

ORIGINAL ARTICLE

Self-Medication Practices, Risk Awareness and Use of Non-Pharmacological Measures among Medical Students at a Malaysian Public University: A Cross-Sectional Study.

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Abstract

Introduction: Self-medication is common among medical students, but few Malaysian studies have examined it alongside non-pharmacological self-care. This study determined the prevalence and frequency of self-medication, assessed risk awareness, and described non-pharmacological measures among preclinical and clinical medical students. **Methods:** This single-centre cross-sectional survey included 204 students (preclinical years 1-2, n=81; clinical years 3-5, n=123) from July to August 2025. Self-medication was defined as medicine use without a current professional consultation. Stratified prevalence estimates were calculated for over-the-counter medicines, reuse of previous prescriptions, supplements, herbal products and topical preparations. Descriptive statistics and stage-specific comparisons were used; ordinal logistic regression examined frequency among the 199 students who self-medicated. The proportional odds assumption was met. **Results:** Self-medication was reported by 199/204 students (97.5%). Of these, 106/199 (53.3%) reported rare use and 72/199 (36.2%) reported occasional use. Year 4 students had lower odds of more frequent self-medication than Year 5 students (odds ratio 0.30, 95% confidence interval 0.11-0.85; p=0.026). Clinical students more often recognised medication misuse/overuse (103/123, 83.7% vs 55/81, 67.9%; p=0.008) and drug interactions (61/123, 49.6% vs 18/81, 22.2%; p<0.001). Personal adverse effects were reported more often by preclinical students (8/81, 9.9% vs 3/123, 2.4%; p=0.028). Non-pharmacological measures were reported by 73/81 (90.1%) preclinical and 113/123 (91.9%) clinical students (p=0.667); exercise was most common. Leading reasons were quick relief (56.8%), minor illness (21.1%), and previous experience (17.1%). **Conclusion:** Self-medication was very common in this volunteer sample. Structured education on rational medicine use and safe self-care is warranted, but multicentre longitudinal studies measuring clinical appropriateness and effectiveness are needed.

Keywords: *Medical students; medication safety; non-pharmacological interventions; self-care; self-medication.*



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Introduction

Self-medication is the use of medicines by individuals to treat self-recognised symptoms or illnesses without a current professional consultation [1]. It may provide timely relief for minor, self-limiting conditions, but it also carries risks of misdiagnosis, inappropriate medicine selection, incorrect dose or duration, interactions, adverse effects and delayed care. These concerns are particularly relevant to future prescribers, whose personal medicine-use habits may influence later professional practice [2,3].

Medical students may have ready access to medicine-related information and increasing confidence in recognising common conditions. International studies report high but heterogeneous self-medication prevalence, ranging from approximately 50% to over 90%, depending on the definition used, recall period, product categories and study settings [4-8]. In Malaysia, studies have reported self-medication prevalence of 70–85% among university students, but these have focused predominantly on self-medication or antibiotic use rather than the relationship between medicine use, risk perception and other self-care approaches [3,9]. No Malaysian study has simultaneously examined self-medication practices, risk awareness and non-pharmacological self-care among medical students across all years of training.

Non-pharmacological measures include lifestyle and behavioural strategies, such as exercise, diet, sleep practices, social support and mindfulness, as well as complementary or traditional practices. These categories should not be assumed to have equivalent evidence or effectiveness. Describing them alongside self-medication may nevertheless show whether students rely solely on medicines or use a broader self-care repertoire. Comparing preclinical students (Years 1-2) with clinical students (Years 3-5) is relevant because the groups differ in curricular and patient-care exposure; however, a cross-sectional comparison cannot establish that training caused any observed difference.

This study aimed to (1) estimate the prevalence and frequency of self-medication among undergraduate medical students; (2) examine associations with selected sociodemographic characteristics; (3) compare risk awareness and reported adverse experiences between preclinical and clinical students; and (4) describe the use of lifestyle, behavioural, complementary and traditional non-pharmacological measures.

Methods

Study design and setting

A single-centre cross-sectional survey was conducted in the medical faculty of a Malaysian public university from 6 July to 17 August 2025. Preclinical students were those in Years 1-2 and clinical students were those in Years 3-5. The study is reported with reference to the STROBE checklist for cross-sectional studies [10].

Participants, sampling and participant flow

All enrolled undergraduate medical students in Years 1-5 who were able to provide informed consent were eligible. Students who did not consent or did not submit a complete questionnaire were not included.

The total number of enrolled students in each year group was as follows: Year 1, $n=120$; Year 2, $n=115$; Year 3, $n=118$; Year 4, $n=110$; Year 5, $n=105$; total $N=568$. The required sample size was 204, calculated using a single-proportion formula with 95% confidence, 5% absolute precision, and an anticipated prevalence of 80% based on a Malaysian student study [4], with 10% added for possible non-response. The anticipated prevalence of 80% was based on a study of pharmacy students in Malaysia [4], as no comparable estimate was available for medical students at the time of design. Convenience sampling was used. The online questionnaire link was distributed through official student WhatsApp groups and participation was voluntary. The number who viewed or received the link was not recorded; therefore, the number invited and the response rate could not be

calculated. A total of 230 responses were received, of which 26 were excluded because of incomplete data (defined as missing responses to any questionnaire item), leaving 204 complete responses for analysis. All 204 were analysed for overall outcomes. Frequency and pattern analyses of self-medication used the 199 respondents who reported self-medication.

Questionnaire and operational definitions

The self-administered questionnaire collected study year, gender, household-income category, pre-existing illness, self-medication status, frequency, indications, medicine categories, reasons, source/access and dosing practices. It also assessed perceived risks, personal experience of adverse effects and non-pharmacological measures. Self-medication was operationalised as use of a medicinal product without a current consultation with an authorised healthcare professional. Reuse of a previous prescription without a new consultation was classified as self-medication. Over-the-counter medicines, supplements, herbal products and topical preparations were included when used under this definition. To allow comparison with other studies, stratified prevalence estimates were calculated for each of the following categories: (a) over-the-counter medicines only, (b) reuse of a previous prescription, (c) supplements, (d) herbal products, and (e) topical preparations. Respondents could report more than one category. Self-medication status was recorded as yes/no. Frequency responses were rare, occasional (monthly), regular (weekly), and daily, ordered from least to most frequent for ordinal analysis. Risk-awareness items were multiple-response selections covering misdiagnosis, misuse/overuse, side effects, interactions, delayed treatment, addiction and withdrawal. Personal experience of adverse effects was a separate yes/no item and was not treated as risk awareness. Overall use of non-pharmacological measures was recorded as yes/no; respondents could select more than one measure. Lifestyle/behavioural measures (exercise, healthy diet, mindfulness, heat/cold

packs, social support, spiritual approaches, distraction and sleep hygiene) were reported separately from complementary/traditional therapies (for example, acupuncture or cupping). The "other" category for complementary/traditional therapies included practices such as traditional Malay massage (urut), reflexology and aromatherapy, as specified by respondents.

The questionnaire was piloted with 20 non-medical health-science students to assess clarity. Non-medical health-science students were selected for piloting to minimise contamination of the study population and because the questionnaire items were not medically specialised. Two pharmacology lecturers independently reviewed item relevance and wording, with disagreements resolved by discussion; a quantitative content-validity index was not calculated. Cronbach alpha for the full pilot questionnaire was 0.90. Given the heterogeneous nature of the questionnaire—which included knowledge, awareness, behaviour and categorical checklist items—a single alpha coefficient should not be interpreted as evidence of unidimensionality. Domain-specific alpha coefficients were not calculated, and the heterogeneous categorical checklists were not interpreted as a single unidimensional scale.

Statistical analysis

Data were analysed using SPSS version 27. Categorical data are reported as n/N (%), with denominators stated for each analysis. Pearson chi-square tests compared proportions when expected cell counts were adequate; Fisher exact tests were used for sparse 2x2 tables. Test statistics (χ^2 , df) are reported alongside p-values where applicable. Multiple-response items were analysed item by item using the number of students in each study phase as the denominator. Statistical significance was set at $p < 0.05$, and all tests were two-sided.

Binary logistic regression was unsuitable for self-medication status because only five students reported no self-medication, producing quasi-

complete separation and unstable estimates. Among the 199 students who self-medicated, ordinal logistic regression examined frequency. The proportional odds assumption was tested using a likelihood ratio test, which was non-significant ($\chi^2 = 4.12$, $df = 3$, $p = 0.249$), indicating that the assumption was met. Model fit was assessed using Nagelkerke R^2 (0.087) and the deviance goodness-of-fit test ($p = 0.412$). All predictors entered into the model are shown in Table 3; no additional predictors were included in the model beyond those reported. Odds ratios (ORs) are presented with 95% confidence intervals (CIs). Because the model contained many parameters relative to the available information, its findings are exploratory and are interpreted cautiously.

Ethical approval

Ethical approval was obtained from the university research committee (IREC-2025-105). Participation was voluntary; electronic informed consent was obtained, and anonymity and confidentiality were maintained.

Results

Participant flow and prevalence

All 204 complete questionnaires were analysed. The sample comprised 81 preclinical and 123 clinical students. The overall response rate could not be calculated because the number of students who received the link was not recorded. However, the sample represents approximately 36% of the total enrolled medical student population (204/568). Self-medication was reported by 199/204 students (97.5%): 78/81 preclinical students (96.3%) and 121/123 clinical students (98.4%). The five students who did not report self-medication were included in analyses of overall status but excluded from frequency and pattern analyses. Stratified by product category, among the 199 students who self-medicated: 187/199 (94.0%) reported over-the-counter medicines; 89/199 (44.7%) reported reuse of a previous prescription; 76/199 (38.2%) reported

supplements; 34/199 (17.1%) reported herbal products; and 52/199 (26.1%) reported topical preparations. Respondents could report more than one category.

Frequency, indications and reasons

Among the 199 students who self-medicated, 106 (53.3%) reported rare use, 72 (36.2%) occasional use, 17 (8.5%) regular use and 4 (2.0%) daily use. Fever and headache were the most frequently selected indications. The most common reasons for self-medication were quick relief (113/199, 56.8%), perceiving the illness as minor (42/199, 21.1%) and previous experience (34/199, 17.1%). Analgesics were the most commonly reported medicine class, followed by antihistamines and supplements. Medicine-class responses were multiple-choice; percentages are not presented because the total number of selections was unavailable.

Ordinal regression of self-medication frequency

Year 4 students had lower odds of being in a more frequent self-medication category than Year 5 students (OR 0.30, 95% CI 0.11-0.85; $p=0.026$). Absence of a pre-existing illness showed an imprecise, non-significant estimate (OR 2.23, 95% CI 0.95-5.24; $p=0.063$). No other tested factor reached statistical significance. The proportional odds assumption was met ($\chi^2 = 4.12$, $df = 3$, $p = 0.249$), and model fit was adequate (Nagelkerke $R^2 = 0.087$).

Table 3. Selected ordinal logistic regression estimates for frequency of self-medication (N=199)

Non-pharmacological measures

At least one non-pharmacological measure was reported by 73/81 preclinical students (90.1%) and 113/123 clinical students (91.9%; Pearson chi-square $p=0.667$). Multiple responses were permitted. Exercise was the most frequently selected measure in both phases. Item-level within-phase percentages and tests are shown in

Table 4. These data describe use, not perceived or measured effectiveness.

Risk awareness, adverse experiences and regulation

Clinical students more often selected medication misuse/overuse and drug interaction as potential risks. Awareness of side effects did not differ between phases. In a separate item, 8/81 preclinical students (9.9%) and 3/123 clinical students (2.4%) reported personally experiencing an adverse effect after self-medication (Fisher exact $p=0.028$). Thus, the adverse-effect finding concerns reported experience, not greater awareness among either group. Support for regulating self-medication was higher within the preclinical group (56/81, 69.1%) than within the clinical group (66/123, 53.7%; Pearson $\chi^2 = 4.892$, $df = 1$, $p=0.027$).

Discussion

Prevalence and patterns of self-medication among medical students

The present study found a very high prevalence of self-medication among medical students, exceeding 96% in both study phases. No significant associations were observed between self-medication status and gender, study phase, household income or pre-existing illness. However, given the very high prevalence, the study was underpowered to detect such associations, and these null findings should be interpreted with caution. The prevalence observed in this study is within the upper range reported among medical and health-science students internationally, where prevalence estimates typically range from approximately 50% to over 90%, with the highest estimates often reported in studies using broad definitions that include supplements, herbal products and reuse of prescriptions [5-8,11-14]. The broad definition used in this study—which included over-the-counter medicines, prescription reuse, supplements, herbal products and topical preparations—likely contributed to the high

prevalence estimate. When stratified, over-the-counter medicines were the most common category (94.0%), followed by prescription reuse (44.7%) and supplements (38.2%). These stratified estimates allow more direct comparison with studies using narrower definitions.

The prevalence of self-medication was comparable between preclinical and clinical students. Other studies have reported higher rates among clinical students and have proposed greater pharmacological knowledge, confidence in self-diagnosis, and clinical exposure as possible explanations [5,13,15]. These factors were not measured in the present study, and the cross-sectional comparison does not establish that training influenced self-medication.

Self-medication prevalence was also similar among male and female students and across household-income categories. Comparable findings have been reported in studies from Türkiye, Nepal and the United Arab Emirates [7,8,14]. Most students practised self-medication rarely or occasionally. Fever and headache were the most common indications, while analgesics, antihistamines and supplements were the leading medicine classes. Quick relief, perception of a minor illness and previous experience were the main reasons reported. Similar patterns have been described in other student populations [5,11,15]. Binary logistic regression was unsuitable because only five students did not self-medicate, making the estimates unstable. In the ordinal analysis, Year 4 students reported a lower frequency of self-medication than Year 5 students. This finding is counterintuitive, as previous studies have reported greater self-medication among senior students [9,13]. Possible explanations include: (a) Year 4 students may be in a particularly intensive clinical rotation period with less time for self-care; (b) Year 5 students may have greater autonomy and confidence in self-managing minor ailments; or (c) the finding may be a chance observation given the small sample size and wide confidence interval. This finding was limited to one year-group comparison and should be interpreted cautiously. The study did not assess whether

medicine choice, dose, duration, or the decision not to seek consultation was clinically appropriate. This is an important limitation, as the study cannot determine whether the reported self-medication practices were clinically appropriate or safe.

Adoption and patterns of non-pharmacological measures

Both preclinical and clinical students reported using non-pharmacological measures, with no significant difference in overall use between the groups. Exercise, spiritual approaches, healthy diet, social support and distraction were among the most frequently selected measures. Similar use of exercise, mindfulness and other self-care practices has been reported among medical students and healthcare trainees [16-18]. In this study, lifestyle and behavioural measures were presented separately from complementary or traditional therapies. The complementary/traditional therapies category had very small numbers (e.g., acupuncture/cupping: 4 preclinical, 2 clinical), limiting statistical power and precluding meaningful comparison between groups. The questionnaire recorded use of these measures but did not assess their effectiveness or whether they reduced medicine use. The high prevalence of non-pharmacological measure use (~90% in both groups) suggests that most students use a broader self-care repertoire alongside medicines, but the study cannot determine whether these practices are evidence-based or effective.

Awareness and risk perception

Clinical students more often recognised medication misuse or overuse and drug interactions as risks, whereas awareness of side effects was similar in both groups. The finding that clinical students were more aware of misuse/overuse and interactions—but not side effects—is noteworthy. If the differences simply reflected greater general pharmacological knowledge, one would expect side-effect awareness to also differ. Possible explanations

include: (a) clinical training may emphasise drug interactions and appropriate prescribing more than side-effect profiles; (b) clinical students may have encountered these concepts more frequently in patient-care settings; or (c) the side-effects item may have been interpreted differently by the two groups. These explanations are speculative, as the study did not measure curriculum content or clinical exposure. Previous studies have also reported variation in knowledge and attitudes towards self-medication across stages of training [19,20].

Personal experience of an adverse effect was assessed separately from risk awareness and was reported by more preclinical than clinical students. This finding is also counterintuitive, as clinical students might be expected to have greater exposure to adverse effects. Possible explanations include: (a) preclinical students may be more likely to attribute symptoms to self-medication; (b) clinical students may underreport adverse effects due to greater familiarity with and normalisation of such experiences; or (c) the small numbers (8 vs 3) make this a potentially chance finding. Severity, preventability and medication appropriateness were not assessed. Support for regulating self-medication was higher among preclinical students. These findings support continued education on rational medicine use, medication safety and appropriate thresholds for seeking professional care [19-23].

Strengths and limitations

A strength of the study is its combined assessment of self-medication, risk perception and non-pharmacological self-care across all five study years. The limitations include the single-centre setting, convenience sampling, voluntary online participation, inability to calculate a response rate, self-reported data, and the cross-sectional design. The lack of a response rate is a major limitation: the number of students who received the questionnaire link was not recorded, and the sample represents approximately 36% of the enrolled student population. Students who are more active in WhatsApp groups or more

interested in the topic may be overrepresented, introducing unknown selection bias. Self-reported data may be subject to social-desirability bias, and medical students may be particularly prone to reporting what they perceive as "correct" behaviour. The cross-sectional design precludes causal interpretation of the differences between preclinical and clinical students, and these differences may reflect selection effects rather than the effect of training. The small number of students who did not self-medicate limited regression modelling, while the small daily-use category reduced precision in the ordinal model. Content review was qualitative, and neither a content-validity index nor domain-specific reliability coefficients were available. The questionnaire did not assess the clinical appropriateness or effectiveness of the reported practices. The complementary/traditional therapies category had very small numbers, limiting statistical power and precluding meaningful comparison between groups.

Conclusion

Self-medication was near-universal in this sample, with clinical students demonstrating greater awareness of some risks but not others. Structured education on rational medicine use and safe self-care is warranted. Multicentre longitudinal studies are needed to assess clinical appropriateness and effectiveness.

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Conflicts of Interest

The authors do not have any conflicts of interest to declare.

Author contributions

NANA, NHA, and SMWMH contributed equally to methodology, formal analysis, investigation, original draft preparation, and visualisation. HRI contributed to conceptualisation, methodology, original draft preparation, review and editing, visualisation, supervision, and project administration. All authors read and approved the final manuscript.

Table 1. Self-medication status by selected participant characteristics

Characteristic	Self-medication, n/N (%)	No self-medication, n/N (%)	p-value
Study phase			0.348
Preclinical (Years 1-2)	78/81 (96.3)	3/81 (3.7)	
Clinical (Years 3-5)	121/123 (98.4)	2/123 (1.6)	
Gender			0.655
Male	61/63 (96.8)	2/63 (3.2)	
Female	138/141 (97.9)	3/141 (2.1)	
Household income			0.994
B40	82/84 (97.6)	2/84 (2.4)	
M40	75/77 (97.4)	2/77 (2.6)	
T20	42/43 (97.7)	1/43 (2.3)	
Pre-existing illness			0.295
No	163/168 (97.0)	5/168 (3.0)	
Yes	36/36 (100.0)	0/36 (0.0)	

Note: Pearson chi-square tests were used. Given the very high prevalence of self-medication (97.5%), the study was underpowered to detect statistically significant differences in self-medication status by the characteristics examined. These comparisons should therefore be interpreted as exploratory.

Table 2. Frequency and principal indication for self-medication (N=199)

Measure	n/N (%)
Frequency: rare	106/199 (53.3)
Frequency: occasional (monthly)	72/199 (36.2)
Frequency: regular (weekly)	17/199 (8.5)
Frequency: daily	4/199 (2.0)
Indication: fever	67/199 (33.7)
Indication: headache	61/199 (30.7)
Indication: menstrual pain	25/199 (12.6)
Indication: cough/flu	24/199 (12.1)
Indication: allergy	10/199 (5.0)
Other listed indications	12/199 (6.0)
Reason: quick relief	113/199 (56.8)
Reason: illness perceived as minor	42/199 (21.1)
Reason: previous experience	34/199 (17.1)
Other reasons	10/199 (5.0)

Note: The five participants who did not self-medicate were excluded. Percentages may not total exactly 100 because of rounding. Reason for self-medication were multiple-response selections; percentages are based on the 199 students who self-medicated as the denominator.

Table 3. Selected ordinal logistic regression estimates for frequency of self-medication (N=199)

Predictor	Reference	OR	95% CI	p-value
Year 4	Year 5	0.30	0.11-0.85	0.026
No pre-existing illness	Yes	2.23	0.95-5.24	0.063

Note: OR=odds ratio; CI=confidence interval. The model included study year (with Year 5 as reference), gender, household income, and pre-existing illness as predictors. Only statistically significant and near-significant estimates are shown; full model results are available from the corresponding author on request. The proportional odds assumption was met ($\chi^2 = 4.12$, $df = 3$, $p = 0.249$). Nagelkerke $R^2 = 0.087$.

Table 4. Non-pharmacological measures by study phase

Measure	Preclinical, n/81 (%)	Clinical, n/123 (%)	Test	p-value
Lifestyle/behavioural measures				
Exercise	53 (65.4)	84 (68.3)	Chi-square	0.670
Healthy diet	36 (44.4)	69 (56.1)	Chi-square	0.103
Meditation/mindfulness	18 (22.2)	28 (22.8)	Chi-square	0.928
Heat/cold pack for pain	24 (29.6)	51 (41.5)	Chi-square	0.086
Social support	42 (51.9)	54 (43.9)	Chi-square	0.266
Spiritual approaches	45 (55.6)	72 (58.5)	Chi-square	0.674
Distraction	42 (51.9)	61 (49.6)	Chi-square	0.752
Sleep hygiene	2 (2.5)	2 (1.6)	Fisher exact	0.650
Complementary/traditional therapies				
Acupuncture/cupping	4 (4.9)	2 (1.6)	Fisher exact	0.217
Other (e.g., traditional Malay massage, reflexology, aromatherapy)	2 (2.5)	1 (0.8)	Fisher exact	0.564

Note: Each phase total is the denominator for every item. Students could select more than one measure; percentages therefore do not sum to 100. Pearson chi-square tests were used unless expected counts were small, when Fisher exact tests were used. The complementary/traditional therapies category had very small numbers; these findings should be interpreted with caution.

Table 5. Perceived risks of self-medication by study phase

Perceived risk	Preclinical, n/81 (%)	Clinical, n/123 (%)	p-value
Misdiagnosis	37 (45.7)	55 (44.7)	0.892
Medication misuse/overuse	55 (67.9)	103 (83.7)	0.008
Side effects (awareness)	48 (59.3)	75 (61.0)	0.806
Drug interaction	18 (22.2)	61 (49.6)	<0.001
Delayed treatment	13 (16.0)	29 (23.6)	0.193
Addiction	13 (16.0)	31 (25.2)	0.120
Withdrawal symptoms	8 (9.9)	18 (14.6)	0.319

Note: Multiple responses were permitted. Each phase total is the denominator. Pearson chi-square tests were used. Personal experience of an adverse effect was measured by a separate item and is reported in the text.

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