

A Study On The Therapeutic And Adverse Effects Of Tramadol

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ABSTRACT

Tramadol is a centrally acting analgesic used for moderate to moderately severe pain and combines weak mu-opioid receptor activity with inhibition of serotonin and norepinephrine reuptake. This prospective observational study evaluated the therapeutic use, prescribing pattern, clinical outcomes, and reported adverse effects of tramadol at KIMS Hospital, Secunderabad, over six months. The final stated sample comprised 120 patients receiving oral or injectable tramadol. Data were collected from interviews, case sheets, treatment charts, and laboratory records and analysed using IBM SPSS version 24 with descriptive statistics and chi-square testing. Therapeutic use was documented in 92 patients (76.7%), whereas 28 (23.3%) received tramadol empirically. The most common treatment duration was 4-7 days (49 patients; 40.8%). Tramadol accounted for 34 prescriptions (28.3%) in the reported analgesic-pattern table. The thesis reports clinically useful pain relief, commonly within 30-60 minutes, but does not provide a numerical pain-score dataset. Reported adverse effects included nausea, dizziness, constipation, and drowsiness, without a patient-level frequency table. Most recorded outcomes were stable or recovered. Interpretation of safety outcomes requires caution because the source contains internal inconsistencies in age eligibility and the death/negative-outcome table and does not establish causality between tramadol and those outcomes.

Keywords: Tramadol; Pain management; Therapeutic effectiveness; Adverse drug effects; Prescription pattern; Pharmacovigilance; Opioid analgesic

I. INTRODUCTION

Tramadol is a centrally acting synthetic analgesic used for moderate to moderately severe pain. Its analgesic effect is produced through weak mu-opioid receptor agonism together with inhibition of serotonin and norepinephrine reuptake, giving it a dual mechanism that differs from conventional strong opioids.

In clinical practice, tramadol is used for post-operative, musculoskeletal, trauma-related, neuropathic, chronic and cancer-associated pain. The drug can be administered orally or parenterally, and the thesis reports typical adult doses in the range of 50-100 mg. Although tramadol is intended to provide effective analgesia with a lower risk of severe respiratory depression than more potent opioids, adverse effects and drug interactions remain clinically important.

Commonly described adverse effects include nausea, dizziness, drowsiness and constipation. The source also discusses recognized risks of seizures, serotonin syndrome, dependence and misuse, particularly with inappropriate doses, prolonged use or interacting serotonergic/CNS-depressant medicines.

The present study was undertaken to evaluate real-world tramadol use, therapeutic outcomes, prescribing practices and adverse effects in a hospital population, with emphasis on rational use and patient monitoring.

II. AIM AND OBJECTIVES

The aim was to appraise tramadol use in pain management by assessing effectiveness, safety, prescribing patterns, and potential misuse or dependence among patients.

- To assess the effectiveness of tramadol in moderate to severe pain.

- To identify the frequency and type of adverse drug reactions associated with tramadol use.
- To study tramadol prescribing patterns and dosage regimens in clinical practice.
- To analyse demographic factors such as age and gender among tramadol users.
- To identify potential misuse, dependence, or abuse among tramadol users.
- To promote rational and safe use of tramadol based on the study findings.

III. LITERATURE REVIEW

The literature reviewed in the thesis describes tramadol as an effective centrally acting analgesic for acute and chronic pain, with a mixed opioid and monoaminergic mechanism. Grond and Sablotzki (2004), Lewis and Han (1997), Vazzana et al. (2015), and Edinoff et al. (2021) are cited for its clinical pharmacology, therapeutic role and dual mechanism.

Safety-related literature emphasizes the need for monitoring. Beakley, Kaye and Kaye (2015) are cited regarding serotonin syndrome with serotonergic medicines, while Manouchehri et al. (2023) discuss toxicity including neurological and respiratory complications. The thesis also cites Radbruch et al. (2013), Roussin et al. (2015), and Crowe (2019) regarding misuse, abuse potential and dependence.

Other studies reviewed in the source address sustained-release formulations, osteoarthritis pain, opioid-withdrawal applications and public-health concerns related to non-medical tramadol use. Collectively, the literature supports evaluating both analgesic benefit and safety under routine prescribing conditions.

IV. MATERIALS AND METHODS

Study design and setting

A prospective observational study was conducted at KIMS Hospital, 1-8-31/1 Minister Road, Krishna Nagar Colony, Secunderabad, Telangana 500003, over a proposed six-month period. The final stated sample size was 120 patients who received tramadol during the study period.

Table 1. Study design, data sources, and analysis

Item	Study specification
Design	Prospective observational study
Setting	KIMS Hospital, Secunderabad, Telangana
Study period	Six months
Final stated sample	120 patients receiving tramadol
Data sources	Patient interviews, medical records, treatment/prescription charts, laboratory results
Variables	Age, gender, medical history, indication, dose, route, frequency, duration, outcomes, interactions, adverse drug reactions
Statistical software	IBM SPSS version 24
Analysis	Descriptive statistics and chi-square test; significance threshold $p < 0.05$ at 95% confidence

Eligibility and ethics

The stated inclusion criteria included adult patients with moderate to severe pain receiving oral or injectable tramadol, including acute, post-operative, trauma-related, neuropathic, musculoskeletal and cancer pain, with informed consent and adequate clinical records. Exclusion criteria included tramadol hypersensitivity, pregnancy/lactation, severe hepatic or renal impairment, opioid dependence or misuse history, concurrent potent opioids, severe respiratory depression, uncontrolled seizures, selected interacting medicines such as MAO inhibitors, inability to report pain, withdrawal of consent, and incomplete records.

The thesis reports ethical clearance from the Institutional Ethical Committee of KIMS Hospital, Hyderabad. No ethics approval/reference number is provided in the source.

V. RESULTS

Demographic profile

Table 2. Age distribution reported in the thesis

Age group (years)	Number of patients	Percentage
11-20	3	2.5%
21-30	9	7.6%
31-40	13	11.0%
41-50	19	16.1%
51-60	24	20.3%

Age group (years)	Number of patients	Percentage
61-70	27	22.9%
71-80	17	14.4%
81-90	5	4.2%
91-100	1	0.8%

Note: These frequencies sum to 118 rather than the stated sample of 120. They also include ages outside the stated 18-70-year inclusion range. The thesis narrative additionally describes different age-band labels/percentages. Values are reproduced without silent correction.

Table 3. Gender distribution

Gender	Number of patients	Percentage
Male	70	58.3%
Female	50	41.7%
Total	120	100%

Comorbidities and prescribing departments

Table 4. Comorbidities among patients

Comorbidity	Number of patients	Percentage
Hypertension	32	26.7%
Diabetes mellitus	28	23.3%
Cardiovascular disease	18	15.0%
Chronic kidney disease	14	11.7%
Respiratory disease	12	10.0%
Others	16	13.3%

Table 5. Department-wise distribution

Department	Number of patients	Percentage
Orthopaedics	36	30.0%
General Medicine	30	25.0%
General Surgery	22	18.3%
Emergency Medicine	15	12.5%
Neurology	10	8.3%
Others	7	5.9%
Total	120	100%

Note: The narrative text states Orthopaedics as 31.7%, whereas the corresponding table reports $36/120 = 30.0\%$; the table value is retained.

Analgesic use and prescribing pattern

Table 6. Number of analgesics prescribed per patient

Number of analgesics	Number of patients	Percentage
One analgesic	68	56.7%
Two analgesics	34	28.3%
Three analgesics	14	11.7%
More than three	4	3.3%
Total	120	100%

Table 7. Evidence and mode of tramadol use

Category	Frequency	Percentage
Clinical evidence documented	92	76.7%
No clear documented evidence	28	23.3%
Therapeutic use	92	76.7%
Empirical use	28	23.3%

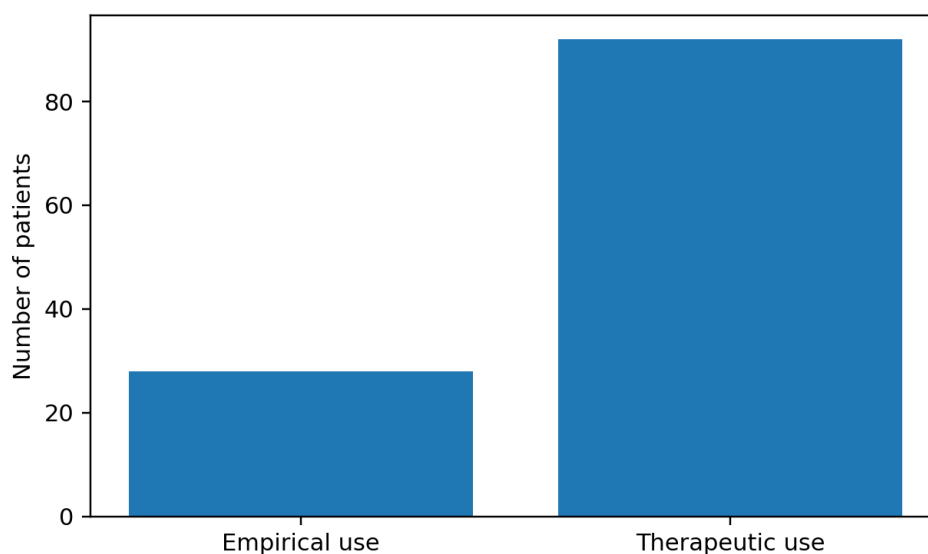


Fig. 1. Therapeutic and empirical tramadol use among the study population.

Table 8. Pattern of analgesic prescriptions reported in the study

Analgesic	Frequency	Percentage
Tramadol	34	28.3%
Paracetamol	25	20.8%
Ibuprofen	18	15.0%
Diclofenac	16	13.3%
Morphine	6	5.0%
Codeine	5	4.2%
Aspirin	5	4.2%
Fentanyl	4	3.3%
Oxycodone	3	2.5%
Hydromorphone	2	1.7%
Meperidine	2	1.7%

Note: The thesis simultaneously describes all 120 study participants as receiving tramadol, yet this analgesic-pattern table lists tramadol in only 34/120 prescriptions. The discrepancy is preserved and not reconciled by assumption.

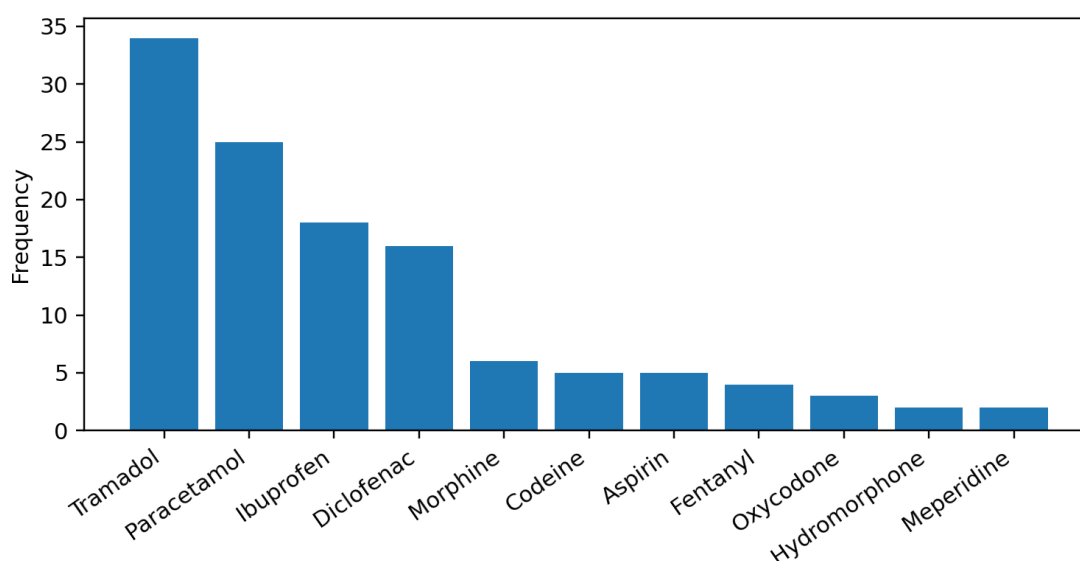


Fig. 2. Analgesic prescription pattern reported in the study.

Duration of therapy

Table 9. Duration of tramadol use

Duration	Number of patients	Percentage
1-3 days	32	26.7%
4-7 days	49	40.8%
8-14 days	27	22.5%
>14 days	12	10.0%
Total	120	100%

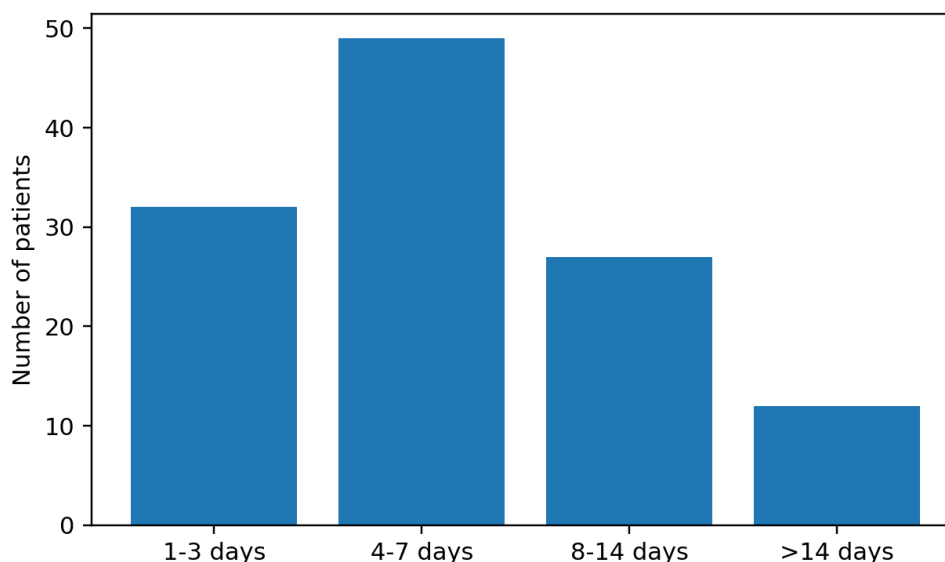


Fig. 3. Duration of tramadol therapy.

Therapeutic response and adverse effects

Table 10. Therapeutic and safety observations available in the thesis

Outcome domain	Source-reported finding	Quantitative detail available
Pain relief	Most participants reportedly experienced noticeable pain reduction, often within 30-60 minutes	No patient-level pain-score table or mean pre/post pain score provided
Dose	Tramadol often administered at 50-100 mg	No dose-distribution table provided
Adverse effects	Nausea, dizziness, constipation, and drowsiness were reported	No frequency/percentage table for individual adverse effects provided
Serious adverse drug reaction attribution	Not established in the results	No causality-assessment table provided
Misuse/dependence	Discussed as an objective and recognized risk	No patient-level misuse/dependence result table provided

Clinical outcomes and chi-square analysis

Table 11. Clinical outcome data as reported

Outcome	Frequency	Percentage / source status
Stable	75	62.5%
Recovered	40	33.3%
Death / negative outcome	Source table prints 120	Source table prints 100%; narrative states 4.2%

Note: The outcome table is internally inconsistent. The narrative states 4.2% negative outcomes, and the chi-square calculation uses equal expected counts of 40 and yields 61.25, which is mathematically consistent with observed counts 75, 40 and 5. Because the source table itself prints 120/100% for the death row, this article does not silently replace that entry or attribute any death to tramadol.

Table 12. Reported chi-square result for clinical outcomes

Statistic	Reported value
Pearson chi-square	61.25
Degrees of freedom	2

Statistic	Reported value
p-value	<0.0001
Interpretation	Statistically significant
Source conclusion	Reject the null hypothesis

Note: The chi-square test appears to compare the observed outcome distribution against equal expected counts (40 per category). It does not establish that tramadol caused recovery, stability, or death.

VI. DISCUSSION

The study describes tramadol as a commonly used analgesic in a hospital population with substantial representation of middle-aged and older patients and frequent comorbidities such as hypertension and diabetes mellitus. Orthopaedics, General Medicine and General Surgery accounted for most of the reported department-wise use, which is consistent with the pain indications described in the thesis.

Most tramadol use was categorized as therapeutic and supported by documented clinical evidence (92/120; 76.7%), while 28/120 prescriptions were categorized as empirical. Treatment duration was generally short: 67.5% of patients received tramadol for seven days or less, and only 10% were reported to receive it for more than 14 days.

The thesis states that tramadol reduced pain and commonly produced relief within 30-60 minutes. However, no numerical pain scores, baseline-to-follow-up comparison, confidence interval, or inferential test for analgesic improvement is supplied in the results section. Accordingly, therapeutic effectiveness in this article is presented as a source-reported clinical observation rather than a quantified pre/post effect.

Nausea, dizziness, constipation and drowsiness were the adverse effects specifically described in the study discussion and conclusion. Their individual frequencies are not provided, and the source contains no formal adverse-drug-reaction causality or severity assessment. The outcome table also contains a major internal inconsistency involving the death/negative-outcome row; therefore, no causal relationship between tramadol and mortality can be inferred from the supplied data.

The reported chi-square value indicates that the three outcome categories were not equally distributed, but this test does not measure treatment efficacy by itself. A stronger efficacy analysis would require validated pain scores before and after therapy, while safety evaluation would benefit from patient-level ADR frequencies, severity grading, causality assessment and adjustment for age, dose, comorbidities and concomitant medications.

Limitations

The thesis identifies a sample size of 120 and a short study duration as limitations, along with incomplete clinical records and limited direct patient communication. Additional source inconsistencies affect interpretation: the age table includes patients outside the stated 18-70 eligibility range and accounts for only 118 patients; the analgesic-pattern table lists tramadol in 34 prescriptions despite the methodology defining the study population as patients receiving tramadol; and the outcome table contains an internally inconsistent death/negative-outcome entry. These issues should be resolved against original case records before publication or clinical inference.

VII. CONCLUSION

- The study describes tramadol as an important analgesic used for moderate to severe pain in routine hospital practice.
- Therapeutic use with documented clinical evidence was reported in 92 of 120 patients (76.7%), while 28 patients (23.3%) were categorized as receiving empirical therapy.
- The most common treatment duration was 4-7 days (40.8%), and the majority of reported courses lasted seven days or less.
- The thesis reports useful pain relief, commonly within 30-60 minutes, but does not provide numerical pain-score data sufficient for a formal pre/post efficacy estimate.
- Reported adverse effects included nausea, dizziness, constipation and drowsiness; individual adverse-event frequencies and formal causality assessments were not provided.
- Source inconsistencies in age eligibility, prescription counts and the outcome table require verification against original clinical records before stronger efficacy or safety claims are made.
- Rational dosing, review of interacting medicines, monitoring for adverse effects, and appropriate pharmacovigilance remain important components of safe tramadol use.

VIII. DECLARATIONS

Ethics approval: The thesis reports clearance from the Institutional Ethical Committee of KIMS Hospital, Hyderabad. No approval/reference number is provided.

Informed consent: The inclusion criteria state that participating patients provided informed permission/consent.

Funding: Not reported in the thesis.

Conflict of interest: Not reported in the thesis.

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