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Research Article

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Behavioral Analysis of Veterinary Students in Accessing Over-The-Counter Analgesic and Antipyretic Drugs for Self-Medication

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ABSTRACT

Background: University students are among the most frequent practitioners of self-medication, particularly with over-the-counter (OTC) analgesic and antipyretic drugs. Students with medical-related backgrounds, including veterinary students, may demonstrate higher confidence in self-medication due to their pharmacological knowledge; however, empirical data on self-medication behavior in this group remain limited.

Aims: This study aimed to analyze self-medication behaviors among veterinary students and to identify potential risks related to drug selection, duplication, and post-use management.

Methods: A questionnaire-based cross-sectional survey was conducted involving 89 veterinary students from the School of Veterinary Medicine and Biomedical Sciences, IPB University. The questionnaire assessed the prevalence of self-medication practices, types of drugs used, purchasing patterns, and post-consumption management of OTC analgesic and antipyretic medications.

Results: The results showed that 86.52% of respondents practiced self-medication using analgesic and antipyretic drugs. Paracetamol, ibuprofen, and mefenamic acid were the most commonly used medications. Many respondents reported purchasing products containing identical active ingredients under different brand names. Additionally, only a small proportion of students consumed the medications completely after purchase.

Conclusion: These findings indicate a high prevalence of self-medication among veterinary students, accompanied by irrational drug-use behaviors that may increase the risk of drug accumulation and improper disposal. The study provides baseline evidence to support educational interventions promoting rational drug use and responsible management of OTC drugs among veterinary students.

INTRODUCTION

Analgesic and antipyretic drugs are among the most widely used pharmaceutical products worldwide and are commonly available as over-the-counter (OTC) medications. Their easy accessibility allows individuals to manage mild pain and fever without consulting healthcare professionals, thereby facilitating prompt symptom relief and reducing the burden on healthcare services. However, inappropriate use of OTC analgesic and antipyretic drugs may lead to irrational drug use, including duplicate therapy, inappropriate dosing, premature discontinuation, and accumulation of unused medicines.

University students represent one of the population groups with a high prevalence of self-medication. Factors such as living away from family, academic pressure, limited time to seek professional care, and perceived familiarity with medicines contribute to frequent OTC drug use among students (Grass et al., 2020). Numerous studies conducted in different countries have consistently reported that analgesics and antipyretics are the most commonly used drugs for self-medication among university students (Saeed et al., 2014; Pandian et al., 2019; Faqihi & Sayed, 2021). In Indonesia, similar findings have been reported among medical students, with self-medication prevalence ranging from 53% to 60% (Syafitri et al., 2017; Kuswinarti et al., 2022).

Students with medical-related educational backgrounds tend to exhibit higher confidence in self-medication practices, as they possess basic knowledge of pharmacology and therapeutics. While this knowledge may support appropriate drug selection, it may also increase the risk of overconfidence, leading to irrational drug use behaviors. Previous studies have predominantly focused on medical or pharmacy students, leaving limited empirical data on other health-related disciplines.

Veterinary students represent a unique yet understudied group. In addition to their exposure to human pharmacology, veterinary students are trained in the use of analgesic and antipyretic drugs for animals, where these drugs play a crucial role in pain management, postoperative care, fever reduction, and inflammation control (Williams et al., 2005). This dual exposure to pharmacological knowledge may influence their personal self-medication behavior. Moreover, as future veterinarians, their attitudes and practices related to drug use may later affect their professional decision-making and client education regarding rational drug use.

Understanding self-medication behavior among veterinary students is therefore important for several reasons. First, inappropriate self-medication may increase the risk of drug duplication, incomplete consumption, and unsafe storage. Second, unused or leftover OTC drugs may contribute to improper disposal practices, which have been recognized as a potential source of pharmaceutical contamination in the environment. Third, identifying behavioral patterns in this population can provide valuable input for developing targeted educational interventions aimed at promoting rational drug use.

Therefore, this study aimed to analyze self-medication practices involving OTC analgesic and antipyretic drugs among veterinary students at the School of Veterinary Medicine and Biomedical Sciences, IPB University. Specifically, this study sought to describe patterns of drug access, selection, brand duplication, and consumption completeness, in order to provide baseline evidence that may support educational strategies and preventive efforts related to rational drug use and responsible management of OTC medications.

MATERIALS AND METHODS

Study Design and Population

This descriptive cross-sectional study was conducted in November 2024 at the School of Veterinary Medicine and Biomedical Sciences (SVMBS), IPB University. In 2024, the total student population at SVMBS consisted of 1,169 students from various academic levels. The sample size (89) was determined using a 95% confidence level and a 10% margin of error.

Ethical Considerations

Ethical clearance for this study was obtained from the Ethics Committee for Research Involving Human Subjects of IPB University (Approval No. 1541/IT3.KEPMSM-IPB/SK/2024), and all procedures were conducted in accordance with applicable ethical standards.

Sampling Technique

A non-probability snowball sampling technique was employed to recruit participants. Eight volunteer students were appointed as initial distributors (key informants) and each was asked to distribute the questionnaire to approximately 10–11 peers from the same academic cohort at SVMBS. All respondents were required to be active SVMBS students and to participate voluntarily.

Students were excluded from the study if they had never consumed nonsteroidal anti-inflammatory drugs (NSAIDs), had never independently purchased NSAIDs for self-medication purposes, or had only used NSAIDs obtained from other individuals. To minimize duplicate reporting, in cases where students reported accessing OTC analgesic and antipyretic drugs collectively, only one response per group was included based on agreement among group members. A total of 89 valid responses met the eligibility criteria and were included in the analysis.

Questionnaire

Data were collected using a printed questionnaire consisting of 13 items. Three short-answer questions collected demographic information (sex, age, and level of study), while the remaining ten multiple-response

questions assessed behaviors related to access, selection, and use of OTC analgesic and antipyretic drugs for self-medication. The questionnaire focused on behavioral patterns rather than clinical outcomes.

Data Analysis

The collected data were tabulated using Microsoft Excel and analyzed descriptively.

RESULTS AND DISCUSSION

Demographic Characteristics

The demographic characteristics of the respondents are presented in Table 1. A total of 89 veterinary students participated in this study, ranging from third-semester undergraduate students to students enrolled in the professional (clinical) program. Female students constituted a higher proportion of respondents (76.4%) compared to male students. At the time of data collection, respondents represented different stages of academic training, including students who had and had not yet completed formal coursework in pharmacology.

Prevalence of Self-Medication

Self-medication was reported by 77 out of 89 respondents, while the remaining respondents obtained analgesic and antipyretic drugs through physician prescriptions (Figure 1A). Three respondents provided additional notes indicating that they were undergoing treatment for chronic dental pain (one respondent) and dysmenorrhea (two respondents), which required physician-prescribed medications.

Access to Analgesic and Antipyretic Drugs

Most respondents (60.67%) reported purchasing one to two brands of over-the-counter (OTC) analgesic and antipyretic drugs. Meanwhile, 39.32% reported purchasing more than two brands, with 2.25% indicating purchases of more than five brands (Figure 1B).

To examine whether academic progression was associated with the use of multiple drug brands, a Pearson correlation analysis was performed between level of study and the number of analgesic and antipyretic brands used. The correlation coefficient was 0.0607, indicating no meaningful correlation between these variables.

Among the 60 respondents who purchased at least two brands, 46 reported purchasing products containing the same active ingredient under different brand names. Analysis of the active ingredients revealed that paracetamol was the most frequently selected drug (95.51%). Other commonly used drugs included non-steroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen (30.34%) and mefenamic acid (13.83%) (Figure 1C).

Family members and friends were the most frequently cited sources of information influencing drug selection. Other sources, including advertisements, online information, and physician recommendations, were selected less frequently. Knowledge obtained from coursework was not commonly reported as a determining factor in selecting active ingredients for self-medication (Figure 1D).

Most respondents (87/89) preferred oral solid dosage forms, such as tablets, caplets, and pills. Oral liquid

Table 1. Demographic Characteristics of Respondents

Respondent Characteristics	Number (n)
Sex	
Male	21
Female	68
Level of Study	
Undergraduate (3rd semester)	22
Undergraduate (5rd semester)	22
Undergraduate (7rd semester)	24
Professional Program	21
Total Respondents	89

formulations (e.g., syrups and suspensions) were selected by 23.59% of respondents (Figure 1E).

Pharmacies were the most frequently reported place of purchase for analgesic and antipyretic drugs (79/89). In addition, 13.92% of respondents reported purchasing OTC analgesic and antipyretic drugs through online shopping platforms (Figure 1F).

The presence of illness was reported by all respondents as the primary reason for purchasing analgesic and antipyretic drugs. Purchasing medications for future use ("stocking") was reported by 74.15% of

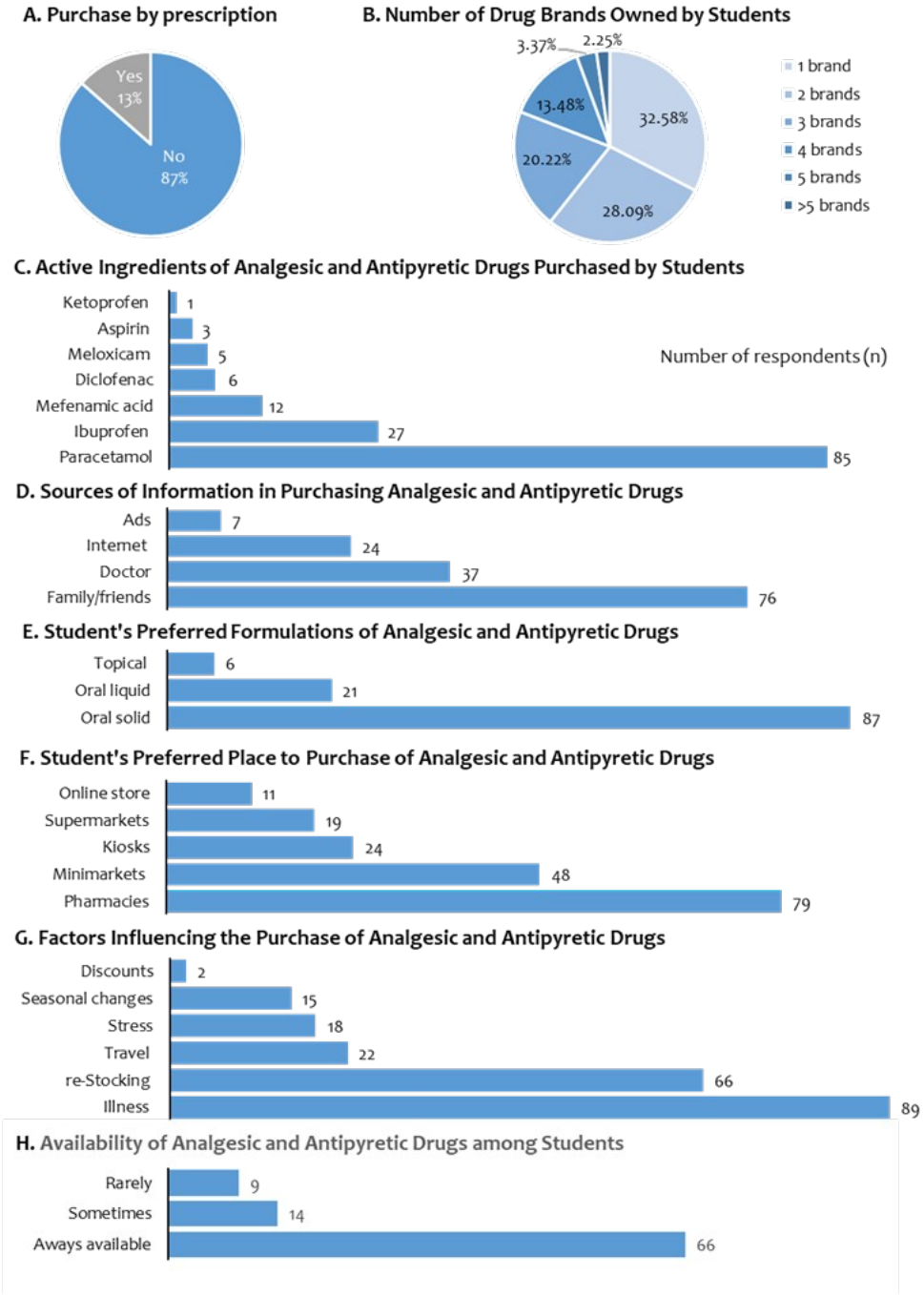

Figure 1. Self-medication behaviors of veterinary students in accessing analgesic and antipyretic drugs.

respondents. Other influencing factors included traveling, stress, and seasonal changes, whereas promotional discounts were less frequently reported (Figure 1G).

Consistent with these practices, most respondents reported having analgesic and antipyretic drugs readily available, with only a small proportion indicating infrequent storage (Figure 1H).

Analgesic and Antipyretic Drugs Usage

The use of analgesic and antipyretic drugs among respondents was categorized as individual use or shared use. Individual use was reported by 72 respondents, while the remaining respondents reported shared use with peers, such as dormitory friends or classmates.

Only nine respondents reported that all purchased analgesic and antipyretic drugs were completely consumed. In contrast, 80 respondents indicated that they had leftover medications after use. Additionally, 12 respondents reported using less than 25% of the purchased drugs during treatment.

The prevalence of self-medication with over-the-counter (OTC) analgesic and antipyretic drugs among veterinary students observed in this study was notably high (86.52%). This finding is consistent with previous reports indicating that university students, particularly those enrolled in academically demanding programs, frequently rely on analgesics to manage pain and discomfort.

Veterinary students are known to experience substantial academic and psychological stress due to intensive curricula, prolonged study hours, and clinical responsibilities. Hofmeister et al. (2010) reported that 33% of veterinary students in the United States routinely used analgesic and antipyretic drugs, while similar patterns have been documented among students in other health-related disciplines. Excessive reliance on analgesics warrants particular attention, as frequent analgesic use has been associated with indicators of poor mental health, including stress, anxiety, and depressive symptoms among students (Karaffa et al., 2019). These findings suggest that self-medication practices may reflect not only physical complaints but also broader psychosocial pressures within the academic environment.

Paracetamol was the active compound most frequently chosen by veterinary students in this study. Paracetamol is a potent analgesic that inhibits prostaglandin synthesis through interactions with

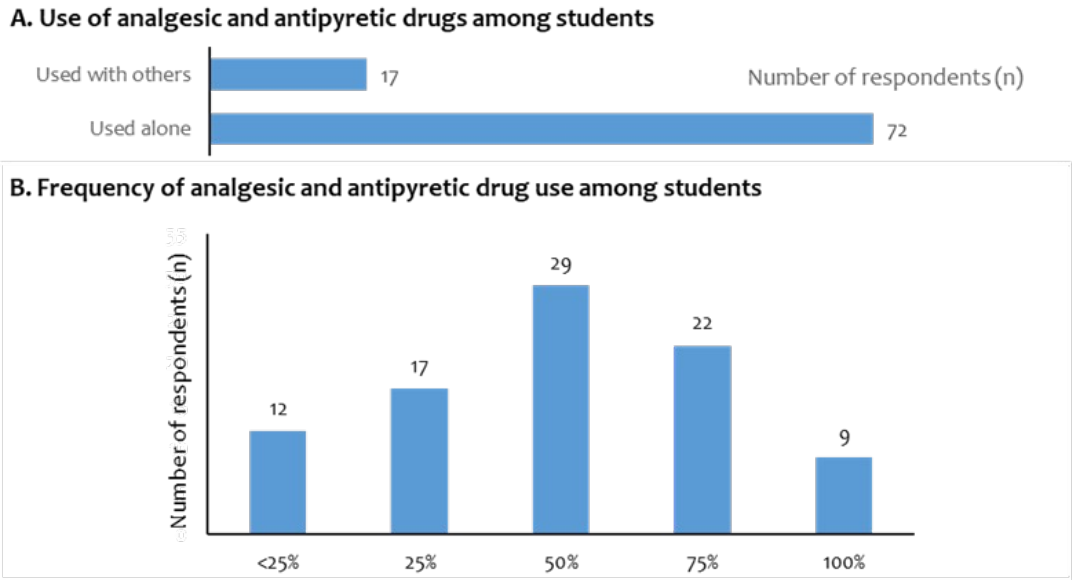

Figure 2. Ownership and use of analgesic and antipyretic drugs among veterinary students for self-medication.

cannabinoid receptors and subsequent activation of serotonergic pain-modulating pathways in the central nervous system (Anderson et al., 2008). It was previously hypothesized that paracetamol exerted its effects through inhibition of cyclooxygenase-3 (COX-3), a mechanism thought to differentiate it from other non-steroidal anti-inflammatory drugs (NSAIDs). For this reason, paracetamol has traditionally been classified separately from NSAIDs. However, subsequent evidence has demonstrated that COX-3 in humans does not play a significant role in nociception comparable to cyclooxygenase-1 and -2 (Przybyła et al., 2021). Although its precise mechanism of action remains incompletely understood, there is general consensus that paracetamol primarily acts within the central nervous system, which underlies its effectiveness as an analgesic and antipyretic agent.

The high level of paracetamol use among veterinary students is further supported by its extensive availability in the Indonesian pharmaceutical market. As of November 2024, a total of 1,563 paracetamol-containing products had been approved by the Indonesian National Agency of Drug and Food Control (BPOM, 2024). This widespread availability, combined with the perception of paracetamol as a relatively safe drug, likely contributes to its popularity and frequent repurchase. In this study, among the 60 respondents who purchased two or more brands containing the same active ingredient, 59 were repeat purchasers of paracetamol. Paracetamol is marketed both as a single-compound formulation and in combination with other agents intended to enhance analgesic efficacy or broaden therapeutic indications. For instance, paracetamol combined with caffeine has been shown to produce a potentiated analgesic effect, particularly in headache management (Renner et al., 2007). Another common formulation is paracetamol combined with pseudoephedrine, where paracetamol provides analgesic and antipyretic effects while pseudoephedrine acts as a nasal decongestant (Sperber et al., 2000). These combination products are widely promoted as flu and cold medications.

Given this context, it is of interest to consider whether the high accessibility and repeated purchase of paracetamol among students reflect a lack of pharmacological knowledge or represent a deliberate choice based on perceived differences in drug combinations and indications. Regardless of the underlying motivation, long-term or inappropriate use of paracetamol has been associated with increased risks of adverse health outcomes, including cardiovascular disease, asthma, renal dysfunction, and uterine disorders (McCae et al., 2018). Moreover, from an environmental perspective, our previous study demonstrated that the combination of paracetamol with other NSAIDs, such as aspirin, resulted in a higher risk of toxic effects on *Daphnia magna* compared to single-compound exposure (Sajidah et al., 2025). These findings highlight the potential compounded risks associated with combination drug use, not only for human health but also for aquatic organisms when such compounds enter the environment as pharmaceutical waste.

Other types of drugs favored by veterinary students in this study were ibuprofen and mefenamic acid. Ibuprofen is a non-selective cyclooxygenase inhibitor (COX-1 and COX-2) and is highly effective for pain relief, fever reduction, and inflammation management (Rainsford, 2009). Its effectiveness and relatively rapid onset of action have contributed to its widespread use among students globally (Faqihi & Sayed, 2021). Mefenamic acid was frequently used by students for the relief of dental pain, which is common among young adults due to the eruption of third molars or wisdom teeth (Hassan et al., 2021). The preference for these NSAIDs suggests that students tend to select analgesics based on perceived effectiveness for specific pain conditions, rather than on considerations of safety profiles or long-term use.

A critical finding of this study is the low consumption rate of analgesic and antipyretic drugs purchased by veterinary students. On average, respondents used only approximately 50% of the medications they had purchased. This finding raises important questions regarding the fate of unused medicines, including whether they are stored for prolonged periods, retained until expiration without use, shared with others, or discarded while still pharmaceutically active. In Indonesia, there are currently no specific national guidelines governing the disposal of OTC medications by consumers. Improper disposal of pharmaceutical products may contribute to environmental contamination, as active pharmaceutical ingredients can enter aquatic systems through household waste and wastewater pathways.

CONCLUSION

Pharmaceutical pollution has been recognized as an emerging environmental issue due to its potential to disrupt aquatic ecosystems, interfere with food chains, and reduce overall environmental quality. Paracetamol contamination has been detected in surface waters at

concentrations as high as 610 ng/L in Muara Angke, Jakarta (Koagouw et al., 2021). When considered alongside the high prevalence of self-medication and the substantial proportion of unused drugs observed in this study, these findings underscore the potential contribution of student medication practices to environmental pharmaceutical pollution. Collectively, the results emphasize the need for improved education on rational drug use, appropriate disposal practices, and the broader environmental implications of pharmaceutical consumption.

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AUTHORS CONTRIBUTION

D.N.P. contributed to the conceptualization, data curation, methodology development, provision of resources, software application, visualization, manuscript drafting, and funding acquisition. W.M., S.S., A.F., and E.S. contributed through research supervision and critical review and editing of the manuscript. R.A.P., I.A.P., A.F.I., M.M.R.N.S., N.A.H., M.L.F., and H.W.S. contributed to data curation. All authors read and approved the final manuscript.

"The authors declare that there is no conflict of interest with any parties involved in this research".

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