Original Research

ASSESSMENT OF KNOWLEDGE AND PERCEPTIONS REGARDING DIETARY SUPPLEMENTS AMONG MEDICAL AND PHARMACY STUDENTS : A CROSS–SECTIONAL STUDY

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ABSTRACT

Introduction: According to the Food and Drugs Administration (FDA), dietary supplements (DS) are products taken by mouth that contain a "dietary ingredient." Such dietary ingredients include minerals, vitamins, herbs or botanicals, amino acids as well as other substances used to supplement the diet. This study aims to determine the prevalence of usage and Knowledge, Attitudes, and Practices (KAP) of dietary supplements among medical and pharmacy students at the University of Cyberjaya, Malaysia. **Methods:** A cross-sectional study is done among 332 undergraduate medical and pharmacy students studying at the University of Cyberjaya, regardless of age and gender. **Results:** It was found that 39.4% of medical students and 28.7% of pharmacy students consume dietary supplements. Among the dietary supplement users, 44.3% consume dietary supplements to improve health meanwhile 34.6% to avoid dietary deficiency. 46.3% of medical students and 52.5% of pharmacy students who consume dietary supplements think the use of dietary supplements is not always safe ($p<0.001$) meanwhile 71.4% of medical students and 73.3% of pharmacy students think that taking a drug, food or drinks with the dietary supplements might interact with each other. It was found that 44.2% of medical students always look for professional medical help when taking dietary supplements meanwhile 57.4% of pharmacy students do not. **Conclusion:** This study only shows the prevalence of dietary supplement consumption among medical and pharmacy students.

Keywords: Dietary supplement consumption, Prevalence, Knowledge, Attitude, Practice

Introduction:

According to the Food and Drugs Administration (FDA), dietary supplements (DS) are products taken by mouth that contain a "dietary ingredient." Such dietary ingredients include minerals, vitamins, herbs or botanicals, amino acids as well as other substances used to supplement the diet (FDA, 1994). Many DS claim to improve health, prevent deficiencies, boost immunity, enhance performance, and reduce stress (Axon et al., 2017). Various factors influence a person's knowledge, attitude, and practice of DS; such as educational, economic, and social factors. Still, knowledge about proper consumption of dietary use is unclear. A study done on US and Canadian pharmacists found they did not perceive their knowledge of DS to be adequate (Shahwan et al., 2018).

A study done about DS use, knowledge, and perceptions among student pharmacists found that 52% had used at least one type of DS in their lives (Axon et al., 2017). Whereas a study done in Tehran University of Medical Sciences found that the prevalence of DS usage was about 33% (females 42.2% and males 20.4%, $p< 0.001$) (Spencer et al., 2006). According to a study done about Nutritional Supplement and Functional Food Use Among Medical Students in India, the most common reasons for DS usage included good health (n=89, 38.8%), doctor's prescription (n=36, 34%), and to fill nutrition gap from a poor diet (n=34, 32.1%) (Joseph, Kumar et al., 2018).

It is very essential to make sure medical and pharmacy students are equipped with sufficient knowledge regarding dietary supplements as they are expected to be well-versed in the science field. Therefore, this study aims to determine the prevalence of usage, Knowledge, Attitudes, and Practices (KAP) of dietary supplements among medical and pharmacy students at the University of Cyberjaya. The expected outcome of this study is to promote and increase awareness of dietary supplement usage.

Methods:

A cross-sectional study was conducted from 7 September 2022 until 10 December 2022. All undergraduate medical and pharmacy students from the University of Cyberjaya were eligible to participate in the study. Those who have graduated or dropped their academic year were excluded. We have gathered 332 participants who fulfilled our inclusion criteria and completed the questionnaire. The sample size was calculated using an online calculator by Raosoft. Considering an error rate of 5% and a confidence level of 95%, the required sample size was 351 by taking into account 20% of non-respondents.

Convenient sampling was employed. We gathered the data by distributing an online Google Form which we gathered 250 respondents and 82 from the questionnaire papers to our targeted participants to further reach them. We collected the data using a 27-item questionnaire which included 4 parts. The first part that the sociodemographic characteristics that respondents need to identify were age, sex, ethnicity, faculty, year of study, smoking status, household monthly income, email address, body weight, and height. The second part consisted of 2 questions where the participants were asked did, they had purchased or consumed the dietary supplements and if the respondent answered yes, they would be brought to the next section of the questionnaire where they were asked the purpose of consuming

dietary supplements. The third part had 6 questions to assess the behavior of the consumption. The fourth part consists of 4 questions about their attitude towards dietary supplements. The last part also consists of 6 questions to assess respondents' knowledge regarding dietary supplements.

Upon obtaining data, the data was analyzed using Jeffrey's Amazing Statistics Program (JASP) version 0.18.3. Statistical tests used are descriptive analysis and Chi-Square. This study's proposal is accepted and evaluated by the University of Cyberjaya Ethics Review Committee (CRERC) before conducting the study. All participants were provided with a written informed consent in which they had to agree with our research condition before proceeding to the next section of the online questionnaire.

Results

A total of 332 respondents from pharmacy and medical students completed the survey out of the total of 351 targeted samples. Thus, the response rate is 94.6%.

Table 1: Sociodemographic characteristics among medical and pharmacy students involved in the study

Sociodemographic Factors	Frequency (n)	Percentage (%)
Age (Years)		
18-20	91	27.4
21-23	215	64.8
24-26	21	6.3
27-30	5	1.5
Sex		
Male	105	31.6
Female	227	68.4
Ethnicity		
Malay	193	58.1
Chinese	83	25.0
Indian	39	11.7
Other	17	5.1
Smoking Status		
Never smoked	303	91.3
Smoker	15	4.5
Ex-smoker	14	4.2
Household monthly income		
B1 < RM 3,171	56	16.9
B2 RM 3,171- 4,850	31	9.3
M1 RM 4,851 – 7,100	62	18.7
M2 RM 7,101 – 10,970	70	21.1
T1 > RM 10,970	113	34.0
BMI (kg/m^2)		
< 18.5	55	16.6

18.5 – 24.9	198	59.6
25 -29.9	51	15.4
>30	28	8.4

Table 1 shows that most of the respondents are aged between 21-23 years old (64.8%), females (68.4%), Malay (58.1%), never smoked (91.3%), have household monthly income of more than Ringgit Malaysia (RM) 10,970 (34%) and normal body mass index (BMI) of 18.5-24.9 (59.6%).

Table 2 : Prevalence of dietary supplement consumption

	Medical students	**Pharmacy students**
Dietary supplement consumption	**Frequency n (%)**	**Frequency n (%)**
Do not take supplements	91 (39.4)	29 (28.7)
Take supplements	140 (60.6)	72 (71.3)
Total	231 (100)	101 (100)

It was found that the majority of pharmacy (71.3%) and medical students (60.6%) consumed dietary supplements.

Table 3: Purpose of dietary supplement usage

Purpose	**Frequency n (%)**
To avoid dietary deficiency	115 (34.6)
To prevent diseases	38 (11.4)
To promote recovery	10 (3.0)
To treat diseases	12 (3.6)
To improve health	147 (44.3)
Others	10 (3.0)
Total	332 (100)

Table 3 shows that the purpose of supplement consumption among medical and pharmacy students is mostly to improve health (44.3%).

Table 4: Attitude towards nutritional supplements

Variables	**Medical students (%)**	**Pharmacy students (%)**	***p-value****
Do you think it is necessary to take nutritional supplements?			
No	56 (24.2)	21 (20.8)	0.493
Yes	175 (75.8)	80 (79.2)	
Why you think it is necessary?			
To avoid dietary deficiency	87 (37.7)	28 (27.7)	0.333
To prevent diseases	26 (11.3))	12 (11.9)	
To promote recovery	6 (2.6)	4 (4.0)	
To treat diseases	6 (2.6)	6 (5.9)	
To improve health	98 (42.4)	49 (48.5)	

Others	8 (3.5)	2 (2.0)	
Would you encourage your friends to take it?			
No	48 (20.8)	16 (15.8)	0.294
Yes	183 (79.2)	85 (84.2)	
Which form of supplements do you like?			
Tablets	143 (61.9)	61 (60.4)	0.750
Capsules	53 (22.9)	27 (26.7)	
Liquids	23 (10.0)	10 (9.9)	
Others	12 (5.2)	3 (3.0)	

**p-value <0.05 indicates significant data*

Table 4 shows that both medical students (75.8%) and pharmacy students (79.2%) find it necessary to take nutritional supplements. Many medical students (42.4%) and pharmacy students (48.5%) agreed that supplement intake is necessary to improve health. Both medical students (79.2%) and pharmacy students (84.2%) would encourage friends to take nutritional supplements. Tablets are the most common dosage form of supplement taken by both medical students (61.9%) and pharmacy students (60.4%). However, the associations between these variables among medical and pharmacy students are not significant.

Table 5 Nutritional supplements consumption behavior among those who consumed dietary supplement

Variables	Medical students (%)	Pharmacy students (%)	p-value
For how long have you taken nutritional supplements?			
Less than 1 year	53 (37.9)	26 (36.1)	0.245
1–2 years	44 (31.4)	17 (23.6)	
3–5 years	17 (12.1)	16 (22.2)	
More than 5 years	26 (18.6)	13 (18.0)	
Duration of consumption over the past year			
None	11 (7.9)	3 (4.2)	0.708
≤2 months	39 (27.9)	21 (29.2)	
3–5 months	32 (22.9)	14 (19.4)	
≥6 months	18 (12.9)	13 (18.1)	
A whole year	40 (28.6)	21 (29.2)	
What kind of nutritional supplements do you take?			
Single	86 (61.4)	36 (50.0)	0.111
Various (more than one type)	54 (38.6)	36 (50.0)	
How is the effectiveness of your nutritional supplements?			
Full	23 (16.4)	9 (12.5)	0.702

Fair	68 (48.6)	41 (56.9)	
Neutral	31(22.1)	14 (19.4)	
Not sure	18 (12.9)	8 (11.1)	
What is the main effectiveness of nutritional supplements do you think?			
To improve immunity	71 (50.7)	20 (27.8)	0.002
To improve body function	59 (42.1)	50 (69.4)	
To treat diseases	8 (5.7)	2 (2.8)	
Others	2 (1.4)	0	

Table 5 shows that most medical students (37.9%) and pharmacy students (36.9%) have only consumed nutritional supplements for less than a year. Most medical students have consumed nutritional supplements for a whole year (28.6%), while most pharmacy students have consumed nutritional supplements for a whole year (29.2%). Most medical students consume a single type of nutritional supplement (61.4%), while half of pharmacy students consume various (more than one) types of nutritional supplement (50%). Both medical students (48.6%) and pharmacy students (56.9%) find the effectiveness of nutritional supplements fair.

Most medical students find that nutritional supplements are effective for improving immunity (50.7%), while most pharmacy students find that nutritional supplements are effective for improving body function (69.4%).

Table 6: Knowledge of study participants regarding dietary supplements

Variables	Medical students (%)	Pharmacy students (%)	p-value
Do you know what dietary supplements are?			
No	18 (7.8)	6 (5.9)	0.095
Yes	199 (86.1)	94 (93.1)	
Do not know	14 (6.1)	1 (1.0)	
Do you use any dietary supplement?			
No	140 (60.6)	38 (37.6)	<0.001
Yes	80 (34.6)	60 (59.4)	
Do not know	11 (4.8)	3 (3.0)	
Have you attended any Health campaign/workshop on dietary supplement?			
No	182 (78.8)	77 (76.2)	0.333
Yes	36 (15.6)	21 (20.8)	
Do not know	13 (5.6)	3 (3.0)	
I always look for a professional medical help, when taking dietary supplement			
No	88 (38.1)	58 (57.4)	0.003
Yes	102 (44.2)	34 (33.7)	

Do not know	41 (17.7)	9 (8.9)	
Do you think the use of nutritional supplements is always safe?			
No	107 (46.3)	53 (52.5)	<0.001
Yes	52 (22.5)	36 (35.6)	
Do not know	72 (31.2)	12 (11.9)	
Do you think that taking a drug, food or drinks with the dietary supplement might interact with each other?			
No	21 (9.1)	19 (18.8)	0.003
Yes	165 (71.4)	74 (73.3)	
Do not know	45 (19.5)	8 (7.9)	

Table 6 shows that both medical students (86.1%) and pharmacy students (93.1%) know dietary supplements. Most medical students (78.8%) and pharmacy students (76.2%) have never attended any health campaigns or dietary supplement workshops.

Most medical students would look for professional medical advice on dietary supplement consumption (44.2%), while most pharmacy students do not seek professional medical advice (57.4%). Both medical students (46.3%) and pharmacy students (52.5%) do not think that the use of nutritional supplements is always safe. Most medical students (71.4%) and pharmacy students (73.3%) also think that certain drugs, food, or drinks might interact with dietary supplement consumption.

Discussion

In light of a study conducted by Sharma et al. (2014), which highlighted medical students' superior performance in knowledge, attitudes, and beliefs regarding micronutrients compared to nursing and dental students, our research aimed to examine the knowledge, attitudes, and beliefs related to dietary intake and its impact on health between medical and pharmacy students. Given that both groups have exposure to medical or biological sciences, we sought to explore potential variations in their awareness and perspectives.

Notably, our findings revealed that 63.9% of the total 332 respondents, comprising medical and pharmacy students, reported the consumption of dietary supplements. This aligns with the observed trend of increasing awareness of nutrition, particularly among specific demographics such as athletes and healthcare professionals, as noted by Molinero & Marquez (2009) and Gardiner et al. (2006). A study by Ilowiecka, Maslej et al. 2022 also mentioned that supplement users have more tendency to have a healthy lifestyle such as greater consumption of fruits and vegetables and limited consumption of alcoholic beverages. It is aligned with our results that proved that dietary supplement consumption is the highest among those who never smoke (91.3%) and those who have a normal BMI of 18.5 - 24.9 kg/m2 (59.6%). This may be attributed to the fact that dietary supplement users are more concerned

and conscious about their general health which may lead to action to improve their health (Abdul Aziz et al. 2020).

The top reasons among the study population for dietary supplement usage were to improve health (44.3 %) followed by avoiding dietary deficiencies (34.6%), and to prevent disease (11.4%). In a study conducted by Kobayashi et al. (2017), it was revealed that the predominant motivation for dietary supplement utilization among college students was the supplementation of nutrients in their diet (59.0%). Additional reasons cited by participants encompassed the desire to maintain overall health (52.9%), derive beauty benefits (36.7%), pursue weight loss goals (25.5%), seek improvements in health (15.4%), and proactively prevent diseases (10.4%). These findings underscore the diverse and multifaceted motivations driving the adoption of dietary supplements among the college student demographic, providing valuable insights into the complex landscape of health-related behaviors in this population. Another study showed that the most common reasons to take supplements were for good health (36.8%), a doctor's prescription (34%), and to balance a poor diet (32.1%) (Joseph et al. 2018). This aligns with our results as the common top reason among these studies to take supplements is to improve or maintain good health.

Comparing medical and pharmacy students, our study found that both groups considered nutritional supplements necessary, with pharmacy students demonstrating a slightly higher inclination shown by pharmacy students (79.2%) are more likely to than medical students (75.8%). This is supported by a study by Bukic et al. (2018) which showed that pharmacy students had more positive attitudes towards dietary supplements, and also had more knowledge scores when compared to dental or medical students ($p < 0.001$).

The majority of medical students (86.1%) and pharmacy students (93.1%) know what dietary supplements are as it involved in the curriculum. This is a significant finding as professional associations such as the Canadian Society of Hospital Pharmacists (CSHP), the American Society of Health-System Pharmacists (ASHP) and the American College of Clinical Pharmacy (ACCP) mentioned that it is the responsibility of pharmacists to ensure the medication safety including the risk of herb-medication interaction. Hence, some pharmacy schools in America opted to incorporate a curriculum regarding dietary herbal products. In addition, according to our findings, most of the medical and pharmacy students believe that the use of nutritional supplements is always safe, 46.3% and 52.5% respectively. Meanwhile, pharmacy students from the University of Beirut believe that all dietary herbal products must be proven safe and effective before being marketed (Nakhal et al. 2020).

While our study provides valuable insights, it is important to recognize the limitations inherent in our study. One such limitation is the lack of comprehensive evaluation of participants' understanding of dietary supplement consumption. Our approach primarily relied on self-reported data, preventing us from conducting thorough analyses to gauge the reliability and depth of participants' knowledge on this subject matter.

Conclusion

In conclusion, the cross-sectional study showed the prevalence and varying levels of awareness among pharmacy and medical students at the University of Cyberjaya regarding vitamin supplement consumption. This study found that the majority of medical students (60.6%) and pharmacy students (71.3%) have taken nutritional supplements at some point. Future healthcare professionals must receive education to make decisions grounded in objective evidence to meet the needs of patients. With medical and pharmacy students being significant consumers of DS themselves, this study highlights the need for targeted educational interventions to enhance students' awareness and provide evidence-based information about vitamin supplements.

Conflicts of Interest

The authors declare no conflicts of interest.

References

- Abdel-Salam, D. M., Alruwaili, J. M., Alshalan, R. A., Alruwaili, T. A., Alanazi, S. A., & Lotfy, A. M. M. (2020). Epidemiological Aspects of Dietary Supplement use among Saudi Medical Students: A Cross-sectional Study. *The Open Public Health Journal*, *13*(1), 783–790. https://doi.org/10.2174/1874944502013010783
- Alfawaz, H., Khan, N., Alfaifi, A. A., Shahrani, F. M., Tameem, H. M. A., Otaibi, S. F. A., Abudigin, W. I., Al-Shayaa, M. S., Alghanim, S. A., & Al-Daghri, N. M. (2017). Prevalence of dietary supplement use and associated factors among female college students in Saudi Arabia. *BMC Women's Health*, *17*(1). https://doi.org/10.1186/s12905-017-0475-y
- Alhomoud, F., Mohammed, B., & Bondarev, A. D. (2016). Knowledge, Attitudes and Practices (KAP) relating to dietary supplements among health sciences and Non-Health sciences students in one of the Universities of United Arab Emirates (UAE). *Journal of Clinical and Diagnostic Research*. https://doi.org/10.7860/jcdr/2016/19300.8439
- Alim, N. E., Karakaya, R. E., & Fidan, O. T. (2021). Dietary supplement use and knowledge among students from a health science faculty in a Turkish University. *Food Research*, *5*(5), 116–123. https://doi.org/10.26656/fr.2017.5(5).760
- AlTamimi, J. Z. (2019). Awareness of the Consumption of Dietary Supplements among Students in a University in Saudi Arabia. *Journal of Nutrition and Metabolism*, *2019*, 1–10. https://doi.org/10.1155/2019/4641768
- Ashri, M. H. M., Saad, H. A., & Adznam, S. N. (2021). Socio-Demographic Characteristics, Body Weight Status and Energy Intake among Users and Non-Users of Dietary Supplements among Government Employees in Putrajaya, Malaysia. *Nutrients*, *13*(7), 2248. https://doi.org/10.3390/nu13072248
- Axon, D. R., Vanova, J., Edel, C., & Slack, M. (2017). Dietary supplement use, knowledge, and perceptions among student pharmacists. *American Journal of Pharmaceutical Education*, *81*(5), 92. https://doi.org/10.5688/ajpe81592
- Aziz, N. I. S. A., Shafii, N. F. M., Azizam, N. A., & Dzulkiply, M. R. (2020). Influencing Factors in Dietary Supplement Consumption among University Students. *Advances in Business Research International Journal*, *6*(1), 96. https://doi.org/10.24191/abrij.v6i1.9945
- Block, G., Jensen, C. D., Norkus, E. P., Dalvi, T., Wong, L. G., McManus, J. F., & Hudes, M. (2007). Usage patterns, health, and nutritional status of long-term multiple dietary supplement users: a cross-sectional study. *Nutrition Journal*, *6*(1). https://doi.org/10.1186/1475-2891-6-30
- Bukić, J., Rušić, D., Božić, J., Zekan, L., Leskur, D., Perišin, A. Š., & Modun, D. (2018). Differences among health care students' attitudes, knowledge and use of dietary supplements:

a cross-sectional study. *Complementary Therapies in Medicine*, *41*, 35–40. https://doi.org/10.1016/j.ctim.2018.09.005
- Chiba, T., Kobayashi, E., Okura, T., Sekimoto, M., Mizuno, H., Saito, M., & Umegaki, K. (2020). An educational intervention improved knowledge of dietary supplements in college students. *BMC Public Health*, *20*(1). https://doi.org/10.1186/s12889-020-08786-3
- Dickinson, A., & Mackay, D. M. (2014). Health habits and other characteristics of dietary supplement users: a review. *Nutrition Journal*, *13*(1). https://doi.org/10.1186/1475-2891-13-14
- Foote, J., Murphy, S. P., Wilkens, L. R., Hankin, J. H., Henderson, B. E., & Kolonel, L. N. (2003). Factors Associated with Dietary Supplement Use among Healthy Adults of Five Ethnicities: The Multiethnic Cohort Study. *American Journal of Epidemiology*, *157*(10), 888–897. https://doi.org/10.1093/aje/kwg072
- Gardiner, P., Woods, C. R., & Kemper, K. J. (2006). Dietary supplement use among health care professionals enrolled in an online curriculum on herbs and dietary supplements. *BMC Complementary and Alternative Medicine*, *6*(1). https://doi.org/10.1186/1472-6882-6-21
- González, O. M., & Márquez, S. (2009). Use of nutritional supplements in sports: risks, knowledge, and behavioural-related factors. *PubMed*, *24*(2), 128–134. https://pubmed.ncbi.nlm.nih.gov/19593480
- Goston, J. L., & Correia, M. I. T. D. (2010). Intake of nutritional supplements among people exercising in gyms and influencing factors. *Nutrition*, *26*(6), 604–611. https://doi.org/10.1016/j.nut.2009.06.021
- Hs, S. (2014). *Use of nonprescription substances among university students in Malaysia*. Malaysian Journal of Public Health Medicine;: 86-98, 2014. | WPRIM. https://pesquisa.bvsalud.org/portal/resource/pt/wpr-626509
- Iłowiecka, K., Maślej, M., Czajka, M., Pawłowski, A., Więckowski, P., Styk, T., Gołkiewicz, M., Kuzdraliński, A., & Koch, W. (2022). Lifestyle, eating habits, and health behaviors among dietary supplement users in three European countries. *Frontiers in Public Health*, *10*. https://doi.org/10.3389/fpubh.2022.892233
- Joseph, N., Kumar, A., Singh, H., Shaheen, M., Das, K., & Shrivastava, A. (2018). Nutritional supplement and functional food use among medical students in India. *Journal of Dietary Supplements*, *15*(6), 951–964. https://doi.org/10.1080/19390211.2017.1407384
- Kobayashi, E., Sato, Y., Umegaki, K., & Chiba, T. (2017). The Prevalence of Dietary Supplement Use among College Students: A Nationwide Survey in Japan. *Nutrients*, *9*(11), 1250. https://doi.org/10.3390/nu9111250
- Liu, H., Yang, Y., Xu, D., Xia, H., Pan, D., Wang, S., & Sun, G. (2018). Investigation and comparison of nutritional supplement use, knowledge, and attitudes in Medical and Non-Medical students in China. *Nutrients*, *10*(11), 1810. https://doi.org/10.3390/nu10111810
- Mehralian, G. (2014). Knowledge, Attitude and Practice of Pharmacists regarding Dietary Supplements : A Community Pharmacy- based survey in Tehran. *Iranian Journal of Pharmaceutical Research*. https://doi.org/10.22037/ijpr.2014.1601
- Mishra, S., Stierman, B., Gahche, J. J., & Potischman, N. (2021). *Data Brief 399: Dietary supplement use among adults: United States, 2017–2018*. https://doi.org/10.15620/cdc:101131
- Nakhal, S. A., Domiati, S., Amin, M. E. K., & El-Lakany, A. (2020). Assessment of pharmacy students' knowledge, attitude, and practice toward herbal dietary supplements. *Journal of American College Health*, *70*(6), 1826–1830. https://doi.org/10.1080/07448481.2020.1825226
- Naqvi, A. A., Ahmad, R., Zehra, F., Yousuf, R., Kachela, B., & Nadir, M. N. (2018). Dietary supplement use among students of pharmacy colleges in the city of Karachi, Pakistan: prevalence, opinions, and attitudes. *Journal of Dietary Supplements*, *16*(2), 166–178. https://doi.org/10.1080/19390211.2018.1443191
- *Office of Dietary Supplements - Dietary Supplement Health and Education Act of 1994*. (n.d.). https://ods.od.nih.gov/About/DSHEA_Wording.aspx
- Orces, C. H. (2019). The Association between Body Mass Index and Vitamin D Supplement Use among Adults in the United States. *Cureus*. https://doi.org/10.7759/cureus.5721
- Pfeiffer, C. M., Sternberg, M., Schleicher, R. L., & Rybak, M. E. (2013). Dietary Supplement Use and Smoking Are Important Correlates of Biomarkers of Water-Soluble Vitamin Status after Adjusting for Sociodemographic and Lifestyle Variables in a Representative Sample of U.S. Adults. *The Journal of Nutrition*, *143*(6), 957S-965S. https://doi.org/10.3945/jn.112.173021

- Ranelli, P. L., Dickerson, R. N., & White, K. G. (1993). Use of vitamin and mineral supplements by pharmacy students. *American Journal of Health-System Pharmacy*, *50*(4), 674–678. https://doi.org/10.1093/ajhp/50.4.674
- Samreen, S., Siddiqui, N. A., Wajid, S., Mothana, R. A., & Almarfadi, O. M. (2020). Prevalence and Use of Dietary Supplements Among Pharmacy Students in Saudi Arabia *Risk Management and Healthcare Policy*, *Volume 13*, 1523–1531. https://doi.org/10.2147/rmhp.s256656
- Sharma, A., Adiga, S., & Ashok, M. L. (2014). Knowledge, attitude and practices related to dietary supplements and micronutrients in health sciences students. *Journal of Clinical and Diagnostic Research*. https://doi.org/10.7860/jcdr/2014/9329.4683
- Spencer, E. H., Bendich, A., & Frank, E. (2006). Vitamin and Mineral Supplement Use among US Medical Students: A Longitudinal Study. *Journal of the American Dietetic Association*, *106*(12), 1975–1983. https://doi.org/10.1016/j.jada.2006.09.003
- Steele, M., & Senekal, M. (2005). Dietary supplement use and associated factors among university students. *The South African Journal of Clinical Nutrition*, *18*(1), 17–30. https://doi.org/10.1080/16070658.2005.11734034
- Zaki, N. a. M., Rasidi, M. N., Awaluddin, S. M., Hiong, T. G., Ismail, H., & Nor, N. S. M. (2018). Prevalence and characteristic of dietary supplement users in Malaysia: Data from the Malaysian Adult Nutrition Survey (MANS) 2014. *Global Journal of Health Science*, *10*(12), 127. https://doi.org/10.5539/gjhs.v10n12p127
- Žeželj, S. P., Tomljanović, A., Jovanović, G. K., Krešić, G., Peloza, O. C., Dragaš-Zubalj, N., & Prokurica, I. P. (2018). Prevalence, Knowledge and Attitudes Concerning Dietary Supplements among a Student Population in Croatia. *International Journal of Environmental Research and Public Health*, *15*(6), 1058. https://doi.org/10.3390/ijerph15061058