

Differences in knowledge, perception, and use of multivitamins and immunomodulators in health students and non-health students during the COVID-19 pandemic

Andriana Sari^{1*}, and Safira Dewi Ariyani¹

¹Faculty of Pharmacy, Universitas Ahmad Dahlan, Yogyakarta, Daerah Istimewa Yogyakarta, Indonesia

Abstract. Corona Virus Disease 2019 (COVID-19) has been designated by WHO as a global pandemic. Based on the data obtained, the proportion of COVID-19 cases in adolescents is 24.88%. This is because the youth group is considered a non-vulnerable group. One of the efforts to prevent exposure to the coronavirus is to take multivitamins and immunomodulators. This study aims to determine differences in knowledge, perception, and use of multivitamins and immunomodulators in health students and non-health students during the COVID-19 pandemic. This research was conducted using a cross-sectional approach and was conducted in April-June 2021. The subjects in this study were health and non-health students who met the inclusion criteria and exclusion criteria. Data analysis in this study used univariate and bivariate analysis. Data analysis was bivariate using the Independent Sample T-Test. The results showed 181 health students and 87 non-health students. The level of knowledge of health and non-health students is included in the sufficient category. Then the perception of health and non-health students shows a negative perception. Meanwhile, the level of use of health students and non-health students is the type of multivitamin or immunomodulator that is most widely used, which is generic and consumed weekly for the reason of increasing endurance. The results of the bivariate analysis showed that there were differences in the level of knowledge ($p = 0.000$), perception ($p = 0.000$), and use ($p = 0.000$) of multivitamins and immunomodulators among health and non-health students. The conclusion of this study shows that there are differences in the level of knowledge, perception, and use of multivitamins and immunomodulators among health students and non-health students during the COVID-19 pandemic.

* Corresponding author: andriana@pharm.uad.ac.id

1 Introduction

The emergence of the Coronavirus Disease 2019 (COVID-19) has profoundly impacted global health, economies, and social structures, leading the World Health Organization (WHO) to declare it a pandemic on March 11, 2020. This unprecedented health crisis has prompted nations worldwide to implement various public health measures aimed at curbing the spread of the virus. In Indonesia, the first confirmed case of COVID-19 was reported on March 2, 2020, marking the beginning of a challenging journey for the nation as it grapples with the ongoing increase in infection rates and the associated health implications [1]. The rapid transmission of the virus has necessitated a comprehensive understanding of its pathophysiology, particularly its effects on the respiratory system, vascular health, and the immune response [2].

The pathogenicity of COVID-19 is primarily attributed to its ability to invade and compromise the respiratory system, leading to severe respiratory distress and systemic complications. The virus not only targets the lungs but also affects blood vessels and the immune system, thereby exacerbating the severity of the disease [2]. The immune system serves as the body's primary defense mechanism against pathogens, including viruses and bacteria, which can be inadvertently encountered through various means such as touch, ingestion, or inhalation. The integrity and functionality of the immune system are crucial in determining the outcome of viral infections, including COVID-19. Consequently, enhancing the immune response has emerged as a critical strategy in mitigating the effects of the virus and reducing the risk of severe illness [3].

In light of the ongoing pandemic, there has been a growing emphasis on the role of immunomodulators and multivitamins in bolstering the immune system. Immunomodulators are pharmacological agents designed to restore and repair immune function, particularly in individuals whose immune responses are compromised. These agents can also be employed to modulate excessive immune responses that may lead to detrimental effects, such as cytokine storms, which have been observed in severe COVID-19 cases [4]. The therapeutic potential of immunomodulators highlights the importance of targeted interventions aimed at optimizing immune function during viral infections.

Moreover, the consumption of multivitamins has gained attention as a preventive measure against various diseases, including viral infections. Multivitamins are essential compounds that play a vital role in maintaining overall health and well-being. Previous research has indicated that adequate intake of vitamins, minerals, and other nutrients is crucial for supporting immune function and protecting the body against many diseases [5, 6, 7]. The synergistic effects of these nutrients can enhance the body's resilience against infections, thereby underscoring the importance of nutritional interventions in the context of the COVID-19 pandemic.

The COVID-19 pandemic has underscored the necessity of understanding the interplay between viral infections and the immune system. As Indonesia continues to navigate the challenges posed by the pandemic, it is imperative to explore effective strategies for enhancing immune function through the use of immunomodulators and multivitamins. This exploration not only contributes to the body of knowledge regarding COVID-19 but also emphasizes the importance of a holistic approach to health that encompasses both pharmacological and nutritional interventions. The ongoing research in this domain will be pivotal in informing public health policies and individual health practices aimed at mitigating the impact of COVID-19 and future viral outbreaks.

2 Material and Methods

2.1 Types of research

This type of research is observational research with a cross-sectional research design.

2.2 Tools and Materials

Online questionnaire on differences in knowledge, perception, and use of multivitamins and immunomodulators among health students and non-health students during the COVID-19 pandemic.

2.3 Population and Sample

Health and non-health students at Ahmad Dahlan University who are still active during the 2020/2021 Odd Year. The sampling technique was purposive sampling, subjects were selected through the accidental sampling method. The minimum sample size was calculated using the OpenEpi calculator with a confidence level of 90% (Figure 1).

Sample Size for Frequency in a Population

Population size (for finite population correction factor or fpc)(N): 29823
 Hypothesized % frequency of outcome factor in the population (p): 50% +/- 5
 Confidence limits as % of 100 (absolute +/- %)(d): 5%
 Design effect (for cluster surveys-DEFF): 1

Sample Size(n) for Various Confidence Levels

Confidence Level(%)	Sample Size
95%	380
80%	164
90%	269
97%	464
99%	650
99.9%	1045
99.99%	1442

Equation

Sample size $n = [DEFF * N * p(1-p)] / [(d^2 / Z^2 * 1 - \alpha/2 * (N-1) + p(1-p)]$

Results from OpenEpi, Version 3, open source calculator--SSPropor
 Print from the browser with ctrl-P
 or select text to copy and paste to other programs.

Fig. 1. Sample size for frequency in a population using the OpenEpi calculator

2.4 Research Procedure

A questionnaire on differences in levels of knowledge, perception, and use of multivitamins and immunomodulators among health students and non-health students during the COVID-19 pandemic was distributed via social media such as WhatsApp, Line, and Instagram. Respondents who meet the research criteria, namely health and non-health students who are currently studying at Ahmad Dahlan University, fill out the questionnaire completely and are willing to be research subjects will be selected as samples in this study. The questionnaire will go through stages of validation and reliability testing before being used. The questionnaire is expected to be able to measure differences in the level of knowledge, perception, and use of multivitamins and immunomodulators among health students and non-health students during the COVID-19 pandemic.

2.5 Validity and Reliability Test

The questionnaire used has gone through content validation carried out by experts and has gone through content validity using SPSS 24 software. The questionnaire is said to be valid provided that $r_{count} > r_{table}$ and $p\text{-value} < 0.05$ [8]. The questionnaire is said to be reliable or consistent if the Cornbach's alpha value is > 0.600 . Questions that do not meet the validity and reliability test requirements are discarded, and the remaining questions will be rearranged to be used as a research tool. The questions used in the knowledge level section were 10 questions, 14 questions about perception and 5 questions about use. The results of the knowledge level reliability test show reliable or consistent results. The results of the reliability test on the perception questionnaire show that the questions cannot provide reliable or consistent results. Meanwhile, the results of the reliability test on the usage questionnaire show reliable or consistent results.

2.6 Data Analysis

Univariate analysis aims to provide an explanation and description of the characteristics of each research variable. This analysis will produce a frequency distribution and percentage of each variable [9]. Bivariate analysis was carried out on two variables that were thought to have a relationship or correlation [9]. Bivariate data analysis using the Independent Sample T-Test. Independent Sample T-test is a statistical analysis that aims to compare two samples that are not paired with each other. The basis for making decisions on the Independent Sample T-test is if the Sig. (2-tailed) > 0.05 then H_0 is accepted and H_a is rejected, which means there is no difference. Meanwhile, if the Sig. (2-tailed) < 0.05 then H_0 is rejected and H_a is accepted, which means there is a difference [10].

3 Results and Discussion

3.1 Respondent Demographics

3.1.1 Respondent demographics by faculty

Table 1. Frequency distribution by faculty

Students	N	%
Health Students		
Faculty of Pharmacy	150	55.97
Faculty of Public Health	21	7.84
Medical School	10	3.73
Total	181	
Non-Health Students		
Faculty of Letters, Culture, and Communication	2	0.75
Faculty of Applied Science and Technology	4	1.49
Faculty of Economic and Business	11	4.10
Faculty of Islamic	4	1.49
Faculty of Psychology	7	2.61
Faculty of Law	1	0.37
Faculty of Teacher Training and Education	23	8.58
Faculty of Industrial Technology	35	13.07
Total	87	100

3.1.2 Respondent Demographics Based on Gender, Age, and Semester

Table 2. Distribution of Respondent According to Gender, Age, and Semester

	n	%
Gender		
Male	52	19.40
Female	216	80.60
Age		
≤ 19 Years old	78	29.10
20 years old	33	12.31
21 years old	73	27.24
≥ 22 Years old	84	31.35
Semester		
Semester 2	42	15.67
Semester 4	39	14.55
Semester 6	64	23.88
Semester 8	123	45.90

3.2 Description of Respondent's Level of Knowledge

Table 3. Distribution of Students Knowledge Level Questionnaire Results

No	Questions	Answer		
		Yes (%)	No (%)	Don't know (%)
KNOWLEDGE				
1	Is an immunomodulator a drug that can repair a human immune system whose function is disturbed?	196 (73.13)	15 (5.60)	57 (21.27)
2	Do you think using multivitamins is always safe?	110 (41.04)	153 (57.09)	5 (1.87)
3	Do you think the use of immunomodulators is always safe?	60 (22.39)	143 (53.36)	65 (24.25)
4	Can multivitamins prevent infection with COVID-19?	193 (72.01)	55 (20.53)	20 (7.46)
5	Can immunomodulators prevent infection with COVID-19?	167 (62.31)	32 (11.94)	69 (25.75)
6	Do you think drugs, food, and drinks interact with multivitamins if taken together?	168 (62.69)	58 (21.64)	42 (15.67)
7	Do you think drugs, food, and drinks interact with immunomodulators if consumed together?	132 (49.25)	46 (17.16)	90 (33.59)
8	Have you ever attended a health seminar about multivitamins?	38 (14.18)	227 (84.70)	3 (1.12)
9	Have you ever attended a health seminar on immunomodulators?	28 (10.45)	237 (88.43)	3 (1.12)

Table 4. Frequency Distribution of Student Knowledge Levels

		Health Students		Non-Health Students	
		n	%	n	%
Knowledge Level	Good	26	14.36	2	2.30
	Enough	19	10.50	3	3.45
	Not Enough	136	75.14	82	94.25
Total		181	100	87	100

The research results showed that 14.36% of health student respondents fell into the good knowledge category, 10.50% of respondents fell into the sufficient knowledge category, and 75.14% of respondents fell into the low knowledge category (Table 3). Meanwhile, for non-health students, 2.30% of non-health student respondents were in the good knowledge category, 3.45% were in the sufficient knowledge category, and 94.25% of respondents were in the low category. From this Table 4, it can be seen that in general the level of knowledge of health students is greater than that of non-health students.

3.3 Description of Student Perception Level

Table 5. Distribution of student perception level questionnaire results

No	Question	Answers				
		SS (%)	S (%)	R (%)	TS (%)	STS (%)
1	Multivitamins are useful for preventing COVID-19	36 (3.43)	187 (69.78)	33 (12.31)	9 (3.36)	3 (1.12)
2	Immunomodulators are useful for preventing COVID-19	33 (12.31)	158 (58.96)	68 (25.37)	8 (2.99)	1 (0.37)
3	Multivitamins are useful for treating COVID-19	32 (11.94)	158 (58.96)	56 (20.90)	21 (7.83)	1 (0.37)
4	Immunomodulators are useful for treating COVID-19	27 (10.08)	145 (54.10)	83 (30.97)	13 (4.85)	0 (0)
5	Multivitamins are beneficial for all ages	50 (18.66)	157 (58.58)	41 (15.30)	19 (7.09)	1 (0.37)
6	Adverse events from multivitamins should be reported to a doctor or pharmacist	153 (57.09)	103 (34.43)	12 (4.48)	0 (0)	0 (0)
7	Adverse events from immunomodulators should be reported to a doctor or pharmacist	147 (54.85)	103 (34.43)	18 (6.72)	0 (0)	0 (0)
8	Health workers need to promote the use of multivitamins	95 (35.45)	154 (57.46)	18 (6.72)	1 (0.37)	0 (0)

According to Azwar [11], perception measurement criteria consist of positive perceptions and negative perceptions. Positive perception if the T score value obtained by the respondent from the questionnaire is $\geq T$ mean, and negative perception if the T score value obtained by the respondent from the questionnaire is $\leq T$ mean. The frequency distribution based on the level of perception among health students and non-health students at Ahmad Dahlan University can be seen in the following Table 6.

Table 6. Frequency distribution of student perception levels

Level of Perception	T Score Respondent	T Mean	Information
Health Student	4.11	4.256	Negatives
Non-Health Students	3.89	4.256	Negatives

Table 6 shows that the level of perception of multivitamins and immunomodulators among health students has a T score of $4.11 < 4.256$, which means that health students have a negative perception of multivitamins and immunomodulators during the COVID-19 pandemic. Likewise, the level of perception of multivitamins and immunomodulators among non-health students has a T score of $3.89 < 4.219$, which means that non-health students have a negative perception of multivitamins and immunomodulators during the COVID-19 pandemic.

3.4 Overview of Student Usage Levels

Table 7. Frequency Distribution of Multivitamin and Immunomodulator Use Levels

Usage Level	Health Students	Non-Health Students
1 time a day	45	12
Weekly	50	13
Monthly	42	20
Never	12	17
Not sure whether or not you have used multivitamins or immunomodulators in the last 3 months	32	25
Total	181	87

Table 7 shows the distribution of levels of multivitamin and immunomodulator use among health students and non-health students. For health students, the highest level of use is weekly. Meanwhile, non-health students were not sure if they had used multivitamins or immunomodulators in the last 3 months. The level of use of multivitamins and immunomodulators is related to the level of knowledge regarding the use of multivitamins and immunomodulators during the COVID-19 pandemic. The level of knowledge is a factor that can influence the level of use of multivitamins and immunomodulators during the pandemic.

Table 8. Frequency Distribution of Types of Multivitamin and Immunomodulator Use

Multivitamin or Immunomodulator type	Health Students	Non-Health Students
Generic	108	34
Branded	15	2
Both of them	32	7
Don't know	12	30
Do not use multivitamins or immunomodulators	14	14
Total	181	87

Table 8 shows the distribution of types of use of multivitamins and immunomodulators among health students and non-health students, types of multivitamins and immunomodulators among health students and non-health students, namely multivitamins or generic immunomodulators are most widely used by health students and non-health students. Generic medicines are most widely used by students because generic medicines have prices that are quite pocket-friendly for students.

Table 9. Frequency Distribution of Reasons for Using Multivitamins and Immunomodulators

Reason for Use	Health Students	Non-Health Students
Increase body resistance	125	42
Strengthens immunity	33	22
Improves general health	21	16
Improve nutrition	2	6
Strengthens athletic performance	0	1
Total	181	87

Table 9 shows the distribution of reasons for using multivitamins and immunomodulators among health and non-health students, the reason for using multivitamins and immunomodulators among health students and non-health students is increasing the immune system which is most expected by health and non-health students. Increasing body endurance is most hoped for by students because increasing body endurance does not hinder all activities carried out by health and non-health students.

Table 10. Frequency Distribution of Side Effects from Multivitamins and Immunomodulators

Side Effects	Health Students	Non-Health Students
No, I did not experience any unexpected side effects	161	62
Not applicable because I do not use multivitamins/immunomodulators	16	23
I suffered from side effects such as diarrhea, hair loss, muscle weakness, and loss of appetite. But I'm not sure if it's related to the use of multivitamins or immunomodulators	1	1
Yes, I suffered from side effects such as diarrhea, hair loss, muscle weakness, and loss of appetite	3	1
Total	181	87

Table 10 shows the distribution of side effects from multivitamins and immunomodulators among health and non-health students. The reason for using multivitamins and immunomodulators among health and non-health students is that there are no unexpected side effects for health and non-health students. Unexpected side effects do not occur among students because unexpected side effects will appear when the use of multivitamins or immunomodulators is not in the appropriate dosage and the use is prolonged.

3.5 Differences in Levels of Knowledge

Table 11. Results of the Knowledge Difference Test

Independent Sample T-Test				
		t	df	Sig. (2-tailed)
Differences of Knowledge	Equal variances assumed	6.665	266	.000
	Equal variances not assumed	7.005	193.294	.000

Based on the calculation results of the Independent Sample T-test differences presented in Table 11, it is known that the sig. (2-tailed) of 0.000. These results show that $p < 0.05$ means there is a difference in the level of knowledge of multivitamins and immunomodulators between health students and non-health students during the COVID-19 pandemic. The results of this study are in line with previous research conducted by Kusumastuti [12], previous results stated that the level of knowledge of health and non-health students was different because non-health students gained knowledge about the meaning, how to use, dosage, interactions and side effects of vitamins and minerals. usually only obtained through incomplete product packaging.

The current research aligns with the findings of Evans et al. [13], which indicate that health students possess a greater understanding of dietary supplements, and their safety compared to their non-health counterparts. This disparity is attributed to the specialized coursework that health students undertake, which equips them with comprehensive knowledge regarding the use of supplements. Supporting this, Sharma (2014) conducted a study in India that revealed health students had the highest percentage of knowledge regarding dietary supplements, further emphasizing the educational impact on their understanding [14]. Moreover, Notoatmodjo posits that access to information significantly influences knowledge levels [15]. Despite this, several studies have reported a general lack of detailed knowledge about dietary supplements among both health and non-health students. For instance, Wheatley and Spink (2013) noted that health students often hold only a rudimentary understanding of supplements, lacking insights into product efficacy, appropriate dosages, and potential adverse effects [16]. This suggests that while health students may have more information, their knowledge is not exhaustive, highlighting a critical gap in education regarding the complexities of supplement use. The difference in knowledge levels between health and non-health students can be attributed to the additional resources available to health students, including information from health seminars and workshops outside of their formal education. This exposure enhances their understanding of multivitamins and immunomodulators, which are often discussed in health-related contexts. In contrast, non-health students may not have similar opportunities to engage with this information, leading to a disparity in knowledge and attitudes toward dietary supplements. In conclusion, while health students demonstrate a higher level of awareness regarding dietary supplements due to their educational background and additional resources, there remains a significant need for improved knowledge across both groups, particularly concerning the efficacy and safety of these products.

3.6 Differences in Perception of Levels Between Health on Non-Health Students

Table 12. Results of Differences in Perception

Independent Sample T-Test				
		t	Df	Sig. (2-tailed)
Differences of Perception	Equal variances assumed	4.256	266	.000
	Equal variances not assumed	4.219	166.078	.000

Based on the calculation results of the Independent Sample T-Test difference test presented in Table 12, it is known that the sig. (2-tailed) of 0.000. These results show that $p < 0.05$ means there are differences in perceptions of multivitamins and immunomodulators between health students and non-health students during the COVID-19 pandemic. Perceptions can be categorized into two categories, namely positive and negative perceptions [11]. Based on research conducted by Lamboan (2020), the public has a good perception regarding preventing the current coronavirus (COVID-19) outbreak [17]. This is also in line with research by Abdelrahman (2020) which shows that people in Qatar have a good perception of preventing the coronavirus [18]. Health students have a positive perception because health students have a better level of knowledge about food supplements than non-health students. So health students will recommend the use of food supplements [19]. One factor that influences differences in perception is experience. Past experiences or things that are already understood can cause differences in interpretation for each person [20].

3.7 Differences in Levels of Use of Health and Non-Health Students

Table 13. Results of the Differences Use Test

Independent Sample T-Test				
		t	df	Sig. (2-tailed)
Differences of Use	Equal variances assumed	5.969	266	.000
	Equal variances not assumed	5.820	159.326	.000

Based on the calculation results of the Independent Sample T-Test difference test presented in Table 13, it is known that the sig. (2-tailed) of 0.000. These results show that $p < 0.05$ means there is a difference in the level of use of multivitamins and immunomodulators between health students and non-health students during the COVID-19 pandemic. Several factors can influence the level of supplement use, one of which is information [21, 22]. In this study, the level of use of multivitamins and immunomodulators among health students and non-health students showed a significant difference because health students had more information regarding the importance of using multivitamins and immunomodulators during the COVID-19 pandemic. Meanwhile, non-health students have less information regarding the importance of using multivitamins and immunomodulators during the COVID-19 pandemic. This level of use is related to the level of knowledge possessed by health students and non-health students. Experience can influence the use of supplements due to consumption reasons, complaints, and reasons for purchasing supplements as a way to prevent COVID-19.

4 Conclusion

It was concluded that there were significant differences in the level of knowledge, perception, and use of multivitamins and immunomodulators between health and non-health students. The factor that influences differences in levels of knowledge is information, then the factor that influences differences in perception and use is experience.

References

1. Kementerian Kesehatan Republik Indonesia, *Situasi Terkini Perkembangan Coronavirus Disease (COVID-19) 2 Maret 2020*. (2020)
2. J. Witkoś and M. Hartman-Petrycka, The use of dietary and protein supplements by women attending fitness clubs on a recreational basis and an analysis of the factors influencing their consumption. *Centr. Europ. J. of Sport Sci. and Med.* **39**, 27 (2022)
3. P. Louca, et al., Dietary supplements during the covid-19 pandemic: insights from 1.4m users of the covid symptom study app - a longitudinal app-based community survey. (2020)
4. C. Pung, S. Tan, & C. Tan, Eating behaviors among online learning undergraduates during the covid-19 pandemic. *Int. J. of Environ. Res. and Pub. Health* **18**, 12820 (2021)
5. M. Shamsi, A. Vahed, A. Hekmatikar, & K. Suzuki, Combined effects of exercise training and nutritional supplementation in cancer patients in the context of the covid-19: a perspective study. *Frontier. in Nutri.* **9**, (2022)
6. C. Tan, et al., Cohort study to evaluate the effect of vitamin d, magnesium, and vitamin b12 in combination on progression to severe outcomes in older patients with coronavirus (covid-19). *Nutri.* **79-80**, 111017 (2020)
7. Z. Uzdil, S. Kaya, & F. Çakiroğlu, Evaluation of nutritional habits of university students: a cross-sectional study during the covid-19 pandemic. *İnönü Üniversitesi Sağlık Hizmetleri Meslek Yüksek Okulu Dergisi* **9**, 10 (2021)
8. A. Mousavi, A. Keramat, K. Vakilian, & S. Vardanjani, Development and adaptation of iranian youth reproductive health questionnaire. *ISRN Obs. and Gynecol.* **2013**, 1 (2013)
9. Z. Arif and A. Azhar, Covid-19 pandemic: impact on skill improvement of the indonesian teachers in using online learning applications. *ELS J. on Interdisciplin. Studi. in Hum.* **4**, 400 (2021)
10. O. Bolarinwa, O. Olagunju, T. Babalola, & B. Saeed, Socio-demographic predictors of adherence to 2019 coronavirus prescribed recommendations and lockdown psychological impacts: perspectives of nigerian social media users. *J. of Pub. Health. Res.* **9**, (2020)
11. S. Azwar, *Sikap Manusia Teori dan Pengukurannya*, 155, (Pustaka Pelajar, Yogyakarta, 2010)
12. T. Kusumastuti, A.T. Widodo, & S. Haryanti, *Perbedaan tingkat pengetahuan mahasiswa kesehatan dan non kesehatan di wilayah tembalang terhadap penggunaan vitamin dan mineral*, Sekolah Tinggi Ilmu Farmasi Yayasan Pharmasi. (2011)
13. E. Evans, E. Redmond, N. Alwan, & S. Ilić, Awareness and attitudes of student dietitians in lebanon, uk and usa towards food safety. *Foods*, **10**, 1875 (2021)

14. A. Sharma, M.A. Adiga S, Knowledge, attitude and practices related to dietary supplements and micronutrients in health sciences students. *J. Clin. Diagn. Res.* **8**, (2014)
15. S. Notoatmodjo, S. *Ilmu Perilaku Kesehatan*, (Rineka Cipta, Jakarta, 2014)
16. V. Wheatley and J. Spink, Defining the public health threat of dietary supplement fraud. *Compre. Rev. in Food Sci. and Food Safe.* **12**, 599 (2013)
17. M.V. Lamboan, A.A. Rumayar, and C.K.F. Mandagi, Gambaran persepsi masyarakat tentang pencegahan Covid-19 di kelurahan Talikuran Utara Kecamatan Kawangkoan Utara. *Kesmas.* **9**, 111 (2020)
18. M. Abdelrahman, Personality traits, risk perception, and protective behaviors of arab residents of Qatar during the covid-19 pandemic. *Int. J. of Mental. Health. and Addict.* **20**, 237 (2020)
19. J. Bukic, et al., Community pharmacists' use, perception and knowledge on dietary supplements: a cross sectional study. *Pharm. Pract.* **19**, 2251 (2021)
20. S. Notoatmodjo, *Metodologi Penelitian Kesehatan*, (Rineka Cipta, Jakarta, 2010)
21. R. Antari, Y. Anggraeny, N. Krishna, A. Putri, M. Ulum, & E. Wina, Effect of protected calcium salts of fatty acid-amino acid on growth rate of young ongole crossbred bulls. *Indian J. of Anim. Res.* (2022)
22. P. Ziarati, S. Tajik, and L. Cruz-Rodriguez, A Nutraceuticals with high antioxidant properties based on fruits and medicinal plants. *Biological. environ. pollut.* **3**, 15 (2023)