



Consumer Awareness and Perception on Mineral and Vitamin Supplements to Boost Immunity Against COVID-19

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ABSTRACT

COVID-19 have been widespread all over the world. Mineral supplementation and Vitamin intake may help to reduce the severity of the common cold. This study determines the Knowledge, Attitude, And Practices of Consumers About Mineral and Vitamin Supplementation to boost immune system for COVID-19. 178 Participants who lived in the NCR Bubble particularly Metro Manila, Laguna, Cavite, Rizal, and Bulacan., 18-years old and above were chosen by convenience sampling. To get the appropriate data needed, the researchers divided the questionnaire into 4 parts such as Demographics, Knowledge, Attitude, and Practices using likert scale. Descriptive analysis of frequencies and percentages for demographic characteristics, KAP assessment and likewert interpretation was applied. The respondents' knowledge, attitude, and practices toward micronutrient supplementation were evaluated. Results showed that the respondents have a very good understanding, belief, and practice of mineral supplementation and vitamin intake to boost the immune system. Before the pandemic, 178 respondents did not take mineral supplements; nevertheless, 58 respondents (32.58 percent) took vitamins, and 117 respondents (65.73%) took both mineral and multivitamin supplements. On the other hand, 61 (34.27%) respondents took vitamins, while 120 (67.42%) respondents took both mineral and vitamin supplements during the pandemic. In addition, the intake of these supplements increased during pandemic. Self-willingness (28.65%) was the most common response to factors linked with mineral and vitamin consumption prior to the pandemic, whereas doctor's prescription was the most common response during the pandemic (44.94%). The level of micronutrient supplementation practiced by the respondents was also applied because they knew and believed that it could reduce the risk of COVID-19 infection.

Keywords: COVID-19, Vitamins, Minerals

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1 Introduction

COVID-19 is considered as destructive agent of infection and have spread rapidly from Asia to the rest of the world (Lu *et al.*, 2020). Nowadays, no effective antiviral therapy has been identified, and symptomatic supportive care remains the primary treatment. There are reports that vitamin supplementation may play a role in reducing the severity of the common cold, preventing the development of acute respiratory distress syndrome (ARDS), and enhancing the immune system through antioxidant properties (Jovic *et al.*,2020). The immune system resiliency has been a major player in winning against COVID-19. When food quality is compromised, nutrient inadequacy takes place and the public turn on to the nutraceuticals to suffice the nutrient needs of the body to support and further boost the immune system. Thus, these nutraceuticals include mineral supplements and multivitamins (Jovic *et al.*,2020).

COVID-19 has been a destructive agent of infection all over the world. It is essential to look at the innate defense mechanism of the individual's body in fighting all sorts of bodily harm (Bergman et al., 2013). During a time of heightened potential infection from COVID-19, favorably modulating immune function can be an important strategy for not only reducing the chance of infection, but for potentially reducing the severity of infections. Plant-based foods such as those high in phytonutrients, water- and lipid-soluble vitamins, and other antioxidants, as well as dietary fiber, can help downregulate an overactive immune response (Rondanelli et al., 2018).

The gut microflora can be modified through dietary components and, ultimately, significantly impact markers of metabolic health that relate to inflammation. It was found that those who had a less diverse gut microbiome also had an inflammatory phenotype and greater metabolic dysfunction, including adiposity and ability to gain weight, insulin resistance, and dyslipidemia. Clinical trial in overweight and obese individuals indicated that less microbial gene diversity (40% lower) was associated with increased metabolic dysfunction and inflammation. Dietary intervention may be helpful for improving microbial gene richness. (Panahi, et al., 2017).

The main objective of the study is to assess the knowledge, attitude, and practices of respondents toward micronutrient supplementation, evaluate the responses in connection with the beneficial properties of micronutrient supplementation against COVID-19 infection and determine the respondent's level of intake of micronutrient supplementations in relation to COVID-19 infection.

2 Methodology

2.1 Selection of Respondents

The study employed 178 respondents from the general public who lived in Metro Manila, Laguna, Cavite, Rizal, and Bulacan. Respondents are of legal age of 18 years old and above.

KAP survey was selected to study the information of the respondents with regards to mineral supplementation and multivitamin intake to boost immune system during COVID-19. The goal of quantitative methods of data collection is to quantify and measure a phenomenon using questionnaires and statistical processing of the information collected. With regards to this, likert scale was also utilized to measure respondents' attitudes by asking the extent to which they agree or disagree with a particular question or statement with regards to KAP of mineral supplementation and multivitamin intake to boost immune system during COVID-19.

To get the appropriate data needed, the researchers divided the questionnaire into 4 parts.

Part I is the Demographics characteristics which the profile of respondents was asked. Sex, age educational attainment, employment status, and location were determined.

Part II. Knowledge, which is a collection of understandings, it is also one's ability to imagine, as well as one's way of perceiving. Knowledge of a beneficial health behavior, on the other hand, does not

guarantee that this behavior will be followed. The survey's assessment of knowledge aids in identifying areas where more information and education efforts are needed regarding the mineral supplementation and multivitamin intake.

Part III is Attitude, which is a way of being, a position. These are leanings or "tendencies to..." This is an intermediate variable between the situation and the response to the situation regarding the mineral supplementation and multivitamin intake before and during COVID-19. It helps to explain why, among the possible practices for a subject exposed to a stimulus, that subject chooses one over the others.

Part IV is Practices, which are observable actions of an individual in response to a stimulus. This is concerned with the concrete, with actions. For health measures, information on mineral supplementation and multivitamin intake.

Researchers utilized Google form questionnaire which was posted online and sent to different institutions. The questionnaire gathered data on knowledge, attitude and practices of respondents toward micronutrient supplementation. Likert scale from 5 to 1 was used to gauge the perceptions of the respondents. The questionnaire went through expert, peer, content and linguistic validation and pilot testing.

2.2 Data Gathering Procedure

Researchers initially gathered, communicated, and oriented the participants online and simultaneously sent out consent forms and the questionnaire set. As the participants accomplished the questionnaires, the researchers collated the submitted data and proceeded with its encoding. Various statistical methods have been applied to generate results from the given data to answer the objectives of the study. The researchers analyzed and interpreted the results of the study and further formed conclusions and recommendations for various stakeholders.

2.3 Statistical Treatment and Data Interpretation

Frequencies and percentages through descriptive analysis for the demographic characteristics and KAP assessment. A 5-point Likert Scale interpretation was also applied.

3 Results

A total of 178 respondents participated in this online survey. Majority of the Population were female 117 (65.7%) between ages 18-25 years old 141 (79.2%) had a college (Bachelor) degree 140 (78.7%). Residents from Cavite 130 (73%), Metro Manila 41 (23%), Province of Laguna 4 (2.2%), and Province of Rizal 3 (1.7%).

Table 1. *Demographics of Study Population (n=178)*

VARIABLE	RESPONSES	n	%
SEX	Female	117	65.7
	Male	61	34.3
AGE	18-25 years old	141	79.2
	26-35 years old	11	6.2
	36-45 years old	11	6.2
	46-55 years old	8	4.5
	56-65 years old	6	3.4
	66-up	1	0.6
	College	140	78.7

EDUCATIONAL ATTAINMENT	Post-Graduate	16	9
	Vocational	2	1.1
	Secondary	19	10.7
OCCUPATION	Student	114	64
	Employed	44	24.7
	Self Employed	14	7.9
	Unemployed	6	3.4
LOCATION	Province of Cavite	130	73
	Metro Manila	41	23
	Province of Rizal	3	1.7
	Province of Laguna	4	2.2

The intake of solely mineral supplements was not practiced by 178 respondents; however, intake of vitamins was practiced by 58 (32.58%) respondents and intake of both mineral and vitamin supplements were practiced by 117 respondents (65.73%) before pandemic. On the other hand, 61 (34.27%) respondents took multivitamins and 120 (67.42%) took both mineral and multivitamin supplementation. Furthermore, the intake of supplements has increased during pandemic.

Table 2. Practices on Mineral and Multivitamins Supplementation

Intake of Supplements	Pre-Pandemic		During Pandemic		Difference
	n	%	n	%	
Mineral	0	0.00	0	0.00	0.00
Vitamin	58	32.58	61	34.27	1.69
Both (mineral & vitamin)	117	65.73	120	67.42	1.69
TOTAL	178		178		

Majority of the respondents answer to factors associated for vitamin and mineral consumption during pre-pandemic was found to be self-willingness (28.65%) as well as recommendation by friends/relatives and during pandemic was doctor's prescription (44.94%). Moreover, the said factors associated for consumption of supplements has increased during pandemic.

Table 3. Factors that contribute to the consumer's decision on the vitamins and minerals consumption

Factors associated for consumption	Pre-Pandemic		During Pandemic		Difference
	n	%	n	%	
Doctor's Prescription	32	17.98	80	44.94	26.97
Recommendation by Friends and Relatives	34	19.10	24	13.48	5.62
Social Media Influence	1	0.56	2	1.12	0.56
Self-Willingness	51	28.65	19	10.67	17.98
Others	0	0.00	14	7.87	7.87
Not applicable	60	33.71	39	21.91	11.80

The current findings showed that 67 (37.6%) respondents had agreed that optimal nutrition status decrease the susceptibility and severity of an infection and has marked a mean score of 4.02 signifying that the respondents have a very good understanding of the statement. Although, 64 (36%) of the respondents were neutral about minerals may decrease risk of infection and has marked a mean score of 2.64 signifying that the respondents have a limited understanding of the statement. Vitamins as an essential way in strengthening the body's immune system showed 109 (61.2%) respondents agreed to this and has marked a mean score of 4.53 signifying that the respondents have an excellent understanding of the statement. 72 respondents (40.4%) agreed that adequate micronutrient intake though food and supplementation help in boosting immune response and has marked a mean score 4.33 signifying that the respondents have an excellent understanding of the statement. On the other hand, 72 respondents (40.4%) agreed that mineral and vitamin supplementation are considered as an inexpensive way to support optimal immune function and has marked a mean score of 3.61 signifying that the respondents have a very good understanding of the statement. Furthermore, 83 respondents (46.6%) respondents agreed that mineral and vitamin supplementation intake support body in fighting COVID-19 infection and has marked a mean score of 4.20 signifying that the respondents have a very good understanding of the statement.

Table 4. *Level of Knowledge regarding Mineral and Vitamin Supplementation*

KNOWLEDGE	Responses	n	%	MEAN	LEVEL
1. Optimal nutritional status decrease the susceptibility and severity of an infection	Strongly Agree	61	34.3	4.02	High
	Agree	67	37.6		
	Neutral	44	24.7		
	Disagree	6	3.5		
	Strongly Disagree	0	0.0		
2. Minerals (such as Zinc, Copper, Selenium, and Magnesium) may decrease risk of infection.	Strongly Agree	11	6.2	2.64	Low
	Agree	22	12.4		
	Neutral	64	36		
	Disagree	54	30.3		
	Strongly Disagree	27	15.2		
3. Vitamins (such as Vitamin A, B6, C, D, and E) are essential in strengthening the body's immune system.	Strongly Agree	109	61.2	4.53	Very High
	Agree	54	30.3		
	Neutral	15	8.4		
	Disagree	0	0.0		
	Strongly Disagree	0	0.0		
4. Adequate micronutrient intake though food and supplementation help in boosting immune response	Strongly Agree	83	46.6	4.33	Very High
	Agree	73	41		
	Neutral	20	11.2		
	Disagree	1	0.6		
	Strongly Disagree	1	0.6		
5. Mineral and Vitamin Supplementation is an inexpensive way to support optimal immune function	Strongly Agree	28	15.7	3.61	High
	Agree	72	40.4		
	Neutral	58	32.6		
	Disagree	20	11.2		
	Strongly Disagree	0	0.0		
6. Mineral and Vitamin supplementation supports body in fighting COVID-19 infection	Strongly Agree	66	37.1	4.20	High
	Agree	83	46.6		
	Neutral	28	15.7		
	Disagree	0	0.0		
	Strongly Disagree	1	0.6		

Legend: 4.30-5.00 Very High, 3.50-4.20 High, 2.70-3.40 Moderate, 1.90-2.60 Low, 1.00-1.80 Very Low

Results for the assessment of respondents' attitudes revealed that 76 (42.7%) respondents believed that optimal nutrition status decreases the susceptibility and severity of an infection and has marked a mean score of 3.98 signifying that the respondents have a very good belief of the statement. 53 (29.8%) respondents were neutral about Minerals (such as Zinc, Copper, Selenium, and Magnesium) may decrease risk of infection and has marked a mean score of 2.78 signifying that the respondents have a satisfactory belief of the statement. 94 (52.8%) respondents believed that vitamins (such as Vitamin A, B6, C, D, E) are essential in strengthening the body immune's system and has marked a mean score of 4.46 signifying that the respondents have an excellent belief of the statement. 78 (43.8%) respondents believed that adequate micronutrient intake through food and supplementation helps in boosting immune response and has marked a mean score of 4.29 signifying that the respondents have a very good belief of the statement. 64 (36%) respondents agreed that mineral and vitamin supplementation is an inexpensive way to support optimal immune function and has a mean score of 4.29 signifying that the respondents have a very good belief of the statement. Furthermore, 82 (46.1%) respondents agreed that mineral and vitamin supplementation support the body in fighting COVID-19 infection and has a mean score of 4.19 signifying that the respondents have a very good belief of the statement.

Table 5. *Level of Attitude regarding Mineral and Vitamin Supplementation*

ATTITUDE	Responses	n	%	MEAN	LEVEL
1. I believe that optimal nutritional status decreases the susceptibility and severity of an infection	Strongly Agree	51	28.7	3.98	High
	Agree	76	42.7		
	Neutral	47	26.4		
	Disagree	4	2.2		
	Strongly Disagree	0	0.0		
2. I believe that minerals (such as Zinc, Copper, Selenium, and Magnesium) may decrease risk of infection.	Strongly Agree	11	6.2	2.78	Moderate
	Agree	38	21.3		
	Neutral	53	29.8		
	Disagree	53	29.8		
	Strongly Disagree	23	12.9		
3. I believe that vitamins (such as Vitamin A, B6, C, D, and E) are essential in strengthening the body's immune system.	Strongly Agree	94	52.8	4.46	Very High
	Agree	72	72		
	Neutral	12	12		
	Disagree	0	0.0		
	Strongly Disagree	0	0.0		
4. I believe that adequate micronutrient intake through food and supplementation help in boosting immune response	Strongly Agree	76	42.7	4.29	High
	Agree	78	43.8		
	Neutral	23	23		
	Disagree	1	0.6		
	Strongly Disagree	0	0.0		
5. I believe that mineral supplementation and Multivitamin intake is an inexpensive way to support optimal immune function	Strongly Agree	43	24.2	3.75	High
	Agree	64	36		
	Neutral	55	30.9		
	Disagree	15	8.4		
	Strongly Disagree	1	0.6		
6. I believe that Mineral supplementation and Multivitamin intake supports body in fighting COVID-19 infection	Strongly Agree	65	36.5	4.19	High
	Agree	82	46.1		
	Neutral	31	17.4		
	Disagree	0	0.0		
	Strongly Disagree	0	0.0		

Legend: 4.30-5.00 Very High, 3.50-4.20 High, 2.70-3.40 Moderate, 1.90-2.60 Low, 1.00-1.80 Very Low

With regards to the knowledge and attitude assessment, practice assessment was the way to confirm what they know and what they believe in regarding mineral and vitamin supplementation in boosting immunity against COVID-19. 89 (50%) respondents ensured that their body be in optimal nutritional status to decrease their susceptibility and severity of any infection and has a mean score of 4.15 signifying that the respondents have a very good practice of the statement. 75 (41.8%) respondents agreed to take an adequate of mineral rich food to lower the risk of infection and has a mean score of 3.55 signifying that the respondents have a very good practice of the statement. 84 (46.6%) respondents agreed that eating and drinking food rich in vitamins is one way to strengthen their immune system and has a mean score 4.23 signifying that the respondents have a very good practice of the statement. 77 (43.3%) and 80 (44.9%) respondents respectively, ensured that mineral and vitamin supplementation to compensate their micronutrient deficiencies as well as to reduce their risks of respiratory infection and illness and has a mean scores of 3.99 and 4.06 signifying that the respondents have a very good practice of the statement.

Table 6. *Level Practices regarding Mineral and Vitamins Supplementation*

PRACTICES	Responses	n	%	MEAN	LEVEL
1. I ensure that my body to be in optimal nutrition to decrease my susceptibility and severity of any infection.	Strongly Agree	58	32.6	4.15	High
	Agree	89	50		
	Neutral	30	16.9		
	Disagree	1	0.6		
	Strongly Disagree	0	0.0		
2. I ensure to take an adequate mineral rich food to lower risk of infection	Strongly Agree	31	17.5	3.55	High
	Agree	75	41.8		
	Neutral	41	23.2		
	Disagree	24	13.6		
	Strongly Disagree	7	4		
3. I eat/ drink food rich in vitamins (such as Vitamin A, B6, C, D, and E) to strengthen my immune system.	Strongly Agree	68	38.2	4.23	High
	Agree	83	46.6		
	Neutral	27	27		
	Disagree	0	0.0		
	Strongly Disagree	0	0.0		
4. I ensure to provide mineral supplements and vitamins to compensate my micronutrient deficiencies.	Strongly Agree	52	29.2	4.04	High
	Agree	85	47.8		
	Neutral	39	21.9		
	Disagree	1	0.6		
	Strongly Disagree	1	0.6		
5. I take mineral supplements and vitamins to reduce risk of respiratory infection and illness	Strongly Agree	51	28.7	3.99	High
	Agree	77	43.3		
	Neutral	48	48		
	Disagree	1	0.6		
	Strongly Disagree	1	0.6		
6. I take mineral supplements and vitamins to support my body in fighting COVID-19	Strongly Agree	55	30.9	4.06	High
	Agree	80	44.9		
	Neutral	42	23.6		
	Disagree	0	0.0		
	Strongly Disagree	1	0.6		

Legend: 4.30-5.00 Very High, 3.50-4.20 High, 2.70-3.40 Moderate, 1.90-2.60 Low, 1.00-1.80 Very Low

Table 7. Summary of Level in KAP about Mineral Supplementation and Multivitamin Intake to boost immune system

Variable	Mean Score	Level	Interpretation
Knowledge	3.89	High	The respondents have a very good understanding of mineral supplementation and vitamin intake to boost immune system against COVID-19
Attitude	3.91	High	The respondents have a very good belief on mineral supplementation and vitamin intake to boost immune system against COVID-19
Practice	4.00	High	The respondent has very good practice of mineral supplementation and vitamin intake to boost immune system against COVID-19

Legend: 4.30-5.00 Very High, 3.50-4.20 High, 2.70-3.40 Moderate, 1.90-2.60 Low, 1.00-1.80 Very Low

The general results showed that the respondents have high levels of knowledge, attitude, and practices in mineral and vitamin supplementation to boost immune system. The respondents marked a mean score of 3.89 for the knowledge assessment interpreted as high signifying that the respondent has very good understanding of mineral supplementation and vitamin intake to boost immune system. Likewise, for the attitude assessment, the respondents marked a mean score of 3.89 interpreted High signifying that the respondents have a very good belief on mineral and vitamin supplementation to boost immune system. Lastly, the respondents marked a mean score of 4.00 for the practice assessment signifying that the respondent have a very good practice of mineral and vitamin supplementation to boost immune system.

4 Discussion

Multivitamin supplements usually contain a variety of vitamins and minerals, as well as trace elements. Many of these have antioxidant qualities and aid in immune system support. Although dietary supplements have been proven to aid immune function, the extent to which individual supplements are linked to a lower risk of COVID-19 infection is still unknown (Louca et al.,2021).

As stated by National Institute of Health (2021), COVID-19 vaccines are now available and pharmacologic treatments are being developed, there is still a lot of interest in dietary supplement ingredients that might boost immune function and reduce inflammation to help prevent COVID-19 or manage its symptoms. Many of these ingredients have not been studied in COVID-19 patients. However, research indicates that they may improve immune function and aid in the prevention or reduction of symptoms of the common cold, influenza, and other respiratory tract infections. As a result, some scientists believe they may hold promise for COVID-19, though the strength of the evidence supporting these hypotheses varies greatly. In this study, 58 (32.58%) respondents were just taking vitamins and both mineral and vitamin supplements were practiced by 117 respondents (65.73%) were primarily due to self-willingness and recommendation by friends/ relatives. On the other hand, the intake of supplements has increased during pandemic due to doctors' prescription.

In our study, doctors' prescription, recommendation by friends/relatives, and the self-willingness were found to be the three most popular factors that influence the consumption of mineral and vitamin supplement. This is in line with the findings of Qidwai et al (2012), who found these to be the three most common factors influencing the use of mineral and vitamin supplements.

About 67 (37.6%) respondents of the study population agreed that optimal nutritional status decrease the susceptibility and severity of an infection. This was also shown in a study by Calder et al (2020) where it was stated that the role of nutrition in immune system is an important factor to protect against viral infections. In connection to this, 76 (42.7%) respondents believed, and 89 (50%) respondents practiced being in optimal nutrition to prevent infection.

While 64 (36%) respondents were neutral regarding minerals (such as Zinc, Copper, Selenium, and Magnesium) may decrease risk of infection and 109 (61.2%) respondents agreed that vitamins such as vitamin A, B6, C, D, and E are essential in strengthening the body's immune system. Similar results were also reported in the study of Calder et al (2020) where a wealth of mechanistic and clinical data show that vitamins such as A, B6, B12, C, D, E, and folate, as well as trace elements such as zinc, iron, selenium, magnesium, and copper, play important and complementary roles in immune system support. Inadequate intake and status of these nutrients are common, resulting in a reduction in resistance to infections. On the other hand, 75 (41.8%) and 83 (46.6%) respondents ensured that they take mineral rich food and vitamins to lower risk of infection as well as to boost their immune system

Around 83 (46.6%) respondents agreed that adequate micronutrient intake through food and supplementation help in boosting immune response, whereas WHO (2008) reported that the optimal intake of all these nutrients would ideally be achieved through the consumption of a well-balanced and diverse diet. Almost 72 (40.4%) respondents agreed that mineral and vitamin supplementation is an inexpensive way to support optimal immune function. An examination of the literature revealed that in vitro and observational studies, as well as clinical trials, highlight the importance of vitamins A, C, and D, omega-3 fatty acids, and zinc in modulating the immune response. Vitamin, omega-3 fatty acid, and zinc supplementation appears to be a safe and low-cost way to support optimal immune system function (Pecora et al., 2020)

Closely 83 (46.6%) respondents agreed that mineral and vitamin supplementation support body in fighting COVID-19 infection which was also noted in the study of Kumar et al (2021) that a cohort study in Singapore found that combining vitamin D, magnesium, and vitamin B12 (DMB) could slow the progression of COVID-19 in patients. Furthermore, 80 (44.9%) respondents ensured that they take mineral and vitamin supplements to protect themselves from COVID-19.

5 Conclusion

The Knowledge, Attitude and Practices of respondents toward micronutrient supplementation was assessed which revealed that the respondents have a very good understanding, belief, and practice of mineral and vitamin supplementation to boost immune system against COVID-19. Majority of the respondents were not taking solely mineral supplementation during pre-pandemic, but vitamins and minerals supplementation were taken by the respondents due to self-willingness and recommendation by friends/relatives. On the other hand, the intake of these supplements has increased during pandemic due to recommendation by friends/relatives and doctor's prescription. The respondent's level of intake of micronutrient supplementation was also practiced since they knew and believed that it could decrease the risk of COVID-19 infection.

6 Declaration

6.1 Acknowledgments

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6.2 Competing Interests

The authors declared that they do not have any known conflict of interest in publishing this work.

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