Dietary Supplement Consumption and Mental Health in Indonesian Adults During Second Wave of COVID-19 Pandemic

by Arifa Mustika

Submission date: 18-Aug-2023 03:28PM (UTC+0800)
Submission ID: 2147456446
File name: in_Indonesian_Adults_During_Second_Wave_of_COVID-19_Pandemic.pdf (1.99M)
Word count: 7641
Character count: 40627

Patient Preference and Adherence

Dovepress
open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

Dietary Supplement Consumption and Mental Health in Indonesian Adults During Second Wave of COVID-19 Pandemic

Junaidah Yusof[1,*], Annette d'Arqom[2,3,*], Amalia Putri Andriani[4], Mhd Zamal Nasution[5], Nurmawati Fatimah[2,3], Arifa Mustika[2,3], Samsriyaningsih Handayani[6], Sharifah Zamiah Syed Abdul Kadir[7]

[1]School of Human Resource Development & Psychology, Faculty of Social Sciences & Humanities, Universiti Teknologi Malaysia, Johor Bahru, Malaysia; [2]Division of Pharmacology and Therapy, Department of Anatomy, Histology, and Pharmacology, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia; [3]Airlangga Research Group for Translational Medicine and Therapeutic, Universitas Airlangga, Surabaya, Indonesia; [4]Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia; [5]Postgraduate School, Universitas Airlangga, Surabaya, Indonesia; [6]Department of Public Health and Preventive Medicine, Faculty of Medicine, Universitas Airlangga Surabaya Indonesia; [7]Department of Pharmacology, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia

*These authors contributed equally to this work

Correspondence: Annette d'Arqom, Division of Pharmacology and Therapy, Department of Anatomy, Histology, and Pharmacology, Faculty of Medicine, Universitas Airlangga, Jl. Mayjen Prof. Dr. Moestopo 47, Surabaya, 60131, East Java, Indonesia, Email annette-d-a@fk.unair.ac.id

Purpose: This study aimed to measure supplement consumption behavior and mental health status among Indonesian adults during the second year of COVID-19.

Participants and Methods: Online questionnaire regarding supplement consumption, and Depression, Anxiety, Stress Scale 21 (DASS-21) was distributed from March to June 2021 and obtained 1006 valid and completed questionnaires. Descriptive and inferential analyses were conducted to determine the frequency and predictor factors of the respondents' supplement consumption behavior and mental health status.

Results: Respondents were divided into two groups, vulnerable and non-vulnerable individuals. The finding showed that 34.5% respondents were vulnerable individuals, including the elderly and those with comorbid disease(s). The vulnerable and non-vulnerable groups exhibited a high prevalence of supplement consumption, with the vulnerable group demonstrating a greater tendency for regular use. The incidence of mental health problems in both groups did not significantly differ (23–38%), where anxiety was higher than depression and stress. Supplement consumption was associated with mental health status. Several positive predicting factors for supplement consumption behavior included older age, higher economic status, and higher education. While the younger age and unmarried respondents were more likely to develop mental health problems.

Conclusion: Taken together, given dietary supplement consumption increased during the pandemic and the potential associations between supplement consumption and mental health, controlling the correct information and regulation regarding supplements, especially their risks and benefits, was important. Additionally, support for mental health issues was necessary, since it might affect self-medication behavior.

Keywords: anxiety, COVID-19, depression, mental health, minerals, stress, vitamins

Introduction

People worldwide have been dealing with the COVID-19 outbreak for almost three years. While the situation is becoming better with high vaccination coverage,[1] epidemiologists are still endeavoring to understand the clinical features of COVID-19, while many researchers and pharmaceutical companies have been developing antivirus medications and more effective vaccines to combat the SARS-CoV-2 virus.[2] The high rate of COVID-19 transmission poses a significant threat to society and the global economy.

Received: 19 May 2023
Accepted: 5 July 2023
Published: 24 July 2023

The number of confirmed cases and deaths was increasing worldwide.[3] According to the WHO report, on January 19, 2021, COVID-19 was responsible for a total of 93,956,883 confirmed cases and 2,029,084 deaths worldwide, including Indonesia.[4] These numbers continued to increase, as of September 2022; WHO reported 601,189,435 confirmed cases and 6,475,346 deaths. At the beginning of the second-year of the pandemic, the Indonesian government reported a total of 751,270 confirmed cases of COVID-19 with 22,329 deaths. However, six months later, the confirmed cases increased by 150% and the fatality increased by 140% to 1,950,276 confirmed cases and 53,753 deaths. Similar to the global trend, in September 2022, the number of confirmed cases in Indonesia was 6,366,518 with 157,608 deaths. The peak of delta variant cases was 56,757 on 15 July 2021, while omicron on 16 February 2022 totaled 64,718 cases.[5]

Understanding anxiety regarding COVID-19 is vital to take preventive measures in the community and as a guide for the pandemic or catastrophic events to come. Those who report stress related to COVID-19 take more preventive measures and are more likely to use drugs and herbs as prevention.[6] Nevertheless, despite the absence of proven drugs for COVID-19, information regarding potential anti-COVID medications has proliferated through social media and news outlets.[7] Pressure from the pandemic and internet misinformation, encouraged people to buy and stockpile drugs leading to the shortage of essential vitamins and other over-the-counter medication.[6] However, individuals taking drugs on their own initiative may lead to drug resistance problems, especially antibiotics, and increase morbidity rate.[8] In Indonesia, anti-COVID-19 self-medication, and supplements and natural products consumption increased among mothers with school-age children, and this consumption was not associated with mental health status.[9]

Furthermore, despite numerous ongoing investigations into virus identification, clinical manifestations, and diagnosis of COVID-19, establishing effective treatment for the disease remains elusive.[10] With no effective treatment yet, experts recommend the intake of vitamins, minerals and herbal medicines to boost the immune system to lower the risk and levels of infection severity.[6] Supplementation with certain vitamins (such as vitamins A, B, C and D), minerals (such as selenium, zinc and iron), and omega-3 fatty acids can be used as a treatment option for patients with COVID-19 and as preventive therapy against lung infections and individuals other medical complications.[11] Supplementation can be a potential source to provide a safe, effective, and cost-effective way to reduce the risk of infection, symptom severity and duration of recovery with minimal side effects.[4] The Indonesian government also provides free medications for patients with asymptomatic COVID-19, which are multivitamins and minerals (vitamins C, B and E, and zinc) for 14 days or vitamins C and D for 14 days. However, for mild cases, the free medications are similar to those of an asymptomatic patient with the addition of favipiravir or molnupiravir and paracetamol if necessary.[12]

The current phenomenon has an impact on the use of drugs and supplements. One US study reported increasing supplement consumption among the elderly, such as zinc and vitamin C.[13] Sales of dietary supplements and nutraceuticals in the US showed an annual growth of around 5% ($345 million) in 2019. Nevertheless, during the six weeks before April 5, 2020, the growth increased by 44% ($435 million) compared with the same period in 2019.[14] Higher demand and consumption were also reported in several countries, including Sweden, Poland and Indonesia.[9,15,16] In a survey involving several countries, the consumption of ginger, garlic, red onions, turmeric and lemon also increased during the pandemic.[13] This consumption was influenced by sociodemographic factors, including sex, education, age, and having chronic diseases.[17]

Therefore, this study aimed to measure the supplement consumption behavior and mental health status of Indonesian adults, especially the vulnerable population during the second wave pandemic in Indonesia. Moreover, its association with sociodemographic factors was explored. The relation between supplement consumption behavior and mental health status was also analyzed.

Materials and Methods

Ethical Clearance

This cross-sectional study on supplement consumption and mental health status in the Indonesian adult population during the second wave pandemic was conducted from March to June 2021. The ethical clearance was issued by the Health Research Ethics Committee, Faculty of Medicine, Universitas Airlangga (No. 86/EC/KEPK/FKUA/2021). This study

followed the Declaration of Helsinki and Checklist for Reporting Results of Internet E-Surveys (CHERRIES) guidelines,[18] including multiple submission prevention.

Study Design and Data Collection

This study was conducted online throughout Indonesia, with a center in Surabaya, East Java. The questionnaire (www.surveyplanet.com) was distributed online using the convenience sampling method through email and social media, mainly WhatsApp. The study aims, the questionnaire consent, and the anonymous response publication were provided at the beginning of the survey. The respondent's consent was given by clicking YES before beginning the survey. Respondents comprised Indonesian adults, older than 18 years old, with and without comorbidity, and residing in Indonesia during the second wave of the COVID-19 pandemic. The exclusion criterion was incomplete submission. The minimum sample size was 385 respondents (5% margin of error at 95% confidence level, with 185 million Indonesian adult population).[19]

Survey Instrument

To measure respondents' medications or supplementation and their mental health, a set of questionnaires containing three sections was distributed online. The sections comprised basic demographic information, supplement consumption, and measurement of mental health status using the Depression, Anxiety, and Stress Scales 21 (DASS-21) (Table S1). The sections of supplement consumption behaviors were developed by a medical doctor and evaluated by three experts, two pharmacologists and a social science expert. Translation of DASS-21 was adopted from a related study in Indonesia and reviewed by a psychiatrist and medical doctors.[9] Face validity was tested in this study since it is crucial to determining the questionnaires' overall validity. About 20 respondents were surveyed to reflect their level of understanding of the questions, including the wording and format. This step has been done to ensure that the potential respondents' and expert opinions on the items are consistent.[20] As a result, all respondents provided favorable responses to each item based on feedback received throughout the face validity process, and they all agreed that no jargon words had been included in the questionnaire. Due to this, it agrees with the expert's assessment.

Analytical Procedure

Respondents were divided into two groups based on their health status; the vulnerable population included adults with comorbid diseases such as metabolic syndrome, obesity, hypertension, diabetes mellitus, cardiovascular diseases, respiratory diseases, cancer, immunology and hematology diseases including thalassemia, lupus erythematosus syndrome, hemophilia, leukemia etc. The elderly was included in this population because several studies showed a correlation between age and the severity of COVID-19.[21,22] Supplement consumption was divided into routinely consumed, not routinely consumed, and never consumed.[23] The DASS-21 responses were calculated following the guidelines for each category: depression, anxiety and stress. Total DASS-21 scores were obtained and divided in five groups of severity, ie, normal, mild, moderate, severe and extremely severe. Data were processed and analyzed using Microsoft Excel and SPSS 24.0 (IBM, Chicago, IL, USA). Graphs were visualized using GraphPad Prism 5.0. Descriptive statistical analyses were performed, including the frequency for each categorical variable. To investigate the predictors of supplement consumption and mental health status, binary logistic regression with 95% confidence intervals (95% CIs) were calculated. In the multivariate analyses, the dependent variables were categorized into two groups. The first group consisted of individuals who had ever consumed supplements, classified as either routine or non-routine consumers. The second group comprised individuals who had never consumed supplements. Lastly, respondents were categorized based on the presence or absence of mental health problems. All models were mutually adjusted for all potential confounders, such as age, sex, marital status, work, economic status, education, religion, and vulnerability. The dummy variables included sex, marital status, work, and vulnerability. Moreover, associations among supplement consumption and mental health status were measured using the chi-square test with Monte Carlo analysis. Significance was defined as a p-value <0.05. The reliability measurement on the survey data showed a Cronbach Alpha coefficient 0.903 for depression, 0.849 for anxiety and 0.883 for stress with nonnormal data distributions.

Results

Characteristics of Respondents

One thousand nine respondents visited the informed consent page, and 1006 completed questionnaires were received and valid for use in the final analysis; the completion rate was 99.7%. Three hundred forty-seven respondents were self-described as a vulnerable population (34.5%), and 659 respondents were self-described as a nonvulnerable population (65.5%). The respondents' ages varied from 18 to >60 years old, with most of the respondents in the nonvulnerable population aged 18 to 25 years, while in the vulnerable population the majority were elderly (37.5%) followed by 18 to 25 years old (16.7%). In terms of marital status, the distribution of married and unmarried respondents was almost similar, even though the unmarried/single slightly higher in the non-vulnerable group. Most respondents in both groups graduated from high school or had obtained bachelor's degrees. Moreover, self-reported economic status was average in both groups. All respondent demographic factors are displayed in Table 1. Three hundreds seven of the total 1006 participants (30.5%) presented comorbidities, with metabolic syndrome in first place, including cardiovascular diseases (35.9%), obesity (20.3%) and diabetes mellitus (12.9%), followed by respiratory diseases such as asthma and chronic obstruction pulmonary diseases (15.6%) (Figure 1A).

Table 1 Sociodemographic Characteristics of the Respondents

	Vulnerable Population (n=347)	Nonvulnerable Population (n= 659)
Age		
18–25 y.o	58 [16.7]	346 [52.5]
26–35 y.o	47 [13.5]	108 [16.4]
36–45 y.o	41 [11.8]	116 [17.6]
46–55 y.o	54 [15.6]	61 [9.3]
56–60 y.o	17 [4.9]	28 [4.2]
>60 y.o	130 [37.5]	
Sex		
Male	106 [30.5]	186 [28.2]
Female	241 [69.5]	473 [71.8]
Marital Status		
Single	174 [50.1]	389 [59]
Married	173 [49.9]	270 [41]
Work		
Unemployed	213 [61.4]	383 [58.1]
Employed	134 [38.6]	276 [41.9]
Economic Status		
Below average	42 [12.1]	77 [11.7]
Average	256 [73.8]	512 [77.7]
Above average	49 [14.1]	70 [10.6]

(Continued)

Table 1 (Continued).

	Vulnerable Population (n=347)	Nonvulnerable Population (n= 659)
Education		
Below high school	58 [16.7]	12 [1.8]
High school	94 [27.1]	287 [43.6]
Undergraduate	135 [38.9]	286 [43.4]
Postgraduate	60 [17.3]	74 [11.2]
Religion		
Majority	289 [83.3]	580 [88]
Nonmajority	58 [16.7]	79 [12]

Supplement Consumption

The results showed that most respondents in both groups consumed vitamins, minerals and natural products as supplements during the COVID-19 pandemic. A significant difference was noted between the two groups concerning consuming supplements, as the vulnerable population consumed the supplements more routinely than the nonvulnerable population (42.7 vs 33.1%, p =0.003). On the other hand, more respondents in the nonvulnerable groups never consumed supplements for COVID-19 prevention as shown in Table 2 (17.3% vs 11.5%). The majority of respondents consumed vitamin C (29%), multivitamins and minerals (19.9%), honey (16.9%), herbs (13.2%), vitamin D (10.3%), zinc (5.7%) and others (5%) (Figure 1B).

The main reason for this consumption was to maintain the immune system (91.5%) during the massive and outbreak of COVID-19. Moreover, the respondents felt positive effects after consuming supplements, including feeling healthier and fitter (52.9%), while 23.1% agreed that consuming supplements brought calmness or physiological relief. Another

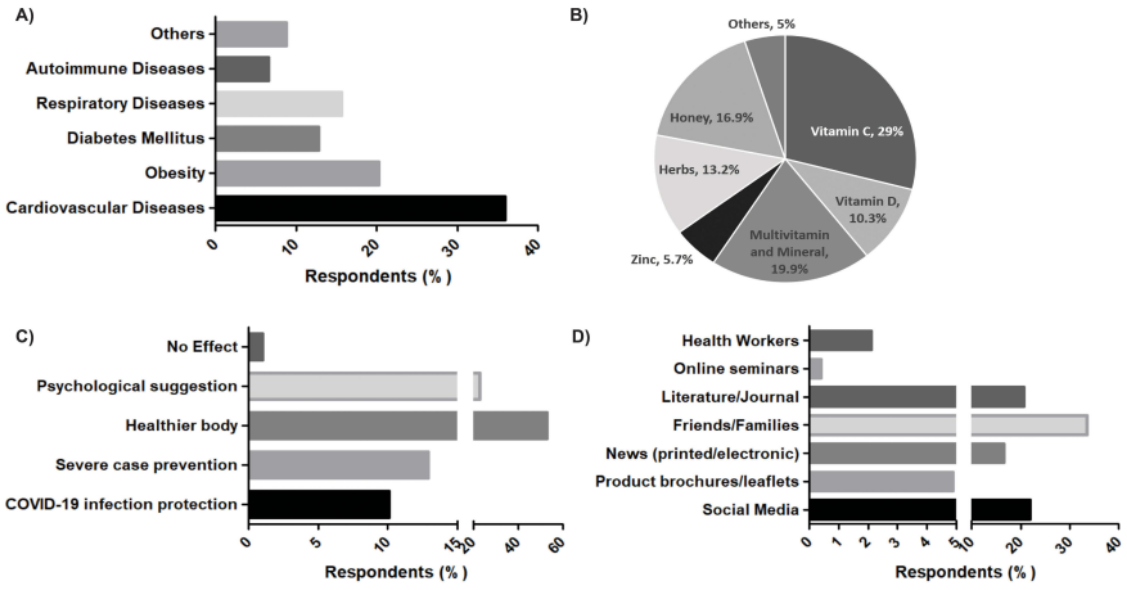

Figure 1 Comorbidity diseases of the respondents (**A**), type of supplements (**B**), respondents' feeling after consuming supplement consumption (**C**), source of information about supplements (**D**).

Table 2 Supplement Consumption During the Second Wave of the COVID-19 Pandemic

	Vulnerable	Nonvulnerable	*p*-value
Supplement Consumption			
Routinely consumed	148 [42.7]	218 [33.1]	***0.003***
Not routinely consumed	159 [45.8]	327 [49.6]	
Never consumed	40 [11.5]	114 [17.3]	

Notes: Italic value shows p-value. Bold values denote statistical significance at the $p < 0.05$ level.

reason was protection from severe cases of COVID-19 (12.9%) and prevention from COVID-19 (10.1%). Only 1% of the respondents felt no effect after consuming supplements (Figure 1C).

Unfortunately, almost one half of respondents (40.6%) consumed these supplements without consulting health professionals. Their source of information regarding supplements came from friends and family members (33.5%), social media (21.9%), literature (20.7%), news (16.5%) and only 2.1% received information from healthcare professionals (Figure 1D).

Mental Health Status and Its Association with Supplement Consumption

The number of mental health problems in both groups was measured using the DASS-21 questionnaire. The results showed the incidence of mental health problems in both groups did not significantly differ, even though being slightly higher in the nonvulnerable group compared with that of the vulnerable group (depression 28 vs 23%, anxiety 38 vs 36% and stress 27 vs 23%, Figure 2A and B). Interestingly, the severity of depression and anxiety was higher in the non-vulnerable group compared with

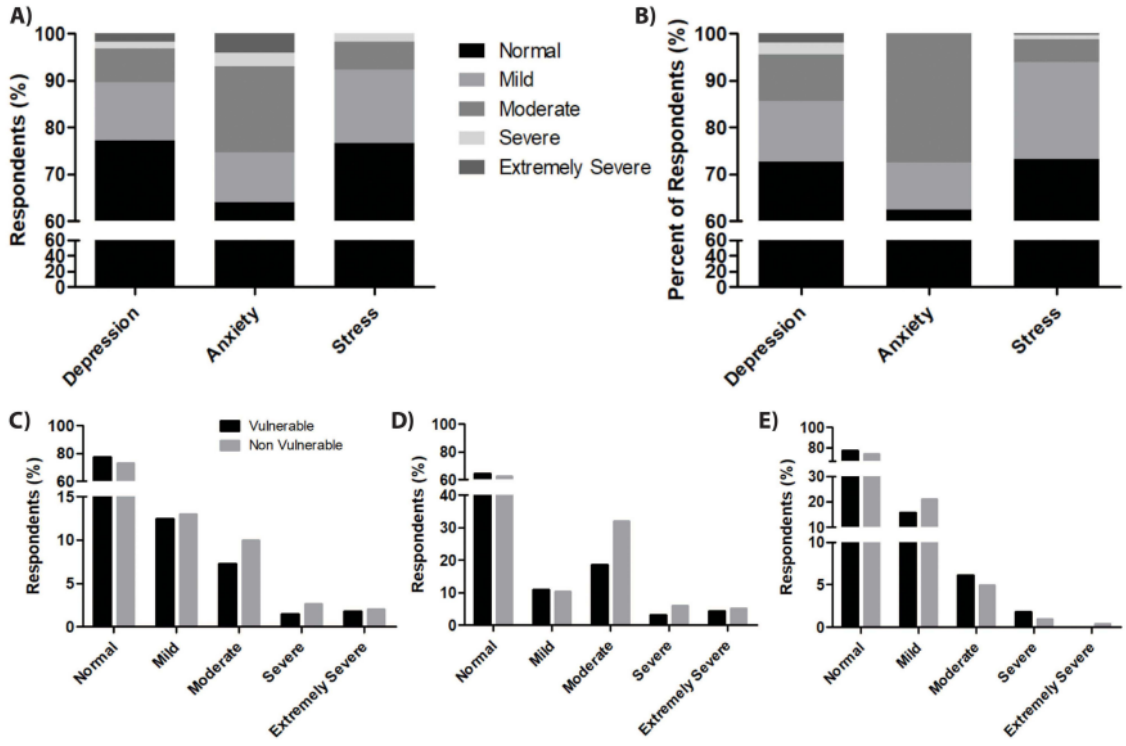

Figure 2 Mental health status among Indonesian adults during the second wave pandemic. Vulnerable group (**A**), nonvulnerable group (**B**), comparison between depression (**C**), anxiety (**D**) and stress (**E**) incidence of both groups.

that of the vulnerable group, but vice versa regarding stress disorder (Figure 2C–E). The result differed from our hypothesis that the vulnerable group would exhibit a higher incidence of mental health problems ($p > 0.05$) due to the possibility to become positive for COVID-19 and more severe cases. Thus, our study showed that the prolongation of this pandemic caused mental health problems in all segments, regardless their health status.

Moreover, chi-square test using Monte Carlo analysis was performed to measure the association between mental health status and supplement consumption. In contrast with a related study of an Indonesian mother with school-age children, our study found that consuming vitamins, minerals and natural products was associated with depression ($p < 0.001$) and anxiety ($p = 0.003$, Table 3).

Determinants of Supplement Consumption Behavior and Mental Health Status

Binary logistic regression was performed to predict sociodemographic factors associated with respondents' supplement consumption behavior and mental health status. Table 4 shows the results from modeling of the outcome as a function of several independent variables including age, sex, marital status, work, economic status, education, religion, and vulnerability/health status.

Determinants of Supplement Consumption Behavior

For supplement consumption, the binary logistic regression model estimated the overall accuracy of 84.6% and explained 9.9% of the variation in supplement consumption for preventing COVID-19 infection (Omnibus tests of model coefficients chi-square: 59.171, $p < 0.001$). The model revealed that older age more likely to consume supplement compared to younger age (AOR 2.26, 95% CI 1.01–5.03 for 26–35 y.o; AOR 2.23, 95% CI 0.90–5.52 for 36–45 y.o; AOR 2.83, 95% CI 1.03–7.73 for 46–55 y.o; AOR 3.78, 95% CI 0.98–14.60; and AOR 2.05, 95% CI 0.84–4.97 for >60 y.o). Moreover, the average self-reported economic status also two time more likely to consume supplement during the second year of COVID-19 pandemic (AOR 2.14, 95% CI 1.33–3.46), similar to respondents with higher education (high school graduate AOR 2.70, 95% CI 1.21–6.03) undergraduate (AOR 2.87, 95% CI 1.27–6.45), and postgraduate (AOR 3.08, 95% CI 1.13–8.40).

Determinants of Mental Health Problems

Meanwhile for mental health, the analysis estimated an overall accuracy of 74.0% and explained 18.8% of the variation in depression (Omnibus tests of model coefficients chi-square: 137.82, $p < 0.001$); 70.5% of overall accuracy and 20.6% of the variation in anxiety (Omnibus tests of model coefficients chi-square: 164.418, $p < 0.001$); and 74.6% of overall accuracy and 17.4% of variation in stress during second year of COVID-19 pandemic (Omnibus tests of model coefficients chi-square: 126.483, $p < 0.001$). The negative predictors to get depression were the late adult (AOR 0.25, 95% CI 0.10–0.66 for 46–55 y.o; AOR 0.15, 95% CI 0.03–0.68 for 56–60 y.o) and elderly (AOR 0.45, 95% CI 0.22–0.90) and married (AOR 0.42, 95% CI 0.24–0.70). Whilst for anxiety, the negative predictors were older age (AOR 0.14–0.43 in 5 groups of age), married (AOR 0.45, 95% CI 0.28–0.71) and healthy (AOR 0.61, 95% CI 0.42–0.88); while female was the positive predictor (AOR 1.57; 95% CI 1.13–2.17) for anxiety problem. Moreover, for stress incidence, the negative predictors were elderly (AOR 0.47, 95% CI 0.23–0.94) and married (AOR 0.26, 95% CI 0.15–0.44) (Table 4).

Table 3 Association Between Supplement Consumption and Mental Health Problems

	Supplement Consumption χ^2 (p-value)
Depression	36.755 (***<0.001***)
Anxiety	22.503 (***0.003***)
Stress	10.623 (*0.211*)

Notes: p-value was obtained from chi-square test using Monte Carlo analysis. Italic value shows p-value. Bold values denote statistical significance at the $p < 0.05$ level.

Table 4 Binary Logistic Regression Analysis for Supplement Consumption Behavior and Mental Health Problems (Depression, Anxiety and Stress)

Variables	Supplement				Depression				Anxiety				Stress			
	B	*p*-value	AOR	95% CI	B	*p*-value	AOR	95% CI	B	*p*-value	AOR	95% CI	B	*p*-value	AOR	95% CI
Age																
18–25			1.00				1.00				1.00				1.00	
26–35	0.81	***0.047***	2.26	1.01–5.03	−0.20	*0.530*	0.82	0.45–1.51	−0.87	***0.003***	0.43	0.24–0.75	−0.08	*0.810*	0.93	0.50–1.71
36–45	0.80	*0.085*	2.23	0.90–5.52	−0.55	*0.154*	0.58	0.27–1.23	−1.10	***0.001***	0.33	0.17–0.64	−0.06	*0.873*	0.94	0.45–2.00
46–55	1.04	***0.043***	2.83	1.03–7.73	−1.38	***0.005***	0.25	0.10–0.66	−1.13	***0.002***	0.32	0.16–0.66	−0.46	*0.285*	0.63	0.27–1.47
56–60	1.33	*0.054*	3.78	0.98–14.60	−1.90	***0.014***	0.15	0.03–0.68	−1.95	***<0.001***	0.14	0.05–0.41	−1.21	*0.067*	0.30	0.08–1.09
>60	0.71	*0.115*	2.05	0.84–4.97	−0.80	***0.025***	0.45	0.22–0.90	−1.20	***<0.001***	0.30	0.16–0.57	−0.77	***0.034***	0.47	0.23–0.94
Sex																
Male			1.00				1.00				1.00				1.00	
Female	−0.38	*0.082*	0.68	0.44–1.05	0.23	*0.201*	1.26	0.88–1.80	0.45	***0.007***	1.57	1.13–2.17	0.6	*0.753*	1.06	0.75–1.50
Marital Status																
Single			1.00				1.00				1.00				1.00	
Married	0.11	*0.755*	1.11	0.57–2.16	−0.88	***0.001***	0.42	0.24–0.70	−0.80	***0.001***	0.45	0.28–0.71	−1.35	***<0.001***	0.26	0.15–0.44
Work																
Unemployed			1.00				1.00				1.00				1.00	
Employed	0.04	*0.898*	1.04	0.60–1.78	−0.44	*0.063*	0.64	0.40–1.02	0.21	*0.341*	1.23	0.81–1.87	−0.24	*0.320*	0.79	0.50–1.26
Economic Status																
Below Average			1.00				1.00				1.00				1.00	
Average	0.76	***0.002***	2.14	1.33–3.46	−0.06	*0.807*	0.95	0.60–1.48	0.21	*0.337*	1.24	0.80–1.90	0.48	*0.055*	1.61	0.99–2.63
Above Average	0.26	*0.458*	1.29	0.66–2.54	−0.31	*0.356*	0.74	0.38–1.41	0.32	*0.293*	1.38	0.76–2.49	0.54	*0.110*	1.71	0.89–3.31

Education																
Below High School			1.00				1.00				1.00				1.00	
High School	0.99	***0.016***	2.70	1.21–6.03	−0.12	*0.742*	0.89	0.43–1.83	−0.24	*0.467*	0.79	0.41–1.51	0.14	*0.726*	1.15	0.54–2.45
Undergraduate	1.05	***0.011***	2.87	1.27–6.45	−0.21	*0.577*	0.81	0.39–1.70	−0.60	*0.074*	0.55	0.28–1.06	0.01	*0.973*	1.01	0.47–2.18
Postgraduate	1.12	***0.028***	3.08	1.13–8.40	−0.13	*0.769*	0.88	0.36–2.12	−0.63	*0.108*	0.53	0.25–1.15	−0.41	*0.396*	0.67	0.26–1.70
Religion																
Majority			1.00				1.00				1.00				1.00	
Non Majority	−0.15	*0.539*	0.86	0.52–1.41	0.34	*0.109*	1.41	0.93–2.13	0.00	*0.989*	1.00	0.67–1.49	−0.20	*0.370*	0.82	0.53 −1.27
Vulnerability																
Vulnerable			1.00				1.00				1.00				1.00	
Non Vulnerable	−0.38	*0.149*	0.68	0.40–1.15	−0.18	*0.405*	0.84	0.55–1.27	−0.50	***0.009***	0.61	0.42–0.88	−0.32	*0.119*	0.73	0.49–1.09

Notes: Italic value shows p-value. Bold values denote statistical significance at the $p < 0.05$ level.

https://doi.org/10.2147/PPA.S415925 DovePress

Discussion

Indonesia has the highest number of COVID-19 cases in Southeast Asia and is ranked 18th globally.[24] The prolonged duration and emerging new variants, such as the delta variant that was responsible for the second wave pandemic in Indonesia, increased anxiety due to uncertainty in many aspects.[25] To name a few, financial stability uncertainty due to job security and the duration of the downturn, health and medical uncertainty on the understanding of the transmission, severity, and treatment, and psychological, social and behavioral uncertainty introduced by the new policies, social norms and public interaction and limitation such as mask-wearing, physical distancing, and remote work. The prolonged pandemic might have influenced people's behavior and triggered fearfulness or tension in addition to the economic effect of the pandemic, marital disputes and stress from being in a confined and restricted environment. These factors would lead to mental health problems, including depression, anxiety, and stress.[26] Mental health problems across the world have been extensively reviewed.[27] In Indonesia, it was reported that 25% of Indonesian mothers with school age children reported mental health problems, such as depression, anxiety and stress during this pandemic.[9] Interestingly, one study among 608 nonhospitalized asymptomatic and patients with mild COVID-19 symptoms in one province in Indonesia in September 2020 showed a relatively low incidence of depression, anxiety and stress.[28] Our study found 23 to 38% of respondents were categorized as indicating depression, anxiety and stress using the DASS-21 in the second wave of the COVID-19 pandemic in Indonesia. Even though no significant difference was observed among vulnerable and nonvulnerable respondents; interestingly, the severity was higher among nonvulnerable respondents. This might have been caused by during this study period, the vaccination target in Indonesia was only for the healthcare professionals, elderly, and the public servant, thus there was possibility that the nonvulnerable respondents might not receive the vaccination yet.

Several drugs have been approved for COVID-19 treatment; however, their efficacy remains debatable.[29,30] These uncertain results show that further investigations and trials are needed to produce a drug that is effective against COVID-19. Current treatment primarily constitutes symptomatic drugs with vitamin and mineral supplements in asymptomatic cases. In the current study, many respondents reported taking vitamin C, multivitamins and minerals. One study in the USA reported similar findings in that the use of supplements, including zinc and vitamin C among the elderly reported a slight increase.[13] The study by Ahmed et al also reported that vitamins C, D and B and zinc were administered to lower the risk of COVID-19[6] as vitamin C exhibits potent antioxidant, anti-inflammatory and antiviral properties which would protect patients for medical complication arising from the cytokine storm following COVID-19 infection.[13] Respondents in this study also consumed natural products, including ginger, turmeric and honey to prevent COVID-19. This finding was similar to other studies in Arab Saudi, Latin America, the Caribbean and Peru.[31–33] Gingerol in ginger, honey and bee products present antioxidant properties and might enhance the immune system by inducing the maturation of immune cells.[34,35] Curcumin inside turmeric is also reported to show antiviral properties by preventing SARS-CoV-2 binding with the ACE2 receptor, and exhibiting anti-inflammatory potency by inhibiting transcription factor, NF-κB.[36]

Our study showed that most participants used these products to improve their immunity and obtain a healthier body. A study conducted among 1054 Saudi Arabians also highlighted that most participants used these products to boost their immune system, but not to protect themselves from COVID-19, displaying a good foundation of knowledge of disease prevention.[31] Similarly, the study conducted among 550 dietitians in Turkey showed that most dietitians used dietary supplements and herbal medicines to lead a healthy life.[37]

Several studies have reported that sociodemographic factors were correlated with consuming supplement. In studies involving adults from western countries, regardless of the type of supplement, older respondents, women, those educated, those with higher income levels and having chronic diseases were more likely to use supplements.[38] However, a study in Korea involving 1529 respondents concluded no relationship existed between supplement use and age, sex, education, income or chronic disease status.[39] In our study, the vulnerable population demonstrated a slightly higher tendency for routine supplement consumption, whereas the non-vulnerable population exhibited a slightly higher proportion of individuals who never consumed supplements for COVID-19 prevention. The respondent's behaviour was significantly associated with older age, higher education level, and higher self-reported economic status were more likely to consume supplements during the second wave of the COVID-19 pandemic.

Similar to the study in Saudi Arabia, our study found that the significant source of information constituted family members and friends (33.5%), followed by social media (21.9%).[31] Even though the media serves a crucial role in spreading awareness concerning the pandemic, unfortunately, it also disseminates disinformation.[40,41] The lack of accuracy and reliability of information might have resulted in improper actions.[42] Similar to the related study involving 610 Indonesian mothers,[9] this study also found that 40% of participants did not consult health workers before taking supplements. This practice might be harmful, because the side effects, gene-to-drugs interaction, or drug-to-supplement interactions, were unknown and uncontrolled. Several studies have reported a correlation between high dose vitamin C among patients with kidney stones, and that high dose vitamin E correlates with prostate cancer among males with high expression of the *CYP1A1* and *CYP1B1* genes.[43] Moreover, self-medicating without knowledge can lead to resistance, especially for virus and bacteria.[8] Because the effect of vitamins and minerals in COVID-19 treatment remains unclear, more investigations are needed before its application can be confirmed. Hence, controlling the information and the use of rules and accurate information need to be created to prevent the emergence of resistance.

Similar to the related report from Indonesia,[9] this study found that approximately one quarter to one-third of respondents were categorized as having mental health problems. Our findings differed from one study in Indonesia among nonhospitalized subjects with COVID which failed to observe their increasing mental health problem.[28] Moreover, several sociodemographic factors might predict the incidence of mental health problems, including younger age and single status positively contributing to depression, anxiety, and stress, while the comorbid contributes only to the anxiety incidence. Our findings were in line with one study in Scotland among 1006 respondents that younger age more likely to report mental health issues.[44] Similar findings were also reported in several studies in Chinese adults conducted in the early pandemic stage.[45,46] Our findings support association between dietary supplements with mental health, as some studies suggest that certain supplements, such as omega-3 fatty acids, B-vitamins, and vitamin D, may have potential benefits for mental health and well-being.[47]

Even though, the usage of online questionnaires and convenience sampling might not reach respondents with no internet and/or did not understand the technology, our study still showed pattern of dietary supplements consumption during second wave COVID-19 pandemic in Indonesia. Moreover, its association with mental health and others socio-demographic factors provides supporting information for future actions.

Conclusion

Results implies that individuals who consume supplements may have an association with mental health status. However, it is important to note that the relationship between supplement consumption and mental health is complex and multifaceted, and individual responses to supplements can vary and depending on their susceptibility to develop psychological condition. Given the potential associations between supplement consumption and mental health, it is essential for government authorities and professionals to take notice. They can play a vital role in disseminating accurate information about the benefits and risks of dietary supplements. Additionally, they can address mental health concerns and provide support systems to individuals who may be experiencing mental health challenges.

Funding

JY received funding from Universiti Teknologi Malaysia, UTM MG, PY/2022/04779(Q.J130000.3053.04M14)/ PY/2021/02555(R.J130000.7353.4B724); Ad'A received funding from LPPM Universitas Airlangga, SATU JRS, No. 1003/UN3/2022.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Huang C, Yang L, Pan J, Xu X, Peng R. Correlation between vaccine coverage and the COVID-19 pandemic throughout the world: based on real-world data. *J Med Virol*. 2022;94(5):2181–2187. doi:10.1002/jmv.27609
2. Robinson PC, Liew DFL, Tanner HL, et al. COVID-19 therapeutics: challenges and directions for the future. *Proc Natl Acad Sci*. 2022;119(15):e2119893119. doi:10.1073/pnas.2119893119
3. Hu B, Guo H, Zhou P, Shi Z-L. Characteristics of SARS-CoV-2 and COVID-19. *Nat Rev Microbiol*. 2021;19(3):141–154. doi:10.1038/s41579-020-00459-7

4. Pinnawala NU, Thrastardottir TO, Constantinou C. Keeping a balance during the pandemic: a narrative review on the important role of micronutrients in preventing infection and reducing complications of COVID-19. *Curr Nutr Rep*. 2021;10(3):200–210. doi:10.1007/s13668-021-00356-2
5. Satuan Tugas Penanganan COVID-19. Peta Sebaran COVID-19 [Map of Spread of COVID-19]; 2022. Available from: https://covid19.go.id/peta-sebaran-covid19. Accessed September 15, 2022.
6. Ahmed I, Hasan M, Akter R, et al. Behavioral preventive measures and the use of medicines and herbal products among the public in response to Covid-19 in Bangladesh: a cross-sectional study. *PLoS One*. 2020;15(12):e0243706. doi:10.1371/journal.pone.0243706
7. Kretchy IA, Asiedu-Danso M, Kretchy JP. Medication management and adherence during the COVID-19 pandemic: perspectives and experiences from low-and middle-income countries. *Res Social Adm Pharm*. 2021;17(1):2023–2026. doi:10.1016/j.sapharm.2020.04.007
8. Rather IA, Kim BC, Bajpai VK, Park YH. Self-medication and antibiotic resistance: crisis, current challenges, and prevention. *Saudi J Biol Sci*. 2017;24(4):808–812. doi:10.1016/j.sjbs.2017.01.004
9. d'Arqom A, Sawitri B, Nasution Z, Lazuardi R. "Anti-COVID-19" medications, supplements, and mental health status in Indonesian mothers with school-age children. *Int J Womens Health*. 2021;13:699–709. doi:10.2147/IJWH.S316417
10. Samal J. Impact of COVID-19 infodemic on psychological wellbeing and vaccine hesitancy. *Egypt J Bronchol*. 2021;15(1):14. doi:10.1186/s43168-021-00061-2
11. Zhang L, Liu Y. Potential interventions for novel coronavirus in China: a systematic review. *J Med Virol*. 2020;92(5):479–490. doi:10.1002/jmv.25707
12. Kemenkes [Ministry of Health Republic of Indonesia]. Panduan Penggunaan Layanan Telemedisin [Telemedicine Service Guideline]. Ministry of Health Republic of Indonesia; 2022. Available from: https://isoman.kemkes.go.id/panduan. Accessed September 3, 2022.
13. Khabour OF, Hassanein SFM. Use of vitamin/zinc supplements, medicinal plants, and immune boosting drinks during COVID-19 pandemic: a pilot study from Benha city, Egypt. *Heliyon*. 2021;7(3):e06538. doi:10.1016/j.heliyon.2021.e06538
14. Lordan R, Rando HM, Greene CS. Dietary supplements and nutraceuticals under investigation for COVID-19 prevention and treatment. *mSystems*. 2021;6(3):e00122–e00221. doi:10.1128/mSystems.00122-21
15. Hamulka J, Jeruszka-Bielak M, Górnicka M, Drywień ME, Zielinska-Pukos MA. Dietary supplements during COVID-19 outbreak. Results of google trends analysis supported by PLifeCOVID-19 online studies. *Nutrients*. 2020;13(1):54. doi:10.3390/nu13010054
16. Karlsson P, Nakitanda AO, Löfling L, Cesta CE, Ghozy S. Patterns of prescription dispensation and over-the-counter medication sales in Sweden during the COVID-19 pandemic. *PLoS One*. 2021;16(8):e0253944. doi:10.1371/journal.pone.0253944
17. Arora I, White S, Mathews R. Global dietary and herbal supplement use during COVID-19-a scoping review. *Nutrients*. 2023;15(3):771. doi:10.3390/nu15030771
18. Eysenbach G. Improving the quality of web surveys: the Checklist for Reporting Results of Internet E-Surveys (CHERRIES). *J Med Internet Res*. 2004;6(3):e34. doi:10.2196/jmir.6.3.e34
19. BPS. Jumlah Penduduk Usia 15 tahun ke Atas Menurut Golongan Umur 2021–2022. Badan Pusat Statistik Republik Indonesia [Population Ages 15 + years in 2021–2022. Central Bureau of Statistics of the Republic of Indonesia]; 2023. Available from: https://www.bps.go.id/indicator/6/715/1/jumlah-penduduk-usia-15-tahun-ke-atas-menurut-golongan-umur.html. Accessed February 2, 2023.
20. Boateng GO, Neilands TB, Frongillo EA, Melgar-Quiñonez HR, Young SL. Best practices for developing and validating scales for health, social, and behavioral research: a primer. Review. *Front Public Health*. 2018;6. doi:10.3389/fpubh.2018.00149
21. Li X, Zhong X, Wang Y, Zeng X, Luo T, Liu Q. Clinical determinants of the severity of COVID-19: a systematic review and meta-analysis. *PLoS One*. 2021;16(5):e0250602. doi:10.1371/journal.pone.0250602
22. Rahman MM, Bhattacharjee B, Farhana Z, et al. Age-related risk factors and severity of SARS-CoV-2 infection: a systematic review and meta-analysis. *J Prev Med Hyg*. 2021;62(2):E329–E371. doi:10.15167/2421-4248/jpmh2021.62.2.1946
23. Southerton D. Habits, routines and temporalities of consumption: from individual behaviours to the reproduction of everyday practices. *Time Soc*. 2013;22(3):335–355. doi:10.1177/0961463x12464228
24. World Health Organization. World Health Organization: Coronavirus 19 Juni, 2021; 2021. Available from: https://covid19.who.int/. Accessed June 19, 2021.
25. Dayton L, Schneider K, Strickland JC, Latkin C. Determinants of worry using the SARS-CoV-19 worry (CoV-Wo) scale among United States residents. *J Community Psychol*. 2021;49(5):1487–1504. doi:10.1002/jcop.22577
26. Porcelli P. Fear, anxiety and health-related consequences after the Covid-19 epidemic. *Clin Neuropsychiatry*. 2020;17(2):103–111. doi:10.36131/cn20200215
27. Wu T, Jia X, Shi H, et al. Prevalence of mental health problems during the COVID-19 pandemic: a systematic review and meta-analysis. *J Affect Disord*. 2021;281:91–98. doi:10.1016/j.jad.2020.11.117
28. Lusida MAP, Salamah S, Jonatan M, et al. Prevalence of and risk factors for depression, anxiety, and stress in non-hospitalized asymptomatic and mild COVID-19 patients in East Java province, Indonesia. *PLoS One*. 2022;17(7):e0270966. doi:10.1371/journal.pone.0270966
29. Jayk Bernal A, Gomes da Silva MM, Musungaie DB, et al. Molnupiravir for oral treatment of Covid-19 in nonhospitalized patients. *N Engl J Med*. 2021;386(6):509–520. doi:10.1056/NEJMoa2116044
30. Extance A. Covid-19: what is the evidence for the antiviral molnupiravir? *BMJ*. 2022;377:o926. doi:10.1136/bmj.o926
31. Abdullah Alotiby A, Naif Al-Harbi L. Prevalence of using herbs and natural products as a protective measure during the COVID-19 pandemic among the Saudi population: an online cross-sectional survey. *Saudi Pharm J*. 2021;29(5):410–417. doi:10.1016/j.jsps.2021.04.001
32. Bendezu-Quispe G, Benites-Meza JK, Urrunaga-Pastor D, et al. Consumption of herbal supplements or homeopathic remedies to prevent COVID-19 and intention of vaccination for COVID-19 in Latin America and the Caribbean. *Trop Med Infect Dis*. 2022;7(6):95. doi:10.3390/tropicalmed7060095
33. Villena-Tejada M, Vera-Ferchau I, Cardona-Rivero A, et al. Use of medicinal plants for COVID-19 prevention and respiratory symptom treatment during the pandemic in Cusco, Peru: a cross-sectional survey. *PLoS One*. 2021;16(9):e0257165. doi:10.1371/journal.pone.0257165
34. Jafarzadeh A, Jafarzadeh S, Nemati M. Therapeutic potential of ginger against COVID-19: is there enough evidence? *J Tradit Chin Med Sci*. 2021;8(4):267–279. doi:10.1016/j.jtcms.2021.10.001
35. Lima WG, Brito JCM, da Cruz Nizer WS. Bee products as a source of promising therapeutic and chemoprophylaxis strategies against COVID-19 (SARS-CoV-2). *Phytother Res*. 2021;35(2):743–750. doi:10.1002/ptr.6872

36. Rattis BAC, Ramos SG, Celes MRN. Curcumin as a potential treatment for COVID-19. *Front Pharmacol*. 2021;12:675287. doi:10.3389/fphar.2021.675287
37. Kamarli Altun H, Karacil Ermumcu MS, Seremet Kurklu N. Evaluation of dietary supplement, functional food and herbal medicine use by dietitians during the COVID-19 pandemic. *Public Health Nutr*. 2021;24(5):861–869. doi:10.1017/s1368980020005297
38. Dickinson A, MacKay D. Health habits and other characteristics of dietary supplement users: a review. *Nutr J*. 2014;13:14. doi:10.1186/1475-2891-13-14
39. Kim J, Lee JS, Shin A, et al. Sociodemographic and lifestyle factors are associated with the use of dietary supplements in a Korean population. *J Epidemiol*. 2010;20(3):197–203. doi:10.2188/jea.je20090064
40. Gupta L, Gasparyan AY, Misra DP, Agarwal V, Zimba O, Yessirkepov M. Information and misinformation on COVID-19: a cross-sectional survey study. *jkms*. 2020;35(27):e256. doi:10.3346/jkms.2020.35.e256
41. Zarocostas J. How to fight an infodemic. *Lancet*. 2020;395(10225):676. doi:10.1016/s0140-6736(20)30461-x
42. Kothari M, Moolani S. Reliability of "Google" for obtaining medical information. *Indian J Ophthalmol*. 2015;63(3):267–269. doi:10.4103/0301-4738.156934
43. d'Arqom A, Melvanda GP, Savitri Y, Rahul Alfaidin AM. Vitamin and mineral supplementation for β-thalassemia during COVID-19 pandemic. *Future Sci OA*. 2020;6(9):Fso628. doi:10.2144/fsoa-2020-0110
44. Hubbard G, den Daas C, Johnston M, Dixon D. Sociodemographic and psychological risk factors for anxiety and depression: findings from the Covid-19 Health and Adherence Research in Scotland on Mental Health (CHARIS-MH) cross-sectional survey. *Int J Behav Med*. 2021;28(6):788–800. doi:10.1007/s12529-021-09967-z
45. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res*. 2020;288:112954. doi:10.1016/j.psychres.2020.112954
46. Wang C, Pan R, Wan X, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 Coronavirus Disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health*. 2020;17(5). doi:10.3390/ijerph17051729
47. Grajek M, Krupa-Kotara K, Białek-Dratwa A, et al. Nutrition and mental health: a review of current knowledge about the impact of diet on mental health. Review. *Front Nutr*. 2022;9. doi:10.3389/fnut.2022.943998

Dietary Supplement Consumption and Mental Health in Indonesian Adults During Second Wave of COVID-19 Pandemic

ORIGINALITY REPORT

19%	15%	12%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	test.dovepress.com Internet Source	2%
2	Dwi Retnaningsih, Ericca Ferari, Rahayu Winarti. "PENGALAMAN PERAWATAN KANKER KOLON STADIUM AKHIR: CASE STUDY", Jurnal Surya Muda, 2022 Publication	1%
3	academic.oup.com Internet Source	1%
4	www.science.gov Internet Source	1%
5	link.springer.com Internet Source	1%
6	www.mdpi.com Internet Source	1%
7	medworm.com Internet Source	1%
8	www.scielo.br Internet Source	

		1 %
9	Amna Abdullah Alotiby, Laila Naif Al-Harbi. "Prevalence of using herbs and natural products as a protective measure during the COVID-19 pandemic among the Saudi population: an online cross-sectional survey", Saudi Pharmaceutical Journal, 2021 Publication	1 %
10	Supriyati Supriyati, Fiddina Mediola, Braghmandita Widya Indraswari, Ratri Kusuma Wardani et al. "Gender differences in social determinant factors of mental health problems among adults during the COVID-19 pandemic in Yogyakarta, Indonesia: A multilevel analysis", Research Square Platform LLC, 2023 Publication	<1 %
11	www.omicsdi.org Internet Source	<1 %
12	Omar F. Khabour, Salwa F.M. Hassanein. "Use of vitamin/zinc supplements, medicinal plants, and immune boosting drinks during COVID-19 pandemic: A pilot study from Benha city, Egypt", Heliyon, 2021 Publication	<1 %
13	journals.umsha.ac.ir Internet Source	

		<1 %
14	Elvin Lufele, Laurens Manning, Lina Lorry, Jonathan Warrel, Susan Aipit, Leanne J Robinson, Moses Laman. " The association of intraleucocytic malaria pigment and disease severity in Papua New Guinean children with severe malaria ", Transactions of The Royal Society of Tropical Medicine and Hygiene, 2023 Publication	<1 %
15	Tareq L Mukattash, Hana Alkhalidy, Buthaina Alzu'bi, Rana Abu Farha et al. "Dietary supplements intake during the second wave of COVID-19 pandemic: A multinational Middle Eastern study", European Journal of Integrative Medicine, 2022 Publication	<1 %
16	e-journal.unair.ac.id Internet Source	<1 %
17	www.frontiersin.org Internet Source	<1 %
18	Submitted to SDM Universitas Gadjah Mada Student Paper	<1 %
19	www.medrxiv.org Internet Source	<1 %

20	Iftekhar Ahmed, Maruf Hasan, Rahima Akter, Bidduth Kumar Sarkar, Marufa Rahman, Md Samun Sarker, Mohammed A. Samad. "Behavioral preventive measures and the use of medicines and herbal products among the public in response to Covid-19 in Bangladesh: A cross-sectional study", PLOS ONE, 2020 Publication	<1 %
21	journals.plos.org Internet Source	<1 %
22	worldwidescience.org Internet Source	<1 %
23	journal.walisongo.ac.id Internet Source	<1 %
24	mdpi-res.com Internet Source	<1 %
25	bmjopen.bmj.com Internet Source	<1 %
26	www.researchgate.net Internet Source	<1 %
27	"OS01: Lung Cancer 1 : Oral Sessions", Respirology, 2013. Publication	<1 %
28	Aurelia Magdalena Pisoschi, Florin Iordache, Loredana Stanca, Iuliana Gajaila et al. "Antioxidant, Anti-inflammatory, and	<1 %

Immunomodulatory Roles of Nonvitamin Antioxidants in Anti-SARS-CoV-2 Therapy", Journal of Medicinal Chemistry, 2022
Publication

29	Mera A. Ababneh, Shatha Halloush, Shoroq Altawalbeh, Afrah Mardini. "Knowledge and attitudes towards herbal and dietary products use during the COVID-19 pandemic", Clinical Nutrition Open Science, 2023 Publication	<1 %
30	hrmasia.com Internet Source	<1 %
31	scholarworks.aub.edu.lb Internet Source	<1 %
32	www.ajtmh.org Internet Source	<1 %
33	Ronan Lordan, Halie M. Rando, Casey S. Greene. "Dietary Supplements and Nutraceuticals under Investigation for COVID-19 Prevention and Treatment", mSystems, 2021 Publication	<1 %
34	Tareq L Mukattash, Hana Alkhalidy, Buthaina Alzu'bi, Rana Abu-Farha et al. "Dietary supplements intake during the second wave of COVID-19 pandemic: A multinational	<1 %

Middle Eastern study", European Journal of Integrative Medicine, 2022
Publication

35	repository.umsu.ac.id Internet Source	<1 %
36	www.enterpriseresearch.ac.uk Internet Source	<1 %
37	Gülşah Kaner, Gamze Yurtdaş-Depboylu, Gamze Çalık, Tuba Yalçın, Tutku Nalçakan. "Evaluation of perceived depression, anxiety, stress levels and emotional eating behaviours and their predictors among adults during the COVID-19 pandemic", Public Health Nutrition, 2022 Publication	<1 %
38	Hadia Radwan, Hayder Hasan, Zeinab Jaafar, Nada Abbas, Eman Rashed Saif, Mahra Al Kitbi, Marwa Al Hilali, Farah Naja. "Diets and dietary supplements used during the COVID-19 pandemic in the United Arab Emirates: A cross-sectional survey", Saudi Pharmaceutical Journal, 2022 Publication	<1 %
39	f6publishing.blob.core.windows.net Internet Source	<1 %
40	platcovid.com Internet Source	<1 %

41	pubmed.ncbi.nlm.nih.gov Internet Source	<1 %
42	ris.utwente.nl Internet Source	<1 %
43	www.covid19reviews.org Internet Source	<1 %
44	www.forbes.com Internet Source	<1 %
45	www.sciencegate.app Internet Source	<1 %
46	Dixie J. Koo, Dale D. Chitwood, Jesús Sánchez. "Factors for Employment: A Case-Control Study of Fully Employed and Unemployed Heroin Users", Substance Use & Misuse, 2009 Publication	<1 %
47	e-jnh.org Internet Source	<1 %
48	ouci.dntb.gov.ua Internet Source	<1 %
49	www.researchsquare.com Internet Source	<1 %
50	Anna Grace Couch, Terry Haines, Belinda O'Sullivan, Hylton B Menz, Cylie M Williams. "Financial characteristics and security of podiatry work in Victoria: the PAIGE cross	<1 %

sectional study of Australian podiatrists", Research Square Platform LLC, 2023
Publication

---

51 Iva Selke Krulichová, Gisbert W. Selke, Marion Bennie, Mohammadhossein Hajiebrahimi et al. " Comparison of Drug Prescribing Before and During the ‐ 19 Pandemic – A Cross ‐ national European Study ", Pharmacoepidemiology and Drug Safety, 2022 <1%
Publication

---

52 Hulya Kamarli Altun, Merve Seyda Karacil Ermumcu, Nilgun Seremet Kurklu. "Evaluation of Dietary Supplement, Functional Food and Herbal Medicine Use by Dietitians during the COVID-19 Pandemic", Public Health Nutrition, 2020 <1%
Publication

---

53 Jee Kei Chan, Aleya A. Marzuki, Samira Vafa, Arjun Thanaraju et al. "A Systematic Review on the Relationship Between Socioeconomic Conditions and Emotional Disorder Symptoms During Covid-19: Unearthing the Potential Role of Economic Concerns and Financial Strain", Research Square Platform LLC, 2023 <1%
Publication

---

54 Md Jahidul Hasan, Jaime Nead. "The Pandemic COVID-19 and the Auspicious Role of Frontier <1%

Pharmacists against This Global Threat", Pharmacology & Pharmacy, 2020
Publication

55	Ravindra Verma, Meenakshi Pal Bagel. "Role of Functional Food Additives in Regulating the Immune Response to COVID-19", Current Biotechnology, 2022 Publication	<1 %
56	Teodora Matić, Peter Pregelj, Aleksander Sadikov, Polona Rus Prelog. "Depression, Anxiety, Stress, and Suicidality Levels in Young Adults Increased Two Years into the COVID-19 Pandemic", International Journal of Environmental Research and Public Health, 2022 Publication	<1 %

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	On		

Dietary Supplement Consumption and Mental Health in Indonesian Adults During Second Wave of COVID-19 Pandemic

GRADEMARK REPORT

FINAL GRADE

/0

GENERAL COMMENTS

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13