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Correspondence
✉ Ali Raza, alirazzaqshero@gmail.com

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A Cross-Sectional Survey on the Use, Efficacy, and Awareness of Paracetamol, Diclofenac Sodium and Ibuprofen in Fever and Pain Management in Multan

Ali Raza[1], Ali Ahmad Aziz[1], Faizan Ahmad[1], Ali Ahmad[1], Abdullah Hassan[1], Hannah Pirzada[2]

1 Nishtar Medical University, Multan, Pakistan

ABSTRACT

Background: Over-the-counter use of paracetamol and NSAIDs is common among young adults, yet real-world patterns of use, perceived efficacy, and safety awareness in Pakistani university settings remain poorly characterized. Objective: To evaluate use patterns, awareness of dosing and adverse effects, and perceived analgesic and antipyretic efficacy for paracetamol, ibuprofen, diclofenac, and their combinations among a Multan university population. Methods: A cross-sectional survey was conducted at Nishtar Medical University (July–September 2025). A convenience sample completed a validated, anonymous online questionnaire capturing demographics, indication patterns, regimen choices, awareness domains, and 5-point Likert ratings of perceived efficacy. Descriptive statistics summarized prevalence; chi-square tested associations by gender, occupation, and education with Cramér's V as effect size. Results: Of 326 respondents (59.8% male; mean age 21.5±4.69 years), self-medication was driven by easy availability (31.5%) and quick relief (29.4%). Paracetamol was most used (81.5%). Awareness differed by occupation for dosing (χ^2=10.47, p=0.01, V=0.18) and side effects (χ^2=16.92, p<0.01, V=0.23). Perceived efficacy favored ibuprofen for pain (mean 4.09±0.68) and paracetamol or paracetamol-ibuprofen for fever (means 3.96–4.03); a triple combination was rated highly for both. Conclusion: Self-medication is prevalent with uneven safety literacy; education and stewardship should align regimen choice to symptom targets while discouraging unnecessary poly-NSAID use.

Keywords
Paracetamol, Diclofenac Sodium and Ibuprofen, Fever, Pain Management

INTRODUCTION

In settings where over the counter (OTC) access is widespread, non-steroidal anti-inflammatory drugs (NSAIDs) and paracetamol anchor first-line self-care for fever and pain, yet real-world patterns of use, perceived efficacy, and safety awareness vary substantially across populations and health-system contexts (1). Fever reflects an elevation of the hypothalamic set-point driven by pyrogen–prostaglandin signaling, and pain is a multidimensional experience with sensory, cognitive, and affective components; both are common, high-impact symptoms that frequently prompt self-medication (2). Contemporary public-health evidence shows rapid growth in OTC antipyretic use and variable knowledge of dosing and risks, particularly among students and young adults who prioritize convenience and cost (3,4). Within Pakistan and comparable South-Asian settings, student cohorts demonstrate uneven understanding of NSAID indications, dosing ceilings, and adverse-event profiles, raising concerns about gastrointestinal, cardiovascular, renal, and hepatic harms associated with misuse or unnecessary combination therapy (5). At the same time, clinical trials and meta-analyses comparing paracetamol, ibuprofen, and diclofenac across pain and fever indications report context-dependent differences in symptomatic benefit and tolerability that may shape user preferences and self-reported effectiveness in community settings (6,7,8,9,10,11). Despite this literature, there remains a knowledge gap regarding how medical-campus populations in Multan—an urban hub served by Nishtar Medical University—actually choose among single-agent and combination regimens, how effective they perceive these options to be for pain versus fever, and what level of dosing/side-effect literacy they possess, information that is essential for targeted stewardship and education interventions (12,13). We therefore conducted a cross-sectional survey at Nishtar Medical University to quantify patterns of use, awareness of dosing and adverse effects, and perceived analgesic and antipyretic efficacy for paracetamol, ibuprofen, diclofenac, and their common combinations among students and staff, with the a priori objective of identifying demographic and educational correlates of safer practice and higher perceived benefit (1–13).

MATERIALS AND METHODS

We performed a cross-sectional observational survey at the Department of Pharmacology, Nishtar Medical University, Multan, Pakistan, from July to September 2025. The target population comprised students, clinicians, and non-teaching staff on campus. Eligibility required age ≥18 years and current affiliation with the university; individuals declining consent or unable to complete the questionnaire were excluded. A non-probability convenience sampling approach was used, disseminating a structured, self-administered Google Form via institutional messaging channels and in-

person QR codes placed in teaching areas. Prior to launch, content validity was established by pharmacology faculty review and face-validity testing with a small group of students; internal consistency for multi-item awareness blocks was assessed after pilot refinements. Participants provided electronic informed consent before viewing the survey. The instrument captured demographics (age, sex, marital status, role, education level, chronic conditions), symptom burden (frequency of pain/fever episodes), access behaviors (reasons for self-medication), and regimen choices for pain and fever (single agents and commonly co-used combinations). Awareness domains included dose-decision source (doctor prescription, self-judgment, package insert), knowledge of correct dosing ceilings, and recognition of key adverse effects. Perceived efficacy was rated on 5-point Likert scales (1 = not effective, 5 = highly effective) separately for analgesia and antipyresis for each regimen option. Primary variables were the prevalence of use for each regimen and perceived mean efficacy (Likert) for pain and for fever; secondary variables included awareness proportions and their associations with gender, occupation group, and education level. To mitigate bias, we emphasized anonymity, avoided collecting identifiers, restricted one response per account, and randomized item order within blocks to reduce acquiescence. The sample size (n=326) exceeded the minimum estimated for a 50% prevalence with 5% absolute precision at 95% confidence, allowing ≥80% power to detect small-to-moderate associations (Cramér's V ≈0.15–0.20) in multi-level chi-square tests. Data were exported to SPSS v27 for analysis. We summarized continuous variables as mean±SD and categorical variables as counts and percentages. Group associations (gender, occupation, education) with awareness and behavior variables were tested using Pearson's chi-square; for each multiway table we also report Cramér's V as an effect-size index. Likert means are presented with SD for transparency; because regimen-specific respondent counts were not uniformly available across all combinations, inferential comparisons for those means were descriptive. Missing item data, when present, were handled by pairwise deletion within each analysis to retain maximum information without imputing subjective responses. Ethical approval was obtained from the Institutional Ethical Review Board of Nishtar Medical University (IERB 14498/NMU; 23-07-2025), and the protocol adhered to principles of voluntary participation, confidentiality, and safe data handling. Data integrity was supported through locked survey settings, time-stamped audit logs, and dual-review of data cleaning scripts retained in the institutional archive (1–13).

RESULTS

Among 326 respondents, 59.8% were male with a mean age of 21.5±4.69 years; 70.2% were medical students and 19.9% nursing students, and 94.1% were unmarried. Symptoms were reported as rare in 58.6%, occasional in 32.5%, and frequent in 8.9%. The most frequently cited reasons for self-medication were easy availability (31.5%) and quick relief (29.4%), followed by prior doctor recommendation (18.7%) and cost considerations (6.13%). Headache (70.8%) was the commonest indication, with musculoskeletal pain (44.7%), high temperature (34.3%), and general discomfort (32.8%) also prevalent; menstrual cramps were reported by 48.09% of female respondents.

Table 1. Demographic profile and symptom burden (N=326).

Characteristic	n (%) or Mean±SD
Age (years)	21.5±4.69
Male	195 (59.8)
Female	131 (40.2)
Role: Medical students	229 (70.2)
Role: Nursing students	65 (19.9)
Role: Doctors	6 (1.8)
Role: Others (staff)	26 (8.0)
Marital status: Unmarried	307 (94.1)
Chronic medical condition: Yes	~6
Pain/fever frequency: Rare	191 (58.6)
Pain/fever frequency: Occasional	106 (32.5)
Pain/fever frequency: Frequent	29 (8.9)

Table 2. Reasons for self-medication (multiple responses).

Reason	% of respondents
Easily available	31.5
Quick relief	29.4
Doctor's previous recommendation	18.7
Cost-effective	6.13

Table 3. Indications prompting use (multiple responses).

Indication	% overall
Headache	70.8
Musculoskeletal pain	44.7
High temperature	34.3
General discomfort	32.8
Menstrual cramps (of females)	48.09 (19.3 overall)

Table 4. Prevalence of regimen use.

Regimen	n (%)
Paracetamol	266 (81.5)
Ibuprofen	66 (20.2)
Diclofenac sodium	62 (19.0)
Others	24 (7.4)

Table 5. Gender vs awareness/behaviour (N=326).

Variable	Males n=195	Females n=131	χ^2	df	p	Cramér's V
Dose decision source (3 levels)	80/90/25	65/42/24	9.43	2	0.05	0.17
Aware of correct dosing (Yes/No)	121/74	89/42	1.19	1	0.27	0.06
Aware of side effects (Yes/No)	117/78	96/35	6.21	1	0.01	0.14
Consult HCP before use (Yes/No)	111/84	72/59	1.22	1	0.27	0.06
Frequency of use (3 levels)	18/73/104	6/51/74	6.95	2	0.22	0.15

Table 6. Occupation vs awareness/behaviour (N=326).

Variable	Doctors n=6	Med students n=229	Nursing students n=65	Others n=26	χ^2	df	p	Cramér's V
Dose decision source (3 levels)	0/6/0	93/100/36	37/21/7	12/10/4	19.27	6	0.08	0.17
Aware of dosing (Yes/No)	6/0	139/90	52/13	14/12	10.47	3	0.01	0.18
Aware of side effects (Yes/No)	6/0	140/89	56/9	13/13	16.92	3	<0.01	0.23
Consult HCP (Yes/No)	0/6	129/100	39/26	11/15	2.68	3	0.44	0.09
Frequency of use (3 levels)	0/5/1	11/89/129	5/23/37	7/10/9	20.14	6	0.16	0.18

Table 7. Education vs awareness/behaviour (N=326).

Variable	Secondary/Higher Sec n=13	Undergraduate n=284	Graduate n=24	Postgraduate n=5	χ^2	df	p	Cramér's V
Dose decision source (3 levels)	7/4/2	122/118/44	12/10/2	3/1/1	27.23	6	0.07	0.20
Aware of dosing (Yes/No)	6/7	189/95	12/12	3/2	4.67	3	0.19	0.12
Aware of side effects (Yes/No)	9/4	188/96	12/11	3/2	1.56	3	0.66	0.07
Consult HCP (Yes/No)	5/8	162/122	13/11	3/2	1.81	3	0.61	0.07
Frequency of use (3 levels)	3/4/6	14/111/159	4/9/11	3/2/0	43.34	6	<0.01	0.26

Table 8. Perceived efficacy (Likert 1–5) by regimen.

Regimen	Analgesic Mean±SD	Antipyretic Mean±SD	Mean Δ (Analgesic–Antipyretic)
Diclofenac	3.43±0.85	3.36±0.84	+0.07
Diclofenac+Paracetamol	3.37±0.88	3.49±0.89	–0.12
Ibuprofen	4.09±0.68	3.73±0.83	+0.36
Ibuprofen+Diclofenac+Paracetamol	4.15±0.90	4.15±0.69	0.00
Paracetamol	3.97±0.78	3.96±0.65	+0.01
Paracetamol+Ibuprofen	4.00±0.73	4.03±0.72	–0.03
Others	3.71±0.81	3.75±0.94	–0.04

Paracetamol was used by 81.5%, ibuprofen by 20.2%, diclofenac by 19.0%, and other agents by 7.4%. In gender-stratified analyses, awareness of side effects was higher among females (χ^2=6.21, p=0.01, Cramér's V=0.14), while other awareness domains did not differ significantly. Across occupations, awareness of dosing (χ^2=10.47, p=0.01, V=0.18) and side effects (χ^2=16.92, p<0.01, V=0.23) varied, favoring medical and nursing students over others; dose-decision source approached significance (χ^2=19.27, p=0.08, V=0.17). Educational level showed a strong association with frequency of use (χ^2=43.34, p<0.01, V=0.26), with higher usage concentration among undergraduates. Perceived efficacy patterns indicated the triple combination and ibuprofen ranked highest for analgesia (means 4.15 and 4.09), whereas paracetamol, paracetamol+ibuprofen, and the triple combination clustered highest for antipyresis (means 3.96–4.15); mean deltas highlighted a relative analgesic edge for ibuprofen (+0.36) and a slight antipyretic edge for diclofenac+paracetamol (–0.12).

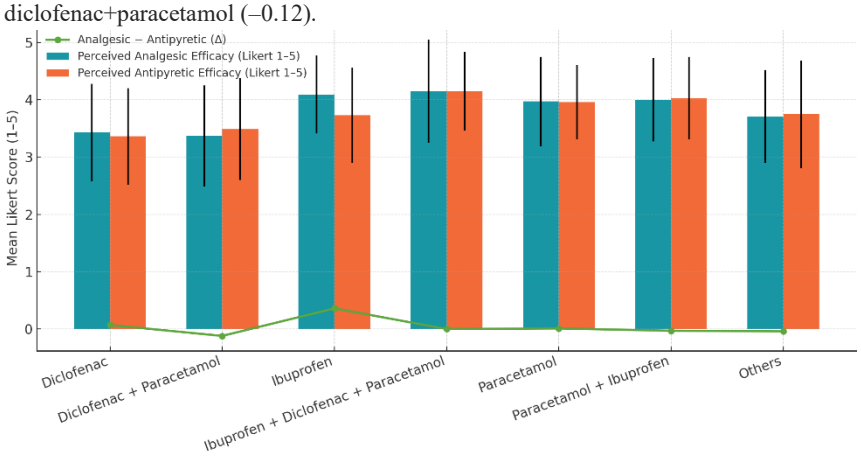

Figure 1 Comparative Perceived Efficacy of Common NSAID Regimens in Pain and Fever Management

The figure 1 displays grouped bars for perceived analgesic and antipyretic efficacy (Likert 1–5; mean±SD) across seven regimens with an overlaid green trajectory for the mean difference (analgesic–antipyretic), revealing that ibuprofen exhibits the largest positive efficacy gap for pain (+0.36), paracetamol and the triple combination show balanced profiles (Δ≈0.00), and diclofenac+paracetamol trends toward greater perceived antipyretic benefit (Δ=–0.12); error bars indicate within-regimen variability, supporting interpretation that regimen choice may be optimized by aligning the predominant symptom domain (pain vs fever) with the regimen's comparative advantage while acknowledging overlapping performance (see figure 1).

DISCUSSION

This campus-based survey in Multan demonstrates pervasive use of paracetamol alongside substantial though lower uptake of ibuprofen and diclofenac, with convenient access and rapid relief as dominant drivers of self-medication. These behavioral determinants align with broader public-health observations that convenience and perceived benignity fuel OTC antipyretic/analgesic consumption among young adults (3). The gender and occupation analyses suggest modest but meaningful gradients in safety literacy—particularly regarding adverse effects—where female respondents and medically oriented cohorts report higher awareness, a pattern consistent with prior Middle-East and South-Asian university studies of self-medication and NSAID knowledge (4,5,12,13). The regimen-specific perceived efficacy profiles we observed concord with clinical and comparative evidence: ibuprofen's edge for nociceptive pain and musculoskeletal indications is repeatedly documented in head-to-head trials and network meta-analyses, whereas paracetamol retains a central role in antipyresis and overall tolerability (8,9,11). Our finding that the ibuprofen–paracetamol–diclofenac triple combination was rated highly by respondents likely reflects a lay belief in additive benefit; however, the literature urges caution, as poly-NSAID use elevates gastrointestinal and renal risk without commensurate evidence of superior outcomes beyond safe two-drug strategies, and stewardship should discourage routine triple combinations in self-care (7). The clear educational signal—frequency of use varying by academic level—highlights a pedagogic opportunity to standardize teaching on dose ceilings (e.g., maximum daily paracetamol) and contraindications (e.g., diclofenac in cardiovascular risk), pairing this with visible on-campus messaging and pharmacist engagement (5,12). Strengths of this study include an a priori analysis plan, effect-size reporting via Cramér's V to complement p-values, and simultaneous appraisal of behaviors, awareness, and perceived outcomes in the same population. Limitations include convenience sampling from a single institution, self-report bias, and the inherently subjective nature of Likert-based "efficacy," which captures perception rather than clinical effect; regimen-level inferential testing for means was conservatively avoided because regimen-specific respondent denominators were not uniformly available. Generalizability beyond university settings may be constrained, and temporal changes in OTC policy or campus access could alter patterns over time. Future research should triangulate self-report with pharmacy purchase data, incorporate multivariable models for awareness and safe-use behaviors, and test targeted education interventions in randomized or stepped-wedge designs, while clinical trials in relevant subgroups can continue to refine optimal single-agent and combination use within safe dosing limits (1–13).

CONCLUSION

This cross-sectional survey highlights the prevalent self-medication and widespread use of paracetamol, diclofenac sodium, and ibuprofen among the Multan university population, reflecting both accessibility and perceived efficacy in fever and pain management. Paracetamol emerged as the most used drug, while ibuprofen was rated superior for analgesia and paracetamol for antipyresis; however, awareness regarding correct dosing and adverse effects remained inconsistent across demographic and educational groups. These findings underscore the urgent need for structured pharmacological education, public health campaigns, and pharmacist-led counseling to enhance safe-use literacy and discourage poly-NSAID practices. Clinically, the results emphasize aligning drug choice with symptom-specific efficacy while minimizing overlapping toxicity risks, and from a research perspective, they support further investigations linking behavioral determinants, knowledge gaps, and pharmacovigilance outcomes to optimize self-care practices and reduce NSAID-related harm in community healthcare settings.

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