



## CORRELATION BETWEEN KNOWLEDGE AND BEHAVIOR OF USING VITAMIN C SUPPLEMENTS AMONG HEALTH AND NON-HEALTH STUDENTS IN CENTRAL JAVA DURING THE COVID-19 PANDEMIC

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### ABSTRACT

**Background:** During the COVID-19 pandemic, 57.1% of students used vitamin C. Everyone's behavior/actions in using vitamin C are different. This is influenced by several factors, one of which is knowledge. **Objective:** Knowing the differences in the level of knowledge and the different levels of behavior in using vitamin C supplements and the correlation between knowledge and behavior in using vitamin C supplements among health and non-health students in Central Java. **Methods:** Cross sectional analytic research using a questionnaire with purposive sampling technique. Data were analyzed using Chi-Square difference test and Rank Spearman correlation test. **Results:** The level of knowledge of health students related to vitamin C was in the good category (75%) and non-health students was in the sufficient category (42%). The behavior level of health students related to the use of vitamin C was in the good category (83.3%) and non-health students was in the poor category (58%). Chi-Square test showed that there were differences in the level of knowledge and behavior in using vitamin C between health students and non-health students ( $p < 0.001$ ). There was a correlation between knowledge and the behavior of using vitamin C ( $p < 0.001$ ). The Spearman correlation coefficient ( $r$ ) obtained was 0.612. **Conclusion:** There were differences in the level of knowledge and different levels of behavior between health students and non-health students. There was a correlation between knowledge and behavior in using vitamin C supplements among health and non-health students in Central Java.

**Keywords:** *vitamin C supplements, knowledge, behavior, students*

### INTRODUCTION

COVID-19 is a disease that is transmitted through a virus and has become a new problem in various countries, causing a pandemic. Indonesia is a country with a large population, so it has a large-scale risk of being infected with a high rate of spread of the virus.<sup>1</sup> One way to avoid transmission of COVID-19 is to strengthen the immune system. There are various ways that can be done to boost the body's immune system, one of which is by taking supplements.<sup>2</sup> Based on the guidelines from BPOM, one type of health supplement that can be used to maintain body immunity is vitamin C.<sup>3</sup>

Based on research conducted by Ningsih et al, during the COVID-19 pandemic as many as 57.1% of students used vitamin C supplements.<sup>4</sup> However, inappropriate use of vitamin C supplements can cause unwanted effects. Everyone's behavior in using vitamin C supplements is certainly different. A person's behavior is influenced by the knowledge they have.<sup>5</sup> Therefore, research is needed to find out the correlation between knowledge and the behavior of using vitamin C supplements among health and non-health students during the COVID-19 pandemic.

### METHOD

This research was a type of analytic observational research with cross sectional method. The sample in this research were health and non-health students in Central Java who met the inclusion criteria.

The inclusion criteria include:

1. Health and non-health students pursuing undergraduate education in Central Java,
2. Still active in college status,
3. Have taken or are currently taking vitamin C supplements in the last 3 months,
4. And willing to be a respondent.

Sampling method used is purposive sampling.

The instrument used in this study was a questionnaire given in the form of a Google form. The data obtained were analyzed using the Chi-square test to determine differences in levels of knowledge and behavior as well as the Rank Spearman correlation test to determine the correlation between knowledge and behavior using vitamin C supplements.



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**RESULT AND DISCUSSION**

**Validity Test**

The validity test in this study used the Pearson Product Moment test with 30 respondents. An item was categorized valid if it has a higher  $r_{count}$  value than  $r_{table}$ .<sup>6</sup> The  $r_{table}$  value for a total of 30 respondents was 0.361. Table 1 shows the results of the validity test of 17 statement items regarding knowledge of vitamin C supplements, as many as 10 items are categorized as valid and 7 items are invalid. Meanwhile, of the 14 question items about the behavior of using vitamin C supplements, as many as 8 items were categorized as valid and 6 items were invalid (table 2). Invalid items were not use in this study. Valid items are needed in reliability testing and data collection.

**Table 1.** Validity test of knowledge of vitamin C supplements questionnaire

Items	$r_{count}$	$r_{table}$ (n=30)	Description
1	0.463		Valid
2	-		Invalid
3	0.490		Valid
4	-		Invalid
5	0.438		Valid
6	0.388		Valid
7	0.487		Valid
8	0.176		Invalid
9	0.672	0.361	Valid
10	0.600		Valid
11	0.314		Invalid
12	0.754		Valid
13	0.220		Invalid
14	0.259		Invalid
15	0.365		Valid
16	-		Invalid
17	0.385		Valid

**Table 2.** Validity test of behavior of using vitamin C supplements questionnaire

Items	$r_{count}$	$r_{table}$ (n=30)	Description
1	0.019		Invalid
2	0.268		Invalid
3	0.395		Valid
4	0.424		Valid
5	0.527	0.361	Valid
6	0.460		Valid
7	0.477		Valid
8	-		Invalid
9	0.536		Valid
10	-0.134		Invalid

11	0.436	Valid
12	0.633	Valid
13	0.112	Invalid
14	-	Invalid

**Reliability Test**

The question items in the questionnaire that were previously declared valid were then tested for reliability using the Cronbach's alpha test. The questionnaire was categorized as reliable if it has a Cronbach's alpha value  $>0.6$ .<sup>6</sup> Table 3 shows the results of the reliability test obtained an Alpha value of the questionnaire about knowledge of 0.763 and the questionnaire about behavior of 0.672. The Alpha value on the knowledge and behavior questionnaire for using vitamin C supplements was in the range of 0.60-0.799 so that it was considered reliable with a high reliability category.<sup>7</sup>

**Table 3.** Reliability test

Variable	Alpha value	Description
Knowledge	0.763	High reliability
Behavior	0.672	

**Respondent Characteristics**

Based on the research, it was known that 105 respondents included the inclusion criteria. According to table 4, 68.57% of respondents were female, and 31.43% were male, because women have a high level of concern related to health problems compared to men.<sup>8</sup> Based on age characteristics, all respondents were between 18-24 years old (100%). According to Nengah et al., students at the Undergraduate (S1) have an age range of 18-24 years.<sup>9</sup> Based on the characteristics of the cluster of education, 36 respondents (34.3%) belong to the health student cluster. Meanwhile, as many as 69 respondents (65.7%) belong to the non-health student cluster. Most of the respondents (61.90%) chose to get vitamin C supplements through a pharmacy. While 35.24% of respondents chose supermarkets/minimarkets and 2.86% of respondents chose stalls to buy vitamin C supplements. Pharmacy is the best place to buy drugs that have guaranteed quality and safety.<sup>10</sup>



**Table 4.** Characteristics of respondents

Characteristics	Category	Frequency	Percentage (%)
Sex	Male	33	31.43
	Female	72	68.57
Age	<18 years	0	0
	18-24 years	105	100
	>24 years	0	0
Cluster of education	Health students	36	34.3
	Non-health students	69	65.7
The place to get vitamin C	Pharmacy	65	61.90
	Supermarket/minimarket	37	35.24
	Stall	3	2.86

### Knowledge of Vitamin C Supplements

The level of knowledge of respondents regarding vitamin C supplements was measured using several indicators. Based on table 5, it could be seen that most of the respondents have good knowledge about vitamin C supplements. Of the 10 indicators available, 8 of them show high correct answers.

The first indicator was the definition of vitamin C which consists of 1 statement. Health students who answered correctly were 36 people (100%), while non-health students who answered correctly were 59 people. This was because the definition of vitamin C is common knowledge for students.<sup>11</sup>

The second indicator was the benefits of vitamin C supplements which consist of 2 statements. The statement number 2, as many as 36 health students and 50 non-health students could answer correctly. Whereas in statement number 3, as many as 31 health students and 54 non-health students could answer correctly. The benefits of vitamin C supplements were important to know because they will affect the accuracy of the indications for the use of vitamin C.

The third indicator was the source of vitamin C which consists of 1 statement. There were 22 people of health students who could answer statements correctly, while non-health students who could answer questions correctly were 30 people. It may be because students only know a few kinds of fruits that can be used as a source of vitamin C, such as oranges and tomatoes.

The fourth indicator was the rules for using vitamin C supplements which consist of 2

statements. The statement number 5, as many as 34 health students and 47 non-health students could answer correctly. Whereas in statement number 6, as many as 30 health students and 45 non-health students could answer correctly. Knowledge of the rules of use needed to be known because it will affect the rationality of drug use, especially for self-medication.

The fifth indicator was the side effect of vitamin C supplements which consists of 2 statements. The correct answer for health students in statement number 7 was 32 and 38 non-health students. Whereas in statement number 8, as many as 25 health students and 23 non-health students could answer correctly. It was due to students' lack of concern for the side effects that may arise from the vitamin C they consume.<sup>12</sup>

The sixth indicator was the storage of vitamin C supplements which consists of 2 statements. The statement number 9, as many as 26 health students and 41 non-health students could answer correctly. Whereas in statement number 10, as many as 29 health students and 57 non-health students could answer correctly. Students need to know how to properly store vitamin C supplements to maintain stability which can affect their effectiveness.



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**Table 5.** Distribution of respondent's answers regarding knowledge of vitamin C supplements

Indicators	Items	Correct answer		Frequency	Percentage (%)
		Health students (n=36)	Non-health students (n=69)		
Definition	1	36	59	95	90.48
Benefit	2	36	50	86	81.90
	3	31	54	85	80.95
Source	4	22	30	52	49.52
	5	34	47	81	77.14
Medication rules	6	30	45	75	71.43
	7	32	38	70	66.67
Side effect	8	25	23	48	45.71
	9	26	41	67	63.81
Storage	10	29	57	86	81.90

According to Nursalam, a person's knowledge can be categorized as good if it has a total score of 76-100%, sufficient if it is 56-75%, and less if it is <56% of the total score.<sup>13</sup> The results of this study showed that 45% of the respondents were in the category of good level of knowledge, 35% of the respondents were in the sufficient category, and 20% of the respondents were in the less category. It meant that the majority of respondents have good knowledge about vitamin C supplements.

The differences level of knowledge and behavior regarding the use of vitamin C supplements

between health and non-health students were analyzed using the Chi-square test. Based on table 6, there was a significant difference in the level of knowledge between health and non-health students regarding vitamin C supplements ( $p < 0.001$ ). The level of knowledge of health students was categorized as good (75%), while non-health students are categorized as sufficient (42%). The level of one's knowledge was influenced by several factors, such as education, information, environment, gender, social culture, experience, and age.<sup>11</sup>

**Table 6.** The differences level of knowledge regarding vitamin C supplements

Cluster of education	Knowledge level category						Total		p
	Good		Sufficient		Less		n	%	
	n	%	n	%	n	%			
Health students	27	75	8	22.2	1	2.8	36	100	<0.001*
Non-health students	20	29	29	42	20	29	69	100	
Total	47	44.8	37	35.2	21	20	105	100	

\*Chi-square test, p value <0.05 considered significant.

### Behavior of Using Vitamin C Supplements

The level of respondents' behavior regarding the use of vitamin C supplements was measured using several indicators. Based on table 7, it was known that the majority of respondents have good and correct behavior in using vitamin C supplements. Of the 8 indicators available, 6 of them show high correct answers.

The first indicator was the appropriate indication which consists of 1 question. The number of health students who could answer questions correctly was 28 people, while non-health students were 46 people. This was because health students get more information about drug indications through formal education compared to non-health students.

The second indicator was the appropriate dosing regimen which consists of 4 questions. On the



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question number 2, as many as 29 health students and 45 non-health students could answer correctly. The question number 3 could be answered correctly by 36 health students and 52 non-health students, the question number 4 can be answered correctly by 36 health students and 53 non-health students, and then question number 5 can be answered correctly by 32 health students and 34 non-health students. Students needed to pay attention to the drug dosage regimens consumed in order to achieve rational treatment.

The third indicator was alert to side effects which consists of 1 question. The number of health students who answered correctly was 28 people, while non-health students were 23 people. This was due to a lack of knowledge and concern for non-medical students regarding the consequences of inappropriate drug use, so they assume that

information about drug side effects was not that important.

The fourth indicator was effectiveness, safety and efficiency which consists of 1 question. Health students who answered correctly were 17 people, while non-health students were 24 people. This was because students feel able to find information independently about the vitamin C supplements they use.

The fifth indicator was the correct way of storing which consists of 1 question. The number of health students who answered correctly was 19 people and non-health students were 35 people. It was important to pay attention to how to store the right medicine. This was done to ensure that the substance content of the drug was maintained its effectiveness.

**Table 7.** Distribution of respondent's answers regarding the behavior of using vitamin C supplements

Indicators	Items	Correct answer		Frequency	Percentage (%)
		Health students (n=36)	Non-health students (n=69)		
Appropriate indication	1	28	46	74	70.48
	2	29	45	74	70.48
Appropriate dosing regimen	3	36	52	88	83.81
	4	36	53	89	84.76
	5	32	34	66	62.86
Alert of side effects	6	28	23	51	48.57
Effective, safe and efficient	7	17	24	41	39.05
Appropriate storage	8	19	35	54	51.43

According to Pasaribu, a person's behavior can be categorized as good if it had a value of  $\geq 75\%$  and less if it was  $< 75\%$  of the total score.<sup>14</sup> The results of this study showed that 56% of respondents were classified as having good behavior, while 44% of respondents were classified as having poor behavior. Thus, it can be seen that the majority of respondents have a good category of behavior using vitamin C supplements.

Based on table 8, the results of the Chi-square test, there was a significant difference in the level of behavior between health and non-health students regarding the use of vitamin C supplements

( $p < 0.001$ ). The behavior of health students is included in the good category (83.3%), while non-health students are included in the poor category (58%). Differences in behavior between health and non-health students are influenced by the knowledge they acquire through education. Both formal and non-formal education could influence the development of knowledge and changes in individual behavior.<sup>11</sup>



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**Table 8.** The differences level of behavior of using vitamin C supplements

Cluster of education	Behavior level category				Total		p
	Good		Less		n	%	
	n	%	n	%			
Health students	30	83.3	6	16.7	36	100	<0.001*
Non-health students	29	42	40	58	69	100	
<b>Total</b>	59	56.2	46	43.8	105	100	

\*Chi-square test, p value <0.05 considered significant.

**Correlation between Knowledge and Behavior in Using Vitamin C Supplements**

The correlation between knowledge and behavior was analyzed using the Rank Spearman test. Table 9 shows that there was a significant correlation between knowledge and the behavior of using vitamin C supplements (p<0.001). The Spearman correlation coefficient (r) obtained was 0.612 with a

positive correlation direction and was in the range of 0.60-0.799 so it was considered to have a strong correlation strength. The direction of positive correlation (+) means that there was a one-way correlation between knowledge and the behavior of using vitamin C supplements. This one-way correlation means that the higher a person's knowledge, the better his behavior will be.<sup>6</sup>

**Table 9.** Correlation between knowledge and behavior in using vitamin C supplements

Knowledge	Behavior				Total		r	P value
	Good		Less		n	%		
	n	%	n	%				
Good	44	93.6	3	6.4	47	100	0.612	<0.001*
Sufficient	13	35.1	24	64.9	37	100		
Less	2	9.5	19	90.5	21	100		
<b>Total</b>	59	56.2	46	43.8	105	100		

\*Rank Spearman test, p value <0.05 considered significant.

**CONCLUSION**

The conclusions of this study were:

1. There were differences in the level of knowledge about vitamin C supplements between health students and non-health students and there are differences in the level of behavior in using vitamin C supplements between health students and non-health students in Central Java.
2. There was a correlation between knowledge and the behavior of using vitamin C supplements among health and non-health students in Central Java.

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