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Original Article

ASSESSMENT OF EYE DROP INSTALLATION TECHNIQUE AMONG PATIENTS ATTENDING OUTPATIENT CLINIC AT PT. JLNGMC, CHAMBA

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ABSTRACT

Objective: A good eye drops installation technique and its knowledge is vital for curing eye ailments and preventing eye from harmful effects of over-dose and under-dose of drugs. The current study assessed the eye drop installation technique and corrected it by imparting them education regarding the same.

Methods: A total of 120 patients were enrolled in the cross-sectional study using consecutive sampling technique till the sample size was achieved in a tertiary care hospital. The participants were observed by the trained observers for their steps of technique for installing eye drops and the errors were noted which were corrected by the observers and followed up till 3 visits to observe a change in the steps of technique.

Results: The mean age of study participants was 41.44±15.4 y. Majority of them were in the age group 18-30 y (35%), females (55.8%), and belonging to upper middle socio-economic status (31.7%). Majority of study participants had 6/6 VA in right eye (65%) and left eye (61.7%). "Drop land on first attempt" and "direct bottle towards eyes" showed maximum improvement of 45.8% each followed by "tilt head while putting" showed 45 % improvement between 1st visit and 3rd visit. "Trouble putting drops" showed least improvement by 20% between 1st and 3rd visit. All the favorable ophthalmic practices showed a statically significant (<0.05) increase in their proportion in each visit.

Conclusion: A high prevalence of errors while installing eye drops among participants were observed which were improved by educating them about right steps, as observe in follow up visits.

Keywords: Eye drops, Installation technique, Ophthalmic, Eye, Ocular

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INTRODUCTION

Ophthalmology drug delivery is one of the most interesting and challenging endeavors facing the pharmaceutical scientists. Topical eye drop is the most convenient and patient-compliant route of drug administration, especially for anterior segment disease [1]. Unlike oral medicines, eye drops require patients to use proper technique for successful medication administration. This requires not only instilling a single drop accurately into the conjunctiva of the eye but also without contacting eye drop container with the ocular surface or adnexa [2]. In ocular diseases, noncompliance could result even from improper technique of administering medication [3]. For patients with poor eye drop instillation technique, a significant portion of the eye drops cannot be delivered to the ocular surface. This can lead to ineffective treatment response, prematurely running out of medications, and increase medicine wastage [4].

Many factors contribute to patient non-adherence, including: visual acuity, eyedrop bottle shape and size, force required to squeeze one drop, angle of the dropper during administration, number of medications patients are currently taking, and the complexity of the administration schedules [5]. Among the administration techniques of pharmaceutical forms, instillation of eye drops deserves special attention, since the correct administration of these is essential for a positive prognosis of diseases affecting the eye. This happens because, unlike medical treatments based on drug oral intake, the correct use of eye drops depends on administration technique based on fine motor movements and good sense of perception [6]. Inadequate eye drops instillation may lead to treatment failure, and can cause eye infection due to contact of eye drops with eye region [7].

The World Health Organization (WHO) states that the irrational use of medications is a global health issue wherein over half of all the dispensed prescription drugs are used inappropriately. The critical steps to a proper eye drop technique comprise: administering a single drop into the pocket formed by gently pulling down the lower eyelid, having the drop land in the eye on the first attempt, not touching the applicator tip to the eye, ocular adnexa, or face, and eye closure with nasolacrimal occlusion after administration to reduce systemic absorption. Clinicians may prescribe eye drops without properly educating the patient or demonstrating the technique for the correct eye drop instillation. One reason this may occur could be due to the paucity of time in a busy practice or the failure to recognize that the patient may not be able to use the eye drops appropriately [8].

It is important to addressed the gaps and most common errors committed by the patients while installing eye drops and correct the errors. This will help patients to have a good knowledge of the right way to administer eye drops. It will also highlight the Importance of patient education with regard to eye drop instillation. The current study was conducted with the objectives to help patients to have a good knowledge of the right way to administer eye drops and a check on this by the eye care providers during follow-up visit and to evaluate whether previous education regarding eye drop administration was associated with better technique.

MATERIALS AND METHODS

A cross-sectional study was conducted for a period of one year in a tertiary care institute reporting in the outdoor patient department (OPD) of Ophthalmology. Patients over 18 y of age, administrating eye drops on their own and having better corrected visual acuity no less than 20/200 in either eye were included in the current study, while the patients with motor difficulties (tremors, motor paralysis, arthritis) and visual acuity in the better eye worse than hand movement were excluded. A total of 120 patients were enrolled in the study using consecutive sampling technique till the sample size was achieved who reported to the OPD of Ophthalmology department.

After clearance from protocol review committee and institutional ethical committee, the study was carried out in the OPD of department of Ophthalmology. A written consent was obtained

before after explaining them the objectives of the study and before enrolling the participants in the study. Each subject was interviewed for demographic data, medical and medication history and participants were observed for eye drop installation technique. There after the eye drop instillation technique was demonstrated to them and observed for compliance during their subsequent visit to outpatient clinic. The patients were followed for 2 follow up visits. Patient were escorted to the examination room where they completed the questionnaire and were asked to instill eye drop on their own. The observer used to note the mistakes performed by the patients on each visit and later on correct it in individual participant.

The data was entered and analyzed in the Statistical package for social sciences (SPPS) software v 24. The data was checked for normal distribution. Continuous data was presented as mean and standard deviation. Categorical data as presented as frequencies and percentages. Bar charts was plotted for the categorical data. For good practices, the results were presented as proportions and Cochran Q test was used to analyzed the outcomes of categorical data. The results were calculated at 95% Confidence interval and 0.05 significance level.

RESULTS

The mean age of study participants was 41.44±15.4 y. Majority of them were in the age group 18-30 y (35%), females (55.8%), and belonging to upper middle socio-economic status (31.7%) as presented in table 1. fig. 1 shows that majority of study participants had 6/6 VA in right eye (65%) and left eye (61.7%).

Table 2 shows incremental increase in percentage of all the ophthalmic practices followed by the study participants during their visits. “Drop land on first attempt” and “direct bottle towards eyes” showed maximum improvement of 45.8% each followed by “tilt head while putting” showed 45 % improvement between 1st visit and 3rd visit. “Trouble putting drops” showed least improvement by 20% between 1st and 3rd visit. All the favorable ophthalmic practices showed a statically significant (<0.05) increase in their proportion in each visit as presented in table 3.

Table 1: Descriptive characteristics of study participants

Characteristics	N (%)
Age Category	
18-30	42 (35)
31-50	37 (30.8)
>50	41 (34.2)
Gender	
Female	76 (55.8)
Male	53 (44.2)
Socioeconomic status	
LC	21 (17.5)
LM	21 (17.5)
UC	19 (15.8)
UL	21 (17.5)
UM	38 (31.7)

Table 2: Ophthalmic practices followed during initial and follow-up visits among study participants

Characteristics	First visit N (%)	Second visit N (%)	Third Visit N (%)
Trouble putting drops			
No	68 (56.7)	76 (63.3)	92 (76.7)
Yes	52 (43.3)	44 (36.7)	28 (23.3)
Squeeze one drop			
No	81 (67.5)	57 (47.5)	34 (28.3)
Yes	39 (32.5)	63 (52.5)	86 (71.7)
Wash hands			
No	77 (64.2)	53 (44.2)	29 (24.2)
Yes	43 (35.8)	67 (55.8)	91 (75.8)
Shake solution			
No	89 (74.2)	66 (55)	38 (31.7)
Yes	31 (25.8)	54 (45)	82 (68.3)
Tilt head while putting			
No	82 (68.3)	56 (46.7)	28 (23.3)
Yes	38 (31.7)	64 (53.3)	92 (76.7)
Direct bottle toward eyes			
No	81 (67.5)	54 (45)	26 (21.7)
Yes	39 (32.5)	66 (55)	94 (78.3)
Form a pocket			
No	102 (85)	69 (57.5)	48 (40)
Yes	18 (15)	51 (42.5)	72 (60)
Instill one drop			
No	83 (69.2)	62 (51.7)	32 (26.7)
Yes	37 (30.8)	58 (48.3)	88 (73.3)
Touch tip with eyes			
No	44 (36.7)	69 (57.5)	89 (74.2)
Yes	76 (63.3)	51 (42.5)	31 (25.8)
Drop land on first attempt			
No	88 (73.3)	62 (51.7)	33 (27.5)
Yes	32 (26.7)	58 (48.3)	87 (72.5)
Close eye for a minute			
No	80 (66.7)	44 (36.7)	24 (36.7)
Yes	40 (33.3)	76 (63.3)	76 (63.3)
Apply pressure at puncture			
No	100 (83.3)	75 (62.5)	50 (62.5)
Yes	20 (16.7)	45 (37.5)	70 (58.3)
Miss drops while putting			
No	46 (38.3)	64 (53.3)	96 (80)
Yes	74 (61.7)	56 (46.7)	24 (20)
Replace cap without touching			
No	89 (74.2)	66 (55.0)	38 (31.7)
Yes	31 (25.8)	54 (45.0)	82 (68.3)

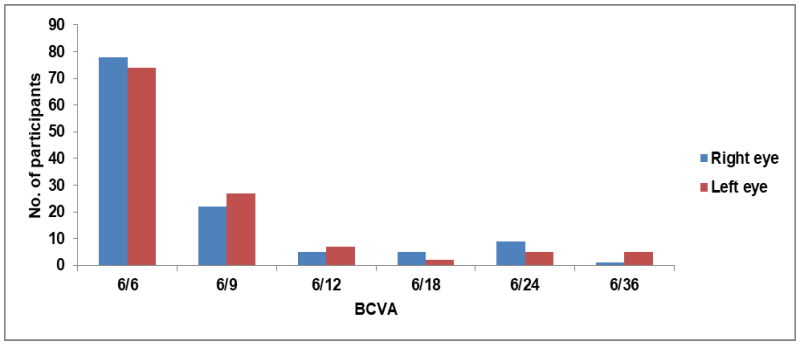

Fig. 1: Distribution of BCVA in each eye among study participants

Table 3: Favorable drop instillation practices during visits in the department of ophthalmology

Characteristics	First visit	Second visit	Third Visit	P value
Trouble putting drops (N)	0.56	0.63	0.76	0.002
Squeeze one drop (Y)	0.32	0.52	0.71	<0.01
Wash hands (Y)	0.35	0.55	0.75	<0.01
Shake solution (Y)	0.25	0.45	0.68	<0.01
Tilt head while putting (Y)	0.31	0.53	0.76	<0.01
Direct bottle toward eyes (Y)	0.32	0.55	0.78	<0.01
Form a pocket (Y)	0.15	0.42	0.60	<0.01
Instill one drop (Y)	0.31	0.48	0.73	<0.01
Touch tip with eyes (N)	0.36	0.57	0.74	<0.01
Drop land on first attempt (Y)	0.26	0.48	0.72	<0.01
Close eye for a minute (Y)	0.33	0.63	0.63	<0.01
Apply pressure at puncture (Y)	0.16	0.37	0.58	<0.01
Miss drops while putting (N)	0.38	0.53	0.80	<0.01
Replace cap without touching (Y)	0.25	0.45	0.68	<0.01

DISCUSSION

Safe and effective technique in the administration of eye drops is indispensable in the medical management of many acute and chronic ocular diseases. Improper technique may contribute to excessive medication waste, poorer outcomes, and increased costs, decreased efficacy of therapeutic measures, lower patient satisfaction, and may lead to traumatic ocular surface injuries. The current study assessed the knowledge of right way of administering eye drops and a check on this by the eye care providers during follow-up visit. There was a significant improvement in the good practices of administering eye drops as observed by the observers during initial visits which were significantly corrected during the follow-up visits.

The current study found that 31 % of the study participants were able to instill one drop from the bottle during their 1st visit while 64% touch the tip of bottle with eyes. Gomes BF *et al.* (2017) conducted a study in which only 28% of the patients were able to correctly instill the eye drops (squeeze out 1 drop and instill it into the conjunctival sac without bottle tip contact). Touching the tip of the bottle to the globe or periocular tissue occurred in 62% of the patients [3]. The quantity of eye drop is crucial as less quantity can be ineffective and more than required quantity of eye drops can lead to wastage of drug, ultimately leading to financial burden on the patients. Similarly, touching the tip of bottle to eyes can lead to physical injury such as corneal abrasion of the eye leading to severe visual loss or even contamination of the eye drops [10]. It is important to teach patients regarding proper practices of instilling eye drops to overcome preventable side effects of eyedrops instillation.

The current study found that only 26% of the participants drop landed on first attempt, while 62% of the participants missed drops while putting eye drops. A study found that 54.1% of patients had a poor drop technique, 11.8% missed the eye, 15.3% touched the tip of the bottle to the bulbar conjunctiva or cornea, and 27.1% touched the eyelid or lashes with the bottle tip. However, in our study it was found that with repeated observation and teaching the participants the technique of installing eye drops, a significant improvement was observed in "drop landed on first attempt" and participants "missed drop while putting eye drops". In the multivariable model, previous instruction regarding drop instillation technique was significantly associated with good technique (adjusted OR=8.17, 95% CI 2.02–33.05, *P*=0.003) and increasing age was associated with poor technique (adjusted OR=0.95, 95% CI 0.91–0.99, *P*=0.01) [7].

The current study found that only 35.8% of the patients wash their hands before using eye drops during their first visit and only 25.8% has shaken the eye solution. A study found that 34.1% of the study participants always used to wash their hands prior to eye drop installation and 20% of participants had not shaken the ophthalmic suspension before installing eye drops. Our study found a significant increase in proportion of participants washing their hands before installing eye drops and shaking the eye solution before installing them. Patients need to teach that if the eye drops are not shaken before installing this can lead to under dose of medication hence resulting in therapeutic failure and last dose might lead to drug toxicity due to overdose of drugs [11]. Hand hygiene has been proven time and again the most economical measure for preventing spread of infection [12, 13]. Hand hygiene programme can prevent around 50% of avoidable infections and can generate economic savings on average 16 times the cost of implementation [14].

The current study found that only 15% patients formed a pocket while installing eye drops and 33.3% of the patients closed the eyes for one minute after installing eye drops on their first visit which was improved to 60% and 63.3%, respectively till third visit. A study found that pre-and post-teaching assessment scores improved significantly with education. After education, 94% of patients versus 47% pre-teaching pulled down their lower eyelids. A total of 91% pre-teaching versus 59% post-teaching patients squeezed one drop into the lower fornix, 74% pre-teaching versus 26% post-teaching patients released the eyelid and closed the eye for 1 m minute, and 56% pre-teaching versus 3% post-teaching patients applied nasal digital pressure on each eye [9]. Formation of pocket and closing eyes for at least one minute after installing eye drops help in

retaining the adequate drug in the eye and, which further help in better effect of drug on eye again preventing the treatment failure.

The current study has comprehensively tried to assess the effect of correctional interventions among patients who are installing eye drops and had added information to the existing literature, which is scarce in this domain. The results of the study can help in better understanding the common errors made by the patients while installing eye drops and can help in correcting it. The current study is a cross-sectional study with no control group; hence the results found may not be generalized. Secondly the observer bias cannot be ruled out of this study as many people tend to perform better when observed. Thirdly the cases included were with visual acuity not less than 20/200; hence the results cannot be extrapolated to the patients with poor visual acuity.

The current study found that the participants had little knowledge regarding proper installation of eye drops and high prevalence of errors while installing eye drops especially not washing hands before installing eye drops, not shaking the eye drops before installation and not applying pressure at puncture. Educating people regarding properly installing eye drops and observing them can improve the eye drop installation technique.

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AUTHORS CONTRIBUTIONS

All the authors have contributed equally

CONFLICTS OF INTERESTS

Declared none

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