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Research Article

Instillation Technique and the Handling of Eye Drop Medications in Glaucoma Patients Attending JUDO from the Month of April to June 2019

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Abstract

Background: Although it is perceived as a simple task, it was shown that patients frequently have difficulty of instilling their eye drop. In glaucoma, where elderly population constitutes a major share of those affected, this issue is of great importance. This is hospital based cross sectional study that aimed to assess eye drop instillation technique and factors affecting performance of instillation in glaucoma patients attending Jimma Medical Center, Southwest Ethiopia.

Method: One hundred glaucoma patients who were using hypotensive eye drop for 6 months or more were included. Subjects were classified into two groups based on who regularly instil the eye drop into patient's eye: 'self-instillers' and 'assisted respondents'. In the latter, patients fully rely on their attendants. A sterile artificial tear solution was used for demonstration. The procedure was video recorded. Parameters used to grade the technique were: number of drops instilled, where drops fell, bottle tip contamination, and post instillation eyelid closure or pressure on the lacrimal sac.

For self-instillers, the background, clinical and observational variables were analyzed against the instillation performance. Finally, the two groups were compared to study the effect of assistance on instillation performance. Statistical tests employed were students t-test, Chi-square test and Fishers exact test. P-value < 0.05 was considered significant.

Results: There were 80 self-instilling and 20 assisted respondents. Eighty percent of the self instillers were poor performers. Bottle tip contamination was the most commonly encountered problem (71.2%). In multivariate analysis, factors significantly associated with poor technique were: older age (p = 0.001, AOR = 9.24, 95% CI 2.4 - 36.2), and rural dwelling (p = 0.028, AOR = 6.96, 95% CI 1.23 - 39.4). Assistance was significantly associated with good technique (p = 0.000, OR = 7.43, 95% CI = 2.55 - 21.65).

Conclusion: Majority of glaucoma patients have poor self-instillation performance. The older age and rural dwelling were independent factors associated with poor eye drops instillation performance. Assistance was significantly associated with good eye drops instillation performance.

Keywords: *Instillation Technique; Eye Drops; Assisted Instillation; Self-Instillers*

Abbreviations

EDM: Eye Drop Medications; JMC: Jimma Medical Center; JUDO: Jimma University Department of Ophthalmology; GSC: Glaucoma Specialty Clinic; OHT: Ocular Hypertension; SPSS: statistical Package for the Social Sciences

Introduction

Glaucoma is an acquired optic neuropathy characterized by a loss of retinal ganglion cells, progressive cupping of the optic nerve head, and a characteristic visual field loss. It is a multifactorial disease and its precise pathogenesis, despite extensive research, remains unknown. Intraocular pressure is considered the main risk factor for the development and progression of glaucoma. Patient diagnosed to have glaucoma has to be started on anti-glaucoma medications. The goal of treating glaucoma is to lower the IOP below which it is less likely to cause the progression of the disease. Furthermore, some drugs act also as a neuroprotector, having an effect of increasing blood flow to the optic nerve head [1].

There are several drug formulations to treat glaucoma prepared suitably to deliver them in different routes. Topical ocular medications, both prescription and over the counter, are the mainstay of therapy for treating ocular disorders such as glaucoma. Eye drops are the preferred method of treatment because they are effective, non-invasive, and, in theory, easy to use [2]. Approximately 80% of patients instill their own eye drops [3] and there are many techniques used. Some patients instill their drops when sitting, others stand or lie down, others use a mirror to aid the process [4-6].

Although instillation of eye drops may be perceived as a simple task, several studies have reported that 25% to 90% of subjects fail to administer their eye drops correctly [7-11]. Poor techniques include missing the eye completely, delivering excess dose, bottle contamination or ocular trauma due to the tip of bottle touching the globe or lid. Moreover, patients with poor technique are often unaware of having the problem [12].

Factors associated with an increased risk of poor eye drop instillation technique were poor manual dexterity, poor vision, limited schooling, and older age [8,13,14]. In addition, proper explanation and demonstration on how the eye drop should be used is often neglected [6], which is likely to be a large problem. This could be due to the lack of time in busy practice or lack of awareness that most patient don't know how to correctly instill eye drop [15,16]. In chronic ocular diseases, such as glaucoma, wherein the elderly population constitutes a major share of those affected, this issue is of great importance [2,8].

Poor drug instillation technique can constitute poor compliance to the drugs [2,7] which can lead to treatment failure with a consequent progression of the disease and a higher rate of visual loss [17]. This may lead to a need for a more frequent follow ups, additional drugs, diagnostic tests, and earlier surgery. These affect patient's economy, and other psychosocial aspects [18,19].

Furthermore, if eye drop instillation is done improperly it can lead to wastage of drugs, overmedication with systemic absorption and adverse effects, predisposition to infection from contaminated bottle tips, corneal abrasions, and ulcerations [10,11]. Lemlem Tamrat., *et al*. reported that prevalence of bottle contamination among eye drop users was 72.9%. The tip of the dropper bottle was more often contaminated (60.8%; 31/51) than the drop [20]. Eye drop contamination is believed to happen due to the contact between the dropper tip and patients' hand, ocular tissues, and other environmental factors.

Currently, data regarding the technique of eye drop administration is sparse in a public practice of developing countries where the issue of noncompliance is considered to be very significant [11]. Therefore, this study, which is the first of its kind in Ethiopia, was done and evaluated the eye drop instillation performance of the self-instilling and the assisted glaucoma patients and factors affecting the instillation performance in the self-instillers.

Materials and Methods

A hospital based prospective cross-sectional study was employed. The ethical clearance was approved by the ethical review committee of Jimma University, College of Health Sciences. A written informed consent for participation was obtained from all participants. The study was done to assess eye drop instillation technique of glaucoma patients who visited Jimma Medical Center (JMC) from March to May 2019.

Jimma Medical Center is the only specialized teaching hospital in the southwest Ethiopia. It is located in the Oromia region of Ethiopia, 352 kilometers southwest to the capital. It provides services for a catchment area of 15 million people.

Specific objectives of this study were: to assess eye drop instillation technique performed by glaucoma patients, to assess factors affecting installation performance, and to evaluate whether health education on eye drop usage has been provided for glaucoma patients. Glaucoma patients using hypotensive eye drops were source population. Glaucoma patients who were having a regular follow up and using hypotensive eye drop for glaucoma or ocular hypertension for ≥ 6 months were eligible. Whole population sampling technique was used to include all eligible glaucoma patients who visited during the study period. Patients with motility disorders (tremor, arthritis, paralysis, or deformity), those with visual acuity in the better eye of hand movement or worse, children (age < 16 years), and repeat patients during the study period were excluded.

Pretested, structured questionnaire was used to collect data. The age, gender, place of residence, level of education, occupation, duration of eye drops use, history of receiving a professional explanation on eye drop usage (classified as never provided, provided but didn't understand, provided and understood), number of different eye drops used and time interval between subsequent drops were asked for and recorded. Visual acuity in the better eye was checked and recorded.

Observation was performed in a room provided with a portable sink, soap, mirror, chair and bed. Participants were classified under two groups based on who regularly instil the eye drop into the patient's eye: the 'self-instilling group' and 'assisted-instillation group'. In the former are those patients who self instilled the eye drop. The latter group possessed those patients for whom attendants instilled the eye drop. Patients or attendants were provided with a sterile artificial tear solution and instructed to instil as they would do at home. The eye with worse visual acuity was selected for the study. For equal visual acuity, one eye was randomly assigned as the study eye. The technique of instillation was observed and video recorded by an observer at a comfortable viewing angle. Another observer sat aside the patient and at a comfortable viewing angle and observed the patient's head position during instillation. For patients with several attempt, the one which made them happy was recorded for the study.

Parameters recorded for each patient were: whether hands were washed; whether bottle was shaken; head position during instillation (assumed from vertical); hand used for instillation (for self-instillers only; classified as contralateral of ipsilateral); time elapsed to instil the first drop after uncapping; and those parameters used to grade the instillation.

Regarding the evaluation of patient's head position, two separate marks were assigned on one side patient's head, each along the assumed vertical line while the head was neither flexed nor extended. With neck extension, the assumed line passing through the two marks make an angle against the assumed vertical. This angle was evaluated as to whether it was below the estimated 45 degrees (slight extension) or above the estimated 45 degrees (adequate extension). The head position of those patients who attempted the instillation on supine position was considered under adequate neck extension.

Parameters used to grade the instillation were: number of squeezed out drop; site where drop landed; any touch to bottle tip; post-instillation eyelid closure or pressure on lacrimal sac area for ≥1 minute. Finally, the technique was scored from -1 to 4 as depicted in table 1. Patients were classified to have a good technique if score was 4, and poor technique if it was -1 to 3. Good instillation technique was considered a proper technique. Scores -1 to 2 of poor techniques denote the differing risk they pose, like: off targeted drop or no drop at all; contamination of bottle tip; or trauma to the globe. Score 3 represent an awkward technique which has no risk of bottle contamination or ocular injury, but considered to have resulted in drug misuse from either multiple drop squeezed or medication washed off ocular surface.

Parameters of instillation technique	Score
Only 1 drop landed on the globe, without any contamination to the bottle tip, with slight eyelid closure or pressure on lacrimal sac area for ≥1 minute.	4
Either of the following: 1. One drop landed on the globe, without bottle tip contamination, and without lid closure or pressure on lacrimal sac area. 2. More than 1 drop landed on the globe, without bottle tip contamination, and with or without lid closure or pressure on lacrimal sac area	3
Any number of drops landed on the globe, with bottle tip contamination	2
Any number of drops landed on the globe, with bottle tip touching the globe (for the additional risk of ocular trauma)	1
Drop(s) missed the eye (or, no drops at all), without bottle tip contamination	0
Drop(s) missed the eye (or, no drops at all), with bottle tip contamination	-1

Table 1: *Scores assigned to the performance of eye drops instillation technique.*

Performance of eye drop instillation was the dependent variable of the study. Independent variables were: age, gender, place of residence, level of education, occupation, duration of eye drops use, history of receiving a professional explanation on eye drop usage, visual acuity of the better eye, head position during instillation, hand used for instillation, time elapsed to instil the first drop after uncapping, and assistance. In the analysis, except for the number of eye drops squeezed, other quantitative variables were handled by being grouped under differing range of scales.

Statistical analysis was performed by using statistical software package IBM SPSS Statistics 25. Normality was assumed by inspection of histograms and by Shapiro-Wilk tests. Statistical tests employed were students t-test, Chi-square test and Fishers exact test.

Analysis of the different variables against the instillation technique was done only for the self-instilling respondents. Variables studied were age, gender, place of residence, level of education, occupation, head position of instillation, hand of instillation, duration of use of eye drop, provision of previous professional explanation, the mean visual acuity, and time elapsed to instill the (first) drop after uncapping. Variables with univariable significance of ≤0.05 were fed to the multivariable regression model. Multivariable analysis was employed to remove confounding factors and to determine the predictors of poor instillation technique. Finally, the respondents within the assisted-instillation group were considered only to be compared with the self-instillers to study the effect of assistance on eye drop instillation performance. Statistical significance was accepted where $p < 0.05$ and 95% confidence interval (CI) of OR didn't touch 1.0.

Results

Data of the total respondents

During the study period, 116 patients were found to be eligible. Among these, 16 patients did not want to be video recorded and, thus, were excluded. Thus, the study was done on 100 patients.

Eighty respondents were self-instillers while the remained 20 were assisted respondents. The demographic and clinical characteristics of respondents is detailed in table 2. Four patients have ocular hypertension and 96 patients have glaucoma. Mean age of the total respondents was 59.73 ± 12.46 years, ranges 24 - 90 years, with a normal distribution curve. Sixty-three were male and 37 were females. Urban dwellers accounted for majority (61%). Illiterate respondents comprised of 47% (47/100).

Variable		Self-instilling (80 patients) N (%)	Assisted (20 patients) N (%)
Age (years)	< 50	16 (20.0%)	1 (5.0%)
	50 - 69	46 (57.5%)	14 (70.0%)
	70 - 89	18 (22.5%)	5 (25.0%)
	Mean (± SD)	58.93 ± 13.12	62.95 ± 8.94
Gender	Male	51 (63.8%)	12 (60.0%)
	Female	29 (36.3%)	8 (40.0%)
Place of residence	Rural	28 (35.0%)	11 (55.0%)
	Urban	52 (65.0%)	9 (45.0%)
Level of education	Never been to school	33 (41.3%)	14 (70.0%)
	Elementary school	25 (31.3%)	3 (15.0%)
	High school	4 (5.0%)	1 (5.0%)
	College and University	18 (22.5%)	2 (10.0%)
Occupation	Farmer	19 (23.8%)	8 (40.0%)
	Merchant	9 (11.3%)	0 (0.0%)
	Government employee	13 (16.3%)	2 (10.0%)
	Private owner	5 (6.3%)	0 (0.0%)
	Daily Laborer	5 (6.3%)	2 (10.0%)
	House wife	20 (25.0%)	7 (35.0%)
	Pensioner	9 (11.3%)	1 (5.0%)
Duration on eye drop medications	< 1 year	9 (11.3%)	7 (35.0%)
	1 - 5 years	60 (75.0%)	11 (55.0%)
	> 5 - 10 years	9 (11.3%)	2 (10.0%)
	> 10 years	2 (2.5%)	0 (0.0%)
	Mean (±SD)	3.05 ± 3.0	1.78 ± 2.35
Explanation for eye drops use	Never provided	7 (8.8%)	1 (5.0%)
	Provided, but didn't understood	8 (10.0%)	3 (15.0%)
	Provided and understood	65 (81.3%)	16 (80.0%)
Mean visual acuity (in decimals)		0.41 ± 0.29	0.4 ± 0.37

Table 2: *Demographic and clinical characteristics of the total respondents.*

Eight respondents reported that they didn't receive any explanation from health care giver on eye drop usage. Only 2 have washed their hands and only 1 has shaken the bottle before the attempted instillation, and all were among the self-instillers. Of the 10 respondents who reported using multiple eye drops, only 4 knew to dose the second eye drop 5 minutes after the first. Others reported instilling the second soon after the first. Descriptive statistics of parameters of instillation technique is detailed in table 3.

Variable		Self-instilling N (%)	Assisted N (%)
Numbers of drops squeezed out	No drops squeezed out	9 (11.3%)	0 (0.0%)
	1 drop	45 (56.3%)	17 (85.0%)
	2 drops	20 (25.0%)	3 (15.0%)
	3 drops	4 (5.0%)	0 (0.0%)
	4 drops	2 (2.5%)	0 (0.0%)
	Mean (± SD)	1.31 ± 0.84	1.15 ± 0.37
Where drop(s) landed	No drops squeezed out	9 (11.3%)	0 (0.0%)
	On the globe	61 (76.3%)	20 (100.0%)
	On eyelids	9 (11.3%)	0 (0.0%)
	Other sites	1 (1.3%)	0 (0.0%)
Touch to the tip of the bottle	Not touched	23 (28.8%)	18 (90.0%)
	Touched to fingers	4 (5.0%)	0 (0.0%)
	Rubbed by cloth	1 (1.3%)	0 (0.0%)
	Touched to the globe	26 (32.5%)	0 (0.0%)
	Touched eyelids or face	26 (32.5%)	2 (10.0%)
Lid closure for >1 minute after instillation	Didn't close	21 (26.3%)	4 (20.0%)
	Closed slightly	53 (66.3%)	15 (75.0%)
	Closed forcefully	6 (7.5%)	1 (5.0%)
Pressure on lacrimal sac area	Didn't pressed	79 (98.8%)	20 (100.0%)
	Pressed the area	1 (1.3%)	0 (0.0%)

Table 3: *Descriptive statistics of parameters of instillation technique for total respondents.*

Data of the 80 self-instilling respondents

It was observed that 80.0% of self-instilling respondents (64/80) performed poor instillation technique. Of the poor performers, 16 (25%) missed the target (globe) and contaminated bottle tip; 3 (4.7%) missed the target without bottle contamination; another 16 instilled on target and touched globe with bottle tip; 25 (39.0%) instilled on target and contaminated bottle tip, but did not touch globe; 4 (6.3%) instilled excess drops on target without bottle contamination and without eyelid closure or lacrimal pressure. Mean score of instillation technique was 1.58 ± 1.7, showing that most respondents instilled on target, contaminated bottle tip and posed injury risk to the globe. Multiple drops were squeezed by 32.5%. Nine patients did not squeeze any drop from bottle. Mean number of drops squeezed was 1.31 ± 0.84 (Table 3).

Results of univariable analysis for predicting poor instillation technique in the self-instillers is illustrated in table 4.

None of the females, farmers and illiterates have shown good self-instillation performance. Although not significant, there was a trend that as educational level gets higher, there was a tendency towards having good performance. Tendency towards being a poor performer was observed when ipsilateral hand is used; as mean duration on eye drop increase; and as time elapsed before instilling the first drop is longer (the nine self-instillers that did not squeeze any drop out of bottle have elapsed more than 10 seconds trying to instil their eye drop). Fifty-two of the 65 respondents (80%) who reported they have understood the explanation and all respondents who reported they didn't understand the explanation provided to them on eye drop usage were among the poor performers.

Variables		Good technique (n = 16) N (%)	Poor technique (n = 64) N (%)	P value
Mean age (years)		55.75 ± 9.55	59.72 ± 13.82	0.001
Gender	Male	16 (31.4%)	35 (68.6%)	0.998
	Female	0	29 (100%)	
Place of residence	Rural	2 (7.1%)	26 (92.9%)	0.05
	Urban	14 (26.9%)	38 (73.1%)	
Level of education	Never been to school	0	33 (100%)	0.998
	Elementary school	3 (12.0%)	22 (88.0%)	
	High school	2 (50.0%)	2 (50.0%)	
	College and University	11 (61.1%)	7 (38.9%)	
Occupation	Farmer	0	19 (100%)	0.597
	Merchant	2 (22.2%)	7 (77.8%)	
	Government employee	8 (61.5%)	5 (38.5%)	
	Private owner	2 (40.0%)	3 (60.0%)	
	Daily laborer	2 (40.0%)	3 (60.0%)	
	House wife	0	20 (100%)	
	Pensioner	2 (22.2%)	7 (77.8%)	
Mean duration of eye drop usage		2.58 ± 2.39	3.17 ± 3.16	0.492
Explanation on eye drop usage	Never provided	3 (42.9%)	4 (57.1%)	0.411
	Provided, didn't understood	0	8 (100%)	
	Provided and understood	13 (20.0%)	52 (80.0%)	
Head position at instillation	Slight extension (n = 69)	11 (15.9%)	58 (84.1%)	0.032
	Adequate extension (n = 11)	5 (45.5%)	6 (54.5%)	
Hand used for instillation	Ipsilateral (n = 32)	3 (9.4%)	29 (90.6%)	0.063
	Contralateral (n = 48)	13 (27.1%)	35 (72.9%)	
Time elapsed to squeeze the first drop	< 5 seconds (n = 10)	3 (30.0%)	7 (70.0%)	0.215
	5 - 10 seconds (n = 45)	11 (24.4%)	34 (75.6%)	
	> 10 seconds (n = 25)	2 (8.0%)	23 (92.0%)	
Mean visual acuity (in decimals)		0.48 ± 0.32	0.38 ± 0.28	0.251

Table 4: *Univariable logistic regression for predicting poor eye drops instillation technique in self-instilling respondents.*

Factors with univariable significance of ≤ 0.05 fed to multivariable analysis were: mean age (p = 0.001), head position at instillation (p = 0.032), and place of residence (p = 0.05). Factors remained significant through multivariable analysis in predicting poor performance of eye drop instillation were older age (p = 0.001, AOR = 9.24, 95% CI 2.4 - 36.2) and rural dwelling (p = 0.028, AOR = 6.96, 95% CI 1.23 - 39.45) (Table 5).

Variable	Poor instillation technique (n = 64)		
	Adjusted OR	95%CI	P-value
Older age	9.24	2.4 - 36.2	0.001
Rural residence	6.96	1.23 - 39.45	0.028
Head position (slight neck extension)	3.9	0.82 - 19.4	0.087

Table 5: *Multivariable analysis of factors predicting poor instillation performance among the self-instillers.*

Older age was associated with a 9.24-fold increment in odds of having poor performance of instillation when rural dwelling was accounted for. Controlling for age, rural residence was associated with a 6.96-fold increased odds of having poor instillation performance.

Comparative analysis of self-instillers versus assisted-respondents

Good performance of instillation was observed in 65% (13/20) of respondents within the assisted instillation group, while only 20% (16/80) of the self instilling respondents were good performers. Assistance was significantly associated with good eye drops instillation technique (OR = 7.43, 95% CI = 2.55-21.65, p = 0.000). Bottle tip was touched only in 10% (2/20) of the assisted cases, while 72.2% (57/80) of self instillers has contaminated bottle tip. Self instillation technique was significantly associated with bottle tip contamination (OR = 10.2, 95% CI 2.13-48.7, p = 0.004).

Discussion

This study revealed that there is a difficulty of eye drop self-instillation in glaucoma patients. Only 20.0% (16/80) of self-instilling respondents performed good instillation technique. This result is comparable to that reported from China (19.7%) [21]. However, it is below that reported from Brazil (28%) [22] and United Kingdom (UK) (45.9%) [23]. Possible factor for these differences could be the level of education. In this study, 41.3% (33/80) of participants have never been to school, while all respondents included in study done in UK and Brazil have attended basic school or more. Unlike that of UK, post-instillation slight eyelid closure or lacrimal pressure for ≥1 minute was included in this study as one parameter to define good instillation technique. This difference in the grading of instillation technique might have accounted for the great discrepancy between both results. If performed most of the time, poor eye drop instillation technique constitutes poor compliance [2,7] which can lead to treatment failure with a consequent progression of the disease and a higher rate of visual loss [17], with all its economic and other psychosocial costs [18,19].

The prime problem with most poor performers was contamination of bottle tip; occurred in 71.2% (57/80) of self-instilling patients. This is almost comparable to that reported from India (75.7%) [9]. This could result in true microbiological contamination. Lemlem Tamrat., *et al*. reported the prevalence of bottle contamination among eye drop users to be 72.9%. Dropper tip was more often contaminated (60.8%) than the drop [20].

Mean score of the technique was 1.58 ± 1.7. This entail that most respondents instilled eye drop on target, contaminated bottle tip, and posed injury risk to the globe. This value is less than that reported from UK (2.4 ± 1.4) [23]. This difference occurred due to presence of the 16 respondents with score -1 in this study, whereas no respondents were reported to have score -1 from that of the UK. Mean number of drops squeezed was 1.31 ± 0.84, and 32.5% of respondents squeezed out multiple drops. There is no much difference between these results and that reported from Brazil, which were 1.4 ± 0.8 and 27% respectively [22]. Ten of the self-instillers (12.5%) were unable to place the squeezed drop into their eyes, which is comparable to the report (13%) of Brown MM., *et al* [12]. These faulty techniques can lead to wastage of drugs, overmedication with systemic absorption and adverse effects, predisposition to corneal abrasions, and ulcerations [10,11].

Fifty-two of the 65 respondents (80%) who reported they have understood the explanation provided to them on eye drop usage were poor performers. This shows the unawareness gap most poor performers have regarding their problem. Out of the total, 8 respondents reported that they didn't receive any professional explanation on eye drop usage. Though seeming less, it is significant as it shows the gap within the health care provision system.

Older age was associated with increased odds of having poor instillation performance, when rural dwelling was accounted for, with a 9.2-fold increment in odds (AOR = 9.2, 95% CI 2.4 - 36.2, p = 0.001). Similarly reported from China, Brazil and UK [21-23], advanced age was revealed as a risk factor for performing poor instillation technique. Controlling for age, being a rural resident was associated with a 6.96-fold increased odds of having poor instillation performance (AOR = 6.96, 95% CI 1.2 - 39.4, p = 0.028). The possible reason for this could be the high rate of illiteracy found (p = 0.003, 95% CI 1.67 - 11.8) in rural dwellers. However, to the author's knowledge, there is no study that revealed similar finding.

Assistance was significantly associated with good eye drop instillation technique (OR = 7.43, 95% CI = 2.55 - 21.65, p = 0.000). To the author's knowledge, there was no study done so far to compare this result with. Bottle tip was touched in 72.2% (57/80) of self instillers, while only in 10% (2/20) of the assisted cases. This was for the reason that the instilling attendant could directly visualize patient's eye and could have avoided touching periocular tissues. Mean age of the self-instillers (58.93 ± 13.12) was below that of the assisted respondents (62.95 ± 8.94), while good instillation performance was still observed among the assisted respondents. This shows that assistance has maximized the performance among the elderly who, otherwise, would have a risk of being a poor performer if they were self-instillers. Out of the total, 98 respondents did not wash their hands before uncapping of the bottle. This is comparable to the report (97%) of Brown MM., *et al* [12].

Limitations encountered in this study were that some of the results were not compared with other studies due to the scarcity of data on the specific matter. And, the fact that this study is the first of its kind in Ethiopia, there was no study done so far on this same population for comparison of the results. However, the results of this study can be generalizable as whole population was sampled.

Conclusion

Most of glaucoma patients have poor performance of self-instillation of their eye drop, and have contaminated the bottle tip. There was a significant unawareness gap on ones' own problem of having poor self-instillation performance. Additionally, there was a gap in the provision of professional explanation on eye drop usage. Older age and being a rural dweller were independent factors associated with poor performance of self-instillation. Assistance was significantly associated with good instillation performance.

Thus, great attention should be given for glaucoma patients regarding their eye drop usage. A trained health professional should specifically be assigned to teach patients in a simple and understandable way on the proper eye drop usage. For elderly patients, special attention should be given and family members should be shown how to apply the eye drops. If possible, screen displays and fliers showing good instillation technique should be made available at waiting areas to educate these patients.

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Conflict of Interest

There is no conflict of interest in this research article.

Bibliography

1. Leske MC., *et al*. "Factors for glaucoma progression and the effect of treatment: the early manifest glaucoma trial". *Archives of Ophthalmology* 121.1 (2003): 48-56.

2. Broadway DC and Cate H. "Pharmacotherapy and adherence issues in treating elderly patients with glaucoma". *Drugs Aging* 32.7 (2015): 569-581.

3. Kass MA., *et al*. "Part I. Patient administration of eyedrops: interview". *Annals of Ophthalmology* 14.8 (1982): 775-779.

4. Fraunfelder FT. "Extraocular fluid dynamics: how best to apply topical ocular medication". *Transactions of the American Ophthalmological Society* 74 (1976): 457-487.

5. Zimmerman TJ., *et al*. "Improving the therapeutic index of topically applied ocular drugs". *Archives of Ophthalmology* 102.4 (1984): 551-553.

6. Tsai T., *et al*. "An evaluation of how glaucoma patients use topical medications: a pilot study". *Transactions of the American Ophthalmological Society* 105 (2007): 29-35.

7. Sleath B., *et al*. "The relationship between glaucoma medication adherence, eye drop technique, and visual field defect severity". *Ophthalmology* 118.12 (2011): 2398-2402.

8. Dietlein TS., *et al*. "Self-application of single-use eyedrop containers in an elderly population: comparisons with standard eyedrop bottle and with younger patients". *Acta Ophthalmologica* 86.8 (2008): 856-859.

9. Gupta R., *et al*. "Evaluating eye drop instillation technique in glaucoma patients". *Journal of Glaucoma* 21.3 (2012): 189-192.

10. Moore DB., *et al*. "Prevalence of self-reported early glaucoma eye drop bottle exhaustion and associated risk factors: a patient survey". *BMC Ophthalmology* 14 (2014): 79.

11. Geyer O., *et al*. "Microbial contamination of medications used to treat glaucoma". *British Journal of Ophthalmology* 79.4 (1995): 376-379.

12. Brown MM., *et al*. "Improper topical self-administration of ocular medication among patients with glaucoma". *Canadian Journal of Ophthalmology* 19.1 (1984): 2-5.

13. Kass MA., *et al*. "Compliance with topical pilocarpine treatment". *American Journal of Ophthalmology* 101.5 (1986): 515-523.

14. Kholdebarin R., *et al*. "Multicenter study of compliance and drop administration in glaucoma". *Canadian Journal of Ophthalmology* 43.4 (2008): 454-461.

15. Sayner R., *et al*. "How glaucoma patient characteristics, self-efficacy and patient-provider communication are associated with eye drop technique". *International Journal of Pharmacy Practice* 24.2 (2016): 78-85.

16. Djafari F., *et al*. "Impact of a brief educational intervention on glaucoma persistence: a randomized controlled clinical trial". *Ophthalmic Epidemiology* 22.6 (2015): 380-386.

17. Stewart WC., *et al*. "Factors associated with visual loss in patients with advanced glaucomatous changes in the optic nerve head". *American Journal of Ophthalmology* 116.2 (1993): 176-181.

18. Haynes RB., *et al*. "Helping patients follow prescribed treatment: Clinical applications". *Journal of the American Medical Association* 288.22 (2002): 2880-2883.

19. Steven L Mansberger. "Are you compliant with addressing Glaucoma adherence?" *American Journal of Ophthalmology* 149.1 (2010): 1.

20. Lemlem Tamirat., *et al*. "Microbial Contamination and Antimicrobial Resistance in Use of Ophthalmic Solutions at the Department of Ophthalmology, Jimma University Specialized Hospital, Southwest Ethiopia". *Canadian Journal of Infectious Diseases and Medical Microbiology* (2019): 5372530.

21. Xinbo Gao., *et al*. "Evaluating Eye Drop Instillation Technique and Its Determinants in Glaucoma Patients". *Journal of Ophthalmology* (2018): 1376020.

22. Gomes BF., *et al*. "Assessment of eye drop instillation technique in glaucoma patients". *Arquivos Brasileiros de Oftalmologia* 80.4 (2017): 238-241.

23. Tatham AJ., *et al*. "Eye drop instillation technique in patients with glaucoma". *Eye (London)* 27.11 (2013): 1293-1298.

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