DOI: 10.7860/JCDR/2026/88665.23682

Original Article

Pharmacology Section

Effectiveness of an Educational Intervention on Community Pharmacists' Knowledge, Attitudes, and Dispensing Practices Regarding Topical Corticosteroids in North Kerala, India: A Quasi-experimental Study

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ABSTRACT

Introduction: Topical Corticosteroids (TCs) are essential in dermatological care, offering rapid relief for inflammatory skin conditions. However, irrational use- including inappropriate potency selection, unsupervised application, and cosmetic misuse- remains widespread, leading to adverse effects and treatment failure. Community pharmacists, given their accessibility and frequent patient contact, are well-positioned to promote rational TC use through informed dispensing and patient education. Yet, gaps in knowledge and practice persist often driven by attitudinal and regulatory challenges.

Aim: To evaluate the effectiveness of a structured educational intervention in enhancing community pharmacists' knowledge, attitudes, and dispensing practices related to TCs and their combinations in North Kerala, India.

Materials and Methods: A quasi-experimental study was conducted among 60 community pharmacists from north Kerala using a validated 21-item questionnaire covering three domains: knowledge (five-items), attitude (four-items), and practice (seven items)-along with four demographic questions and one demographic identifier, during January 2025 to June 2025. The intervention comprised a focused training module addressing rational TC use, regulatory guidelines, Adverse Drug Reactions (ADR), and patient counselling. Statistical analysis included McNemar's test for paired nominal data and the Wilcoxon signed-rank test for ordinal responses.

Results: Post-training, significant improvements were observed in all domains. Knowledge scores increased markedly, with correct responses regarding the mechanism of action increased from 42.86% to 83.93% (p-value <0.001). Attitudinal shifts included enhanced information-seeking behaviour (from 10.71% to 53.57%) and a notable reduction in financial motivation influencing dispensing decisions p-value <0.001). Practice behaviours improved substantially: the previously widespread habit of dispensing TCs without a valid prescription showed a sharp decline following the intervention (p-value <0.001), and patient counselling practices increased significantly (from 17.86% to 78.57%, p-value <0.001). A significant improvement was observed in pharmacists' attitude toward informing patients about adverse drug reactions during dispensing, increasing from 12.5% (7/56) pre training to 76.8% (43/56) post-training (p-value <0.001).

Conclusion: The intervention significantly improved pharmacists' competence in rational TCs dispensing and patient-centered care. Incorporating such modules into continuing professional development could strengthen primary-care pharmacotherapy and reduce irrational medication use.

Keywords: Drug safety, Pharmacist information booklet, Pharmacy education, Rational dispensing

INTRODUCTION

The TCs are widely used in dermatology because they reduce inflammation and suppress immune reactions in many skin conditions. By acting on glucocorticoid receptors and lowering inflammatory cytokines, they help relieve redness, itching, and scaling, which improves symptoms and patient comfort [1]. However, their safe use depends on choosing the right potency, correct formulation, proper duration, and regular monitoring to avoid local and systemic side-effects.

Despite clear guidelines, irrational use of TCs is common in many healthcare settings [2]. People often use them without medical supervision, select high-potency products unnecessarily, or apply them for cosmetic purposes such as skin lightening [3]. These practices can lead to several local problems, including skin thinning, purpura, stretch marks, acne-like eruptions, and perioral dermatitis [4]. In some cases, systemic absorption may cause serious effects such as iatrogenic Cushing's syndrome, growth retardation in children, and Hypothalamic-Pituitary-Adrenal (HPA) axis suppression, especially when large areas are treated or occlusion is used. Furthermore, abrupt cessation can trigger rebound flares, complicating long-term management [5]. Multiple factors drive this pattern of misuse. Patients frequently seek rapid symptomatic relief and may demand the most potent formulations. Pharmaceutical marketing can encourage dispensing of fixed-dose combinations of corticosteroids with antibiotics or antifungals preparations often lacking evidence-based indications and further escalating risks of microbial resistance [6]. In many parts of India, weak regulatory enforcement allows prescription-only TCs to be sold without proper oversight. Across India, patients commonly bypass medical consultations, obtaining TCs directly from community pharmacists based on non medical advice from acquaintances or online sources [7].

Community pharmacists play an important role in primary healthcare. Their frequent contact with patients gives them opportunities to guide rational medicine use, identify inappropriate dispensing, and refer patients to dermatologists when needed [8].

Trained pharmacists can check prescription validity, teach correct application methods such as fingertip units, and advise patients about avoiding unnecessary occlusion [9]. They can also help patients recognise early signs of adverse effects and encourage safe use. However, irrational dispensing of TCs continues due to gaps in knowledge, underestimation of risks, and attitudinal barriers such as pressure to satisfy customers or increase sales [10]. Without proper training, these practices become routine and contribute to treatment failure and dermatological complications. Continuing Professional Education (CPE) programme have been shown to improve pharmacists' knowledge and skills in areas such as inhaler technique, antibiotic use, and diabetes care [11]. Similar structured programme focusing on TCs are limited, especially in developing countries where misuse is more common. There is a clear need for targeted training that strengthens pharmacists' understanding of TCs and promotes safe dispensing practices [12].

Community pharmacists are well-positioned to support rational TC use due to their accessibility and frequent patient interactions. The study evaluated an educational intervention aimed at improving pharmacists' knowledge, attitudes, and practices in North Kerala, India. Structured training programme for community pharmacists on rational TC use are scarce in India, and this work specifically addresses the practical challenges observed in this region. This study is part of a larger project examining TC use in the community, including prescription patterns, dispensing practices, potency-class selection, and appropriateness of use [11]. The broader project also involves assessing knowledge, attitudes, and practices related to TCs dispensing, of which the present educational-intervention study forms one component.

MATERIALS AND METHODS

This pre-post quasi-experimental study was conducted during January 2025 to June 2025 among community pharmacist in North Kerala, India. Prior to the initiation of the study, hospital ethics committee clearance was obtained. (IEC No.29/2022/GMCK). The larger study was registered in the CTRI (CTRI/2023/05/053287). Before enrolment in the study, the pharmacists were explained about the study and written informed consent was obtained.

Inclusion criteria: Registered community pharmacists working in the North Kerala were included in the study.

Exclusion criteria: Pharmacists who did not provide consent were excluded from the study.

Study participants and sampling: A complete list of registered community pharmacist was collected and 60 pharmacists were selected using simple random sampling method.

The following formula was used for sample size calculation:

$$n = \frac{\left(Z_{(1-\alpha/2)} + Z_{(1-\beta)}\right)^2 * [P_1(1-P_1) + P_2(1-P_2)]}{(P_1 - P_2)^2}$$

Whereas, P1=Pre-test proportions, P2=Post-test proportions, α=Significance level, 1-β=Power. On substituting, Z1-α/2=1.96 corresponding to 5% level of significance, Z1-β=1.28, corresponding to 90% power, P1 and P2 are 0.41, 0.72, respectively [13]. The minimum sample size was calculated to 48.46. Adding 20% non-response, sample size=58.15≈60. The study included 60 community pharmacists for the training programme.

Study Procedure

From the list of 701 registered community pharmacists obtained from a professional organisation, 60 pharmacists were selected through simple random sampling and were contacted for the pre-test and the lecture-based training session for three hours conducted in Kannur district. Three months after the training, post-training changes were assessed using the same questionnaire. Participants attended the training led by the pharmacy practice faculty. The training was provided using a validated Pharmacist Information Booklet on TCs. The training was based on the content of the booklet and covered the mechanism of action, approved dermatological indications, common local and systemic side-effects, ADR -reporting pathways, regulatory requirements for dispensing, and appropriate counselling strategies.

To ensure methodological rigor and alignment with the study objectives, both the Pharmacist Knowledge-Attitude-Practice (KAP) questionnaire and the Pharmacist Information Booklet on TCs underwent a structured validation process prior to their use. A panel of five subject-matter experts- comprising clinical pharmacists, dermatologists, and academicians with demonstrated experience in TC use- was invited to evaluate the content of the questionnaire and the training booklet. Experts were selected based on their clinical expertise, research experience, and familiarity with corticosteroid use.

Each expert independently reviewed the materials for clarity, relevance, completeness, and appropriateness. The validation process employed the Content Validity Ratio (CVR) and Content Validity Index (CVI) to quantify expert consensus. For each item, experts indicated whether it was essential, or not necessary. CVR was calculated using the standard formula. A minimum CVR value of 0.99 was adopted as the critical threshold for panels of five experts, as recommended in methodological literature [14]. All items in both the KAP questionnaire and the training booklet achieved a CVR of 1.0, indicating unanimous agreement on their essentiality. The CVI, calculated as the average CVR across all items, was also 1.0, demonstrating excellent overall content validity for both tools.

Assessment of Knowledge, Attitude and Practice (KAP)

A validated 21 item questionnaire covering three domains: knowledge (five-items), attitude (four-items), and practice (seven items)—along with four demographic questions and one demographic identifier. Each item in the knowledge domain evaluated a distinct aspect of TC-related knowledge, including the mechanism of action, approved dermatological indications, adverse effects, regulatory guidelines, and ADR reporting protocols. The items in the attitude domain evaluated pharmacists' tendencies to seek updated information, share knowledge with peers, caution patients about irrational use, and influence the financial motivation on dispensing behaviour. The items specifically evaluated practice such as dispensing without a valid prescription from a Registered Medical Practitioner (RMP), dispensing based on reused tubes or outdated prescriptions, and the extent of patient-centered services, including drug information, counselling, and ADR communication. The assessment was carried out immediately before training (pre-test) and three months later (post-test).

STATISTICAL ANALYSIS

Statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) version 29.0. Knowledge, and practice changes in item-level responses were evaluated using McNemar's test for paired nominal data. Attitude changes were assessed using the Wilcoxon signed-rank test. A two-tailed p-value <0.05 denoted significance.

RESULTS

A total of 60 community pharmacists were enrolled, and 56 (93.3%) completed the post-training assessment. Four pharmacists (6.7%) did not complete the post-training assessment because they had been relocated from their workplace and could not be reached for follow-up contact. The mean age of participants was 36.8±10.3 years and most were female. The majority held a Diploma in Pharmacy, and one-third had 11-20 years of professional experience. The demographic characteristics are summarised in [Table/Fig-1].

Impact of training on knowledge: The training produced substantial improvements across all five knowledge domains. Before training,

Variable		n (%)
Gender	Male	18 (32.14)
	Female	38 (67.86)
Age (years)	20-29	18 (32.14)
	30-39	14 (25)
	40-49	16 (28.57)
	≥50	8 (14.29)
Educational qualification	D Pharm	45 (80.36)
	B Pharm	10 (17.86)
	M Pharm	1 (1.78)
Experience as pharmacist (years)	<5	17 (30.36)
	6-10	9 (16.07)
	11-20	19 (33.93)
	>20	11 (19.64)

[Table/Fig-1]: Demographic details of the community pharmacist (n=56).

pharmacists demonstrated limited understanding of key concepts related to TCs, particularly adverse effects and ADR-reporting procedures. Post-training assessments showed marked gains in all areas, with a clear shift toward correct responses. McNemar's test confirmed statistically significant improvements for every item (p-value <0.001), indicating that the training effectively addressed critical knowledge gaps [Table/Fig-2].

Knowledge domain assessed	Response	Pre-Training n (%)	Post-Training n (%)	p-value
a) Mechanism of action	No	12 (21.43)	3 (5.36)	χ^2=27, <0.001
	Yes	24 (42.86)	47 (83.93)	
	Not sure	20 (35.71)	6 (10.71)	
b) Approved indications	No	6 (10.71)	1 (1.79)	χ^2=21, <0.001
	Yes	34 (60.71)	53 (94.64)	
	Not sure	16 (28.57)	2 (3.57)	
c) Adverse Drug Reactions (ADR)	No	10 (17.86)	1 (1.79)	χ^2=46, <0.001
	Yes	9 (16.07)	51 (91.07)	
	Not sure	37 (66.07)	4 (7.14)	
d) Regulatory guidelines	No	4 (7.14)	0	χ^2=17, <0.001
	Yes	39 (69.64)	55 (98.21)	
	Not sure	13 (23.21)	1 (1.79)	
e) Guidelines for ADR reporting	No	48 (85.71)	0	χ^2=52, <0.001
	Yes	4 (7.14)	54 (96.43)	
	Not sure	4 (7.14)	2 (3.57)	

[Table/Fig-2]: Pre- and post-training comparison of pharmacists' knowledge on Topical Corticosteroids (TC).
McNemar-Bowker symmetry test: p-value <0.001 for all pre- and post-training comparisons.

Impact of training on attitude: Pharmacists initially exhibited passive attitudes toward information seeking, peer communication, and patient safety. Following the training, there was a notable shift toward proactive professional behaviour, including increased information-seeking, greater willingness to share knowledge, and more consistent patient cautioning. Additionally, the influence of financial motivation on dispensing decisions decreased. Wilcoxon signed-rank and McNemar's tests demonstrated significant improvements across all attitude items (p-value <0.001), with large effect sizes for the first three domains [Table/Fig-3].

Impact of training on practice: Prior to training, several irrational dispensing practices were common, including dispensing without valid prescriptions and inadequate patient communication. McNemar test: p-value <0.001 for all pre- and post-training comparisons. Among the 47 pharmacists who dispensed medications without a prescription, 30 (63.83%) did so due to patient demand, 15 (31.91%) to promote business, and 2 (4.26%) because the individuals were regular customers. After the training, pharmacists demonstrated substantial improvements in rational dispensing and patient-centered practices, with increased provision of drug information, counselling, and ADR communication. All practice-related domains showed statistically significant positive changes (p-value <0.001), confirming the effectiveness of the training in promoting safer and more responsible pharmacy practice [Table/Fig-4]. Seven pharmacists (12.5%) indicated that patients had reported ADRs related to TCs and their combinations. It is relevant to note that only 4 (7.14%) of the 56 pharmacists had received any prior training on rational dispensing practices for TCs before this intervention.

DISCUSSION

The present study demonstrated that a structured training programme can substantially enhance community pharmacists' knowledge, attitudes, and dispensing practices related to TCs. The improvements observed across all domains highlight the value of focused educational strategies in strengthening pharmacists' competence in dermatological pharmacotherapy and promoting rational medication use.

Pharmacists initially exhibited limited understanding of key aspects of TC use, a finding consistent with earlier reports of knowledge gaps among pharmacy professionals [15,16]. Similar deficiencies have been documented in other settings such as Saudi Arabia healthcare professionals, where inadequate training contributed to uncertainty regarding indications, potency, and adverse effects [16]. Marripalli SS et al., reported that community pharmacists demonstrated substantial deficiencies in baseline knowledge, attitudes, and dispensing practices related to TCs, with more than half scoring below acceptable levels prior to training [17]. The significant post-training gains observed in the present study suggest that the training effectively addressed deficiencies in areas such as mechanism of action, approved indications, adverse effects, and pharmacovigilance procedures. Shakeel S et al., likewise emphasised the need for structured dermatology related training to improve pharmacists' clinical decision making [18]. Enhanced awareness of regulatory guidelines also reflects improved understanding of prescription only requirements and banned combinations, aligning with the concerns raised by Ashique K and Chandrasekhar D regarding the importance of regulatory literacy in preventing irrational TC use [19].

Attitude-related Domain	Response	Pre-training n (%)	Post-training n (%)	p-value
a) Seek information	Never	3 (5.36)	1 (1.79)	p<0.001, r_rb=0.73
	Rarely	9 (16.07)	6 (10.71)	
	Whenever required	38 (67.86)	19 (33.93)	
	Regularly	6 (10.71)	30 (53.57)	
b) Share knowledge with colleagues	Never	11 (19.64)	1 (1.79)	p<0.001, r_rb=0.83
	Rarely	9 (16.07)	5 (8.93)	
	Whenever required	29 (51.79)	15 (26.79)	
	Regularly	7 (12.5)	35 (62.5)	

c) Caution patients about irrational use	Never	38 (67.86)	2 (3.57)	p<0.001, r_rb=0.86
	Rarely	7 (12.5)	2 (3.57)	
	Whenever required	6 (10.71)	11 (19.64)	
	Regularly	5 (8.93)	41 (73.21)	
d) Dispensing motivated by financial benefits of the management	No	9 (16.07)	27 (48.21)	χ^2=21.4, p<0.001
	Yes	37 (66.07)	22 (39.29)	
	Not sure	10 (17.86)	7 (12.5)	

[Table/Fig-3]: Pre- and post-training comparison of attitude related to Topical Corticosteroid (TC) dispensing.
Wilcoxon signed-rank test; effect size reported as rank-biserial correlation (r_rb) (a-c); McNemar test (d)

Practice domain assessed	Response	Pre-training n (%)	Post-training n (%)	p-value
a) Dispense without prescription	No	9 (16.07)	49 (87.5)	χ^2=38.0, <0.001
	Yes	47 (83.93)	7 (12.5)	
b) Dispense with old prescription or used tube	No	20 (35.71)	48 (85.71)	χ^2=26.0, <0.001
	Yes	36 (64.29)	8 (14.29)	
c) Provide drug information services	No	52 (92.86)	14 (25)	χ^2=36.0, <0.001
	Yes	4 (7.14)	42 (75)	
d) Provide patient counselling	No	46 (82.14)	12 (21.43)	χ^2=32.0, <0.001
	Yes	10 (17.86)	44 (78.57)	
e) Inform patients about ADRs	No	49 (87.5)	13 (23.21)	χ^2=34.0, <0.001
	Yes	7 (12.5)	43 (76.79)	

[Table/Fig-4]: Pre- and post-training comparison of practice-related to Topical Corticosteroid (TC) dispensing.

Beyond knowledge, the training produced meaningful attitudinal shifts. Pharmacists demonstrated greater inclination toward information seeking, peer communication, and patient safety—behaviours essential essential for responsible dispensing. Previous studies have similarly noted that pharmacists often underprioritise continuous learning and patient education [20,21]. Barakat M et al., also reported hesitancy among healthcare professionals to counsel patients on corticosteroid risks, highlighting the need for confidence building educational interventions [22]. The reduction in financial motivation influencing dispensing decisions further indicates a shift toward ethical practice, echoing concerns highlighted by Lahiri K and Coondoo A about commercial pressures contributing to TC misuse [23]. These attitudinal changes suggest that training not only imparts knowledge but also reshapes professional values and priorities.

Improvements in dispensing practices provide the strongest evidence of the training's practical impact. The decline in dispensing without valid prescriptions and the increased provision of drug information, counselling, and ADR communication indicate a transition toward patient centered care. This is particularly relevant in settings where over the counter access and patient demand often drive inappropriate TC use. Prior research has shown that pharmacists play a pivotal role in either perpetuating or preventing misuse [24]. Kurdi SM et al., similarly reported gaps in counselling practices and inconsistent adherence to prescription requirements among community pharmacists, reinforcing the need for structured educational support [25]. The present study demonstrated that targeted training can empower pharmacists to adhere to regulatory norms and resist inappropriate dispensing pressures. Enhanced patient centered practices observed here are consistent with the recommendations of Saraswat A et al., who emphasised the importance of pharmacist involvement in dermatological safety [26]. Evidence from Hussain A et al., study also supports the effectiveness of educational interventions in improving dispensing behaviour, further validating the outcomes of the current study [27].

Several mechanisms may explain the observed improvements. First, the training provided structured, evidence-based content that directly addressed common misconceptions. Second, the interactive nature of the session may have facilitated better retention and reinforced professional responsibility. Third, the provision of a reference booklet likely supported continued learning beyond the training session. These elements collectively contributed to sustained improvements across knowledge, attitudes, and practices. Despite these positive outcomes, barriers to optimal KAP remain relevant. Pharmacists often face constraints such as limited access to continuing education, commercial pressures, inadequate regulatory enforcement, and high patient expectations for over the counter dispensing. Addressing these systemic barriers is essential for ensuring long term sustainability of the improvements achieved through training.

Limitations(s)

As the study was conducted in a single region, broader generalisability would require replication in larger and more diverse settings. The post-training assessment was conducted after three months; longer follow-up periods are needed to evaluate sustained behavioural change. Additionally, the study did not assess patient outcomes, which could provide deeper insight into the clinical impact of improved pharmacist practices.

CONCLUSION(S)

A structured training programme produced substantial improvements in community pharmacists' knowledge, attitudes, and dispensing practices related to TCs in North Kerala. The observed gains in knowledge, professional attitudes, and dispensing practices indicate that focused educational training can strengthen ethical dispensing, enhance patient safety, and promote rational pharmacotherapy. These outcomes highlight the value of integrating similar training components into continuing professional development initiatives to support responsible medication use and improve dermatological safety. The findings also emphasise the importance of training approaches that address both knowledge enhancement and attitudinal reform, enabling pharmacists to function as informed and patient centered healthcare providers. Further studies involving larger and more diverse populations are recommended to validate these results and assess long term sustainability.

Acknowledgement

Authors would like to thank Government Medical College Kannur and Nitte (Deemed to be University) for providing the research facilities.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Mar 10, 2026
- Manual Googling: May 07, 2026
- iThenticate Software: May 09, 2026 (3%)

ETYMOLOGY: Author Origin

EMENDATIONS: 7

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Mar 02, 2026**
Date of Peer Review: **Mar 26, 2026**
Date of Acceptance: **May 11, 2026**
Date of Publishing: **Jul 01, 2026**