

## Knowledge and Perception Regarding Safe-Use of Natural Health Products Among Undergraduates

Yusnaini Md Yusoff<sup>1</sup>, Wardah Mustafa Din<sup>2</sup>, Nurul Hanis Aminuddin Jafry<sup>3</sup>, Azlan Abdul Rahim<sup>4</sup>, Noor Sharizad Rusly<sup>5</sup>, Ahmad Firdhaus Arham<sup>6</sup>, Muhammad Firdaus Aziz<sup>7</sup>, Nurul Syakirah Nazri<sup>8</sup>, Nur Asmadayana Hasim<sup>9</sup>, Mashitoh Yaacob<sup>10</sup>

### Abstract

*Awareness of healthy living has driven youth, including undergraduates, to prefer natural health products (NHP). With the rise of online sales for medications, supplements, and cosmetics, understanding NHP safety among undergraduates is crucial. A university elective course included a KYM module on NHP safety. A one-group pre- and post-test study (n=48) assessed the module's impact using a questionnaire covering demographics, self-assessed knowledge (15 items), and perception (8 items). Frequency analysis and paired sample T-tests evaluated the results. The paired T-test showed significant improvement (p<.05) in students' knowledge and perception post-course. Knowledge gains were observed in safe use, risks, practices, and regulations. The mean of two perception items shows a modest decrease in comparison to the pre and post-test. This shows that this course improved NHP effectiveness and safety knowledge. In summary, the elective course offered for undergraduates regarding safe use of NHP excellently improved self-assessed knowledge and perception towards NHP. The module embedded in the elective course can be used as a module to also educate other segment of consumers to safeguard them from unnecessary risks to health.*

**Keywords:** *Natural Health Products, Undergraduates, Knowledge and Practice.*

### Introduction

The health supplement market in Southeast Asia is estimated to be worth close to USD \$10 billion (Tjahyo et al. 2024). This is due to the growing number of health conscious consumers (Shafi et al. 2024; Balzan et al. 2017). Moreover, Euromonitor estimates that 35.7% of health supplements sold in Malaysia in 2019 were herbal or traditional products (Galenytska 2019). This corresponds to the National Pharmaceutical Regulatory Agency (NPRO) Annual Report for year 2022, which reports that the highest new product registration is from natural health products (NHP) mounting to 776 applications from the total of 1942 applications (NPRO 2018). In addition to herbal drinks, supplement capsules, tablets, and topical herbal formulations, these numbers show the vast amount of NHP products that are being marketed to consumers via multiple platforms. There are several issues related to these products, including their safety, efficacy, and quality.

Under the Malaysian law, Natural Health Products (NHP) are regulated under the NPRO, and guidelines are available for producers and manufacturers. There are 4 categories of products under NHP which are traditional products, herbal products, commercial herbal products and homeopathy. Recently, NPRO has

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<sup>1</sup> Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, 43650 UKM Bangi, Selangor, Malaysia, Email: yusnaini@ukm.edu.my, (Corresponding Author)

<sup>2</sup> Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, 43650 UKM Bangi, Selangor, Malaysia, Human Development and Civil Society (INSANI) Research Group, Universiti Kebangsaan Malaysia, 43650 UKM Bangi, Selangor, Malaysia

<sup>3</sup> Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, 43650 UKM Bangi, Selangor, Malaysia

<sup>4</sup> Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, 43650 UKM Bangi, Selangor, Malaysia.

<sup>5</sup> Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, 43650 UKM Bangi, Selangor, Malaysia

<sup>6</sup> Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, 43650 UKM Bangi, Selangor, Malaysia

<sup>7</sup> Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, 43650 UKM Bangi, Selangor, Malaysia

<sup>8</sup> Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, 43650 UKM Bangi, Selangor, Malaysia

<sup>9</sup> Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, 43650 UKM Bangi, Selangor, Malaysia

<sup>10</sup> Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia, 43650 UKM Bangi, Selangor, Malaysia

also introduced a guideline regarding therapeutic claims for herbal products in 2020 as an initiative to provide more evidenced-based NHP in market (NRPA 2023). Consumers can check the registration of NHPs on the Quest3+ website, and report products with side effects or adverse effects via the NPRA portal.

Youths are one of the consumer segment in NHP as according to studies, youths are becoming more health-conscious as extensive education about healthy lifestyle are being implemented at schools (Pham et al. 2019; Gupta et al. 2023). As a result of the ever-expanding number of health products available to young people, they consume a bewildering range of pharmaceuticals, dietary products and cosmetics in daily life. This also includes undergraduates in university campuses. Malaysia has over 1.5 million undergraduates enrolled in degree programs, with a higher number of female students compared to males, which corresponds to 15% of the whole population of youths (IYRM 2022).

To support the dissemination of the quality use of NHPs to undergraduate students, an elective course is being offered by Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia. The coordinator for the course in UKM is currently being appointed as one of the Know Your Medicine (KYM) ambassador under Serdang Hospital, Selangor. The elective course offered is LMCR1572 Benefits and Risks of Natural Products, and is open for enrolment to all undergraduates from different faculties. The course is being implemented via conventional lecture sessions, sharing from invited pharmacists, group discussions and group projects for a duration of 14 weeks.

The course learning outcomes for the course are:

- Able to describe basic knowledge regarding common natural products used by the community
- Able to explain the benefits, risks and ethics of current natural products
- Able to summarise responses to current issues in natural products holistically

Hence, this study aims to assess the impact of the course module in improving knowledge and perception regarding safe-use of NHP to enrolled students. The findings will give important insights in understanding the effectiveness of the course and thus, might be helpful in improving the course and in the long run, can be implemented as part of public education for the society.

## Methods

### *Research Design and Sampling*

A one group pre-test and post-test design was adopted for the study. One group pre and post-test design is part of a quasi-experimental research design, which utilizes a single group of research participants. Data were collected before and after an intervention. Impact of the intervention is measured by significant difference of the pre and post scores. Participants of the study were students enrolled into the elective course (LMCR1572 Benefits and Risks of Natural Products) in the second semester of 2022/2023 academic year. Student responses on their knowledge and perception were measured via an online survey in Google Form. The pre-test survey was collected during the first week of the semester and the Post-test survey was done in week-14 which is the final week of the semester. To make sure only enrolled students of the course participate in the survey, the link to the survey is posted in the Learning Management System of the University, which only permits enrolled students to the course contents, including the survey link. The study was conducted at Universiti Kebangsaan Malaysia. From 72 students enrolled in the course, only 48 students enrolled completed both the pre and post survey. Uncompleted data from other students were removed from the data. Students enrolled into the course consists of students from various faculties and programs as the elective course were offered to all undergraduates, and any of them are free to choose the courses that they prefer.

*Research Instrument*

A self-developed questionnaire was employed to the participants of the study online via Google Form. Link to the questionnaire were given to the students through UKM Learning Management System during lecture in Week-1(Pre-test survey) and in Week-14 (Post-test survey). The link can only be accessed by students that is enrolled into the course. Email address and student registration number is recorded in the questionnaire submission. The survey consists of three sections namely; demographic profile of the respondents, knowledge assessment and perception assessments. The details of respondents' demographic profile include faculty, and year of study. The knowledge assessment consists of 15 statements which covers all the main points of the course content and 8 statements to measure perception. Knowledge measurement were self-assessed knowledge because all questions were given as a statement, and answers were in a Likert scale. The knowledge domain was further categorized into three aspects which are knowledge regarding safe-use and risk, knowledge on safe-use practice and knowledge on regulations. Likert scale were used to measure each item i.e (1: Strongly disagree and 7: Strongly agree). A Cronbach alpha value were calculated for all the 3 aspects of knowledge which consists of 15 items, and 8 item for perception to see the internal reliability of the items The Cronbach alpha value was .886 for knowledge on safe-use and risk, .867 on knowledge on safe-use practice, .763 for knowledge on regulations and .788 for perception.

*Intervention Procedure*

The elective course is a two credit course, which includes 2 hours' class every week for the whole 14-week semester. The content of the module can be divided to four main sections which are 1) Introduction to NHP, 2) Source and Proses of NHP, 3) Quality practices for consumption and 4) Product registration. In the section of quality practices of consumption, the concept of 5R is being introduced i.e., Right patient, Right medicine, Right dose, Right route of administration and Right time of administration.

Throughout the semester, the KYM materials are integrated into the other course contents by five different means of teaching and learning which are formal lectures, sharing from pharmacists, group discussions, group project and self-reflection writing. The course plan throughout the 14 weeks are as tabulated in Table 1. Besides topics regarding the KYM content, there are other topics that are covered in the course i.e., introduction to natural products, source of natural products, benefits and risks of natural products, understanding bioactive ingredients in natural based health products and safety precautions in consuming natural products. For this specific cohort of students, the group project comprises of an innovation project from the KYM materials, to invent a new approach to the materials for dissemination of KYM content to two different audiences which are primary school children and university students.

**Table 1. The Course Plan For 14 Weeks**

Week	Approach
1	Introduction to course (Pre-test survey)
2-4	Lecture
5-6	Project group discussions
7	Sharing from pharmacist
8-10	Project group execution
11-12	Group presentation
13	Reflective writing
14	Course wrap-up (Post-test survey)

## Results

### *Demography*

Based on **Table 1**, 48 respondents completed both the pre and post-test. Pre-test was done at week 1, before any learning materials are being shared, whereas post-test was done on week 15, after the final class. Respondents comes from different faculty; Faculty of Science and Technology (FST), Faculty of Islamic Studies (FPI), School of Liberal Studies (CITRA), Faculty of Health Sciences (FSK), Faculty of Education (FPEND), Faculty of Economics and Management (FEP), Faculty of Information Sciences and Technology (FTSM), Faculty of Social Sciences and Humanities (FSSK), Faculty of Law (FUU). Majority of them are first year students (26), followed by final year students (14) and Year 2 students (5).

**Table 1 : Demographic Profiling of Respondents**

		Frequency	Percent	Valid percent	Cumulative percent
Valid	FST	10	20.8	20.8	20.8
	FPI	13	27.1	27.1	47.9
	CITRA	5	10.4	10.4	58.3
	FSK	1	2.1	2.1	60.4
	FPEND	6	12.5	12.5	72.9
	FEP	8	16.7	16.7	89.6
	FTSM	1	2.1	2.1	91.7
	FSSK	3	6.3	6.3	97.9
	FUU	1	2.1	2.1	100.0
	<b>Total</b>	<b>48</b>	<b>100.0</b>	<b>100.0</b>	
Valid	Year 1	26	60.4	60.4	60.4
	Year 2	5	10.4	10.4	70.8
	Year 3	14	29.2	29.2	100.0
	<b>Total</b>	<b>48</b>	<b>100.0</b>	<b>100.0</b>	

Based on the **Table 2**, Cronbach's Alpha ( $\alpha$ ) value is between 0.886 and 0.763 which is approaching 1. The more Cronbach's Alpha ( $\alpha$ ) values approaching 1 is best. According to Nunally (1978) and Hair et.al (2006) the interpretation of the acceptable reliability coefficient is  $\alpha \geq .60$  is sufficient for exploratory studies. It can be concluded that the questions posed by the researchers are reliable and can be understood by the respondent.

**Table 2. Reliability Statistics**

	Safe Use and Risk	Practice	Regulation	Perception
<i>Cronbach's Alpha (a)</i>	.886	.867	.763	.788

*Impact of Module on Knowledge*

Students were asked to answer fifteen statements to self-assess their knowledge regarding safe-use and risk, practice and regulation of natural health products on week 1 (Pre) and week 15 (Post) test. All questions were based on a Likert scale to measure each item i.e (1: Strongly disagree and 7: Strongly agree). Based on **Table 3**, all of the knowledge statements asked are showing increment mean differences from pre-test to post-test average value. A paired samples test was conducted to the pre and post-test data, to evaluate the impact of modules towards knowledge regarding safe-use of natural health products among students based on three sub items being measured which were safe use and risk, regulations and practice (**Table 4**). Interestingly, taking together the analysis in **Table 3** and **4**, all statements showed statistically significant increase in knowledge with a 95% confidence interval,  $p < .05$  (2-tailed). This shows that the module provided in this course tremendously improved students' knowledge on the subject being measured.

**Table 3. Mean Average Scores for Each Items Anticipant in Knowledge Measurement Pre and Post-Test**

No.	Questions	Pre		Post		Mean Difference
		Mean	Std. Deviation	Mean	Std. Deviation	
1	I know there are risks when I use natural health products (Safe-use - Risk)	4.21	1.473	5.65	1.296	+1.44
2	I know that some natural health products have side effects (Safe-use - Risk)	4.23	1.477	6.02	1.0214	+1.79
3	I know that natural health products may react with other medicines (Safe-use - Risk)	4.40	1.162	5.96	1.071	+1.56
4	I know not all natural health products are safe for everyone to use. (Safe-use - Risk)	4.92	1.485	5.96	1.220	+1.04
5	I know that natural health products only work as supplements and does not replace prescribed medicine. (Safe-use - Risk)	3.75	1.695	5.50	1.488	+1.75
6	I know the use of natural health products can be harmful especially if taken in high doses/measures. (Safe-use - Risk)	4.85	1.598	6.08	1.028	+1.23
7	I know that I should talk to a medical practitioner before taking any natural health products. (Practice)	5.29	1.515	6.19	1.232	+0.9
8	I know that I need to tell my doctor about taking natural health products. (Practice)	5.50	1.444	6.31	0.971	+0.81

9	I know that there are acts/regulations related to natural health products in Malaysia. (Regulations)	3.88	1.953	5.69	1.432	+1.81
10	I know the right person to consult regarding the use and intake of natural health products. (Practice)	4.08	1.686	5.83	1.342	+1.75
11	I know that every health product must be registered with the Ministry of Health Malaysia. (Regulations)	5.67	1.464	6.33	1.038	+0.66
12	I know that the registration of individual health products can be checked on the Quest3+ website. (Practice)	2.96	1.833	6.12	1.579	+3.16
13	I know that every natural health product has a MAL registration number that must be displayed on the product box. (Regulations)	3.98	1.907	6.27	1.250	+2.29
14	I know that I can file a complaint with the Ministry of Health if there are health products on the market that give me negative side effects. (Practice)	5.10	1.519	5.96	1.458	+0.86
15	I know the proper channel to make a complaint about natural health products. (Practice)	3.96	1.926	6.04	1.458	+2.08

**Table 4. Paired Samples Test for Each Items Anticipant in Knowledge Measurement Based Timeline (Pre and Post-Test)**

Paired Samples Test		t	df	Sig. (2-tailed)
Pair 1	Timeline - I know there are risks when I use natural health products (Safe-use - Risk)	-24.030	95	.000
Pair 2	Timeline -I know that some natural health products have side effects (Safe-use - Risk)	-26.829	95	.000
Pair 3	Timeline -I know that natural health products may react with other medicines (Safe-use - Risk)	-31.410	95	.000
Pair 4	Timeline -I know not all natural health products are safe for everyone to use. (Safe-use - Risk)	-28.537	95	.000
Pair 5	Timeline -I know that natural health products only work as supplements and does not replace prescribed medicine.	-18.781	95	.000

	(Safe-use - Risk)			
Pair 6	Timeline -I know the use of natural health products can be harmful especially if taken in high doses/measures. (Safe-use - Risk)	- 28.992	95	.000
Pair 7	Timeline -I know that I should talk to a medical practitioner before taking any natural health products. (Practice)	- 30.220	95	.000
Pair 8	Timeline -I know that I need to tell my doctor about taking natural health products. (Practice)	- 35.169	95	.000
Pair 9	Timeline -I know that there are acts/regulations related to natural health products in Malaysia. (Regulations)	- 18.356	95	.000
Pair 10	Timeline -I know the right person to consult regarding the use and intake of natural health products. (Practice)	- 21.691	95	.000
Pair 11	Timeline -I know that every health product must be registered with the Ministry of Health Malaysia. (Regulations)	- 34.630	95	.000
Pair 12	Timeline -I know that the registration of individual health products can be checked on the Quest3+ website. (Practice)	- 14.750	95	.000
Pair 13	Timeline -I know that every natural health product has a MAL registration number that must be displayed on the product box. (Regulations)	- 20.524	95	.000
Pair 14	Timeline -I know that I can file a complaint with the Ministry of Health if there are health products on the market that give me negative side effects. (Practice)	- 26.636	95	.000
Pair 15	Timeline -I know the proper channel to make a complaint about natural health products. (Practice)	- 18.012	95	.000

### *Impact of Module on Perception*

Among all of the perception statements asked, two statements were observed with a decline mean average value, which were Q2 and Q7 with a slight reduction of 0.13 and 0.06, respectively between pre and post-test (**Table 5**). The rest of the statement were observed with an increment score patent between pre and post-test which denote an improved perception regarding safe-use of natural health products among students. Based on paired samples test (**Table 6**), all the statements were statistically significant between pre and post-test in their perception, with a 95% confidence interval,  $p < .05$  (2-tailed).

**Table 5. Mean Average Scores for Each Items Anticipant in Perception Measurement Pre and Post-Test**

No.	Questions	Pre		Post		Mean Difference
		Mean	Std. Deviation	Mean	Std. Deviation	
1	Herbal/natural remedies/medicines are safer than modern medicine (Perception)	4.17	1.389	4.19	1.539	0.02
2	All herbal/natural remedies/remedies are safe for everyone to use (Perception)	3.69	1.490	3.56	1.934	-0.13
3	Herbal/natural remedies/medicines can cause problems to overall health (Perception)	3.63	1.315	4.17	1.928	0.54
4	Herbal/natural remedies/medicines are safe to take with other medicines (Perception)	4.08	1.302	4.40	1.455	0.32
5	Herbal/natural remedies/medicines can help improve the body's immune system (Perception)	4.62	1.104	4.85	1.584	0.23
6	Herbal/natural remedies/medicines are more effective than modern medicine (Perception)	3.83	1.434	4.10	1.679	0.27
7	Most of the claims about the effectiveness of recommended herbal/natural cures/medicines have no evidence (Perception)	4.27	1.349	4.21	1.515	-0.06
8	Information regarding the effectiveness and safety of the use of remedies/medicines based on herbs and natural materials to the general public is insufficient (Perception)	5.06	1.359	5.40	1.567	0.34

**Table 6. Paired Samples Test for Each Items Anticipant in Perception Measurement Based Timeline (Pre and Post-Test)**

Paired Samples Test				
		t	df	Sig. (2-tailed)
Pair 1	Timeline - Herbal/natural remedies/medicines are safer than modern medicine (Perception)	17.044	95	.000
Pair 2	Timeline - All herbal/natural remedies/remedies are safe for everyone to use (Perception)	11.517	95	.000



Pair 3	Timeline - Herbal/natural remedies/medicines can cause problems to overall health (Perception)	14.163	95	.000
Pair 4	Timeline - Herbal/natural remedies/medicines are safe to take with other medicines (Perception)	18.956	95	.000
Pair 5	Timeline - Herbal/natural remedies/medicines can help improve the body's immune system (Perception)	22.475	95	.000
Pair 6	Timeline - Herbal/natural remedies/medicines are more effective than modern medicine (Perception)	15.158	95	.000
Pair 7	Timeline - Most of the claims about the effectiveness of recommended herbal/natural cures/medicines have no evidence (Perception)	17.619	95	.000
Pair 8	Timeline - Information regarding the effectiveness and safety of the use of remedies/medicines based on herbs and natural materials to the general public is insufficient (Perception)	24.404	95	.000

## Discussion

Natural health products (NHPs) are widely used, but many people mistakenly believe that because they are "natural," they are automatically safe (Gaston et al. 2020). However, NHPs can have potent effects on the body and may have serious side effects, just like synthetic drugs (Raynor et al. 2011; Izzo et al. 2016; Datta et al. 2023). It is important for consumers to be aware that "natural" does not necessarily mean "safer." NHPs, like any substance that affects the body, have the potential to be risky, especially for vulnerable populations like children, pregnant women, seniors, and those with serious medical conditions.

Researchers have found that people's preference for natural things is often based on the belief that nature is inherently pure and superior to human-made products (Balzan et al. 2017; Puhakka et al. 2021). This bias can affect their decisions about using natural health products, even if the evidence does not support their effectiveness or safety. Knowledge and perception of the safe use of natural health products is crucial, as these products can have significant effects, both beneficial and harmful, on one's health (Rahayu et al. 2020; Gutierrez et al. 2015).

Surveys of young adults, particularly university students, have found a relatively high willingness to try novel health-enhancing products containing natural, plant-based substances (Puhakka et al. 2021). Factors like gender, nationality, and past use of natural health products influenced their openness to trying these products. Whereas, teenagers in particular have expressed a strong preference for using natural skin care products to maintain the "originality" of their skin, with 70% preferring natural over synthetic options. They also showed good awareness of the benefits of natural ingredients like vitamin B12, oatmeal, rose water, vitamin E, and turmeric for skin health (Balzan et al. 2017).

Educating young consumers about the need to evaluate the evidence on the safety and efficacy of natural health products, just as with any other product, is very important. Consumers need to be informed and proactive to use NHPs safely and effectively. Thus, one convenient way to achieve that is via credit bearing subject that is being enrolled in by undergraduate students. Many universities have implemented this strategy for myriads of issues such as cardiovascular disease prevention, effective sleeping and postural

ergonomics (Earl et al. 2019; Basheti et al. 2024; Mathew et al. 2024). Not many studies have been published on any modules regarding safe-use of NHPs, but it is crucial that they are informed about the potential risks and benefits of these products to use them safely and effectively.

Knowing Your Medicine (KYM) initiative by the Ministry of Health (MOH), Malaysia is an initiative to educate consumers via grass root strategies by electing an ambassador among the community members. Among them elected are also lecturers in universities, which plays an important role of educating the undergraduates on the right use of medicines, including NHPs. Findings from this study supports the effectiveness of the modules, by incorporating it in an elective course for undergraduates. This strategy of having grass root ambassadors are also being practiced in other countries, and are proven effective for increasing awareness and knowledge and improving perceptions (Cedenilla et al. 2014; Downing et al. 2023).

In summary, while youth in Malaysia and globally show a strong preference for natural products, there are significant knowledge gaps about their safe and appropriate use. Educating young consumer, especially undergraduates on evaluating the evidence, safety, and regulations around natural health products is important to promote their responsible use. They will become the future of adult consumers in the market, and educating them on the right safe-use knowledge and influencing the right perceptions will ensure safety and quality use of NHPs.

## Conclusion

Youths, including undergraduates are avid consumers of NHPs which includes pharmaceuticals, cosmetics and supplements. They preference for natural health products are translated from their high awareness and consciousness regarding health and sustainability. Many consumers benchmark natural with safety due to the belief that anything natural is safe to use. This misunderstanding need to be corrected in order to ensure consumers safety and protect them from unnecessary risks. To cater this issue among undergraduates, an elective course is introduced to undergraduates in Universiti Kebangsaan Malaysia. A pre and post-test pertaining self-assessed knowledge and perception was conducted on the students, and findings shows that there was significant increase in self-assessed knowledge and also perception towards safe-use of NHPs. The findings support that incorporating awareness and knowledge modules in a credit bearing course in one effective way of educating undergraduates in any issues, including health. There are limitations to this study as the results only can be concluded to the students that completed the course, and could not be generalized to other populations. The knowledge items are also self-assessed because answers were given in a form of a Likert scale. In future studies, knowledge would be better measured if the answers a nominal instead.

## Acknowledgements

Acknowledgement to Pharmacy Division of Serdang Hospital in providing assistance and materials regarding the KYM Module. The authors also would like to thank the Pusat Pengajian Citra Universiti, Universiti Kebangsaan Malaysia (UKM) for providing funding for publishing this research.

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