

# Knowledge of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) and their Adverse Effects among Medical and Non-Medical Students

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## ABSTRACT

**Background:** Non-steroidal anti-inflammatory drugs (NSAIDs) are the common analgesics, antipyretics, and anti-inflammatory drugs. Though, their frequent consumption cause peptic ulcer disease (PUD) and other unfavorable side effects. This study aimed to compare the knowledge and attitude of Karachi medical and non-medical students about NSAIDs and their adverse effects.

**Methods:** A comparative cross-sectional study was conducted from June 2021-2022, including 344 students from four universities in Karachi, with an equal ratio of medical (n=172) and non-medical(n=172). The study participants were requested to fill out the questionnaire based on the usage of NSAIDs, over-the-counter availability, side effects, etc. The knowledge of adverse drug reactions, reasons for self-medication, and NSAID prescriptions were compared using the Chi-square/Fisher Test.

**Results:** The results showed that about 88.4% of students had some previous knowledge of NSAIDs, of which 98.2% were from the medical sector and 78.4% were from the non-medical sector. 68.6% of students were familiar with the NSAIDs' adverse effects, 90.1% were medical students, and 47.1% were non-medics. Only 47.7% of the total population was aware of PUD, with 80.2% attending medical universities. While most of the self-medicating students were non-medical 84.7%.

**Conclusion:** Medical students of Karachi possessed more knowledge about NSAID use and its adverse effects. The most known prevalent adverse was PUD, which indicates GI bleeding. It is recommended that there is a dire need for awareness concerning the usage, safety and adverse effects of NSAIDs.

**Keywords:** NSAIDs; Peptic Ulcer Disease; Medical Students; Non-medical Students.

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## INTRODUCTION

Non-steroidal anti-inflammatory drugs (NSAIDs) are the most common medications used as analgesics, antipyretic or anti-inflammatory drugs and are also used for post-operative surgical management<sup>1,2</sup>. However, unregulated and chronic use of these drugs is associated with toxicity and pathologies of cardiovascular, renal, and gastrointestinal systems. Among these adverse effects, hepatotoxicity, blood pressure elevation, peptic ulcer, and gastrointestinal (GIT) bleeding are most noticeable and occur due to inhibition of both prostaglandins, a mucosal protective agent of GIT, and thromboxane-A<sub>2</sub>, which gives NSAIDs their antiplatelet effect<sup>3-5</sup>. Therefore, NSAIDs are contraindicated in patients with a positive history of ulcers. Their effect can be aggravated by advancing age, history of peptic ulcer, heart disease, *H. Pylori* infection, and concurrent use of antiplatelet and gastro-erosive agents<sup>6,7</sup>. The risk of adverse events with NSAID use is 0.4% among chronic users without other risk factors, while 9% among those with multiple risk factors<sup>8</sup>.

NSAIDs are usually considered comparatively safe medications by the community as they are readily available over the counter without any prescriptions, which might have contributed to the increased consumption of NSAIDs in the past few years<sup>9,10</sup>. However, they have the most frequent and severe side effects related to GIT, about which prior studies suggest that people using over-the-counter (OTC) analgesics do not have sufficient awareness and appropriate health literacy about these drastic effects, which can lead to severe complications due to their lack of knowledge about NSAIDs people usually do not consult their physicians before using them<sup>11,12</sup>. If this public health issue is not addressed shortly, people taking NSAIDs will ignore the mild symptoms, which can precede fatal complications. Their easy availability has led to their increased use, predisposing the patients to multiple preventable side effects that most people are unaware of.

Some degree of gastrointestinal toxicity has been associated with all NSAIDs. The data from a large-scale placebo-controlled trial also confirmed that gastrointestinal injury risk increased with NSAIDs, specifically COX-2 inhibitors, diclofenac, ibuprofen, and naproxen<sup>13</sup>. The risk ratio varies with the NSAIDs used, i.e., the risk of gastrointestinal complications is minimal with aceclofenac, celecoxib, and ibuprofen, intermediate with diclofenac, meloxicam, ketoprofen, highest when piroxicam and ketorolac are used over the counter<sup>14</sup>.

To date, literature on the knowledge of medical or non-medical students regarding frequent NSAID use and its association with specific adverse events is scarce. Hence, this current study was conducted to explore the knowledge among Medical and Non-Medical students so that the overuse and adverse effects problems can be addressed.

## METHODS

A comparative cross-sectional study was done involving Medical (Dow University of Health Sciences and Jinnah Sindh Medical University) and Non-medical universities (NED and Institute of Business Administration) from June 2021 to June 2022. Convenience sampling was done, and a sample size of 344 was calculated using an open-epi version 3.01 calculator having a population of 7000 and a ratio of unexposed to exposed is 1.0, a confidence level of 95%, and a power of 80%. The frequency of knowledge among the non-medical (45%) and medical (29.91%) population was taken from similar studies<sup>15,16</sup>.

All the students from respective universities who showed willingness and consented to be part of the study were included, while those who were not willing to consent were excluded. The data was collected using a structured questionnaire, informed consent was taken from the participants, and all ethical considerations and research protocols were followed.

The collected data was then analyzed using SPSS software version 20.0. The knowledge of adverse drug reactions, reasons for self-medication, NSAIDs prescriptions, and dosage advisors were compared using the Chi-square test/Fisher Exact Test; a p-value < 0.05 was considered statistically significant.

## RESULTS

In this study, 344 students participated, among which 121 (35.2%) were males and 219 (63.7%) were females. 90.1% of medical and 47.1% of non-medical students were aware of at least one side effect of NSAIDs which shows a significant difference between the two groups ( $p < .001$ ). The most common adverse effect known by the participants was bleeding in the GI tract 52.7%, followed by hypersensitivity reaction 46.2% and nausea and vomiting 42%. Among the participants who chose bleeding in the GI tract as an adverse effect, 133 were medical students, and 15 were non-medical students ( $p < 0.001$ ) shown in table 1.

**Table 1: Knowledge of medical and non-medical students regarding NSAIDs' side effects.**

| Side-effects of NSAIDs      | Medical n(%) | Non-medical n(%) | Total | p-Value |
|-----------------------------|--------------|------------------|-------|---------|
| Gastrointestinal bleeding   | 133(85.8)    | 15(18.5)         | 148   | 0.000*  |
| Hypersensitivity            | 94(60.6)     | 15(18.5)         | 109   | 0.000*  |
| Nausea and Vomiting         | 73(47)       | 26(32)           | 99    | 0.000*  |
| Asthma                      | 59(38)       | 7 (8.6)          | 66    | 0.000*  |
| Heart attack                | 40 (25.8)    | 25(30.8)         | 65    | 0.053*  |
| Dizziness                   | 36 (23.2)    | 24(29.6)         | 60    | 0.118*  |
| Headache                    | 36 (23.2)    | 16(19.8)         | 52    | 0.004*  |
| Edema                       | 32(20.6)     | 4(4.9)           | 36    | 0.000*  |
| Tinnitus                    | 26 (16.8)    | 4(4.9)           | 30    | 0.000*  |
| Don't know any side effects | 6(3.9)       | 20(24.7)         | 26    | 0.007*  |

\*p<0.05 is considered statistically significant.

Furthermore, it is also found that in contrast to 80.2% of medical students, only 15.1% of non-medical students agreed that NSAIDs are one of the leading causes of peptic ulcers showing a significant difference. Upon investigations, it was also found

that 88.7% of participants accepted that they had taken NSAIDs for therapeutic uses in the past. 83.7% of medical students and 84.7% of non-medical students took NSAIDs without prescription as shown in Table 2.

**Table 2: Knowledge of medical and non-medical students regarding NSAIDs prescription and dosage advisors.**

| Question                        | Response                        | Medical n(%) | Non-medical n(%) | Total | p-Value |
|---------------------------------|---------------------------------|--------------|------------------|-------|---------|
| <b>NSAID prescribing source</b> | Family Doctor                   | 70(54.6)     | 49(35.5)         | 119   | 0.023*  |
|                                 | Pharmacy shop                   | 27(21.1)     | 49(35.5)         | 76    | 0.006*  |
|                                 | Family and friends              | 45(35.1)     | 73(52.9)         | 118   | 0.002*  |
|                                 | By reading leaflets             | 24(18.8)     | 30(21.7)         | 54    | 0.459   |
|                                 | Internet                        | 35(27.3)     | 40(29)           | 75    | 0.602   |
|                                 | Medical Books                   | 25(19.5)     | 3(2.2)           | 28    | 0.000*  |
|                                 | Previous experience             | 44(34.4)     | 55(39.9)         | 99    | 0.234   |
|                                 | Guessing the dosage by yourself | 7(5.5)       | 13(9.4)          | 20    | 0.249   |

\*p<0.05 is considered statistically significant.

In addition, participants were taking NSAIDs primarily for the complaint of pain 68.4%, followed by fever,

menstrual problems, and cough and sore throat, as depicted in Table 3.

**Table 3: Knowledge of medical and non-medical students regarding reasons for self-medication.**

| Question                                            | Response           | Medical n(%) | Non-medical n(%) | Total | p-Value |
|-----------------------------------------------------|--------------------|--------------|------------------|-------|---------|
| <b>Complaint(s) for self-medication with NSAIDs</b> | Runny nose         | 15(11.7)     | 24(17.4)         | 39    | 0.173   |
|                                                     | Nasal Congestion   | 9(7)         | 11(8)            | 20    | 0.818   |
|                                                     | Cough              | 16(12.5)     | 29(21)           | 45    | 0.054*  |
|                                                     | Sore throat        | 19(14.8)     | 30(21.7)         | 49    | 0.122   |
|                                                     | Fever              | 80(62.5)     | 88(63.8)         | 168   | 0.450   |
|                                                     | Aches or pains     | 90(70.3)     | 92(66.7)         | 182   | 0.914   |
|                                                     | Menstrual problems | 49(38.3)     | 36(26.1)         | 85    | 0.133   |

\*p<0.05 is considered statistically significant.

Table 4 shows that slightly more than half of the study subjects (medical/non-medical) agreed that

healthcare settings provide insufficient knowledge of adverse drug reactions.

**Table 4: Knowledge of medical and non-medical students on adverse drug reactions associated with NSAIDs.**

| Question                                                                                                        | Response | Medical n(%) | Non-medical n(%) | Total | p-Value |
|-----------------------------------------------------------------------------------------------------------------|----------|--------------|------------------|-------|---------|
| In your opinion, does the healthcare setting provide you with insufficient knowledge of adverse drug reactions? | Agree    | 98(57)       | 89(51.7)         | 187   | 0.387   |
|                                                                                                                 | Neutral  | 51(29.7)     | 58(33.7)         | 109   | 0.423   |
|                                                                                                                 | Disagree | 23(13.4)     | 24(14)           | 47    | 1.000   |

In our survey, 92.7% of the participants considered Disprin an NSAID, along with ibuprofen 64.5% and Ponstan 54.9%. In comparison, some of the participants 18.5% believed Risek (Omeprazole), Motilium (Domperidone), and Flagyl (Metronidazole) were also NSAIDs. There is a significant difference in medical and non-medical data in some medicines like Ibuprofen, Panadol, and Naproxen.

## DISCUSSION

The study reveals that 98.2% of medical and 78.4% of non-medical students had some previous knowledge of NSAIDs. More than one drug was opted for by the students, as 94.8% of medical and 90.7% of non-medical students considered Disprin as an NSAID, followed by ibuprofen and Ponstan. In addition, 90.1% of students from medical and 47.1% from non-medical were familiar with the NSAIDs' adverse effects, which showed a vast knowledge gap between the two groups. Another study, including 1445 pharmacy customers, concluded that 28.5% of customers bought analgesic drugs, and only 11.2% acknowledged their side effects, whereas the rest (17.3%) took them without any fundamental knowledge<sup>17</sup>. One more study was conducted to assess the good insight of 236 medical students about the adverse effects of frequent use of NSAIDs at the medical university of Lublin. It showed most students between 18-20 years old used NSAIDs. However, only 30% knew about their adverse drug reactions. Hence, this survey concluded that a minority of the young population knew the risks of frequent NSAID usage<sup>16</sup>.

In the current study, versatility was found in the medical and non-medical student's perceptions about adverse drug reactions, and each student chose various options regarding side effects. 85.8% of medical and 18.8% of non-medical students considered GI bleeding the most dominant ADR, also reported in another study<sup>18</sup>. In contrast, hypersensitivity was opted by 60.6% of medical and 18.5% of non-medical students, and 47% of medical and 32% of non-medical students considered nausea and vomiting. In addition to these, other minor findings were also found, like edema, tinnitus, and headache. GI bleeding was found to be a

well-known side effect in 37.1% of the population of Saudi Arabia and allergy in 53.1% of the adult population of Albania<sup>19,20</sup>.

More than 90% of our students used NSAIDs. However, other articles showed that 77% of students took NSAIDs at Lublin Medical University and 65.1% of the general population in Saudi Arabia<sup>16,18</sup>. Students in our survey who used NSAIDs without prescription got information from multiple resources; for example, 44.4% got it from a family doctor, 37.2% from previous experience, followed by pharmacy, internet, and leaflet. A similar study from Saudi Arabia reported that 18.6% got information about NSAID's side effects from the internet and 5.4% by reading inserted leaflets<sup>21</sup>. In the general population of Malaysia, 15% of participants obtained knowledge from the internet and 9.2% from media resources<sup>22</sup>. Moreover, it is presumed that the given drug and its dosage are unarmful, and the details on the leaflet inserted in the package are most often ignored<sup>23,24</sup>.

More than half of our student population agreed that healthcare settings provide inadequate knowledge about NSAID use and its adverse effects. Corresponding with the results of a study conducted in an orthopedic clinic in Riyadh in which 84.5% of patients also agreed with the same fact<sup>25</sup>. Knowledge regarding the adverse effects of NSAIDs is limited among students of Karachi; hence proper counseling and education should be provided in the healthcare setting, especially; pharmacists should play a vital role in guiding their customers who are buying NSAIDs without any prescription.

These recommendations can efficiently reduce the complications caused by the abuse of NSAIDs. It has been found that there is a good number of non-medical as well as medical students taking NSAIDs without any consultation from a doctor, which can be detrimental to their health in the future, so there is an urgent need to raise knowledge about its usage, safety, and adverse effects by educating the medical as well as non-medical students, organizing knowledgeable seminars and multimedia. Moreover, many students also agreed

that NSAIDs should be used cautiously, so issuing a notice to pharmacies to decrease their OTC availability is necessary. The study has limitations in terms of data based on observational findings and might be attributable to biases due to unmeasured factors.

## CONCLUSION

Considering this study, it is concluded that medical students of Karachi have more knowledge about the detrimental effects of NSAIDs as well as their compelling indications and contraindications. The most prevailing adverse effect was found to be peptic ulcer disease (PUD) which manifests as GI bleeding. It is recommended that there is a need for awareness concerning the usage, safety and adverse effects of NSAIDs.

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## CONFLICTS OF INTEREST

The author(s) have no conflict of interest.

## ETHICS APPROVAL

This study was approved by Jinnah Sindh Medical University Review Board (JSMU/IRB/2021/-495).

## PARTICIPANT CONSENT

Informed consent was taken at the start of the questionnaire from the participants, and all ethical considerations and research protocols were followed.

## AUTHORS' CONTRIBUTION

MK, SM collected the data and wrote the manuscript. AA, HA analyzed and interpreted the patients' data. SM, SS, AA helped in writing the first draft and assisted in data interpretation. MK, HA facilitated the literature review search. SS proofreading and editing manuscript. AHS mentored and assisted in the proofreading and printing process. UN mentored and guided the authors throughout the process.

## REFERENCES

- Green M, Norman KE. Knowledge and use of, and Attitudes toward, non-steroidal anti-inflammatory drugs (NSAIDs) in Practice: A survey of Ontario physiotherapists. *Physiother Can.* 2016;68(3):230-241. doi: 10.3138/ptc.2015-25
- Ahmed S, Noushad S. Pathophysiology and management of ischemic and neuropathic pain. *Int J Endors Health Sci Res.* 2014;2(1):1-4.
- Bindu S, Mazumder S, Bandyopadhyay U. Non-steroidal anti-inflammatory drugs (NSAIDs) and organ damage: A current perspective. *Biochem Pharmacol.* 2020;180:1-22. doi: 10.1016/j.bcp.2020.114147

- Lanas A, Chan FKL. Peptic ulcer disease. *Lancet.* 2017;390(10094):613-624. doi: 10.1016/S0140-6736(16)32404-7
- Malebari AM, Khayyat AN, Mahdali RA, Alamoudi JS, Alsayed BY, Alrasheed SA. Evaluation of the community pharmacists' performance in the screening of non-steroidal anti-inflammatory drugs risks in Saudi Arabia. *Saudi Med J.* 2020;41(8):849-857. doi: 10.15537/smj.2020.8.25221
- Setshedi M. Non-steroidal anti-inflammatory drug-related gastrointestinal tract adverse effects. *S Afr Gastroenterol Rev.* 2020;18(1):11-4.
- Sostres C, Carrera-Lasfuentes P, Benito R, Roncales P, Arruebo M, Arroyo MT, *et al.* Peptic Ulcer Bleeding Risk. The role of *Helicobacter pylori* infection in NSAID/low-dose Aspirin users. *Am J Gastroenterol.* 2015;110(5):684-689. doi: 10.1038/ajg.2015.98
- Bhala N, Emberson J, Merhi A, Abramson S, Arber N, Baron JA, *et al.* Vascular and upper gastrointestinal effects of non-steroidal anti-inflammatory drugs: meta-analyses of individual participant data from randomised trials. *Lancet.* 2013;382(9894):769-779. doi: 10.1016/s0140-6736(13)60900-9
- Ali SD, Shah SKA, Qureshi MK, Aliuddin AM, Ali A, Siddiqui A. Role of Vitamin B-12 in chronic low backache: A comparative study. *Int J Endors Health Sci Res.* 2021;9(4):474-478. doi: 10.29052/IJEHSR.v9.i4.2021.474-478
- Stone JA, Phelan CH, Holden RJ, Jacobson N, Chui MA. A pilot study of decision factors influencing over-the-counter medication selection and use by older adults. *Res Social Adm Pharm.* 2020; 16(8): 1117-1120. doi: 10.1016/j.sapharm.2019.11.013
- Bielsa-Fernández MV, Tamayo-de la Cuesta JL, Lizárraga-López J, Remes-Troche JM, Carmona-Sánchez R, Aldana-Ledesma JM, *et al.* The Mexican consensus on the diagnosis, treatment, and prevention of NSAID-induced gastropathy and enteropathy. *Rev Gastroenterol Mex.* 2020;85(2):190-206. doi: 10.1016/j.rgmex.2019.11.001
- Parnell TA, Stichler JF, Barton AJ, Loan LA, Boyle DK, Allen PE. A concept analysis of health literacy. *Nurs Forum.* 2019;54(3):315-327. doi: 10.1111/nuf.12331
- Domper Arnal MJ, Hijos-Mallada G, Lanas A. Gastrointestinal and cardiovascular adverse events associated with NSAIDs. *Expert Opin Drug Saf.* 2022;21(3):373-384. doi: 10.1080/14740338.2021.1965988
- Castellsague J, Riera-Guardia N, Calingaert B, Varas-Lorenzo C, Fourier-Reglat A, Nicotra F, *et al.* Safety of Non-Steroidal Anti-Inflammatory Drugs (SOS) Project Individual NSAIDs and upper gastrointestinal complications: a systematic review and meta-analysis of observational studies (the SOS project). *Drug Saf.* 2012;35(12):1127-1146. doi: 10.2165/11633470-000000000-00000
- Bahdailah AAbdullah. Basic knowledge of non-steroidal anti-inflammatory drugs among Saudi community. *PTB Rep.* 2019;5(2):93-96. doi: 10.5530/PTB.2019.5.17
- Wawryk-Gawda E, Chylinska-Wrzos P, Lis-Sochocka M, Jodlowska-Jedrych B. Consumption and awareness of students about non-steroidal anti-inflammatory

- drugs. *Curr Issues Pharm Med Sci*. 2014;27(3):175-178. doi: 10.1515/cipms-2015-0010
17. Wirtz VJ, Taxis K, Dreser A. Pharmacy customers' knowledge of side effects of purchased medicines in Mexico. *Trop Med Int Health*. 2009;14(1):93-100. doi: 10.1111/j.1365-3156.2008.02186.x
18. Chi TY, Zhu HM, Zhang M. Risk factors associated with non-steroidal anti-inflammatory drugs (NSAIDs)-induced gastrointestinal bleeding resulting on people over 60 years old in Beijing. *Medicine*. 2018; 97(18):1-8. doi: 10.1097/MD.00000000000010665
19. Asiri OA, Alzahrani AA, Alshehri KM, Althomali OW, Alameen AAI, Serwah MA. Prevalence of non-steroidal anti-inflammatory drugs usage and assessment of knowledge related to its complications among Saudi population; a cross-sectional study. *Int J Med Dev Ctries*. 2020;4(2): 296-302. doi: 10.24911/IJMD.51-1571228702
20. Roshi D, Toçi E, Burazeri G, Schröder-Bäck P, Malaj L, Brand H. Users' knowledge about adverse effects of non-steroidal anti-inflammatory drugs in Tirana, Albania. *Mater Sociomed*. 2017;29(2):138-142. doi: 10.5455/msm.2017.29.138-142
21. Sales I, Aljadhey H, Albogami Y, Mahmoud MA. Public awareness and perception toward Adverse Drug Reactions reporting in Riyadh, Saudi Arabia. *Saudi Pharm J*. 2017;25(6):868-872. doi: 10.1016/j.jsps.2017.01.004
22. Sulaiman W, Seung OP, Ismail R. Patient's knowledge and perception towards the use of non-steroidal anti-inflammatory drugs in rheumatology clinic northern Malaysia. *Oman Med J*. 2012;27(6):505-508. doi: 10.5001/omj.2012.121
23. Moore RA. Analgesic safety-myths, mysteries and misconceptions. *Int J Clinical Pract Suppl*. 2015;1(182):24-27. doi: 10.1111/ijcp.12655
24. Mullan J, Weston KM, Bonney A, Burns P, Mullan J, Rudd R. Consumer knowledge about over-the-counter NSAIDs: they don't know what they don't know. *Aust N Z J Public Health*. 2017;41(2):210-214. doi: 10.1111/1753-6405.12589
25. Babelghaith SD, Alarifi MN, Wajid S, Alhawassi TM, Alqahtani SK, Alghadeer SM. Knowledge of patients on safe medication use in relation to non-steroidal anti-inflammatory drugs. *Saudi J Anaesth*. 2019;13(2):106-111. doi: 10.4103/sja.SJA\_557\_18