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The Impact of A Short Instructional Video in Improving Self-Efficacy in Eyedrops Application

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ABSTRACT
Introduction: Eyedrops are primary treatment for many eye conditions, and patients often struggle with self-administration. In busy clinics, patients often receive little instruction on self-administration, and short instructional videos offer a practical solution. Study evaluated the impact of a short video on self-efficacy in eyedrop application.
Methods: This quasi-experimental pretest-posttest study included 30 patients from a tertiary hospital eye clinic in Central Java (February and March 2025) that randomized to Direct Education Group (DEG), Video-Based Education Group (VEG), or Direct Education Assisted by Video Group (DEVG). Eyedrop techniques were video-recorded at pretest, post-test 1, and post-test 2; Self-efficacy as primary outcome was measured by number of correctly performed steps using 13-step checklist, then analyzed using multiple linear regression.
Results: 80% reported eyedrop difficulties, 90% never received education, only 13.3% watched videos despite smartphone access. All groups improved self-efficacy significantly ($p<0.001$). DEG declined at post-test 2 ($p=0.018$), while DEVG maintained gains and showed superior scores vs DEG at 2-weeks ($p=0.003$)
Conclusion: Short instructional videos significantly improve self-efficacy in eyedrop applications, with DEVG showing the most stable retention.
Keywords: eyedrops application, self-efficacy, Short instructional video

ABSTRAK
Pendahuluan: Tetes mata merupakan terapi utama untuk berbagai penyakit mata, namun pasien sering mengalami kesulitan dalam penggunaan mandiri. Di klinik dengan beban pelayanan tinggi, pasien sering menerima edukasi yang terbatas mengenai cara penggunaan tetes mata, sehingga video instruksional singkat dapat menjadi solusi praktis. Penelitian ini bertujuan mengevaluasi dampak video instruksional singkat terhadap efikasi diri dalam penggunaan tetes mata.
Metode: Penelitian kuasi-eksperimental dengan desain pretest–posttest ini melibatkan 30 pasien di poliklinik mata RS Tersier di Jawa Tengah pada Februari–Maret 2025. Subjek dibagi secara acak ke dalam *Direct Education Group* (DEG), *Video-Based Education Group* (VEG), dan *Direct Education Assisted by Video Group* (DEVG). Teknik penggunaan tetes mata direkam pada pretest, post-test 1, dan post-test 2. Efikasi diri sebagai hasil utama diukur berdasarkan jumlah langkah yang dilakukan dengan benar menggunakan daftar 13 langkah menetaskan tetes mata, kemudian dianalisis menggunakan regresi linier berganda.
Hasil: 80% peserta kesulitan menggunakan tetes mata mandiri, 90% belum pernah menerima edukasi, dan hanya 13,3% yang pernah menonton video edukasi meskipun memiliki akses *smartphone*. Seluruh kelompok menunjukkan peningkatan efikasi diri yang signifikan ($p < 0,001$). Skor DEG menurun pada post-test 2 ($p = 0,018$), sedangkan DEVG mempertahankan peningkatan dan menunjukkan skor yang lebih tinggi dibanding DEG pada minggu ke-2 ($p = 0,003$).
Kesimpulan: Video instruksional singkat secara signifikan meningkatkan efikasi diri dalam penggunaan tetes mata, dengan kombinasi edukasi langsung dan video menunjukkan retensi yang paling stabil.
Kata kunci: Aplikasi tetes mata, Efikasi diri, video singkat instruksional

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INTRODUCTION

Eyedrops remain the primary treatment modality for a wide range of ocular conditions. 76% of all ophthalmic drugs were prescribed as eyedrops.[1] Correct administration is crucial to effective treatment.[2] Someone's belief in one's ability to succeed in specific situations, or accomplish certain tasks is known as self-efficacy[3]. An individual's sense of self-efficacy plays a major role in how one approaches goals, tasks, and challenges related to their health.[3] Approximately 25% of patients' attempts to instill eyedrops miss the eye entirely, and between 20% and 80% of patients contaminate the eyedrop bottle by touching the ocular surface, adnexa, or face.[4] These mistakes may lead to less effective treatment and higher risk of infection.

Communication between health providers and patients plays a crucial role in ensuring optimal health-care delivery. Direct education is an important approach through which health-care professionals can inform, guide, and engage patients in person, helping to improv their health literacy.[5] In busy clinical settings, limited appointment times and heavy workloads often prevent healthcare providers from offering direct comprehensive instruction or demonstrations. As a result, patients frequently leave the clinic without proper guidance, leading to uncertainty about the correct application methods.[6]

Studies showed that 81% of patients using topical medications report that they were never taught how to properly use them by their physicians, and even among those who were given instructions, only a third were shown how to do it properly.[7]Instilling eye drops may seem to be an effortless task, but administering one correctly may pose a challenge to the patients. Former studies have reported poor patient performance while instilling eye drops, and Improper technique may contribute to excessive medication waste, poorer outcomes, increased costs, decreased therapeutic efficacy, lower patient satisfaction, and may lead to traumatic ocular surface injuries [8]

Videos are known as educational tool and have proven effective in many areas of healthcare education.[9] Video engage both visual and auditory senses, helping learners understand complex information, improve long-term memory retention, and review content at their own pace. A randomized controlled trial by Scott A. et al. showed that a short educational video can significantly improve glaucoma patients' short-term self-efficacy and eye drop technique compared to a video control group. [10] A prior study by Alexander Feng et al. demonstrated that combining an instructional video with an illustrated educational handout resulted in immediate and significant improvement in proper eye drop administration technique. Most patients also reported that these materials helped them better understand and confidence.[8]

Video-based education offers a way to complement direct interactions between health providers and patients. Its accessibility makes it an efficient tool to address educational gaps, especially during busy clinic hours.[10] However, there is still limited evidence comparing video-based education directly to direct education. This study aimed to evaluate the impact of a short instructional video on self-efficacy in eye drop administration, both alone and in combination with direct education.

METHODS

This quasi-experimental pretest-posttest study was approved by the institutional ethics committee (No.16473/EC/KEPK-RSDK/2025).
Informed consent was obtained from all participants. Julious et al, recommends lower limit of the pilot study sample size at 10 per treatment group.[11] Accounting for

15% dropout, a total of 36 new patients were consecutively recruited from Kariadi Hospital Eye Clinic between February and March 2025. Inclusion criteria: age >18 years, best-corrected visual acuity (BCVA) better than 6/60, receiving first-time eyedrop prescription, and able to self-administer drops. Exclusion criteria: physical or cognitive impairments, severe vision loss interfering with self-administration.

Participants were randomly assigned in 1:1:1 ratio to three groups using simple randomization: sealed opaque envelopes containing group labels (DEG, VEG, DEVG) prepared by independent researcher blinded to study. Upon consent, participants blindly selected envelopes. Allocation concealment maintained until intervention delivery. Participants were assigned to: Direct Education Group (DEG), Video-Based Education Group (VEG), or Direct Education Assisted by Video Group (DEVG) (Figure 1).

Figure 1. (A) DEG: one-on-one instruction. (B) VEG: 3-minutes video. (C1-C2) DEVG: combined intervention. (D1-D2) Post-test 1 (5 min post). (E) Post-test 2 (video call, 2 weeks)

Figure 2. The 13 steps of correct eyedrop application (checklist + video content)[12–14]

In the DEG, participants received approximately three minutes direct instruction by trained educator on the 13 eyedrop application steps (adopted from several sources, and expert-validated), delivered once.[12–14] In the VEG, participants watched 3-minute instructional video created by the researcher. The video was displayed on a laptop at maximum volume (Image 2). In the DEVG, participants received both interventions sequentially: direct instruction followed by video. Video content shows the same 13 validated steps, emphasizing image quality, clear voice, body language, and text overlays. The video was reviewed and approved by three experts from our institution for direct testing on the VEG and the DEVG.

Participants were video-recorded self-administering artificial tears at three timepoints: pretest (baseline), post-test 1 (5 minutes post-intervention), and post-test 2 (2 weeks via video call). Self-efficacy as primary outcome was measured by number of correctly performed steps using 13-step checklist (1=correct, 0=incorrect), adopted from validated sources and expert-validated at our institution. [12–14] A trained educator acted as observer, and Video recording allowed the observer to review session for clarification. During the study, five participants dropped out. To maintain equal group sizes, 10 participants were included in the final analysis for each group.

Data analyzed using SPSS software. All data were presented on a ratio scale. Normality test was used the Shapiro-Wilk test. For data with a normal distribution, paired comparisons were analyzed using repeated ANOVA and if the data were not normally distributed, the Whitman test was applied. Within-group comparisons, self-efficacy before and after the intervention were analyzed using repeated measures ANOVA for normally distributed data and the Friedman test for non-normally distributed data.

Between-group comparisons, self-efficacy before and after the intervention were analyzed using one-way ANOVA for normally distributed data and the Kruskal–Wallis test for non-normally distributed data. Within-group comparation of self-efficacy scores over time (pretest-posttest1, pretets-posttest2, posttest 1-posttest 2), post hoc tests were used for normally distributed data, and the Wilcoxon test was employed for non-normally distributed data. Between-group comparison of self-efficacy scores over time, one-way ANOVA followed by Post Hoc analysis was used for normally distributed data, while the Kruskal–Wallis test followed by the Mann–Whitney U test was used for non-normally distributed data. Baseline imbalances (eyedrop experience p=0.007, difficulty p=0.013) adjusted via ANCOVA. A p-value < 0.05 was considered statistically significant.

RESULT

In total of 30 participant included into analysis (Table 1), a total of 53.3% of participants had previously used eyedrops, 90% stated they had never received education on the correct way to use eyedrop, and 80% of participants reported experiencing difficulty in using eyedrops. About 83.3% of the participants owned a smartphone with internet connection, but only 13.3% had watched educational video on how to use eyedrops online or offline. Significant differences were observed in two variables: previous experience with using eyedrops was notably lower in the VEG group compared to the other groups (p = 0.007), and difficulty in using eyedrops was more frequently reported among participants in the VEG and DEVG groups (p = 0.013).

Table 1. Demographic characteristic of participants

Variable	Group			n=30	p
	DEG (n=10)	VEG (n=10)	DEVG (n=10)		
Age- mean (min-max)	52 (18 – 65)	36,5 (27 – 64)	51 (18 – 65)	47.5 (18-65)	0,900‡
Gender-					
Male	60%	50%	60%	59.7%	0,873£
Female	40%	50%	40%	43.3%	
Education					
Illiterate	20%	10%	0%	19%	0,179£
Primary	50%	0%	40%	30%	
Intermediate	10%	20%	10%	13.3%	
Higher	20%	70%	50%	46.7%	
Previous use of eyedrop					
Yes	90%	20%	50%	53.3%	0,007£*
No	10%	80%	50%	46.7%	
Has difficulty using eyedrop					
Yes	50%	90%	100%	80%	0,013£*
No	50%	10%	0%	20%	
Received education on eyedrop application technique					
Yes	20%	10%	0%	10%	0,329£
No	80%	90%	100%	90%	
Have watched an educational video about eyedrop thecnique before					
Ye	10%	20%	10%	13.3%	0,749£
No	90%	80%	90%	86.7%	
Have smartphone with internet connection					
Yes	0%	10%	0%	83.3%	0,355£
No	100%	90%	100%	16.6%	

Note: ‡ Kruskal-Wallis; £ Chi-Square; Baseline imbalances adjusted via ANCOVA

* Significant (p < 0,05)

Table 2. Self-Efficacy Scores Across Time Points and Groups

Group	Self-efficacy scores			p
	Pre-test (Mean ± SD)	Post-test 1 (Mean ± SD)	Post-test 2 (Mean ± SD)	
DEG (n = 10)	6,10 ± 0,99	10,80 ± 1,40	9,50 ± 1,65	<0,001¶*
VEG (n = 10)	6,00 ± 1,49	11,70 ± 1,16	10,90 ± 1,85	<0,001¶*
DEVG (n = 10)	6,70 ± 1,16	11,70 ± 0,82	11,70 ± 0,95	<0,001¥*
p	0,382‡	0,220‡	0,012§*	

Note: * Significant (p < 0,05); ¶ Friedman; ¥ Repeated Anova; ‡ Kruskal-Wallis; § One Way Anova

Within-group changes over time

All intervention groups showed significant improvements in self-efficacy scores from pre-test to post-test 1 ($p < 0.05$), and these improvements remained significant at post-test 2 compared to pre test ($p < 0.05$; Supplementary Table S3). In DEG, self-efficacy scores decreased significantly between post-test 1 and post-test 2 ($p = 0.018$), although post-test 2 scores remained higher than baseline. In contrast, the Video-Based Education Group (VEG) showed no significant change between post-test 1 and post-test 2 ($p=0.053$), while DEVG maintained or slightly increased self-efficacy scores over the two-week follow-up.

Between-group comparisons

There were no significant differences between groups at pre-test or post-test 1 ($p > 0.05$). At post-test 2, a significant difference in self-efficacy scores was observed among the three groups (One Way Anova test, $p = 0.012$). Post hoc analysis revealed that the DEVG group had significantly higher self-efficacy scores compared to the DEG group ($p = 0.003$; Supplementary Tables S4).

DISCUSSION

Low health literacy has been associated with poor adherence to topical glaucoma therapy, often due to incorrect dosing, timing errors, and improper self-administration.[15,16] Consistent with previous reports, most participants in this study had never received formal instruction on eyedrop use and experience difficulty instilling drops correctly, indicating a substantial educational gap, which potentially cause improper application and poor adherence.

Self-efficacy is one of the key factors influencing medication adherence, particularly in eyedrop therapy. They need to not only commit to regular use but also feel confident in administering the drops correctly.[17] But confidence in eye drop technique does not always translate into quality self-application.[18] Maria Achilleos stated that interventions should be designed to increase patient medication self-efficacy through proper eye-drop techniques.[15] The intervention in this study was developed from literatures of recommended eyedrop practices, incorporating essential elements of medical safety and comfort (checking packaging, reading instructions, ensuring the dropper tip is not damaged, wiping away excess medication), hygiene technique (hand washing, opening the cap without touching the tip, holding the dropper without touching the eye), correct instillation technique (tilting head back, pulling down lower eyelid, instilling one drop only), also drug absorption optimization (punctal occlusion, closing eyes for 1–2 minutes). The intervention also applying dual-channel sensory input (visual and auditory sensory) in line with multimedia learning theory. However, this study did not assess participants' prior knowledge of their eye condition, which may have influenced their confidence and technique.

All intervention groups showed significant improvement from baseline; however, differences emerged in retention over time. A common feature across the groups was the use of dual-channel sensory input (visual and auditory). According to Mayer's Cognitive Theory of Multimedia Learning, sensory memory briefly stores visual and auditory information, which then enters working memory where learners actively process and organize the material before it is transferred into long-term memory.[19] Dual-channel processing reduces cognitive load and strengthens retention, which explains why all three interventions produced significant improvement.[19]

In this study, the DEG experienced a decline at two weeks, while the VEG remained stable, and the DEVG demonstrated the most sustained improvement. These findings indicate superior skill retention in the VEG and DEVG reflecting higher self-efficacy. The educational video appears to have helped participants overcome their initial inexperience, increase the interest and gains focus. In the other hand, the fact that participants in the VEG were less experienced at baseline, therefore it had more room to improve. As The DEVG achieved the most sustained gains, it indicates that combining direct instruction with video reinforcement may be the most effective approach.

Bandura identifies four main sources of successful self-efficacy: mastery experience, vicarious experience, verbal persuasion, and physiological states.[5] In the DEG, patients gained mastery experience by practicing under direct supervision and received verbal persuasion from their health provider. In the VEG, patients benefited from vicarious experience by watching the video and text demonstration and listening to the accompanying explanation. The DEVG combined all three sources, offering direct guidance, modeling, and reinforcement, which explains why this group showed the most sustained improvement. These findings are consistent with longer-duration studies, such as Lee et al., who reported that educational video and self-video feedback improved glaucoma patients' instillation technique, and the SEE in-person coaching program, which enhanced both technique and self-efficacy through motivational interviewing.[4,20] Together, these studies support the robustness of video-based and hybrid education in ophthalmology.

The decline observed in the DEG at two weeks reflects the principle of Ebbinghaus' Forgetting Curve, which shows that newly learned information is rapidly lost when there is no rehearsal or reinforcement.[21]Ebbinghaus demonstrated that humans tend to forget up to half of newly acquired knowledge within days unless they actively review it.[21] Direct education, by its nature, is a single exposure: patients watch and listen to their provider once, and after the session ends, there is no opportunity to revisit the material.[22] Verbal persuasion can convince individuals to believe they are capable of performing behavior, but the self-efficacy expectation around through verbal persuasion usually are not as strong as those produced though various experience or performance.[5] This makes direct education more vulnerable to rapid memory decay, especially when patients are distracted, have limited attention spans during intervention, or do not regularly repeat the task.

Several limitations of this study should be acknowledged. First, baseline differences, a possibility of a Hawthorne effect (recording awareness), and lack of blinding may have introduced bias.[23] Second, small sample size, a single center study, and short follow-up (2 week) limit generalizability. Future multicenter RCT with larger samples and longer period are recommended. Providing patients with opportunities to rewatch educational videos at home or during follow-up visits could enhance retention as Mayer's Cognitive Theory of Multimedia Learning.[19,21]

CONCLUSION

Short instructional videos significantly improve self-efficacy in eyedrop applications, with hybrid DEVG showing most stable retention. Despite methodological limitations, findings support video-based education as practical solution for busy ophthalmology clinics. . The hybrid approach observed in the DEVG group may be particularly valuable for first-time users, as it combines the reassurance of human interaction with the repeatability and reinforcement offered by multimedia.

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