitters, chronic diseases, long standing pain, hormonal variations particularly in female sex,[16] stress, childhood abuse, autoimmune and metabolic diseases and family history are considered among the risk factors for developing depression.[17]

Dry eye disease can be clinically diagnosed by assessing subjective symptoms and signs. Symptoms can be assessed using questionnaires while various clinical procedures are used for evaluation of signs including Schirmer test, tear film break up time (TBUT), meibomian gland function (MGF) test, corneal and conjunctival staining,[18] Infrared meibography, interferometry, optical coherence tomography (OCT) and inflammatory biomarkers assessment are some of the new advancements in diagnosis of DED.[19]

MATERIALS AND METHODS

This was a cross sectional study, comprising 66 women with dry eyes who visited eye OPD, Mayo Hospital. Self-designed and pre-tested questionnaire was used for diagnosing dry eyes and determining the severity of depression at College of Ophthalmology and Allied Vision Sciences. Clinical signs were assessed by Schirmer test-1 and TBUT. Study sample was selected via non-probability convenient sampling. Women with dry eyes aged 18-45 years were included in this study but the patients with already diagnosed psychiatric disease or any other ocular pathology were excluded. Instruments used were Schirmer strips, fluorescein strips, anesthetic drops, stop watch and slit lamp biomicroscope. DED signs and symptoms were dependent variables while age, occupation, gender and economic level were independent variables. After descriptive analysis for symptoms of dry eyes and depression, the total score for depression was summed and then categorized into no depression (0-10), mild depression (11-21), moderate depression (22-32), moderately severe depression (33-42) and severe depression (43-63). The association of depression with DED signs and symptoms was assessed by spearman's correlation.

RESULTS

The present study included 66 women with dry eyes whose ages ranged from 18 to 45 years with the mean age of 33.4 ± 9.19 years. Majority of the women were married (77.3%) and were housewives (62.1%).Most of the women felt symptoms like sandy sensation (95.5%), sensitivity to light (94%), feeling of dry eyes (98%), feeling uncomfortable in dry environment (98%), ocular pain (91%), blurring of vision (95%) and burning (85%) in eyes. Dry eye and depression were diagnosed more frequently among housewives and married women. Most frequently observed depressive symptoms were low energy levels or tiredness (97%), restlessness (77%), difficulties in remembering (59%) and concentrating on things (94%), disturbance in sleep schedule (67%), anxiousness (70%) and appetite changes (56%).

47% of women with dry eyes had depression. Most of them had mild (29%) and moderate (15%) depression. Only 3% had severe depression. (Table 1).

Table- 1:

Depression	Depression score	Frequency	Percentage	Total
No	No depression (0-10)	35	53.0	35
Yes	Mild depression(11-21)	19	28.8	31
	Moderate depression (22-32)	10	15.2	
	Moderately severe depression (33-42)	0	0.0	
	Severe depression (43-63)	2	3.0	
	Total	**66**	**100**	66

Table-2: Correlation between depression and symptoms of dryness

Symptoms of dry eyes	Correlation coefficient	p-value	Total (N)
Feeling of dry eyes	.084	0.505	66
Feeling of sandy sensation in eyes	0.11	0.381	66
Feeling of burning in eyes	0.13	0.298	66
Worsening of burning under sun or in hot climate	0.284	0.021	66
Feeling intolerable in air conditioned areas	0.259	0.036	66
Discomfort with prolonged screen use	-0.054	0.667	66
Discharge on lashes early in the morning	0.3	0.014	66

According to Spearman's correlation coefficient (Table 2), feeling of dry eyes, sandy sensations, burning, worsening of burning under sun, feeling intolerable in air-conditioned areas and presences of discharge on lashes has positive weak correlation with depression, however, discomfort with prolonged screen use is negatively correlated.

Worsening of burning sensation under sun or in hot climate, feeling intolerable in air-conditioned areas & presence of discharge on lashes early in the morning have weak positive correlations with depression which are statistically significant (p = 0.021, 0.036 & 0.014, respectively).

Table-3: Correlation of problems faced with depression

Symptoms of dry eyes	Correlation coefficient	p-value
Experiencing sensitivity to light	0.111	0.373
Feeling of ocular pain	0.306	**0.013**
Worsening of ocular pain on blinking	0.401	**0.001**
Experiencing blurring of vision	0.069	0.584
Facing problem in doing close up work	0.119	0.341
Difficulty in watching television	0.066	0.601
Feeling uncomfortable in dry environment	0.203	0.101

All the symptoms of dry eyes have positive and weak correlation with depression, however, only feeling of ocular pain (r_s = .306, p = .013) and worsening of ocular pain on blinking (r_s = .401, p = .001) have significant association. (Table 3).

Table- 4: Correlation of clinical signs and depression

	TBUT for right eyes	TBUT for left eyes	Schirmer for right eyes	Schirmer for left eyes
Correlation coefficient	0.093	-0.144	-0.129	-0.169
P-value	0.460	0.363	0.301	0.175

No association was found between clinical signs of dry eyes and depression. (Table 4).

DISCUSSION

Women aged 18-45 years were taken as study population because higher prevalence of dry eyes was previously reported in women than men and in older population. Likelihood of depression also become greater in women when menopausal transition occurs.[20]

In present study, 47% of women with dry eyes were found to have depression. Most of them had mild and moderate depression. Only 3% had severe depression. A recent descriptive study reported depression among 42% of patients with DED. However, the proportion of patients with moderate and moderately severe depression is greater than those with mild depression.[1]

In our study, depression was observed to be more frequent among married women (40%) compared to unmarried and among housewives (32%) compared to working women. Previous data supported our results by concluding that married women were more likely to have depression which may occur due to family conflict, adolescent pregnancy, spouse violent behavior, lack of support from society, emotional and psychological trauma.[21]

Our results suggest that having feeling of dry eyes is not significantly associated with depression (p = .505). However, previous data revealed that frequent subjective DED symptoms were associated with symptoms of depression. DED symptoms adversely affect emotional and psychological health of patients.[22]

Hence, results of present study are not in line with above mentioned study, which could be due to the reason that patient may experience something but they are unable to tell what they are experiencing.

Discomfort with prolonged use of digital screens like mobile phones and computers is not significantly associated (negatively correlated) with severity of depression in our study (p = .667). According to earlier researches, over use of digital media is associated with ocular discomfort causing dry eyes, reduction in blink rate, instability of tear film, eyestrain and headache.[23] Pessimistic behavior and feeling of dissatisfaction in life of children with extended screen time and uncontrolled use of digital devices causes them to develop anxiety and depression later in life.[24] Our results are not consistent with literature may be because of limited

time frame or small study population.

In the present study, it was determined that frequent feeling of ocular pain in women with dry eyes has significantly positive but weak correlation with depression (p = .013). Previous investigations reported that, chronic pain associated with dry eyes may contribute to depression.[25] This indicates that, current results are consistent with literature.

It was found in current study that worsening of ocular pain on blinking is moderately associated with different levels of depression (p = .001).The pain associated with dry eye due to shorter TBUT stimulates nervous system, causing excessive blinking which further exaggerated symptoms of ocular pain.[26] Mental health, brain functions, cognitive processing, cardiovascular health and sleep are affected by chronic pain.[27] Present results are in accordance with previous studies.

In our study, feeling of sandy sensations and burning in eyes are not significantly associated with depression (p >0.05). Previously, contrary results were obtained, as it was determined that disorders of mental health contribute to subjective symptoms of dry eyes including grittiness, pain and burning.[28] Another study, however, support our results by emphasizes that ocular irritation is not at all associated with depressive symptoms which was attributed to different specificity and sensitivity of DES and depression questionnaires.[29]

Feeling intolerable in air-conditioned areas is significantly correlated with depression (p = 0.036). Previously a study on "thermal comfort and indoor air quality (IAQ) of air-conditioned and mechanically ventilated bedrooms" determined that around 60% of individuals report that they usually woke up from sleep because of discomfort, even when air- conditioning system is on and approximately 70% felt stuffy. Workplace stress, financial problems and dry atmosphere may affect psychological health of people leading to panic attack, anxiety and depression.[30] Therefore, harmonious results were obtained.

Blurred vision and difficulty in watching television are not significantly associated with different levels of depression (p >0.05) in the current study. According to former studies, DED is closely related with depression, particularly the symptom of blurring of vision showed strong association with depressive symptoms, negatively affecting one's performance of visual task.[30] This indicates that our results are not in accordance with literature.

A significant association was found between subjective feeling of presence of discharge on lashes early in the morning and depression (p = 0.14) in current study. Previous studies showed that DED patients were more likely to have different levels of depression, anxiety and dementia[31] but none of studies specifically showed that feeling of presence of discharge is associated with depression as per our knowledge.

Worsening of burning under sun or in hot climate is significantly associated with depression in our study (p = .21). Previously it was determined that hot climatic conditions and excessive exposure to sunlight affect ocular surface causing irritation, burning and dry eyes.[32]

Another study reported that disorders of mental health contribute to subjective symptoms of dry eyes including grittiness, pain and burning.[31] Therefore, our results are in accordance with literature.

Concordant with literature, current results revealed that TBUT <10 seconds for both eyes is not at all significantly associated with severity of depression (p >0.05). Earlier studies showed that strong correlation exists between DED symptoms and depression, but no significant association was found particularly between clinical signs of dry eyes (TBUT, Schirmer test, fluorescein staining score) and occurrence of depression.[25]

Similarly, we found that Schirmer test-1 without anesthesia for both eyes is not significantly associated with severity of depression (p >0.05), which is also in accordance with above mentioned studies.[25]

CONCLUSION

A weak association was found between dry eyes and depression in pre-menopausal women, with statistically significant correlation existed between DED symptoms and severity of depression. Clinical signs of dry eyes including Schirmer test-1 and TBUT were not associated with depression. The significantly associated symptoms were feeling of ocular pain, worsening of ocular pain on blinking, worsening of burning under hot climate, presence of discharge on lashes early in the morning and feeling intolerable in air-conditioned areas. Among these only worsening of ocular pain on blinking has moderate association with depression

while others have weak association. Depression among dry eye patients was observed to be more prevalent among married women and housewives. Multidisciplinary coordination is required to ensure quality care.

RECOMMENDATION

Eye care professionals (ECP) managing patients with dry eyes must have knowledge of associated psychological morbidities, so that ECP could cater such issues in addition to ocular problems as we treat patients as womenand proper referral, if required, to psychiatry and psychology department could be ensured for maintaining quality care. Primary health care workers and gynecologist must be aware of how to recognize the symptoms of dry eyes and start initial treatment, as high frequency of DED is reported around menopausal transition period in women.

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