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Impact of Knowledge on Analgesic Self-Medication Practices Among Pharmacy Students

Lidya Pratiwi Afri Tjaja[1*], Fahrida Nuraziza Supandi[2], Gina Aulia[3], Annisa Septiyana Putri[4]

[1,4] S1 Clinical and Community Pharmacy Study Programme, Widya Dharma Husada College of Health Sciences, Jl. Pajajaran No. 1, South Pamulang, South Tangerang City 15417, Indonesia
[2]Nursing Study Programme, Widya Dharma Husada College of Health Sciences, Jl. Pajajaran No. 1, South Tangerang City 15417, Indonesia
[3]D3 Pharmacy Study Programme, Widya Dharma Husada College of Health Sciences, Jl. Pajajaran No. 1, South Pamulang, South Tangerang City 15417, Indonesia

** Corresponding Author. Email: lidyapratiwiafritjaja@wdh.ac.id*

ABSTRACT

Self-medication using analgesics is a common practice among pharmacy students, where knowledge is assumed to play a critical role in guiding behavior. This study aims to investigate the relationship between students' knowledge levels and their self-medication practices involving analgesic drugs. A cross-sectional study was conducted involving 294 pharmacy students at STIKes Widya Dharma Husada Tangerang, using a structured and validated questionnaire to assess demographic data, knowledge levels, and self-medication behaviors. Results showed that 45.2% of students had good knowledge, while 51.7% demonstrated responsible self-medication behavior, with paracetamol being the most frequently used analgesic (35%). Chi-square analysis revealed a statistically significant association between knowledge level and self-medication behavior ($p < 0.05$), indicating that higher knowledge correlates with safer medication practices. These findings underscore the importance of strengthening educational programs on rational drug use to promote safe and informed self-medication behaviors among future healthcare professionals.

Keywords:
Pharmacy students; Analgesics; Self-medication; Knowledge level; Rational drug use

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1. Introduction

Self-medication is a widely practiced behavior across all populations, including university students. Analgesics, particularly over-the-counter (OTC) pain relievers, are among the most commonly used medications due to their accessibility and perceived safety for relieving mild to moderate symptoms such as headaches, toothaches, or muscle pain [1],[2],[3]. While self-medication may offer practical advantages such as time and cost efficiency, improper use may result in adverse drug reactions, masking of serious conditions, drug dependence, or incorrect dosage administration [5],[6].

As future healthcare providers, pharmacy students are expected to possess strong pharmacological knowledge and demonstrate rational medication behavior. However, studies have shown that irrational self-medication remains prevalent even among pharmacy and medical students. Factors such as academic stress, peer influence, and unrestricted access to medicines contribute to this phenomenon [7],[8]. These issues

raise important concerns about whether knowledge alone is sufficient to ensure safe medication practices.

Research exploring the relationship between knowledge and self-medication behavior has yielded mixed findings. Some studies have demonstrated a positive correlation, suggesting that better knowledge leads to safer practices [8],[9]. Others argue that additional behavioral and psychosocial factors—such as motivation, access to healthcare, and personal attitudes—may override knowledge and lead to unsafe practices [10], [11].

Given the limited studies conducted within private health education institutions in Indonesia, particularly at the undergraduate level, this research aims to fill the gap. Specifically, the study investigates the relationship between the level of knowledge and self-medication behavior with analgesic drugs among students of the Clinical and Community Pharmacy Study Program at STIKes Widya Dharma Husada Tangerang.

2. Methods

Study Design

This study applied a cross-sectional quantitative design to investigate the relationship between pharmacy students' knowledge of analgesics and their self-medication practices. The target population comprised undergraduate students enrolled in the Clinical and Community Pharmacy Study Program at STIKes Widya Dharma Husada Tangerang.

Population and Sampling

A total of 1,113 students constituted the study population. Using Slovin's formula with a 5% margin of error (e = 0.05), the required minimum sample size was calculated as follows:

$$n = \frac{N}{1 + N(e)^2} = \frac{1113}{1 + 1113(0.05)^2} = 294$$

Thus, 294 respondents were purposively selected from semesters 2, 4, and 6, ensuring their availability and willingness to participate [10].

Research Instrument

Data collection was conducted using a structured questionnaire consisting of two parts. The first section gathered demographic information, including age, gender, semester, and the most recently used analgesic. The second section assessed the respondent's knowledge and behavior regarding analgesic self-medication [1].

The knowledge section comprised 13 true/false questions classified as either positive or negative statements depending on their alignment with correct medication practices [3]. The items are summarized in **Table 1**, which shows the nature of each statement.

Table 1. Nature of Questions in the Knowledge Questionnaire

No.	Question	Nature of the question
1.	Choosing a headache medicine tailored to the headache experienced	Positive
2.	Paracetamol can be used for toothache	Positive
3.	Ampicillin can be used for headaches	Negative
4.	All headache medications must be purchased on prescription	Negative

5.	Headache medication with this logo must be bought at a pharmacy 	Negative
6.	Headache medicine is taken in accordance with the rules stated on the medicine packet.	Positive
7.	Headache medications (such as Paramex and Saridon) can be taken before meals	Negative
8.	All painkillers should be taken after meals	Positive
9.	If you forget to take your medicine in the morning, you may take twice the amount in the afternoon.	Negative
10.	Paramex headache medicine may cause drowsiness	Positive
11.	Headache medication should be stored in the refrigerator	Negative
12.	Headache medication should be stored away from sunlight	Positive
13.	If the pain medication has exceeded the expiry date, it should not be taken.	Positive

Source: Lulu'Nur Afifah (2019) [1]

The behavior section consisted of 12 statements measured using a 5-point Likert scale (from "Always" to "Never"). These items evaluated the frequency and appropriateness of self-medication behavior and are described in **Table 2**.

Table 2. Nature of Questions in the Behavioral Questionnaire

No.	Question	Nature of the question
1.	I choose a headache medicine according to the headache I am experiencing	Positive
2.	I store headache medicine in a place that avoids direct sunlight	Positive
3.	When taking Ponstan, I take it after meals.	Positive
4.	I buy medicine that has a logo on the packaging at the pharmacy 	Negative
5.	Before taking my headache medicine, I read the instructions on the medicine packaging.	Positive
6.	I take parassetamol medicine for headaches and toothaches	Positive
7.	I check the expiry date of the medicine before taking the medicine	Positive
8.	I take more than 2 tablets of headache medicine at a time.	Negative
9.	I take medicine according to the rules stated on the medicine packaging	Positive
10.	Type a night I forgot to take medicine, then during the day I take medicine with double amount	Negative
11.	Before taking painkillers, I read the side effect information on the medicine packaging.	Positive
12.	I keep headache medications like: Saridon, Paramex, and Bodrex in the fridge.	Negative

Source: Lulu'Nur Afifah (2019) [1]

Each item was also categorized as positive or negative based on its consistency with rational self-medication practices.

Validity and Reliability

The questionnaire was adapted from Afifah (2019) [1] and reviewed by content experts to ensure content validity. Reliability testing yielded a Cronbach's alpha value of 0.85, indicating strong internal consistency [3].

Data Collection Procedure

The data collection process was carried out in three stages: instrument preparation, questionnaire distribution, and data recapitulation. These stages are summarized in **Table 3**, which outlines the sequential flow of activities. During the preparation stage, informed consent and printed questionnaires were distributed. In the implementation stage, questionnaires were administered to students in semesters 2, 4, and 6. Finally, responses were collected, coded, and processed using Microsoft Excel and SPSS.

Table 3. Data collection process

Stages	Activities
Stage I	Preparation before the research questionnaire
Stage II	Implementation of questionnaire distribution
Stage III	Recapitulation of data from respondents

Data Analysis

Data were analyzed using both univariate and bivariate approaches. Univariate analysis was employed to describe respondent characteristics and the distribution of knowledge and behavior scores. Bivariate analysis, specifically the Chi-Square test, was used to determine the relationship between knowledge level and self-medication behavior. Statistical significance was determined at $p < 0.05$ [8],[9],[10].

3. Results and Discussion

Demographic Characteristics

A total of 294 undergraduate students from the Clinical and Community Pharmacy Study Program at STIKes Widya Dharma Husada Tangerang participated in this study during the 2023/2024 academic year. Univariate analysis was conducted to describe respondents' demographic characteristics, including gender, age, semester level, and the most recently used analgesic. The detailed distribution is presented in **Figure 1**.

In terms of age distribution, the majority of respondents were 18 years old (n = 123; 41.8%), followed by those aged 19 (n = 64; 21.8%), 20 (n = 58; 19.7%), and 21 years (n = 49; 16.7%). These age groups fall within the category of early adulthood, typically defined as the range between 18 and 24 years. According to the Indonesian Ministry of Health [12], individuals in this developmental stage are classified as being in the productive age group—physically healthy, cognitively maturing, and increasingly independent in making life decisions, including those related to health and personal well-being. At this stage, students are expected to develop autonomy, which includes the ability to assess symptoms, seek treatment, and manage minor illnesses on their own. This makes early adulthood a critical phase for shaping rational self-medication habits.

Theoretical perspectives support this developmental profile. Monks et al. [12] [13] describe early adulthood as a period of increasing curiosity, self-reflection, and cognitive advancement. Individuals begin to form more stable identities and make independent choices, including in the context of health behavior. Asrori [13] further emphasizes that emotional and physiological transitions during this phase often

enhance confidence in decision-making. These factors explain why pharmacy students in this age group are likely to engage in self-medication using analgesics. However, the presence of independence and basic pharmaceutical knowledge does not always ensure responsible behavior. As this study suggests, while many students have sufficient knowledge, behavioral gaps still exist—indicating the need for targeted educational interventions that align with the psychosocial characteristics of this age group.

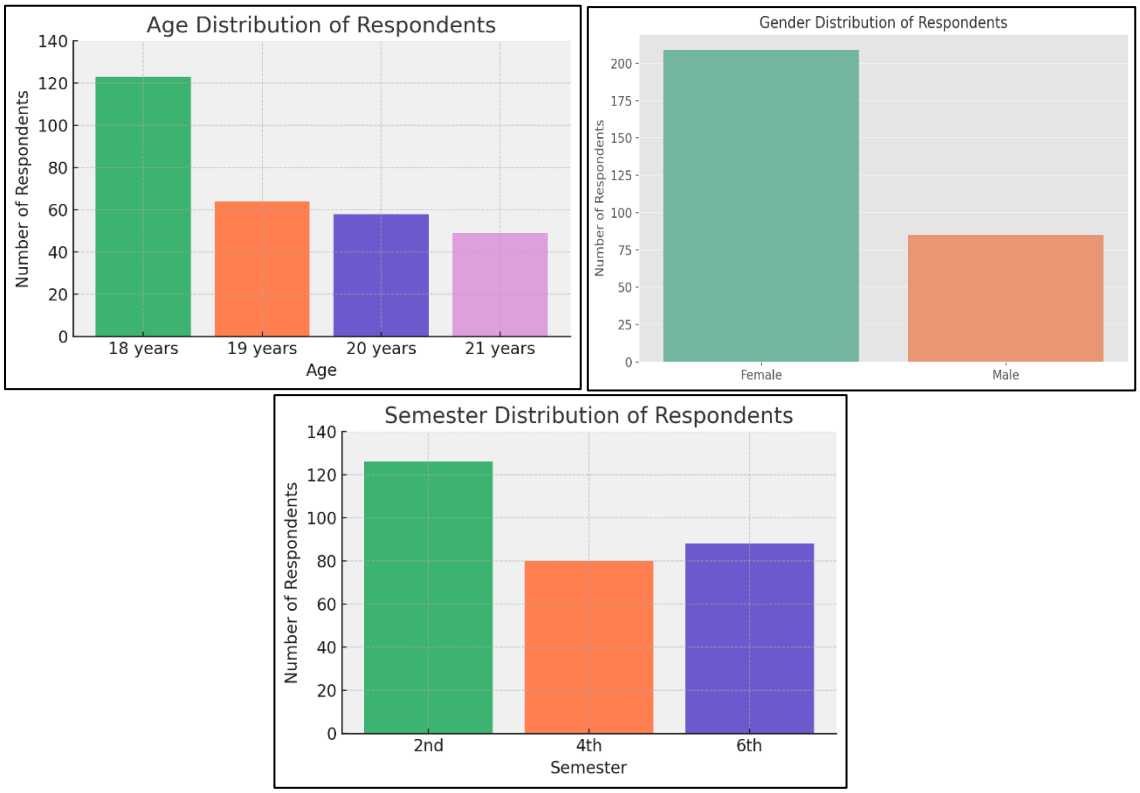

Figure 1. Demographic characteristics of respondents, including age, gender, and semester level (N = 294). *Source: Primary data, 2024*

The majority of respondents were female (n = 209; 71.1%), while male students accounted for 28.9% (n = 85). This gender distribution reflects a broader trend in health-related higher education in Indonesia, where female enrollment is dominant, particularly in pharmacy and nursing programs [10]. The overrepresentation of female students at STIKes Widya Dharma Husada is therefore consistent with national patterns in the health sciences sector.

Gender differences in health-related behaviors may help explain this distribution's relevance to self-medication practices. Women are often more proactive in seeking health information and are generally more attentive to physical symptoms, making them more likely to engage in self-care activities, including self-medication. A study by Hamid et al. [14] found that women tend to self-medicate for practical reasons, such as treating minor ailments at home rather than seeking professional care. This may be influenced by their perceived role in managing family health and their higher health literacy levels compared to men, particularly in student populations.

With regard to semester level, the second semester had the highest representation among respondents (n = 126; 42.9%). This may be attributed to the higher availability and responsiveness of early-year students, as they are often more actively involved in campus activities and class assignments. In addition, second-semester

students are typically in the early stages of exposure to pharmaceutical education, where foundational courses introduce concepts of pharmacology, drug safety, and rational drug use.

Despite their enthusiasm for learning, early-semester students may not yet possess the analytical depth or clinical experience required to make fully informed decisions regarding self-medication. According to Nasir et al. [15] and Clinciu [16], students in the early years of higher education are often in a transitional phase marked by exploration and experimentation. This combination of academic curiosity and limited judgment may lead to behaviors such as self-medication without full understanding of potential risks. Therefore, semester level is an important factor to consider when evaluating student knowledge and behavior related to analgesic use.

Types of Analgesic Drugs

As for the most recently used analgesics, paracetamol was the most frequently reported by respondents (n = 103; 35.0%), followed by potassium diclofenac (n = 71; 24.1%), ibuprofen (n = 66; 22.4%), and mefenamic acid (n = 54; 18.4%). This ranking reflects the preferences of students when choosing over-the-counter pain relievers for self-treatment of minor ailments such as headaches or muscle pain, as shown in **Figure 2**.

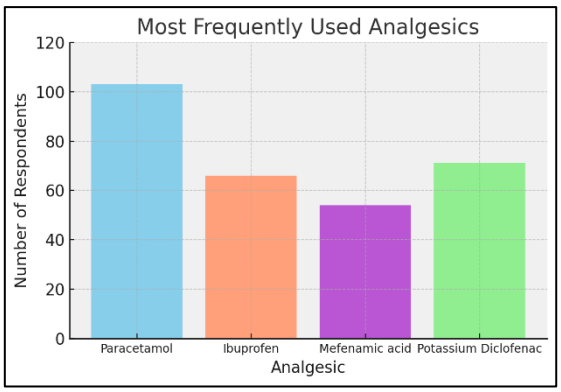

Figure 2. Most frequently used analgesics among respondents (N = 294).
Source: Primary data, 2024

Paracetamol dominance as the analgesic of choice is likely due to its wide availability, affordability, and reputation for safety, especially when used correctly. It is often perceived as a first-line treatment for mild pain and fever, and does not require a prescription in most pharmacy settings. These findings are in line with previous studies, including Bunardi et al. (2022) [2] and related literature, which confirm paracetamol as the most frequently used analgesic among student populations [3].

Knowledge Level

Respondents knowledge regarding self-medication with analgesics was evaluated through a 13-item true/false questionnaire covering key aspects such as indications, dosage, side effects, and storage. As shown in **Figure 3**, 133 respondents (45.2%) demonstrated good knowledge, indicating a strong understanding of appropriate analgesic use. Meanwhile, 120 students (40.8%) were categorized as having adequate knowledge, and 41 respondents (14.0%) were identified as having poor knowledge, suggesting notable gaps in understanding.

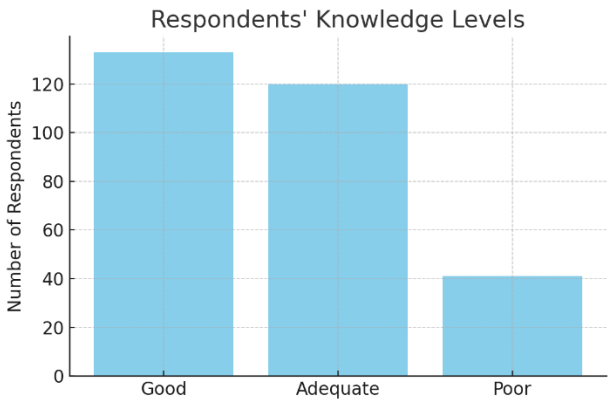

Figure 3. Distribution of Respondents' Knowledge Levels Regarding Self-Medication with Analgesics. *Source: Primary data, 2024*

Out of the total respondents, 133 students (45.2%) demonstrated a good level of knowledge, indicating a comprehensive understanding of appropriate analgesic use. Meanwhile, 120 students (40.8%) were categorized as having an adequate level of knowledge—possessing basic awareness but with certain misconceptions or gaps. A smaller portion, 41 students (14.0%), were found to have poor knowledge, suggesting a limited understanding of safe self-medication practices.

These findings indicate a generally high awareness among pharmacy students, likely influenced by their academic exposure to pharmacology. However, the substantial proportion of students with only moderate or poor knowledge suggests that formal instruction alone may be insufficient to ensure comprehensive understanding. This is consistent with previous studies, such as those by Romlah et al. (2022) [3], Adnan (2014) [17], and Notoatmodjo (2019) [9], which note that while knowledge forms the foundation of rational behavior, gaps may persist without reinforcement through experiential learning and public health engagement.

Self-medication behaviour

Self-medication behavior was assessed using a 12-item Likert scale questionnaire with responses ranging from "always" to "never." Based on their total scores, students were categorized into three behavioral groups: good, fair, and inappropriate. As shown in **Figure 4**, 152 respondents (51.7%) exhibited good self-medication behavior, including consistent practices such as reading drug labels, checking expiry dates, and adhering to proper dosage. Another 102 respondents (34.7%) demonstrated fair behavior, occasionally engaging in questionable habits such as improper storage or ignoring side-effect warnings. Meanwhile, 40 respondents (13.6%) showed inappropriate behavior, including doubling doses, skipping instructions, or self-medicating without sufficient understanding.

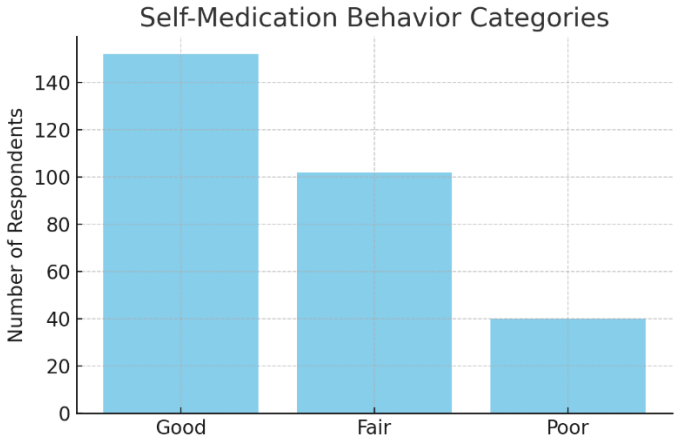

Figure 4. Distribution of respondents self-medication behavior related to analgesic use (N = 294). Source: Primary data, 2024

This distribution suggests that although most pharmacy students engage in responsible medication practices, a considerable proportion remains at risk of unsafe behavior. According to the World Health Organization (WHO), over 60% of individuals worldwide practice self-medication, particularly in populations with easy access to over-the-counter (OTC) drugs [18],[19]. Students are especially vulnerable due to academic pressures and perceived self-efficacy. Supporting this, Al-Qahtani et al. (2022) found that knowledge alone does not guarantee safe behavior without continuous reinforcement of health literacy, even informed individuals may adopt unsafe practices over time [5].

Bivariate Analysis

The bivariate analysis was conducted to assess the association between students' knowledge levels and their self-medication behavior regarding analgesic use. The Chi-Square test for independence was applied to the data, with the results presented in **Table 4**. A statistically significant relationship was observed between the two variables, with a p-value of 0.000 ($\alpha = 0.05$), indicating that differences in knowledge levels were significantly associated with variations in self-medication behavior.

Table 4. Relationship between knowledge level and self-medication behavior (N = 294)

Knowledge Level	Good Behavior	Fair Behavior	Poor Behavior	Total
Good	89 (30.3%)	33 (11.2%)	11 (3.7%)	133 (45.2%)
Adequate	38 (12.9%)	45 (15.3%)	12 (4.1%)	95 (32.3%)
Poor	25 (8.5%)	9 (3.1%)	32 (10.9%)	66 (22.5%)
Total	152 (51.7%)	87 (29.6%)	55 (18.7%)	294 (100%)

Chi-Square Test p-value = 0.000

As shown in **Table 4**, among the 133 students categorized as having good knowledge, 89 (30.3%) exhibited good self-medication behavior, while only 11 (3.7%) exhibited poor behavior. In contrast, of the 66 students identified as having poor knowledge, 32 (10.9%) demonstrated poor behavior, suggesting a strong correlation between limited knowledge and inappropriate analgesic use. These data support the notion that knowledge plays a key role in guiding responsible medication behavior, especially in student populations that frequently access over-the-counter (OTC) drugs.

This finding is consistent with previous research by Melizsa et al. (2022) [3], who reported a moderately positive correlation (r = 0.516) between knowledge and self-

medication behavior among health science students. Similarly, Afifah Nur (2019) [1] found a direct and proportional relationship between analgesic knowledge and rational medication practices in academic settings. These results reinforce the importance of integrating applied pharmacology and drug safety education in early stages of pharmacy training, particularly to address misconceptions and prevent misuse.

Furthermore, the study highlights the need for continuous reinforcement of health literacy. While formal education contributes significantly to students' foundational knowledge, it does not always translate into safe behavior unless supported by practical interventions. As noted by WHO, more than 60% of the global population engages in self-medication, particularly in settings where access to OTC medications is high [18],[19]. Therefore, targeted strategies such as peer-led education, experiential learning modules, and behavioral counseling may be effective in strengthening the link between knowledge and responsible self-medication behavior.

This study has several limitations that should be taken into account when interpreting the findings. First, the cross-sectional design limits the ability to establish a causal relationship between knowledge levels and self-medication behavior, as the data were collected at a single point in time. Second, the use of purposive sampling may introduce selection bias, thereby limiting the generalizability of the results to the broader population of pharmacy students. Third, the reliance on self-reported questionnaires raises the possibility of social desirability bias and inaccurate responses, as participants may have provided answers they believed to be more acceptable rather than those that reflect their actual behavior. These limitations should be carefully considered in drawing conclusions and underscore the need for future studies employing longitudinal designs and more diverse sampling strategies.

4. Conclusion

This study revealed a statistically significant association between knowledge levels and self-medication behavior with analgesics among pharmacy students. While nearly half of the respondents demonstrated good knowledge (45.2%) and responsible behavior (51.7%), a considerable proportion exhibited inadequate understanding and suboptimal practices. These findings underscore the critical need to strengthen rational drug use education within the pharmacy curriculum. Given their future role as health advocates, pharmacy students must not only be competent in personal medication practices but also capable of educating the wider community. Educational institutions should therefore enhance curriculum delivery through targeted interventions such as seminars, workshops, and experiential learning to promote safe and informed self-medication practices and reduce the potential for drug misuse in the long term.

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Conflicts of Interest:

The authors declare no conflicts of interest.

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