Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 20s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Usage Patterns And Safety Awareness Of Nsaids (Non-Steroidal Anti-Inflammatory Drugs) Among The Rural Population In Kerala A Cross-Sectional Survey

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Cite this paper as: Mohamed Shifan K, Dr. Krishna Ravi, Dr. Alwin Simon, (2025) Usage Patterns And Safety Awareness Of Nsaids (Non-Steroidal Anti-Inflammatory Drugs) Among The Rural Population In Kerala A Cross-Sectional Survey. *Journal of Neonatal Surgery*, 14 (20s), 145-153.

ABSTRACT

Background: The widespread use of NSAIDs as over the counter medicines (OTCs) raises concern on patient safety. Current study investigated and evaluated the usage patterns, safety awareness, and potential risks of NSAID use among the rural population of Kerala.

Methodology: The cross-sectional observational study was conducted among people residing in rural areas of Malapuram, Kerala, India, who were taking NSAIDs with or without prescription for their pain management. The sample size was determined using a statistical formula that accounts for the expected prevalence of NSAID use based on preliminary studies or surveys.[8] Total of 390 participants were participated in the survey. Awareness and Knowledge of NSAID use, Self-Medication Practices.

Results: The study surveyed 407 participants, with 390 included in the final analysis. The participants were categorized as occasional and regular users. The results showed that NSAID use increased with age, particularly among females aged 21-60 years. The most common reasons for NSAID use were back and muscle pain, followed by headaches and menstrual cramps. A significant portion of participants who used NSAIDs occasionally (66.92%) were self-medicated, and 29.23% used them regularly without prescription. Gastrointestinal issues like dyspepsia and epigastric pain were common side effects, particularly among regular users.

Conclusion: This study analyzed NSAID use patterns in the rural population of Kerala, focusing on demographics, usage patterns, and side effects. Most participants (66.92%) were self-medicated with NSAIDs, while only 2.56% used prescription NSAIDs. Regular use was less common but more prevalent among females and gastrointestinal side effects, especially epigastric pain and dyspepsia, were more frequent in regular users, underscoring the need for caution with long-term use. Since there was a gap in knowledge and awareness regarding NSAID use risks, indicating a need for better safety education.

Keywords: *NSAIDs, Self medications, Gastrointestinal effects*

1. INTRODUCTION

Nonsteroidal anti-inflammatory drugs (NSAIDs) are the medications usually indicated for the management of various acute and chronic conditions associated with pain and inflammation.[1] These are the drugs which are mainly used as over the counter (OTC) medications due to its analgesic properties. With over 73 million NSAID prescriptions globally each year, they are

commonly utilized both over the counter (OTC) and by prescription, particularly for management of pain in conditions such as arthritis, musculoskeletal disorders, and acute injuries.[2] In India, NSAID use is notably high, with studies showing that 40-50% of individuals use these drugs at some point in their lives. The pain-relieving property of analgesics causes a drastic increase in its use as OTC for various conditions for the past three decades in developing countries regardless of their risks.[3] Even though there are many analgesics available globally, NSAIDs continue to be the most common analgesics used in medicine to reduce pain.[4]

Pharmacologically NSAIDs inhibits the enzyme cyclooxygenase (COX), thereby production of prostaglandins which results in reduction of inflammation and pain as desired effect while at the same time reducing protection to gastric mucosa, renal and platelet function as an undesired effect. Although prostaglandins are mediators of pain, inflammation, and fever, they also play a critical role in protecting the gastric mucosa, renal function, and platelet activity.[5] Therefore, concurrent use of these medications without consulting health practitioners may result in other gut related issues in patients.

NSAIDs are primarily used by the rural population due to their easy availability over the counter (OTC), affordability, and limited access to healthcare facilities. In rural areas, where medical resources and healthcare professionals may be scarce, individuals often rely on OTC medications like NSAIDs for self-medication to manage pain and inflammation, especially related to chronic conditions or injuries from physically demanding work. And the widespread availability and reliance on NSAIDs make them a convenient, albeit sometimes risky, choice for pain relief in rural communities. Despite their effectiveness, the widespread use of NSAIDs, especially in rural populations, raises concerns about safety, appropriate usage, and potential health risks. So, the appropriateness of analgesics uses, especially NSAIDs as OTC is a major concern given to both intentional and unintentional drug intoxications, drug interactions, and the incidence of adverse drug responses.[7] In Kerala, NSAID usage as OTC is more prevalent, particularly among older adults managing chronic conditions and younger individuals seeking relief from acute pain. However, the lack of healthcare access in rural areas often leads to self-medication, posing risks of misuse and adverse effects, such as gastrointestinal, renal, and cardiovascular issues.

The current study aims to evaluate the usage patterns, safety awareness, and potential risks of NSAID use among the rural population of Kerala. By identifying demographic and socioeconomic factors that influence NSAID consumption and self-medication practices, the study seeks to inform public health initiatives, promote safer medication practices, and reduce the incidence of NSAID-related complications in rural settings.

2. METHODOLOGY

The cross-sectional observational study was conducted among people residing in rural areas of Malapuram, Kerala, India, who were taking NSAIDs with or without prescription for their pain management. The study obtained ethical approval and those with informed consent were only included in the study. The sample size was determined using a statistical formula that accounts for the expected prevalence of NSAID use based on preliminary studies or surveys.[8] Data were collected using a structured questionnaire that will encompass several sections including demographics, frequency and types of NSAIDs used, reasons for use, and methods of acquisition (self-medication or prescription), Awareness and Knowledge of NSAID use, Self-Medication Practices. Data analysis was done with descriptive statistics.

3. STUDY CRITERIA

***Inclusion Criteria*:** Participants aged 18 years and older, who had provided informed consent and were capable of accurately reporting their medication use; they had resided in the selected rural community for at least six months to ensure familiarity with local healthcare practices and the availability of NSAIDs.

Exclusion Criteria

Individuals with cognitive impairments, those who had not resided in the selected rural community for at least six months, and patients who were on irregular medications (as reported during patient interaction) were excluded from the study.

4. RESULTS

A total of 407 participants were part of the survey, of which 390 were included in the study. The study categorized the participants according to their habit of NSAID intake i.e, occasional users of NSAIDs and frequent/regular users of NSAIDs. This classification provides insight into the patterns and behaviors surrounding NSAID usage, with important distinctions in how often and for what purposes these medications are used.

Table 1 showed clear patterns of usage of NSAIDs, with varying prevalence of occasional and regular usage across different age groups. Among participants aged 20 or younger, the incidence of NSAID use is relatively low, with only 1.28% being occasional users and 3.08% regular users which suggests that younger individuals in this age group may tend to use NSAIDs regularly, possibly due to acute pain from injuries or musculoskeletal issues. As age increases, particularly in the 21-30 and 31-60 age groups, there is a noticeable increase in NSAID use (11.54%; 12.31% using NSAIDs occasionally and 10.00 %; 13.08% using regularly respectively) reflecting a greater prevalence of conditions like arthritis, joint pain, and muscle strain. The older age groups, particularly those between 61-70 years, show a pattern of occasional NSAID use, which may be linked

to age-related health problems.

S. No	Age (Years)	No. of study participants initially	No. of occasional NSAID users	(%)	No. of regular NSAID users	(%)
1	≤20	20	5	1.28	12	3.08
2	21-30	90	45	11.54	39	10.00
3	31-40	99	48	12.31	51	13.08
4	41-50	130	76	19.49	51	13.08
5	51-60	38	29	7.44	6	1.54
6	61-70	30	28	7.18	0	0.00

Table 1: Age wise distribution of study participants who were taking NSAIDs

Table 2 showed that both males and females use NSAIDs for occasional relief, but females tend to use them more regularly. Among males (164 participants), 32.31% use NSAIDs occasionally, and 9.74% use them regularly. In contrast, among females (226 participants), 26.92% use NSAIDs occasionally, while 31.03% use them regularly.

S. No	Gender	No. of study participants	No. of occasional NSAID users	(%)	No. of regular NSAID users	(%)
1	Male	164	126	32.31	38	9.74
2	Female	226	105	26.92	121	31.03

Table 2: Gender wise distribution of study participants

The marital status distribution of the study participants revealed that most of the study participants were married (83.33%), with a small percentage being single (12.82%) and even fewer being widowed (3.85%). Notably, there were no divorced participants in the study. **(Table 3)**

S. No	Marital status	No. of study participants	Percentage (%)
1	**Single**	50	12.82
2	**Married**	325	83.33
3	**Widowed**	15	3.85
4	**Divorced**	0	0.00

Table 3: Distribution of study participants based on their marital status

Table 4 listed out the occupation details and their NSAID usage pattern of study participants. Daily wage workers (161 participants) had the highest usage, with 24.87% using NSAIDs occasionally and 16.41% using them regularly. Farmers (50 participants) also showed substantial NSAID usage, with 10% using them occasionally and 2.82% using them regularly. Homemakers (56 participants) and students (51 participants) had moderate NSAID usage. Among homemakers, 7.95% used NSAIDs occasionally, and 6.41% used them regularly. Similarly, 7.69% of students used NSAIDs occasionally, with 5.38% being regular users. The Other category (72 participants), which includes individuals in varied occupations, had a mix of 8.72% occasional and 9.74% regular NSAID usage.

S. No	Occupation	No. of study participants	No. of occasional NSAID users	(%)	No. of regular NSAID users	(%)
1	**Farmer**	50	39	10.00	11	2.82
2	**Daily wage**	161	97	24.87	64	16.41
3	**Homemaker**	56	31	7.95	25	6.41
4	**Student**	51	30	7.69	21	5.38
5	**other**	72	34	8.72	38	9.74

Table 4: Distribution of study participants based on their occupation

Table 5 analyzed the NSAID usage patterns based on socioeconomic status which revealed a clear relationship between socioeconomic class and the frequency of NSAID use, with a higher usage observed in the middle and lower socioeconomic groups. The Middle/Lower middle class (11-15); comprising 136 participants, had the highest proportion of NSAID use, with 21.79% using NSAIDs occasionally and 13.08% using them regularly. 114 participants were in the Lower/Upper lower class (5-10) and among them 17.44% use NSAIDs occasionally and 11.79% use them regularly. For Upper Middle (16-25) and Upper class (26-29); the usage of NSAIDs in these higher socioeconomic classes was relatively lower, with the upper middle class showing 8.21% occasional use and 7.18% regular use, and the upper class showing 6.41% occasional use and 4.87% regular use. Individuals in these classes may have greater access to healthcare, possibly leading them to seek professional medical advice rather than self-medicating with over-the-counter NSAIDs. Lower socioeconomic class (<5) had the lowest NSAID usage, with only 5.38% using NSAIDs occasionally and 3.85% using them regularly.

S. No	Socioeconomic class	No. of study participants	No. of occasional NSAID users	(%)	No. of regular NSAID users	(%)
1	**Upper (26-29)**	44	25	6.41	19	4.87
2	**Upper Middle (16-25)**	60	32	8.21	28	7.18
3	**Middle/Lower middle (11-15)**	136	85	21.79	51	13.08
4	**Lower/Upper lower (5-10)**	114	68	17.44	46	11.79
5	**Lower (<5)**	36	21	5.38	15	3.85

Table 5: Distribution of study participants based on their Socioeconomic class (Using socioeconomic classification by Kuppusamy scale) [9]

The study participants were evenly split between those who were not diagnosed with any health condition (49.74%) and those who had a clinically diagnosed health condition (50.26%). The study showed that nearly half of the study population has been diagnosed with one or more health issues, which may influence their NSAID usage patterns. The predominance of hypertension, affecting 51.30% of the participants, followed by diabetes mellitus at 36.79% can be seen (**Table 6)**. Other conditions, such as myocardial infarction (5.18%), migraine (2.59%), arthritis (3.11%), hypothyroidism (2.07%), and stroke (0.52%), are less common but still significant in the study population. Individuals with arthritis and migraine may also use

NSAIDs for symptom management.

S. No	Diagnosis	No. of study participants	Percentage (%)
1	Hypertension	99	51.30
2	Diabetes Mellitus	71	36.79
3	Myocardial Infarction	10	5.18
5	Migraine	5	2.59
6	Arthritis	6	3.11
7	Hypothyroidism	4	2.07
8	Stroke	1	0.52

Table 6: List of various clinically diagnosed health conditions observed among the study participants

The indications for NSAID use among the study participants revealed that back pain was the most common reason for both occasional and regular NSAID usage, with 20.90% of participants using NSAIDs occasionally and 2.74% using them regularly. Muscle pain followed closely, with 14.93% of participants using NSAIDs occasionally and 6.72% using them regularly. Other significant indications for NSAID use included headaches (7.96% occasional, 9.45% regular), menstrual cramps (4.98% occasional, 11.69% regular), fever/body pain (4.98% occasional, 8.46% regular), and joint pain (7.46% occasional, 5.47% regular). Although conditions like arthritis (0.75% occasional, 0.75% regular) and migraine (0.75% occasional, 0.50% regular) were less common as reasons for NSAID use, they still contributed to the overall NSAID usage patterns. **(Table 7)**

S. No	Indications	No. of study participants	No. of occasional NSAID users	Percentage (%)	No. of regular NSAID users	Percentage (%)
1	**Back Pain**	95	84	20.90	11	2.74
2	**Muscle Pain**	87	60	14.93	27	6.72
3	**Headache**	70	32	7.96	38	9.45
4	**Menstrual Cramps**	67	20	4.98	47	11.69
5	**Fever/ Body pain**	54	20	4.98	34	8.46
6	**Joint Pain**	52	30	7.46	22	5.47
7	**Tooth ache**	20	9	2.24	11	2.74
8	**Arthritis**	6	3	0.75	3	0.75
9	**Migraine**	5	3	0.75	2	0.50

Table 7: List of indications of NSAID use among study participants

It was found that a significant 66.92% of participants used NSAIDs occasionally on their own, while 29.23% used them regularly without a prescription (self-medication). On the other hand, only 2.56% of participants used NSAIDs occasionally through a prescription, and 1.28% used them regularly under medical guidance. **(Table 8)**

S. No	Usage of NSAIDs	No. of study participants	No. of occasional NSAID users	(%)	No. of regular NSAID users	(%)
1	**Self-medication practice**	375	261	66.92	114	29.23
2	**Prescription NSAID use**	15	10	2.56	5	1.28

Table 8: Usage pattern of NSAIDs among study participants

The frequency of NSAID use varied significantly between occasional and regular users. Among occasional users, the highest proportion (27.69%) used NSAIDs occasionally, while only a small number (4.36%) were regular users. Conversely, regular users showed a higher frequency of monthly (28.21%) and weekly (6.92%) use compared to occasional users. Daily use was reported by 3.85% of occasional users, while only 1.28% of regular users used NSAIDs daily. Regarding the source of information on NSAID use, both occasional and regular users commonly relied on self-experience, with 27.69% of occasional users and 14.36% of regular users citing this as their primary source of information. Pharmacists were another significant source, with 20% of occasional users and 12.56% of regular users obtaining information from them. Friends and family were also consulted by a notable number of occasional users (4.87%), whereas healthcare providers were consulted less frequently by both groups (2.56% of occasional users and 1.28% of regular users).

Duration of use also differed between the two groups. Short-term use (less than 3 days) was more common among occasional users, with 37.44% reporting this duration, compared to 30.51% of regular users. Medium-term use (3-7 days) was more prevalent among regular users (7.95%), while occasional users showed a slightly lower percentage (16.41%). Long-term use (more than a week) was less common in both groups, with only a few participants in each group reporting such usage (5.38% of occasional users and 2.31% of regular users).

In terms of specific NSAIDs, Aceclofenac and Diclofenac were the most used, with 20.90% of occasional users and 27.69% of regular users using Aceclofenac, and 20.00% of occasional users and 25.79% of regular users using Diclofenac. Other NSAIDs like Mefenamic acid (14.93% of occasional users, 13.08% of regular users), Ibuprofen, and Acetaminophen were also used, though to a lesser extent. Awareness of potential adverse drug reactions (ADR) was reported by 20% of occasional users and 15.64% of regular users. However, only a small proportion of both groups were aware of the recommended dose (10.26% of occasional users and 9.23% of regular users) and the appropriate duration of use (14.62% of occasional users and 7.69% of regular users). **(Table 9)**

S. No	Parameter	No. of occasional NSAID users	No. of NSAID regular users
1	**Frequency of NSAID use**		
	Daily	15	5
	Weekly	34	27
	Monthly	74	110
	Occasionally	108	17
2	**Source of Information**		
	Health care provider	10	5
	Pharmacist	78	49
	Self (Previous experience)	108	56

	Friends/Family	19	29
	Internet/Online resources	16	20
3	**Duration of NSAID use**		
	<3 days	146	119
	3-7 Days	64	31
	More than a week	21	9
4	Commonly used NSAID		
	Aceclofenac	100	103
	Diclofenac	105	98
	Mefenemic acid	87	51
	Ibuprofen	48	30
	Acetaminophen	96	65
	Mefenemic acid/Aceclofenac	30	27
	Diclofenac/mefenemic acid/Aceclofenac	24	21
	Diclofenac/mefenemic acid	14	10
	Nimesulide	12	3
4	**Awareness of NSAID risks and safety**		
	Aware of potential ADR	78	61
	Aware of recommended dose	40	36
	Aware of duration of use	57	30

Table 9: NSAID use evaluation among study participants

Table 10 listed out the common side effects observed among the study participants, which included dyspepsia, Epigastric pain, Peptic Ulcer and Skin Rashes. Dyspepsia was reported by 10.39% of occasional NSAID users and 8.18% of regular users. The slightly higher percentage among occasional users may be linked to improper use of the drug. Epigastric pain was experienced by 19.91% of occasional users and 25.79% of regular users. Regular NSAID use appears to be associated with a higher frequency of this issue, likely due to long-term irritation of the stomach lining. Peptic ulcers were reported by 2.60% of occasional users and 5.03% of regular users. Regular NSAID use is known to increase the risk of ulcers, indicating that long-term users should be monitored for gastrointestinal complications. Skin rashes were reported by 0.87% of occasional users and 0.63% of regular users. Though rare, skin reactions can occur in some individuals, suggesting a need for caution and awareness. Both occasional and regular NSAID users reported gastrointestinal side effects, with regular users experiencing a higher frequency of epigastric pain and peptic ulcers. Skin rashes were less common but still noted.

S. No	Side effects	No. of occasional NSAID users	(%)	No. of regular NSAID users	(%)
1	Dyspepsia	24	10.39	13	8.18

2	Epigastric pain	46	19.91	41	25.79
3	Peptic Ulcer	6	2.60	8	5.03
4	Skin Rashes	2	0.87	1	0.63

Table 10: Common side effects observed among the study participants.

5. DISCUSSION

The results revealed that NSAID use was most prevalent in the females in age group of 21-40 years, indicated that the younger old individuals more likely to use NSAIDs regularly due to injuries or musculoskeletal pain and the higher prevalence of conditions that typically require regular pain management, such as menstrual cramps, migraines, and arthritis, which are more common among women. This suggests that health interventions should consider gender differences, particularly focusing on regular NSAID use in women. Similar findings observed in a study conducted by Tom et al., stated that, female population has a greater inclination to the use of NSAIDs. [9] The marital status of participants, with a predominant percentage being married, might suggest that family and household responsibilities or chronic conditions associated with aging could influence the usage patterns of NSAIDs. Occupation played a role, with daily wage workers and farmers showing the highest usage, likely due to the physically demanding nature of their work. NSAID usage was notably higher in the middle and lower socioeconomic classes. This pattern likely reflects greater self-medication practices in individuals with less access to formal healthcare. In contrast, individuals from higher socioeconomic classes had lower NSAID usage, likely because they have better access to medical care and may prefer to consult healthcare professionals before using such medications. Socioeconomic status was linked to NSAID use, with individuals from middle and lower socioeconomic classes using NSAIDs more frequently, potentially due to greater reliance on self-medication. The most frequent reasons for NSAID use were back pain and muscle pain, which were reported by a large proportion of participants. Headaches and menstrual cramps were also common causes, with regular NSAID use more common for menstrual cramps (11.69%) compared to occasional use. These findings suggest that pain management, particularly for musculoskeletal conditions, is the primary driver of NSAID usage. A study conducted by Sali et al., stated that headache (65.7%), low backache (11.4%) and fever (10.5%) were common indications of NSAID use.[10] The study found that self-medication was a prevalent practice, with most participants using NSAIDs without a prescription, raising concerns about misuse and potential adverse reactions. Side effects such as dyspepsia, epigastric pain, and peptic ulcers were common, particularly among regular users, indicating the risks of long-term NSAID use. A study conducted by Chakravarthy et al. in Chennai reported that majority of the population are aware of the side effects of NSAIDs, instead of this knowledge they self-medicate by themselves which were contrast to our study findings.[11,12]

6. CONCLUSION

This study analyzed NSAID use patterns in the rural population of Erode, Tamil Nadu, focusing on demographics, usage pattern, and side effects. Most participants were aged 21-40, with females showing higher rates of regular NSAID use than males. NSAID usage was more common among married individuals, daily wage workers, and those from lower socioeconomic backgrounds, likely due to pain or physical strain. Most participants (66.92%) were self-medicated with NSAIDs, while only 2.56% used prescription NSAIDs. Regular use was less common but more prevalent among females, likely due to conditions like menstrual cramps. Aceclofenac, diclofenac, and mefenamic acid were the most used NSAIDs. Gastrointestinal side effects, especially epigastric pain and dyspepsia, were more frequent in regular users, underscoring the need for caution with long-term use. While participants were aware of some risks and proper dosages, there was a gap in knowledge regarding long-term NSAID risks, indicating a need for better safety education.

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