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Research Article

Hospital Based Study to Determine the Characteristics and Risk Factors for Opioid Analgesics Prescription in Post-Operative Patients

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ABSTRACT

Opioid analgesics are commonly prescribed for managing post-surgical pain, but prolonged and excessive opioid use can lead to dependence, misuse, and public health concerns. This prospective, observational study aimed to analyze the characteristics and identify risk factors for post-operative opioid use in a tertiary care hospital. The study included 338 patients, with a mean age of 57.35 years, of whom 65.08% were prescribed opioids during hospitalization and 57.98% upon discharge. Tramadol, both in tablet and injection form, was the most commonly prescribed opioid, followed by morphine and buprenorphine patches. Patients were prescribed opioids for durations ranging from 1 to 29 days, with a large proportion receiving opioids for acute pain management (1-5 days). Risk factors for opioid prescription included male gender, age between 31-50 years, lower income, lower educational status, and a medical history of pain (e.g., migraine, osteoarthritis). Pre-hospital analgesic use was found to increase the likelihood of post-operative opioid prescription, especially among patients with a history of using multiple analgesics or long-term use of analgesics prior to hospital admission. The study highlights the need for cautious opioid prescribing to minimize the risk of misuse and long-term dependence. Tailored pain management strategies, including the combination of opioid and non-opioid analgesics, are crucial to reducing opioid consumption and preventing the potential for opioid-related harm in post-surgical patients. Further research is recommended to explore more effective pain management alternatives and address the ongoing opioid epidemic.

INTRODUCTION

Opioid are the narcotic analgesics prescribed to treat persistent and severe pain which binds to

opioid receptor leading to the release of endorphins which suppress the perception of pain and boost feelings of pleasure, creating a

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temporary but powerful sense of well-being leads to the addiction of the drug. India is said to be going through an opioid epidemic. According to data from the International Narcotics and Control Board (INCB), the global opioid analgesic use more than double.^[1] Patients frequently receive opioids either unnecessarily or in excess of their requirements for surgical pain control. Prolonged opioid usage may lead to induction of tolerance and potentiate dependence.^[2] Opioids are routinely prescribed for postoperative pain management with tramadol the most commonly prescribed agent in India. Developed nations are facing opioid misuse crises due to the increasing use of opioid analgesics for non-cancer chronic pain. World Health Organization (WHO) acknowledged that tramadol death out number's heroin death. Surgery is among the most common indications for opioid initiation. Excessive prescribing of opioids for pain treatment after surgery has been recognized as an important concern for public health and a potential contributor to patterns of opioid misuse and related harm. Administration of any opioid to inpatients doubled the probability of outpatient use after discharge. Receipt of discharge opioid prescription in previously hospitalized, opioid naive patients has been linked to chronic opioid use.^[3] Excessive postoperative opioid prescribing has been associated with increased risks of drug diversion, new long-term opioid use and the development of opioid use disorder.^{[4][5][6]} Commencement of opioid therapy for acute pain is gateway to long-term therapy and ultimately dependence. Prolonged continuous infusion of an opioid may lead to rapid induction of tolerance and potentiate dependence. Prescription opioid (PO) analgesics use, abuse and mortality case increased over the last decades in developed countries. According to National Institute on Drug abuse, 80% of people who were addicted to heroin first misused prescription opioids.^[8]

MATERIALS AND METHODS

Study Design: A Prospective Observational study was carried out to determine characteristics of post-surgery prescription of opioid analgesics and ascertain risk factors for opioid prescription in a tertiary care hospital.

Sample Size: A total of 338 samples were involved in the current study.

Ethical Clearance: Ethical clearance was obtained from the Institutional Ethics Committee (IEC) of Srinivas Institute of Medical Science and Research Centre (SIMS & RC), Mangaluru.

Inclusion Criteria: Patients admitted in the hospital aged ≥ 18 years, of any sex underwent any surgical procedure prescribed with any class of analgesics.

Exclusion Criteria: OPD patients and severely ill, unconscious and unresponsive patients.

Source Of Data: The required information was collected from patient and medical records. Data collection form included the patient's demographic details, information on past medical and medication history, social history, information on current surgical procedure and analgesics prescribed.

Data Analysis: Statistical analysis involves collection and scrutinizing every data sample in a set of items from which samples can be drawn and a suitable statistical test was applied to analyze the data. Descriptive statistics summarized demographics and clinical characteristics while categorical variables were presented as frequencies and percentages. Chi-square or Student's t-tests were used as needed. P-value less than 0.05 was considered as significant. The collected data were analyzed using Microsoft Excel.

RESULT

Demographic of the Patient:

The research included 338 participants in total, the mean age was 57.35 years (minimum 18 and maximum 85), and the sex ratio (male/female) was



1.28. The majority of participants were between 41-50 (25.73%) year old followed by 51-60 (24.55%), 31-40 (23.96%), above 60 years (13.60%) and 18-30 (12.13%). The majority of patients (65.08%) were prescribed opioid analgesics during post-surgical hospital stay and

57.98% were prescribed opioids during discharge. 149 (44.08%) patients were prescribed a combination of opioid and non-opioid medications, i.e., either in one dosage form or in separate forms. The prevalence and demographics of the patients are shown in Table 1.

Table 1: Age-wise Distribution of Opioid Analgesics:

Category	Variables	No. of subjects (n=338)	Percentage (%)
Gender	Male	190	56.21
	Female	148	43.79
Age (years)	18-30	41	12.13
	31-40	81	23.96
	41-50	87	25.73
	51-60	83	24.55
	> 60	46	13.60
No. of patients prescribed with opioids during post-operative hospitalisation		220	65.08
No. of patients prescribed with combination of opioid and non-opioid analgesics		149	44.08
No. of patients prescribed with opioids during discharge		196	57.98

Characteristic of Opioid Prescribed to Post-Operative Hospitalized Patients:

Analysis of opioid use in 220 patients revealed significant insights. Tramadol in tablet form is the most commonly prescribed opioid i.e., 60.44% (133), with 73 men and 60 women. The mean dose for it was 29.04 mg and the mean MME was 3.8, followed by Tramadol in injection form, which was prescribed to 68 (30.9%) patients with a mean dose of 50 mg and a mean MME of 7.4. Injection Morphine, Butorphanol, and Fentanyl were used in

a limited number of cases of 5, 3 and 3 patients respectively. Notably, Buprenorphine patches was administered in 8 patients. Mean morphine equivalence (MME) was determined by dividing the product of the strength of the opioid per unit and the number of units administered per day by the standard MME conversion factor for each opioid, and it was found that no drug was prescribed for more than 50 MME, which is considered to be one of the factors leading to rational prescribing of opioids (Table 2).

Table 2: Characteristic of Opioid Prescribed to Post-Operative Hospitalized Patients:

Opioid Medication	Total No. of Patients (n=220)	Gender		Age (years)			Mean Dose Prescribed	Mean MME/Day Prescribed
		Male (n=126)	Female (n=94)	18-30	31-60	>60		
Tab.Tramadol	133	73	60	12	89	32	29.04	3.8
Inj.Tramadol	68	40	28	4	59	5	50	7.4
Inj.Morphine	5	4	1	1	4	0	10	10
Inj.Fentanyl	3	2	1	1	2	0	0.1	12



Buprenorphine Patch	8	4	4	2	5	1	0.25	9
Inj. Butorphanol	3	3	0	0	3	0	1	5

Characteristic of Opioid Prescribed to Discharge Patients:

Among patients discharged from the hospital, there was a notable pattern was observed in opioid prescribing. The most frequently prescribed opioid was Tab. Ultracet which was given to 140 (71.4%) patients, suggesting that it is the preferred choice for pain management in a substantial proportion of

patients, followed by Tab. Semi-Ultracet which was prescribed to 44 (22.42%) patients, Tab. Tramadol was given to only 9 patients, suggesting that it is important in a smaller subset of cases. In addition, only 3 patients were prescribed with Buprenorphine patch at discharge, possibly indicating its use in the treatment of chronic post-surgical pain (Figure 1).

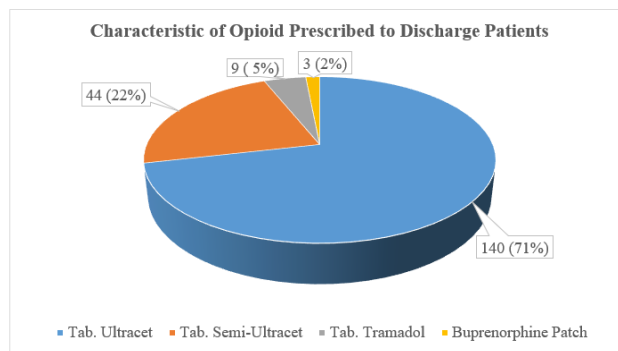


Figure 1: Characteristic of Opioid Prescribed to Discharge Patients

Duration of Opioid Prescription

A large proportion of patients were prescribed with opioid analgesics and these prescriptions were distributed over different time periods. Specifically, 131 (59.54%) post-operative patients admitted to the hospital and 81 (41.32%) discharged patients were prescribed opioids for a short duration of 1-5 days, indicating acute pain management. 67 inpatients and 59 discharged patients received opioid prescriptions for a

duration of 6 to 10 days, indicating a need for intermediate pain relief. Additionally, 8 hospitalized and 22 discharged patients were prescribed opioids for a longer period of time, ranging from 16 to 30 days, also 9 patients were prescribed opioids for more than 30 days at discharge, which may indicate a longer treatment schedule and thus an increased risk of addiction. Hence monitoring of patients for opioid dependence is required in these patients.

Table 3: Duration of Opioid Prescription:

Duration of Prescription (Days)	During Post-Operative Hospitalization		During Discharge	
	No. of Patients(n=220)	Percentage (%)	No. of Patients(n=196)	Percentage (%)
1-5	131	59.54	81	41.32
6-10	67	30.45	59	30.5
11-15	14	6.36	25	12.75
16-30	8	3.63	22	11.22
>30	0	0	9	4.59

Risk Factors for Post-Operative Opioid Prescription:

The analysis of factors associated with post-surgical opioid prescription in comparison to non-opioid prescription, it was observed that among genders, opioid prescribing was higher in men i.e., 126 (57.2%) received opioids compared to 94 (42.8%) women. In terms of age, it was found that a significantly higher proportion of patients (90.9%) were prescribed with opioids aged above 30 years ($p > 0.001$), compared to other groups. The socio-economic status of the coparticipants was categorized based on their ration card type. Individuals holding an APL card were designated as belonging to the high-income group, whereas those possessing a BPL card grouped into low-income category. It was found that low-income patients with low income (132) received more opioid prescriptions than high-income patients (88). Patients pursued SSLC or below and above SSLC are grouped into lower and higher educational status respectively and it was observed that patients with lower educational status (149) received more opioid prescriptions than patients with higher education (71). Opioids were prescribed significantly more frequently to patients with a medical history inducing pain

(64.09%). This suggests that patients with pre-existing conditions like Migraine or Osteoarthritis, which are known to cause significant pain, were more likely to receive opioid prescriptions. Patients with history of receiving analgesic medications in the past (60.45%) were significantly more likely to receive opioid prescriptions. A statistically significant association was found between opioid prescriptions and history of pain inducing diseases and also history of analgesia. The current study revealed that Opioid prescriptions were notably higher in patients with a social history of substance abuse, including alcohol and tobacco (56.36%). Patients who underwent minimally invasive surgery (64.09%) were more likely to receive opioid prescriptions. Patients with a history of prior surgeries had a lower but still notable percentage of opioid prescriptions (26.36%).

In the present study it is observed that older age of greater than 30 years, past history of pain inducing medical condition and past history of analgesic usage were found to be risk factor for post-operative opioid prescription.

Table 4: Risk Factors for Post-Operative Opioid Prescription:

Sl.no	Factors	No. of Patients Prescribed with Opioids analgesics (n=220)	No. of Patients Prescribed with Non-opioid analgesics (n=118)	P-Value	
1	Gender	Male (n=190)	126	64	>0.05
		Female (n=148)	94		
2	Age	18-30 years	20	21	<0.001
		31-50 years	102	66	
		>50 years	98	31	
3	Income Status	Low Income	132	64	>0.05
		High Income	88	54	
4	Educational Status	Low	149	77	>0.05
		High	71	41	
5	Present	141	57	<0.005	



	Past Medical History Inducing Pain	Absent	79	61	
6	Past Medication History of Analgesics	Present	133	41	<0.0001
		Absent	87	74	
7	Social History of Substance Abuse	Present	124	55	>0.05
		Absent	96	63	
8	Type of Surgery	Minimally Invasive	140	111	>0.05
		Open	80	7	
9	Past Surgical History	Present	58	29	>0.05
		Absent	162	89	

Association of Number and Duration of Analgesics Use Prior to Hospital Admission on Opioid Prescription:

The study of prehospital analgesic use in 338 patients provides valuable insight into the influence of analgesic usage on pain management strategies. It was observed that among 13 patients using > 2 analgesics, majority of 9 (84.61%) were prescribed with opioids, among 36 using 2 analgesics, 28 (77.7%) were prescribed with opioids. Among 128 patients using only one pre-analgesic, 96 (73.43%) were prescribed with opioids. Only 87 (54.04%) out of 161 patients with no history of analgesic usage were prescribed with

opioids. The results indicate that the number of analgesics taken before hospital admission increases the rate of opioid prescription during hospitalization. Analysis of duration of analgesic use revealed that among 43 patients using analgesics for more than 1 year, 29 (74.41%) have been prescribed with opioids. 53 (69.47%) of 95 patients who used analgesics for a period of 6 months to 1 year were prescribed with opioids. Opioids were prescribed the least, 138 (61%) of 200 patients taking pain killers for less than 6 months. This indicates that previous medication with analgesics increased the likelihood of opioid use.

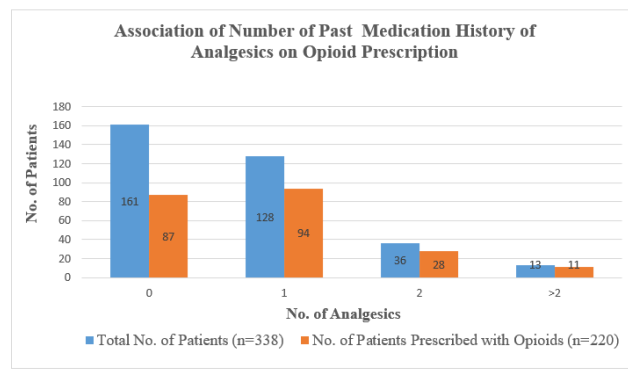


Figure 2: Association of Number of Past Medication History of Analgesics on Opioid Prescription

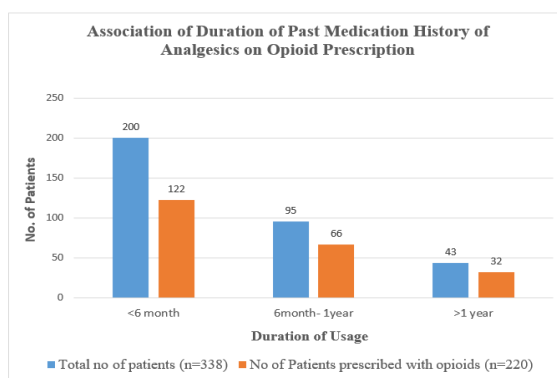


Figure 3: Association of Duration of Past Medication History of Analgesics on Opioid Prescription

DISCUSSION

The study highlights the widespread use of Tab. Ultracet, Semi-Ultracet, and Tramadol as the most frequently prescribed opioid medications for post-operative pain management, emphasizing the importance of personalized pain treatment based on the severity of the patient's condition. These medications are commonly chosen due to their effective pain-relieving properties, though the use of Morphine and Buprenorphine in some cases raises concerns about potential opioid addiction or dependence. This points to the importance of closely monitoring of patients who are prescribed with these stronger opioids, as they may require more intensive care and tailored treatment plans to prevent misuse or dependency. The study also sheds light on the fact that while most post-operative patients are prescribed opioids for a relatively short duration, some individuals continue to receive opioids over extended periods. This extended use could be due to factors such as unresolved pain, chronic conditions, or insufficient management of the underlying issues, which could contribute to prolonged reliance on opioid medications. Supporting this, a similar study by Ladha K. S. *et al.* observed that Codeine and Tramadol account for a significantly higher proportion of post-operative opioid prescriptions in countries like Canada, Sweden, and the United States, revealing marked differences in prescribing practices and preferences for opioid medications across different healthcare systems and cultural

contexts. [2] The study also identifies that the use of opioids is more prevalent among male patients and those aged between 41 and 60 years, a trend that mirrors the findings of Clarke H. *et al.*'s research. However, there is a noteworthy divergence when it comes to age-related risks, as the study by Clarke H. *et al.* suggests that younger individuals are more likely to be prescribed with opioids, which contrasts with the current study's findings. This discrepancy may point to varying regional or institutional practices, as well as differing pain management protocols that are influenced by patient demographics and clinical guidelines. Another key finding of the study is the increased risk of opioid prescriptions among individuals with comorbidities or a history of previous analgesic use. These findings align with the work of Clarke H. *et al.*, who highlighted that socio-economic factors and pre-existing health conditions contribute to a higher likelihood of opioid prescriptions. Patients who fall into these categories may be more likely to experience greater pain or health complications, making them more dependent on pain-relieving medications like opioids. [3] Moreover, the study underscores the role of social determinants in opioid prescribing patterns. It found that individuals with lower educational levels or negative social histories, such as smoking, were more likely to be prescribed opioids, echoing the results of Ajda B. *et al.*, who noted that people with only primary education and those who smoke had a higher likelihood of

receiving opioid prescriptions. These social factors could be linked to a range of issues, including a lack of access to alternative pain management options, lower health literacy, or higher levels of chronic pain associated with smoking. The combination of these factors further complicates the landscape of opioid use, suggesting that a multi-faceted approach addressing not just the clinical but also the social and economic determinants is essential for improving pain management strategies and reducing the risks associated with opioid prescriptions.^[9]

CONCLUSION

The current study highlighted the significant role of opioids in postoperative pain management while revealing critical patterns and risk factors associated with their prescription. The prevalent use of Tramadol and the distribution of opioid prescriptions across various patient demographics suggest a need for more stringent guidelines to avoid excessive use. The findings indicate that factors such as age, past pain inducing medical history and previous analgesic use are closely linked to opioid prescribing practices. Also patients with analgesic usage for longer duration are at higher risk for opioid prescription. Notably, the study highlights the potential for increased risk of opioid dependence and misuse associated with prolonged or excessive opioid use. These insights are essential for developing strategies to balance effective pain management with minimizing the risk of opioid addiction, emphasizing the importance of tailored prescription practices and ongoing monitoring of opioid use in post-surgical settings.

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REFERENCES

1. Bohnert AS, Guy Jr GP, Losby JL. Opioid prescribing in the United States before and

after the centers for disease control and prevention's 2016 opioid guideline. *Annals of internal medicine*. 2018; 169(6):367-75.

2. Ladha KS, Neuman MD, Broms G, Bethell J, Bateman BT. Opioid prescribing after surgery in the United States, Canada, and Sweden. *JAMA Network Open*. 2019;2(9):1-11.
3. Clarke H, Soneli N, Ko D T, Yun L, Wijeyesundera D N. Rates and risk factors for prolonged opioid use after major surgery: population-based cohort study. *BMJ*. 2014; 348:1-10
4. Bicket MC, Long JJ, Pronovost PJ, Alexander GC, Wu CL. Prescription opioid analgesics commonly unused after surgery: a systematic review. *JAMA surgery*. 2017 Nov 1;152(11):1066-71.
5. Brat GA, Agniel D, Beam A, Yorkgitis B, Bicket M, Homer M, Fox KP, Knecht DB, McMahill-Walraven CN, Palmer N, Kohane I. Postsurgical prescriptions for opioid naive patients and association with overdose and misuse: retrospective cohort study. *Bmj*. 2018 Jan 17;360.
6. Brummett CM, Waljee JF, Goesling J, Moser S, Lin P, Englesbe MJ, Bohnert AS, Kheterpal S, Nallamothu BK. New persistent opioid use after minor and major surgical procedures in US adults. *JAMA surgery*. 2017 Jun 1;152(6):e170504.
7. Sabatino JM, Kunkel TS, Ramkumar BD, Keeney JB, Jevsevar SD. Excess Opioid Medication and Variation in Prescribing Patterns Following Common Orthopedic Procedures. *The journal of bone & joint surgery*. 2018 ;100(3): 180-188.
8. Grattan A, Sullivan MD, Saunders KW, Campbell CI, Von Korff MR. Depression and prescription opioid misuse among chronic opioid therapy recipients with no history of substance abuse. *The Annals of Family Medicine*. 2012;10(4):304-11.



9. Bedene A, Lijfering WM, Niesters M, van Velzen M, Rosendaal FR, Bouvy ML, Dahan A, van Dorp EL. Opioid prescription patterns and risk factors associated with opioid use in the Netherlands. *JAMA network open*. 2019 Aug 2;2(8): e1910223.

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