

INTERVENTION STUDY ON PHARMACISTS' KNOWLEDGE AND COUNSELLING ON OPHTHALMIC PREPARATIONS IN A TERTIARY HOSPITAL IN SOUTH-WESTERN NIGERIA

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ABSTRACT

The study aimed to assess hospital pharmacists' knowledge and counselling on ophthalmic preparations before and after an educational intervention was carried out. A cross-sectional study was carried out among 83 pharmacists working at the University College Hospital, Ibadan, Nigeria. A 30-item semi-structured questionnaire was administered to participants to assess their background knowledge and counselling points on use of ophthalmic preparations. An educational intervention was carried out among the pharmacists to address the gaps discovered. Post-intervention assessment of the pharmacists' knowledge and counselling on ophthalmic preparations was done a month after the educational intervention to evaluate the impact of the intervention. Data obtained was summarised using descriptive statistics and inferential statistics. Level of significance was set at $p < 0.05$. Response rate was 79% (83/105). Fifty-six (67.5%) participants were female and 38 (45.7%) had other educational qualification(s) aside from the basic Bachelor of Pharmacy qualification. The average knowledge scores of the pharmacists on ophthalmic preparations increased from 2.55 ± 1.602 at baseline to 7.93 ± 2.879 post-intervention ($p < 0.001$). Also, the average counselling scores of the pharmacists on ophthalmic preparations increased from 8.12 ± 1.603 at baseline to 11.46 ± 1.0277 post-intervention ($p < 0.001$). Years of working experience and postgraduate education were predictors of participants' knowledge and counselling on ophthalmic preparations. The study addressed the knowledge and counselling gaps identified and there was significant improvement in the knowledge and counselling of the study participants, vis-à-vis ophthalmic preparations.

Keywords: Ophthalmic preparations, Pre-post intervention study, Hospital pharmacists, Knowledge assessment, Counselling assessment

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INTRODUCTION

The physician-patient proportion is yet to be within the recommendation of the World Health Organization (WHO). Because of the shortage of ophthalmologists, insufficient time is devoted to patients and this may affect the depth of explanations offered as regards their medications (Umar, Oche and Umar 2011; Megbelayin *et al.* 2013). Pharmacists that have not been thoroughly exposed to ophthalmic medication administration training might not be in a vantage position to fill in this gap to offer appropriate counselling to patients on ophthalmic preparations (Megbelayin *et al.* 2013).

Medication adherence is yet a major drug therapy problem in ophthalmology, with majority of patients self-administering their ophthalmic medications (Gupta *et al.* 2012). Application technique, cost, patient education and health literacy are some of the factors responsible for adherence level among patients on ophthalmic preparations (Friedman *et al.* 2008; Juzych *et al.* 2008; Lacey, Cate and Broadway 2009). Improved patient medication adherence reduces needless expenditure on the entire healthcare system (Sachdeva *et al.* 2020).

Inappropriate application of ophthalmic preparations can potentially lead to pharmacotherapeutic failure. For patients on long-term use for an asymptomatic disease, such as glaucoma, adequate administration technique is critical to curb disease worsening (McVeigh and Vakros 2015). Tatham and colleagues (2013) stated that patient education on ophthalmic preparation administration is associated with improved administration technique. Pharmacists' involvement in patient education on administration technique for ophthalmic preparations is vital, considering today's overwhelmed hospital settings. Several studies found out that numerous patients receive little or no training on self-administration of ophthalmic preparations prescribed for them (Gupta *et al.* 2012; Tatham *et al.* 2013; Castel *et al.* 2014; Sleath *et al.* 2015; Sayner *et al.* 2016).

Worse still, patients with inappropriate ophthalmic drop administration skill were mostly unaware of this fact. Majority of patients overrate their administration technique for ophthalmic preparations (Lampert *et al.* 2019). Aside from educating patient on the appropriate ophthalmic drop instillation procedure, reinforcement of the correct technique should occur during refills and this will enhance medication adherence (Flach 2008; Lampert *et al.* 2019).

This study aimed at evaluating the knowledge and counselling practice of pharmacists on ophthalmic preparations with a view to carrying out an intervention to bridge any gap discovered. This becomes necessary to ensure that pharmacists are properly positioned to fill the counselling needs of patients on ophthalmic preparations.

METHODS

Study Design and Setting

The research was a cross-sectional study. The study took place at the Pharmacy Department of the University College Hospital, Ibadan, Oyo State, Nigeria. The hospital is a 950-bed tertiary healthcare institution that serves as a major referral centre in Nigeria. The University College Hospital is involved in healthcare service delivery, training of healthcare professionals and various clinical research activities.

Study Population

Pharmacists working at the Department of Pharmacy, University College Hospital, Ibadan were recruited for the study. Total sampling of the entire sampling frame of 105 pharmacists was done, considering the interventional nature of the study. Pharmacy students on experiential training were excluded from the study.

Design and Validation of Data Collection Instrument

The 30-item semi-structured questionnaire used for data collection was designed by the investigators after extensive literature review on ophthalmic preparations. The questionnaire was divided into three sections: (1) Section A addressed the demographic information and family history of the participants. Some of the questions included educational qualification(s), years of professional experience as hospital pharmacist, university attended for pharmacy training, hospital cadre, family history of ophthalmic preparation use and participants' medical history on ophthalmic-related medications; (2) Section B addressed participants' knowledge of ophthalmic preparations. Some of the responses had 'Yes' and 'No' options while others were open-ended responses and (3) Section C addressed the participants' counselling points on the use of ophthalmic preparations. There were both 'Yes' and 'No' options and open-ended responses.

The research tool was reviewed for content validity by two faculties in the Department of Clinical Pharmacy and Pharmacy Administration, Faculty of Pharmacy, University of Ibadan. The questionnaire was pre-tested among five pharmacists at the study centre for face validity. The responses from the pre-test were not included in the final analysis for the study. Adjustments were made to the questionnaire based on the content and face validity.

The responses were awarded one point for each correct response and zero point for each incorrect response. The total obtainable score for the knowledge assessment of ophthalmic preparations was 13 points. The open-ended responses to the counselling tips as regard ophthalmic drops administration steps was scored with each correct step awarded a point and each incorrect step awarded zero point. The total obtainable score was 11 points. The scores for the pharmacists' knowledge and counselling assessment were converted to percentages and categorised as follows: 0%–49.9% = below average; 50.0%–69.9% = satisfactory; 70.0%–89.9% = good and 90.0%–100.0% = excellent.

The ophthalmic preparation instillation procedure adapted for the study was based on the study by McVeigh and Vakros (2015). The step-by-step procedures are as follows:

1. Wash your hands with soap and water. Dry your hands with a clean towel.
2. Shake the eye drop container gently.
3. Remove the cap of the eye drop bottle and rest it on a clean tissue.
4. Do not touch the dropper tip with your hand or any object. Eye drops must stay clean.
5. Quickly turn the bottle upside down.
6. Place the back of your thumb against your forehead, above the eye receiving the drop.
7. Tilt your head backward with both eyes open and look at a point on the ceiling.
8. Pull your lower lid down gently to form a pocket for the drop.

9. Squeeze the bottle lightly to allow the drop to fall into the pocket.
10. Close your eyes without squeezing them. Keep your eyes closed and gently blot them with a clean tissue. With your eyes closed, gently press on the inner part of your eyes for 30 sec. This keeps the medication in contact with the eye longer.
11. Replace the cap on the eye drop bottle.

Data Collection Procedure

The 30-item semi-structured questionnaire was administered to the study participants at their different units and collected immediately because of the assessment nature of the questionnaire. This was done at baseline and at 1-month post-intervention. The questionnaire took an average of 20 min to complete.

Educational Intervention

An educational intervention was carried out to address the knowledge and counselling gaps discovered after the analysis of the baseline data. The content of the educational intervention materials was developed after extensive literature search and was validated by two faculties in the Department of Clinical Pharmacy and Pharmacy Administration, Faculty of Pharmacy, University of Ibadan. The educational intervention comprised didactic lectures on ophthalmic preparations, as well as demonstration of the application of ophthalmic preparations. Theoretical basis for some steps in ophthalmic administration, such as punctal occlusion, was addressed. This lasted for about an hour.

Data Analysis

Data was analysed using SPSS version 20 for Windows. Data was summarised using descriptive statistics like frequency count, percentage, mean and standard deviation. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. Independent-samples *t*-test was used to test the significance of the difference between the mean assessment scores for pharmacists who had only Bachelor of Pharmacy qualification and those with additional qualification. The impact of the intervention on participants knowledge and counselling on ophthalmic preparations was evaluated using paired-samples *t*-test, which compared the mean pre- and post-intervention assessment scores. Analysis of variance was carried out to compare the assessment scores of the pharmacists with their categorised years of hospital experience. Significance level for inferential statistics was set at $p < 0.05$.

Ethical Approval

Research protocol was approved by the joint University of Ibadan and University College Hospital Ethics Committee at the Institute of Research and Advanced Training building, College of Medicine, Ibadan. The approval number obtained was UI/EC/16/0034.

RESULTS

The response rate was 79%; 83 out of 105 pharmacists took part in the study. Majority of the study participants were females 56 (67.5%). Other demographic characteristics of the participants is as shown in Table 1. Only 11 (13.3%) pharmacists had a family history of long-term use of ophthalmic preparations; 18 (21.7%) had not used an ophthalmic preparation before while only 2 (2.4%) were currently on long-term use of an ophthalmic preparation.

Table 1: Demographic characteristics of study participants (*N* = 83).

Variables		Frequency (%)
Educational qualification(s)	B. Pharm only	45 (54.3)
	B. Pharm and M. Sc.	14 (16.8)
	B. Pharm and PharmD	3 (3.6)
	B. Pharm and FPCPharm	12 (14.5)
	B. Pharm, M. Sc. and PhD	1 (1.2)
	B. Pharm, M. Sc. and MBA	1 (1.2)
	B. Pharm, M. Sc. and FPCPharm	6 (7.2)
	B. Pharm, Pharm. D and FPCPharm	1 (1.2)
Hospital cadre	Intern Pharmacists	21 (25.3)
	Pharmacist Grade I	23 (27.7)
	Senior Pharmacist	18 (21.7)
	Chief Pharmacist	10 (12.0)
	Assistant Director of Pharmaceutical Services	11 (13.2)
Years of hospital working experience	0–5	44 (53.1)
	6–10	20 (24.1)
	> 10	19 (22.8)

Notes: B. Pharm = Bachelor of Pharmacy; M. Sc. = Master of Science; PharmD = Doctor of Pharmacy; FPCPharm = Fellow of West African Postgraduate College of Pharmacists; PhD = Doctor of Philosophy; MBA = Master of Business Administration.

There was an improvement in the knowledge assessment scores of the study participants on ophthalmic preparations post-intervention. While majority of the participants had 'satisfactory' knowledge score category pre-intervention, majority had 'good' knowledge score category post-intervention. The mean score pre-intervention was 8.12 ± 1.603 , while the mean score post-intervention was 11.46 ± 1.028 . Table 2 shows detailed information on the results from the knowledge assessment of the pharmacists on ophthalmic preparations. Figure 1 describes the percentage of study participants that had specific knowledge scores pre- and post-intervention.

Table 2: Study participants' knowledge of ophthalmic preparations.

Questions	Frequency (%) of correct responses	
	Pre-intervention	Post-intervention
Do ophthalmic preparations have systemic side effects?	57 (68.7)	75 (90.4)
The ocular contact time of eye drops and eye ointments are the same	81 (97.6)	82 (98.8)
Can eye drops be applied on a soft contact lens?	68 (81.9)	79 (95.2)
Is it compulsory for patients to always wash their hands before and after applying eye drops?	76 (91.6)	81 (97.6)
Is it important to gently shake the bottle before use?	34 (41.0)	78 (94.0)
Eye drops should be applied in the pocket created in the lower eye lid	65 (78.3)	83 (100.0)
The tip of the eye drop bottle should touch the eyes gently to facilitate accurate drop application	78 (94.0)	78 (94.0)
Eye drop bottles are better kept on a table in the bedroom as a reminder for prompt application	47 (56.6)	49 (59.0)
How long should a patient wait if he must apply more than one drop of the same eye drop?	13 (15.7)	61 (73.5)
How long should a patient wait if he must apply one drop each from two separate eye drops?	21 (25.3)	69 (83.1)
Briefly explain the punctal occlusion method	9 (10.8)	74 (89.2)
For how long can eye drops be safe for use after opening it for use?	52 (62.7)	61 (73.5)
If a patient is to use both eye drops and eye ointment, which one should be used first?	73 (88.0)	81 (97.6)
Mean knowledge score (Maximum obtainable score is 13)	8.12 ± 1.603	11.46 ± 1.028
Knowledge category		
Below average (0%–49.9%)	10 (12.0)	0 (0)
Satisfactory (50.0%–69.9%)	59 (71.1)	3 (3.6)
Good (70.0%–89.9%)	14 (16.9)	68 (81.9)
Excellent (90.0%–100.0%)	0 (0)	12 (14.5)

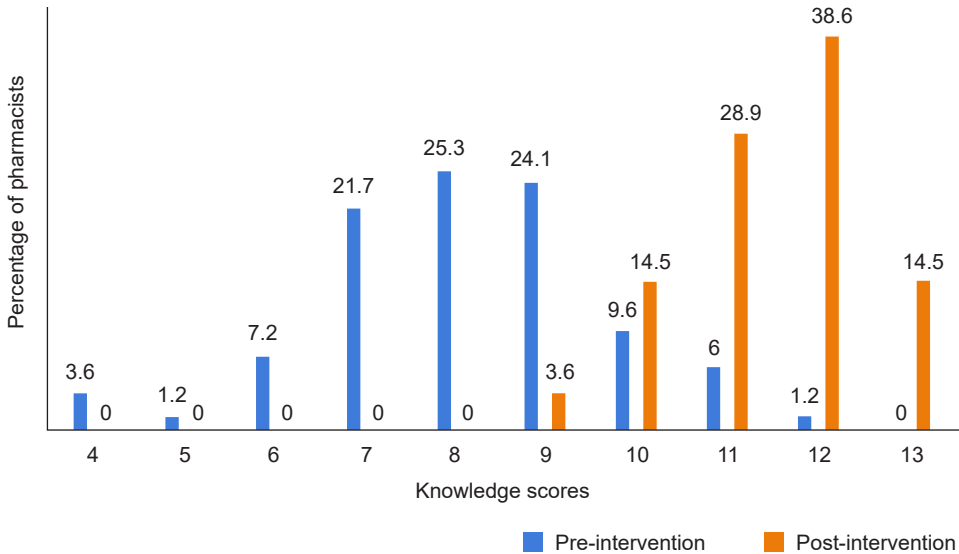


Figure 1: Pharmacists' pre- and post-intervention knowledge assessment on ophthalmic preparations.

The pre-intervention counselling assessment score category of the study participants shows that 81 (97.6%) were 'below average' and 2 (2.4%) were 'satisfactory'. For the post-intervention counselling assessment score category, 18 (21.7%) were 'below average', 16 (19.3%) were 'satisfactory', 32 (38.6%) were 'good' and 17 (20.5%) were 'excellent'. The percentage of pharmacists that gave specific number of counselling points expected for patients to whom ophthalmic preparations would be dispensed to is as shown in Figure 2. The mean scores of the pharmacists' assessment was compared with their educational qualification(s) and years of working experience and the results were presented in Table 3. Pre-intervention, participants with over 5 years of working experience displayed statistically significantly higher knowledge of ophthalmic preparations than those with 5 years of working experience and below. They also had higher scores for the counselling assessment on ophthalmic preparations than those with less than 6 years of working experience, though not statistically significant. Pharmacists with additional educational qualifications had statistically significantly higher knowledge of ophthalmic preparations than those with only the basic Bachelor of Pharmacy at the pre-intervention phase of the study.

A paired-samples *t*-test was carried out to evaluate the impact of the intervention on the pharmacists' knowledge of ophthalmic drops as well as counselling points offered patients on the steps involved in the use of ophthalmic drops. A statistically significant increase from the mean pre-intervention score (2.55 ± 1.602) to mean post-intervention score (7.93 ± 2.879 ; $t(82) = 14.700$; $p < 0.001$) for the counselling points offered patients on the steps involved in the use of ophthalmic drops. Similarly, a statistically significant increase was observed from the mean pre-intervention score (8.12 ± 1.603) to the mean post-intervention score (11.46 ± 1.0277 ; $t(82) = 15.524$; $p < 0.001$) for the knowledge assessment of pharmacists on ophthalmic preparations.

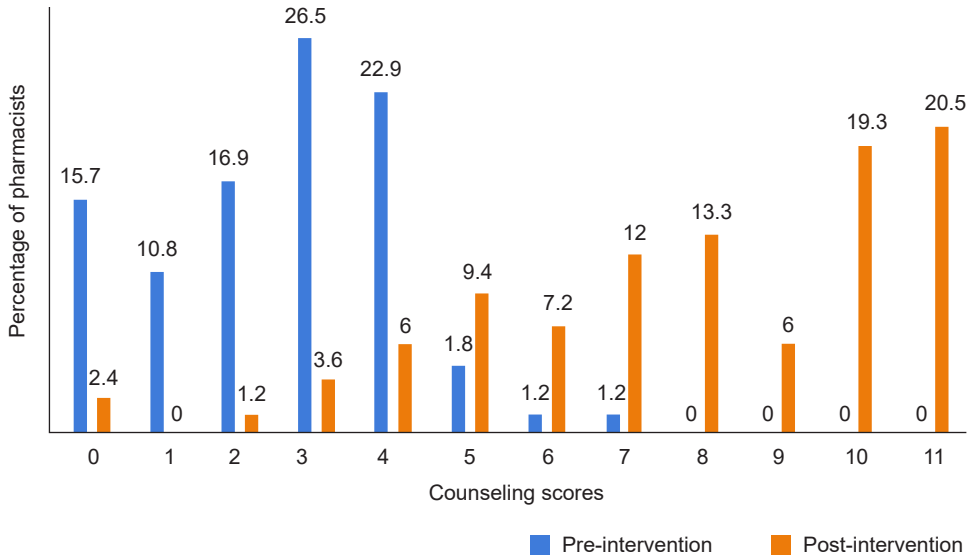


Figure 2: Pharmacists' pre- and post-intervention counseling assessment on ophthalmic preparations.

Table 3: Comparison of participants' assessment scores with years of experience and educational qualification.

Variables	Mean \pm SD	<i>p</i> -value	Mean \pm SD	<i>p</i> -value
	Pre-intervention		Post-intervention	
Years of experience				
Knowledge assessment	0–5 (<i>n</i> = 44)	7.25 \pm 1.69	< 0.01 ^{ab}	11.61 \pm 1.07
	6–10 (<i>n</i> = 20)	8.70 \pm 1.35		11.44 \pm 0.80
	> 10 (<i>n</i> = 19)	8.43 \pm 1.40		11.32 \pm 1.19
Counseling assessment	0–5 (<i>n</i> = 44)	2.14 \pm 1.35	0.19 ^b	7.64 \pm 2.39
	6–10 (<i>n</i> = 20)	2.93 \pm 1.57		7.59 \pm 3.04
	> 10 (<i>n</i> = 19)	2.61 \pm 1.81		8.54 \pm 3.16
Educational qualification				
Knowledge assessment	B. Pharm only (<i>n</i> = 45)	7.76 \pm 1.65	0.02 ^{ac}	11.51 \pm 0.97
	Additional qualification (<i>n</i> = 38)	8.55 \pm 1.45		11.39 \pm 1.10
Counseling assessment	B. Pharm only (<i>n</i> = 45)	2.71 \pm 1.50	0.34 ^c	7.44 \pm 2.65
	Additional qualification (<i>n</i> = 38)	2.37 \pm 1.72		8.50 \pm 3.07

Notes: ^aStatistically significant; ^bAnalysis of variance; ^cIndependent-samples *t*-test; SD = Standard deviation

DISCUSSION

Baseline evaluation of the participants' knowledge and counselling on ophthalmic preparations revealed a satisfactory knowledge level but a below average counselling level. Greater than 5 years working experience and additional education influenced participants' preintervention knowledge and counselling on ophthalmic preparations. The knowledge and counselling gaps discovered at baseline were addressed by an educational intervention which led to significant improvements in both the knowledge and counselling of the study participants.

Approximately one-third of the study participants did not know that ophthalmic preparations could have systemic side effects. It was not surprising to find out that only around one-tenth of participants in this study understood punctal occlusion, a procedure required to reduce systemic side effects of eye drops. A similar result was reported in a study by Megbelayin and colleagues (2013), who reported that majority of the study participants did not understand punctal occlusion.

Only roughly a quarter of the participants knew the waiting time between two ophthalmic drops' application. A study carried out among patients in 136 community pharmacies in Belgium revealed that 24.3% of the patients did not observe the waiting period of 5 min while instilling two eye drops (Mehuys *et al.* 2020). Not allowing time for proper distribution of an instilled eye drop before instilling another could lead to wastage of the medication and therapeutic failure because of non-uptake of the medication applied. About one-tenth did not know that eye drops should be applied before eye ointments. Eye ointments are usually applied before bedtime. If an eye drop is applied after the application of an eye ointment, it will reduce the space for the eye drop later applied and compromise therapeutic effect of the same.

Years of working experience and postgraduate education are predictors of knowledge and counselling on ophthalmic preparations in this study. It is important to encourage hospital pharmacists to engage in postgraduate education for knowledge update and reinforcement. Aje and Aina (2020) carried out an intervention study in the same study population and reported that years of working experience and postgraduate education influenced their knowledge and counselling on metered dose inhalers and nebulizers.

Megbelayin and colleagues (2013), in a study carried out among 30 pharmacists reported that majority, 23 (76.7%) were either unaware or disagreed with the potential benefit of punctal occlusion following eye drop application.

Majority of the participants knew that the tip of ophthalmic preparations should not touch the eye. Touching the eye with the tip of the eye drop bottle is a difficulty some patients face while administering ophthalmic preparations (Stone *et al.* 2009; Gupta *et al.* 2012). Between 18.2% and 80% of patients contaminated their eye drops by touching it with their eyes and faces, as reported by a recent study (Davis *et al.* 2018).

Majority of the study participants had below the average performance in counselling points for ophthalmic preparations. Specific educational intervention on ophthalmic preparations is vital for pharmacists who interphase with patients who access ophthalmic preparations. Weekes and Ramzan (2020) stressed the importance of patient counselling. Pharmacists need to demonstrate proper ophthalmic preparation of administration technique and to observe that patients had practiced it in a proper way (Weekes and Ramzan 2020). This will improve the pharmacotherapeutic benefits of ophthalmic preparations.

In a study carried out in German community pharmacies, intervention group which received repeated training on administration steps missed for ophthalmic preparations eventually became perfect at it (Lampert *et al.* 2019). Patients in the control group only received an initial training, but that was not good enough to make them perfect at their ophthalmic preparation administration. Majority of patients overrate their administration technique for ophthalmic preparations (Lampert *et al.* 2019). This obviously shows that pharmacists, both in community pharmacies and hospitals, have a lot to do for patients to become perfect at administering their ophthalmic preparations. Administration techniques should be evaluated during refill until they show optimal application technique.

The knowledge and counselling gaps identified at baseline were addressed by the educational intervention and appreciable improvement was observed postintervention. However, it is important to note that a one-off educational intervention may not be sufficient to sustain the improvement observed. Regular updates will be useful.

The study is not without limitations. Evaluation of the participants was questionnaire-based. It could have been better to further evaluate them by observing them while attending to patients. The results from the study cannot be generalised to pharmacists in Nigeria since it was only carried out in one tertiary hospital.

CONCLUSION

Baseline ophthalmic preparation knowledge of the pharmacists in the study population was satisfactory, while their counselling was below average. Years of working experience and postgraduate education were predictors of knowledge and counselling on ophthalmic preparations. A significant improvement was observed after the educational intervention offered during the study.

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