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The Correlation Between Level of Knowledge on Immunological Materials With Healthy Life Style Awareness of Pre-service Biology Teachers

Hubungan Tingkat Pengetahuan Materi Imunologi dengan Kesadaran Gaya Hidup Sehat Pra-Jabatan Guru Biologi

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ABSTRACT

The study aims to analyze the relationship between level of knowledge on immunological materials with healthy lifestyle awareness of pre-service biology teachers. Researchers have used correlational research design with a sample of pre-service biology teacher as many as 30 randomly chosen. The instruments developed in this study of 20 multiple choice involving sub-matter of immunological system and 20 online-questionnaire distributed through survey heart app to reveal the healthy lifestyle awareness of participants. Data analysis uses statistical method of Pearson product moment and simply regression after a prerequisite test of normality, linearity and heteroscedasticity test. The results of this study reveal that coefficient correlation of the amount (0.428) means that there is a strong enough correlation between two variables, significant tests show a value of sig 0.018 <0.05. Regression tests show 0.184 determinative coefficient which means that the level of knowledge on immunological material affect to healthy lifestyle awareness by18.4%. The result provides educational implications that it will require integration of healthy lifestyle awareness as part of a character that needs to be strengthened in biology aside.

ABSTRAK

Penelitian ini bertujuan untuk menganalisis hubungan antara tingkat pengetahuan materi imunologi dengan pola hidup sehat calon guru biologi. Peneliti menggunakan desain penelitian korelasional (*correlational research*) dengan sampel penelitian sebanyak 30 calon guru biologi yang dipilih secara random. Instrumen yang dikembangkan dalam penelitian berupa 20 soal multiple choice yang berkaitan dengan sub-materi terkait sistem immunologi serta 20 questionnaire tertutup yang didistribusikan melalui aplikasi survey heart untuk mengungkap pola hidup sehat partisipan. Analisis data menggunakan metode statistik penelitian korelasi pearson *product moment* dan regresi sederhana setelah dilakukan uji prasyarat berupa uji normalitas, linearitas dan heterokedastitas. Hasil dari penelitian ini mengungkap bahwa besarnya koefisien korelasi sebesar (0.428) yang berarti bahwa terdapat hubungan yang cukup kuat antara kedua variabel, uji signifikansi menunjukan nilai sig 0,018<0.05 yang berarti bahwa terdapat hubungan signifikan antara tingkat pengetahuan materi sistem immune dengan penerapan pola hidup sehat calon guru biologi. Uji regresi menunjukan koefisien determinasi 0.184 yang berarti bahwa pengaruh tingkat pengetahuan materi immunologi terhadap

kesadaran pola hidup sehat sebesar 18,4%. Hasil tersebut memberikan implikasi dalam bidang pendidikan yakni diperlukan adanya integrasi penerapan pola hidup sehat sebagai bagian dari karakter yang perlu dikuatkan dalam pembelajaran biologi disamping untuk menguatkan pengetahuan, karena tingkat pengetahuan seseorang dipandang cukup berhubungan kuat dan berpengaruh terhadap kesadaran pola hidup sehat.

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INTRODUCTION

Awareness of healthy lifestyle is needed to preserve one's endurance as a vital step in preventing the spread of disease. Immune system in biology at University is specifically covered in immunology chapters in which its studies can be either integrated into subjects of human anatomy and physiology and can be transmitted by different methods (Al-Hazmy, Kusumawati, & Aryoseto, 2015). The immune system analyzes mechanisms in the body that play a role in maintaining the body against incoming pathogens (Widiastuti, 2020). Ideally in biology materials with diverse education could enable students to have including immunological materials.

A person's level of knowledge of material is viewed as essential in order to equip pre-service biology teacher as part of professional competence and to prepare for the real teacher in the future (Laelasari, Auliana, Fadlillah, & Sobah, 2021). Immune system material is contextual material, so close to daily life, that it is likely that a person can obtain such knowledge based on his own experience, that of others or other sources of information, and can be dimmed to tackle related problems found in daily life (Hadiyanti & Widodo, 2015). Issues relating to immunology studies are consistent with current issue of the spread and invasion of covid-19 virus whether in the pandemic or post-pandemic.

In both pandemic and post-pandemic situations is needed an approach to increasing public knowledge of the importance of preserving the immunity and a healthy lifestyle to protect itself from the dangers of virus transmission and overcoming the spread of the virus (Sulfandi, 2021). The key to success in addressing covid-19 is through preventive movements to practice healthy lifestyle and restrict physical contact. Also, it needs to increase the body's resistance to infection by sufficient and varied nutritional intake (Salman & Norhasanah, 2021).

The World Health Organization recommends during the covid-19 pandemic that each individual should keep his hands clean, wear masks, and objects around him be cleaned with a disinfectant. Keeping physical distancing and avoiding crowds are included in the covid-19 transmission precautions, and implementing a healthy and clean lifestyle (Karo, 2020). Some healthy lifestyle can be manifest in the various forms of exercise, watching sleep patterns, stress management, keeping clean as well as balanced nutritional intake (Nopiyanto, Raibowo, Sugihartono, & Yarmani, 2020). The implanting of healthy lifestyle can certainly be integrated in various educational activities some of them through the delivery of the learning materials at each level of education.

Education and learning about a material thing are viewed as having an effect on the college student's knowledge level (Kristanti & Febrijanto, 2021). It suggests that through learning activities, a person may be equipped to have a level of good knowledge and thus be implemented in daily life. Having a good understanding of knowledge and a good attitude can make a person healthy lifestyle in the face of covid-19 pandemic. As research has revealed, a person's behavior can last longer if they have knowledge materials (Fitriani, 2011). Understanding about immunological materials can play a vital role in either raising

awareness of oneself or in helping communities learn about health care and prevention by adopting healthy lifestyle. Studies indicate that everyone can be exposed to and infected with a disease, so advanced immunological system materials given to schools and colleges not only as knowledge but also depend on applications in daily life.

It is important to have an understanding of immunological materials for pre-service biology teachers because it helps to inspire the entry mechanism of the pathogen into the body as well as the immune response to the pathogen (Saraswati, 2017). The immune system can naturally perform such functions without being governed and without being asked (Rahmawati, 2020). Immunity is dynamic and can be affected by age, emotion, vitamins, nutrition, minerals, sports and hormone (Amalia, 2020).

A healthful pattern of preserving and increasing body immunity in various ways is required (Yuliana, 2020). But studies show that awareness of the importance of a healthy lifestyle is still low because of various things (Ruska et al., 2022). Many individuals have not already done and applied a healthy lifestyle of immune systems to the body's immune system caused by lifestyle and other factors still to be examined (herdiyanti, 2020; Kartika et al., 2021). Studies will thus need to be made to reveal other factors that influence consciousness in applying healthy lifestyle.

Previous research on the relation of knowledge level variables with bound variables of certain attitudes, the relation of women's reproductive health levels with clean and healthy living behaviors (Kustantya & Anwar, 2015), the student's level of understanding in digestive system material with food election behavior (Amalina & Fitrah, 2020), hypertensive knowledge level relationships with prevention behavior on hypertension (Fajarsari, 2021), knowledge level and attitude toward toxoplasmosis (Yani et al., 2022), as the result indicates that there are correlation between independent variables and dependent variable under study. But the research on the relationship between level of knowledge on immunological materials with healthy lifestyle has not been researched. It is expected that this study will provide an idea of the relationship between level of knowledge on immunological materials with healthy lifestyle of pre-service biology teachers and effect of person's knowledge level to healthy lifestyle awareness, so that it can provide implications and contributions in the field of education particularly to the importance of integrating the cultivation of healthy lifestyle awareness in the study of biological materials especially in immunology materials.

METHOD

Researchers use correlational research design to establish the relationship between immunological materials' level of knowledge and healthy lifestyle for pre-service biological teachers, as well as to reveal the significance of the relationship (Cohen, Manion, & Morisson, 2007). The sample in this study is 30 pre-service biology teachers who have teamed up with courses in human anatomy and physiology and are chosen with random sampling. Research instruments used as 20 multiple choice questions were developed by following the cognitive of bloom's domain spread from C1 (memorizing) through C6 (create) by referring to immunological sub-matter of: (1) immune system components, (2) non-specific immunity, (3) specific immunity, (4) work mechanism of immune system and (5) immune system disorders.

It also uses 20 online-questionnaire that are distributed through survey heart app to collect data on healthy life style awareness of participants. Data about level of knowledge and healthy life style awareness is elaborately analyzed for further interpretive to knowledge level criteria (Kartika, 2018).

Table 1. Category of Level of Knowledge

No.	range score	category
1	$85{,}00 \leq X \leq 100$	very high
2	$70{,}00 \leq X \leq 84{,}99$	high
3	$55{,}00 \leq X \leq 69{,}99$	medium

4	40,00 ≤ X ≤ 54,99	low
5	0,00 ≤ X ≤ 39,99	very low

As for the criteria for healthy lifestyle awareness are interpreted by referring **Table 2** (Arikunto, 2021).

Table 2. Category of Healthy Lifestyle Awareness

No	range score	category
1	X≤ 25	low
2	25,5≤ X≤ 50	medium
3	50.5 ≤ X ≤75	high
4	75,5 ≤ X	very high

After descriptive analysis was conducted, the next step is parametric correlation test using Pearson product moment correlation, after measuring normality test by Kolmogorov-Smirnov tests, and linearity tests by testing for linearity through SPSS 25 for Windows software.

As for the category of correlation between variables based on **Table 3** (Fraenkel & Wallen, 2012).

Table 3. Correlation Criteria

Score of Correlation	Correlation Category
0,00 – 0,20	very low
0,21 – 0,40	low
0,41 – 0,60	middle
0,61 – 0,80	high
0,81 – 1,00	very high

In order to know the significance of both variables, researcher comparing the value of results test with α=0.05, if its value is smaller than 0.05 then it can be interpreted that there is a significant relationship between the two variances, and so is the opposite. Following a correlation test, simple regression tests are made to determine direction of the relationship between level of knowledge and of healthy lifestyle awareness, whether they are positive or negative and are used to determine the value of the variables bound when independent variable values is fall or arise. Researchers also conducted heteroscedasticity test using scatter plot as a prerequisite for regression testing. As for the following regression tests:

$$\mathbf{Y = a + bX}$$

description:
Y= dependent variable
X= independent variable
a= constant (value of Y if X is 0)
b= coefficient regression (positive or negative)

RESULT AND DISCUSSION

The results of level of knowledge on immunological materials and healthy lifestyle awareness provide a descriptive data showing that the average participants' knowledge score of 71.16 in high category and healthy lifestyle awareness of 77.30 in good category.

Table 4. Descriptive Statistic Analysis

Variable	N	mean	std. deviation
Level of Knowledge	30	72.16	±11.117
Healthy life style awareness	30	77.30	±6.628

Based on **Table 4** it is known that the level of knowledge on immunological materials is viewed as adequate, as well as healthy lifestyle awareness. This indicates that the level of knowledge a person has is

directly proportional to awareness for apply the habits of healthy lifestyle in their daily life. In this case the pre-service of biology teacher has been able to meaningful learning by implementing the theories acquired within sphere of life. This agrees with research that reveals that meaningful learning can be characterized by a person's ability to implement the knowledge to solve problems or meeting the needs of life (Rolando, Salvador, Vasconcellos, & Luz, 2021).

The level of knowledge about immunology materials can also be seen by its sub-matter. Based on the classification of sub material can be obtained information that the highest level of participant's knowledge is about immune system components with 81.67%, while the lowest level on sub material of immune system's work mechanism with 67.33%.

Table 5. Percentage of each sub-matter of Immunology

No	Sub-matter	%	category
1	component of immune system	81.67	high
2	non-specific immunity	72.50	high
3	specific immunity	69.75	medium
4	work mechanism of immune system	67.33	medium
5	immune system disorder	82.50	high

Table 5 provides information that a sub-matter of immune system still has to be upgraded by pre-service biology teacher is about specific immunity and immune system's work mechanisms. The average percentage of participants' knowledge for both sub-matter is 69.75% and 67.33%. The score obtained is made possible because sub material specific immunity and work mechanisms of immune system have higher levels of matter complexity than other sub-materials. For example, in a specific sub-matter, the are many new concepts and terms have been discovered of how the body responds to antigen through the work of antibody and helper T-cell. In the process there are many relationships between concepts to be trained and analyzed by students. This is so with the immune system's operating mechanism in which it integrates all the concepts and terms involved in a non-specific immunity as well as specific immunity. This complexity of matter is viewed as contributing to a person's learning difficulties and thus contributing to knowledge level.

Researchers ran a classic assumption test as a prerequisite for testing correlation between variable level of knowledge with healthy lifestyle awareness. The test, among other things, was the normality of the data with Kolmogorov-Smirnov test to determine whether the data was normal or not.

Table 6. One-Sample Kolmogorov-Smirnov Test

N	Kolmogorov-Smirnov Z	Asymp.Sig (2-tailed)
30	0.732	0.658

Based on **Table 6** can be discerned that the value of asymp. sig 0.658 > 0.05 so that data are normally discrete. The next step is conducted linearity data test to find the significance of a linear relationship between the level of knowledge on immunological material and healthy lifestyle awareness of participants.

Table 7. Test of Linearity

	df	mean square	F	sig
Deviation from Linearity	8	26.936	0.653	0.725
	20	41.248		

Based on **Table 7** obtained output regarding deviation from linearity sig 0725 > 0.05, so it could be argued that independent and dependent variable in the study has a linear relationship. As a next prerequisite test, researchers perform a parametric test using Pearson product-moment test.

Table 8. Pearson Correlations Output

		Level of knowledge	healthy lifestyle
Level of knowledge	Pearson Correlation	1	.428(*)
	Sig. (2-tailed)		.018
	N	30	30
healthy lifestyle awareness	Pearson Correlation	.428(*)	1
	Sig. (2-tailed)	.018	
	N	30	30

* Correlation is significant at the 0.05 level (2-tailed).

Based on table 8 it is known that the value of sig 018<0.05 which means that there is a significant correlation between the level of knowledge on immunological material and healthy lifestyle awareness. Pearson correlation 0.428 suggests the force of the relationship between these two variables is strong enough. This results in contrary to research finding which has found that there is no significant link between knowledge and one's attitudes and actions to safeguard and boost immunity (Azrimaidaliza, Helmizar, & Yollanda, 2021; Kurnia & Siti, 2020). Previous research suggests that students with a good understanding of the immune system's material do not necessarily have a good sense of immune protection. Nevertheless, the results of this study are consistent with the findings of the study that suggest that there is a correlation between the level of knowledge and healthy lifestyle behavior, eating pattern and prevention of disease (Amalina & Fitrah, 2020; Fajarsari, 2021; Kustantya & Anwar, 2015; Tri Hartati, 2012; Yani et al., 2022).

Further simple regression testing in order to know the direction of positive or negative relationships of variable knowledge and awareness of healthy lifestyle and predict the value of healthy lifestyle awareness (dependent variable) when the value of level of knowledge (independent variable) increases or decreases. In this test first conducted heteroscedasticity test using the scatterplot.

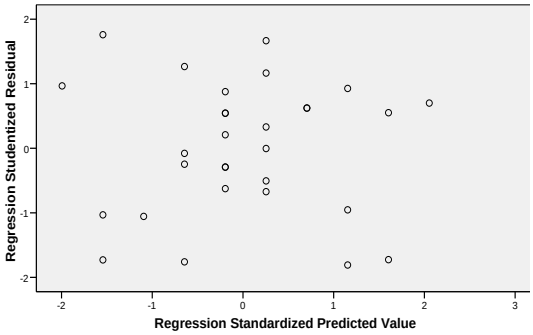

Figure 1. Scatter plot of research data

Based on the scatterplot on figure 1 it appears that the dots are dispersed in the upper, middle and bottom areas, not accumulating in just one point and un-patterned dots dissemination, so that it can be maximized

that there is no heteroscedasticity problem on the data being analyzed. It shows that regression prerequisite tests have been met, so that further regression test can be conducted to determine the relationship between level of knowledge on immunology materials and healthy lifestyle awareness of pre-service biology teachers.

Table 9. Model Summary of Regression

R	R Square	Adjusted R Square	Std. Error of the Estimate
.428(a)	.184	.154	6.09583

a Predictors: (Constant), Level of knowledge

Based on output at **Table 9**, the magnitude of the correlation is 0.428, and the coefficient of the 0.184 determinations which means that the level of immunological material knowledge on healthy pattern awareness is 18.4%, while the rest is affected by other variables.

Table 10. Output of ANOVA (b)

	df	Mean Square	F	Sig.
Regression	1	233.845	6.293	.018(a)
Residual	28	37.159		
Total	29			

a Predictors: (Constant), Level of knowledge

b Dependent Variable: Healthy lifestyle awareness

Based on output at **Table 10** it is known that f = 6,293 with a degree of significance 0.018 < 0.05 so that a regression model can be used to predict variables of healthy lifestyle awareness

Table 11. Output of Coefficients(a)

	Unstandardized Coefficient		Standardized coefficient	t	Sig.
	B	Std. Error	Beta	B	Std. Error
(Constant)	58.867	7.432		7.921	.000
Level of knowledge	.255	.102	.428	2.509	.018

Based on output at **Table 11** it is known that the magnitude of the constants (a) in column b is 58,867 while the variable value of healthy lifestyle awareness (b) is 0.255, the regression equation can be written:

$$Y = a + b\ X \text{ or } 59.867 + 0.255X$$

The equations suggest that if there is no value in the level of knowledge, then the value of healthy lifestyle awareness of 59,867, of each additional 1 value level of knowledge then the value of healthy lifestyle awareness grows by 0.255. This implies that increased level of knowledge would be followed by an increased awareness of a healthy lifestyle. The results suitable with early studies that reveal there is a

significant relationship between student's knowledge and attitude toward healthy living behavior (Sani, 2011).

Regression tests show that the level of knowledge of pre-service biological teachers about immunology materials has an 18.4% percent impact on healthy lifestyle awareness, while the rest is influenced by variables or other factors. It deals with research findings that there are external and internal factors that contribute to a person's sense of well-being that contribute to awareness and action, among other things, environment and reforestation (Qoriah, Susanti, & Haliza, 2020). Based on the findings found in this study, it provides the educational implications of instructing teachers or educators to be able to direct learners in getting and adjusting their environment to adopt healthy lifestyle awareness, and integrating their character to apply it in the study of biology.

CONCLUSION

Based on research, it could be concluded that pre-service biology teachers have level of knowledge on immunological materials and healthy lifestyle awareness in high category with average 72.16 and 77.30. As for the highest-knowledge sub-matter is the material about the components of immune system, while the lowest knowledge category is about work mechanisms of immune system. There is a significant correlation between the level of knowledge and healthy lifestyle awareness with strong relationship (r= 0428). The direction of the relationship between two variables is positive, meaning that if the level of participants' knowledge increases then it will be followed by an increased healthy lifestyle awareness. The enormous adaptive impact the level of knowledge on healthy lifestyle awareness is estimated at 18.4%. The study is limited to testing the relationship between two variables studied and presupposed the impact of independent variables on dependent variables, not being able to explain how knowledge levels can affect healthy lifestyle awareness, so further study is needed to eliminate these kinds of influences through other methods and design.

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