



## Pharmacy Students' Over-the-counter Recommendations for Primary Dysmenorrhea and Childhood Fever Cases in an Indonesian University

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### ABSTRACT

**Background:** The quality of pharmacy education is stated in the literature to be one of the factors influencing the quality of self-medication services in pharmacies. However, research describing the ability of pharmacy students to handle self-medication cases is limited.

**Objectives:** This study aims to describe pharmacy students' recommendations for two vignette cases involving analgesic-antipyretics (i.e., primary dysmenorrhea and childhood fever cases) in an Indonesian university and to identify factors related to the appropriateness of their recommendations.

**Methods:** Apothecary students were asked to provide recommendations and their reasoning for primary dysmenorrhea and childhood fever cases using a structured telephone interview.

**Results:** Of the 86 participants, appropriate recommendations were provided by 86% and 78% for a case of primary dysmenorrhea and for childhood fever respectively. One-quarter of students did not identify referral criteria in the case of childhood fever and thus made inappropriate recommendations. Age and study period were factors significantly related to providing appropriate recommendations, in which students who were younger and completed their study program within 5 to 6 years were significantly able to provide appropriate recommendations compared to students who were older and whose study period exceeded 6 years.

**Conclusion:** A considerable number of apothecary students in an Indonesian university were able to properly manage cases related to analgesic-antipyretic recommendations. Further qualitative research is needed to identify factors underlying the knowledge of Indonesian pharmacy students in identifying major and minor patient presentations.

**Keyword:** analgesics-antipyretics; Indonesia; pharmacy students; self-medications

### INTRODUCTION

Self-medication is defined by the World Health Organization as "the selection and use of medicines by individuals to treat self-recognized illnesses or symptoms".<sup>1</sup> Self-medication is widely practiced worldwide with a prevalence ranging from 8% to 98% across both developed and developing countries.<sup>2</sup> In Indonesia, the prevalence of self-medication is reported to be 75% in 2022.<sup>3</sup> However, the appropriateness of the use of medicines for self-medication is of concern. In 1997, Sclafer et al. reported that self-medication used to treat acute simple illness in urban Indonesia was considered appropriate in only 16% of the 965 cases surveyed.<sup>4</sup> Newer research published in 2017, conducted in Panyabungan North Sumatra Indonesia, reported higher

appropriate use of medicines for self-medication compared to Sclafer's study; the reported percentage of rational drug use was 59% of 342 respondents surveyed.<sup>5</sup> The medicines commonly used for self-medication are usually called non-prescription medicines and are available without a doctor's prescription. Non-prescription medicines usually have a good safety profile and are usually approved to treat minor illnesses.

Research has shown that antipyretic analgesics are among the top ten medicines used for self-medication, mainly to treat pain or fever; which are common symptoms for which most people seek self-medication.<sup>6-8</sup> People often visit community pharmacies to obtain these medicines and often seek advice from the pharmacist.<sup>6,9</sup> Therefore, pharmacists have a pivotal position to provide quality counseling for their patients choosing medication with antipyretic analgesics.

Studies related to the provision of antipyretic analgesics for self-medication from community pharmacies have reported that the comprehensiveness of the information gathered, the appropriateness of the recommendations provided, and/or the adequacy of the counseling provided were sub-optimal.<sup>10-13</sup> In Indonesia, Lestari et al. reported that only 9% of the 45 pharmacies in Lamongan district, East Java performed a patient assessment and only less than 10% of pharmacies provided medicine information related to the indication, how to use the medicines, and side effects when handling patients' request for mefenamic acid.<sup>14</sup> A study in Pekanbaru, Riau also showed similar results, in which only 24% of pharmacy staff performed patient assessment when responding to patients with toothache.<sup>15</sup> Furthermore, Roseno et al. in Bandung, West Java also stated low quality of patient assessment, since only 43%, 14%, and 11% of 232 pharmacy staff asked about the signs and symptoms, efforts to treat signs and symptoms, and medical conditions respectively.<sup>16</sup> Counselling related to lifestyle modification was only performed by 10% of 232 pharmacies, and less than 37% of pharmacies provided medicine information on dosage, duration of treatment, precaution, and side effects.<sup>16</sup>

Several factors may have influenced the quality of self-medication counseling at pharmacies in developing countries including the quality of pharmacy education.<sup>17,18</sup> Lack of relevance between the topic as provided at university and the application in practice, as well as commercialization of educational organizations placing more attention on the number of graduated students rather than the quality of the education and training, have been proposed as problems faced by pharmacy educators at universities in developing countries.<sup>17-19</sup>

In Indonesia, pharmacists are required to complete a four-year Bachelor of Pharmacy (BPharm) degree, followed by a one-year pre-registration training program (apothecary program). The curriculum of a four-year BPharm degree is expected to be mainly focused on basic knowledge, and the curriculum for an apothecary program accentuates applied practice.<sup>20</sup> Abilities to provide quality self-medication services have been stated as a competence required in both the Indonesian BPharm degree and the apothecary program by the Indonesian Association of Higher Education in Pharmacy; as stated in their 2013 Academic Competence and Curriculum document – APTFI document.<sup>20</sup> While the curriculum related to self-medication services was proposed almost 10 years ago, published research related to Indonesian pharmacy students' recommendations and clinical reasoning in managing cases of minor ailments, particularly concerning the use of antipyretic analgesics, is limited.

Currently, only a few Indonesian studies examining the ability of pharmacy students to handle self-medication cases have been conducted. Brevmana et al. found that the ability of 14 BPharm students to provide appropriate recommendations for self-medication cases of tension headache, diarrhea, dyspepsia, migraine, and cough differed according to the cases, ranging from 0% to 86%.<sup>21</sup> Another study showed that approximately only 55% of 183 third-year BPharm students participating in the research were able to provide appropriate recommendations in the case of cough due to asthma worsening.<sup>22</sup> Furthermore, a study from a faculty of pharmacy in Surabaya found that 71% of 86 apothecary students were able to provide appropriate recommendations in a case of low back pain.<sup>23</sup> While few studies related to the ability of pharmacy students to handle self-medication cases have been conducted, the results were varied. In addition, no studies have been undertaken to identify factors associated with students' providing appropriate recommendations for self-medication cases that can be crucial to develop and implement strategies for improvement. To have a complete picture of the ability of Indonesian pharmacy students to handle self-medication cases, more studies using different cases are needed. This study aims to (1) describe Indonesian pharmacy students' recommendations and the reasoning when managing vignette cases of childhood fever and primary dysmenorrhea, (2) determine the appropriateness of the recommendations when handling vignette cases of childhood fever and primary dysmenorrhea, and (3) identify factors related to the appropriateness of the recommendations when handling vignette cases of childhood fever and primary dysmenorrhea.

## **METHODS**

### **Study design and ethical approval**

This study was a cross-sectional study conducted in a private Indonesian pharmacy university located in an urban city of East Java. Ethics approval was obtained from the Ethical Committee University of Surabaya, Indonesia (No: 074/KE/V/2019). To protect the identity of the participants, any identifying information was not published.

### **Study instrument**

A questionnaire consisting of 2 parts: (1) pharmacy students' characteristics and (2) two vignette cases: a case of primary dysmenorrhea and a case of childhood fever that did not respond to paracetamol were developed (Table I). The case of primary dysmenorrhea was adapted from Blenkinsopp et al. and was designed as a minor ailment case.<sup>24</sup> The case of childhood fever was adapted from Patel et al. and was designed as a case that contained warning symptoms requiring a direct medical referral.<sup>25</sup> Participants were asked to provide their recommendations and reasons for the recommendations for these 2 vignette cases. The two vignette cases were assessed by four Indonesian academics who were lecturers in pharmacy practice (CB, YIW, ES, SVH) for content validity to adjust to the local context. These validators are experienced in developing questionnaires and conducting research related to pharmacy practice. Two of them (CB and SV) also had work experience in community pharmacies. The cases were provided to the validators with written instructions. They were specifically asked to review the content of the questionnaire about (1) whether sufficient information regarding warning symptoms (referral criteria) has been provided so that participants could identify whether medical referral was needed or self-medication could be undertaken; (2) whether sufficient information related to symptoms, patient identity, and patient medical and medication history has been provided to help participants provide appropriate recommendations; and (3) whether the story in the cases, the wording and the language were understandable and appropriate to the Indonesian context. The questionnaire was then piloted for face validity on 11 apothecary students in the research setting. Students involved in the pilot were asked to not inform their friends regarding the content of the questionnaire. Data from the pilot was included in the analysis since no significant changes were made to the questionnaire after the pilot. The vignettes are provided in Table I.

### **Sampling, participant recruitment, and data collection**

All apothecary students in batch 2020 of this research setting were eligible for recruitment (n=104). This cohort was chosen because this is the graduating cohort at the time of data collection. The minimum sample requirement was calculated using Slovin's formula using the population size of 104 and an acceptable margin of error of 0.05 was 83 participants. Total sampling was used, in which all 104 students in this cohort were invited to participate in this study.

The data collection was conducted when the apothecary students were about to graduate (after they finished all the final examinations required). Two final-year undergraduate students (KS and PAN) acted as data collectors. Before data collection started, all data collectors were trained on the procedure of the survey, how to communicate with the apothecary students, and how to conduct a phone interview. The training was provided by two academics (CB and SV) who are experienced in conducting community pharmacy surveys. The data collectors contacted all students on the list by sending them a WhatsApp message about the research and permission to conduct a phone interview at a time that suited them. The invitation letter contained information that the interviews would be confidential, the participants would be asked to provide their recommendations regarding self-medication vignette cases, and the results of the interview would not affect participants' marks or graduation. If the participant agreed, the data collectors called the participant, re-explained the study, and asked for their consent to participate and to audio-record the interview. Before the interview began, the participant was told to answer according to their current knowledge without having to look at the book or search the internet since no mark would be undertaken. The data collectors conducted a structured telephone interview by reading the questions in the questionnaire for participants who volunteered to participate. After the interviews finished, participants who had participated in the interview were asked to not inform their classmates about the scenarios provided in the questionnaire.

Table I. Vignette cases

Topic	Vignette cases	Appropriate recommendation
<b>Primary dysmenorrhea</b>	A young woman aged about 18 years old asks for a medicine for period pain. She said that she always has pain on the first day of his period and she usually cannot carry out her normal activities when having the pain. Her periods are regular (every 28 days). The bleeding is normal and not heavy. The pain only occurred on the first day of her period and she has never had any pain during other parts of the cycle. She also does not experience any pain in other parts of the body such as in the back or in the leg. This patient does not have any medical history, is not pregnant, and does not consume any medicines, supplements, or herbals routinely. What would you advise this woman? Why do you recommend the advice?	Recommending a non-prescription analgesic (i.e., NSAIDs or paracetamol) and/or non-pharmacological advice (i.e., topical heat such as menstrual heat patch or warm/hot compress) <sup>#</sup>
<b>Childhood fever</b>	A woman comes to the pharmacy and asks if you can recommend something for her baby's fever. The baby is 7 months old and weighs 7 kg. The baby has been irritable and the axillary temperatures have ranged from 38°C to 39°C over the past 5 days. The mother has been giving the baby Tempra <sup>®</sup> drops 0.8 ml about three to four times a day for 5 days. The mother asks you if there are any medicines that are better for reducing fever. She said that her friend recommended her to use Proris <sup>®*</sup> for better fever control. What would you advise this woman? Why do you recommend the advice?	Direct medical referral

<sup>^</sup>Tempra drop is a brand name medicine that contains paracetamol (in each 0.8ml contains 80mg paracetamol); <sup>\*</sup>Proris is a brand name medicine that contains ibuprofen; <sup>#</sup> Recommending NSAIDs or paracetamol were considered appropriate based on the literature<sup>26</sup>

### Data analysis

Descriptive statistics were used to analyze data from the first part of the questionnaire (participants' characteristics). Open-ended data about pharmacists' recommendations and reasons for the recommendations were transcribed verbatim from the audio-recorder and entered into an Excel database. Content analysis as described by Elo and Kyngas was used.<sup>27</sup> The analysis was done inductively by firstly reading participants' statements several times to familiarize them with the data. Then, initial codes were generated from participants' statements. The initial codes were then clustered into categories. The process of generating categories was reviewed and refined by going back and forth between the categories, the initial codes, and the original participant statements. The data analysis process was done by two coders (CB and KS for primary dysmenorrhea case, and CB and PAN for childhood fever). If there were disagreements between the two coders, the third coder (YIW) was consulted, and the disagreement was resolved by consensus or by voting. Lastly, the number of participants corresponding to the categories was counted.

Participants' recommendations provided for the 2 vignette cases were assessed for appropriateness. The appropriateness of the recommendation for these 2 cases was determined based on the literature and was confirmed by consensus of a panel of 3 academics in pharmacy practice. Recommendations considered appropriate for the case of primary dysmenorrhea included recommending analgesics such as NSAIDs or paracetamol and/ or recommending local applications (i.e., topical heat such as menstruation heat patch, hot compress).<sup>24,26,28</sup> Further, NSAIDs particularly ibuprofen, were considered the first choice; paracetamol may be recommended [based on the Handbook of Nonprescription Drugs: An Interactive Approach to Self-Care].<sup>26</sup> The appropriate recommendation for the case of childhood fever was direct medical referral (Table I).<sup>25</sup>

A chi-square test was used to identify factors associated with the appropriateness of recommendations provided by pharmacy students when handling these 2 vignette cases. The variables tested were pharmacy students' demographic characteristics: gender, age, GPA, and course majoring during BPharm and apothecary study, time taken for studying undergraduate and pre-pharmacy registration (apothecary) courses, and having work experience in community pharmacies. Participants' ages and GPAs were categorized based on the median. A Fisher's exact test was used if the cell count was less than 5. IBM SPSS Statistics for Windows version 26 (Armonk, NY: IBM Corp) was used for the analysis. A p-value of  $\leq 0.05$  was considered significant.

## RESULTS AND DISCUSSION

### Participants' characteristics

The total population of the apothecary student cohort was 104. Of these, 86 agreed to participate, leading to a response rate of 83%. Non-participation was owing to several reasons (Figure 1). Of the 86 participants, most (84%) were female, had never had any experience working in community pharmacies before entering pharmacy school (86%), and had a mean age of 24 years. Most (80%) took 5 to 6 years to complete the BPharm and apothecary programs with a mean GPA average of 2.84 (on a scale of 4) for their BPharm degree (Table II).

The type of recommendation most commonly stated by participants was recommending a nonprescription analgesic without nonallopathic advice (53 of the 86 participants, 62%), followed by recommending a nonprescription analgesic with nonallopathic advice (13 of the 86 participants, 15%) (Table III). The type of analgesic mostly chosen was either paracetamol, ibuprofen, or mefenamic acid. According to primary dysmenorrhea treatment guidelines, providing an analgesic with NSAID (such as ibuprofen or mefenamic acid) as the first line therapy for primary dysmenorrhea is recommended.<sup>29</sup> A small number of participants (3 of the 86 participants, 3%), however, recommended methampirone with antispasmodic (i.e., papaverine, hyoscine butylbromide) which was considered a prescription medicine.<sup>30</sup> The reasons for recommending an analgesic were varied. The most common reason stated (55 of the 86 participants) was to treat the symptoms, and/or that the patient's condition was minor and could be self-medicated with an analgesic, and/or the pain is disturbing their normal activities and therefore an analgesic was needed, and/or choosing an analgesic based on the legal requirement and/or the literature.

A smaller percentage of participants (12 of the 86 participants) recommended non-allopathic advice or herbal products without recommending an analgesic in the case of primary dysmenorrhea. This included using pads or warm water or recommending a product containing turmeric and tamarind that is believed can ease the pain without recommending an analgesic. The most common reason for recommending a non-allopathic approach was mainly because these participants concluded that the pain was minor and did not warrant the use of mainstream medicines (stated by 9 participants) (Table III).

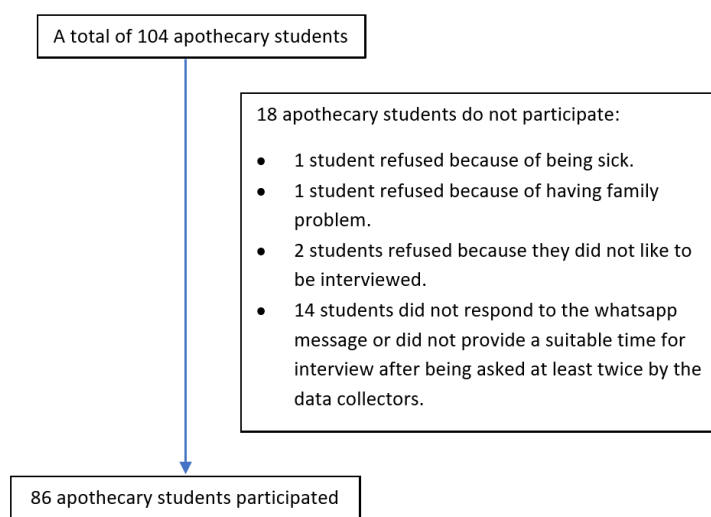
In the case of primary dysmenorrhea, an appropriate recommendation was defined as providing a non-prescription analgesic and/or non-pharmacological advice such as a menstrual heat patch or warm/hot compress.<sup>24,26,28</sup> Providing an herbal product containing turmeric and/or tamarind was considered inappropriate because the efficacy evidence is lacking. Not recommending anything or stating do not know the answer was considered inappropriate. Of the 86 participants, 66 recommended a nonprescription analgesic with or without non-pharmacological advice, and 8 recommended non-allopathic advice (either menstrual patch or hot compress). Therefore, an appropriate recommendation was provided by 74 of 86 participants (86%).

The non-allopathic advice, which is using topical heat (such as a hot compress/patch), is effective in relieving the pain, particularly if this is combined with an analgesic (i.e., ibuprofen).<sup>28,31</sup> Although some pharmacy textbooks on non-prescription medicines have not stated topical heat as a stand-alone therapy for primary dysmenorrhea,<sup>24,32</sup> this approach was considered appropriate in this study. This was based upon literature reports which have indicated that topical heat was effective for the relief of dysmenorrhea and could be comparable to ibuprofen.<sup>26,28,31,33-35</sup> However, only a small number of participants (20 participants, 23% of the total 86 participants) provided such advice. Since topical heat, such as a hot compress, is effective in relieving pain and relatively easy and cheap to prepare, students should be encouraged to include such advice for patients with primary dysmenorrhea, as part of the class learning process.

### The types, reasons, and appropriateness of the recommendations for the case of childhood fever

In the case of childhood fever, 67 of the 86 (78%) participants recommended direct medical referral, of which 60 participants recommended direct medical referral without recommending products and 7 recommended direct medical referral and a product for fever (either ibuprofen or paracetamol) (Table IV).

## Pharmacy Students' Over-the-counter Recommendations



**Figure 1. Participant recruitment**

**Table II. Participant's demographic characteristics (n=86)**

Participants' characteristics	n (%)
<b>Gender</b>	
Male	14 (16%)
Female	72 (84%)
Age (years) mean $\pm$ SD	24 $\pm$ 1.005
<b>Time taken for studying undergraduate and pre-pharmacy registration (apothecary) course</b>	
5 to 6 years	69 (80%)
>6 years	17 (20%)
<b>Majoring during undergraduate pharmacy course</b>	
Clinical	48 (56%)
Industrial	38 (44%)
<b>Majoring during pre-pharmacy registration program (apothecary program)</b>	
Clinical	47 (55%)
Industrial	39 (45%)
<b>GPA undergraduate pharmacy courses (on a 4 scale)</b>	
$\geq 3$	28 (33%)
<3,00	58 (67%)
Mean $\pm$ SD	2.84 $\pm$ 0.431
<b>Having working experience in pharmacy</b>	
Yes	12 (14%)
No	74 (86%)

The most common reason stated by these 67 participants for recommending direct medical referral was that they identified warning symptoms in the case. The other 19 participants recommended antipyretics (either ibuprofen or paracetamol) or did not know the answer and therefore did not provide any recommendations. According to the Indonesian pharmacist profession standard, the ability to differentiate between minor illness and the condition needing a medical referral is a competence that should be mastered by a pharmacist.<sup>36</sup> However, when analyzing the reasons for our students' recommendations, we found that students who did not recommend direct medical referral, since mostly they could not identify that there were warning symptoms or referral criteria for this case (Table IV). This was despite obvious warning symptoms (i.e., a 7-month-old baby that had a persisting fever for 5 days and did not respond to paracetamol) had been provided. Therefore, increased emphasis on identifying conditions that can be self-medicated and/or need a medical referral is needed during the class learning process.

**Table III. Types and reasons of the recommendations in the primary dysmenorrhea cases (n=86)**

Type of recommendations	Reasons of the recommendations	n (%)
<b>Recommending medicines with or without non-pharmacological advice and/or follow up* (n=69)</b>	Recommending / choosing medicines based on safety reasons	5 (6%)
• Recommending nonprescription analgesic without nonpharmacological advice = 53	Recommending/choosing medicines based on the indication to treat the symptoms and/or legal requirement and/or the condition of the patient (ie the pain disturbing patients' activity, the patient's pain or condition is minor) and/or the literature	55 (64%)
• Recommending nonprescription analgesic with nonpharmacological advice (i.e. hot compress, resting) = 13	The analgesic chosen is believed to be more effective than other analgesics	2 (2%)
• Recommending prescription medicines without non-pharmacological advice = 2	The analgesic chosen is believed to be more effective than other analgesics and is viewed as safe	1 (1%)
• Recommending prescription medicines with nonpharmacological advice (i.e. hot compress) = 1	Recommending/choosing medicines based on the indication and/or the condition of the patients (the patients' pain or condition is minor) and safety	3 (3%)
<b>Recommending non-pharmacological advice and/or herbal products with or without advice related to follow up* (n=12)</b>	During menstruation, the body is alkali and therefore need acid such as mefenamic acid to balance it	1 (1%)
• Menstrual patch or warm/hot compress (n=6)	No reasons were provided	2 (2%)
• Warm/hot compress and Kiranti (n=2)	The patient has not consumed anything for the pain and therefore try non-pharmacological approach first	1 (1%)
• Kiranti (a herbal product containing turmeric and tamarind)(n=3)	Recommending herbal product for the pain	1 (1%)
• Rest (n=1)	Concluding that the condition of the pain is minor and therefore no modern medication is needed	9 (10%)
<b>Not recommending anything for now, only follow up advice* if the pain is not getting better (n=2)</b>	Using herbal product first because it is natural	1 (1%)
<b>Do not know the recommendation (n=3)</b>	Concluding that the condition is minor and therefore no need to recommend anything for now	2 (2%)
	Still need to ask more questions	1 (1%)
	No reasons	2 (2%)

\*follow up advice means advising the patient to contact a doctor if symptom persist or worsen after trying the first advice (i.e., product or non-pharmacological advice)

Consistent with this finding, two Indonesian studies examining pharmacists' recommendations in cases of dyspepsia and headache also showed that appropriate recommendations were lower in cases that needed a medical referral compared to other minor ailment cases.<sup>37,38</sup> Sub-optimal pharmacists' recommendations in cases requiring prompt medical referral have also been reported in other international studies.<sup>39,40</sup> Furthermore, pharmacists' difficulties in differentiating minor symptoms that can be self-medicated and conditions that require medical referral have been previously reported.<sup>41,42</sup> Considering that approximately one-quarter of this student cohort could not identify warning symptoms in the case of childhood fever, there is a need for interventions to improve the ability of pharmacy students and also pharmacists to recognize red flag referral criteria for patient consultations. The use of a standardized protocol has been reported to have improved pharmacist referrals;<sup>43</sup> however, further research is still needed to identify appropriate strategies in improving the knowledge of Indonesian pharmacy students and possibly pharmacists in identifying conditions that require medical referral and conditions that can be self-medicated.

Theoretically, to be able to provide appropriate advice in the vignette cases, students need to have good skills in problem-solving, clinical reasoning, and clinical decision-making. A foundation to master these skills is good critical thinking skills.<sup>44</sup> For students to learn critical thinking skills, four factors need to be addressed by the



Table IV. Types and reasons of the recommendations in the childhood fever case (n=86)

Type of recommendations	Reasons of the recommendations	n (%)
<b>Recommending direct medical referral and/or non-pharmacological advice without providing any products (n=60)</b>	Identify warning symptoms <sup>^</sup>	48 (56%)
	Identify warning symptoms <sup>^</sup> and suspect the cause of the symptoms	12 (14%)
<b>Recommending direct medical referral and providing a product with or without non-pharmacological advice (n = 7)</b>	Identify warning symptoms <sup>^</sup>	4 (5%)
	Direct medical referral because identifying warning symptoms <sup>^</sup> and providing antipyretic for the fever	2 (2%)
	Direct medical referral because identifying warning symptoms <sup>^</sup> and suspecting the cause of the symptoms. Providing the requested product (ibuprofen) to calm the mother	1 (1%)
<b>Recommending the product that is requested (i.e., ibuprofen) with or without non-pharmacological and/or follow up advice*. Direct medical referral was not recommended (n= 8)</b>	Ibuprofen is more effective than paracetamol	3 (3%)
	Ibuprofen is considered safe	2 (2%)
	The temperature is still 38 to 39°C	1 (1%)
	Has been using paracetamol but not effective and therefore can considered using other drugs like ibuprofen	1 (1%)
<b>Recommending the product that has been used (i.e., paracetamol) with or without non-pharmacological and/or follow up advice*. Direct medical referral was not recommended (n=7)</b>	Fulfilling the wish of the mother who wants to buy ibuprofen and have a thought that Proris (the brand name of the product requested) has paracetamol as the main ingredient	1 (1%)
	Recommending paracetamol with adjustment of the dose or rechecking the appropriateness of the dose given	2 (2%)
	The age of the baby is still 7-month-old	1 (1%)
	Recommending paracetamol because it has not showed the effectiveness yet	1 (1%)
	Recommending paracetamol based on the personal experience during work training and ibuprofen is more expensive than paracetamol	1 (1%)
	Recommending paracetamol because ibuprofen is viewed as contraindicated with the patient (i.e., ibuprofen is not suitable for the patient's age, suspecting the patient might contracted covid and viewed that ibuprofen cannot be used for covid)	2 (2%)
	Do not remember whether it is ok to use the requested product (ibuprofen) for 7-month-old baby	1 (1%)
<b>Not providing any recommendation (n=4)</b>	No reason provided	3 (3%)

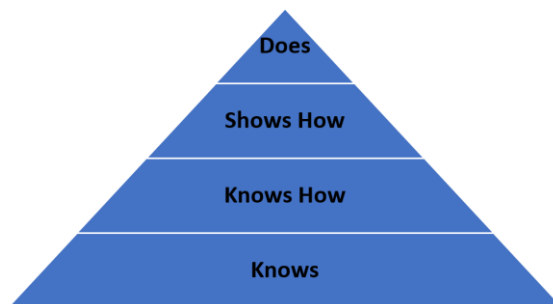
<sup>^</sup>Warning symptoms include: long duration of fever (5 days), persisting fever despite paracetamol has been given, the patient's age is only 7 months, and the temperature is 38 to 39°C; \*Follow up advice means advising the patient to contact a doctor if symptom persist or worsen after trying the first advice (i.e., product or non-pharmacological advice)

lecturers, including (1) creating a learning environment that lets the students integrate their knowledge, (2) modeling expert thinking, (3) providing guidance and supporting until students can perform on their own, and (4) challenging students' assumption by prompting to question what students have known.<sup>44</sup> Furthermore, appropriate delivery methods that help with students' critical thinking should be chosen. A finding from a systematic review reported that case-based learning can increase the capacity of medical and pharmacy students to analyze cases compared to other techniques,<sup>45</sup> and therefore this approach can be considered by clinical and community pharmacy lecturers in Indonesia.

The appropriate recommendation in this case of childhood fever was defined as direct medical referral with or without providing antipyretics.<sup>25</sup> Recommending products and/or non-pharmacology without direct medical referral was considered inappropriate. Not recommending anything or not knowing the answer was also considered inappropriate. Of the 86 participants, appropriate recommendation was provided by 67 participants (78%).

Although 78% of students in this setting were able to provide the appropriate recommendation in this childhood fever case, this number is lower than findings reported in an Australian study;<sup>46</sup> the percentage of





**Figure 2. Miller's pyramid of competence**

final-year Australian students who were able to provide appropriate advice in the childhood fever case was 92%. Differences in the curriculum, learning process method, and assessment method may contribute to this difference. Comparing these results with Miller's pyramid model of clinical competence (Figure 2),<sup>47</sup> the competence of students in this setting might be lower than the competence of students reported in the Australian study.<sup>46</sup> Miller's pyramid model divides competence into four hierarchical processes.<sup>47-49</sup> The lowest level of the pyramid is "knows", representing knowledge, and this can be assessed using written exams or multiple-choice questions (MCQs). The second tier is "knows how", which is the application of knowledge. This level can be tested using essays, clinical problem-solving or clinical context-based tests, and extended MCQs. Next, the third tier is "shows how" and this represents clinical skills competency. This level can be assessed by standardized patient-based tests or Objective Structured Clinical Examination (OSCE). Finally, on the top of the pyramid is "does" which represents clinical performance. This can be assessed by direct observation in real clinical settings.<sup>48,49</sup> The assessment method used in this study was clinical vignette cases, which can be classified as the "knows how" level. Meanwhile, the assessment method used in the Australian study is the simulated patient method and this can be classified as a "shows how" level. Therefore, based on Miller's pyramid model, the assessment of students in the Australian study represented a higher competency ("shows how" level) than students in this study ("knows how" level). Further research might be needed to explore these differences.

Overall, the competence of this apothecary student cohort to manage a minor ailment case requiring a simple analgesic (such as in the primary dysmenorrhea case) and to identify warning symptoms leading to direct medical referral (such as in the childhood fever case) was quite good. A considerable number were able to provide appropriate recommendations; 86% in the case of primary dysmenorrhea and 78% in the case of childhood fever. The number of pharmacy students who were able to provide appropriate recommendations was higher in this cohort compared with another Indonesian study.<sup>22</sup> Differences in the students' grade level (final year vs third year), the scenario used (analgesic-antipyretic cases vs cough case), and the assessment method (case vignette vs simulated patient) might be factors causing the differences between the two studies. This may indicate that their university teaching and learning processes have equipped them quite well to manage analgesic-antipyretic self-medication cases. This may also indicate that changes made in the Indonesian pharmacy curriculum that incorporated self-medication courses as stated in the APTFI document almost 10 years ago may have provided some positive effects.<sup>20</sup>

#### **Factors associated with the provision of appropriate recommendations**

In the case of childhood fever, chi-square analysis identified that students who completed the B.Pharm and apothecary qualifications within 5 to 6 years were significantly able to provide an appropriate recommendation compared to students whose study period extended more than 6 years (Table V). This could indicate higher academic competency, in which they were more proficient in understanding the course material related to self-medication and thus appropriate recommendations.<sup>50</sup> Furthermore, students whose age was equal to or less than 24 years old (younger students) were significantly able to provide an appropriate recommendation compared to students who were more than 24 years old (older students). Older students may have a negative association with their extended study period thus providing less appropriate recommendations. While there is existing evidence of relative age effects in education for primary school students, in which older pupils usually perform better than younger ones;<sup>51</sup> research related to the association between age and academic performance in university students was inconsistent. Pellizarry et al. found that younger students of

Table V. Factors associated with the provision of appropriate recommendation

Factors	The appropriateness of the recommendations provided in the case of primary dysmenorrhea				The appropriateness of the recommendations provided in the case of childhood fever			
	Appropriate (n= 77)	Not appropriate (n=9)	Total (n=86)	p value*	Appropriate (n= 67)	Not appropriate (n=19)	Total (n=86)	p value*
<b>Gender</b>								
Male	11	3	14	0.40	12	2	14	0,72
Female	63	9	72		55	17	72	
<b>Age</b>								
24 years old or less	55	8	63	0.73	53	10	63	0.02
More than 24 years old	19	4	23		14	9	23	
<b>GPA (on a 4 scale)</b>								
More than 2.7	38	3	41	0.09	34	7	41	0.28
2.7 or less	36	9	45		33	12	45	
<b>Choice of major during BPharm</b>								
Clinical	41	7	48	0.85	38	10	48	0.75
Industrial	33	5	38		29	9	38	
<b>Choice of major during Apothecary program</b>								
Clinical	40	7	47	0.78	36	11	47	0.75
Industrial	34	5	39		31	8	39	
<b>Time taken for studying undergraduate and pre-pharmacy registration (apothecary) course</b>								
5 to 6 years	59	10	47	0.78	57	12	69	0.03
More than 6 years	15	2	39		10	7	17	
<b>Having work experience in community pharmacies</b>								
Yes	12	0	12	0.20	12	0	12	0.06
No	62	12	74		55	19	74	

Bold letter indicates significant p value; \*chi square test was used; two-sided fisher Exact was used when the cell value is less than 5

Bocconi University in Italia perform better in almost all subjects compared to the older ones.<sup>52</sup> Similarly, Jacobparayil reported that younger medical students perform better on the clinical knowledge examination of USMLE (United States Medical Licensing Examination) than older students.<sup>53</sup> A study on medical students in Japan also found that the average number of years required to graduate was slightly higher in the older than younger group and the younger students scored significantly higher in the clinical clerkship integrative test.<sup>54</sup> The author, however, argued that there were no significant differences in the remaining tests between older and younger groups, and therefore, in general, no inferiority of older medical students in most clinical skills and competencies compared to the young ones.<sup>54</sup> A study by Wambugu et al. showed a different result, in which no significant relationship between age and academic performance in science students at the University of Nairobi, Kenya; the author proposed that better academic performance might be more influenced by personal determination than age.<sup>55</sup> Gender, choice of major, GPA, and working experience were not associated with the provision of

appropriate recommendations. No factors related to participants' demographic characteristics were associated with the provision of appropriate recommendations in the case of primary dysmenorrhea. A further qualitative study is needed to explore factors influencing students' performance in providing self-medication services in pharmacy so that appropriate strategies to improve student competence in this topic can be designed and implemented.

### Study Limitations

We informed the participants in advance about this research, and therefore there was a possibility that the participants studied the topic before the agreed interview schedule. Furthermore, this was a phone interview and therefore participants could search the internet, or open the textbook to answer the case. However, to minimize this bias, we have stated in the invitation letter that the interviews would be confidential and the results of the interview would not affect participants' marks or graduation. In addition, the participants were told that they would be asked to provide recommendations for self-medication cases in the invitation letter, but no specific symptoms/cases were told to the participants before the interview. Furthermore, before the interview started, we also told the participants to answer according to their current knowledge without having to look at the book or search the internet since no mark would be taken.

This study only used two analgesic-antipyretic cases and therefore limited the generalizability of the findings to other scenarios. Moreover, this study was conducted only in one Indonesian pharmacy university. Since the quality of Indonesian pharmacy education institutions is variable across the country, these findings cannot be generalized to graduates from other Indonesian universities.<sup>20</sup> However, this study may provide evidence of the competence of pharmacy students in an Indonesian university in handling analgesic-antipyretic cases, in which knowledge related to this topic is limited. Further research using different cases conducted in different places of Indonesian universities might be needed to confirm these findings. Further qualitative research is needed to identify factors related to the ability of Indonesian pharmacy students in the provision of self-medication services particularly in differentiating between minor and major conditions, and therefore intervention strategies can be designed and implemented.

### CONCLUSION

A considerable number of apothecary students in an Indonesian university were able to properly manage cases related to an analgesic-antipyretic recommendation. However, improvement is still needed in the knowledge of pharmacy students to differentiate between minor conditions that can be self-medicated and conditions that require medical referral.

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### CONFLICT OF INTEREST

None to declare.

### STATEMENT OF ETHICS

Ethics approval was obtained from the Ethical Committee University of Surabaya, Indonesia (No: 074/KE/V/2019).

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