



## Original Article

## Dry Eye Disease and Depression.

## Authors

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**Purpose:** Dry eye disease (DED) is a common health problem. The chronic painful symptoms of DED can cause depression and conversely the anti-depressive medications can themselves cause DED. Purpose was to know the relationship between DED and depressive symptoms in elderly population of Islamabad.

**Methods:** A cross sectional population based study of 18 months' duration was done at eye department, Federal Government Services Hospital, Islamabad. Ethical approval and informed consent was taken from 1600 willing patients aged 38-78 years of both sexes to undergo study of DE. All patients were assessed in two steps. Initially dry eye questionnaire (DEQ-6) was administered and then DE tests were performed. DE diagnosis was made according to the latest dry eye diagnostic criteria of Japan. During second step Korean short geriatric depression scale (SGDS-K) was used on all cases, scoring one point for each answer selected. SPSS version 17 was used data analyzed for frequencies/ percentages.

**Results:** Out of consecutive 1600 patients, 486 (30.3%) subjects were diagnosed as having DED. One hundred and thirty (26.7%) subjects had definite depression with (SGDS-K) scale among DE patients. Common symptom in our study was watering 34.6% and 133 (60%) of females were post-menopausal. Maximum number of DE patients were of older age over 50 years, more men, more living in an urban area, had a higher income and had a lower visual acuity compared to the patients without DED.

**Conclusion:** Patients with dry eyes were more depressed than non-dry eye subjects.

**Keywords:** Dry eye disease, depression, dry eye questionnaire, Schirmer's test

## Introduction

Dry eye is a tear film disorder. Ocular surface disease (OSD), dysfunctional tear syndrome (DTS), keratoconjunctivitis sicca (KCS)<sup>1</sup> a Latin word which means "dryness of the cornea and conjunctiva." are other names of DE. The "sicca" is an English word meaning "desiccate." When tears are deficient they are named as "Sjögren's syndrome".<sup>2</sup>

The DE incidence varies 5%-30% in various age groups.<sup>3</sup> DE is a common ocular problem over 50 years of age.<sup>4</sup> The DE burden rises as the age progresses.<sup>5</sup> DED affects quality of life which results in decreased activities like reading, driving and computer related works.<sup>6</sup>

Late life depression (LLD) is common psychiatric problem. Depression is the leading cause of disability measured by Years Lived with Disability and stands second in global disability burden BDG, 2010 study. Depression is a state of sadness and hopelessness lasting for months or years.

Two retrospective population-based studies reported that 17% of subjects with depression had DED as opposed to 10% without this diagnosis.<sup>7</sup> The second study reveals 24% of patients with depression had DED compared to 18% without this diagnosis.<sup>8</sup>

Research has shown that longer-term depression increases chronic pro-inflammatory cytokine levels which can worsen DED.<sup>9</sup> Kiecolt-Glaser et al<sup>9</sup> reported that higher depressive symptoms and omega-6 to omega-3 ratio can enhance the production of pro-inflammatory cytokines.

The short (SGDS-K) is a screening test for LLD having questions for memory/ concentration pertaining to older age rather than early life depression. In GDS each item is reported as 'Yes' or 'No', which enhances reliability and easy to administer in elderly people. The GDS has been used in 17 countries after translation including Korea.<sup>10</sup>

Decreased vision and chronic discomfort disturbs DE patients which worsen depression. The aim of this study was to know the relation of DED symptoms and depression in elders.

## Materials and Methods

1600 willing patients attending Eye OPD or referred from other departments of Federal Government Services Hospital Islamabad were briefed about this study. Patients with systemic disease, previous surgery, using contact lenses and using any systemic medicine or drops were excluded.

Eight hundred and thirty three males (52%) and

seven hundred and sixty seven female (47.9%) subjects aged 38-78 years,, were assessed for DE in two steps. Initially, baseline demographics were recorded and dry eye questionnaire (DEQ-6) was administered by a trained interviewer. Each subject noted the presence of a symptom as "rarely", "sometimes", "often" or "all the time". Tear film break up time (TBUT), Schirmer's test(ST), corneal fluorescein staining (CFS) and slit lamp examination for any lid pathology were performed by a single surgeon under same physical conditions. DED was defined as presence of one or more symptoms often or all the time and at least one sign.

Korean short geriatric depression scale (SGDS-K) was used during second step on all cases by a single surgeon. Answers indicating depression are italicized and bold scoring one point for each one selected. A score of 0 to 5 is normal. A score greater than 5 suggests depression. Definite depression was defined as having an SGDS-K score of eight or higher. The relation between DED and depression was evaluated. In each subject, the data from worse eyes were used for analyses. SPSS version 17 was used data analyzed for frequencies/percentages. STUDY DESIGN: An institution based case series of 18 months duration was undertaken at, Federal Government Services Hospital, Islamabad.

## Results

Of 1600 patients, 833 (52%) were male, 767 (47.9%) were female. 992 (62%) belonged to urban while 38% (608/1600) from rural areas. 71% (1136) were educated, 28% were laborers. All 1600 subjects completed both questionnaires for DE and depression (Table1.)

486 (30.3%) were diagnosed as having DED according to the latest Japanese dry eye diagnostic criteria, 261 (53.7%) were males and 225 (46.2%) were females, table 2. Among symptomatic patients, 57.6% (280) had visited an eye clinic, 33% of male were smokers. Blepharitis was detected in 31% (150) of the dry eye cases. In our study 27% (131) subjects had refractive errors and 41% were computer users.

Maximum number of DE patients in this study was more than 50 years old. 286 (58.8%) of females were post-menopausal. Most common symptoms in our study were watering 31.6%, burning/irritation 22.8% and redness 19.9%, table 3.

Among symptomatic patients, 58.2% (283) had a low TFBUT (10 seconds or less), 38.5% (187) had a low Schirmer test result (5 mm or less), 36% (175) had fluorescein scoring 1or greater, and 48.8% (237) had

abnormal anatomic features of the meibomian glands, lid plugging/ mucous threads, table 4.

130 (26.7%) subjects had definite depression, defined as having an SGDS-K score of eight or higher which was more common in DE patients than those without, female being more common. Depressive group showed lower TBUT, Schirmer test with a higher oxford score. Family history of DED, smoking, refractive errors, computer use and high income level were related to depression in DE patients.

**Table1:** Baseline Characteristics

		Total	Male		Female	
		833	52.00%	240	47.90%	
Age	38 - 50	511	271 (53.00%)	240	47.00%	
	51 - 65	644	330 (51.20%)	314	48.80%	
	66 - 78	445	232 (52.10%)	213	47.90%	
Urban		992	522 (52.60%)	470	47.40%	
Rural		608	314 (51.60%)	294	48.40%	
Educated		1136	673 (59.20%)	463	40.70%	
Laborers		448	198 (44.00%)	250	56.00%	
Smokers		274	274 (100.00%)	0	0.00%	
Glasses		336	147 (43.80%)	189	56.20%	
Computer Use		301	167 (55.50%)	134	45.50%	
Family History		268	131 (48.80%)	137	51.20%	

**Table 2:** DE and Depression Prevalence

Total	Male	Female	Total
Total participants	843 (52.6%)	757 (47.4%)	1600
DED	261 (53.7%)	225 (46.2%)	486
Depression	41 (31.3%)	89 (68.7%)	130

**Table 3:** Age/symptoms Distribution of DE

Age (yrs)	Total	Male (%)	Female (%)
38 - 47	101	57 (56.5%)	44 (43.5%)
48 - 57	122	62 (50.8%)	60 (49.2%)
58 - 67	136	80 (58.8%)	57 (45%)
68 - 77	127	70 (55.1%)	57 (45%)
Symptoms			
Watering	168	92 (54.7%)	76 (45.3%)
Burning	140	100 (71.5%)	40 (28.5%)
Redness	97	43 (44.3%)	54 (55.7%)
Blurring	81	42 (51.8%)	39 (48.2%)

**Table4:** Age-Wise Calculation of TBUT

Age	Total	Low TBUT		Normal TBUT	
		Male (%)	Female (%)	Male (%)	Female (%)
38 - 50	151	37 (24.5%)	32 (21.0%)	53 (35.0%)	29 (19.0%)
51 - 65	186	58 (31.0%)	40 (21.5%)	44 (23.6%)	44 (23.6%)
66 - 78	149	46 (30.8%)	37 (24.8%)	35 (23.4%)	31 (20.8%)

## Discussion

Depression is a condition of mental or emotional stress due to adverse conditions. Late life depression (LLD) is one of the most common psychiatric problems in elders responsible for higher mortality and morbidity. Depression and anxiety are more common among DE patients.<sup>11</sup> The cornea is one of the most sensitive parts of the human body and has rich innervation.<sup>12</sup> The corneal low pain tolerance is blamed for the DED.<sup>13</sup> DED reduces quality of life and affects 6–34% of the elderly population worldwide.<sup>1</sup> In our study, 30.3% (486) patients presented in eye unit were diagnosed as dry eyes. This is consistent with international dry eye workshop (DEWS) 2007 which states that global prevalence of DED is about 17% while in Asia it is higher about 30%.<sup>14</sup>

Both older age and female sex are the risk factors for dry eyes.<sup>1</sup> DED prevalence increases with age especially from the sixth decade. Most of our patients were over 50 years of age consistent with study. Previous studies have shown that the risk of DED is 1.56-1.85 times higher in females compared to males. However in this study male were more symptomatic than female which is contrary to other study.<sup>15</sup>

286 (58.8%) women in this study were post-menopausal. This shows the hormonal effect on the tear film and ocular surface.<sup>16</sup> Female sex and menopause are common risk factors of DE and depression indicating sex hormones involvement. Also inflammation has a role in the development of DED.<sup>1</sup> Most of our patients were urban than from rural areas similar to other study in South Korea showing higher prevalence of DED in urban areas.<sup>17</sup>

Smoking induces unstable tear film or aggravates allergic disease.<sup>18</sup> The present study revealed that 33% of the patients were smokers of 10 years duration. The DE symptoms like dryness, irritation and fatigue were main causes for reduced daily activities and quality of life<sup>19</sup> in our study. Also, in other studies, female incidence was higher than in males as the rates of depression for women were between 4.0% and 9.3% and for men between 2.8% and 6.9%.<sup>20</sup> Our study showed 68.7% rate of depression for female which was higher than that in men (31.3%) in DE

patients.

In present study 41% were computers users. A study by Uchino et al. reported that more than 4 hours of VDT use was related with an increased risk of DED.<sup>21</sup> Subjects spending more time on reading had more corneal fluorescein staining and poor Schirmer's value as blink rate reduces during reading. This exposes the ocular surface to external stimuli causing epitheliopathy.<sup>18</sup>

The 2007 Dry Eye Workshop (DEWS) discussed the effect of DED on the quality of life.<sup>1</sup> One study correlated vision-related quality of life with anxiety and depression. Labbe et al, from the Beijing Eye Study, showed that depression was associated with DED symptoms.<sup>7</sup> The depressive symptoms were present in older age groups in our study is akin to other study. Galor et al.<sup>22</sup> noted DE relationship with depression, which is in good agreement with the findings of our study.

Female sex, age, and hormonal influence are well established risk factors for both DED and depression. Literature showed that DE symptoms and mood status affect each other.<sup>23</sup> Vriezolk et al. mentioned that depression, fatigue, and pain were common in Sjögren syndrome patients. Other indicated depressive mood was responsible for dry mouth.<sup>24</sup> In present study, 58.4% subjects had low TBUT and ST values, were more prevalent in the DED group than in the non-DED group. Kim et al.<sup>23</sup> have shown recently that depression was present in those DED patients who had reduced tear production.

The level of adrenaline within the body remains elevated in anxiety and stress. This can cause pressure on the eyes resulting in blurred vision. Tunnel vision is another feature of excessive adrenaline. This occurs at times of crisis.<sup>8</sup> This explains occasional blurring in DE patients in our study. Meibomian gland dysfunction (MGD) was defined as the presence of gland orifice plugging. 48.8% of DE patients had Lid plugging in this study, a major cause of DE.<sup>25</sup> Interestingly in the present study the risk of DE was related with a family history of DE. It is well known that DE is common with systemic hereditary diseases such as diabetes or autoimmune disorders.<sup>26</sup>

There are reports that systemic medications including antidepressants, antihistamines and anti benign prostate hypertrophy medications were associated with DED.<sup>22</sup> Studies showed that the DE symptoms were related with individual pain perception and depression.<sup>7</sup> and reports also indicated that antidepressant medications may develop dry eye symptoms.<sup>11</sup>

## Conclusion

Ophthalmologists usually have no training in mental health aspects. So, some knowledge about depression in DE patients is required. Depression is characterized by much more than just sadness. As we see that depression can be related with DE symptoms and reduced tear formation. Subjects with DED require proper management and screening of depression.

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