Content available at: https://www.ipinnovative.com/open-access-journals

Indian Journal of Clinical and Experimental Ophthalmology

Journal homepage: www.ijceo.org

Original Research Article

A study to correlate over the counter drugs and ophthalmologists prescribed osmoprotective drugs among prolonged visual display terminal users

Choudhury Sirajum Monira[1]*, **Sudipta Das**[2], **Priya Jana**[3]

[1]*Pailan College of Management and Technology, Kolkata, West Bengal, India*
[2]*Netaji Subhas Chandra Bose Institute of Pharmacy, Nadia, West Bengal, India*
[3]*L V Prasad Eye Institute, Hyderabad, Telangana, India*

ARTICLE INFO

Article history:
Received 01-03-2024
Accepted 17-05-2024
Available online 30-12-2024

Keywords:
OTC
Osmoprotective
Visual Display Terminals

ABSTRACT

Aims: To find out the drug instillation behaviour, the relationship between drug instillation behaviour and subjective symptoms & compliance rate of OTC purchased Osmoprotective drugs and to find the correlation between OTC drugs and Ophthalmologist prescribed drugs among VDT users.
Materials and Methods: A prospective, cross-sectional study included 100 subjects who use OTC-purchased Osmoprotective drugs and have not visited Ophthalmologist recently. The study data were collected by asking one sutured questionnaire to find out the complete scenario of OTC drug usage patterns. Subjects were tested for Schirmer's II test and according to the diagnosis, Osmoprotective drugs were prescribed.
Results: In our study, out of 100 subjects a significant majority (86%) did not visit ophthalmologists in the recent past, therefore the prevalence of OTC drugs has increased. Schirmer's-II test indicated that most participants experienced mild dry eye symptoms in both eyes (14.26 + 4.21 & 14.37 +4.20). CarboxymethylCellulose emerged as the most commonly used OTC drug (64%). A significant association was observed between the dry eye severity levels before and after treatment ($p < 0.000$). Only 2 drugs CarboxymethylCellulose ($p < 0.003$) and Polyethylene glycol and polypropylene glycol ($p < 0.000$) are commonly given in both OTC and ophthalmologist prescriptions.
Conclusion: This work gives a detailed insight into drug usage patterns purchased from OTC and also found the correlation between OTC drugs and Ophthalmologist prescribed drugs.

1. Introduction

The COVID-19 pandemic has had a large impact on the eye health of the people who uses digital devices for the longer period of time. Digital screen timing, excessive near work and limited outdoor activities are the key factors behind the eye strain among these groups.[1]

Osmoprotective tear drops are most commonly used drugs for the management of any dry eye related symptoms. These drugs are easy to use, accessible to wide range of varieties and also have a low risk potential. So, it has been found that symptomatic VDT users have a tendency to buy Osmoprotective drugs from medicine shops without any valid ophthalmic prescription by a registered medical practitioner.[2,3]

OTC-purchased eye drops may provide advantages like easy access to medicines and self-treating with minimal complications with the help of a pharmacist. However, it is not always safe and answers for all types of ocular conditions especially when the condition is not properly diagnosed by an expert. As a result, there is often a chance of not adhering to the compliance rate in terms of dosage,

* *Corresponding author*.
E-mail address: monirachoudhury007@gmail.com (C. S. Monira).

https://doi.org/10.18231/j.ijceo.2024.131

instructions to use, drug discontinuation schedule, etc.[4]

OTC eye drop users are therefore faced with a perplexity of variable products and very little or no clear understanding or knowledge of which one is most effective. On the other hand, a prescription by a registered ophthalmology practitioner after the complete evaluation of the clinical condition, diagnostic tests, and proper diagnosis may help to choose the appropriate eye drops with specific dosage and also take care of any specific drug allergy or co-morbid conditions.[5]

Thus we intend to take up this study to find the correlations between the OTC dispensing pattern and ophthalmologist prescription pattern of Osmoprotective drugs among prolonged VDT users.

2. Materials & Methods

This study was a cross sectional, questionnaire based conducted on 100 patients those who were visited to the outpatient department of hospital. All the participants were given a detailed explanation of the study and informed consent were signed. The necessary permission from research committee were obtained from the concerned to conduct the study. Inclusion criteria includes (i) Above 18years of age or older irrespective of any gender (ii) Subjects are prolonged VDT users at least 6 hours/day or more (iii) Not visited to any ophthalmologist in recent past within 3 months of period (iv) Subjects those who are using only over the counter Osmoprotective drugs within last 3 months. We have excluded the subjects those who are using any other ocular drugs other than dry eye condition. Any medical professionals such as Doctor, Nurse and Pharmacist etc. were also excluded & those who had undergone ophthalmic surgery within 6 months' period.

Data collections involved in filling up a questionnaire as a self-completion task with instructions provided for each questions. Questionnaire used for this study were used in earlier published literature where we have done only few minor iterative modifications as per the need of our work.[6]

After completion of the questionnaire all the subjects were assessed for detailed clinical history and ocular examinations for both the eyes. Schirmer's-II test were performed with topical anesthesia as a baseline diagnostic tests to diagnose the dry eye conditions. A value of >15 mm of wetting: Normal, 10 mm – 15 mm: Mild dry eye,5 mm – 10 mm: Moderate dry eye, 0 mm – 5 mm: Severe dry eye as per the literature.[7] Subjects were prescribed with Osmoprotective drugs as per their clinical diagnosis by the ophthalmologist.

3. Results

A total of 100 subjects were included. The average age of participants was approximately 36+ 9 years. On average, participants spent around 8.5+2.3 hours/day using Visual Display terminal (VDT) devices. Table 1 presents insights into the other demographic and background characteristics.

In finding the number of days unable to follow the prescribed frequency, the analysis of variance (ANOVA) results revealed a statistically significant difference across different severity levels of eye symptoms ($F = 2.905$, $p<0.026$). Specifically, individuals with moderate symptoms had the lowest average number of days (16.25 ± 5.98), followed by those with severe symptoms (17.11 ± 4.93), mild symptoms (19.43 ± 3.78), and no symptoms (20.67 ± 2.73).

$$Compliance\ Rate = \left(\frac{Number\ of\ Compliant\ Instances}{Total\ Number\ of\ Instances} \right) \times 100$$

$$Compliance\ Rate = \left(\frac{1230}{3000} \right) \times 100$$

The compliance rate is calculated using the variable "Number of days unable to follow the prescribed frequency of dry eye treatment eye drops in a month (Days)" by assessing the number of days able to follow the prescribed frequency of dry eye treatment. Therefore, the average compliance rate is 41%.

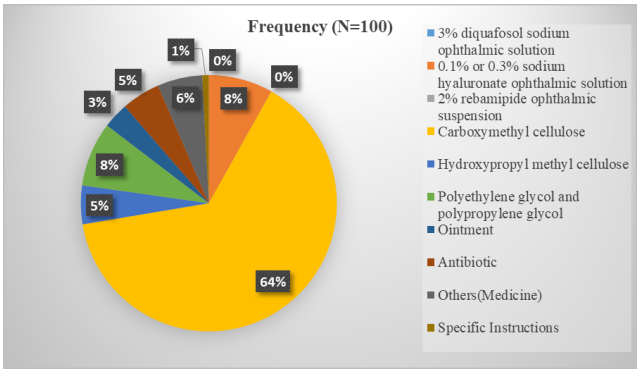

Figure 1: Various types of OTC drug used

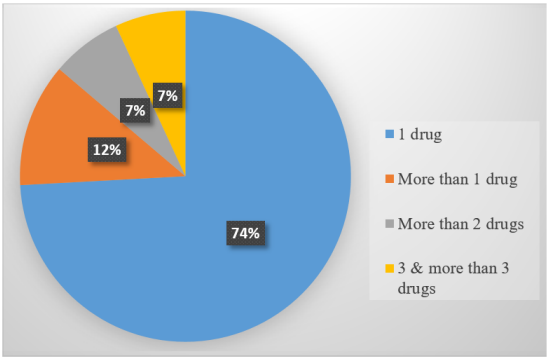

Figure 2: Frequency of drug usage

Table 1: Patient background and other information

Gender	**Frequency (n=100)**
Male	45
Female	55
Suffering from any of the systemic diseases	
Rheumatoid arthritis	4
Hypothyroidism	4
Hypertension	4
Depression illness	1
Connective tissue disease	3
Not applicable	84
Yes	11
No	89
Smoking	
Yes	17
No	83
Diagnosed of dry eye by ophthalmologist (Past)	
Yes	14
No	86
If yes	
Duration since initial diagnosis of dry eye by ophthalmologist in past (Years) (Mean ±SD)	2.264±0.810 yrs.
Duration of continuous usage of eye drops as prescribed during previous ophthalmologist visits	
Less than 1 month	1
1month or more	6
3 months or more	4
6 months or more	2
Not visited	87
Usage of eye drops as treatment (last 1 month)	
Almost every day	21
About 15 days	20
A few days(1-2 days /week)	46
Rarely	13
Frequency of usage of eye drops as treatment(last 1 month)	
0 time	30
1 time	44
2 times	15
3 times	4
4 times	2
5 times	3
6 times	2
Instances of eye drop usage (last 1 month)	
Instilled the DED eye drops at a fixed frequency regardless of whether had subjective symptoms	14
Instilled the DED eye drops only when felt subjective symptoms	86
Instructions received on frequency of eye drop usage by pharmacist	
2 drops	6
4 drops	26
5 drops	2
6 drops	17
8 or more	8
The frequency of eye drop usage varies, not a fixed frequency	15
Unable to recall the instructions or was not instructed	26

Continued on next page

Table 1 continued

Instructions received on timing of eye drop usage by pharmacist	
Should use eye drops at a fixed frequency, regardless of whether had subjective symptoms	63
Should use eye drops only when felt subjective symptoms	11
Unable to recall the instructions or was not instructed	26
Severity of eye symptoms before starting eye drop treatment	
Mild	27
Moderate	46
Severe	17
Very severe	10
Average severity of eye symptoms (last 1 month)	
No symptoms	6
Mild	7
Moderate	36
Severe	36
Very severe	15
Diagnosis for Right and left Eye	
Evaporative Dry Eye	11
Meibomitis	3
Mild Dry Eye	66
Moderate Dry Eye	15
Severe Dry Eye	5
Schirmer's Test-II	
Right Eye	
Normal	51
Mild	39
Moderate	5
Severe	5
Left Eye	
Normal	60
Mild	30
Moderate	5
Severe	5
Right Eye(mm)	14.260+4.21
Left Eye(mm)	14.370+4.20

4. Discussion

Our study provides a detailed insight into the use of over-the –counter medication in patients with dry eyes. A significant majority (86%) had not visited an ophthalmologist for an eye drop prescription in the past 2.264+0.8 years, suggesting that over-the –counter eye drops were the most commonly used medication by all participants. As also described in previous studies, patients often consult the pharmacist for minor symptoms.[8]

The results of the Schirmer's-II Test (Table 1) showed that on average, participants had a moisture levels of DED. These scores indicate that most participants experienced mild dry eye symptoms in both eyes. This is an evident that self-medication is significantly increasing when the problem is minor.[9]

Figures 1 and 2 presents carboxymethyl cellulose emerged as the most commonly used OTC drug followed by Sodium hyaluronate ophthalmic solution (0.1% or 0.3%) and Polyethylene glycol and polypropylene glycol. This finding showed similar kind of results to previous studies.[10]

In Table 2 the chi-square test results showed a significant association was observed between the severity levels before and after treatment ($p < 0.000$), indicating that the treatment had a noticeable impact on symptom severity.[11]

In Table 3 the findings showed that adhering to a fixed frequency of instillation, irrespective of subjective symptoms, could moderately alleviate symptoms for a significant portion of individuals (71.4%). Conversely, those who used eye drops solely in response to subjective symptoms demonstrated a more diverse spectrum of symptom severity, with a higher proportion (67.4%) experiencing moderate to severe symptoms. The Chi-square test indicated a significant association between the pattern of eye drop usage and symptom severity $p<0.033$).

In the case of instructions received on the frequency of eye drop usage, the Chi-square test reveals a significant association between the instructions received and symptom severity ($p <0.038$). From the results, it can be evidenced that prescribing 2 drops may be the most appropriate initial dosage for managing dry eye symptoms, as it provides relief for a significant portion of patients while minimizing the risk of exacerbating symptoms. However, individualized treatment plans tailored to each patient's specific needs and responses should always be considered to optimize therapeutic outcomes.

In finding the association with compliance rate (Figure 3 & Table 4) participants who strongly agreed to use eye drops after feeling symptoms, reported a substantial proportion experiencing severe symptoms, with 37.6% experiencing severe symptoms and 17.6% reporting very severe symptoms. This association is significant ($p<0.016$). Participants strongly agreed that their symptoms were relieved with the eye drop treatment ($p<0.003$).

Table 2: Association between severity of eye symptoms before and after eye drop treatment

Before starting eye drop treatment	Average severity of eye symptoms in the last 1 month (After)					Total	Chi square	p value
	No symptoms	Mild	Moderate	Severe	Very severe			
Mild	6 (22.2%)	5 (18.5%)	15 (55.6%)	0 (0%)	1 (3.7%)	27	73.259	0.000
Moderate	0 (0%)	0 (0%)	17 (37%)	27 (58.7%)	2 (4.3%)	46		
Severe	0 (0%)	0 (0%)	2 (11.8%)	7 (41.2%)	8 (47.1%)	17		
Very severe	0 (0%)	2 (20%)	2 (20%)	2 (20%)	4 (40%)	10		

Table 3: Association between severity of eye symptoms in the last 1 month and drug instillation behaviour

Drug instillation behaviour	Average severity of eye symptoms (eye fatigue, dryness, and discomfort) in the last 1 month					Total	Chi square	p value
	No symptoms	Mild	Moderate	Severe	Very severe			
Usage of eye drops as treatment in last 1 month (Days)								
Almost every day	0 (0%)	0 (0%)	9 (42.9%)	9 (42.9%)	3 (14.3%)	21	12.830	0.382
About 15 days	1 (5%)	0 (0%)	9 (45%)	5 (25%)	5 (25%)	20		
A few days (1-2 days /week	4 (8.7%)	6 (13%)	15 (32.6%)	15 (32.6%)	6 (13%)	46		
Rarely	1 (7.7%)	1 (7.7%)	3 (23.1%)	7 (53.8%)	1 (7.7%)	13		
Frequency of usage eye drops as treatment in last 1 month								
0	1 (3.3%)	3 (10%)	10 (33.3%)	13 (43.3%)	3 (10%)	30	18.280	0.789
1time	3 (6.8%)	4 (9.1%)	12 (27.3%)	14 (31.8%)	11 (25%)	44		
2times	2 (13.3%)	0 (0%)	6 (40%)	6 (40%)	1 (6.7%)	15		
3times	0 (0%)	0 (0%)	3 (75%)	1 (25%)	0 (0%)	4		
4times	0 (0%)	0 (0%)	2 (100%)	0 (0%)	0 (0%)	2		
5times	0 (0%)	0 (0%)	2 (66.7%)	1 (33.3%)	0 (0%)	3		
6times	0 (0%)	0 (0%)	1 (50%)	1 (50%)	0 (0%)	2		
Instances of eye drop usage for dry eye treatment in last 1 month								
Instilled the DED eye drops at a fixed frequency regardless of whether I had subjective symptoms	0 (0%)	0 (0%)	10 (71.4%)	4 (28.6%)	0 (0%)	14	10.484	0.033
Instilled the DED eye drops only when I felt subjective symptoms (dry, tired, etc.)	6 (7%)	7 (8.1%)	26 (30.2%)	32 (37.2%)	15 (17.4%)	86		
Instructions received on frequency of eye drop usage for dry eye treatment for ophthalmologist or pharmacist								
2 drops	0 (0%)	2 (33.3%)	3 (50%)	1 (16.7%)	0 (0%)	6	37.616	0.038
4 drops	0 (0%)	2 (7.7%)	9 (34.6%)	11 (42.3%)	4 (15.4%)	26		
5 drops	0 (0%)	0 (0%)	1 (50%)	1 (50%)	0 (0%)	2		
6 drops	4 (23.5%)	1 (5.9%)	5 (29.4%)	7 (41.2%)	0 (0%)	17		
8 or more	2 (25%)	1 (12.5%)	1 (12.5%)	2 (25%)	2 (25%)	8		
The frequency of my eye drop usage varies, not a fixed frequency	0 (0%)	1 (6.7%)	4 (26.7%)	6 (40%)	4 (26.7%)	15		
Unable to recall the instructions or was not instructed	0 (0%)	0 (0%)	13 (50%)	8 (30.8%)	5 (19.2%)	26		
Instructions received on timing of eye drop usage for dry eye treatment from ophthalmologist or pharmacist								
Should use eye drops at a fixed frequency, regardless of whether had subjective symptoms	6 (9.5%)	7 (11.1%)	21 (33.3%)	21 (33.3%)	8 (12.7%)	63	13.408	0.099
Should use eye drops only when felt subjective symptoms (dryness, eye fatigue, etc.)	0 (0%)	0 (0%)	2 (18.2%)	7 (63.6%)	2 (18.2%)	11		
Unable to recall the instructions or was not instructed	0 (0%)	0 (0%)	13 (50%)	8 (30.8%)	5 (19.2%)	26		

Table 4: Association between severity of eye symptoms in the last 1 month and reasons for non-compliance with instructed frequency by the pharmacist

Reasons why the eye drop was not used at the instructed frequency by the pharmacist		Average severity of eye symptoms (eye fatigue, dryness, and discomfort) in the last 1 month					Total	Chi square	p value
		No symptoms	Mild	Moderate	Severe	Very severe			
Used the eye drops after feeling symptoms such as dryness in my eyes	Strongly agree	6 (7.1%)	7 (8.2%)	25 (29.4%)	32 (37.6%)	15 (17.6%)	85	12.200	0.016
	Disagree	0 (0%)	0 (0%)	11 (73.3%)	4 (26.7%)	0 (0%)	15		
I forgot to carry my eye drops with me when I went out, or it's bothersome to carry it around	Strongly agree	6 (9.1%)	6 (9.1%)	17 (25.8%)	25 (37.9%)	12 (18.2%)	66	14.682	0.066
	Agree	0 (0%)	1 (5%)	9 (45%)	7 (35%)	3 (15%)	20		
	Disagree	0 (0%)	0 (0%)	10 (71.4%)	4 (28.6%)	0 (0%)	14		
Symptoms were relieved with the eye drop treatment, I did not need to use the eye drops	Strongly agree	0 (0%)	1 (7.1%)	10 (71.4%)	1 (7.1%)	2 (14.3%)	14	23.651	0.003
	Agree	6 (9.5%)	6 (9.5%)	16 (25.4%)	22 (34.9%)	13 (20.6%)	63		
	Disagree	0 (0%)	0 (0%)	10 (43.5%)	13 (56.5%)	0 (0%)	23		
The frequency of use (times per day) instructed by the ophthalmologist or pharmacist was high	Agree	0 (0%)	0 (0%)	3 (100%)	0 (0%)	0 (0%)	3	11.487	0.176
	Disagree	6 (8.3%)	5 (6.9%)	25 (34.7%)	28 (38.9%)	8 (11.1%)	72		
	Strongly disagree	0 (0%)	2 (8%)	8 (32%)	8 (32%)	7 (28%)	25		
Unit dose bottles are too bulky to carry around	Disagree	2 (2.7%)	5 (6.7%)	28 (37.3%)	28 (37.3%)	12 (16%)	75	6.099	0.192
	Strongly disagree	4 (16%)	2 (8%)	8 (32%)	8 (32%)	3 (12%)	25		
I do not remember the frequency of use (times per day)	Strongly agree	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	1	3.279	0.916
	Agree	3 (4.5%)	5 (7.6%)	22 (33.3%)	25 (37.9%)	11 (16.7%)	66		
	Disagree	3 (9.1%)	2 (6.1%)	13 (39.4%)	11 (33.3%)	4 (12.1%)	33		
Eye drops ruin my makeup	Disagree	6 (10%)	4 (6.7%)	24 (40%)	14 (23.3%)	12 (20%)	60	13.876	0.008
	Strongly disagree	0 (0%)	3 (7.5%)	12 (30%)	22 (55%)	3 (7.5%)	40		
I have experienced brightness, discharge, or bitterness after using	Agree	0 (0%)	0 (0%)	8 (47.1%)	7 (41.2%)	2 (11.8%)	17	16.865	0.032
	Disagree	6 (9.7%)	7 (11.3%)	21 (33.9%)	16 (25.8%)	12 (19.4%)	62		
	Strongly disagree	0 (0%)	0 (0%)	7 (33.3%)	13 (61.9%)	1 (4.8%)	21		
It could not be used from the top of the contact lens	Strongly agree	(0%)	2 (28.6%)	1 (14.3%)	2 (28.6%)	2 (28.6%)	7	4.878	0.181
	Agree	(0%)	0 (0%)	3 (75%)	1 (25%)	0 (0%)	4		
The frequency of use (times per day) instructed by the ophthalmologist or pharmacist was low.	Disagree	0 (0%)	1 (1.7%)	24 (40%)	27 (45%)	8 (13.3%)	60	19.415	0.001
	Strongly disagree	6 (15%)	6 (15%)	12 (30%)	9 (22.5%)	7 (17.5%)	40		
Using the eye drops was uncomfortable	Agree	0 (0%)	0 (0%)	8 (47.1%)	7 (41.2%)	2 (11.8%)	17	16.865	0.032
	Disagree	6 (9.7%)	7 (11.3%)	21 (33.9%)	16 (25.8%)	12 (19.4%)	62		
	Strongly disagree	0 (0%)	0 (0%)	7 (33.3%)	13 (61.9%)	1 (4.8%)	21		

Table 5: Association between over the counter (OTC) drug prescription pattern and Schirmer's test-II results for right eye & left eye

Over the counter (OTC) drug	Schirmer's Test-II results for Right eye				Total	Chi square	p value
	Normal	Mild	Moderate	Severe			
0.1% or 0.3% sodium hyaluronate ophthalmic solution	2 (20%)	5 (50%)	2 (20%)	1 (10%)	10	7.994	0.066
CarboxymethylCellulose	44 (55.7%)	29 (36.7%)	2 (2.5%)	4 (5.1%)	79	6.720	0.081
Hydroxypropyl MethylCellulose	1 (16.7%)	4 (66.7%)	1 (16.7%)	0 (0%)	6	4.785	0.188
Polyethylene glycol and polypropylene glycol	5 (50%)	3 (30%)	2 (20%)	0 (0%)	10	5.789	0.122
Ointment	0 (0%)	4 (100%)	0 (0%)	0 (0%)	4	6.517	0.089
Antibiotic	3 (50%)	3 (50%)	0 (0%)	0 (0%)	6	0.838	0.840
Others (medicine)	5 (71.4%)	2 (28.6%)	0 (0%)	0 (0%)	7	1.578	0.664
Specific instructions	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1	19.192	0.000

Values were given only for those who used eye drops.

Table 6: Association between prescribed medicine by ophthalmologist and Schirmer's test-II results for right eye & left eye

Prescribed medicine by Ophthalmologist	Schirmer's Test-II results for right eye				Total	Chi square	p value
	Normal	Mild	Moderate	Severe			
0.1% or 0.3% Sodium hyaluronate ophthalmic solution	18 (56.3%)	9 (28.1%)	4 (12.5%)	1 (3.1%)	32	7.306	0.063
Carboxymethyl Cellulose	30 (52.6%)	22 (38.6%)	1 (1.8%)	4 (7%)	57	3.947	0.267
Hydroxypropyl Methyl Cellulose	15 (50%)	10 (33.3%)	2 (6.7%)	3 (10%)	30	2.742	0.433
Polyethylene glycol and polypropylene glycol	7 (43.8%)	9 (56.3%)	0 (0%)	0 (0%)	16	3.554	0.314
Antibiotic	2 (11.1%)	13 (72.2%)	2 (11.1%)	1 (5.6%)	18	14.714	0.002
Others (medicine)	4 (20%)	9 (45%)	2 (10%)	5 (25%)	20	26.192	0.000
specific instructions	10 (45.5%)	10 (45.5%)	1 (4.5%)	1 (4.5%)	22	0.495	0.920

Values were given only for those who used eye drops

Table 7: Association between prescribed medicine by ophthalmologist and diagnosis of right and left eye

Prescribed medicine by ophthalmologist	Diagnosis					Total	Chi square	p value
	Evaporative Dry Eye	Meibomitis	Mild Dry Eye	Moderate Dry Eye	Severe Dry Eye			
0.1% or 0.3% Sodium hyaluronate ophthalmic solution	8 (25%)	2 (6.3%)	16 (50%)	5 (15.6%)	1 (3.1%)	32	12.210	0.016
CarboxymethylCellulose	2 (3.5%)	1 (1.8%)	43 (75.4%)	7 (12.3%)	4 (7%)	57	10.970	0.027
Hydroxypropyl Methyl Cellulose	4 (13.3%)	1 (3.3%)	16 (53.3%)	6 (20%)	3 (10%)	30	4.127	0.389
Polyethylene glycol and polypropylene glycol	3 (18.8%)	0 (0%)	10 (62.5%)	3 (18.8%)	0 (0%)	16	2.778	0.596
Antibiotic	3 (16.7%)	2 (11.1%)	5 (27.8%)	7 (38.9%)	1 (5.6%)	18	18.679	0.001
Others (medicine)	4 (20%)	1 (5%)	1 (5%)	9 (45%)	5 (25%)	20	51.269	0.000
specific instructions	2 (9.1%)	1 (4.5%)	14 (63.6%)	4 (18.2%)	1 (4.5%)	22	0.544	0.969

Values were given only for those who used eye drops

Table 8: Association between the OTC prescription and ophthalmologist prescription

Drugs	Ophthalmologist	OTC prescription		Total	Chi square	P
		No	Yes			
0.1% or 0.3% Sodium hyaluronate ophthalmic solution	No	63 (92.6%)	5 (7.4%)	68	1.654	0.198
	Yes	27 (84.4%)	5 (15.6%)	32		
CarboxymethylCellulose	No	15 (34.9%)	28 (65.1%)	43	8.765	0.003
	Yes	6 (10.5%)	51 (89.5%)	57		
Hydroxypropyl Methyl Cellulose	No	67 (95.7%)	3 (4.3%)	70	1.216	0.270
	Yes	27 (90%)	3 (10%)	30		
Polyethylene glycol and polypropylene glycol	No	80 (95.2%)	4 (4.8%)	84	16.005	0.000
	Yes	10 (62.5%)	6 (37.5%)	16		
Antibiotic	No	78 (95.1%)	4 (4.9%)	82	1.017	0.313
	Yes	16 (88.9%)	2 (11.1%)	18		
Others (medicine)	No	74 (92.5%)	6 (7.5%)	80	0.154	0.695
	Yes	19 (95%)	1 (5%)	20		
Specific instructions	No	77 (98.7%)	1 (1.3%)	78	0.285	0.594
	Yes	22 (100%)	0 (0%)	22		

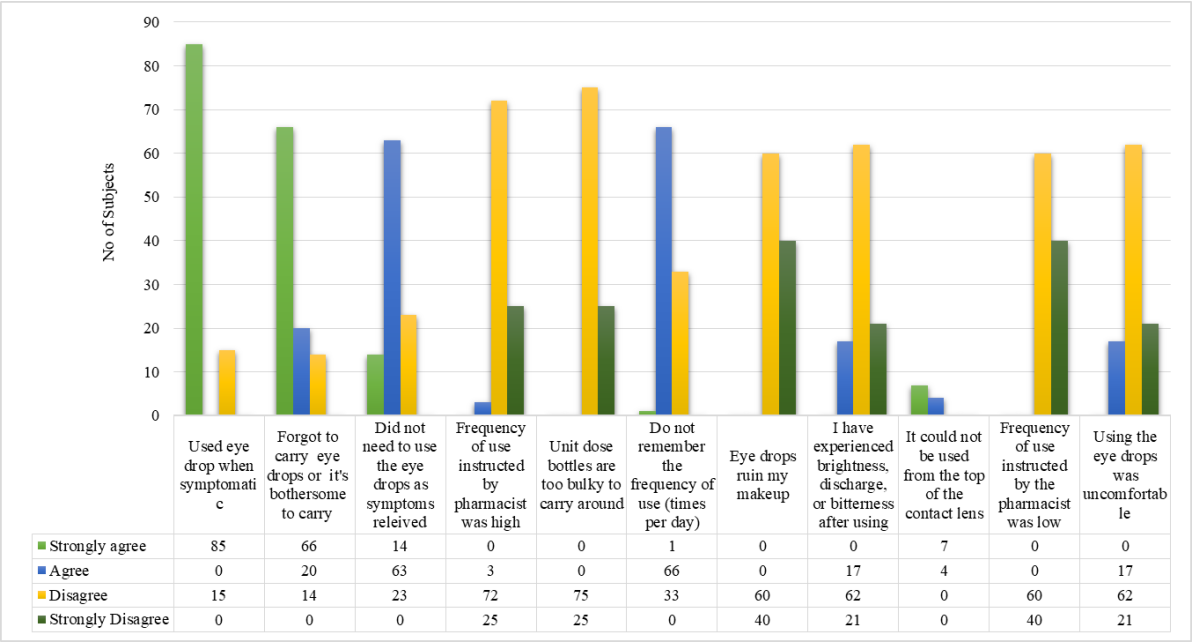

Figure 3: Reasons why the OTC eye drop was not used at the instructed frequency

For participants who agreed that they experienced brightness, discharge, or bitterness after using eye drops the association is significant for them too ($p<0.03$). Participants who agreed that using the eye drops was uncomfortable predominantly reported moderate to severe symptoms. ($p<0.032$). A significant no of subjects have also disagreed on the point that eye drops ruin makeup ($p<0.008$).[12]

In interpretation of ANOVA results, showed that individuals without any symptoms appeared not to adhere more closely to the prescribed regimen compared to those with symptomatic conditions, suggesting that the presence of symptoms may influence participants' adherence to the recommended eye drop frequency.

Although no significant associations were found between the type of OTC drug prescription and the severity of dry eye symptoms in the right & left eye overall (Table 5), a notable exception was observed for users receiving specific Instructions (Ex: Hot fomentation), indicating a significant relationship between these instructions and Schirmer's-II results. These findings indicate an association between OTC drug usage and symptom severity in dry eye management, suggesting the importance of personalized treatment approaches meant for individual needs and responses.

In Table 6 the association between prescribed medicine by the Ophthalmologist and Schirmer's Test-II results for

the both right and left eye showed that patients who are using antibiotics and other medicines are more prevalent in the mild group compared to the other group.

Table 7 resents associations between prescribed medications by ophthalmologists and the diagnosis of various dry eye conditions. Most respondents who were prescribed 0.1% or 0.3% Sodium hyaluronate ophthalmic solution and CarboxymethylCellulose are suffering from mild dry eye. Most respondents who were prescribed antibiotics and other medicines are suffering from moderate dry eye.

In illustrating the association between prescribed drugs and OTC drugs (Table 8) it is found that, for Carboxymethyl Cellulose, out of the 57 patients prescribed this medication by an ophthalmologist, a significant majority of 89.5% were also directed to use it as an over-the-counter (OTC) purchased, while only 10.5% were not ($p < 0.003$). Polyethylene glycol and polypropylene glycol had an association, where 62.5% of the 16 patients receiving it as an Ophthalmologist prescription were also directed to obtain it as an OTC prescription, and 37.5% were not. ($p < 0.000$).[13] The distribution of prescribed medications by ophthalmologists reveals distinct patterns across different diagnoses of dry eye severity. Our study only showed associations for 2 drugs including Carboxymethyl Cellulose & Polyethylene glycol and polypropylene glycol between OTC purchase and Ophthalmologist's prescription. Other dry eye medications may be needed considering the severity of the dry eye conditions. Therefore, OTC drugs may not be the answer for all subjects. Clinical diagnosis has a major impact on deciding the choice of drug even if the condition is minimal. Otherwise, the symptoms may last longer due to improper drug choices. With the advancement of digitalization, in the coming days dry eye could impact the quality of life of a considerable number of population.

This study has a few limitations too. The population of this study is relatively less. To diagnose dry eye only Schirmer's II test has been performed, other tests could not be investigated**.** Therefore, further studies may be needed.

5. Conclusion

Therefore, based on our findings and previous study reports we can say, that our work gives a detailed insight into drug usage patterns purchased from OTC. This study also found a correlation between OTC drugs and ophthalmologist-prescribed drugs. To achieve an improved compliance rate in drug usage it's always advisable to know the reasons behind non-adherence to eye drop usage.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. Bahkir FA, Grandee SS. Impact of the COVID-19 lockdown on digital device-related ocular health. *Indian J Ophthalmol*. 2020;68(11):2378–83.
2. Chen W, Zhang X, Li J, Wang Y, Chen Q, Hou C, et al. Efficacy of Osmoprotectants on Prevention and Treatment of Murine Dry Eye. *Invest Ophthalmol Vis Sci*. 2013;54(9):6287–97.
3. Korb DR, Herman JP, Blackie CA, Scaffidi RC, Greiner JV, Exford JM, et al. Prevalence of lid wiper epitheliopathy in subjects with dry eye signs and symptoms. *Cornea*. 2010;29(4):377–83.
4. Pucker AD, Ng SM, Nichols JJ. Over the counter (OTC) artificial tear drops for dry eye syndrome. *Cochrane Database Syst Rev*. 2016;2(2):CD009729.
5. Ray I, Bardhan M, Hasan MM, Sahito AM, Khan E, Patel S, et al. Over the counter drugs and self-medication: A worldwide paranoia and a troublesome situation in India during the COVID-19 pandemic. *Ann Med Surg (Lond)*. 2022;78:103797.
6. Uchino M, Yokoi N, Shimazaki J, Hori Y, Tsubota K. On Behalf Of The Japan Dry Eye Society null. Adherence to Eye Drops Usage in Dry Eye Patients and Reasons for Non-Compliance: A Web-Based Survey. *J Clin Med*. 2022;11(2):367.
7. Mangoli MV, Bubanale SC, Bhagyajyothi BK, Goyal D. Dry eye disease in diabetics versus non-diabetics: Associating dry eye severity with diabetic retinopathy and corneal nerve sensitivity. *Indian J Ophthalmol*. 2023;71(4):1533–7.
8. Marathe PA, Kamat SK, Tripathi RK, Raut SB, Khatri NP. Over-the-counter medicines: Global perspective and Indian scenario. *J Postgrad Med*. 2020;66(1):28–34.
9. Wu Y, Wang C, Wang X, Mou Y, Yuan K, Huang X, et al. Advances in Dry Eye Disease Examination Techniques. *Front Med (Lausanne)*. 2021;8:826530.
10. Rahman MS, Hasan MS, Nitai AS, Nam S, Karmakar AK, Ahsan MS, et al. Recent Developments of Carboxymethyl Cellulose. *Polymers (Basel)*. 2020;13(8):1345.
11. Rodriguez-Garcia A, Babayan-Sosa A, Ramirez-Miranda A, Cruz-Valdes CS, Hernandez-Quintela E, Hernandez-Camarena J. A Practical Approach to Severity Classification and Treatment of Dry Eye Disease: A Proposal from the Mexican Dry Eye Disease Expert Panel. *Clin Ophthalmol*. 2022;16:1331–55.
12. Winfield AJ, Jessiman D, Williams A, Esakowitz L. A study of the causes of non-compliance by patients prescribed eyedrops. *Br J Ophthalmol*. 1990;74(8):477–80.
13. Jain S, Upadhyaya P, Goyal J, Kumar A, Jain P, Seth V, et al. A systematic review of prescription pattern monitoring studies and their effectiveness in promoting rational use of medicines. *Perspect Clin Res*. 2015;6(2):86–90.

Author's biography

Choudhury Sirajum Monira, Assistant Professor https://orcid.org/0009-0003-1114-4755

Sudipta Das, Professor https://orcid.org/0000-0002-7707-8629

Priya Jana, Optometrist https://orcid.org/0009-0005-3026-7712

Cite this article: Monira CS, Das S, Jana P. A study to correlate over the counter drugs and ophthalmologists prescribed osmoprotective drugs among prolonged visual display terminal users. *Indian J Clin Exp Ophthalmol* 2024;10(4):754-763.