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The Influence of the Demonstrative Method on the Learning Outcomes of Digestive System for Fifth Grade Students at Cokroaminoto Cluster Elementary School Blora District

Romnah Kistiari[1*], Farid Ahmadi[1]

[1] Department of Primary School Teacher Education, Faculty of Education and Teacher Training, Semarang State University, Semarang, Indonesia.

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Corresponding Author:
Romnah Kistiari
romnah01@students.unnes.ac.id

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Abstract: This research addresses issues in understanding the human digestive system material at Cokroaminoto Elementary School Cluster, Blora district, due to ineffective teaching methods. It aims to assess the impact of the demonstration method on fifth-grade students' learning outcomes. The Quasi-Experimental design revealed a significant improvement in the experimental group compared to the control group across three schools, accepting the alternative hypothesis (H_a). Conversely, the control groups did not show significant differences, accepting the null hypothesis (H_0). In conclusion, implementing the demonstrative method positively impacts fifth-grade students' learning outcomes in the study of the digestive system.

Keywords: Demonstration method; Digestive system; Learning outcomes

Introduction

Quality education is a crucial foundation in preparing Indonesia for a future full of competition and dynamics (Abels et al., 2021). Through such quality education, an excellent and competitive human resource will be cultivated (Puspa et al., 2023). Quality education can enhance individuals' abilities to cope with environmental changes and provide protection against economic downturns and financial crises. This view is in line with the findings of Suratini (2017), indicating that the education Gini index and human capital are significant factors influencing Indonesia's growth rate from 1975 to 2005. These findings suggest that the nation's economy improves alongside the quality of education and human resources. This is also supported by several other studies finding a positive relationship between education and economic growth in Indonesia (Anwar, 2018; Purwaningsih et al., 2020; Yan, 2011).

In practice, quality education involves not only academic aspects but also character development, skills enhancement, and continuous knowledge acquisition (Ma'dan et al., 2020; Shen et al., 2022). Article 37, Paragraph 1, stipulates that in efforts to improve the quality of education, including natural science subjects (IPA) as an integral part of the elementary school curriculum is essential, considering the diversity of its content and relevance to daily life. Through learning IPA, students will be equipped with knowledge and skills related to daily life while also instilling environmental care character (Pertiwi et al., 2019; Rohmah et al., 2019; Wijaya, 2018).

The essence of science subjects at the elementary level is the development of critical, logical, systematic, and creative thinking (Arnidha et al., 2021). By studying

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science from an early age, students are taught not only to passively receive information but also to analyze, evaluate, and question the information they receive. This helps students develop essential critical thinking skills in understanding and interpreting the world around them. Therefore, understanding concepts in IPA learning is considered crucial. Students are expected to be able to explain these concepts in their own words, not just know them.

To be able to explain, students must also understand the essence of the material they are studying. Understanding scientific concepts not only involves the ability to understand, apply, classify, generalize, synthesize, and draw conclusions about various objects but also goes beyond simple understanding (Asmawati, 2015). Students' understanding of a concept significantly impacts how they receive information, as these concepts form the basis for more complex mental processes, allowing the formation of principles and generalizations (Dahar, 2011; Fatchurrohim et al., 2016). Therefore, deep understanding of science must be accompanied by practical application in everyday situations. This involves integrating learning in the classroom with field exploration, problem-based projects, and direct interaction with the real world (Charles et al., 2018).

A deep understanding of scientific concepts is crucial for students because with factual, conceptual, procedural, and metacognitive knowledge, they can enhance intellectual knowledge and skills that will ultimately affect students' attitudes and actions in addressing and solving everyday problems (Ali et al., 2020; Anderson et al., 2001).

However, many elementary school students still struggle to deeply understand the science material they are learning. This is because many teachers apply methods that are not in line with the essence of IPA learning as a process-oriented learning (Wisudawati et al., 2016). Especially if the material learned involves many abstract concepts. If this issue is overlooked, it can certainly hinder learning objectives. This reality is confirmed by teachers at Gugus Cokroaminoto Elementary School, Blora Regency. They mentioned that many of their students struggle to understand the concepts of science materials, especially the digestive system. In studying the digestive system, students must learn the process from food intake to excretion. The continuity of this process also involves body components working dynamically to support the digestive process. Most of them have difficulty understanding this material because the digestion process occurs inside the body and cannot be directly understood. Therefore, learning about the human digestive system is considered abstract learning (Nurhayati et al., 2021). The domination of conventional learning methods alone is considered insufficiently effective by teachers. In the context of learning the digestive system, conventional methods require demonstrations so that students can understand the abstract digestion process that occurs within the human body. In the implementation of conventional methods, the delivery of material by teachers dominates without emphasizing the participation of students in learning. Such learning methods become inappropriate for students' needs, causing them to lose interest and become quickly bored, thus impacting their motivation to learn (Hasanah, 2019; Sobron et al., 2019). This situation ultimately leads to students not understanding the essence of the material they are learning, resulting in low learning outcomes.

From the context of IPA learning issues at Gugus Cokroaminoto Elementary School, the method deemed suitable for learning the digestive system material is the demonstration method. This method refers to demonstration and presentation activities (Kudisiah, 2018; Maharani et al., 2020). This method aims to facilitate students' understanding of the concepts taught or to demonstrate the steps of a particular process (Alarcón, 2021; Burton et al., 2015). The demonstration method is a teaching approach in which the teacher directly shows physical objects or their representations to students, such as how to make relief maps or operate a camera for optimal results (Endayani et al., 2020). The advantage of demonstration media is that it enhances the clarity and concreteness of learning and reduces dependence on verbalism. Demonstration media also facilitate students' understanding of lesson material, encourage active student engagement in observation, and allow the presentation of material that cannot be done with other methods. The implementation of this demonstration method is believed to facilitate understanding of the material so that students can achieve the expected learning outcomes.

In creating efficiency and effectiveness in implementing demonstration-based learning methods, teachers must consider innovative learning approaches that are more engaging for students. In the execution of demonstration methods, teachers can leverage not only concrete media but also digital media. Technology-aided information and communication literacy media (ICT-based literacy media) utilize information technology and communication to convey information, messages, or ideas to students, such as audio, visual, and video formats (Farid et al., 2018). With learning designs crafted to be as engaging as possible for students, it is hoped to generate high learning motivation that influences the enhancement of students' learning outcomes. Several studies have demonstrated that utilizing ICT-based literacy media can improve students' learning outcomes across various fields. For instance, Ahmadi et al. (2020)

showed that a flipped classroom model based on android platforms can enhance learning outcomes, motivation, and satisfaction among students in web programming courses. Additionally, Ahmadi et al. (2023) indicated that a mobile learning application containing basic pedagogical material can improve students' learning outcomes in pedagogical courses. From both research findings, it is evident that utilizing TIK-based learning approaches positively impacts enhancing students' learning outcomes. This indicates that digital approaches can also be applied to the demonstration learning method to be used in this study. TIK-based literacy media can be utilized to support the successful implementation of demonstration methods by providing a more vivid and concrete depiction of the digestive processes that occur in humans.

From the essence of the background above, the objective of this research is to ascertain the extent to which the demonstration method can influence the learning outcomes of fifth-grade students at SD Gugus Cokroaminoto, undoubtedly with a TIK approach as the essence of modern education. The results of this research are expected to have a positive impact on the implementation of subsequent learning through the application of modernized demonstration methods.

Method

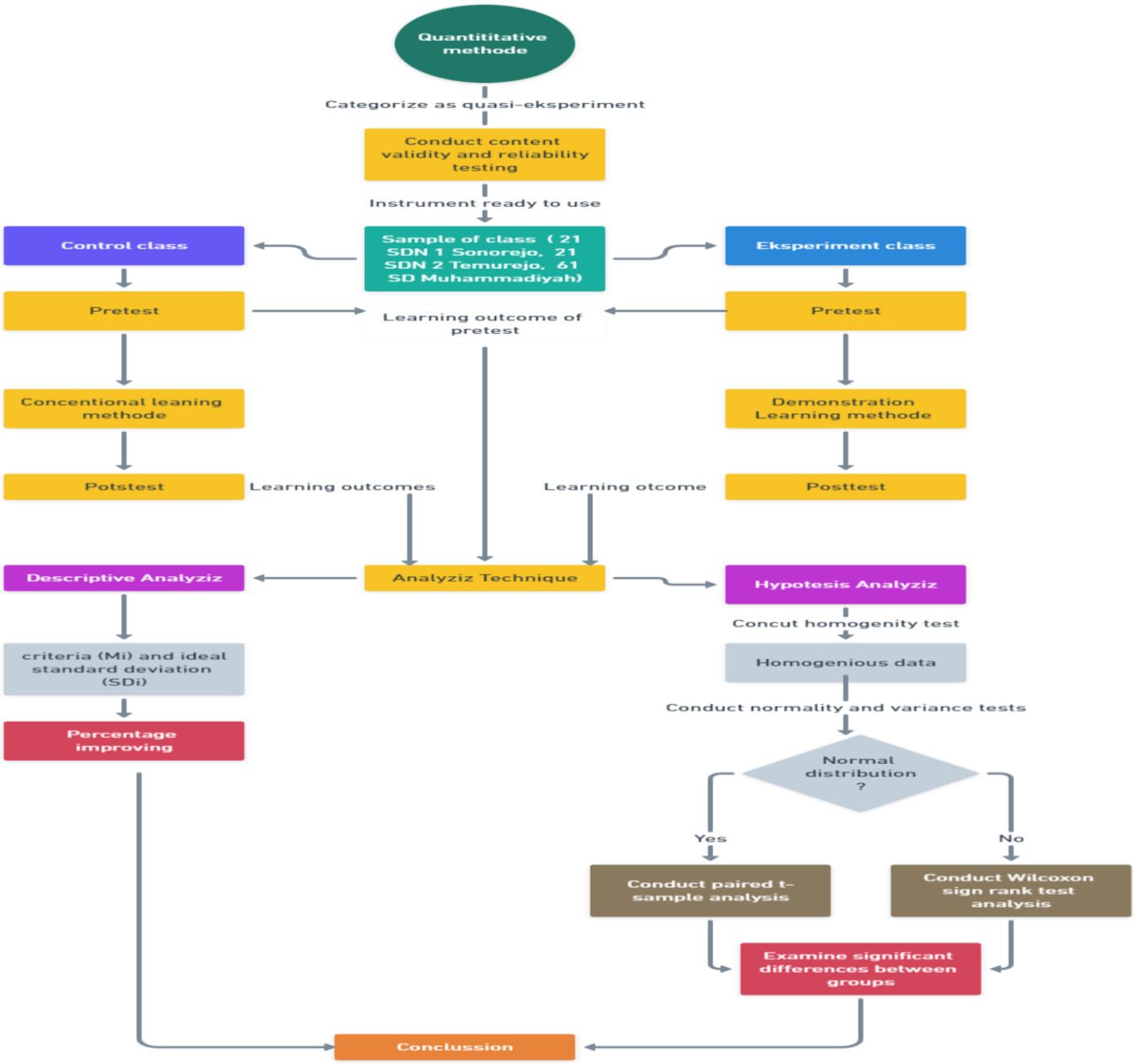

Figure 1. Research flow

This research is a quantitative study. The research method used is Quasi-Experiments with a Nonequivalent Pretest-Posttest Comparison Group Design (Purwaningsih et al., 2020). The research population includes all fifth-grade students in the Cokroaminoto Cluster, Blora Regency. The sample is taken using a simple random sampling technique. The research sample consists of 103 participants from three different elementary schools: SDN 1 Sonorejo, SDN 2 Temurejo, and SD Muhammadiyah. Out of the total subjects, there are 61 students from SD Muhammadiyah, 21 students from SDN 1 Sonorejo, and 21 students from SDN 2 Temurejo. Each group will be formed into an experimental class and a control class, categorizing this research as a quasi-experiment. Two draws are conducted to determine the experimental and control classes (Table 1).

Table 1. Pretest Posttest Noneequivalent Control Group Design

Pretest	Treatment	Posttest
O_1	X	O_2
O_1	-	O_2

Description:
O_1 = Initial test for experimental and control classes
O_2 = Final test for experimental and control classes
X = Learning in the experimental class using demontratitive method

The data collected focus on students' learning outcomes in Natural Sciences (IPA) education. The learning outcome instrument undergoes content validity testing and reliability testing. The data analysis method includes descriptive analysis (mean, standard deviation, and percentage improvement) with conversion using ideal average criteria (Mi) and ideal standard deviation (SDi), and percentage improving. Before hypothesis testing, normality and variance homogeneity tests are conducted. Hypothesis testing uses two techniques: Paired t-sample (parametric analysis technique) for classes with a normal distribution and Wilcoxon sign rank test analysis technique (non-parametric analysis technique). The purpose of hypothesis testing is to examine significant differences between the experimental and control groups. Put simply, the flow of this study is illustrated in the provided Figure 1.

Result and Discussion

Learning outcomes are formulated as a mental and psychological activity, the mastery of knowledge and skills in the subjects owned by students, and operationalized in the form of indicators in the form of grades (Fadhila et al., 2020; Prasetyawan et al., 2019; Wahyuni et al., 2019; Zengin, 2022). Of these two components of learning outcomes, test scores play a crucial role as the main indicator to assess students' learning success in the field of mastering in-depth knowledge for students to understand the essence of the material studied. By knowing students' learning outcomes, solutions to the same or similar problems in subsequent learning related to the application of methods in appropriate learning can be provided.

Of these two components of learning outcomes, test scores play a crucial role as the main indicator to assess students' learning success in the field of knowledge mastery. Test scores are not just a measure of students' understanding of the subject matter but serve as a holistic evaluation tool capable of measuring students' problem-solving abilities and the application of their knowledge in practical contexts, reflecting their ability to apply learning concepts in daily life (Dimyati et al., 2022; Nasir et al., 2014).

Table 2. Description of Cognitive Learning Outcomes (Source: SPSS data processing 2024)

School	Test type	Average score (Mi) Experimental Class	Control Class
SDN 1 Sonorejo	Pretest	50.00, SDi: 13.33333	43.64, SDi : 12.863
	Posttest	80.00, SDi: 11, 54701	46.36, SDi: 10.269
% g		60%	6.23%
SDN 2 Temurejo	Pretest	50.00, SDi: 13.333	46.63. SDi : 16.895
	Posttest	77.00, SDi: 14, 181	50.00, SDi : 16.733
% g		54%	7.22%
SD Muhammdiyah	Pretest	46.77, SDi : 12.751	45.48, SDi : 13.623
	Posttest	73.00, SDi : 12.623	50.00, SDi: 13.391
% g		56.08%	9.94%

Deskription : improvement %

From the above perspective, this research utilizes test scores as parameters to measure students' cognitive learning achievements. Pretest and posttest score analyses are utilized to ascertain the impact of the carry out of the teaching method used by the fifth-grade teacher to teach students about the digestive system.

These scores are compared between the experimental group, where students receive learning using the demonstration method, and the control group, where students do not receive this teaching model. To make it easier to understand, information about pretest and post-test scores is presented in Table 2.

In the educational setting, assessing learning outcomes provides insights into the extent of students' comprehension of the content taught by teachers throughout the teaching and learning process (Syofyan, 2018). In other words, learning outcomes become indicators of improvement and development for students compared to their previous state.

Based on the descriptive analysis in Table 2, it is evident that there is an average improvement in learning outcomes in both classes, both in the control and experimental groups. The percentage increase figures at SDN 1 Sonorejo in the experimental class experienced a significant increase of 60%, while the control class increased by 6.23%. Similarly, at SDN 2 Temurejo, the experimental class increased by 54%, while the control class increased by 7.22%. The same trend is observed at SD Muhammadiyah, with a similar increase in percentages of 56.08% for the experimental class and 9.94% for the control class.

From the percentage increase in learning outcomes of these three schools, it can be inferred that there is a more significant improvement in the experimental group compared to the control group in each school. This indicates that the teaching method or approach applied in the experimental class contributes positively to the enhance of students' cognitive result.

Furthermore, to determine the significance of the application of the demonstration method in learning about the digestive system for fifth-grade students, a hypothesis test is conducted. Before conducting the research hypothesis test, prerequisite tests (Ghozali, 2018) must be performed. Prerequisite tests applied in this study are tests for variance homogeneity and normality of data distribution. The purpose of the variance homogeneity test is to check the consistency of variance between groups. The success of statistical analysis heavily relies on variance homogeneity because the interpretation of results becomes more reliable when basic assumptions are met. Therefore, the variance homogeneity test plays a crucial role in ensuring the validity of statistical analysis results.

In the context of this research, the variance homogeneity test is conducted on the paired variance between the experimental and control classes based on student pretest scores processed using the SPSS application. Both classes are considered homogenous if the p-value exceeds 0.05 (sig. > 0.05). The outcomes of the variance homogeneity test are outlined in Table 3.

Table 3. Homogeinity Test (Source: SPSS Data Processing 2024)

	Based on mean
SDN 1 Sonorejo	0.178
SDN 2 Temurejo	0.212
SD Muhammadiyah	0.98

Based on the results of the homogeneity of variance test listed in Table 3, "based on mean" values are obtained at 0.178 for SDN 1 Sonorejo, 0.212 for SDN 2 Temurejo, and 0.498 for SD Muhammadiyah. The homogeneity of variance criteria indicates that the significance value (sig.) for all three schools is greater than 0.05, indicating that the variance criteria between the two classes (experimental class and control class) are homogeneous.

The second prerequisite test is the normality test of data distribution. The normality test aims to ensure that the observed data meet the requirements needed for data analysis. In this study, two statistical tools were used: the Shapiro-Wilk normality test and the Kolmogorov-Smirnov normality test. The choice between these two normality tests depends on the sample size being tested.

Shapiro and Wilk (1958) and Shapiro, Wilk, Chen (1968) stated that the Shapiro-Wilk normality test is used when the sample size is less than 50 (N<50). However, if the sample is above 50 (N>50), it is recommended to use the Kolmogorov-Smirnov test. In these two testing tools, data are considered normally distributed homogenous if the p-value exceeds 0,005 (sig. > 0.05). The outcomes of the normality assessment assisted by the SPSS application are presented in the following tables.

Table 4. Normality Test for the Control Class (Source: SPSS data processing 2024)

School	Types test	Sig Kormogorov-smirnov	Shapiro wilk
SDN 1 Sonorejo	Prestest		0.311
	Posttest		0.100
SDN 2 Temurejo	Pretest		0.433
	Posttest		0.020
SD Muhammadiyah	Pretest	0.020	
	Posttest	0.011	

Table 5. Normality Test for the Experiment Class

School	Types test	Sig Kormogorov-Smirnov	Shapiro wilk
SDN 1 Sonorejo	Prestest		0.113
	Posttest		0.703
SDN 2 Temurejo	Pretest		0.113
	Posttest		0.520
SD Muhammadiyah	Pretest	<0.001	
	Posttest	<0.001	

From the outcomes of the normality assesment presented in Tables 4 and 5, it can be observed that two standard deviations (SD), namely SDN 1 Sonorejo and SDN 2 Temurejo, follow a normal distribution. This determination is based on the significance value, which is greater than 0.05. Meanwhile, one standard deviation, SD Muhammadiyah, does not follow a normal distribution because the significance value is less than 0.05.

After conducting tests for variance homogeneity and normality, the study proceeded with hypothesis testing to evaluate the significant influence of the learning model on the learning outcomes of the digestive system material in science. Referring to the found normality distribution, the researcher used two hypothesis analysis techniques: Paired t-sample (parametric analysis) for classes with normal distribution and Wilcoxon signed-rank test (non-parametric analysis) for data with non-normal distribution. In interpreting the results, if the significance value is less than the alpha value (α=0.05), the null hypothesis (H0) is rejected; conversely, if the significance value is greater than alpha, then H0 is accepted. The results of the hypothesis test can be found in Table 6.

Table 6. Hypothesis Test (Source: SPSS 2024)

School	Class	Test Technique		Conclussion
		Pired t sample (sig. Two-Sided P)	Wilcoxon sign rank test (Asymp. Sig. 2-tailed)	
SDN 1 Sonorejo	Control	0.192, df :10		H_0 : Accepted
	Experiment	<0.001, df : 9		H_a : Accepted
SDN 2 Temurejo	Control	0.341, df : 10		H_0 : Accepted
	Experiment	<0.00, df : 9		H_a : Accepted
SD Muhammadiyah	Control		0.206, df :30	H_0 : Accepted
	Experiment		<0.001 df : 29	H_a : Accepted
Score alpha(α) = 0.05				

From the analysis results in Table 6, it is evident at SDN 1 Sonorejo that the intervention group experienced a significant progress in learning outcomes ($p < 0.001$), whereas the control group did not demonstrate a significant difference ($p = 0.192$). Similarly, at SDN 2 Temurejo, the intervention group also demonstrated a significant progress ($p < 0.001$), whereas the control group did not exhibit a significant difference ($p = 0.341$). At SD Muhammadiyah, the experimental group demonstrated a significant progress ($p < 0.001$), whereas the control group did not a significant difference ($p = 0.206$). The significant improvement in the experimental classes reinforces the conclusion that Ha is accepted. Meanwhile, in the control classes, the differences did not reach the specified level of significance, indicating that H0 is accepted.

The validity of these research findings is supported by Blupur's (2021) study, which indicates a 21.87% increase in the number of students achieving satisfactory results in learning about force and motion. Similarly, Sukandi (2020) reported a significant improvement in students' understanding and motivation in learning. Dewi et al. (2017) in their research demonstrated a positive correlation between the application of demonstration-based learning methods and the improvement of scientific attitudes in science education, particularly in process skills. Process skills are closely related to students' learning outcomes. The higher the process skills, the higher the level of understanding, which will ultimately impact students' cognitive learning outcomes.

Another aligned study is from Khairunnisak (2018), stating that demonstration-based media has a positive influence on students' learning motivation and conceptual understanding, as evidenced by improved learning outcomes. Furthermore, the impact of supportive media in implementing demonstration methods, such as videos, is supported by Razak et al. (2023) research, which found that the effectiveness of using videos is higher compared to classes that do not use video media in learning biology from a cognitive perspective. In addition to cognitive aspects, the use of video media in demonstration methods also has a positive impact on the environment. Through watching videos, children explicitly learn how to behave positively according to the content of the videos they watch (Anantasari et al., 2015).

From this research and several other studies, it consistently indicates that the demonstration method has a positive impact on learning outcomes, characterized by an improvement in process skills leading to enhanced cognitive learning outcomes.

Conclusion

This study concludes that the implementation of the demonstrative method in the fifth-grade learning of the digestive system material has a positive impact on students' learning outcomes.

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Author Contributions
Conceptualization, Romnah kistiari, Farid Ahamdi.; methodology, qualitative descriptive; software, Microsoft Excel, SPSS.; validation, Farid Ahmadi.; formal analysis, Skala Likert.; investigation Romnah Kistiari.; resources, 5thgrade students of SDN 1 Sonorejo, SDN 2 Temurejo, SD Muhammadiyah, SDN 2 Patalan.; data curation, Romnah Kistiari.; writing—original draft preparation, Romnah Kistiari.; writing—review and editing, Romnah Kistiari.; visualization, Romnah Kistiari.; supervision, Farid Ahmadi.; project administration, Romnah Kistiari.; funding acquisition, Romnah Kistiari. All writers have reviewed and consented to the final version of the manuscript as it appears in the publication.

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The authors declare no conflict of interest

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