



Trends on Dietary Supplement use among Health-allied Students of Centro Escolar University – Malolos: A Basis for Pharmacist Intervention

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KEYWORDS

Source; Knowledge and Perception; College students; Intervention; Trends of Dietary Supplements

ABSTRACT

Background

Some college students live away from home and make their meals, while others may choose to dine out. These factors contribute to college students not obtaining enough nutrients; a nutrient deficiency and a weak immune system may prompt them to take dietary supplements.

Objective

This study aims to determine the trends of dietary supplement usage among the health-allied students of Centro Escolar University- Malolos as a basis of pharmacist intervention.

Method

The study utilized a stratified random sampling technique to determine the 281 respondents and used an online questionnaire for data collection.

Results

The respondents take 1-2 nutritional role supplements per day to supplement nutrients to their health. The primary source of information was their family, yet they mainly purchase in the drugstore/pharmacy. Also, knowledge and perception do not differ substantially among health-allied students, indicating that they firmly agreed on positive and negative statements, implying that they are not well-versed in the use of dietary supplements. However, dietary supplements were never a consideration for non-users, while former users discontinued taking supplements because they no longer needed them.

Conclusion

Therefore, the trends indicated a need for educational intervention and direct engagement of the pharmacist to comprehend the dietary supplement.

INTRODUCTION

People nowadays are looking for new ways to improve their health. A nutritious diet consumed throughout one's life helps avoid malnutrition in its manifestations and various non-communicable illnesses (NCDs) and disorders. Individual factors such as age, gender, lifestyle, and level of physical activity, cultural background, regionally accessible foods, and dietary habits will all influence the precise composition of a diverse, balanced, and nutritious diet (World Health Organization, 2020). A well-balanced diet provides the body with the nutrition it requires to function correctly. Without a well-balanced diet, the body is more susceptible to illness, infection, tiredness, and poor performance (Healthline, 2020). According to the Center for Science in the

Public Interest, diet is directly connected to four of the top ten leading causes of mortality in the United States: heart disease, cancer, stroke, and type 2 diabetes.

To attain a healthy diet, adults or even children use food supplements to increase nutrients in their diet and decrease their health problems. With this, food supplements have played an essential role in achieving this goal. Food supplements, also known as dietary supplements, distribute nutrients that people may not consume in adequate quantities inside their bodies. It includes vitamins, minerals, herbs, amino acids, and enzymes to improve someone's health. In a short interview from CNN Philippines, deputy director of the extramural research division at the National Center for Complementary and Integrative Health, Craig Hopp, said that dietary supplements are also "best utilized" in preventing nutritional deficiency.

With a 12.1% gain in 2020, the nutritional supplement sector saw its most rapid growth over two decades (Healthline, 2021). The global demand for dietary supplements is influenced by rising health and fitness awareness. In 2019, the global dietary supplements market was approximately USD 167.8 billion (Facts and Factors, 2020). It is anticipated that the global dietary supplement market will reach over USD 306.8 billion by the year 2026.

With this increasing use of a dietary supplement, a person may excessively use dietary supplements, resulting in adverse medical consequences. As stated in the study of Liebermann et al. (2015), the majority of students take nutritional supplements to "treat a problem they don't have." College is the most crucial preparation stage for young adults before setting out in the "real world." The lifestyle of college students may differ from those of high school. Some may be living independently from their parents and preparing their daily meals for themselves. Some may be skipping breakfast, and some may be eating take-out meals due to their strict schedule and other extracurricular activities. These factors lead to college students not getting enough nourishment; the lack of proper nutrients and vulnerable immune systems may urge them to use dietary supplements. This discernible abuse of dietary supplements by college students is a notable concern because many habits and patterns may manifest during their college years that may carry on throughout their lives. When utilizing dietary supplements, undesirable effects may occur, this may be traced back to students' inaccurate perception of dietary supplements as a viable replacement to other healthy habits.

Consuming large amounts of dietary supplements shows a variety of potential dangers. For example, chronic excessive consumption of Vitamin C substantially increases kidney stone formulation. Another possible negative consequence of unnecessary dietary supplementation is that individuals may incorrectly perceive them as substitutes for other healthy behaviors (Liebermann et al., 2015). Furthermore, the use of dietary supplements may cause significant harm, including side effects such as liver or kidney damage, cancer, and heart attack or stroke when not used properly. As stated in a study by Dung (2019), pharmacists should improve their relationship with the consumers as a chief aspect of the service quality in managing pharmacy trust, loyalty, and satisfaction. It comprises the pharmacist's relationship, interaction, communication, and association with the consumers.

With the limited study regarding dietary supplements used in the Philippines, the researchers took the initiative to determine the trends in dietary supplement usage among health-allied students. This study can be utilized as a foundation for pharmacist intervention as they support patients in selecting informed and safe nutritional supplement decisions. (Tefera et al., 2019).

MATERIALS AND METHODS

Design - This study is a quantitative descriptive research study that focuses on and aims to determine the trends of dietary supplement consumption among health-allied college students of Centro Escolar University-Malolos.

Ethical Considerations - The ethical approval of this study will be requested from the Centro Escolar University - Institutional Ethics Review Committee in accordance with the application of this research.

Population and Sampling Technique - This study used a stratified random sampling technique to increase precision while decreasing error. With a total population of 944 from the health-allied programs, namely Dentistry, Medical Technology, Pharmacy, Nursing, and Psychology, the researchers used Slovin's formula to determine the sample size of 281 needed for the study. The sample size was evenly distributed in different strata. Herewith, the researchers were able to identify the total needed students in each stratum, and the interval was determined to avoid any form of biases.

Data Collection - The researchers distributed the questionnaire through the social media platform, Facebook Messenger, and the data collected through the online survey was accumulated from Google Forms.

Instruments - The researchers prepared a 9-item questionnaire to gather the data needed for this study. The questionnaire is divided into four parts: Demographic profile section, Usage of dietary supplement section, Trends of dietary supplement section, and Knowledge and perception section.

Validation and Reliability - The researchers asked for guidance and assistance from the researcher adviser to scrutinize the appropriateness and coherence of the questionnaire. The said questionnaire was presented to some experts in Pharmacy, including pharmacy professors and a community-based pharmacist. After this process, a statistician was requested to check the reliability of the research tool, which accumulated a score of 0.713.

Statistical Treatment - The data collected were analyzed and interpreted using descriptive statistics, including mean, standard deviations, frequency distributions, and percentages. The use of cross-tabulation also helped to determine the frequency of answers per strata.

RESULTS AND DISCUSSION

Dietary Supplement User - Most students were dietary supplement users (43%) where the highest percentage came from the Psychology program (53%). The need for supplementation of nutrients (89%) drives the users to use dietary supplements.

Non-dietary Supplement User - Non-dietary supplement users are also noticeable in the population (35%), where the Doctor of Dental Medicine program (47%) has the highest proportion. Non-users reasoned that they never thought about using dietary supplements (59%).

Former Dietary Supplement User - Several respondents are considered former users (22%), of which Medical Technology has the highest portion (61%). They believe that they no longer needed the supplements (90%), which is why they discontinued taking supplements.

Source of Dietary Supplement - Dietary supplement users purchase their supplements in the drugstore/pharmacy (93%), followed by family (36%), and the supermarket (26%).

Source of Dietary Supplement Information - Dietary supplement users consider their family (89%) as their primary source of information regarding dietary supplements. It was followed by Internet or the Social Media (67%), and the Healthcare Professionals (60%)

Average Dietary Supplement per Day - On average, dietary supplement users take 1-2 supplements per day. Dietary supplements taken are mainly those that have a nutritional role (89%).

Knowledge - The study revealed that health-allied students are not knowledgeable about dietary supplements (0.459 ± 0.031).

Perception - The overall perception of health-allied students revealed that they strongly agree with the statements pertaining to dietary supplement use (3.011 ± .0.716).

Knowledge and Perception - The perception and the knowledge of health-allied students regarding dietary supplements has no significant difference.

Table 1. Cross-tabulation of the Significant Difference of Dietary Supplement Usage Among Health-allied Students

	DIETARY SUPPLEMENTS			Chi-Square	p-value	Sig
	NON-USERS (%)	USERS (%)	FORMER USERS (%)			
BSMT	24	45	31	15.939 ^a	p = 0.043 < 0.05	S
BSN	37	37	26			
BSP	25	52	23			
BS Psych	37	53	11			
DMD	47	38	15			
Total	99	121	61			

Abbreviations: *BSMT*- Bachelor of Science in Medical Technology; *BSN*- Bachelor of Science in Nursing; *BSP*- Bachelor of Science in Pharmacy; *BS Psych*- Bachelor of Science in Psychology; *DMD*- Doctor of Dental Medicine; and *Sig*- Significance

There is a significant difference among the health-allied students and their dietary supplement usage. With this, the students from the Psychology program have the most dietary supplement users. In contrast, the students from the Doctor of Dental Medicine program have the most non-dietary supplement users. With the collected data, the students from the Medical Technology program have the most number of former users of dietary supplements. In line with this, a study conducted by Kobayashi et al. (2017) stated that the results significantly increased the usage of dietary supplements among medical and pharmaceutical-related college programs. The rationale behind this is the different factors that might affect the knowledge and understanding about dietary supplements, such as the range of information regarding dietary supplements of each health-allied program.

Table 2. Reason(s) for Using Dietary Supplement(s)

Reason(s) for Using Dietary Supplements (s)	f	%
Supplementation of nutrients	108	89.26
Improvement of health	91	75.21
Maintenance of health	88	72.73
Prevention of diseases	87	71.90
Beauty benefits	22	18.18
Weight loss	12	9.92
Building muscle	10	8.26
Treatment of diseases	9	7.44
Energy	1	0.83
Prescription or over-the-counter drugs are too expensive	1	0.83

Sleep supplement	1	0.83
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Abbreviation: f- frequency

Table 3. Cross-tabulation of Reason(s) for Using Dietary Supplement(s) and the Health Allied Program

Reason(s) for Using Dietary Supplement(s)	BSMT	BSN	BSP	BS Psych	DMD
Supplementation of health	20 (76.92%)	16 (94.12%)	26 (83.87%)	9 (90%)	37 (100%)
Improvement of health	15 (57.69%)	14 (82.35%)	26 (83.87%)	7 (70%)	29 (78.38%)
Maintenance of health	22 (84.62%)	11 (64.71%)	23 (74.19%)	7 (70%)	25 (67.57%)
Prevention of diseases	16 (61.54%)	15 (88.24%)	22 (70.97%)	6 (60%)	28 (75.68%)
Beauty benefits	4 (15.38%)	4 (23.53%)	7 (22.58%)	1 (10%)	6 (16.22%)
Weight loss	2 (7.69%)	2 (11.76%)	4 (12.90%)	1 (10%)	3 (8.11%)
Building muscle	2 (7.69%)	2 (11.76%)	4 (12.90%)	1 (10%)	1 (2.70%)
Treatment of diseases	2 (7.69%)	2 (11.76%)	3 (9.68%)	0 (0%)	2 (5.41%)
Energy	0 (0%)	0 (0%)	1 (3.23%)	0 (0%)	0 (0%)
Prescription or over-the-counter medicine are too expensive	0 (0%)	1 (5.88%)	0 (0%)	0 (0%)	0 (0%)
Sleep supplement	0 (0%)	1 (5.88%)	0 (0%)	0 (0%)	0 (0%)

Abbreviations: BSMT- Bachelor of Science in Medical Technology; BSN- Bachelor of Science in Nursing; BSP- Bachelor of Science in Pharmacy; BS Psych- Bachelor of Science in Psychology; DMD- Doctor of Dental Medicine.

The majority of the dietary supplement users chose supplementation of health as their reason why they use these dietary supplements. In accordance with this, a study established by Liebermann et al. (2015) said that college students used dietary supplements to boost their general health, produce more energy, enhance their muscle strengths, and lastly, improve their performance. The dietary supplement users' experiences and how well-informed they are about the dietary supplements affect their reasons for using supplements.

Table 4. Reason(s) for Not Using Dietary Supplement(s)

Reason(s) for Not Using Dietary Supplements (s)	f	%
Never thought about it	58	58.59
Don't need it	47	47.47
No reason	27	27.27
It costs too much	23	23.23
Don't believe in it/ It doesn't work	17	17.17
Question not applicable	13	13.13
Never heard of it/ don't know much about it	8	8.08
A health care provider told me not to use it	7	7.07
Medical science has not shown that it works	7	7.07
It is not safe to use	7	7.07
I was told not to depend on supplements rather I eat fruits and vegetables to gain	1	1.01

desired nutrients		
I don't use	1	1.01

Abbreviation: f- frequency

Table 5. Cross-tabulation of Reason(s) for Not Using Dietary Supplement(s) and the Health Allied Program

Reason(s) for Using Dietary Supplement(s)	BSMT	BSN	BSP	BS Psych	DMD
Never thought about it	8 (57.14%)	9 (52.94%)	9 (60%)	4 (57.14%)	28 (60.87%)
Don't need it	6 (42.86%)	8 (47.06%)	6 (40%)	4 (57.14%)	23 (50%)
No reason	2 (14.29%)	5 (29.41%)	5 (33.33%)	1 (14.29%)	14 (30.43)
It costs too much	2 (14.29%)	3 (17.65%)	5 (33.33%)	3 (20%)	10 (21.74%)
Don't believe in it/ It doesn't work	2 (14.29%)	5 (29.41%)	1 (6.67%)	1 (14.29%)	8 (17.39%)
Question not applicable	2 (14.29%)	0 (0%)	2 (13.33%)	2 (28.57%)	7 (15.22%)
Never heard of it/ I don't much of it	0 (0%)	2 (11.76%)	1 (6.67%)	0 (0%)	5 (10.87%)
A healthcare provider told me not to use it	1 (7.14%)	2 (11.76%)	0 (0%)	1 (14.29%)	3 (6.52%)
Medical Science has not shown that it works	1 (7.14%)	2 (11.76%)	1 (6.67%)	0 (0%)	3 (6.52%)
It is not safe to use	0 (0%)	3 (17.65%)	0 (0%)	1 (14.29%)	3 (6.52%)
I was told not to depend on supplements rather I eat fruits and vegetables to gain desired nutrients	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (2.17%)
I don't use	0 (0%)	1 (5.88%)	0 (0%)	0 (0%)	0 (0%)

Abbreviations: BSMT- Bachelor of Science in Medical Technology; BSN- Bachelor of Science in Nursing; BSP- Bachelor of Science in Pharmacy; BS Psych- Bachelor of Science in Psychology; DMD- Doctor of Dental Medicine.

Non-dietary supplement users never used dietary supplements because they never thought about it. The lifestyle difference of each health-allied student is a factor for not using or for using dietary supplements (Valentine et al., 2018). Thus, the limited exposure, awareness, and comprehension of dietary supplement information can drive an individual to never consider using one.

Table 6. Reason(s) for Discontinuing Dietary Supplement(s)

Reason(s) for Not Using Dietary Supplements (s)	f	%
No longer needed the supplement(s)	39	69.93
Felt that the product(s) were ineffective	21	34.34
Too expensive	18	29.51
Was recommended to discontinue taking by a healthcare professional	4	6.56
Doesn't have stock	1	1.64
Found an alternative which is better	1	1.64
Having a hard time taking it	1	1.64

Parents stopped buying dietary supplements	1	1.64
Question not applicable	1	1.64

Abbreviation: *f*- frequency

Table 7. Cross-tabulation of Reason(s) for Discontinuing Dietary Supplement(s) and the Health Allied Program

Reason(s) for Using Dietary Supplement(s)	BSMT	BSN	BSP	BS Psych	DMD
No longer needed the supplement(s)	14 (77.78%)	8 (66.67%)	8 (57.14%)	0 (0%)	9 (60%)
Felt that the product(s) were ineffective	5 (27.78%)	3 (25%)	6 (42.86%)	1 (50%)	6 (40%)
Too expensive	2 (11.11%)	5 (41.67%)	6 (42.86%)	1 (50%)	4 (26.67%)
Was recommended to discontinue taking by a healthcare professional	1 (5.56%)	1 (8.33%)	1 (7.14%)	0 (0%)	1 (6.67%)
Doesn't have stock	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (6.67%)
Found an alternative which is better	0 (0%)	0 (0%)	1 (7.14%)	0 (0%)	0 (0%)
Having a hard time taking it	0 (0%)	0 (0%)	0 (0%)	1 (50%)	0 (0%)
Parents stop buying dietary supplements	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (6.67%)
Question not applicable	1 (5.56%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Abbreviations: *BSMT*- Bachelor of Science in Medical Technology; *BSN*- Bachelor of Science in Nursing; *BSP*- Bachelor of Science in Pharmacy; *BS Psych*- Bachelor of Science in Psychology; *DMD*- Doctor of Dental Medicine.

Former users discontinued the use of supplements because they no longer needed the supplement. However, in a study conducted by Valentine et al. (2018), the main reason why dietary supplement users discontinued using dietary supplements was that they felt that dietary supplement was ineffective and the adverse effect experienced by the former users. The reasons that might support the user's discontinuation were the factors of income, inadequate knowledge and understanding of how dietary supplements work, the intention of the respondent's use, and the overall experience in using dietary supplements.

Table 8. Most common source of dietary supplements

Source of Dietary Supplement	BSMT	BSN	BSP	BS Psych	DMD	TOTAL
Pharmacy or drugstore	21 (80.77%)	16 (94.12%)	30 (96.77%)	10 (100%)	35 (94.59%)	112 (92.56%)
Family	12 (46.15%)	8 (47.06%)	7 (22.58%)	3 (30%)	14 (37.84%)	44 (36.36%)
Supermarket	5 (19.23%)	10 (58.82%)	7 (22.58%)	2 (20%)	7 (18.92%)	31 (25.62%)
Convenience store	2 (7.69%)	7 (41.18%)	1 (3.23%)	0 (0%)	6 (16.22%)	16 (13.22%)
Retail store	3 (11.54%)	2 (11.76%)	5 (16.13%)	1 (10%)	2 (5.41%)	13 (10.74%)
Internet (Social Media)	2 (7.69%)	2 (11.76%)	1 (3.23%)	0 (0%)	6 (16.22%)	11 (9.09%)
Department store	1 (3.85%)	2 (11.76%)	3 (9.68%)	0 (0%)	4 (10.81%)	10 (8.26%)
Friends or acquaintances	1	2	1	0	3	7

	(3.85%)	(11.76%)	(3.23%)	(0%)	(8.11%)	(5.79%)
Shopee and Lazada	0 (0%)	0 (0%)	1 (3.23%)	0 (0%)	1 (2.70%)	2 (1.65%)

Abbreviations: *BSMT- Bachelor of Science in Medical Technology; BSN- Bachelor of Science in Nursing; BSP- Bachelor of Science in Pharmacy; BS Psych- Bachelor of Science in Psychology; DMD- Doctor of Dental Medicine.*

The majority of the students' common source of dietary supplements is in pharmacies or drugstores. Drugstore is a commonplace wherein most people purchase their medications. In line with this, a study by Kobayashi (2017) entitled "Prevalence of Dietary Supplement Use among College Students: A Nationwide Survey in Japan" showed that although most students learned about nutritional supplements on the internet, they primarily purchase them through pharmacy stores.

Table 9. Common sources of dietary supplement information

Source of Dietary Supplement Information	BSMT	BSN	BSP	BS Psych	DMD	TOTAL
Internet (Social Media)	11 (42.31%)	13 (76.47%)	25 (80.65%)	6 (60%)	26 (70.27%)	81 (66.94%)
Healthcare professionals	11 (42.31%)	11 (64.71%)	18 (58.06%)	8 (80%)	25 (67.57%)	73 (60.33%)
Television	12 (46.15%)	10 (58.82%)	18 (58.06%)	6 (60%)	20 (54.05%)	66 (54.55%)
Drugstore Clerks	9 (34.62%)	8 (47.06%)	11 (35.48%)	8 (80%)	19 (51.35%)	55 (45.45%)
Friends	9 (34.62%)	9 (52.94%)	11 (35.48%)	3 (30%)	20 (54.05%)	52 (42.98%)
Product Labels	8 (30.77%)	6 (35.29%)	10 (32.26%)	4 (40%)	14 (37.84%)	42 (34.71%)
Print materials (Newspapers, magazines, flyers)	3 (11.54%)	6 (35.29%)	11 (35.48%)	4 (40%)	9 (24.32%)	33 (27.27%)
Radio	4 (15.38%)	3 (17.65%)	2 (6.45%)	1 (1%)	6 (16.22%)	16 (13.22%)
Manufacturer	3 (11.54%)	0 (0%)	3 (9.68%)	1 (1%)	4 (10.81%)	11 (9.09%)
School	0 (0%)	0 (0%)	1 (3.23%)	0 (0%)	0 (0%)	1 (0.83%)
Internet (Social Media)	11 (42.31%)	13 (76.47%)	25 (80.65%)	6 (60%)	26 (70.27%)	81 (66.94%)

Abbreviations: *BSMT- Bachelor of Science in Medical Technology; BSN- Bachelor of Science in Nursing; BSP- Bachelor of Science in Pharmacy; BS Psych- Bachelor of Science in Psychology; DMD- Doctor of Dental Medicine.*

On the other hand, the students' common sources of dietary supplement information are Family, Internet, and Healthcare Professionals, respectively. Family is most likely to be the nearest source of information for some students who may still live with them. In line with this, a study conducted by Liebermann H. et al. (2015) showed that female college students were more likely to acquire knowledge on dietary supplements from their families, followed by healthcare experts and television. However, a study conducted by Žeželj et al. (2018) stated that the internet was the most popular source of dietary supplement information for all students, followed only by healthcare professionals.

Table 10. Average number of dietary supplements taken by the dietary supplement users.

	Frequency	%
1	65	53.72

2	41	33.88
3	11	9.09
4	1	0.83
5	1	0.83
6	2	1.6
Total	121	100.00
Mean	1.66	
S.D.	1.803	

Abbreviation: S.D. - Standard Deviation

The dietary supplement users who took part in the study used to consume around two dietary supplements each day. However, as Homan (2018) eloquently noted, 91 students took only one dietary supplement among the users. Some individuals consumed a variety of dietary supplements regularly. Ten users selected two products, four selected three products, one selected four products, two selected five products, and two selected six products. The reason for these findings could be that respondents usually took dietary supplements that included a wide variety of vitamins and minerals to address nutritional deficiencies and under-consumed nutrients in their bodies in a single intake rather than taking numerous supplements to supplement their health.

Table 11. Most common dietary supplements being used.

Category	%
Nutritional Role Supplements	89
Herbal Supplements	3
Physiological Boosters	8

The majority of students who used dietary supplements did so for nutritional purposes, such as multivitamins, vitamin C, and minerals. Furthermore, as Kobayashi et al. (2017) discovered, individual vitamins and minerals were more prevalent than a combination of multivitamins and minerals, or multivitamins or multi-minerals alone. Females supplemented with iron at a higher rate. College students have used Non-vitamin and non-mineral supplements. Additionally, weight loss supplements were a popular item. Following that, most respondents used to take nutritional supplements rather than herbal supplements and physiological boosters, most probably because they emphasize boosting and strengthening their immune system, especially now that we are amid a pandemic. They also used to take nutritional supplements because it may cover a wide range of what herbal supplements and physiological boosters can perform within our bodies.

Table 12. Knowledge of each Health-allied program per statement.

Statement	Health-allied Program	Mean	S.D.	V.I.
K1. Dietary supplements can positively affect my health.	BS Pharmacy	1.00		K
	BS Medical Technology	0.962		K
	BS Nursing	0.941	±.0286	K
	BS Psychology	1.00		K
	Doctor of Dental Medicine	0.946		K
K2. Dietary supplements can be used as a replacement for a healthy diet.	BS Pharmacy	0.548		K
	BS Medical Technology	0.731	±.153	K

	BS Nursing	0.529		K
	BS Psychology	0.9		K
	Doctor of Dental Medicine	0.622		K
K3. Dietary supplements can cancel out the effects of bad habits (e.g., smoking, drinking, or not exercising)	BS Pharmacy	0.613		K
	BS Medical Technology	0.731		K
	BS Nursing	0.706	±.079	K
	BS Psychology	0.6		K
	Doctor of Dental Medicine	0.541		K
K4. Dietary supplements can have adverse side effects (e.g., vomiting, dizziness, constipation, others)	BS Pharmacy	0.484		NK
	BS Medical Technology	0.462		NK
	BS Nursing	0.529	±.096	K
	BS Psychology	0.7		K
	Doctor of Dental Medicine	0.595		K
K5. Herbal supplements are safe to take because they come from “natural sources.”	BS Pharmacy	0.258		NK
	BS Medical Technology	0.115		NK
	BS Nursing	0.235	±.075	NK
	BS Psychology	0.3		NK
	Doctor of Dental Medicine	0.162		NK
K6. Dietary supplements can be dangerous when combined with prescription medications and over-the-counter medications (e.g., antibiotics, pain relievers, others.)	BS Pharmacy	0.613		K
	BS Medical Technology	0.385		NK
	BS Nursing	0.412	±.130	NK
	BS Psychology	0.6		K
	Doctor of Dental Medicine	0.676		K
K7. The FDA controls the components of dietary supplements.	BS Pharmacy	0		NK
	BS Medical Technology	0.038		NK
	BS Nursing	0.118	±.049	NK
	BS Psychology	0		NK
	Doctor of Dental Medicine	0.054		NK
K8. The FDA requires that dietary supplements must be proven to be safe and effective before they are marketed.	BS Pharmacy	0.097		NK
	BS Medical Technology	0.038		NK
	BS Nursing	0.059	±.035	NK
	BS Psychology	0		NK
	Doctor of Dental Medicine	0.054		NK

Abbreviations: S.D. - standard deviation; V.I. - verbal interpretation

Interpretation: Knowledgeable (K) = 0.51-1.00; and Not Knowledgeable (NK) = 0-0.50

Table 13. Overall knowledge of Health-allied programs.

Knowledge	Rank	Mean	S.D.	Health-allied Program
Not Knowledgeable	1	0.513	±.380	BS Psychology
	2	0.463	±.328	Doctor of Dental Medicine
	3	0.449	±.300	BS Nursing

	4	0.435	±.323	BS Pharmacy
	5	0.433	±.353	BS Medical technology
Overall Knowledge: Not Knowledgeable (0.459 ± 0.031)				

Abbreviation: S.D. – Standard Deviation

Interpretation: Knowledgeable (K) = 0.51-1.00; and Not Knowledgeable (NK) = 0-0.50

Health-allied students are not knowledgeable about dietary supplements. A study conducted by Alowais and Selim (2019) reveals that health sciences students were not highly knowledgeable about the facts involving dietary supplements. The BS Pharmacy program is on the fourth spot out of the five health-allied programs available in the institution despite being a future drug expert. Bukic (2021) conducted a study that revealed that the students’ differences in experience and lifestyle greatly affect their knowledge and perception regarding dietary supplements. It shows that health professionals tend to use their experiences in recommending dietary supplements to patients in the absence of objective knowledge. Aside from that, using evidence-based sources of dietary supplements is also a factor that leads to a low level of knowledge.

Table 14. Perception of each Health-allied program per statement.

Statement	Health-allied Program	Mean	S.D.	V.I.
P1. The source from which I obtained information on dietary supplements is reliable.	BS Pharmacy	3.81	±.575	SA
	BS Medical Technology	3.62		SA
	BS Nursing	3.65		SA
	BS Psychology	3.90		SA
	Doctor of Dental Medicine	3.62		SA
P2. Dietary supplements can positively affect my health.	BS Pharmacy	3.68	±.583	SA
	BS Medical Technology	3.58		SA
	BS Nursing	3.65		SA
	BS Psychology	3.70		SA
	Doctor of Dental Medicine	3.54		SA
P3. Dietary supplements can be used as a replacement for a healthy diet.	BS Pharmacy	2.35	±.887	A
	BS Medical Technology	2.12		A
	BS Nursing	2.18		A
	BS Psychology	1.90		D
	Doctor of Dental Medicine	2.27		A
P4. Dietary supplements can cancel out the effects of bad habits (e.g. smoking, drinking, or not exercising)	BS Pharmacy	2.19	±.942	A
	BS Medical Technology	2.15		A
	BS Nursing	2.12		A
	BS Psychology	2.10		A
	Doctor of Dental Medicine	2.35		A
P5. Dietary supplements can have adverse side effects (e.g., vomiting, dizziness, constipation, others.)	BS Pharmacy	2.68	±.886	A
	BS Medical Technology	2.38		A
	BS Nursing	2.71		A
	BS Psychology	2.90		A
	Doctor of Dental Medicine	2.65		A
P6. Herbal supplements are safe to take because they come from “natural	BS Pharmacy	2.87		A
	BS Medical Technology	3.08		SA

sources.”	BS Nursing	2.71	±.682	A
	BS Psychology	3.10		SA
	Doctor of Dental Medicine	3.05		SA
P7. Dietary supplements can be dangerous when combined with prescription medications and over-the-counter medications (e.g., antibiotics, pain relievers, etc.)	BS Pharmacy	2.74	±.904	A
	BS Medical Technology	2.50		A
	BS Nursing	2.41		A
	BS Psychology	2.70		A
	Doctor of Dental Medicine	2.89		A
P8. The FDA controls the components of dietary supplements.	BS Pharmacy	3.61	±.606	SA
	BS Medical Technology	3.38		SA
	BS Nursing	3.24		SA
	BS Psychology	3.50		SA
	Doctor of Dental Medicine	3.49		SA
P9. The FDA requires that dietary supplements must be proven to be safe and effective before they are marketed.	BS Pharmacy	3.55	±.640	SA
	BS Medical Technology	3.62		SA
	BS Nursing	3.59		SA
	BS Psychology	3.90		SA
	Doctor of Dental Medicine	3.76		SA

Abbreviations: *S.D.* - standard deviation; *V.I.* - verbal interpretation; *D-* disagree; *A-* agree, and *SA-* strongly agree
Interpretation: Strongly Agree= 3.00 - 4.00; Agree= 2.00 - 2.99; Disagree= 1.00 - 1.99 and Strongly Disagree= 0.99 - 1.00

Table 15. Overall perception of health-allied programs.

Health-allied program	Mean	Standard Deviation	Verbal Interpretation
BS Psychology	3.078	±.628	Strongly Agree
Doctor of Dental Medicine	3.069	±.779	Strongly Agree
BS Pharmacy	3.053	±.751	Strongly Agree
BS Medical technology	2.937	±.708	Agree
BS Nursing	2.918	±.715	Agree

Overall Perception: Strongly Agree (3.011 ± .0716)

Interpretation: Strongly Agree= 3.00 - 4.00; Agree= 2.00 - 2.99; Disagree= 1.00 - 1.99 and Strongly Disagree= 0.99 - 1.00

The health-allied students' perception of dietary supplement usage shows that they did not understand the importance of dietary supplements and their essential information. A study conducted by Alowais and Selim (2019) observed a significant disparity in the views and perceptions of health sciences students and other people in Saudi Arabia about dietary supplements. It was evident that the usage of dietary supplements of health-allied students was based on their perceived knowledge. Moreover, a study conducted by Begdache, Kianmehr, and Heaney (2018), showed that the increasing usage of dietary supplements on college students is strongly associated with their perceived self-knowledge.

Table 16. The significant difference between the Knowledge and the Perception of the Health-allied students.

Health-allied program	Knowledge	Standard Deviation	Perception	Standard Deviation	p-value	Significance
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BS Medical technology	0.433		2.937		p-value= 0.88	No Significance
BS Nursing	0.449		2.918			
BS Pharmacy	0.435	± 0.031	3.053	± .0716		
BS Psychology	0.513		3.078			
Doctor of Dental Medicine	0.463		3.069			

The students' perceptions represent their lack of understanding, in which they strongly agree both on the negative and positive statements. Therefore, there is no significant difference between the perception and the knowledge of health-allied students regarding dietary supplements usage. A study conducted by Axon et al. in 2017 stated that dietary supplements were viewed as unnecessary by student pharmacists, label information was seen as unhelpful, and research was regarded inadequate. Students believed that understanding dietary or herbal supplements were vital, although their knowledge was insufficient

CONCLUSIONS

Dietary Supplements are commonly used for supplementation of nutrients and are least used as Sleep Supplements. Most students took 1-2 supplements per day wherein these are mostly nutritional supplements rather than herbal and physiological boosters. Users' primary source of dietary supplement information is their family, and the least source is the school, yet they mainly purchase it on pharmacies or drugstores and least on online shops. With that, knowledge and perception do not differ substantially among health-allied students, indicating that they firmly agreed on all positive and negative statements, implying that they are not well-versed in the use of dietary supplements. On the other hand, dietary supplements were never a consideration for non-users, while former users discontinued taking supplements because they no longer needed them. In conclusion, the trends showed a need for educational intervention and direct participation of the pharmacist to better understand the dietary supplement.

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