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Effect of Blinking Exercises on Eye Dryness and Quality of Life for ElderlyPeople

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Abstract
Background: Eye dryness is a common health problem among older adults which negatively impacts their quality of life. **Aim:** To assess the effect of blinking exercises on eye dryness and quality of life for elderly people. **Design:** A quasi-experimental research design (Pre/post-test) was utilized. **Sample:** A purposive sample of one hundred elderly patients who complained from dry eye was selected. **Setting:** The study was conducted in ophthalmology outpatient clinics at Minia University Hospital, Egypt. **Methods:** Three validated tools were used 1) **A structured interview questionnaire sheet involving** personal and medical profiles. 2) Ocular Surface Disease Index (OSDI) questionnaire, and 3) Impact Dry Eye Everyday Life Questionnaire. **Results:** The mean age of the studied sample was 68.62±8.62, and 59.0% were female. It was found that the severity of eye dryness declined after the implementation of eye blinking exercises to 5% versus 15% before the intervention at a mild level and declined to 15% at a moderate level compared with 40% before with a high statistical significance difference P value < 0.00001*. Additionally, the effect of eye dryness on quality of life diminished with a statistically significant difference between pretest & after 4 weeks of the intervention reflected by P-value=0. 0352. **Conclusion:** Applying eye blinking exercises effectively reduced eye dryness and **improved** the quality of life among older adults. **Recommendation:** Health education and training should be provided regularly in eye blinking exercises in different healthcare settings for elders with the availability of related posters, brochures, and handouts given to them.

Keywords: Blinking exercises, Eye dryness, older adults & Quality of life.

Introduction
Dry eye disease (DED) is an increasingly prevalent eye condition and a significant public health particularly among older adults, negatively impacting their quality of life **(Zhang et al., 2022).** This eye disorder occurs when the eyes cannot produce enough tears or when the tears that are created evaporate too quickly. Tears are crucial for maintaining the health and comfort of the eyes. They provide lubrication, nourishment, and protection to the cornea and the surrounding tissues **(Hynnekleiv et al., 2022)**.

The aging process associated with several changes contributes to dry eyes. As people get older, tear production tends to decrease due to the changes in the lacrimal glands, which produce tears. Added to this, blinking frequency and completeness are reduced during digital screen exposure, compromising meibum secretion and distribution, causing tear film instability, and finally leading to dry eye disease **(Craig et al., 2017).**

The prevalence of dry eye disease was estimated in many countries and indicated that it is a growing problem with a prevalence rate ranging from 6.8% to 69% worldwide **(Bbott et al., 2024).** The estimated prevalence in Saudi Arabia was from 32.1% to 62.4%, from 6.8% to 28% in Egypt, prevalence of 69% for Palestine, 52% for Jordan, 27.2% for Iraq, 30% for the United Arab Emirates, 28.5% for Tunisia, 36.4% for Lebanon, and 40% for Libya **(Aljarousha et al., 2021).**

With a growing elderly population worldwide and longer life expectancy, conditions such as dry eye disease exacerbated by digital device use are becoming more prevalent. This trend is contributing to higher costs associated with eye care visits, medications, and reduced work productivity **(Zhang et al., 2022)**

The reported symptoms of dry eye disease include ocular surface burning, itching, foreign body sensation, photosensitivity, ocular hyperemia, and intermittent poor vision. Severe forms of dry eye disease are associated with anxiety and depression and interfere with the ability to work and carry out daily functions **(Aljarousha et al., 2021).**

Several risk factors contribute to developing dry eye disease including female sex, advancing age, exposure to low humidity environments, contact lens wear, refractive surgery, and use of digital devices. The prolonged use of digital devices has been associated with symptoms of dry eyes, as well as lower tear volume and instability of the tear film. **(Bakkar et al., 2016).**

Dry eye disease significantly impacts daily activities, work productivity, and social functioning, placing financial burdens on elderly individuals and their caregivers, thereby diminishing overall quality of life. There are several available pharmacological methods for treating eye dryness including eye drops, medications, and tear duct plugs **(Lee et al., 2022).**

Blinking exercises are a simple, non-pharmacological method that can be easily incorporated into daily routines at minimal cost. **(Kim et al., 2021).** It is also highly effective in improving the proportion of functional meibomian glands (the oil glands that sit along the edge of the eyelids where the eyelashes are) in patients suffering from dry eye.

The exercises entail closing the eyes and gently squeezing the eyelids shut for more than two seconds, performed several times per hour throughout the day (Christianto and Purwito, 2022). Each blink helps cleanse the ocular surface of debris and provides lubrication, so reduced blinking can lead to increased irritation and dryness. **(AlMarshedi & Alshamrani 2022)**.

Nurses play a crucial role in preventing and managing dry eyes by educating patients on modifying risk factors such as exposure to smoky environments, dust, and air conditioning. They also address natural tendencies to reduce blinking while concentrating and discourage eye rubbing, which can aggravate irritation (de Araujo et al., 2016). Additionally, nurses provide essential training for elderly patients in ophthalmic clinics and units on blink exercises, explaining their benefits, proper techniques, duration, and frequency **(Hadavand et al., 2019).**

Significance of the Study:

Dry eye disease is a prevalent health concern among older adults, associated with numerous adverse effects. Globally, the prevalence of dry eye syndrome among adults aged 65 and older was estimated at 43.79% **(Bbott et al., 2024).** In a study conducted by **Aziz et al. (2020)** at outpatient clinics across multiple hospitals in Egypt Ain Shams University Hospital and Al Watany Eye Hospital in Cairo, Saint Mary Hospital in Qena, and Aswan Eye Center in Aswan a total of 603 eyes were examined. Of these, 290 belonged to male participants and 313 to female participants. The age of participants ranged from 18 to 94 years, with a mean age of 50.06 ± 19.06 years. The study found a high prevalence of Dry Eye Disease (DED), affecting 77.6% of the eyes examined (468 eyes).With a growing elderly population and increasing life expectancy worldwide, dry eye is anticipated to remain a primary reason for visits to ophthalmology clinics **(Bbott et al., 2024).**

Many previous studies reflected that dry eye disease negatively impacts the elders' daily activities, social and physical functioning, and their workplace productivity, with a substantial effect on the sense of overall well-being and leads to a significantly reduced quality of life (**Aljarousha et al., 2021 & Kaštelan et al., 2024).** Given that dry eye disease is a leading cause for elderly individuals seeking eye care and increased hospital visits, this study aimed to assess the effect of blinking exercises on alleviating eye dryness and enhancing the quality of life among older adults.

Aim of the Study:

This study aimed to assess the effect of blinking exercises on eye dryness and quality of life for elderly people.

Study hypothesis:

Blinking exercises will improve the quality of life for elderly people.

Null hypothesis:

Blinking exercises will not improve the quality of life for elderly people.

Subject and Methods

Research design: -

A quasi-experimental research design (Pre/post-test) was utilized.

Setting:

The study was conducted in ophthalmology outpatient clinics at Minia University Hospital.

Sample:

The total number of elderly patients attended the ophthalmology outpatient clinics at Minia University Hospital during the last year 2023 was 150 elderly. A purposive sample of 100 older adults was involved in the current study. The sample size was calculated by EP/Info version 3.3 with a 95% confidence interval.

Inclusion criteria:

- Individuals aged 60 years and older of both genders
- Elderly diagnosed with dry eye.
- Patients who were alert and able to communicate.

Exclusion criteria:

- Patients underwent refractive surgery procedures.

Tools:

Three tools were utilized to collect the data for this study:

Tool I: Structured interview questionnaire sheet: It was developed by the researchers after reviewing the related literature and included the following three parts:

Part (1): Socio-demographic characteristics of the study participants as, age, sex, residence, marital status, occupation before retirement, family type, and level of education.

Part (2): Included medical data such as history of cataracts, glaucoma, conjunctivitis, and keratomileusis and present history (onset and

duration of the eye dryness disease).

Part (3): Included questions to assess risk factors of eye dryness among the participants as; smoking status, using heating and cooling equipment as air conditioners and electric heater, being exposed to air pollution, using computers, and using many drugs as antibiotics which used for long time more than six months which affect eye health.

Tool II: Ocular Surface Disease Index (OSDI) questionnaire (Grubbs et al., 2014): The Ocular Surface Disease Index (OSDI) is a valuable tool for evaluating dry eye disease due to its simplicity and accessibility. It is the most widely used symptomology questionnaire in the dry eye community. The OSDI evaluates both the frequency of symptoms and their impact on daily life. It covers five ocular-related symptoms (sensitivity to light, grittiness, pain/soreness, blurred vision, and poor vision), four quality-of-life questions regarding limitations in activities (reading, night driving, using a computer or ATM, and watching TV), and three items assessing discomfort from environmental triggers (wind, humidity, and air conditioning). Each of the 12 items is scored on a scale of 0 to 4, where 0 indicates no symptoms and 4 indicates symptoms occurring continuously.

Scoring system:

The OSDI provides a total score and three subscale scores: vision-related symptoms (five items), ocular symptoms (four items), and environmental triggers (three items).

The participants responses on a 5 point Likert scale (between all of the time (4), most of the time (3), half of the time (2), some of the time (1), and none of the time (0)) and the combined scores of the three subscales are aggregated, then multiplied by 25, and finally divided by the number of questions answered to derive the final OSDI score. Scores of 0-12 indicate normal OSDI, 13-22 indicate mild OSDI, 23-32 indicate moderate OSDI, and 33-100 indicate sever OSDI **(Lisa et al., 2014).**

Validity:

The OSDI was valid, effectively discriminating between normal, mild to moderate, and severe dry eye disease as defined by both physician's assessment and a composite disease severity score. The OSDI also correlated significantly with the McMonnies questionnaire, the National Eye Institute Visual Functioning Questionnaire, the physical component summary score of the Short Form-12, patient perception of symptoms, and artificial tear usage **(Schiffman et al., 2000).**

Reliability:

An acceptable internal consistency level for the OSDI questionnaire measured by Cronbach's-α was revealed. All questions showed good internal consistency. Test-retest reliability analysis revealed good stability (interclass correlation coefficient, r=0.832, P<0.001). The construct validity for the questionnaire was also high **(Schiffman et al., 2000).**

Tool III: Impact Dry Eye Everyday Life Questionnaire (IDEEL): It is a validated questionnaire **developed by (Rajagopalan et al., 2005) to** assess the impact of dry eye symptoms on quality of life in everyday. It involved 27 item divided into three sub-domain of quality of life these sub-domains include daily activity limitations sub-domain, emotional wellbeing sub-domain, and work limitations sub-domain.

Scoring system:

For each of these 3 domains (daily activity limitations, emotional wellbeing, and work limitations), a scale score is calculated between 0 (representing total impairment) and 100 (representing no impairment). The daily activities sub-domain is the quality of life instrument. It is comprised of 27 items, each item had five answers "strongly agree" is scored as 1, "agree" is scored as 2, "neutral" is scored as 3, "disagree" is scored as 4, and "strongly disagree" is scored as 5. The greater score indicate high quality of life **(Rajagopalan et al., 2005)**.

Validity and Reliability of IDEEL:

Concurrent validity between IDEEL dimensions and DEQ items, as measured by Pearson coefficient correlations, varied from -0.05 to 0.83. Specifically, correlations between clinical findings and treatment-related bother/inconvenience, symptom-related bother, impact on daily activities, emotional impact due to dry eye, and impact on work due to dry eye were generally low ($p < 0.05$) **(Rajagopalan et al., 2005)**.

An educational booklet was developed by the researchers based on the review of relevant literature and available resources and was given to every participant as a handout which included theoretical and practical parts.

A. **Theoretical part**: includes knowledge about the disease, causes, signs and symptoms, risk factors, complications, and preventive measures of DED.
B. **Practical part:** Include different types and steps of eye blinking exercises as (Eye gaze exercise, Right and left eye movement exercise, eye rise and fall exercise, eye-crossing exercise, eye control exercise, eye pressure exercise, eye rotation exercise, and eye relaxation exercise).

Methods:

Preparatory phase and administrative design:

- Before starting the study, a review of the literature regarding current and past available literature was done to prepare the educational booklet in Arabic language.

- An official letter of approval was obtained from the Dean of the Faculty of Nursing to the directors of outpatient clinics in Minia University Hospitals to carry out the study. The letter includes permission to carry out the study and explains the purpose and nature of the study.

Pilot study:

Before starting data collection, a pilot study was conducted with 10% older adult patients who were subsequently excluded from the main study. The pilot study aimed to evaluate the clarity of the tools and estimate the time required to complete them. Based on the pilot study results, adjustments were made to the study tools as necessary.

Ethical Consideration:

The research proposal obtained ethical approval from the faculty of nursing's ethical committee. The study posed no risks to the study participants during its implementation and adhered to ethical principles in clinical research. Confidentiality and anonymity of participants were ensured. Participants were given the right to refuse participation or withdraw from the study at any time without needing to provide a reason.

Filed work (Procedure)

Data collection for the current study spanned 12 months, from January 2023 to December 2023. Researchers allocated two days a week for data collection activities. The study was structured into three phases: the pre-intervention phase (pre-test), the intervention phase involving an educational program, and concluded with the post-intervention phase after four weeks (post-test).

Pre-intervention (Pre-test) phase:

Data collection involved face-to-face interviews with participants diagnosed with eye dryness in the previously mentioned setting. Initially, researchers gathered socio-demographic information and medical profiles. Subsequently, the third part of the tool, which included the Ocular Surface Disease Index (OSDI) questionnaire to assess the presence and severity of eye dryness, and the Impact Dry Eye Everyday Life Questionnaire (IDEEL) to evaluate the effect of eye dryness on quality of life, was administered. The structured questionnaire was completed by researchers, and each interview lasted approximately 30-40 minutes depending on the participants' responses.

Intervention phase:

During this phase, an explanation of the procedure and the purpose of the study was given to the participants. The educational sessions about blinking exercises were implemented for the participants who were divided into small training 24 groups with 4-5 participants for each group. Two sessions were needed for each group each session took about 1-2hrs.

- The 1st session included (definition, causes, signs & symptoms, risk factors, complications, prevention, and management of eye dryness).
- The 2nd session covered the recommended exercises for reducing eye dryness including (Eye gaze exercise, Right and left eye movement exercise, eye rise and fall exercise, eye-crossing exercise, eye control exercise, eye pressure exercise, eye rotation exercise, and eye relaxation exercise). This session continue for 2 hours and the objective of this session was to enhance eye coordination, flexibility, and relaxation through targeted exercises following this instructions:

Eye Exercise Routine: Pre, During, and Post Session Instructions

Preparation:

- **Environment:** Choose a well-lit room with minimal distractions.
- **Warm-up:** Blink several times to moisten the eyes and relax facial muscles.
- **Posture:** Sit comfortably with the back straight and shoulders relaxed.
- **Materials:** Ensure any required materials (e.g., a distant object for gaze exercises) are ready.

During the Session: each exercises had specific instructions

Post-Session:

- **Reflection:** Take a moment to reflect on how the eyes feel after the exercises.
- **Hydration:** Ensure adequate hydration to keep eyes lubricated.
- **Rest:** If the eyes feel tired, consider resting them or using lubricating eye drops.
- **Regular Practice:** Consistency is key; aim to incorporate these exercises into the routine regularly for best results.
- The investigators used discussion, PowerPoint presentation demonstration, and re-demonstration, handouts, posters & and videos as teaching methods. At the end of each session, the investigator provided an opportunity for participants to ask questions for clarification and then summarized the key points covered during the session.
- After the implementation session for blinking exercises, each participating group was instructed to perform the same exercises at home at least twice daily for one month.

Post-intervention (Post-test) phase:
Posttest was done for participants after one month to evaluate the effect of blinking exercises on eye dryness and the quality of life among the participants by using the second and third tools as post-tests.

Statistical design:
Data entry and statistical analysis were done using SPSS version 22 statistical software package. Data were presented using descriptive statistics in the form of (Percentage, mean and+ standard deviation) for quantitative variables were done using computer program. The cronbach alpha coefficient was calculated to assess the reliability of the developed tools through their internal consistency. Chi-square test used for analysis of variance P-Value <0.05 is considered significant.

Results

Table (1): Percentage distribution of the studied sample according to their socio-demographic data (N=100).

Socio-demographic data	No.	%
Age (years)		
60 to 65 year	32	32.0
>65 year	68	**68.0**
Mean+SD	**68.62±8.62**	
Sex		
Male	41	41.0
Female	59	**59.0**
Marital status		
Married	80	80.0
Divorced	5	5.0
Widow	15	15.0
Current Occupation		
Manual work	35	35.0
Sedentary work	15	15.0
Heavy work	10	**10.0**
Not work	40	40.0
Level of education		
Illiterate	45	45.0
Read & Write	15	15.0
Primary school	20	20.0
Preparatory school	10	**10.0**
Secondary school	5	5.0
University education	5	5.0
Residence		
Urban	40	40.0
Rural	60	**60.0**
Family type		
Simple	20	20.0
Extended	80	80.0

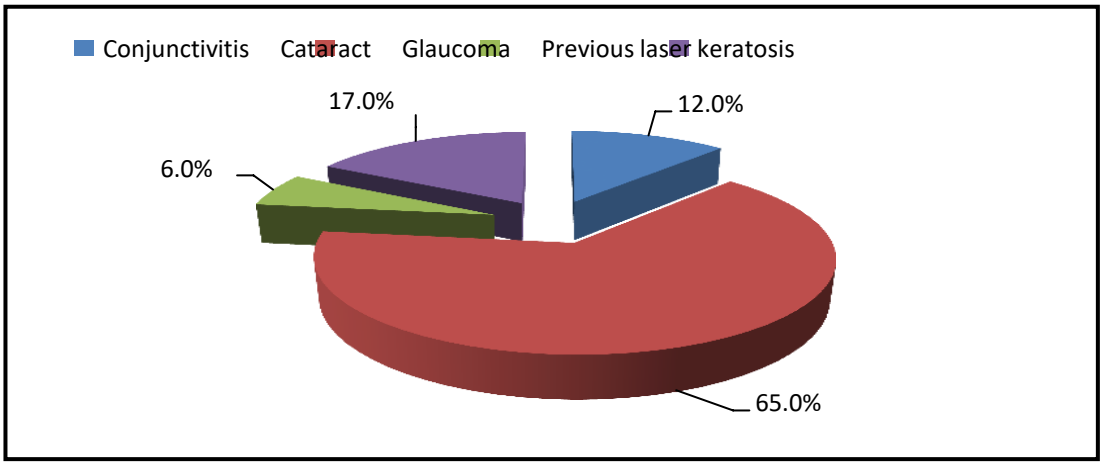

Figure (1): Medical history of the participants (N=100)

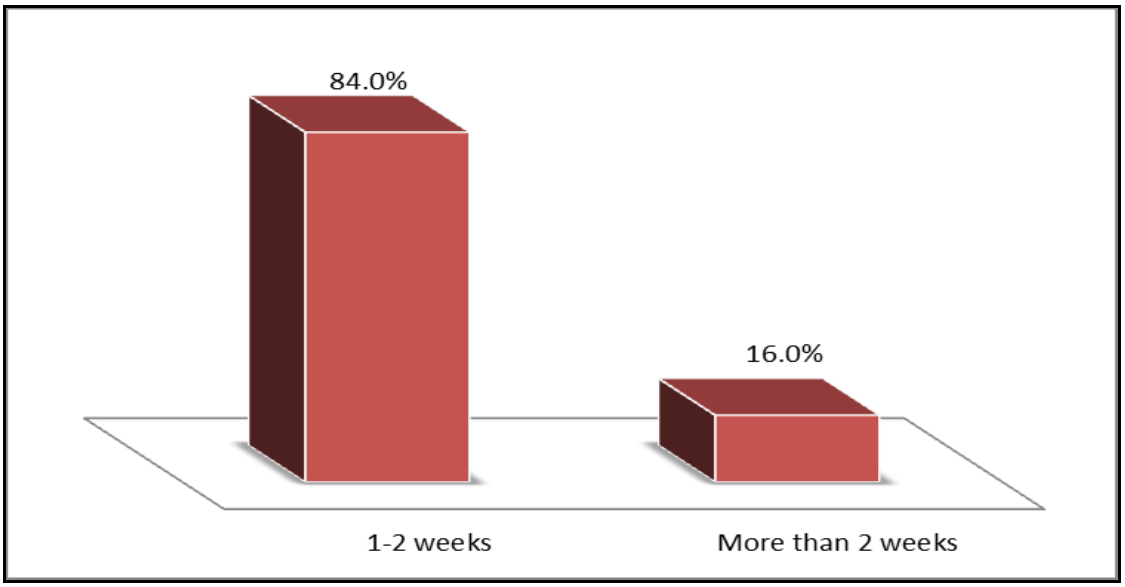

Figure (2): Distribution of the studied sample regarding to the duration of eyedryness (N=100).

Table (2): Frequency distribution of the studied sample according to risk factors of eye dryness (N=100).

Risk factors of eye dryness	No.	%
Smoking status		
Yes	41	41.0
No	59	59.0
Do you use heating andcooling equipment as air conditioners and electric heater?		
Yes	65	65.0
No	35	35.0
Are you exposed to airpollution?		
Yes	100	100
Using telephone or computer		
Yes	10	10
No	90	90.0
Using many drugs for more than six months		
Yes	70.0	**70.0**
No	30.0	30.0

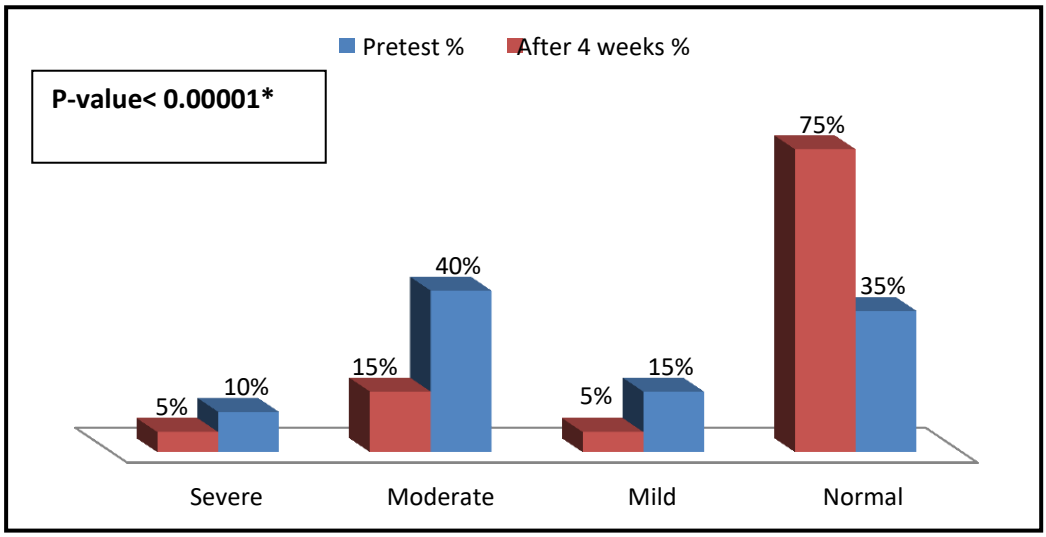

Figure (3): Comparison between the severity of eye dryness before and after the application of eye blinking exercises by using Ocular surface disease index (OSDI) among the studied sample (N=100).

Table (3): Number and percentage of impact dry eye everyday life questionnaire (IDEEL) at pretest and after 4 weeks of educational intervention (N=100).

ct of eye dryness on quality ofdaily life using (IDEEL)≠	Pre test		After fourweeks		P-Value
	No.	%	No.	%	
Impact on daily activities	80	80.0	25	25.0	0.0352*
Impact on emotional wellbeing	100	100.0	55	55	
Impact on work	70	70.0	25	25.0	
Mean (SD)	**75.21+2.36**		**43.01+1.23**		

≠ *means more than one answer*

Table (4): Relation between the participants' age, OSDI and IDDEL scales after 4 weeks of applying eye blinking exercises (N=100).

Total score	Age (60-65 year) n=32		Age > 65 year n=68		Chi square & P-value
	No.	%	No.	%	
Ocular Surface Disease Index (OSDI)					
Normal ocular surface	17	53.1	58	85.3	13.2353
Mild ocular surface diseases.	3	**9.4**	2	**2.9**	
Moderate ocular surface diseases	8	**25.0**	7	**10.3**	
Severe ocular surface diseases	4	**12.5**	1	**1.5**	0.00415*
Impact dry eye everyday life (IDDEL) questionnaire					
Impact on daily activity	5	**15.6**	20	**29.4**	21.2692
Impact on emotional wellbeing	12	**37.5**	43	**63.2**	
Impact on work	15	**46.9**	5	**7.4**	0.000*

Table (5): Relation between the participants' sex, OSDI and IDDEL scales after 4 weeks of applying eye blinking exercises (N=100).

Total score	MaleN=41		FemaleN=59		Chi square& P-value
	No.	%	No.	%	
Ocular Surface Disease Index (OSDI)					
Normal ocular surface	31	75.6	44	74.	1.1162
				6	
Mild-ocular surface diseases.	3	7.3	2	3.4	**0.773**
Moderate ocular surface diseases	5	12.2	10	16.	
				9	
Severe ocular surface diseases	2	4.9	3	5.1	
Impact dry eye everyday life (IDDEL) questionnaire					
Impact on daily activity	3	7.3	17	28.	
				8	32.5923
Impact on emotional wellbeing	17	41.5	40	67.	
				8	**< 0.000***
Impact on work	21	51.2	2	3.4	

Table (6): Relation between the risk factors and the severity of eye dryness among the studied sample (N=100).

Risk factors of eyedryness	OSDI				
	Normalocular surfaceN=35	Mild-ocular surface N=15	Moderate ocular surface N=40	Severe ocular surface N= 10	P-value
Smoking status					
Yes	15	5	16	5	0.857
No	20	10	24	5	
Do you use heating andcooling equipment as air conditioners and electric heater?					
Yes	23	9	31	2	**0.008***
No	12	6	9	8	
Using telephone or computer					
Yes	1	3	**5**	**1**	0.272
No	34	12	35	9	
Using many drugs for more than 6 months					
Yes	20	10	**35**	**5**	**0.014***
No	15	5	5	5	

Table (1): Showed that 68% of the studied sample was aged more than 65 years with a mean age of 68.62±8.62, and 59.0% of them were female. Also, results reflected that 45.0 and 60% of the participants were illiterate and from rural areas respectively.

Figure (1): Demonstrated that 65.0% of the studied sample had cataract and 12.0% of them had previous laser keratomileusis.

Figure (2): Clarified that 84.0% of the studied sample suffering from of eye disease from 1-2 weeks in duration and 16.0% of them had duration of dry eye disease more than 2 weeks.

Table (2): Illustrated that 100% of the studied sample were exposed to air pollution, 90 % of them don't using telephone or computer, and 70% of them used many drugs.

Figure (3): Reflected that the percent of normal ocular surface was increased after the application of blinking exercises to be 75%, as well as, the OSDI level was declined at posttest to be 5% versus 15% before intervention at mild level and declined to be 15% at moderate level compared with 40% before with high statistical significance difference P value < 0.00001*. It achieved our research hypothesis.

Table (3): Displayed that the impact of eye dryness on daily life activities, emotional wellbeing, and work diminished after the application of eye blinking exercises with statistical significant difference between pretest & after 4 weeks reflected by P-value=0.0352. It achieved our research hypothesis.

Table (4): clarified that there was statistical significant difference between OSDI level and age

with P-value=0.00415 in which elderly people aged >65 year reflected a decline in eye dryness at posttest compared with those aged (60-65 year). While the impact of dry eye everyday life was decreased among participants who age >65 year with statistical significant difference P-value=0.000.

Table (5): Clarified that there was no statistical significant difference between the OSDI levels after blinking exercises intervention and their gender. While there was statistical significant difference between gender and the impact of dry eye everyday life withP-value=0.000.

Table (6): Illustrated that there was statistical significant difference only between OSDI levels with using heating & cooling equipment as air conditioners and using many drugs among participated patients with P=0.008, and P=0.014 respectively.

Discussion:

Dry eye disease (DED) is increasingly recognized as a significant public health issue, particularly affecting the quality of life of older adults. Concurrently, the widespread use of digital screens has been linked to reduced blink frequency and incomplete blinking **(Zhang et al., 2020),** leading to inadequate meibum secretion and distribution, tear film instability, and ultimately, DED. Recent research by **Kim et al. (2021)** has explored how blinking exercises can potentially alter these poor blinking patterns, offering improvements in dry eye symptoms and modest enhancements in objective measures of tear film quality.

This study aimed to assess the effect of blinking exercises on eye dryness and quality of life for elderly people.

Regarding demographic characteristics of the studied sample, it was found that around two-thirds of the participants were aged more than 65 years, with a mean age of 68.62±8.62. Our opinion is that a healthy ocular surface is usually protected by both appropriate tear production and tear drainage, with aging there are deficiencies in both which led to dryness. This is highly agreed with **(Wang & Craig, 2019**) who discussed as age-related changes combined with other risk factors like poly-pharmacy, androgen deficit, reduced blink rates, and oxidative stress can dispose the older patient to develop a dry eye that is consequently reflected greater economic costs and worse concerns to the patient's well-being.

This study findings indicated that more than half of the studied sample were female. According to **Sharma & Hindman (2014),** hormonal changes such as declining estrogen and progesterone levels with aging increase women's susceptibility to dry eyes compared to men. These hormonal changes affect both the quality and quantity of the tear film, which plays a crucial role in protecting the eye from dryness.

Regarding the participants' place of residence, this findings showed that three fifth of them lived in rural areas. This suggests that individuals residing in rural areas may face higher risks of eye dryness due to limited access to healthcare services and environmental factors. This observation aligns with the findings of **Vehof (2021),** who similarly reported that a majority of their study sample hailed from rural areas.

Regarding the level of education, it was observed that more than half of the participants had a low education. This agrees with **(Sherry, 2020)** who reported that educational level was a risk factor for dry eye and liked with healthy lifestyle. While disagrees with **(Wang & Craig, 2019)** who found no association between eye dryness and education.

A recent study revealed that most participants don't use computers. This could be due to the nature of their jobs not requiring computer use. Additionally, all participants were exposed to air pollution, possibly because elderly participants exposed to smoke and dust which affect their eye health. These findings are consistent with previous studies by **Kim et al. (2021) & Kaštelan et al. (2024).**

Also, the current study demonstrated that two-thirds of the studied sample had cataracts and about one-tenth of them had previous laser keratomileusis, this agrees with **(Vehof, 2021)** who reported that more than half of the studied sample had previous laser keratomileusis**.**

Concerning the Ocular Surface Disease Index (OSDI) among participants, our study revealed a significant improvement in OSDI scores after the intervention. Additionally, there was an increase in the proportion of participants with a normal ocular surface and a decrease in the severity of eye dryness following the implementation of blinking exercises especially for elderly aged 65 years and more, this may be due to elderly who age 65 years and more don't use phones, smart phones and other electronic devices such as computers as those elderly aged 60 to 64 years. This suggests that blinking exercises had a positive effect on tear production and the maintenance of healthy eyes. These findings align with those of **Sakakura et al. (2023),** who also found a beneficial impact of blinking exercises on reducing the severity of eye dryness among older adults.

The meibomian glands, situated along the eyelid edges where the eyelashes are, produce oil that plays a crucial role in the composition of tears. This oil forms the outer layer of the tear film, preventing tears from evaporating too rapidly. A prior study

conducted by **Kim et al. (2021)** affirmed that blinking exercises can aid in alleviating dry eye symptoms by enhancing the quality of the lipid layer and extending the stability of tears before a breakup occurs.

Owing to the effect of eye blinking on impact of dry eye everyday life **(**IDEEL) among study participants, there was a statistically significant difference between the mean score of impact dry eye everyday life questionnaire at the pretest and after four weeks of the blinking exercises intervention. This reflected that the quality of life subsequently improved after the improvement of the ocular surface disease index**,** and this achieved our research hypothesis. It was like the results of **(Kong et al., 2023)** who reported that the **(**IDEEL) as quality of life among the studied sample significantly increased after the application of eye blinking exercises.

This study revealed a statistically significant difference in OSDI scores relative to participants' age, with those under sixty-five achieving higher scores indicative of a healthier ocular surface. This suggests that older individuals may face an increased risk of eye dryness and demonstrate gradual improvement through blinking exercises, consistent with findings from **Oganov et al. (2023).** Furthermore, we observed a statistically significant difference in quality-of-life index scores based on gender, corroborating findings by **Kong et al. (2023).**

Finally, the present study examined the relationship between risk factors for dry eye and the severity of eye dryness among our sample. We found a statistically significant difference in the severity of eye dryness associated with the use of heating and cooling equipment, as well as with the use of multiple medications. Several studies have indicated that both prescribed and over-the-counter medications can reduce tear secretion and contribute to dry eye. This includes diuretics, beta-blockers, antihistamines, sleeping pills, anti-anxiety medications, and pain relievers **(Vehof, 2021 & Oganov et al., 2023).**

Conclusion:

An application of eye blinking exercises was effective in reducing the level of eye dryness and increasing the quality of life among elderly people.

Recommendations:

- Continuous education and training should be provided regularly about eye blinking exercises in different healthcare settings for elders with the availability of related posters, brochures, and handouts given for them.
- Emphasize the importance of eye dryness assessment as a routine part of clinical examination in each visit for elderly people in ophthalmic clinics for early detection, and proper management and consequently limit its negative consequences.
- Replication of the current study on a larger sample from different geographical areas should be done to achieve generalization of the results.

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Conflict of Interest: All authors declare that there is no conflict of interest.

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