

KNOWLEDGE, ATTITUDE AND PRACTICES RELATED TO DIETARY SUPPLEMENTS AND MICRONUTRIENTS INTAKE AMONG IIUM KUANTAN STUDENTS DURING THE COVID-19 PANDEMIC

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Abstract

Introduction: The emergence of the COVID-19 Pandemic has fundamentally changed many things, including everyday lifestyle and food habits, particularly during the Movement Control Order (MCO). This is also influencing micronutrient intake due to supplement consumption and limited access to foods, which leads to inadequacy and toxicity of micronutrients causing health complications. This study aims to assess the level of knowledge, attitude and practices related to dietary supplements and micronutrients among IIUM Kuantan students during the COVID-19 Pandemic. **Method:** 186 IIUM Kuantan students (male: 50.5%) were randomly chosen from each Kulliyyah using a random stratified sampling technique. The questionnaire, which includes sociodemographic data and questions about knowledge, attitudes, and practices, were provided through an online survey to the students. **Result:** The overall consumption of dietary supplements among the students during the Pandemic (44.6%) increased compared to before COVID-19 (29.0%) occurred. The score of knowledge mean (\pm SD) and attitude mean (\pm SD) levels were moderate for both genders. There was a balanced distribution of high and low levels of practice among students mean (\pm SD), with female students mean (\pm SD) demonstrating a slightly higher level of practice than male students mean (\pm SD). Besides, vitamins (47.3%) have become the most popular supplement among students and the main reason for general health. In addition, there was a significant association between the level of knowledge and attitude ($p = 0.001$), as well as the level of attitude and practice ($p = 0.038$). However, there is no association between knowledge and practice. **Conclusion:** This study indicates that proper education and guidance need to be provided for university students as the majority of KAP scores among male and female students were still at a moderate level.

Keywords: Dietary Supplements, Micronutrients, Knowledge, Attitude, Practices

Introduction

Numerous investigations and discoveries were made during the scientific revolution of the 19th century, particularly the discovery of the vitamin theory, which had a profound effect on human life (Semba, 2012). New studies about vitamins and minerals are still undergoing. Researchers from all around the world laboured actively to find a cure by examining how micronutrient intake affected the immune response and COVID-19 when it unexpectedly emerged in 2019.

Micronutrients are essential for humans to maintain their health by regulating several physiological processes. As a result, vital elements that humans cannot produce adequately must be supplied through diet (Godswill et al., 2020). Additionally, having a healthy nutrient intake when COVID-19 first appeared favours the immune system, which is the only sustainable strategy to survive the COVID-19 condition (Aman & Masood, 2020). However, Radzi et al. (2021) showed that the studies on the level of knowledge and attitude towards dietary supplement intake conducted in Malaysia are limited compared to developed countries, especially among university students. According to Nor Azizam et al. (2022), dietary behaviours are influenced by nutritional knowledge and attitude toward dietary intake and supplementation.

As mentioned by Levine (2011), dietary supplements are commonly consumed in high doses compared to the recommended intake. Encouraging students to eat healthy with enough nutrients, especially micronutrients, and correctly practising dietary supplement intake is very important. Students' confidence should be built with the proper attitude toward dietary supplements by distinguishing between micronutrients and dietary supplements. This is due to the fact that during the COVID-19 Pandemic, the misuse of dietary supplements has increased significantly (Kurniawan & Nur., 2022).

In addition, knowing the demographic characteristics of supplement users, the characteristics of supplement use, and the effects of supplement use could assist public health interventions in limiting the use of unnecessary and costly supplements. (Wiltgren et al., 2015). Thus, the level of practice on the dietary supplement and micronutrient intake is an important thing that needs to be assessed on the IIUM Kuantan students.

Materials and Methods

Subjects

The subjects were 186 respondents from the International Islamic University Malaysia (IIUM) Kuantan campus students from different courses and gender. There were 36 respondents from Kulliyah of Sciences, 36 from Kulliyah of Allied Health Sciences, 50 from Kulliyah of Medicine, 24 from Kulliyah of Nursing, 24 respondents from Kulliyah of Pharmacy and 16 respondents from Kulliyah of Dentistry.

Instruments

An online survey was generated from several previous studies with the concept of adopting and adapting, consisting of true-false questions, yes-no, and open-ended questions (Radzi et al., 2021 & Sharma., 2012). The questionnaire comprises of 3 sections. The first section covered the social-demographic questions, while the second section was on knowledge about dietary supplements and micronutrients. The questions about attitudes toward the dietary supplement and micronutrient intake were in the third section, while the last section focused on the tendency of the student to consume the dietary supplement and micronutrients during the Pandemic.

Study Design

A random stratified sampling technique was used in this cross-sectional study. This study aims to determine the relationship between IIUM Kuantan students' knowledge, attitudes, and practices about dietary supplements and micronutrient intake and the factors and types of supplement use during the COVID-19 Pandemic.

Sampling Method

A random stratified sampling technique was used in this study. A sample size of 180 participants was randomly selected from all of the Kuliyyah at IIUM Kuantan using two sample group calculations. Year 4, postgraduate and international students are excluded from this study and are only focused on undergraduate students.

Statistical analysis

The statistical analysis was done by using Statistical Package for The Social Sciences Version 27 (SPSS 27.0). The data obtained from this study was set with a 95% of confidence interval (CI) at 0.05. The analysis used in this study were descriptive study, independence T-test, Chi-square test and Pearson correlation.

Results

Sociodemographic Data

Table 1 shows the sociodemographics of the IIUM Kuantan students participating in this study. Among the 186 respondents, 93 (49.7%) are male students and 94 (50.3%) are female students. The highest proportion of the respondents was year 3, with 97 (52.2%) students. The students whom COVID-19 has not infected were 105 (56.5%) from all over the kuliyyah in the IIUM Kuantan campus. Most respondents were not taking any supplements before the COVID-19 Pandemic, 123 (66.1%).

Table 1: Sociodemographic of IIUM Kuantan students. (N=186)

Variables	Frequency (n)	Percentage (%)
Gender		
Male	92	50.5
Female	94	49.5
Course study		

Kulliyyah of Allied Health Sciences	36	19.4
Kulliyyah of Dentistry	16	8.6
Kulliyyah of Medicine	50	26.9
Kulliyyah of Nursing	24	12.9
Kulliyyah of Pharmacy	24	12.9
Kulliyyah of Science	36	19.4
Year of study		
1	36	19.4
2	53	28.5
3	97	52.2
Study funding		
PPTN	38	20.4
JPA	46	24.7
Self-Funding	63	33.9
Others	39	21.0
Infected with covid 19		
Yes	81	43.5
No	105	56.5
Supplement Intake before Pandemic		
Yes	54	29.0
No	123	66.1
Not sure	9	4.8

Knowledge level of respondents

From Table 2, a small number of respondents, which is only 5 (2.7%) respondents have a higher level of knowledge about dietary supplements and micronutrient intake, while 40 (21.5%) respondents were in the poor knowledge category. Most IIUM Kuantan students have a moderate understanding of dietary supplements and micronutrients, which was 141 (75.8%).

Table 2: Knowledge category of IIUM Kuantan students

Knowledge	Frequency	Percentage	Mean±SD
Good	5	2.7	
Fair	141	75.8	1.81±0.456
Poor	40	21.5	

The result shown in Table 3, there were no significant differences ($p=0.249$) in scores for female ($M = 2.85, \pm 1.68$) and male respondents ($M = 2.59, \pm 1.42$). The magnitude of the difference (mean difference = 0.26, 95% CI: -0.186 to 0.714) was very small. This shows that both male-female respondents have almost the same level of knowledge regarding dietary supplements

and micronutrient intake.

Table 3: Knowledge category of IIUM Kuantan students

Knowledge	n	Mean	SD	t	p
Female	94	2.85	1.68	1.156	0.249
Male	92	2.59	1.42		

Attitude level of respondents

Based on Table 4, the respondents showed a positive result as the number of respondents who had a good attitude (n = 47, 25.3%) towards dietary supplements and micronutrient intake was higher than the number of students that had a poor level of knowledge (n = 19, 10.2%). However, most of the respondents had a fair (n = 120, 64.5%) attitude on dietary supplements and micronutrient intake as the mean (M= 2.15±0.578) is still in the range of the fair level.

Table 4: Attitude category of IIUM Kuantan students

Attitude	Frequency	Percentage	Mean±SD
Good	47	25.3	
Fair	120	64.5	2.15±0.578
Poor	19	10.2	

Based on Table 5, both male and female respondents have the same level of attitude. The result showed there was no significant differences (p=0.920) in score for both female (M = 3.56, ±1.30) and male (M = 3.54, ±1.46) respondents. Moreover, the magnitude of the differences in the means (mean difference = 0.02, 95% CI: -0.380 to 0.421) was very small.

Table 5: Attitude category of IIUM Kuantan male and female students

Attitude	n	Mean	SD	t	p
Female	94	3.56	1.30	0.100	0.920
Male	92	3.54	1.46		

Practices level of respondents

Based on Table 6, the overall mean score (M = 1.40±0.501) for practising dietary supplements and micronutrient intake is moderate. There is not much of a variation in percentage between the number of respondents in the two groups. This can be seen by the fact that when it comes to practising the consumption of dietary supplements and micronutrient intake, half of the respondents (n = 92, 49.5%) fall into the high-level category, while the other half (n = 94, 50.5%) fall into the low- level category.

Table 6: Practice category of IIUM Kuantan students

Practice	Frequency	Percentage (%)	Mean±SD
Low	94	50.5	1.40±0.501
High	92	49.5	

Based on Table 7, there was no significant difference ($p = 0.085$) between the mean scores for female students ($M = 3.01, \pm 1.04$) and male students ($M = 2.76, \pm 0.92$).

Table 7: Practice category of IIUM Kuantan male and female students

Practice	n	Mean	SD	T	p
Female	94	3.01	1.04	1.733	0.085
Male	92	2.76	0.92		

Figure 1 showed the students' most common dietary supplement consumed was vitamins (47.3%, $n = 88$) while multivitamin/mineral (12.9%, $n = 24$) became the second highest type of supplement consumed by the students.

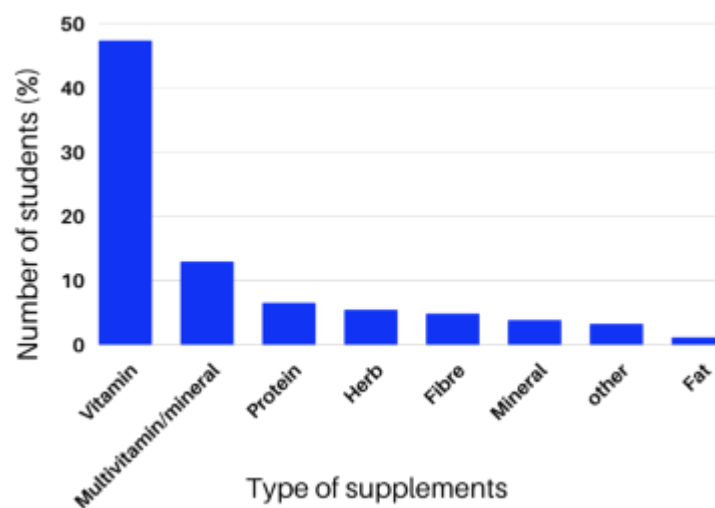


Figure 1: Type of supplements consumption

Figure 2 showed that the primary reason for students to consume the supplement is for their general health (39.8%, $n = 74$). However, both bodybuilding and sports performance shared the same place, becoming the least reason (2.2%, $n = 4$) for the student to consume the supplements.

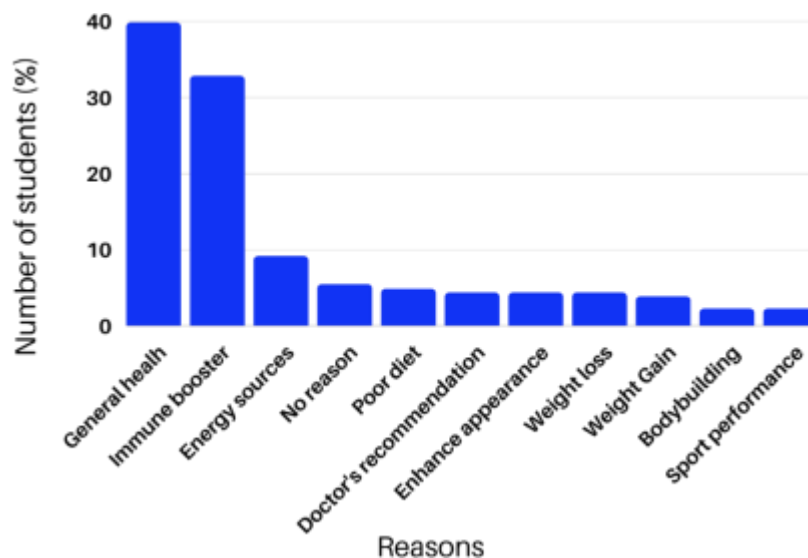


Figure 2: Reason for supplements intake

Based on Table 8, there were significant correlation between knowledge and attitude ($r = 0.252$, $p = 0.001$) and attitude and practice ($r = 0.152$, $p = 0.038$, $p < 0.05$) of dietary supplements and micronutrient intake with weak relationship. However, since the correlation was close to zero and the p-value was more than 0.05, there was no relationship in the association of the other variables.

Table 8: The relationship between knowledge, attitude and practice regarding dietary supplements and micronutrient intake (n = 186)

Item	Correlation, r	p-value
Knowledge - Attitude	0.252	.001
Attitude - Practice	0.152	0.038

Discussion

In this study, most of the respondents' knowledge is moderate for both male and female students. Many false and misleading claims about COVID-19 were made during the first wave of the Pandemic, particularly concerning various micronutrients and treatments that may treat COVID-19, which were widely disseminated online (Van der Linden, Roozenbeek & Compton, 2020). However, the authorities could combat this false information by disseminating health awareness posters, hosting seminars, and conducting live expert discussions on social media.

From the result of this study, only 34 (18.3%) respondents correctly answered the statement that "*Green leafy vegetables are the main dietary sources of vitamin B12*". Cobalamin, known as vitamin B12, is a water-soluble vitamin and is exclusively obtained from animal-based products, as it is absent in plant-based foods (Vincenti, Bertuzzo, Limitone et al., 2021). The deficiency could affect the formation and function of innate and adaptive immune systems, which is essential for our gut microbiome regulation (Vincenti, Bertuzzo, Limitone et al., 2021). The results show that this statement got low correct response scores because people had limited knowledge about micronutrients.

For the students' attitude toward dietary supplements and micronutrient intake during the COVID-19 Pandemic, the finding shows that over half of the students, 120 (64.5%) of both genders are in moderate attitude. Only 78 (30.9%) of the respondents had a positive viewpoint on the claim that taking vitamin D supplements is a better preventative measure for vitamin D deficiency than getting enough sun exposure. Taking a vitamin D supplement instead of increased sun exposure is more effective in treating vitamin D insufficiency (Wu & Chen, 2022). Sun protection is necessary for those with a history of skin cancer as sun exposure has become less effective due to the danger of developing the disease (Martin-Gorgojo, Gilaberte & Nagore, 2021). According to reviews cited in Ali (2020), a vitamin D deficit may impair the respiratory immune system, which could worsen COVID-19 and increase mortality. However, recent research found no correlation between COVID-19 infection and the incidence of vitamin

D deficiency, even for severe deficiency (Bakaloudi & Chourdakis, 2022). Overall, the attitudes toward dietary supplements and micronutrient intake are moderate among male and female respondents.

The intake of dietary supplements among IIUM Kuantan students increased during the COVID-19 Pandemic when compared to before COVID-19. According to this study, female students are more likely to consume dietary supplements ($n = 47, 50\%$) than male students ($n = 36, 39.1\%$). Similarly, to the finding made by Zaki et al. (2014), who discovered that women were substantially more likely than men to take dietary supplements. This is because women could be more conscious of the importance to maintain a healthy life (Dickinson & MacKay, 2014). For the majority of supplement users, vitamins and minerals were the most popular supplement types among IIUM Kuantan students. Radzi, Razak, and Hassan (2021) showed that nearly half of female respondents ($n = 51, 54.3\%$) prefer to take vitamins as their dietary supplements during the COVID-19 Pandemic compared to male students ($n = 37, 40.2\%$). Based on the study about eating behaviour among online learning undergraduates during the COVID-19 Pandemic done by Pung, Tan, Tan and Tan (2021), they found that nearly half of their respondents consumed supplements during the period of online learning with the advice of their parents due to concerns on health. However, the authors did also mention that no dietary supplement has been shown to be effective in preventing COVID-19, therefore it is crucial to use supplements only under the guidance of a medical practitioner.

Lastly, there are several significant associations between knowledge, attitude and practices in dietary supplement and micronutrient intake. The relationship between knowledge and attitudes ($r = 0.252, p = 0.001^*, p < 0.01$) shows a strong association among the students. Subsequently, the awareness and intervention about health should be delivered by the authorities to the public as it is very crucial to avoid any cases of excessive consumption of micronutrients, as well as develop the trust to sustain the public's positive attitudes towards dietary supplements and micronutrient intake. It demonstrated a strong correlation in terms of attitudes and practices. Despite being weak, the association is stronger ($r = 0.152, p = 0.038^*, p < 0.05$) when compared to knowledge and attitudes. However, there is no correlation between knowledge and practice of dietary supplementation intake. This can be explained by the possibility that students may practise taking dietary supplements without having a strong knowledge of micronutrients. Even though there was no correlation between practice and knowledge, educating students to have good information is still important since it can influence their attitudes, which can either influence their good or bad practise with regard to dietary supplement intake.

Conclusion(s)

Overall, both male and female students displayed a moderate level of knowledge and attitude towards supplements and micronutrient intake. The overall mean score for practising dietary supplements and micronutrient intake was also moderate for both genders. According to this study, intakes of dietary supplements and micronutrient increased during the COVID-19 Pandemic compared to intakes prior to the Pandemic. This study also found that students most frequently take vitamins for general health. Lastly, a significant association can be seen

between the level of knowledge and attitude, as well as the level of attitude and practices while there was no significant association found between knowledge and practices regarding dietary supplements and micronutrient intake. Proper education and guidance need to be provided for university students as the majority of KAP scores among male and female students were still at a moderate level.

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References

- Aman, F., & Masood, S. (2020). How Nutrition can help to fight against COVID- 19 Pandemic. *Pakistan Journal of Medical Sciences*, 36(COVID19-S4), S121.
- Bakaloudi, D. R., & Chourdakis, M. (2022). A critical update on the role of mild and serious vitamin D deficiency prevalence and the COVID-19 epidemic in Europe. *Nutrition (Burbank, Los Angeles County, Calif.)*, 93, 111441.
- Godswill, A. G., Somtochukwu, I. V., Ikechukwu, A. O., & Kate, E. C. (2020). Health benefits of micronutrients (vitamins and minerals) and their associated deficiency diseases: A systematic review. *International Journal of Food Sciences*, 3(1), 1-32.
- Kurniawan, A. H., & Nur, A. (2022). IAI SPECIAL EDITION: Effects of health supplement self-medication learning media on health student behaviours during the COVID-19 Pandemic. *Pharmacy Education*, 22(2), 30-35.
- Levine, M., Padayatty, S. J., & Espey, M. G. (2011). Vitamin C: a concentration- function approach yields pharmacology and therapeutic discoveries. *Advances in nutrition (Bethesda, Md.)*, 2(2), 78-88.
- Martin-Gorgojo, A., Gilaberte, Y., & Nagore, E. (2021). Vitamin D and Skin Cancer: An Epidemiological, Patient-Centered Update and Review. *Nutrients*, 13(12).
- Nor Azizam, N. S., Yusof, S. N., Amon, J. J., Ahmad, A., Safii, N. S., & Jamil, N. A. (2022). Sports Nutrition and Food Knowledge among Malaysian University Athletes. *Nutrients*, 14(3), 572.
- Pung, C. Y. Y., Tan, S. T., Tan, S. S., & Tan, C. X. (2021). Eating Behaviors among Online Learning Undergraduates during the COVID-19 Pandemic. *International Journal of Environmental Research and Public Health*, 18(23), 12820.
- Radzi, S. N. A. M., Razak, R. N. H. A., & Hassan, N. F. N. (2021). Dietary Supplements: A Survey Use, Attitudes and Knowledge Among IIUM Kuantan Students. *INTERNATIONAL JOURNAL OF CARE SCHOLARS*, 4(Supplementary 1), 40-47.

Sharma A, Adiga S, M A. (2014). Knowledge, attitude and practices related to dietary supplements and micronutrients in health sciences students. *J Clin Diagn Res.*, 8(8): 10-13.

Semba, R. D. (2012). The historical evolution of thought regarding multiple micronutrient nutrition. *The Journal of nutrition*, 142(1), 143S-156S.

Van der Linden, S., Roozenbeek, J., & Compton, J. (2020). Inoculating Against Fake News About COVID-19 [Perspective]. *Frontiers in Psychology*, 11.

Wiltgren, A. R., Booth, A. O., Kaur, G., Cicerale, S., Lacy, K. E., Thorpe, M. G., ... & Riddell, L. J. (2015). Micronutrient supplement use and diet quality in university students. *Nutrients*, 7(2), 1094-1107.

Wu, S.-E., & Chen, W.-L. (2022). Moderate Sun Exposure Is the Complementor in Insufficient Vitamin D Consumers [Original Research]. *Frontiers in Nutrition*, 9.

Zaki, N. M., Rasidi, M. N., Awaluddin, S. M., Hiong, T. G., Ismail, H., & Nor, N. M. (2018). Prevalence and characteristic of dietary supplement users in Malaysia: data from the Malaysian Adult Nutrition Survey (MANS) 2014. *Glob J Health Sci*, 10(12).