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AN OBSERVATIONAL PROSPECTIVE STUDY OF PRESCRIPTION PATTERN OF ANALGESICS AMONG IN-PATIENT IN AN ORTHOPAEDIC DEPARTMENT IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Analgesics including nonsteroidal anti-inflammatory drugs are commonly prescribed group of drugs in clinical practice for the management of pain and inflammation. The objective of the study is to find out the percentage of analgesics prescribed and most commonly prescribed analgesics. Data were daily collected from patients of both genders who were admitted to the orthopedic in-patient department and who were prescribed NSAIDs during the study period. The data was collected from the patient's medical records. Prescriptions containing NSAIDs are documented in an ethically approved and specialized drug utilization proforma. Out of 163 patients, 112 were males and 51 were females. The results revealed most patients were in the age group of 20-30 years followed by 41-50 years. Analgesics used in the study population were identified and categorized. Out of 163 patients, the majority of the prescription share was for Aceclofenac 163[46.4%] followed by Diclofenac 145[41.3%], Tramadol 28[7.9%], and Ibuprofen 15[4.2%]. Proton pump inhibitors [15.1%] were the most frequently prescribed gastroprotective agents. Of the total 228 prescribed antibiotics, ceftriaxone was the most commonly prescribed Antibiotic 163[71.4%] followed by Amikacin 60[26.3%] and Ciprofloxacin 5 [2.1%]. Types of drug formulation used were oral [46.4%], intramuscular [41.3%], and intravenous [12.2%] preparations. Analgesics, especially NSAIDs were the most commonly prescribed medicine in the orthopedic in-patient department followed by gastroprotective agents. The majority of

the drugs are given by oral route.

KEYWORDS: Prescription pattern, non-steroidal anti-inflammatory drugs, cyclooxygenase enzyme, Orthopedics, Analgesics.

INTRODUCTION

Orthopaedic is a fundamental unit where various drugs like Antibiotics, NSAIDs, and gastroprotective are given to the patients. Most of the patients present in the orthopaedic department with fracture which is the most common condition followed by arthritis, degenerative bone diseases (spondylitis, osteoporosis), and joint replacements.[1]

Pain is most commonly experienced by these patients and is defined as "An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage". Analgesics such as NSAIDs are commonly prescribed classes of drugs for the management of pain along with muscle relaxants. NSAIDs are the most commonly prescribed medications in the orthopaedic department and the most commonly used over-the-counter drugs (OTC). These drugs have a wide range of adverse effects, gastrointestinal toxicity is a Major Clinical Limitations.[2]

An analgesic (commonly known as a painkiller) is a member of a diverse group of drugs used to relieve pain. Analgesic drugs act in a variety of ways on the peripheral and Central Nervous System; they include Paracetamol, NSAIDs such as Morphine, Synthetic drugs having narcotic properties such as Tramadol, and others.[3]

The analgesic effect of NSAIDs is associated with the peripheral inhibition of prostaglandin production and it can also occur in the subcortical site due to the inhibition of pain stimuli. The inhibition of Interleukin -1 and Interleukin – 6 induced the Production of prostaglandin in the hypothalamus which is related to the antipyretic effect and also in the resetting of the thermoregulatory system which can lead to vasodilation. The generic names of the drugs and categorization of the drugs under NLEM were considered during the study.[4]

CLASSIFICATION OF ANALGESICS

Drugs that relieve pain by acting on the Central Nervous System and reduce without loss of consciousness.

They are of two types

a) Narcotic Analgesics
b) Non- Narcotic Analgesics

a) Narcotic Analgesics: These are the drugs that bind to the opioid receptors present in both the central and the peripheral nervous system and block them for their interaction with neurotransmitters.

Narcotic Analgesics are classified into

i. Natural Analgesics
ii. Synthetic Analgesics

i. Natural Analgesics: Herbal analgesics are natural products effective in reducing pain, soreness and inflammation associated with various conditions. Herbal analgesics consist of components that are used as pain relievers or anti-inflammatory agents.
E.g.: Codeine, Morphine

ii. Synthetic Analgesics: Synthetic analgesics are substances that are synthesized in a laboratory and that act on the same targets in the brain as natural opioids (e.g., morphine and codeine) to produce analgesic (pain relief) effects.
Eg: Pethidine, Methadone, Heroin, Fentanyl

b) Non-narcotic analgesics: A subclass of analgesic agents that typically do not bind to opioid receptors and are not addictive. Many non-narcotic analgesics are offered as non-prescription drugs.

Eg; Salicylates and related compounds

- Aspirin
- Paracetamol
- Diclofenac
- Piroxicam
- Ibuprofen
- Ketoprofen

Analgesics help in the reduction of pain and inflammation acting in the Central Nervous System or on the peripheral pain receptors without affecting the consciousness of a patient since no single agent is ideal the physician chooses the best suitable drug. However,

prolonged use of analgesics may cause resistance or serious adverse effects such as GI complications, treatment failure etc. Therefore, a Drug Utilization Evaluation study with antibiotics and analgesics needs to check their efficacy in patients.[5]

The prescription pattern study has been done to capture the current trend of drug usage in the perioperative period by surgeons and anesthesiologists. In developing countries like India, where the financial resources are scarce and the affordability of the patients is less, Implementation of RUM becomes more important and therefore, the assessment of drug utilization is vital for clinical, economic, and educational purposes.[6] Prescription writing is a science and art because it conveys the message from the prescriber to the patient.[7]

Prescribing pattern studies are undertaken to scrutinize, assess, and advocate the various amendments in the prescribing behavior of healthcare professionals to ensure that medical care is rational. The study of prescribing patterns provides information on the rational use of the drugs are based on the rational prescribing. Rational use of medicine is defined as the patient receiving medications appropriate to their clinical needs, in doses that meet their requirements for an adequate period and at a low cost.[8]

MATERIALS AND METHODS

STUDY SITE: The study was conducted in the in-patient department of Chigateri District Hospital, Davangere over 6 months.

STUDY DESIGN: Prospective observational study.

SAMPLE SIZE: 163 case sheets of patients admitted to the Orthopaedics Department of the Hospital.

STUDY CRITERIA

INCLUSION CRITERIA

- Patients who received analgesics in the orthopaedics ward during the study period irrespective of Age, Gender, Diagnosis, and Treatment.

EXCLUSION CRITERIA

- Patients who were absconded or discharged against medical advice were excluded from the study.
- Outpatients

STUDY PROCEDURE

A prospective observational study was conducted among 163 patients admitted to the orthopaedic in-patient department of Chigateri District Hospital Davangere over 6 months. This study received approval from the Institutional Ethical Committee of SCS College of Pharmacy. A specifically designed data collection form was created to gather information, which encompasses the patient's demographic details, medical history, personal history, comorbid condition, social and family history as well as the medications prescribed for each individual.

RESULTS

1. GENDER-WISE DISTRIBUTION OF PATIENTS

Out of 163 patients evaluated, it was found that the total number of male patients was 112 (68.1%), whereas female patients were 51 accounting for 31.2% of the study population.

Table 1: Gender-wise distribution of patients.

GENDER	FREQUENCY (n =163)	PERCENTAGE (%)
Male	112	68.1%
Female	51	31.2%

2. AGE-WISE DISTRIBUTION OF PATIENTS

The results revealed that the maximum number of patients were in the age group of 20-30 years (25%) followed by 41- 50 years (28%).

Table 2: Age-wise distribution of patients.

AGE GROUP (years)	TOTAL NO OF PATIENTS (n=163)	PERCENTAGE (%)
20-30	42	25.7%
31-40	24	14.9%
41-50	28	17.1%
51-60	23	14.1%
61-70	26	15.9%
71-80	15	9.2%
Above 80	5	3%

3. DISTRIBUTION ACCORDING TO DIAGNOSIS

Table 3 depicts that 134 (82.3%) were fracture, 12 (7.3%) patients were Dislocation, 8 (4.9%) patients were Osteomyelitis, and 6 (3.6%) patients were Implant removal. Osteoarthritis was found in 3 (1.8%) patients.

Table 3: Distribution According to Diagnosis.

Condition	Frequency (N=163)	Percentage (%)
Fracture	134	82.2%
Osteomyelitis	8	4.9%
Osteoarthritis	3	1.8%
Implant removal	6	3.6%
Dislocation	12	7.3%

4. DISTRIBUTION OF CO-MORBIDITIES

Among the 163 patients, 11 patients had Hypertension (HTN) [50%]. 6 patients had Type 2 Diabetes Mellitus (DM) [27.2%] and 5 patients had Urinary Tract Infection (UTI) (22.7%). Complete data regarding the distribution of co-morbidities are given in the following;

Table 4: Distribution of co-morbidities.

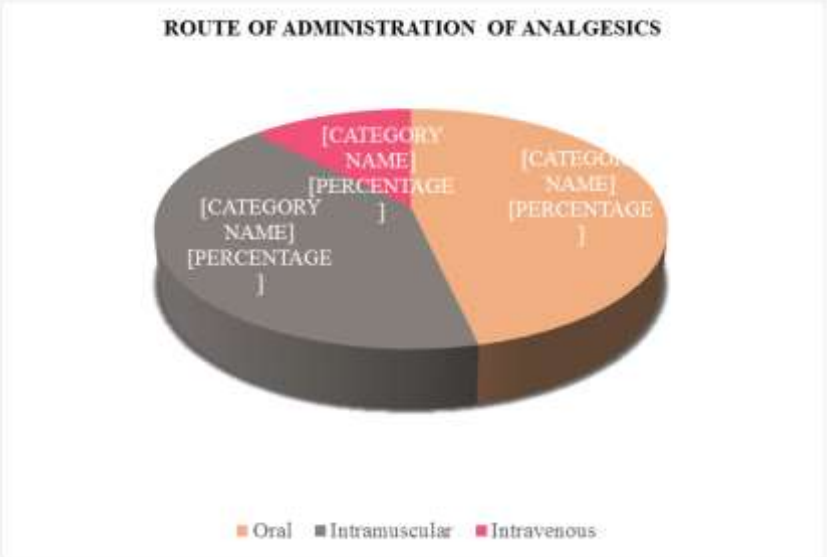
Co-Morbidities	Number of Patients (n = 22)	Percentage (%)
Hypertension	11	50%
Diabetes Mellitus	6	27.2%
Urinary Tract Infection	5	22.7%

5. ROUTE OF ADMINISTRATION OF ANALGESICS

Out of 351 Analgesics, 163 (46.4%) were administered orally, 145 (41.3%) were administered intramuscularly, and 43 (12.2%) were administered intravenously.

Table 5: Route of Administration of Analgesics.

ROUTE	NO: OF DRUGS (n=351)	PERCENTAGE (%)
Oral	163	46.4%
Intramuscular	145	41.3%
Intravenous	43	12.2%



6. TYPES OF ANTIBIOTICS PRESCRIBED IN ORTHOPAEDIC DEPARTMENT

Of the total 228 prescribed antibiotics, Ceftriaxone was the most commonly prescribed Antibiotic 163 (71.4%) followed by Amikacin 60 (26.3%) and Ciprofloxacin 5 (2.1%).

Table 6: Types of Antibiotics Prescribed.

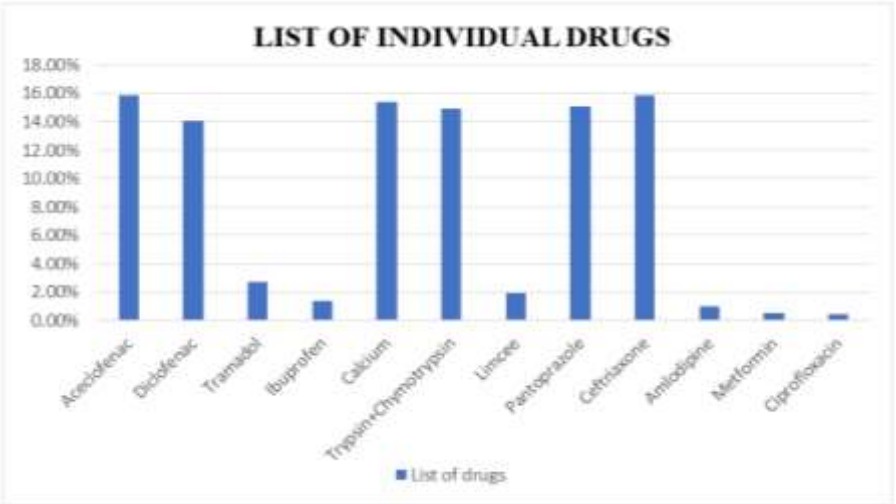
ANTIBIOTICS	NO: OF DRUGS (n=228)	PERCENTAGE (%)
Ceftriaxone	163	71.4%
Amikacin	60	26.3%
Ciprofloxacin	5	2.1%

7. LIST OF INDIVIDUAL DRUGS

The most commonly prescribed individual drug in the orthopaedic department was Aceclofenac. The list of individual drugs is given in the following table;

Table 7: List of individual drugs.

DRUGS	NO: OF DRUGS (n=1022)	PERCENTAGE (%)
Aceclofenac	163	15.9%
Diclofenac	145	14.1%
Tramadol	28	2.7%
Ibuprofen	15	1.4%
Calcium	158	15.4%
Trypsin + Chymotrypsin	153	14.9%
Limcee	20	1.9%
Pantoprazole	155	15.1%
Ceftriaxone	163	15.9%
Amlodipine	11	1.0%
Metformin	6	0.5%
Ciprofloxacin	5	0.4%

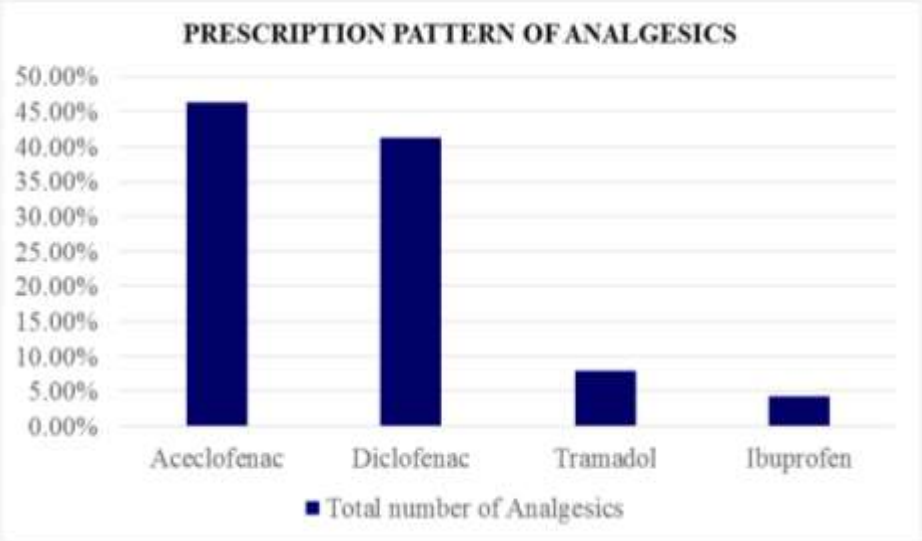


8. PRESCRIPTION PATTERN OF ANALGESICS

Analgesics used in the study population were identified and categorized. Out of 163 patients, the majority of the prescription share was for Aceclofenac 163 (46.4%) followed by Diclofenac 145 (41.3%), Tramadol 28 (7.9%), and Ibuprofen 15 (4.2%). There was no record of ADEs, the prescribing pattern of analgesics is explained in the table below;

Table 8: Prescription Pattern of Analgesics.

ANALGESICS	TOTAL NUMBER OF ANALGESICS (n=351)	PERCENTAGE (%)
Aceclofenac	163	46.4%
Diclofenac	145	41.3%
Tramadol	28	7.9%
Ibuprofen	15	4.2%

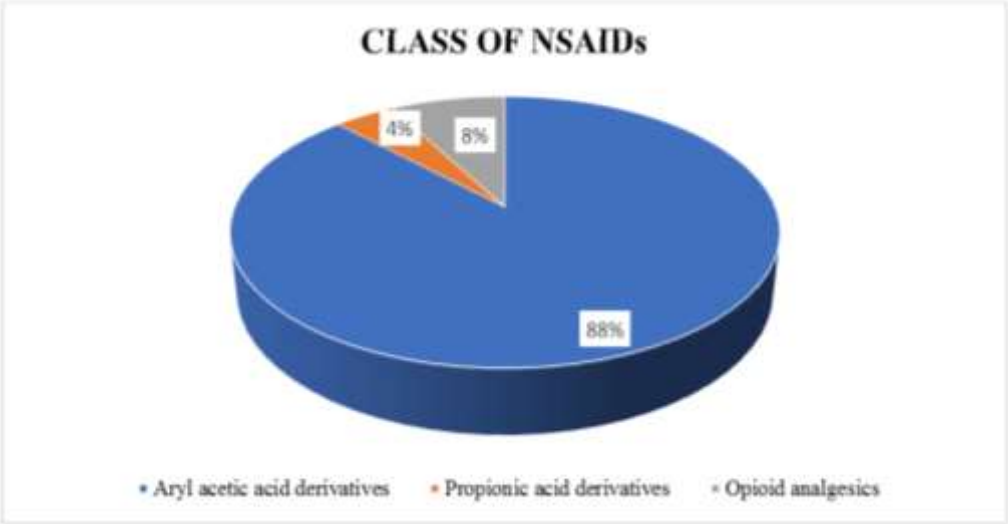


9. CLASS OF NSAIDS

Out of 351 NSAIDs prescribed, 308 (87%) are Aryl-acetic acid derivatives, 15 (4.27%) are Propionic acid derivatives, and 28 (7.97%) are Opioid analgesics.

Table 9: Class of NSAIDs.

CLASS OF NSAIDs	NO: OF DRUGS (n=351)	PERCENTAGE (%)
Aryl Acetic Acid Derivatives	308	87%
Propionic Acid Derivatives	15	4.27%
Opioids Analgesics	28	7.97%

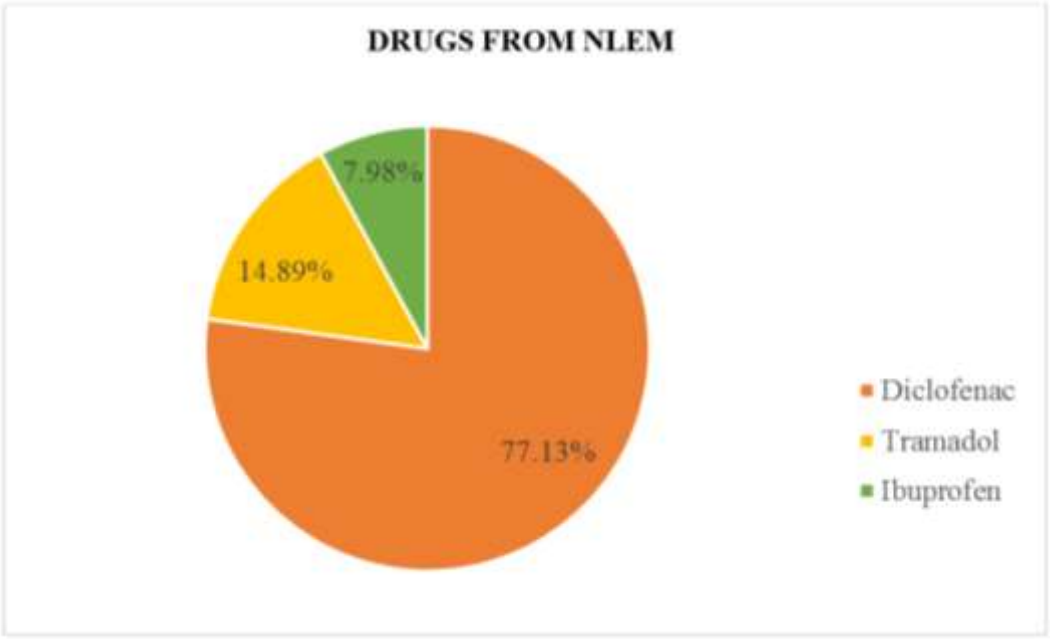


10. DRUGS FROM NLEM

Table 10 depicts the list of drugs from NLEM, among which 145(77.13%) were Diclofenac, 28(14.89%) were Tramadol and 15 (7.98%) were Ibuprofen.

Table 10: Drugs from NLEM.

DRUGS	NO: OF DRUGS (n=188)	PERCENTAGE (%)
Diclofenac	145	77.13%
Tramadol	28	14.89%
Ibuprofen	15	7.98%



DISCUSSION

The present study aimed to analyze the prescribing pattern of analgesics in the inpatient Department of Orthopaedics. The study of prescribing patterns helps monitor and evaluate

medical practitioners' prescribing practices to make medical care more rational. The perioperative period is very stressful and painful for the patient. Response and tolerance to pain differ from one patient to another, therefore pain therapy should be individualized. There are no set guidelines that are followed by clinicians while rating perioperative pain. The discrepancy in pain management is a norm because it can vary with the type of setup, type of surgery, clinician's experience with the analgesics, marketing forces, and availability in public sectors. Numerous obstacles in pain management and the growing rate of chronic pain despite a variety of analgesics available were the important driving factors for conducting the prescription audit. Males [68.1%] outnumbered females [31.2%] and the majority of the patients were between 20-30 years of age group. A study conducted by Farid H Malik *et al*.,[4] study shows similar results 74% of patients are males and 26% are females. This gender difference may be due to more outdoor activities and a higher incidence of trauma among young Indian males.

The current study revealed fractures [82.2%] as the most common cause of hospitalization. A study conducted by Geenamol *et al*.,[9] study shows that fractures are the most common cause of hospitalization. Similar observations were also reported by Farid H Malik *et al*.,[4] From our study it is evident that Non-Selective NSAIDS are more preferred over the selective cox 2 inhibitors in the inpatient department. Chinju Anil *et al*.,[10] also described a similar result. The most prescribed gastroprotective drug in our study was pantoprazole. Geenamol *et al*.,[9] conducted a prescription pattern of analgesics in the orthopedics inpatient department at a tertiary care hospital, in this study also the most prescribed gastroprotective is pantoprazole.

In the present study, the main route of administration was oral followed by the parenteral route. The topical route causes a high local concentration in the cutaneous and subcutaneous area of the body with low systemic delivery thereby significantly improving the therapeutic efficacy and minimizing systemic side effects. The study carried out by Chinju Anil *et al*.,[10] shows the most commonly preferred route of drug administration was oral, followed by parenteral. The usage of co-medication in our study was found to be Antibiotics [228] followed by enzymes 153[14.9%], calcium supplements 158[15.4%], and vitamin supplements 20[1.9%]. The study carried out by Chinju Anil *et al*.,[10] reported antibiotics, vitamins, and calcium supplements in the study. In the current study, the drugs from the NLEM are Diclofenac 145[77.15%], Tramadol 28[14.89%], and Ibuprofen 15[7.98%].

CONCLUSION

Pain is the most commonly experienced symptom among post-operative patients; it may vary from one study to another, depending on the activities of the selected patients. In the present study, NSAIDs were more prevalently used in middle-aged male patients. Aceclofenac and Diclofenac were most commonly used to indicate fracture and arthritic conditions in the in-patient department. Non-selective COX inhibitors are preferred over COX-2 inhibitors.

Our study highlighted the need to maximize the prescribing patterns according to NLEM and to accelerate prescribing patterns using generic use. Our study suggests analgesic, Aceclofenac was used for a short course with minimum side effects and it was based on the type of surgery and physician preference. This study highlights the need to minimize the average number of drugs per prescription. Antacids and Gastroprotective should be used along with a large number of antibiotics, calcium, and vitamin supplements. Regular educational interventions to improve the prescribing practices of doctors at different levels may further promote rational prescribing. Periodic evaluation of prescribing patterns is necessary to improve prescribing standards. It should be noted that appropriate use of medications enhances the quality of life of patients and leads to community development. This should be carefully considered by GPs and specialists. Thus, a strategy must be developed and implemented for the prescription, and rational use of medications which includes continuing medical education regarding the potential risk of NSAIDs, the importance of their appropriate and rational use, and the necessity of appropriate prescription writing regarding both content and indication is noticeable.

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AUTHOR'S CONTRIBUTION

All the authors have contributed equally.

CONFLICT OF INTEREST

All authors declare that there are no conflicts of interest.

ETHICS DECLARATION

The Institutional Ethics Committee at SCS College of Pharmacy approved the protocol. All residents in the hospital provided informed consent.

CONSENT FOR PUBLICATION

All authors have consented to the publication of their work.

COMPETING INTERESTS

The authors hereby declare that they did not obtain any financial support from any source for the writing, or publication of this article.

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