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Epidemiological Study of Functional Dry Eye Disease in a Working-class Population in Shanghai, China

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Abstract

Background: *To investigate the current status, morbidity, and risk factors of functional dry eye disease (DED) in Shanghai's working-class population and explore measures to prevent and manage functional DED.* **Methods:** *A questionnaire was used to record the data of positively diagnosed functional DED working-class subjects in Shanghai. Subjective symptoms and clinical results were also documented. The classification and corneal staining between subjects who wear contact lenses and those who do not were compared. Correlation of classification and corneal staining with their risk factors was analyzed.* **Results:** *Risk factors of functional DED showed much in common in subjects of this population, though their specific types of work differed. Evaporative dry eye (EDE) accounts for a large proportion of DED (45.35%) and many subjects with co-existing symptoms and signs (mixed DED, 32.64%). The age of 21-40 year old is most prominent, accounting for 70.4% of the subjects. Wearing contact lenses, working with computer monitors, working in air-conditioned offices, interior decoration, staying up later, sleep disorders, and smoking were risk factors in most functional DED subjects. Notably, wearing contact lens is the leading risk factor for causing functional DED and ocular surface complications (both were p<0.01), while deep sleep seems to be a protective factor (p<0.01%).* **Conclusion:** *The incidence of functional DED in Shanghai is high, and most risk factors are closely related to daily work and life conditions. Reducing and eliminating these daily risk factors are expected to be uesful in preventing and managing functional DED.*

1. Introduction

Dry eye disease (DED) is a multifactorial condition of the ocular surface characterized by a loss of homeostasis in the tear film, accompanied by ocular symptoms. In this condition, tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities play significant etiological roles [1]. According to a meta-analysis conducted in the United States, the estimated incidence rates of DED and meibomian gland dysfunction (MGD) are 8.1% and 21.2%, respectively. In comparison, the incidence rate of DED in China is reported to be 17.0% [2, 3]. A 10-year investigation found that DED symptoms have not been effectively treated; the discomfort and visual disturbances experienced by patients have continuously worsened, significantly impacting their daily work and lives [4].

Similarly, in Shanghai, a major metropolis in China, DED is becoming an increasingly prominent issue for the working class. The work pace in

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Shanghai is quickening, along with a fast-paced lifestyle, leading to heightened anxiety among the population. Mobile phones, computers, and other electronic devices have become essential in daily activities. Furthermore, factors such as a polluted environment, confined work and living spaces, frequent overtime, poor sleep habit, and insomnia likely contribute to an unhealthy state of the eye, resulting in insufficient tear film quality or quantity and a high incidence of DED. The pathogenetic classification divides DED into aqueous deficient dry eye (ADDE) and evaporative dry eye (EDE). ADDE describes conditions affecting lacrimal gland function, while EDE encompasses lid and ocular surface-related causes. Recently, Bron et al. published a series of reports on the clinical diagnosis and treatment of DED [5]. They proposed that the causes and classifications of DED are diverse, and thus, the corresponding treatment methods should also be personalized, reflecting the pathophysiological aspects of DED. Notably, in 2019, Liang et al. described the concept of functional DED, referring to patients with dry eye symptoms but without detectable signs [6]. In our clinical practice, we also found that most dry eye patients belong to this subtype, displaying a discrepancy between subjective ocular symptoms and objective signs, with unexplained severe symptoms absent visible indicators. Additionally, the triggering factors for most dry eye patients can be attributed to various unhealthy work and lifestyle habits, such as excessive use of computers and mobile phones, working overtime, staying up late, poor sleep quality, and continuous contact lens wear. It is feasible to prevent and treat DED by addressing these pathogenic factors. This aligns with a recent Chinese expert consensus on lifestyle-related dry eye and the Tear Film & Ocular Surface Society (TFOS) lifestyle epidemic report series on ocular surface diseases [7-11].

In light of this, we sought to explore the characteristics of functional DED within the working-class population in Shanghai, a typical metropolis in China. We enrolled 527 functional DED patients representing various industries in Shanghai. We administered a questionnaire to identify the risk factors associated with functional DED. An additional study combined the survey data with clinical examinations, revealing a high incidence of functional DED among the working class in Shanghai, with most cases linked to risk factors related to their daily work and life.

2. Methods

In this study, we only focused on the working class in Shanghai. They were all diagnosed in our hospital as functional DED patients.

The study protocol was approved by the Medical Ethics Committee of Huashan Hospital (No. 2021-880) and adhered to the tenets of the Helsinki Declaration in 2000. All participants gave informed consent. A power analysis was performed to determine the number of patients needed to be enrolled in the study.

2.1. Enrolled Patients

This study surveyed 527 patients diagnosed with functional DED. The enrolled subjects were office workers who lived and worked in the Shanghai metropolitan area. The scope of data collection included individuals working in various industries throughout Shanghai without any significant primary or organic diseases.

Patients with functional DED were enrolled based on the TFOS Dry Eye Workshop II (DEWS II) definition and classification and the Chinese expert consensus on dry eye [1, 7]. The criteria included the following items: (1) Dry eye symptoms - discomfort, photophobia, gritty sensation, etc. (2) Tear break-up time (TBUT) - less than 10 s. (3) Tear film curvature radius - less than 0.5 mm. (4) Positive corneal staining. (5) Abnormal morphology or opening of the meibomian gland. (6) Elevated tear film osmolality.

The inclusion standards required that the presence of symptoms and two or more positive examination indices mentioned above met the criteria for functional DED. The exclusion criteria included (1) Diabetes, (2) Sjogren's syndrome, (3) Ankylosing spondylitis, (4) Laser-assisted myopia correction or keratoplasty, (5) Active ocular surface inflammation, (6) Cataract surgery or similar procedures, and (7) Other known diseases or medications that could cause dry eye.

2.2. Characteristics of Subjects

In the study population, age of 21-40 years old was the prominent group with functional DED, accounting for 70.4% of the total enrolled subjects. There were more female than male patients (1.27:1), and subjects with college degrees and above accounted for 87.8%. The subjects' occupations cover various industries. IT practitioners, finance, teachers, science researchers, computer designers, marketing and consultants were the most common types of jobs with functional DED patients, accounting for 78.8% (Table 1).

Table 1. Basic Characteristics of Enrolled Patients

Characteristics	N (%)
Total	527 (100)
Age (years old)	
• ≤20	4 (0.8)
• 21-30	178 (33.8)
• 31-40	193 (36.6)
• 41-50	113 (21.4)
• ≥51	39 (7.4)
Gender	
• Male	232 (44.0)
• Female	295 (56.0)
Highest Education	
• Middle school or lower	3 (0.6)
• High school	61 (11.6)
• University or college	281 (53.3)
• Graduate school	182 (34.5)
Profession	
• IT pratitioner	92 (17.5)
• Office staff	42 (8.0)
• Financial staff	46 (8.7)
• Teacher/researcher	103 (19.5)
• Computer design	79 (15.0)
• Consultant	53 (10.1)
• Others	112 (21.2)
DED classification	
• ADDE	116 (22.0)
• EDE	239 (45.4)
• Mixed DED	172 (32.6)

2.3. Observation of Clinical Symptoms and Signs

In our clinical practice, when a subject reported dry eye symptoms such as dryness, a foreign body sensation, and burning discomfort without other abnormal signs like vision problems, intraocular pressure changes, or fundus abnormalities, we initially diagnosed the patient as functional DED suspect. We then utilized a corneal topography instrument (SW-6000D, Suoer Electronic Technology Co., Ltd., Tianjin, China) to conduct specific dry eye examinations. Additionally, we observed the meibomian glands and checked for positive staining of the cornea with fluorescein sodium using a slit lamp microscope (YZ5X1, 66 Vision Tech Co., Ltd., Suzhou, Jiangsu, China). When necessary, we employed an osmometer (Osmotic Molar Concentration Tester SMC 30C, Tianhe Analytical Instrument Co., Ltd., Tianjin, China) to assess the osmotic pressure of tear fluid. If two or more indices from these examinations aligned with DED, and other related diseases and surgeries were excluded, the patient was diagnosed as functional DED. We documented the subjective symptoms and their clinical observations, which primarily includes the state of the meibomian glands, TBUT, tear film curvature radius, and corneal fluorescein staining.

2.4. Questionnaire Survey

We maintained effective communication with patients diagnosed with functional DED, clarified relevant items, and encouraged them to join our functional DED volunteer program. After obtaining the patient's consent and signature confirmation, we provided a DED questionnaire survey form for them to complete on-site. The enrolled patients' age, gender, type of work, and education background were expected to reflect the general characteristics of this population in Shanghai. The questionnaire thoroughly documented their work nature and lifestyle habits, particularly focusing on underlying risk factors such as electronic screens (mobile phones, computers, TVs), daily life, working environment,

contact lens use, and more. All survey forms were ultimately submitted to the researchers for evaluations and statistical analysis.

2.5. Statistical Analysis

Statistical analysis was carried out using IBM SPSS software version 22.0. Data were expressed as mean or mean ± standard errors. Using a chi-squared test, frequencies and DED classification percentages were compared between functional DED patients wearing contact lenses and other functional DED patient groups. DED classification and corneal staining associations with potential risk factors were estimated using multivariate logistic regression.

3. Results

3.1. Functional DED Classification

Among 527 functional DED patients, we found that most participants were classified as EDE (n = 239; 45.4%). A significant number exhibited symptoms and signs of two types of DED (n = 172; 32.6%). The remaining subjects were diagnosed as ADDE (n = 116; 22.0%). Additionally, DED classification correlates with the frequent use of electronic screens, air conditioning, contact lenses, smoking, and drinking alcohol (Table 1 and Figure 1). These data of the distribution of DED classes align with the conclusions of the TFOS DEWS II Definition and Classification Report [1].

3.2. Evaluation of Potential Risk Factors

We administered a questionnaire to the enrolled patients to understand the potential risk factors of functional DED in the working class. We included specific questions that the general population in China believes are potential causes of DED. The specific questions, responses, and response rates are shown in the supplementary table (Table S1).

Based on this questionnaire and the patients' responses, we used logistic regression analysis to evaluate the potential association of these factors with DED. The multivariate logistic regression analysis and calculated odds ratios of these factors are shown in Table 2.

This analysis demonstrates no statistically significant correlation among the study subjects between functional dry eye disease (DED) and the variables

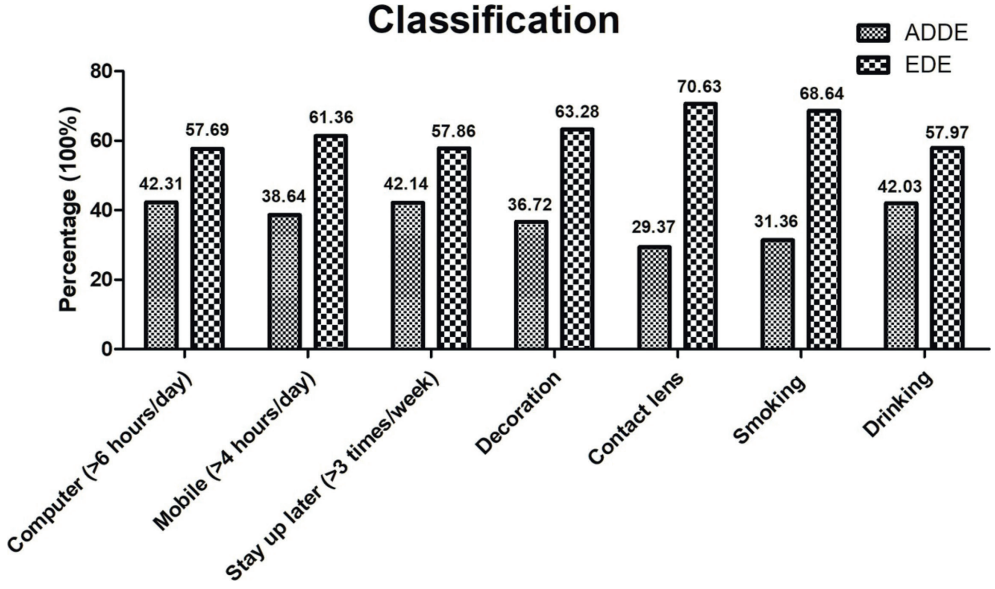

Figure 1. Percentage of aqueous deficient dry eye (ADDE) and evaporative dry eye (EDE) risk factors is classified based on primary manifestations.

Table 2. Multivariate logistic regression analysis of various factors vs. functional DED.

			95% CI	
Factors	***p***	**Odds ratio**	**Lower**	**Upper**
Gender	0.494	0.815	0.453	1.466
Age	0.061	1.516	0.980	2.345
Education	0.901	1.038	0.578	1.863
Computer use	0.007*	2.847	1.328	6.104
Mobile phone use	0.004*	2.349	1.317	4.188
Television time	0.199	0.716	0.431	1.192
Deep sleep length	0.014#	0.685	0.507	0.926
Staying up late	0.007*	1.781	1.171	2.710
Staying under air-conditioning	0.843	1.184	0.221	6.347
Recent home/office renovation	0.014*	2.817	1.234	6.430
Work pressure	0.152	0.676	0.396	1.155
Anxiety	0.871	0.975	0.721	1.319
Wearing Contact lens	0.003*	2.104	1.282	3.453
Frequent overtime work	0.216	0.597	0.263	1.352
Smoking	0.000*	4.630	2.394	8.953
Drinking alcohol	0.008*	1.786	1.162	2.746

*Note: *: p<0.05, increase risk of DED, #: p<0.05, decrease risk of DED.*

of gender, age, or education level. Nonetheless, a trend suggests increased odds in the older age group, with an odds ratio of 1.516 (p = 0.061). Furthermore, the survey indicates that daily average time spent watching television, residing in air-conditioned environments, or engaging in frequent overtime work is not associated with functional DED. Similarly, the psychological states of the patients, including work-related pressure and anxiety, do not significantly influence the odds ratio of DED. Conversely, average daily time spent using a computer or mobile phone, wearing contact lenses, and undergoing recent home or office renovations are all associated with an increased odds ratio of functional DED by more than twofold.

Additionally, frequent alcohol consumption is linked to a heightened risk of DED. Notably, smoking emerges as a lifestyle habit exerting the most substantial impact on DED, with the odds ratio for smokers being 4.63 times (95% CI = 2.394-8.953) that of non-smokers. Among all factors analysed, the average nightly duration of deep sleep correlates with a decreased risk of functional DED by more than 30% (odds ratio = 0.685).

To provide an objective and independent evaluation of the patients' DED conditions, we employed a corneal topography instrument to confirm signs of dry eye. We also assessed the meibomian glands and examined the cornea for positive staining using a slit lamp microscope after the topical ocular administration of fluorescein sodium (Figure 2).

Subsequently, we analysed the potential association of lifestyle factors with positive corneal staining through logistic regression analysis. The multivariate logistic regression analysis and calculated odds ratios for these factors in relation to corneal staining are presented in Table 3.

This analysis of corneal staining produces similar results to that of DED evaluation in some factors but different results in others. For example, there is no statistically significant correlation between functional DED or corneal staining and gender, age, or

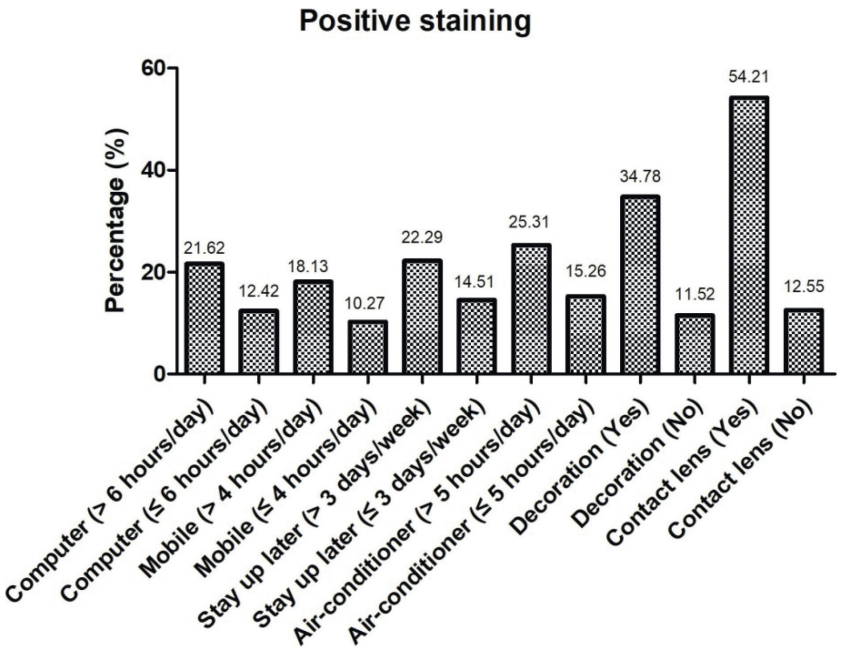

Figure 2. Percentage of positive corneal staining in risk factors.

Table 3. Multivariate logistic regression analysis of various factors vs. corneal staining results.

			95% CI	
Factors	***p***	**Odds ratio**	**Lower**	**Upper**
Gender	0.055	1.818	0.987	3.347
Age	0.535	0.861	0.537	1.381
Education	0.426	1.286	0.692	2.388
Computer use	0.007*	1.626	1.142	2.315
Mobile phone use	0.003*	2.072	1.289	3.33
Television time	0.770	1.077	0.654	1.776
Deep sleep length	0.006#	0.458	0.263	0.795
Staying up late	0.000*	2.044	1.391	3.002
Staying under air-conditioning	0.006*	2.081	1.240	3.493
Recent home/office renovation	0.038*	1.989	1.039	3.81
Work pressure	0.112	0.604	0.324	1.125
Anxiety	0.158	1.757	0.803	3.844
Wearing Contact lens	0.025*	1.922	1.087	3.399
Frequent overtime work	0.232	1.300	0.846	1.998
Smoking	0.445	1.154	0.799	1.666
Drinking alcohol	0.500	1.311	0.596	2.884

*Note: *: p<0.05, increase risk of cornea staining, #: p<0.05, decrease risk of cornea staining.*

education level. Time spent watching television or frequent overtime work is not associated with functional DED or corneal staining.

Patient psychological states, like work-related pressure or anxiety, do not significantly influence the odds ratio of corneal staining. In contrast, daily time spent on computers, mobile devices, wearing contact lenses, and recent home or office renovations increases the chances of functional dry eye disease (DED) by over twofold. Nightly deep sleep duration correlates with a decreased risk of corneal staining. However, results for corneal staining differ from DED evaluations. Time spent in air-conditioned environments does not significantly impact functional DED risk but is a known risk factor for corneal staining. While smoking and alcohol consumption affect self-reported DED, they do not increase the risk of corneal staining. These differences between functional DED evaluations and corneal staining highlight a divergence between subjective experiences and objective symptoms.

3.3. Contact Lens

Both the results of the questionnaire and the clinical examination showed that contact lens was a leading risk factor for EDE (Table 2, p=0.003, 95% CI: 1.282-3.453) and ocular surface complications (Table 3, p=0.025, 95% CI: 1.087-3.399). By questionnaire data, we found that the proportion of DED patients who used contact lenses was not very high (22.39%), while the incidence of symptoms and signs were much higher than other DED patients. The symptoms, such as eye dryness, gritty sensation, photophobia, and ocular surface irritation were much higher than those induced by other risk factors. The incidence of EDE and ocular surface lesions such as corneal epithelial exfoliation were invariably detected in contact lens wearers (Figure 3, P <0.01).

3.4. Deep Sleep

Deep sleep acts as a protective factor in our study, contrasting with other risk factors. Our multivariate regression analysis indicates a protective effect in dry eye disease (DED) (Table 3, p=0.014, 95% CI: 0.507-0.926) and ocular surface lesions (Table 3, p=0.006, 95% CI: 0.263-0.795). Notably, increased deep sleep duration inversely correlates with DED incidence. Classification analysis reveals that as deep sleep duration rises, the incidence of evaporative dry eye (EDE) declines, along with its proportion in DED (Figure 4 (A), P < 0.01). Additionally, prolonged deep sleep appears to benefit ocular surface tissue function, as indicated by a gradual decrease in corneal staining incidence. Subjects with less than 6 hours of deep sleep exhibited significantly higher staining rates compared to those with over 7 hours (Figure 4 (B), P).

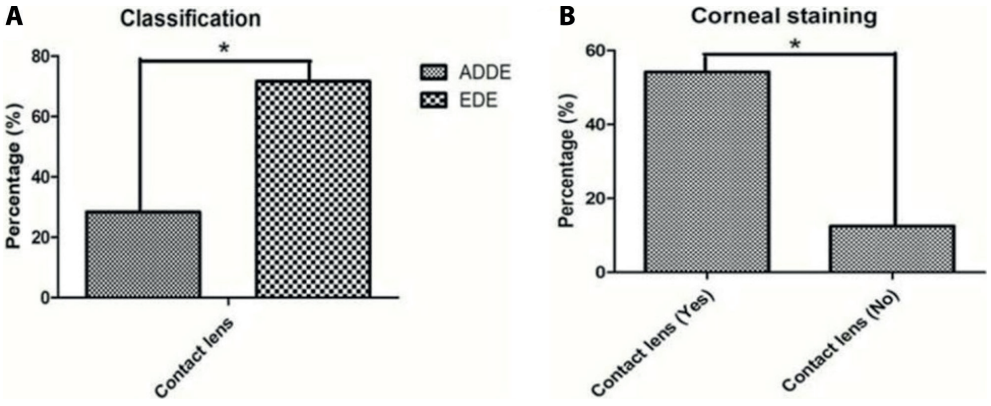

Figure 3. χ^2 test for DED and corneal staining. (A): *evaporative dry eye (EDE) prevalence *vs* that in the aqueous deficient dry eye (ADDE) in the contact lens group, P <0.01. (B): *positive corneal staining percentage in the contact lens group versus that in no contact lens groups, P <0.01.

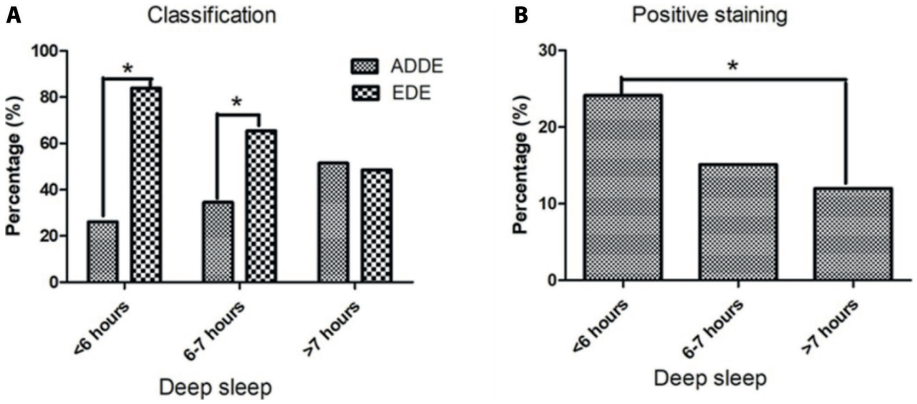

Figure 4. χ^2 test for deep sleep. (A): *prevalence of aqueous deficient dry eye (ADDE) *vs* evaporative dry eye (EDE), P <0.01. (B): * positive corneal staining incidence in <6 hours deep sleep *vs* >7 hours deep sleep, P <0.01.

4. Discussion

Shanghai, as an international metropolis, showcases a fast-paced work and life rhythm for its working-class population. Clinical data indicates that functional dry eye disease (DED) has become a significant concern among workers. Daily, we encounter numerous DED patients, predominantly healthy individuals who often appear fatigued. Common traits among these patients include a rapid work pace, high stress levels, frequent overtime, irregular lifestyles, extensive use of electronic screens, and regular contact lens use. Recent research highlights occupational and lifestyle-related risk factors for DED, leading to important prevention and treatment guidelines [8-11]. Chinese researchers have introduced the concept of functional DED, associating it with unhealthy habits and proposing related expert consensus [7].

Our questionnaire reflects a high incidence of functional dry eye (DED) among Shanghai wage earners across various occupations, mainly due to the contemporary work environment and pace. Despite unique job characteristics, many share traits like high pressure, constant device use, and prolonged time in air-conditioned settings that impact their health. Most patients in our study sample are classified as having evaporative dry eye (EDE). However, some exhibit mixed DED, showing signs of aqueous deficient dry eye (ADDE) and EDE, aligning with TFOS DEWS II reports.

Prolonged high-frequency use of digital devices is a recognised risk factor for dry eye disease (DED) [12, 13]. Increased concentration reduces blink frequency, leading to partial or complete uncovering of the tear film on the cornea before the next blink. This intermittent exposure results in effects similar to those of the evaporative dry eye (ADDE), increasing tear osmotic pressure and causing inflammation on the ocular surface. Modern office environments also contribute to DED, primarily due to air conditioning and renovations [11, 14]. Air conditioning lowers humidity and increases tear film evaporation. Renovation materials can irritate the eyes, prompting reflex tear secretion and damaging the ocular surface.

Attention should also be paid to the damage caused by contact lenses. Their friction can harm conjunctival and corneal tissues, disrupting the epithelial cell barrier and causing inflammation [15, 16]. Additionally, contact lenses can damage meibomian glands and interfere with tear film dynamics, impeding tear production and leading to abnormalities in tear function [17-19].

Our questionnaire showed that functional DED subjects using contact lenses exhibited dry eye symptoms and ocular surface lesions from various risk factors. These patients often complained of dry eyes and foreign body sensation, with congestive and swollen

meibomian glands. Chronic hyperemia of the conjunctiva was common, and some mucilaginous secretion was present in the conjunctival sac. The corneal epithelium frequently showed oedema, positive fluorescein staining was often present, and ocular surface inflammation, including keratitis, was commonly observed. Notably, functional DED subjects wearing contact lenses or experiencing sleep disorders often had positive fluorescein staining in the lower cornea, possibly due to Bell's phenomenon, causing incomplete eyelid closure and exposure of lower cornea or accumulation of inflammatory factors in the lower tear meniscus, resulting in corneal issues [20].

Additionally, our analysis highlighted deep sleep as a protective factor for DED. Poor sleep quality and insomnia, prevalent in modern society, are linked to DED, as sleep deprivation (SD) decreases tear secretion, reduces corneal sensitivity, and promotes epithelial defects and apoptosis [21-23]. Long-term SD can even lead to limbal stem cell deficiency [24]. Microvilli, crucial for ocular surface lubrication, are negatively affected by SD due to down-regulation of PPARα and other factors [25].

Increasing deep sleep duration appeared to reverse these issues, indicating its protective role in tear film maintenance and ocular surface function in functional DED patients. While various risk factors contribute to functional DED, most are retrospective and tissue damage is often reversible. Symptoms and signs in functional DED patients typically improve or resolve completely when they strictly follow health education and address specific risk factors in their lifestyle and work. Thus, we believe identifying and eliminating these risk factors is more effective for functional DED patients than solely relying on drug therapy. This approach targets the root cause, while drug therapy only alleviates symptoms. Therefore, functional DED patients must discuss their medical history, understand their condition, and eliminate harmful habits rather than focus solely on symptomatic treatment.

5. Conclusions

The data show that functional DED in Shanghai results from various risk factors, including contact lens use, sleep disorders, heavy screen time, air conditioning, and recently renovated spaces [1]. It's also associated with less obvious factors like work stress, lifestyle, and social environment [2]. The working class in Shanghai often lives a fast-paced, high-pressure life, leading to unhealthy coping mechanisms such as smoking, alcohol, and gaming [3]. Our dry eye survey illustrates these challenges in metropolitan life. By addressing unhealthy habits and lifestyles, we can potentially cure and prevent functional DED. Thus, adopting healthy work and life practices is essential, and society must recognize their importance [4].

Ethics and Consent to Participate: The study was approved by the Institutional Review Board (IRB) of Huashan Hospital, which is affiliated with Fudan University (No. 2021-880). All participants gave informed consent, and the study adhered to the tenets of the Declaration of Helsinki.

Competing Interests: None.

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Authors' Contribution: Nianhong Wang conceived the research idea and designed the questionnaire. Yan Liu and Huan Weng performed the questionnaire and collected data, Huiying Wang designed clinical examinations and analysed the results and data, Weibao Xiao conceived the research idea, analysed data, and wrote and revised the manuscript. All authors read and approved the final version of the manuscript.

Supplementary Material: Table S1.

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Supplementary Material

Table S1. Questionaire for Enrolled Functional DED Patients

Questions and Responses	N (%)
What electronic screen/monitor do you usually use during your daily activities?	527 (100)
• Mobile phone	396 (75.1)
• Computer	426 (80.8)
• Television	104 (19.7)
• E-book	26 (4.9)
• Three devises or more	137 (26.0)
How many hours per day in average do you spend in front of a computer screen?	426
• <4	29 (6.8)
• 4-6	73 (17.1)
• 6-8	228 (53.5)
• >8	96 (22.5)
How many hours per day in average do you use your mobile phone?	396
• <4	163 (41.2)
• 4-6	149 (37.6)
• 6-8	60 (15.2)
• >8	24 (6.0)
How many hours per day in average do you watch television?	104
• <1	8 (7.7)
• 1-3	39 (37.5)
• 3-6	44 (42.3)
• >6	13 (12.5)
How many hours per day in average do you spend under air conditioning?	406
• <3	63 (15.5)
• 3-5	149 (36.7)
• 5-8	160 (39.4)
• >8	34 (8.8)
In the past year, did you renovate your home?	527
• Yes	69 (13.1)
• No	458 (86.9)
If you had home/office renovation, did you feel eye irritation related to that?	69
• Yes	47 (68.1)
• No	22 (31.9)
Do you wear contact lens?	527
• Yes	118 (22.4)
• No	409 (77.6)

(*continued*)

Questions and Responses	N (%)
If you wear contact lens, how many times do you wear them each week?	118
• 1-2	43 (36.4)
• 3-4	49 (41.5)
• ≥5	26 (22.0)
If you wear contact lens, do you remove them before sleeping?	118
• Yes	112 (94.9)
• No	6 (5.1)
If you wear contact lens, what is their water content classification?	118
• High	69 (58.5)
• Middle	41 (34.8)
• Low	8 (6.8)
If you wear contact lens, how often do you replace them?	118
• Daily	65 (55.1)
• Monthly	32 (27.1)
• Quarterly	10 (8.5)
• Half year	8 (6.8)
• Yearly	3 (2.5)
Do you often need to work overtime?	527
• Yes	249 (47.2)
• No	278 (52.8)
If you need to work overtime, how many overtime hours per day in average?	249
• <1	52 (20.9)
• 1-2	123 (49.4)
• 2-3	46 (18.5)
• >3	28 (11.2)
When do you get up in the morning?	527
• Before 6 AM	56 (10.6)
• 6-7 AM	149 (28.3)
• 7-8 AM	251 (47.6)
• After 8 AM	71 (13.5)
When do you sleep at night?	**527**
• Before 9 PM	18 (3.4)
• 9-11 PM	117 (22.2)
• 11-12 PM	299 (56.7)
• After midnight	93 (17.6)
In average, how many hours of deep sleep per night do you have?	527
• <5	89 (16.9)
• 5-6	118 (22.4)
• 6-7	217 (41.2)
• 7-8	93 (17.6)
• >8	10 (1.9)

Questions and Responses	N (%)
In average, how many nights per week do you sleep after midnight?	527
• <1	82 (15.6)
• 1-2	215 (40.8)
• 3-5	158 (30.0)
• ≥6	72 (13.7)
Do you feel excessive pressure at work?	527
• Yes	293 (55.6)
• No	234 (44.4)
Do you usually feel anxiety?	527
• Yes	205 (38.9)
• No	322 (61.1)
Do you exercise often?	527
• Yes	224 (42.5)
• No	303 (57.5)
If exercise often, how many times per week do you exercise?	224
• 1-2	141 (63.0)
• 3-4	56 (25.0)
• >5	27 (12.0)
If exercise often, how many hours each time do you exercise?	224
• <0.5	55 (24.6)
• 0.5-1	102 (45.5)
• 1-2	47 (21.0)
• 2-3	17 (7.6)
• >3	3 (1.3)
Do you smoke?	527
• Yes	19 (3.6)
• No	508 (96.4)
If you smoke, in average how many cigarettes do you smoke each day?	19
• <5	1 (5.3)
• 5-10	3 (15.8)
• 10-20	10 (52.6)
• >20	5 (26.3)
Do you drink alcohol?	527
• Yes	112 (21.2)
• No	415 (78.8)
If you drink alcohol, in average how many times per week?	112
• 1-2	75 (67.0)
• 3-4	23 (20.5)
• ≥5	14 (12.5)