

The Prevalence and Impact of Nonadherence to Analgesic Medications in Chronic Pain Patients: A Cross-sectional Study

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Abstract:

Objective: Nonadherence to medication therapy is a common problem among patients with chronic pain. Nonadherence to medication leads to failure of treatment and increased healthcare costs. This study aimed to determine the prevalence of nonadherence to pain medications and its impact among patients who visit the outpatient pain clinic at Siriraj Hospital.

Material and Methods: A cross-sectional study was conducted from September to December 2021, involving 150 chronic pain patients. A self-administered questionnaire was used to collect demographic and treatment-related information. Medication adherence was evaluated using the Morisky Medication Adherence Scale-8 (MMAS-8) questionnaire and pill count. The Brief Pain Inventory was used to assess the intensity of pain and its impact on daily life. The total cost of the unused medication was calculated based on the market value of each medication.

Results: The overall prevalence of nonadherence to pain medications among chronic pain patients was 25.3% by MMAS-8 scoring, 38% by pill count, and 53.1% by combining MMAS-8 and pill count. The highest prevalence of nonadherence was observed among participants who received strong opioids. However, there was no significant association between sociodemographic data, diagnosis, type of analgesic, number of prescribed analgesics, frequency of analgesic management, and drug compliance. Nonadherence to analgesic medication was associated with less pain reduction after treatment, greater impact of pain on normal work, and decreased enjoyment of life.

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Conclusion: The prevalence of nonadherence to analgesic medications among patients with chronic pain is high. Nonadherence to analgesic medications is associated with negative impacts on clinical outcomes and function.

Keywords: analgesics, chronic pain, medication adherence, opioids, prevalence

Introduction

Nonadherence to medication among patients with chronic pain is a prevalent and complex issue that significantly impacts treatment outcomes and healthcare costs. A systematic review from 2016 revealed that the incidence of nonadherence to medications in patients with chronic pain ranged from 8% to 62%, with a weighted mean of 40%¹. Furthermore, a 2016 cross-sectional study at Ramathibodi Hospital showed that 52.6% of chronic pain outpatients did not adhere to their strong opioid prescription². This lack of adherence leads to suboptimal treatment results and higher healthcare costs, including the disposal of medical waste.

The financial burden caused by medication nonadherence has become a notable concern in recent years. In the United Kingdom (UK), the annual cost of discarded drugs is estimated to be £37.6 million annually³. In the United States (US), about two-thirds of prescribed medications remain unused⁴. A 2017 survey at Siriraj Hospital's internal medicine outpatient clinic found that 74.4% of patients had leftover drugs, costing a total of 187,950.55 Thai baht⁵. These findings highlight the urgent need to address medication nonadherence.

Pill counts and the Morisky Medication Adherence Scale (MMAS-8) have been applied widely to evaluate medication adherence. The MMAS-8 is a validated self-report questionnaire to assess medication adherence. It consists of eight questions designed to assess the patient's adherence to a prescribed medication in many aspects, including forgetfulness, stopping medication when feeling better, and difficulties with the treatment plan⁶.

Considering the significant impact of medication nonadherence on treatment outcomes and healthcare costs, investigating its prevalence and associated factors is essential. We conducted a cross-sectional study aimed at determining the prevalence of nonadherence to analgesic medications among chronic pain patients. Our secondary objectives included assessing the prevalence of underuse and overuse of analgesic medications based on pill counts and MMAS-8, examining the prevalence within each group of analgesic medications, identifying factors linked to nonadherence and treatment outcomes, analyzing patients' behaviors regarding the disposal of unused analgesic medications, and calculating the total cost of these unused medications.

Material and Methods

This descriptive cross-sectional study was conducted at the Siriraj Pain Clinic, Siriraj Hospital, Mahidol University, from September 2021 to December 2021. The Human Research Protection Unit of Mahidol University (COA No. Si 511/2021) approved the study. All participants were fully informed about the study's purpose and procedures, and written informed consent was obtained from each.

Inclusion criteria included patients aged 18 or older, diagnosed with chronic pain, and who had been receiving round-the-clock analgesic medication for more than two weeks. Exclusion criteria were patients unable to communicate in Thai and those with a diagnosed psychiatric disorder.

Data were collected through a structured self-administered questionnaire covering demographics, pain

characteristics, medication adherence, and medication disposal behaviors. Pain intensity and its impact on daily activities were measured using the Brief Pain Inventory. Data analysis involved descriptive statistics, and the relationship between medication adherence and treatment outcomes was explored using univariable analysis. The total cost of unused medication was estimated based on the market value of each medication left unused.

Data collection and instrumentation

In this study, data collection was conducted using questionnaires segmented into four parts.

Sociodemographic questionnaires gathered sociodemographic information, including sex, age, marital status, education, job, and income.

Treatment questionnaires inquired about the participants' diagnoses, current treatments, side effects, alternative treatments, and a brief pain inventory.

The 8-item MMAS-8 Thai version was validated in Thai⁷⁻¹⁰ and used to evaluate medication nonadherence. The questions were formulated to avoid a "yes-saying" bias.

The wording of item 5 was reversed to prevent the tendency of respondents to answer consistently across a series of questions. Responses for items 1 through 7 were 'yes' or 'no', and item 8 had a five-point Likert response scale. Each 'no' response was rated as 1 point, and each 'yes' response was rated as 0 points, except for item 5, where each 'yes' response was rated as 1 point and 'no' as 0 points. For item 8, the scores were normalized by dividing by 4 to calculate a summated score. Total scores on MMAS-8 ranged from 0 to 8, with scores of 6 to 8 indicating adherence and scores <6 reflecting medication nonadherence. Permission for the use of the scale was granted by the Faculty of Graduate Studies at Mahidol University, the copyright holder of the instrument.

Leftover drugs (ask or count manually) and disposal questionnaires were used to calculate pill count to evaluate

medication nonadherence and to gather information on leftover drug disposal behaviors. Patients with a drug usage percentage below 80% were identified as nonadherent, based on calculations exclusive to around-the-clock prescriptions, excluding as-needed analgesics.

Medication adherence status was evaluated using both the MMAS-8 Thai version and the pill count method. Patients scoring between 6 and 8 on the MMAS-8 and who used 80% to 100% of their prescribed drugs were classified as adherent to analgesic medications, while others were classified as nonadherent. The reasons for nonadherence were also assessed during the interview.

Statistical analysis

The sample size for this study was determined using adaptive clinical design software (nQuery). We employed the estimated proportion formula, expressed as $n = \frac{Z^2 P(1-P)}{d^2}$, where n represents the sample size, Z is the confidence interval, P is the estimated proportion, and d is the desired precision. We aimed for a confidence level with an 8% margin of error. The estimated proportion was derived from a prior systematic review, which identified a nonadherence rate of 40%. Consequently, a minimum of 145 participants was necessary; thus, 150 participants were consecutively recruited for this study.

Statistical analysis was conducted using Microsoft Excel 2016 (16.0.4266.1003) and Statistical Package for the Social Sciences (SPSS) 26.0 (SPSS Inc., Chicago, IL, USA). For continuous data, descriptive statistics, including means and standard deviations or medians and ranges, were used, whereas frequencies and percentages were used to analyze categorical data. The chi-square test, Mann-Whitney U test, 95% confidence intervals, and p-values were employed to analyze the associations between various factors and nonadherence to analgesics. A p-value of less than 0.05 was considered statistically significant. Missing outcome data were not imputed.

Results

Demographic data

A total of 150 participants completed the questionnaires in this study. Demographic and social characteristics of the participants are presented in Table 1. Among the participants, 75.3% were women (n=113). The overall median age was 57 years (interquartile range 45–64.25 years). Most patients are covered under basic healthcare schemes, including the Thai Universal Coverage Scheme (46.7%), the Social Security Scheme (15.3%), and the Civil Servant Medical Benefit Scheme (36%). However, 2% of the patients were self-pay. Musculoskeletal disease was the primary diagnosis in 50.7% of participants (n=76), while 51.3% (n=77) reported experiencing neuropathic pain. Anticonvulsant analgesics were the most prescribed (n=139, 92.7%), followed by antidepressant analgesics (n=85, 56.7%). Half of the participants experienced side effects from these medications (n=74, 49.3%), with drowsiness being the most common (n=45, 30%). One-third engaged

in additional non-pharmacological treatments (n=61, 40.7%), including physical therapy, Thai massage, and exercise. Most participants reported their pain as moderate to severe (n=110, 73.3%).

Primary outcome

According to the Thai version of the MMAS-8, nonadherence to analgesic medications (a score of less than 6 on MMAS-8) was found in 25.3% of patients, while the pill count method (drug use less than 80%) indicated a nonadherence rate of 38% (p-value=0.019, McNemar test). Overall, 30.7% of patients underused their analgesic medications, and 7.3% overused them. Among those assessed, 73 participants (48.7%) adhered to analgesic medications (score of 6 to 8 on the MMAS-8 and using 80% to 100% of their medication), resulting in a nonadherence rate of 51.3% when considering either the MMAS-8 or pill count methods (Table 2).

Table 1 The demographic and social characteristics of the patients

Characteristic	Patients (N=150) No. (%)
Age	
Median (Interquartile range)	57 (45–64.25)
Sex	
Female	113 (75.3)
Male	37 (24.7)
Status	
Single	44 (29.3)
Married	86 (57.3)
Divorced/Widowed	20 (13.3)
Education	
Undergraduate	92 (61.3)
Graduated	58 (38.7)
Occupation	
Student	3 (2.0)
Civil servants	30 (20.0)
Company employee	11 (7.3)
Self employed	25 (16.6)

Table 1 (continued)

Characteristic	Patients (N=150) No. (%)
Housekeeper	37 (24.7)
Others	44 (29.3)
Income (THB/Month)	
<5,000 THB	42 (28.0)
5,000–10,000 THB	32 (21.3)
10,001–20,000 THB	26 (17.3)
20,001–30,000 THB	19 (12.7)
>30,000 THB	31 (20.7)
Hospital card	
Social security scheme	23 (15.3)
Universal coverage	70 (46.7)
Government officer	54 (36.0)
Full pay	3 (2.0)
Primary diagnosis (ICD10)	
Musculoskeletal	76 (50.7)
Infection	7 (4.7)
Cancer	29 (19.3)
Trauma	19 (12.7)
Neurological	9 (6.0)
Others	10 (6.7)
Pain diagnosis (ICD11)	
Chronic primary pain	4 (2.7)
Chronic cancer-related pain	28 (18.7)
Chronic post-surgical, traumatic pain	8 (5.3)
Chronic secondary musculoskeletal pain	48 (32)
Chronic secondary visceral pain	4 (2.7)
Chronic neuropathic pain	77 (51.3)
Chronic secondary headache, orofacial pain	1 (0.7)
Number of drug groups prescribed	
1	37 (24.7)
2	68 (45.3)
3	29 (19.3)
4	10 (6.7)
5	5 (3.3)
6	1 (0.7)
Drug group	
Opioids	37 (24.7) ¹
Strong opioids	25 (16.7)
Weak opioids	13 (8.7)
Anticonvulsants	138 (92.0)
Antidepressants	86 (57.3)
Acetaminophen	5 (3.3)
NSAIDs	26 (17.3)
Muscle relaxants	40 (26.7)
Medication side effects	
No	76 (50.7)
Yes	74 (49.3)
Reported side effects	
Drowsiness	45 (30)
Nausea	13 (8.7)

Table 1 (continued)

Characteristic	Patients (N=150) No. (%)
Constipation	28 (18.7)
Dry mouth	4 (2.7)
Urinary retention	1 (0.7)
Peripheral edema	1 (0.7)
Pruritic rash	1 (0.7)
Others	2 (1.3)
Medication Management	
Self-medication	131 (87.3)
Caregiver	19 (12.7)
Additional non-pharmacological treatment	
No	89 (59.3)
Yes	61 (40.7)
Non-pharmacological treatment	
Physical therapy	35 (23.3)
Exercise	12 (8.0)
Thai massage	13 (8.7)
Acupuncture	3 (2.0)
Chemotherapy	4 (2.7)
Radiation therapy	5 (3.3)
Pain intervention	3 (2.0)
Herbal therapy	1 (0.7)
Surgery	2 (1.3)
Psychotherapy	2 (1.4)
Pain score (Total 10)	
Low (1–3)	40 (26.7)
Moderate (4–6)	66 (44.0)
Severe (7–10)	44 (29.3)

¹=One participant was prescribed both a weak opioid and a strong opioid concurrently from different clinics. THB=Thai baht, ICD-10=international classification of diseases 10th Revision, ICD-11=international classification of diseases 11th Revision, NSAIDs=non-steroidal anti-inflammatory drugs

Table 2 The prevalence of nonadherence to analgesic medications in the patients

Assessment tools	Prevalence	
	Nonadherence ¹ No. (%)	Adherence No. (%)
MMAS-8	38 (25.3)	112 (74.7)
Drug counting	57 (38.0)	93 (62.0)
Undermedication	46 (30.7)	
Overmedication	11 (7.3)	
MMAS-8 and drug counting	77 (51.3)	73 (48.7)

¹=Nonadherence was assessed using two methods: drug counting and MMAS-8. Participants were classified as non-adherent if nonadherence was identified by at least one method. MMAS-8=8-item Morisky medication adherence scale

Secondary outcome

Regarding the nonadherence to analgesic medications by pill count, opioids had the highest nonadherence rate at 48.6%, with a marked difference between strong opioids (60.0%) vs weak opioids (23.1%) (Table 3). However, 18 patients were nonadherent with opioid usage by pill count: 17 patients underused their medication (strong opioids 14, weak opioids 3), and one patient reported overusing a strong opioid due to unrelieved cancer pain.

Of the 150 participants, 62% reported taking less medication than prescribed. The most common reason for taking less medication was symptom improvement (n=54, 58%), followed by side effects (n=28, 30.1%), concerns about side effects (n=14, 15.1%), and forgetting (n=10, 10.8%). Additionally, 25% of participants reported exceeding the prescribed dosage, primarily due to inadequate pain relief (n=36, 87.8%), followed by prophylactic usage (n=7, 17%) (Table 4).

Other outcomes

There is no statistically significant relationship between nonadherence to analgesic medications and demographics or social factors. Furthermore, no association

was found between nonadherence and treatment-related variables, including primary diagnosis, pain diagnosis, medication type and quantity, side effects, medication management, daily pill count, and pain level by univariate analysis (Supplemental Table 1); thus, multivariate analyses to identify the independent predictors of nonadherence could not be performed.

Patients in the nonadherence to analgesic medication group were associated with worse outcomes in terms of pain interference, assessed by the Thai version of the Brief Pain Inventory, including less pain reduction after treatment, a greater impact of pain on work, and reduced enjoyment of life (Table 5).

Out of 150 participants, 76 reported having leftover medication. Among those, most (n=55, 72.4%) stored it at home, while only a small proportion (n=8, 10.5%) returned it to the Siriraj Pain Clinic or shared it with others. Additionally, 29 participants reported having leftover opioids, with the majority (n=20, 69%) keeping them in storage. None reported distributing leftover opioids (Supplemental Table 2). The estimated cost of unused analgesic medication was 76,981.5 Thai baht over three months. Anticonvulsants accounted for the highest value (38,425.25 Thai baht, 49.91%), followed

Table 3 The adherence to analgesic medications (pill count), by group of medications

Drug groups prescribed	Prevalence		Total No. (%)
	Nonadherence No. (%)	Adherence No. (%)	
Opioids	18 (48.6)	19 (51.4)	37 (100)
Strong opioids	15 (60.0)	10 (40.0)	25 (100)
Weak opioids	3 (23.1)	10 (73.9)	13 (100)
Anticonvulsants	50 (36.2)	88 (63.8)	138 (100)
Antidepressants	18 (20.9)	68 (79.1)	86 (100)
Acetaminophen	1 (20.0)	4 (80.0)	5 (100)
NSAIDs	7 (26.9)	19 (73.1)	26 (100)
Muscle relaxants	10 (25.0)	30 (75.0)	40 (100)

NSAIDs=non-steroidal anti-inflammatory drugs

Table 4 The self-reported reasons for nonadherence to analgesic medications

Characteristic	N (%)
Self-report history of undermedication	93 (62.0)
Self-report causes of undermedication	
Clinical improve	54 (58.0)
Medication side effects	28 (30.1)
Concern about side effects	14 (15.1)
Forget to take medication	10 (10.8)
Clinical not improve	9 (9.67)
Feeling that already took too many drugs	3 (3.2)
Misunderstood drug management	3 (3.2)
Others	4 (4.3)
Self-reported history of overmedication	41 (27.3)
Self-reported causes of overmedication	
Clinical not improve	36 (87.8)
Prophylaxis	7 (17.1)
Need fast onset pain relief	3 (7.3)
Unrelieved pain	1 (2.4)

Table 5 The relationship between nonadherence to analgesic medications and the brief pain inventory

Characteristic	Adherence status		p-value
	Nonadherence (n=77)	Adherence (n=73)	
BPI (Pain intensity)			
Max	7 (4.5–8.5)	7 (5–8)	0.532
Min	2 (0–4)	2 (0–3)	0.223
Average	5 (4–7)	5 (3–6)	0.175
Now	4 (2–7)	4 (2–6)	0.281
Pain reduction after treatments	6 (5–8)	7 (5–9)	0.015*
BPI (Pain interference)			
General activity	4 (0–7)	3 (0–6)	0.312
Mood	4 (0–7)	3 (1–6)	0.617
Walking ability	5 (1–8)	5 (0–7)	0.260
Normal work	6 (2–8)	5 (0–7)	0.047*
Relations with other people	0 (0–5)	0 (0–4.5)	0.674
Sleep	5 (0–7)	3 (0–6.5)	0.274
Enjoyment of life	5 (1–7)	3 (0–5)	0.025*
Total	29 (14.5–42.5)	21 (10.5–37.5)	0.098

BPI=brief pain inventory

Table 6 The value of the unused analgesic medication

Leftover drugs	Value of leftover drugs, THB (%)
Opioids	26233 (34.08)
Anticonvulsants	38425.25 (49.91)
Antidepressants	10141.5 (13.17)
Acetaminophen	45 (0.06)
NSAIDs	257.25 (0.33)
Muscle relaxants	1879.5 (2.44)
Total	76981.5 (100)

THB=Thai baht, NSAIDs=non-steroidal anti-inflammatory drugs

by opioids (26,233 Thai baht, 34.08%), antidepressants (10,141.5 Thai baht, 13.37%), muscle relaxants (1879.5 Thai baht, 2.44%), non-steroidal anti-inflammatory drugs (257.25 Thai baht, 0.33%), and acetaminophens (45 Thai baht, 0.06%), respectively (Table 6).

Discussion

The purpose of this study was to determine the prevalence of nonadherence to analgesic medication among chronic pain patients at Siriraj Hospital. Our findings revealed a nonadherence rate of 51.3% based on the Thai version of MMAS-8 and pill count, indicating that medication nonadherence is a common problem among patients with chronic pain.

Our findings are consistent with a systematic review by L. Timmerman¹, which reported a mean nonadherence rate to analgesics in chronic pain patients of 40% (ranging from 8% to 62%), as well as the 51% reported by Sampaio¹¹. Similarly, the World Health Organization (WHO) estimates that medication nonadherence among patients with chronic diseases is approximately 50%¹².

While our results highlight the common occurrence of nonadherence to analgesic medications among chronic pain patients, we found an inconsistency in the prevalence

rates between the two methods used. The Thai version of the MMAS-8 questionnaire indicated a nonadherence rate of 25.3%, whereas the pill counting method showed a rate of 38% (p-value=0.019). This inconsistency aligns with findings from a previous study at Ramathibodi Hospital, Thailand². The lower prevalence of nonadherence detected by the Thai version of the MMAS-8 may be due to its psychometric properties. Studies have reported that the internal consistency reliability of the Thai version of MMAS-8 is moderate to questionable (Cronbach's alpha=0.55–0.61)^{9,10}, and its sensitivity, specificity, positive predictive value, and negative predictive value were quite low (51%, 64%, 71%, and 43%, respectively)⁹. Given the lack of a definitive, gold-standard tool for detecting nonadherence to analgesic medications in chronic pain patients, we used both assessment methods in our study to enhance the sensitivity in detecting nonadherence.

In the subgroup analysis, we evaluated the prevalence of nonadherence to analgesic medications according to the drug class. The highest prevalence of nonadherence was observed among opioid users (48.6%), with strong opioids accounting for 60.0% and weak opioids for 23.1%. This was followed by anticonvulsants (36.1%), NSAIDs (26.9%), muscle relaxants (25%), antidepressants

(20.9%), and acetaminophen (20%). The high prevalence of nonadherence in the strong opioid group is consistent with findings from Kanya (52.6%) and a study by R. Sampaio, which identified opioid side effects as the primary reason for this high rate^{2,11}.

The prevalence of nonadherence by pill count in our setting shows that underuse is more common than overuse, with a prevalence of 30.7% and 7.3%, respectively. This is consistent with findings from Timmerman¹ and Broekmans, which reported underuse rates of 34% and overuse rates of 14%¹³. Nevertheless, the overuse of analgesic medications in this study was lower than in previous literature (33% (9–51%)¹ and 14%¹³). Moreover, the prevalence of strong opioid overuse in our setting was also extremely low (1 patient, 0.7%), compared to North American reports (9–11.7%^{1,13,14}). However, this difference may in part reflect variations in measurement methods, definitions of overuse, and healthcare system practices across studies. Notably, the patient who overused strong opioids in our cohort did so due to unrelieved cancer pain, a legitimate medical need rather than aberrant or drug-seeking behavior.

Participants' self-reported reasons for nonadherence to analgesic medications showed that two-thirds (62%) took less medication than prescribed. The most common reason was symptom improvement, followed by side effects and concerns about potential side effects. Interestingly, fear of side effects ranked third, with some patients avoiding NSAIDs due to concerns about kidney damage. While this contributed to medication underuse, it may also reflect appropriate patient caution, as NSAIDs are generally not recommended for long-term treatment in chronic pain due to their known adverse effect profile. These findings are consistent with R. Sampaio's study¹¹, which reported patient symptoms, knowledge, and understanding of analgesic medications as primary factors in underuse. Conversely, 27% of participants reported taking more medication than

prescribed, mainly due to persistent symptoms (87.8%). Our findings support R. Sampaio's findings¹¹, which linked overuse to patients' perception of treatment inefficacy. Therefore, addressing patient concerns about side effects, assessing pain relief, and providing targeted education are essential for optimizing adherence and improving treatment outcomes.

We found no association between nonadherence to analgesic medications and demographic factors, social characteristics, primary pain diagnosis, analgesic medication management, analgesic medication complexity, daily pill count, or pain intensity. This contrasts with Broekmans' study¹³, which reported a negative association between adherence and both the number of prescribed groups and total daily pill count. This discrepancy can be attributed to the limited sample size in our study, which was calculated solely to determine the prevalence of nonadherence to analgesic drugs. Future studies with a larger population may be needed to identify the factors influencing nonadherence to analgesic medications.

Patients in the adherence group experienced greater pain reduction after treatment. Additionally, they also reported statistically lower pain interference in the enjoyment of life and normal work subscales of the Brief Pain Inventory. However, as this is a cross-sectional study, causal relationships cannot be established. A prospective study is needed to clarify these associations in the future.

Our study of 150 patients conducted between September and December 2021 showed that the total value of unused analgesics was 76,981.5 baht. Given that the Siriraj Pain Clinic served over 7,000 outpatient visits in 2021, we estimate that the economic loss from unused medications at this clinic alone could reach 3.6 million baht per year (around 100,000 USD). Therefore, improving adherence to analgesic medications could help reduce unnecessary expenditures. The Thai Health Systems Research Institute

(HSRI) estimates that Thailand's annual financial losses from leftover medications are approximately 2,350 million baht per year¹⁵. Additionally, only 13.8% of unused drugs were properly disposed of by returning them to the clinic, where the drugs are destroyed properly according to the hospital's protocol. The majority were either stored at home or disposed of improperly, raising concerns about potential drug diversion and environmental contamination.

This study has several limitations. First, its cross-sectional, single-center design prevents us from establishing a causal relationship between nonadherence to analgesic medications and pain interference. Second, the sample size was calculated to determine the overall prevalence of nonadherence to analgesic drugs, which may be inadequate to detect specific patterns of overuse, underuse, or associated risk factors. Additionally, the MMAS-8 questionnaire primarily captures underuse-related nonadherence and may not reflect other nonadherence, such as overuse or incorrect administration. Furthermore, several factors that can affect adherence, including the type of patient (new vs previously treated patients) or the time points to assess adherence, have not been addressed. To address these limitations, a larger prospective study is needed to identify the factors contributing to nonadherence and establish causal relationships.

The findings of this study highlight that nonadherence to analgesic medications is a common problem among chronic pain patients, potentially affecting treatment outcomes, increasing healthcare costs, and causing societal and environmental consequences. Healthcare providers should take measures to improve medication adherence in patients with chronic pain, such as educating patients on its importance, promoting proper drug disposal, enhancing patient-provider communication, and offering adequate care, counseling, and support. They should also recognize that non-pharmacological strategies (e.g.,

exercise, psychological interventions, acceptance-based therapies) may reduce the need for pharmacological treatment. Implementing these strategies could improve the quality of life for chronic pain patients while reducing the economic, societal, and environmental burdens associated with medication nonadherence.

Conclusion

The prevalence of nonadherence to analgesic medications among patients with chronic pain at Siriraj Hospital was as high as 51.3%. Our study found no significant association between adherence and sociodemographic data, diagnosis, type or number of prescribed analgesics, frequency of medication management, or pain intensity. However, adherence was linked to greater pain reduction after treatment and lower pain interference with daily functioning and quality of life. While this association is notable, it does not imply a causal relationship. Additionally, nonadherence contributes to unnecessary healthcare costs due to unused drugs and poses risks of societal and environmental harm from improper drug disposal. To address this issue, clinicians should routinely assess medication adherence and engage patients in shared decision-making to identify any barriers and misconceptions regarding analgesic use.

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Conflict of interest

There are no potential conflicts of interest to declare.

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Supplementary Table 1 The relationship between analgesic medication nonadherence and participants' demographics, social characteristics, and treatment information

Characteristic	Adherence status		p-value
	Nonadherence	Adherence	
Sex			0.988
Male	19 (24.7)	18 (24.7)	
Female	58 (75.3)	55 (75.3)	
Age	56 (46–63)	58 (40.5–67.5)	0.855
Status			0.985
Single	23 (29.9)	21 (28.8)	
Married	44 (57.1)	42 (57.5)	
Divorced/Widowed	10 (13.0)	10 (13.7)	
Education			0.795
Undergraduate	48 (62.3)	44 (60.3)	
Graduated	29 (37.7)	29 (39.7)	
Occupation			
Student	2 (2.6)	1 (1.4)	
Government officer	11 (14.3)	19 (26.0)	
Company employee	4 (5.2)	7 (9.6)	
Self employed	17 (22.1)	8 (11.0)	
Housekeeper	21 (27.3)	16 (21.9)	
Others	22 (28.6)	22 (30.1)	
Income			0.601
<5,000 THB	21 (27.3)	21 (28.8)	
5,000–10,000 THB	19 (24.7)	13 (17.8)	
10,001–20,000 THB	10 (13.0)	16 (21.9)	
20,001–30,000 THB	10 (13.0)	9 (12.3)	
>30,000 THB	17 (22.1)	14 (20.7)	
Hospital card			0.410
Social security scheme	12 (15.6)	11 (15.1)	
Universal coverage	40 (51.9)	30 (41.1)	
Government officer	23 (29.9)	31 (42.5)	
Self-pay	2 (2.6)	1 (1.4)	
Pain score			0.451
Low	20 (26.0)	20 (27.4)	
Moderate	31 (40.3)	35 (47.9)	
Severe	26 (33.8)	18 (24.7)	
Drug Management			0.389
Self-medication	69 (89.6)	62 (84.9)	
Caregiver	8 (10.4)	11 (15.1)	
Diagnosis (ICD10)			0.723
Musculoskeletal	41 (53.2)	35 (46.1)	
Infection	3 (3.9)	4 (5.5)	
Cancer	17 (22.1)	12 (16.4)	
Trauma	8 (10.4)	11 (15.1)	
Nervous	3 (3.9)	6 (8.2)	
Others	5 (6.5)	5 (6.8)	

Supplementary Table 1 (continued)

Characteristic	Adherence status		p-value
	Nonadherence	Adherence	
Diagnosis (ICD11)			
Chronic primary pain	1 (1.3)	3 (4.1)	0.286
Chronic cancer related pain	16 (20.8)	12 (16.4)	0.495
Chronic post-surgical, traumatic pain	3 (3.9)	5 (6.8)	0.421
Chronic secondary musculoskeletal pain	22 (28.6)	26 (35.6)	0.355
Chronic secondary visceral pain	3 (3.9)	1 (1.4)	0.337
Chronic neuropathic pain	40 (51.9)	37 (50.7)	0.877
Chronic secondary headache, orofacial pain	1 (1.3)	0 (0)	0.329
Drug group			
Opioids	22 (28.6)	15 (20.5)	0.255
Strong opioids	14 (18.2)	11 (15.1)	0.609
Weak opioids	9 (11.7)	4 (5.5)	0.177
Anticonvulsants	72 (93.5)	67 (91.8)	0.685
Antidepressants	45 (58.4)	40 (54.8)	0.652
Acetaminophen	3 (3.9)	2 (2.7)	0.693
NSAIDs	13 (16.9)	12 (16.4)	0.942
Muscle relaxants	16 (20.8)	24 (32.9)	0.094
No. of drug groups prescribed			0.643
1	20 (26.0)	17 (23.3)	
2	34 (44.2)	34 (46.6)	
3	14 (18.2)	15 (20.5)	
4	4 (5.2)	6 (8.2)	
5	4 (5.2)	1 (1.4)	
6	1 (1.3)	0 (0)	
Frequency per day			0.763
1	9 (11.7)	11 (15.1)	
2	23 (29.9)	23 (31.5)	
3	34 (44.2)	33 (45.2)	
4	7 (9.1)	3 (4.1)	
5	4 (5.2)	3 (4.1)	
Pills per day			0.141
0-5	52 (67.5)	59 (80.8)	
6-10	19 (24.7)	13 (17.8)	
11-15	3 (3.9)	1 (1.4)	
>15	3 (3.9)	0 (0)	
Medication side effects			0.516
No	41 (53.2)	35 (47.9)	
Yes	36 (46.8)	38 (52.1)	
Reported side effects			
Drowsiness	22 (28.6)	23 (31.5)	0.695
Nausea	5 (6.5)	8 (11.0)	0.331

Supplementary Table 1 (continued)

Characteristic	Adherence status		p-value
	Nonadherence	Adherence	
Constipation	14 (18.2)	14 (19.2)	0.876
Dry mouth	2 (2.6)	2 (2.7)	0.957
Urinary retention	1 (1.3)	0 (0)	0.329
Peripheral edema	0 (0)	1 (1.4)	0.303
Pruritic rash	0 (0)	1 (1.4)	0.303
Others	1 (1.3)	1 (1.3)	0.907
Alternative treatment			0.442
No	48 (62.3)	41 (56.2)	
Yes	29 (37.7)	32 (43.8)	
Alternative treatment			0.207
Physical therapy	29 (87.9)	20 (71.4)	
Intervention, surgery	1 (3.0)	3 (10.7)	
Behavioral, Psychotherapy	1 (3.0)	0 (0)	
CMT, RT	2 (6.1)	5 (17.9)	

THB=Thai baht, ICD-10=international classification of diseases 10th revision, ICD-11=international classification of diseases 11th revision, NSAIDs=non-steroidal anti-inflammatory drugs, CMT=chemotherapy, RT=radiation therapy

Supplemental Table 2 The disposal management of the leftover drugs among the participants

Drug disposal	Drug groups	
	Opioids (n=29) No. (%)	All (n=76) No. (%)
Store at home	20 (69.0)	55 (72.4)
Throw away	3 (10.3)	4 (5.3)
Distribution	0 (0)	9 (11.8)
Return	4 (13.8)	9 (11.8)
Others	4 (13.8)	12 (15.8)