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Painkiller Self-Medication Practices and Knowledge of Painkiller-Related Kidney Damage Among the General Population of Punjab, Pakistan.

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Abstract

Background: Self-medication with analgesics or painkillers to relieve pain is a widespread phenomenon which can be associated with the risk of unnecessary kidney damage, which occurs, especially if analgesics are used for long periods of time, in high doses and without the supervision of a professional. There is limited evidence based on the community on painkiller self-medication and knowledge about kidney damage attributed to use of painkillers in the general population of Punjab, Pakistan.**The methodology** adopted for the study was descriptive cross-sectional study with a non-probability convenience sampling technique of which 138 adults were included in the study in the locality of Punjab, Pakistan. Data were obtained using a structured questionnaire which covered sociodemographic characteristics, painkiller self-treatment, awareness of kidney-damaging effects of painkillers, and safe handling of painkillers. The software SPSS version 26 was used for analyzing the data. The following descriptive statistics were carried out and the use of Chi-square tests, Pearson correlation and Multiple linear regression and the set statistical significance was $p < 0.05$.**Results**: Moderate knowledge (58.7%) and moderate safe painkiller-use practices (67.4%) were seen in most participants. 15.2% of participants said they used painkillers to treat themselves for pain in the last six months. The age ($p = 0.003$), place of residence ($p = 0.003$), educational level ($p = 0.002$) was statistically significantly associated with knowledge level. The knowledge was not associated with the variables of safe painkiller use ($r = 0.051$, $p = 0.555$), and none of the sociodemographic variables had a significant association with variables of safe painkiller use in regression analysis.**Conclusion:** The participants had moderate levels of knowledge and safe use of pain medications, but there are definite areas for improvement. Improving community education, providing emerging service level of counselling to pharmacists, and raising awareness regarding medication safety are key to enhance the appropriate utilization of pain killers and lessen the chances of kidney injuries caused by painkillers in Punjab, Pakistan.

Keywords: Painkiller self-medication, Analgesics, Kidney damage, Knowledge, Safe medication practices, public health, Punjab, Pakistan.

Introduction

Self-medication, the use of medicines without the advice or prescription of a competent health professional is a major public health problem globally, especially in low- and middle-income countries (LMICs) (May, Bauer et al. 2023). Analgesics (the drugs used to relieve pain) are the most commonly self-medicated drugs, including aspirin, ibuprofen, diclofenac, naproxen, and paracetamol (Gregg, Elseviers et al. 1989). They are widely available, inexpensive, common medication used for headache, painful joints, fever, painful periods (May, Bauer et al. 2023). Analgesics are medications used for pain, and are generally safe when taken at the recommended dose for the allotted amount of time, but if a person chooses to use a medication that is not prescribed for their condition, takes a dose that is not indicated, takes a high dose, or uses it for an extended period, they can harm their body and cause serious health issues resulting in kidney damage.

Self-medication, particularly with painkillers, is prevalent in Pakistan for several health- and socio-economic-related reasons (Aziz, Masood et al. 2018). Many people self-diagnose their symptoms so they do not seek medical advice by visiting the doctor's office because they have easy access to OTC medicines at pharmacies which are not part of the public healthcare system, the enforcement of prescription conditions is not implemented very strictly, healthcare can be expensive, for many waiting times at the public healthcare system are long and getting longer, and many people rely on advice they receive from family, friends, social media or untrained healthcare workers from the community pharmacies for their condition (Ma and Zhang 2025). The province of Punjab is the most populous province of Pakistan and with a big and diversified population it is an important setting in which the practices of self-medication of the community could be investigated (Aziz, Masood et al. 2018).

Painkiller-related kidney damage is one of the most under recognized complications of inappropriate analgesic use, and is very important (Nair, Guedes et al. 2026). NSAIDs use may also lead to acute kidney injury (AKI) when used repeatedly or for extended periods of time and chronic misuse may promote chronic kidney disease (CKD) development or progression (Lucas, Leitão et al. 2019). Damage to the kidney may be asymptomatic initially, only to be diagnosed when there is significant loss of its function (Chen, Li et al. 2023). Analgesics also have nephrotoxic properties and are particularly harmful for people with diabetes mellitus, hypertension, pre-existing kidney disorders, dehydration, and are older in age (Kuo, Tsai et al. 2010).

In many developing nations, even though there is a possibility of inappropriate use of analgesics being a health hazard, there is not much awareness about the adverse effect these analgesics may have on the kidneys (Enuagwuna, Dappa et al. 2025). Lack of health literacy and/or knowledge about the safe consumption of analgesics can reduce the likelihood of them taking safe recommended doses, taking them for longer than advised, using a variety of analgesics simultaneously, and even ignore the warnings on the medicines label. These behaviors can make it more likely for drug-related adverse events to happen, and put stress on healthcare systems that might be prevented (Mutair, Alhumaid et al. 2021).

A few studies have been done in Pakistan on self-medication practices among the university students or the students from health-related profession or even in any specific locality of urban area in Pakistan (Mushtaq, Gul et al. 2017). The studies in the communities of Punjab, however, with an explicit focus on self-medication with painkillers, and knowledge of painkiller related kidney damage, are hard to find (Juneja, Chauhan et al. 2024). However, there is limited information about the extent of self-medication with analgesics, community awareness of renal complications and their related practices among these individuals.

Local evidence is needed to be reliable to design effective Public Health interventions focusing on the rational use of analgesics, and preventing avoidable kidney disease (Ahmed, Ye et al. 2026).

Impressing the information about the existing community knowledge on medication forms and self-medication will help identify high risk groups, provide pharmaceutical based counselling, enhance 'medicine safety education' and assist with its implementation to help better promote responsible use of analgesics in the community (Aldali, Elsokkary et al. 2026). Moreover, this evidence can help guide policymakers and healthcare providers in targeted awareness initiatives and education to minimize medication-related renal issues.

Therefore, the aim of the study is to check painkiller self-medication practices and to analyze the knowledge on painkiller induced renal impairment among general population of Punjab, Pakistan. The findings will be useful in understanding the extent of self-medication and awareness deficits and possibly unsafe use of analgesics, and guide future public health initiatives that will ensure rational use of analgesics and prevent community deaths associated with self-medication.

Methodology

Study Design

A descriptive cross-sectional community-based observational study was conducted to evaluate painkiller self-medication practices and knowledge of painkiller-related kidney damage among the general population of Punjab, Pakistan.

Study Setting

The study was conducted among adults residing in selected urban and rural areas of Punjab, Pakistan. Data were collected from community settings, including residential areas, educational institutions, workplaces, markets, and other public places, where applicable and permitted.

Study Duration

The study was conducted over a period of 2 months, from **January, 2026** to **March, 2026.**

Study Population

The target population consisted of adult residents of Punjab, Pakistan. The accessible population included individuals who were available at the selected data collection sites during the study period and met the eligibility criteria.

Sample Size

A total sample of **138 participants** was included in the study. The sample size was considered sufficient for this small-scale community-based observational study based on the available time, resources, and accessibility of the target population.

The required sample size is calculated using the single population proportion formula, assuming a conservative prevalence estimate to maximize sample size and statistical power:

$$\boldsymbol{n = \frac{z^2 \times p(1-p)}{\varepsilon^2}}$$

Where:

- Z=1.96*Z*=1.96 (standard normal deviate for 95% confidence interval)
- p=0.10 *p*=0.10 (assumed prevalence of adequate first aid knowledge – conservative 10%, maximizing variance)
- d=0.05*d*=0.05 (absolute precision or margin of error)

$n = Z^2 \times p \times (1 - p) / d^2$

Where:

Z = 1.96 (for 95% CI)

p = 10% = 0.1 (assumed prevalence of adequate first aid knowledge; conservative estimate maximizes sample size)

d = 0.05 (absolute precision)

$n = 1.96^2 \times 0.1 \times (1\text{-}0.1) / 0.05^2$

n= 138
138 participants

Sampling Technique

A non-probability convenience sampling technique was used to recruit participants. Eligible individuals who were available during the data collection period and were willing to participate were included until the required sample size of 138 participants was achieved.

Inclusion Criteria
Participants were included if they:

- Were 18 years of age or older.
- Were residents of Punjab, Pakistan.
- Were able to understand Urdu or English.
- We're willing to provide informed consent.
- Had used a painkiller at least once in their lifetime.

Exclusion Criteria
Participants were excluded if they:

- Were younger than 18 years of age.
- We're not residents of Punjab, Pakistan.
- Were unable to understand or complete the questionnaire.
- Were critically ill or mentally incapable of providing informed consent.
- Submitted an incomplete questionnaire.

Study Variables
The main study variables included painkiller self-medication practices and knowledge of painkiller-related kidney damage. The sociodemographic variables included age, gender, educational level, occupation, marital status, place of residence, monthly household income, history of chronic disease, and previous diagnosis of kidney disease.
Painkiller self-medication practices included the use of painkillers without prescription, type of painkiller used, frequency of use, reason for use, source of medicine, source of information, dosage practices, duration of use, and reasons for self-medication.

Knowledge variables assessed participants' understanding of the possible kidney-related harms associated with inappropriate or prolonged painkiller use, including acute kidney injury, reduced kidney function, risk of kidney damage in dehydrated individuals, and increased kidney-related harm associated with excessive doses or prolonged use.

Data Collection Instrument
Data were collected using a structured, self-administered questionnaire developed after reviewing relevant literature. The questionnaire was prepared in English and translated into Urdu to improve participants' understanding.

Section A: Sociodemographic Characteristics
This section collected information regarding age, gender, education, occupation, marital status, place of residence, monthly household income, chronic diseases, and previous kidney problems.

Section B: Painkiller Self-Medication Practices
This section assessed whether participants used painkillers without consulting a qualified healthcare professional. It also included questions regarding commonly used painkillers,

frequency of use, reasons for self-medication, source of medicines, reading of medication labels, adherence to recommended dosage, and previous adverse effects.

Section C: Knowledge of Painkiller-Related Kidney Damage

This section included statements assessing participants' knowledge regarding the effects of excessive, prolonged, or inappropriate painkiller use on kidney function. Responses were recorded as **True, False,** and **Don't Know.**

Operational Definitions

Painkiller
A painkiller referred to any medicine used to relieve pain, including paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen, diclofenac, aspirin, naproxen, and mefenamic acid.

Self-Medication
Painkiller self-medication was defined as the use of a pain-relieving medicine without a current prescription or consultation with a qualified healthcare professional for the illness or symptom being treated.

Painkiller-Related Kidney Damage
Painkiller-related kidney damage referred to a decline in kidney function or injury associated with inappropriate, excessive, prolonged, or high-risk use of painkillers.

Knowledge Level
Each correct knowledge response was awarded one point, whereas incorrect and "Don't Know" responses received zero points. The total knowledge score was calculated by summing all knowledge item scores.
Knowledge levels were categorized as follows:

- **Poor knowledge:** Less than 50% of the total score
- **Moderate knowledge:** 50%–74% of the total score
- **Good knowledge:** 75% or more of the total score

Validity of the Instrument and Pilot Study
The questionnaire was reviewed by experts in public health, nursing, pharmacy, medicine, and research methodology to assess its clarity, relevance, and content validity. Necessary modifications were made based on expert recommendations.
A pilot study was conducted among approximately **14 participants** (10% of the calculated sample size) who had characteristics like those of the study population. Participants included in the pilot study were excluded from the final study. The pilot study assessed the clarity, feasibility, and estimated completion time of the questionnaire.

Reliability of the Instrument
The internal consistency of the knowledge and practice items was assessed using **Cronbach's alpha.** A Cronbach's alpha value of **0.70 or above** was considered acceptable.

Data Collection Procedure
After obtaining the necessary permission and ethical approval, eligible individuals were approached at the selected community locations. The researcher explained the purpose, procedure, risks, and benefits of the study to each participant. Written or electronic informed consent was obtained before participation. The questionnaire was provided in English or Urdu according to the

participant's preference. Participants were given sufficient time to complete the questionnaire. Completed questionnaires were checked for missing information before data entry. No names, identity card numbers, or other directly identifying information were collected.

Data Analysis

The collected data were coded, entered, and analyzed using the **Statistical Package for the Social Sciences (SPSS).** Descriptive statistics were used to summarize the data. Frequencies and percentages were calculated for categorical variables, while means and standard deviations were calculated for continuous variables where appropriate. The prevalence of painkiller self-medication was presented as frequencies and percentages. Knowledge scores were calculated and categorized as poor, moderate, or good. The chi-square test was used to examine associations between categorical variables, including the association of painkiller self-medication practices and knowledge levels with sociodemographic characteristics. Where appropriate, independent-samples *t*-tests or one-way analysis of variance (ANOVA) were used to compare mean knowledge scores between participant groups. Multiple linear regression was performed to examine predictors of overall safe painkiller-use practice. Statistical significance was considered at **$p < 0.05$,** with a **95% confidence interval.**

Ethical Considerations

Ethical approval was obtained from the all participants before data collection. Participation was entirely voluntary, and informed consent was obtained from every participant. Participants were informed that they had the right to refuse participation or withdraw from the study at any time without any penalty. Confidentiality and anonymity were maintained throughout the study. The collected information was used solely for research purposes and was stored securely. No invasive procedures or direct physical harm were involved in the study.

Results

Table 1. Sociodemographic characteristics of participants (N = 138)

Characteristic	**Category**	**Frequency (n)**	**Percentage (%)**
Age	18–25 years	46	33.3
	26–35 years	39	28.3
	36–45 years	26	18.8
	46–55 years	19	13.8
	56 years or above	8	5.8
Gender	Male	70	50.7
	Female	68	49.3
Marital status	Single	59	42.8
	Married	71	51.4

Characteristic	Category	Frequency (n)	Percentage (%)
	Divorced/Widowed	8	5.8
Educational level	No formal education	2	1.4
	Primary	10	7.2
	Secondary	21	15.2
	Higher secondary	38	27.5
	Bachelor’s degree	50	36.2
	Master’s degree or above	17	12.3
Occupation	Student	27	19.6
	Government employee	15	10.9
	Private employee	28	20.3
	Self-employed	33	23.9
	Homemaker	21	15.2
	Unemployed	8	5.8
	Other	6	4.3
Monthly household income	Below 50,000 PKR	44	31.9
	50,000–100,000 PKR	56	40.6
	100,001–200,000 PKR	27	19.6
	Above 200,000 PKR	11	8.0
Residence	Urban	86	62.3
	Rural	52	37.7
Chronic disease	None	44	31.9
	Diabetes	94	68.1

Characteristic	Category	Frequency (n)	Percentage (%)
Previous kidney disease diagnosis	No	125	90.6
	Yes	13	9.4

The largest age group was 18–25 years, representing 33.3% of participants. Male and female participants were almost equally represented. Slightly more than half of the participants were married, and the most common educational qualification was a bachelor's degree. Most participants lived in urban areas, while approximately two-thirds were recorded as having diabetes. Only 9.4% reported a previous diagnosis of kidney disease. The chronic-disease distribution should be checked because the questionnaire included several chronic conditions, but the SPSS output contains only "None" and "Diabetes."

Table 2. Painkiller self-medication practices among participants (N = 138)

Variable	Category	Frequency (n)	Percentage (%)
Painkiller self-medication during the previous six months	No	117	84.8
	Yes	21	15.2
Frequency of self-medication	Rarely	65	47.1
	Sometimes	44	31.9
	Often	21	15.2
	Always	8	5.8
Main condition treated	Headache	36	26.1
	Fever	26	18.8
	Toothache	18	13.0
	Muscle pain	25	18.1
	Joint pain	18	13.0
	Menstrual pain	6	4.3
	Other	9	6.5
Read medicine label or leaflet	Always	20	14.5
	Sometimes	69	50.0
	Never	49	35.5
Took more than recommended dose	Yes	16	11.6
	No	122	88.4
Used painkillers for more than seven days without advice	Yes	19	13.8
	No	119	86.2
Combined two or more painkillers without advice	Yes	22	15.9
	No	116	84.1

Variable	Category	Frequency (n)	Percentage (%)
Experienced side effects	Yes	21	15.2
	No	117	84.8

Only 15.2% of participants reported using painkillers without a doctor's prescription during the previous six months. However, 47.1% were classified as rarely self-medicating, 31.9% sometimes self-medicating, 15.2% often self-medicating, and 5.8% always self-medicating. Headache was the most frequently reported condition for self-medication, followed by fever and muscle pain. Half of the participants sometimes read the medicine label, while 35.5% never read it.

Risky painkiller-use behaviors included taking more than the recommended dose among 11.6%, prolonged use for more than seven days among 13.8%, and combining multiple painkillers among 15.9% of participants. Side effects were reported by 15.2%.

Important inconsistency

The self-medication results are internally inconsistent. Although only 21 participants answered "Yes" to self-medication, all 138 participants were assigned responses for self-medication frequency, painkiller type, condition treated, and reason for self-medication. Questions 11–21 should normally be analyzed only among participants who answered "Yes" to Question 10, unless the questionnaire instructed all participants to answer them.

Table 3. Painkiller types, reasons for self-medication, and recommendation sources

Variable	Category	Frequency (n)	Percentage (%)
Painkiller type	None	59	42.8
	Paracetamol	14	10.1
	Diclofenac	7	5.1
	Aspirin	14	10.1
	Naproxen	8	5.8
	Ibuprofen	1	0.7
	Ketorolac	35	25.4
Reason for self-medication	Minor illness	58	42.0
	Saves time	13	9.4
	Saves money	7	5.1
	Previous experience	15	10.9
	Easy availability	8	5.8

Variable	Category	Frequency (n)	Percentage (%)
	Difficult access to healthcare	1	0.7
	Other	36	26.1
Recommendation source	Pharmacist	58	42.0
	Family	13	9.4
	Friend	7	5.1
	Previous doctor’s prescription	15	10.9
	Internet	8	5.8
	Social media	1	0.7
	Self-decision	36	26.1

Ketorolac was recorded as the most used painkiller, accounting for 25.4% of all participants, followed by paracetamol and aspirin. Minor illness was the most frequently reported reason for self-medication. Pharmacists were the main source of painkiller recommendations, followed by self-decision.

These findings should be verified because ketorolac being the most common self-medicated analgesic is unusual and may indicate a coding or value-labeling error. Questions 11 and 14 were originally multiple-response questions. They should not have been entered as single categorical variables if participants were allowed to select more than one option.

Table 4. Types of side effects recorded among participants

Side effect	Frequency (n)	Percentage (%)
Stomach pain	64	46.4
Nausea or vomiting	41	29.7
Swelling	7	5.1
Reduced urination	15	10.9
Skin allergy	9	6.5
Other	2	1.4

Stomach pain was the most frequently recorded side effect, followed by nausea or vomiting and reduced urination. Only 21 participants reported experiencing side effects, but the side-effect-type

variable contains responses for all 138 participants. Therefore, this table cannot be interpreted as valid until Question 20a is corrected. Question 20a should contain values only for participants who answered "Yes" to Question 20. Participants who answered "No" should be coded as missing or not applicable.

Table 5. Overall knowledge and safe-practice categories

Variable	**Category**	**Frequency (n)**	**Percentage (%)**
Overall knowledge	Poor knowledge	31	22.5
	Moderate knowledge	81	58.7
	Good knowledge	26	18.8
Overall safe practice	Poor practice	29	21.0
	Moderate practice	93	67.4
	Good practice	16	11.6

More than half of the participants had moderate knowledge of painkiller-related kidney damage, while 22.5% had poor knowledge and 18.8% had good knowledge. Most participants also demonstrated moderate safe painkiller-use practices. Approximately one-fifth had poor practices, whereas only 11.6% had good practices.

The SPSS descriptive output reported a mean knowledge-category score of 1.96 ± 0.64 and a mean practice-category score of 1.91 ± 0.57. These means refer to category codes 1, 2, and 3 rather than actual knowledge and practice scores. Therefore, frequencies and percentages are more appropriate than means and standard deviations for these variables.

Table 6. Association between sociodemographic factors and overall knowledge level

Factor	**Pearson χ^2**	**Degrees of Freedom**	**p-value**	**Interpretation**
Age group	23.001	8	0.003	Significant
Gender	0.428	2	0.808	Not significant
Educational level	27.319	10	0.002	Significant
Monthly household income	3.075	6	0.799	Not significant
Residence	11.462	2	0.003	Significant
Chronic disease	1.192	2	0.551	Not significant
Previous kidney disease diagnosis	4.917	2	0.086	Not significant

Overall knowledge level was significantly associated with age group, educational level, and place of residence. Participants aged 26–35 years had the largest number of good-knowledge responses relative to several other age groups. Urban participants demonstrated better knowledge levels than rural participants. Among urban residents, 21 had good knowledge compared with only 5 rural residents. Gender, household income, chronic disease status, and previous kidney disease diagnosis were not significantly associated with overall knowledge level.

Caution

The age and education analyses violated the chi-square expected-frequency assumption:

- Age: 40.0% of cells had expected counts below 5.
- Education: 50.0% of cells had expected counts below 5.

These results should therefore be interpreted cautiously. Categories may need to be combined, or an exact test should be considered.

Table 7. Association between sociodemographic factors and overall safe-practice level

Factor	**Pearson χ^2**	**Degrees of Freedom**	**p-value**	**Interpretation**
Age group	5.468	8	0.707	Not significant
Gender	1.360	2	0.507	Not significant
Educational level	5.922	10	0.822	Not significant
Monthly household income	12.544	6	0.051	Not significant
Residence	1.580	2	0.454	Not significant
Chronic disease	3.346	2	0.188	Not significant
Previous kidney disease diagnosis	1.887	2	0.389	Not significant

None of the sociodemographic characteristics demonstrated a statistically significant association with safe-practice level at the 5% significance level. Monthly household income approached statistical significance, with $p = 0.051$, but it should still be reported as non-significant. Several analyses had small expected cell counts, particularly age, education, income, and kidney diagnosis. Consequently, these findings should be interpreted cautiously.

Table 8. Correlation between overall knowledge and safe-practice levels

Variables	**Pearson Correlation**	**p-value**	**N**
Overall knowledge and overall practice	0.051	0.555	138

There was a very weak positive correlation between overall knowledge and safe-practice levels. The correlation was not statistically significant, $r = 0.051$, $p = 0.555$. This indicates that higher

knowledge categories were not significantly associated with safer painkiller-use practice categories in this sample.

Methodological concern

Pearson correlation is not the most appropriate test because both variables were entered as ordinal categories coded 1, 2, and 3. Spearman's rank-order correlation would be more appropriate. The strongest analysis would use the original continuous knowledge score and continuous practice score rather than categorized variables.

Table 9. Model summary for predictors of overall safe-practice category

R	R^2	Adjusted R^2	Standard Error of Estimate
0.215	0.046	−0.013	0.569

The predictors collectively explained only 4.6% of the variation in the overall practice category. The negative adjusted R^2 indicates that the model did not perform better than a model containing only the intercept.

Table 10. Overall significance of the regression model

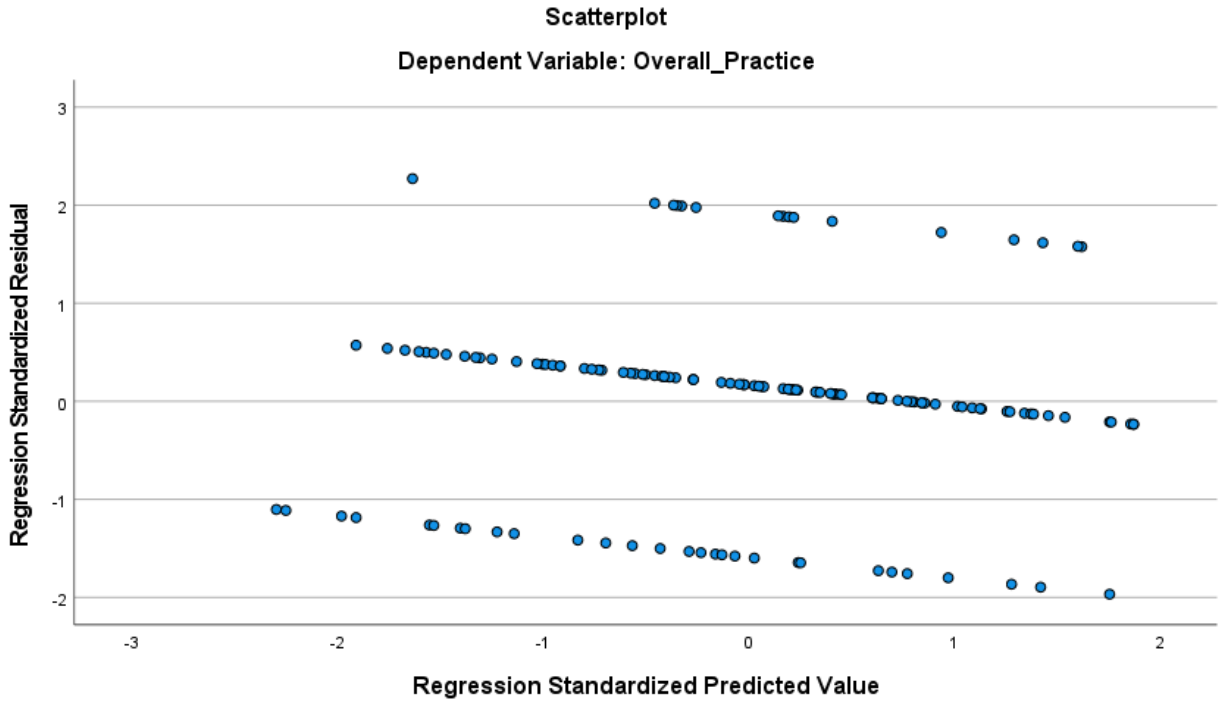
Source	Sum of Squares	df	Mean Square	F	p-value
Regression	2.018	8	0.252	0.779	0.622
Residual	41.757	129	0.324		
Total	43.775	137			

The overall regression model was not statistically significant, $F(8,129) = 0.779$, $p = 0.622$. Therefore, the included demographic variables and overall knowledge category did not significantly predict overall safe-practice category.

Table 11. Regression coefficients for predictors of overall safe-practice category

Predictor	B	Standard Error	Standardized Beta	t	p-value
Constant	1.808	0.439	—	4.114	<0.001
Age group	−0.011	0.044	−0.025	−0.259	0.796
Gender	−0.075	0.099	−0.066	−0.751	0.454
Educational level	−0.014	0.046	−0.029	−0.305	0.761
Monthly household income	−0.053	0.055	−0.086	−0.960	0.339
Residence	0.132	0.106	0.114	1.249	0.214
Chronic disease	0.153	0.125	0.127	1.225	0.223
Previous kidney disease diagnosis	0.024	0.195	0.013	0.125	0.901
Overall knowledge category	0.059	0.089	0.067	0.664	0.508

None of the independent variables significantly predicted overall safe-practice level, including overall knowledge (B = 0.059, β = 0.067, p = 0.508), although residence and chronic disease showed the largest standardized effects. However, the model should be interpreted cautiously because linear regression was applied to an ordinal practice outcome, categorical predictors were not dummy coded, and categorized rather than continuous knowledge scores were used. A more appropriate approach would be linear regression with continuous total scores and properly coded predictors, or ordinal logistic regression using poor, moderate, and good practice categories.



A good residual plot should show points scattered randomly around zero without a curved or funnel-shaped pattern. In your current model, the dependent variable was an ordinal category coded 1–3. Therefore, this graph is only exploratory. Ideally, repeat regression using the **continuous total practice score.**

Discussion

This is an observational, community-based study to explore the general population's knowledge of painkiller-related kidneys damage and painkiller self-medication practices, supplemented by the analysis of the relationship between knowledge and their use of painkillers, as well as the analysis of sociodemographic correlates of knowledge. Moderate community knowledge and moderate levels of safe painkiller-use practices, including salient gaps in community awareness of analgesic safety and risky medication behaviors, provided baseline information that can support public health interventions for rational analgesic use (Pai, Engling et al. 2019).

The participants were drawn from various age groups of adults, both male and female were represented almost equally, most had at least a higher-secondary education and most of the respondents were females residing in urban areas. Chronic diseases were most common, with diabetes being the predominant one; and few participants had been diagnosed with kidney disease. This sociodemographic distribution, is similar to the pattern of recent studies in the local communities, which showed the increasing burden of NCDs in Pakistan (Hamza, Siddique et al. 2026). The prevalence of diabetes among participants highlights the need to educate the

community on safe medication use, particularly focus groups, for population subgroups at high risk of developing diabetes.

The prevalence of self-reported six-month use of painkillers for self-medication was 15.2% compared to 15–20% reported in other self-reported community surveys in Pakistan and South Asia conducted earlier, which is quite low compared to the widely reported values of 50%–70%(Saifullah, Sharafi et al. 2025). Socio-desirability bias may have contributed to underreporting of unsanctioned medicines use among participants and differences in sampling and/or recall periods and local health care contexts may have resulted in variability. Despite low overall rates of self-medication, unsafe use of analgesics in self-medication was found throughout the sample. Painkiller use was mostly due to headache, fever, and muscle pain, like regional data indicating frequent use of OTC painkillers for self-limiting conditions among the community(Zamir and Nadeem 2016). of the participants consumed analgesics at doses higher than recommended, 13.8% consumed painkillers for durations longer than seven days, in the absence of medical advice, while 15.9% share took more than one type of analgesics without consulting a health worker. These behaviors would increase the likelihood of gastrointestinal side effects and nephrotoxicity, like South Asian studies which documented that patient who readily access their pharmacies would be more likely to take pain killers that were misappropriate, in terms of potentially being taken in excessive amounts. The findings show that public awareness programs are not enough, pharmacy counseling is necessary, as is a work on measures against pharmacy permutations and combinations. (Saifullah, Sharafi et al. 2025).

Fewer than one-fifth (14.5%) participants regularly read medicine labels, and more than one-third of participants never read the information on the label, which could lead to improper dosage or unknown side effects. The main provider of painkiller advice was the pharmacist, with independent decision making second. This places community pharmacists as important stakeholders in patient care in front of routine care, underscoring the value of expanding role of the pharmacist in counselling patients in the community, to improve medication security (Hamza, Siddique et al. 2026). About 15.2% of participants mentioned the side-effects of painkillers, predominantly stomach pain and nausea which is the commonly reported side-effects of NSAID toxicity; some who said that they experienced reduced urination which may indicate renal impairment (Pai, Engling et al. 2019). Findings, however, for the data coded inconsistently for the "side effect" variables should not be interpreted as conclusively valid, but rather descriptively.

Most participants (76.5%) had moderate knowledge of the kidney damage associated with the use of painkillers, while 18.8% had good knowledge and 22.5% had poor kidney damage knowledge. Use of safe practice patterns was like outcomes of knowledge: most of the respondents had moderate practices and only 11.6% had continually good safe painkiller-use behaviors. These findings align with the previous findings from the region, which reported poor community awareness of the risk of nephrotoxicity associated with analgesics use in South Asia (Montuori, Shojaeian et al. 2024).

There was a significant difference between knowledge levels across age, education, and residential location. The proportion of good knowledge was the highest among the 26-35 age group and higher educational level and urban residence was related to better risk awareness. There are a variety of information barriers that rural communities experience with decreased access to information and services, whereas urban communities experience an increased flow (Barna, (Saifullah, Sharafi et al. 2025). No significant association was found between knowledge and gender, household income, chronic disease status or prior kidney disease diagnosis. Notably, the patients with diabetes lacked better risk knowledge, and it means that patients with chronic illnesses who are at increased risk for kidney disease are not getting the information needed for analgesic safety provided to them routinely in the clinic.

There was no significant correlation between knowledge and the practice of safe painkiller use ($r = 0.051$, $p = 0.555$) rebutting a defined knowledge-practice gap, as well documented in the literature, in low and middle income country settings (Montuori, Shojaeian et al. 2024). Factual knowledge of renal hazards did not translate into safer medication behaviors as other factors such as convenience, availability of medicines, the cost, personal illness experience and social influences influenced the decision to use analgesics (Aziz, Masood et al. 2018). Behavioral change cannot rely on information provision alone and requires multi-component interventions. The non-significant multiple linear regression model ($F = 0.779$, $p = 0.622$, $R^2 = 0.046$) further showed that measured sociodemographic variables and knowledge explained very little variance in safe-practice outcomes. These regression results should be treated as exploratory due to methodological limitations including categorized outcome variables, absence of dummy coding for categorical predictors and limited statistical power in some subgroups.

This study provides important baseline information on the safety of analgesics use in Punjab despite these limitations. Simplified safety education for rural and less-educated populations, along with formal education for community pharmacists regarding counselling on analgesic safety and a routine education on the risk of nephrotoxicity on patients with diabetes mellitus and hypertension (Hamza, Siddique et al. 2026). Using probability sampling, larger sample sizes, questionnaires with fully validated and appropriate statistical analysis is recommended for future research to better understand the social-cultural determinants of painkiller self-medication. It is important to have comprehensive strategies as well as the use of pharmacy-based interventions and clinical counselling to improve rational use of painkillers other than relying on the increase in public knowledge only(Saifullah, Sharafi et al. 2025).

Limitations and Recommendations

The cross-sectional design of this study, the relatively small sample size, the use of a convenience non-probability sample, the reliance on self-reported measures and the potential for recall and social desirability bias in the answering of these measures limited the generalizability of findings from this study. Also, there were some inconsistencies with the coding of practice related variables which may have affected some of the descriptive findings. Future studies should comprise of more representative and random sample of greater size recruited from different parts of Pakistan, validated data collection tools, with strict data handling procedures, and a scientific statistical method. To encourage safe and rational use of painkillers and minimize the risk of kidney damage caused by painkillers, community-based educational programmes, counselling by pharmacists and reinforcement of public awareness raising campaigns should be conducted.

Conclusion

The present study had been evaluating the self-medication practice of pain killers and knowledge about pain killer related kidney damage among general population of Punjab (Pakistan). Most of the participants had moderate knowledge, and moderate safe use of painkillers; but there were significant gaps in knowledge and several unsafe medications use patterns. Age, educational status, place of residential area and knowledge were found to be significantly related while safe painkiller-use practices were not found to be related with knowledge. In the same way, none of the assessed sociodemographic factors were statistically significant in the prediction of “safe behaviors” related to medication. The study findings point toward robust public health initiatives, the educational component of which would be particularly geared toward the community, the pharmacist-led counseling for appropriate use of pain meds, and targeted interventions for high-risk populations.

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Conflict of Interest
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Authors' Contribution
All authors are equally participated in conceiving and designed the study, collected, and analyzed the data, interpreted the findings, and prepared the manuscript.
Data Availability Statement
The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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