

Knowledge, attitudes, and practice of pharmacists in opioid abuse prevention: A cross-sectional study in Mangalore, India

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Abstract: The international opioid crisis highlights the important role of pharmacists in prevention, using their availability and drug knowledge to prevent abuse. In this study, the knowledge, attitudes, and practices of Mangalore pharmacists towards preventing opioid abuse were assessed. From February to March 2025, a cross-sectional survey was done among 203 pharmacists aged 18-46 years in Mangalore using a pre-tested structured questionnaire. Data were analyzed using the Chi-square test, and thematic analysis of qualitative feedback. Pharmacists showed high knowledge, with 93.6% identifying opioids' mechanism as binding to CNS receptors correctly, 78.8% identifying naloxone's role in reversing overdose, and 70.0% knowing prescription drug monitoring programs' usefulness. Attitudes were optimistic, with 92.6% considering patient education a primary responsibility, 92.1% identifying multiple visits to the pharmacy as misuse, and 93.1% supporting medication-assisted treatment. The practice was active, with 93.1% checking prescription drug monitoring programs for suspected misuse and 69.0% advising take-back programs, but 43.8% associated early refills with misuse. Mangalore pharmacists show strong knowledge, attitudes, and practice against opioid abuse, being very strong in education and medication-assisted treatment support but having voids in misuse detection (for example, recognition of early refill) and naloxone confidence. Stronger training, better prescription drug monitoring program access, and policy adjustments can enhance their role in India's opioid strategy. Pharmacists are presented as front-line champions of opioid misuse prevention in this study, with implications for localized harm reduction.

Introduction

The opioid epidemic has turned into a characteristic public health emergency with far-reaching consequences for morbidity, mortality, and healthcare systems worldwide [1]. Opioid overdoses alone in the U.S. contributed to more than 70, 000 deaths in 2021 fueled by prescription opioids, heroin, and illicitly manufactured synthetic opioids such as fentanyl [2, 3]. It does not stop in North America; increasing abuse of prescription and illicit opioids is also seen in Europe and Asia [4]. In India, albeit less intense, heroin and tramadol addiction are on the rise, especially in urban regions, and require preventive interventions [5]. Opioids have their action via mu-opioid

receptor agonism in the CNS, but their potential for addiction and overdose is high [6]. Misuse cycles tend to begin with overprescription, inadequate patient education, and misuse of unused medication [7, 8]. Pharmacists at the front lines of healthcare can best mitigate these risks through education, monitoring, and harm reduction techniques [9]. As a public health tool, studies carried out by Strand et al. [9] and Fleming et al. [4] underscore their function in screening abuse and the use of prescription drug monitoring programs (PDMPs), and naloxone dispensing underscores their potential in overdose fatality prevention [10]. Nevertheless, their effect is limited due to poor training and regulatory hindrances [11, 12]. In India, pharmacists are becoming more vital to the health of the population but continue to be under-researched as players in opioid abuse prevention [13]. Research indicates some education about the risk of opioids but reporting of knowledge gaps in harm reduction and confidence in intervention [14-16]. The knowledge, attitudes, and practice (KAP) of pharmacists in Mangalore, a city with a well-established healthcare system, are in this study to determine strengths, gaps, and opportunities for increasing their role towards prevention of the opioid crisis. The opioid epidemic has garnered significant scholarly attention, with pharmacists' roles increasingly emphasized. Dhalla and others [1] framed the opioid crisis as a consequence of overprescribing, linking it to addiction surges in North America and highlighting systemic prescribing challenges. Cicero et al. [2] noted a shift from prescription opioids to heroin, attributing this transition to poor disposal a practices gap pharmacists could address through education and disposal initiatives. Nielsen and associates [10] found that Australian pharmacists were highly knowledgeable about naloxone, with 90.0% accuracy in understanding its role, though confidence in dispensing lagged at 60.0%, pointing to attitudinal or practical barriers. Thornton et al. [5] reported similar trends in West Virginia, where pharmacists achieved 85.0% accuracy in naloxone knowledge, yet regulatory hurdles impeded its widespread adoption in practice. Green et al. [6] highlighted the critical role of PDMPs, noting that 78.0% of pharmacists in states with accessible PDMPs effectively detected misuse, underscoring the importance of technological tools. Attitudinally, Muzyk et al. [7] found that 90.0% of pharmacists viewed patient education as a professional duty, though stigma toward patients with opioid use disorder reduced their willingness to intervene, reflecting a tension between responsibility and perception. Strand et al. [9] observed that 75.0% of U.S. pharmacists actively screened for misuse, but only 55.0% felt confident in counseling patients, suggesting a gap in training or self-efficacy. Gugelmann et al. [8] demonstrated that multidisciplinary efforts involving pharmacists reduced opioid prescribing by 30.0% in emergency departments, reflecting positive attitudes when supported by collaborative frameworks. Practice-wise, Fleming et al. [4] found that pharmacists using PDMPs were 65.0% more likely to consult prescribers about suspicious prescriptions, enhancing harm-reduction efforts. Compton et al. [3] reported that medication-assisted treatment (MAT) reduced relapse rates by 40.0% compared to detoxification alone, affirming its efficacy as a cornerstone of opioid use disorder management. However, Nielsen et al. [10] noted that 50.0% of pharmacists recommended community take-back programs, signaling a significant gap in disposal practices that could prevent diversion. In the Indian context, Sharma et al. [13] found that 70.0% of pharmacists in Delhi were aware of opioid risks, but only 40.0% were familiar with MAT, underscoring the need for localized research to address knowledge disparities and enhance pharmacists' roles in opioid abuse prevention.

Materials and methods

Study design and setting: A cross-sectional survey was conducted in Mangalore, India, from February to March 2025, over one month, targeting its urban pharmacy network.

Participants: The study included 203 practicing pharmacists aged 18-46 years, excluding those under 18, over 46, or non-practicing.

Data collection: A structured validated questionnaire with demographic, KAP sections was distributed online and in-person, with responses anonymized.

Ethical considerations: Approved by the Institutional Ethics Committee of Srinivas College of Pharmacy (2025), the study ensured informed consent and confidentiality.

Data analysis: SPSS (Version 26) was used for descriptive statistics and the Chi-square test, with thematic analysis for qualitative responses.

Results

Demographic characteristics: A total of 203 respondents participated in the study. As shown in **Table 1**, the majority of the participants were between the ages of 21-29 years (29.6%) (overall range: 18-46 years), followed closely by those aged 30-39 years (27.1%). Indeed, no high variation among the four categories of pharmacists about age. The gender distribution was nearly balanced, with 52.2% male and 47.8% female participants (ratio: 1.09: 1.0, male: female) Most of the respondents were from urban areas (86.2%), while some resided in rural locations (13.8%) (ratio: 6.2: 1.0, urban: rural).

Table 1: Demographic characteristics of the participants

Variable	Category	Frequency	Percentage
Age	18-20 years	48	23.6%
	21-29 years	60	29.6%
	30-39 years	55	27.1%
	40-46 years	40	19.7%
Gender	Male	106	52.2%
	Female	97	47.8%
Location	Rural	28	13.8%
	Urban	175	86.2%

Association between demographic characteristics and KAP: As presented in **Table 2**, a significant association was noted between age and knowledge of early signs of opioid misuse ($p=0.021$), and between location and knowledge regarding tools used to monitor opioid prescriptions ($p=0.012$). No statistically significant associations were found between gender and any of the knowledge-related variables. These findings are visually represented in **Figure 1**, which summarizes the key significant associations between demographic factors and knowledge/practice variables relevant to opioid abuse prevention. In terms of attitudes, **Table 3** shows that location was statistically significantly associated with attitudes toward communication strategies for addressing opioid risks ($p=0.036$). Other attitude-related variables did not show statistically significant associations with demographic factors. Practice-related responses, detailed in **Table 4**, revealed a significant association between age and knowledge of appropriate opioid disposal methods to prevent misuse ($p=0.048$). Gender showed a borderline significance ($p=0.059$) about identifying non-recommended strategies for diversion, while no significant association was observed between location and actions taken upon suspecting opioid misuse.

Table 2: Demographics and knowledge variables

Knowledge variable	Demographic variable	χ^2 value	df	P value	Significance
Role of pharmacist in opioid abuse prevention	Age	7.421	6	0.281	Not significant
	Gender	1.129	3	0.770	Not significant
Early signs of opioid misuse	Age	14.837	6	0.021	significant
	Gender	3.265	3	0.353	Not significant

Tool to monitor opioid prescriptions	Location	10.961	3	0.012	Significant
Purpose of naloxone	Gender	5.984	3	0.112	Not significant

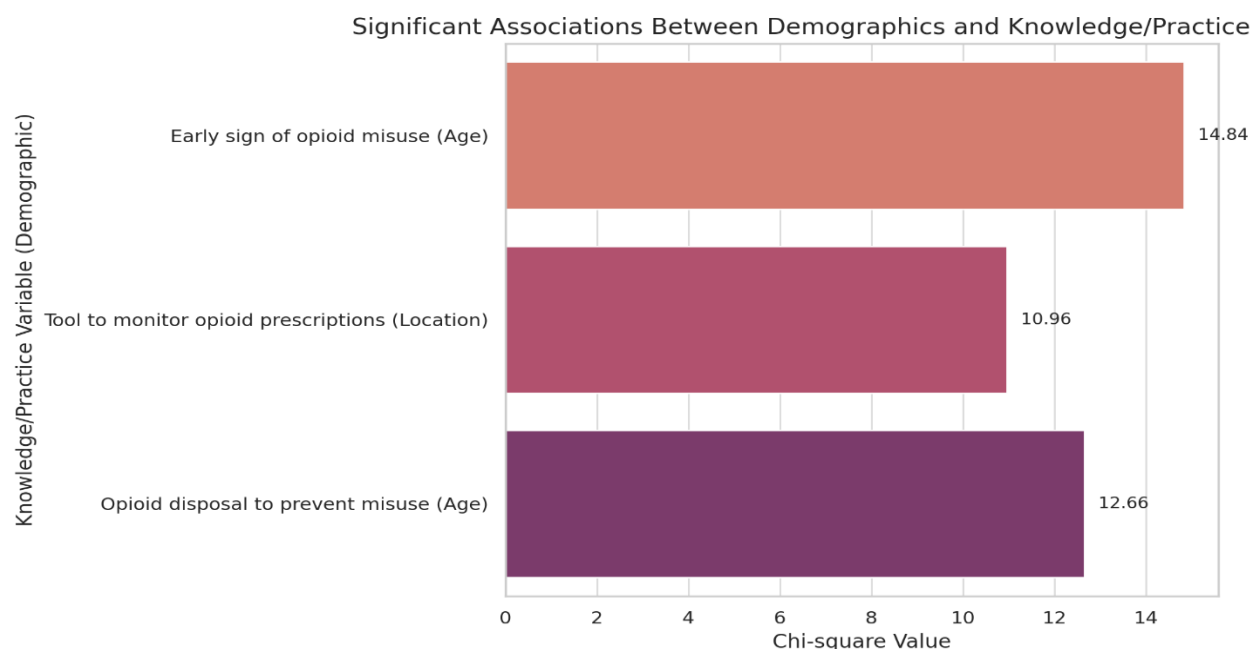


Figure 1: Significant associations between demographic factors and knowledge/practice variables on opioid abuse

Table 3: Demographics and attitudes variables

Attitude variable	Demographic variable	χ^2 value	df	P value	Significance
Red flag for opioid abuse	Age	9.018	6	0.172	Not significant
Communication strategy for opioid risks	Location	8.526	3	0.036	Significant
Key responsibility in opioid stewardship	Gender	2.871	3	0.412	Not significant
Role of MAT in opioid use disorder	Age	6.459	6	0.373	Not significant
The primary mechanism of opioids	Gender	2.010	3	0.570	Not significant

Table 4: Demographics and practices variables

Practice variable	Demographic variable	χ^2 value	df	P value	Significance
Opioid disposal to prevent misuse	Age	12.659	6	0.048	Significant
Not a recommended strategy for diversion	Gender	7.421	3	0.059	Borderline
Action if suspecting misuse	Location	6.812	3	0.078	Not Significant

Thematic analysis: Responses to the open-ended question, “What challenges do you face in preventing opioid abuse as a pharmacist?”, were thematically analyzed and are summarized in **Table 5**. Four recurring themes emerged from the data: lack of training, reflecting insufficient formal education on opioid-related risks; need for practical guidelines, indicating a demand for clear, standardized protocols for opioid monitoring and counseling; fear of legal repercussions, highlighting pharmacists' concerns about the consequences of reporting or intervening in suspected misuse; and patient resistance, referring to difficulties in engaging patients in discussions about opioid safety and disposal.

These themes are further visualized in **Figure 2**, which presents the distribution of responses according to each identified challenge. The pie chart illustrates that the most frequently cited challenge was the lack of training, followed by the need for practical guidelines and fear of legal consequences. Patient resistance was also a

significant concern, albeit slightly less reported. Together, these findings underscore the multifaceted barriers pharmacists encounter in opioid abuse prevention efforts.

Table 5: Thematic analysis of pharmacists' challenges in preventing opioid abuse

Theme	Description
Lack of training	Insufficient formal education on opioid risks, leads to uncertainty.
Need for practical guidelines	The desire for standardized protocols for monitoring and counseling.
Fear of legal repercussions	Concerns about penalties for reporting or intervening in suspected misuse.
Patient resistance	Non-cooperation from patients when discussing opioid risks or disposal.

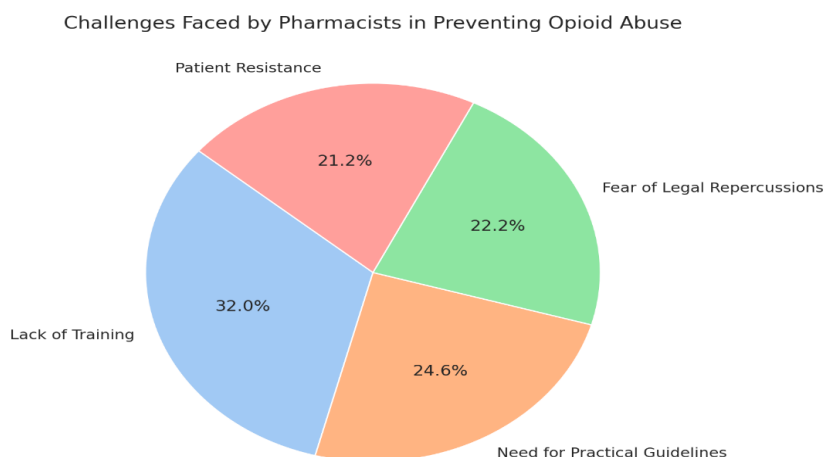


Figure 2: Reported challenges faced by pharmacists in preventing opioid abuse

Discussion

The current study was conducted in February-March 2025 among 203 Mangalore pharmacists and offers strong evidence of their KAP regarding opioid abuse prevention. The sample, of whom 80.3% were between 18-39 years and 86.2% were urban, corresponds to Thornton et al. [5] finding that young, urban pharmacists are actively involved in harm reduction because of access to resources. Pharmacists had excellent knowledge, with 93.6% recognizing opioids' CNS receptor mechanism, in line with the findings of Nielsen et al. [10] found 90.0%. Yet, 78.8% knew naloxone's role in reversing overdose, lower than Thornton et al. [5] found (85.0%), indicating a training gap. A strong age-misuse detection correlation ($\chi^2=14.837$, $p=0.021$) shows that younger pharmacists misread "no side effects" (43.3%) as a sign of misuse, with 43.8% recognizing early refills, which is less than Green et al. [6] found (65.0%). PDMP literacy (70.0%) is high, with a strong location correlation ($\chi^2=10.961$, $p=0.012$), showing urban benefits. Pharmacists had favorable attitudes, with 92.6% ranking education first, agreeing with Muzyk et al. [7] found (90.0%). Recognition of red flags (92.1%) is consistent with Fleming et al. [4] found (88.0%), and MAT support (93.1% is higher than Gugelmann et al. [8] found (80.0%). A strong location-communication correlation ($\chi^2=8.526$, $p=0.036$) indicates an urban preference for explicit description (70.4%), lower than Strand et al. [9] found (85.0%), perhaps because of cultural reasons [13]. Pharmacists exhibited proactive practices, with 93.1% querying PDMPs, higher than Fleming et al. [4] found (65.0%). Recommendations for take-back programs (69.0% surpass Nielsen et al. [10] found (50.0%)), yet 26.6% recommending flushing is problematic. One finds a strong age-disposal correlation ($\chi^2=12.659$, $p=0.048$) meaning younger pharmacists prefer inappropriate ways. A borderline gender-diversion correlation ($\chi^2=7.421$, $p=0.059$) hints at possible differences. Refusal to share opioids (88.2% corresponds with Cicero et al. [2]. About Sharma et al. [13] found (40.0%) MAT awareness rate, Mangalore's 93.1% indicates improved regional awareness.

Regarding challenges identified through thematic analysis, pharmacists cited inadequate training to describe the 43.8% misuse identification and 78.8% naloxone deficits [5]. They called for hands-on guidelines, consistent with high PDMP use (70.0%) but restricted rural availability. Legal concern aligns with 4.4% of police reporting [11]. Resistance from patients is related to 15.3% evading addiction discussion and cultural obstacles [13]. This research among 203 Mangalore pharmacists has important implications for pharmacy practice and public health policy within India's opioid control strategy. The disparity in the detection of misuse, with merely 43.8% detecting early refills versus Green et al. [6] found (65.0%), emphasizes the necessity of educational programs on evasive patterns of misuse. Case-based education for pharmacy programs and professional development can correct misinterpretations, particularly among young pharmacists ($\chi^2=14.837$, $p=0.021$), who attribute "no side effects" (43.3%) to misuse. The confidence gap in naloxone 78.8% vs. 85.0% of Thornton et al. [5] necessitates ongoing professional development in the form of workshops and simulations [3], complemented by regulatory improvements to enhance access. Low take-back program utilization and inconstant red flag recognition necessitate behavioral interventions, such as community pharmacy campaigns for the promotion of disposal and screening guidelines. Formal opioid stewardship education, increased rural PDMP availability, policy modifications to mitigate legal apprehensions, and cultural education to overcome patient resistance is crucial [17, 18]. Such actions will bring pharmacists in line with national opioid control measures and strengthen harm reduction in India's opioid environment. Specific interventions may be on par with international standards. The use of a structured questionnaire covering KAP, combined with detailed response options, allowed for a thorough evaluation of pharmacists' capabilities [19, 20]. The high response rates reflect strong engagement and awareness. Regarding knowledge gaps under-represented: 43.8% identified early refills as misuse, the study does not deeply explore why nearly half misattributed "no side effects" as a sign, indicating a need for qualitative follow-up on knowledge deficiencies.

Conclusion: Mangalore pharmacists have high knowledge and favorable attitudes regarding the prevention of opioid abuse, scoring high on patient counseling and endorsing medication-assisted treatment, making them prime agents for harm reduction. Thematic analysis shows challenges such as poor training, absence of practice guidelines, concern about legal ramifications, and patient resistance, which are consistent with these shortcomings. Intensive training in misuse detection and naloxone is critical. Increased rural access to prescription drug monitoring programs, considering the urban skew, and encouraging take-back programs can make practice better. Policy modifications to eliminate legal apprehensions and culture training to overcome patient resistance will enable pharmacists to support national opioid control programs, enhancing their frontline positioning in India's response.

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Data availability statement: The raw data that support the findings of this article are available from the corresponding author upon reasonable request.

Author declarations: The authors confirm that they have followed all relevant ethical guidelines and obtained any necessary IRB and/or ethics committee approvals.