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The Implementation of Cooperative Learning with Numbered Heads Together (NHT) Technique to Improve Students' Educational Interaction in Islamic Education

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Abstract: The Implementation of Cooperative Learning with Numbered Heads Together Technique to Improve Students' Educational Interaction in Islamic Education Subjects

Objective: This study aims to implement the Numbered Heads Together (NHT) with a cooperative learning model to improve students' educational interaction in Islamic education. This research was conducted at SMPN 34 Mukomuko. **Method:** The research used a Classroom Action Research design. Data was collected through observation, documentation, and interviews. Data was analyzed using three interrelated components: reduction, display, and conclusion drawing. **Results:** Numbered Heads Together (NHT) technique in cooperative learning significantly improves students' educational interaction in the classroom. **Conclusion:** The NHT technique encourages students to actively participate, discuss, and share knowledge within the group, thus creating an inclusive and collaborative learning environment. **Contribution:** This research guides teachers and managers of educational institutions in designing Islamic education learning strategies by prioritizing Islamic values.

Keywords: Cooperative Learning; NHT Technique; Students; Educational Interaction; Islamic Education

Abstrak: Implementasi Pembelajaran Kooperatif dengan Teknik Numbered Heads Together (NHT) untuk Meningkatkan Interaksi Edukatif Siswa pada Mata Pelajaran Pendidikan Agama Islam

Tujuan: Penelitian ini bertujuan untuk mengimplementasikan model pembelajaran kooperatif tipe Numbered Heads Together (NHT) dalam meningkatkan interaksi edukatif siswa pada mata pelajaran Pendidikan Agama Islam. Penelitian ini dilaksanakan di SMPN 34 Mukomuko. **Metode:** Desain penelitian menggunakan Classroom Action Research. Pengumpulan data melalui pengamatan, dokumentasi dan wawancara. Analisis data menggunakan reduksi data. **Hasil:** Penggunaan teknik Numbered Heads Together (NHT) dalam pembelajaran berbasis pembelajaran kooperatif secara signifikan meningkatkan interaksi edukatif siswa di dalam kelas. **Kesimpulan:** Teknik NHT mendorong siswa untuk berpartisipasi aktif, berdiskusi, dan berbagi pengetahuan di dalam kelompok, sehingga menciptakan lingkungan belajar yang inklusif dan kolaboratif. **Kontribusi:** Penelitian ini memberikan panduan bagi guru dan pengelola Madrasah Aliyah dalam merancang strategi pembelajaran pendidikan Islam dengan mengedepankan nilai-nilai Islam.

Kata Kunci: Pembelajaran Kooperatif; Teknik NHT; Siswa; Interaksi Edukatif; Pendidikan Agama Islam

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A. INTRODUCTION

Learning is an interaction between students and their environment, leading to positive behavior changes. In learning, the most important responsibility of a teacher is to adjust the environment to support students' behavior changes (Van Braak et al., 2021). The main principle of learning is to integrate all or most of the students' potential (physical and non-physical) and emphasize the importance of life skills for their present and future lives (Nortvig et al., 2020).

On the other hand, various issues persist regarding implementing Islamic education in schools, along with criticisms of its continued implementation (Nuryana, 2022). For example, when assessing the failure of Islamic education through educational practices, we consider the purely cognitive aspect of raising awareness of religious values and the emotional and active/motor aspects of the willingness and determination to practice those values. The practice of determination is often neglected as one of the values in religious teachings (Selman et al., 2014). As a result, there is a gap between knowledge and the experience of religious values in life. In achieving the objectives of Islamic education, the teacher's responsibility is to guide, teach, and train students so they can dedicate their talents and interests to pursuing and developing religious teachings (Zguir et al., 2022). Islamic teachings guide achieving happiness for personal benefit by maximizing existing potential. They facilitate a holistic understanding of Islamic knowledge in worldly and eternal contexts, depending on students' receptiveness and time constraints (Kadirov et al., 2016).

Several aspects must be considered in learning. First, learning should emphasize practice in laboratory settings, the social environment, and work (business). Therefore, teachers must select and apply strategies and methods for students to practice their learning. Second, learning must establish connections between schools and the community. Hence, every teacher must possess the capability and broad insight to identify various possibilities within society to be learning resources and bridges between schools and their surroundings. Third, there is a need to foster a democratic and open learning climate through integrated and participatory learning. Fourth, learning should emphasize real-life issues directly related to society. Fifth, a learning model should be developed for each field of study, with classrooms functioning as laboratories. Each classroom should have various facilities and resources necessary for learning so students can study effectively (Susanti et al., 2020).

Selecting teaching methods and techniques to enhance students' interactions requires careful consideration and deep understanding from educators. Every student has a unique learning style, interests, and level of comprehension (Hsu, 2017). A method that works effec-tively for one student may not necessarily be effective for another. There is no perfect method; what matters most is that educators can select and adapt methods that best suit students' needs and the learning context (Magdalena et al., 2020).

To address these challenges, alternative Islamic Education methods that promote a recreational atmosphere should be introduced, enabling students to develop their potential actively (Bodolica et al., 2021). Activities can be created through trust, open communication, autonomy, and moderate supervision. Learning activities can be enhanced by providing a creative environment and adopting an informative approach.

Thus, teachers must possess appropriate teaching methods to convey the material effectively. One approach utilized is through educational interaction. Educational interaction is key to creating active, enjoyable, and meaningful Islamic education learning (Khan et al., 2018). Students learn about religion by applying educational interaction and developing social skills and positive attitudes (Volman & Gilde, 2021).

Effective educational interaction fosters dynamic and positive relationships between teachers and students (Chong et al., 2018). However, concerns about potential negative im-pacts, such as arrogance or a lack of respect for teachers, must be anticipated (Burić & Frenzel, 2019). These concerns can be mitigated through careful planning, consistent rule enforcement, and

building a mutually respectful relationship between teachers and students. When appropriately executed, educational interaction brings numerous benefits to learning for students and teachers (Ester et al., 2024).

Educators who hold narrow views and fail to acknowledge this perspective risk diminishing their role in education. A teacher's responsibility is to cultivate students into individuals with noble character and moral integrity (Mulyono et al., 2023). Cooperative learning leverages the phenomenon of teamwork and collaboration in learning, forming relationships between students, fostering democratic attitudes and behaviors, and enhancing the productivity of students' learning activities (Mora et al., 2020). The cooperative learning model is an instructional approach that divides students into study groups. The goal is for students to exchange ideas within their assigned groups, as they are often more comfortable expressing their thoughts or opinions to peers than to their teacher (Lajoie et al., 2015). However, the teacher's role remains crucial in this model, as they monitor group activities, guide discus-sions, and facilitate the presentation of students' discussion outcomes in class (Xu et al., 2020).

Interpersonal attraction plays a key role in explaining students' behavior at school. Moreover, the varying composition of student groups and teacher interactions in each class create different environmental influences. Educational interactions occur in the school envi-ronment (Kumpulainen & Rajala, 2017). Consequently, education is a psychosocial pheno-menon, a study of how the social environment influences individual interactions and beha-viors. In learning activities, interpersonal and individual interactions can shape subsequent behaviors (Rimé et al., 2020).

Based on observations on November 10, 2024, Islamic education learning at SMPN 34 Mukomuko still employs conventional teaching methods, which have not effectively enhanced interaction during learning. Students appeared bored and unengaged while the researcher explained the material during the pre-test. Some students distracted themselves by playing or chatting with their seatmates during learning.

Several previous studies have demonstrated the effectiveness of the Numbered Heads Together (NHT) technique in enhancing students' concept comprehension, critical thinking skills, and collaboration across various subjects, including science, mathematics, and social studies (Siswasusila, 2017; Pendy & Mbagho, 2021; Ikhwandari et al., 2019; Nuraisyah & Pratomo, 2023). Additionally, this method has been widely used to improve learning motivation and academic performance (Yusnarti, 2020; Wiratman, 2023; Muna & Afriansyah, 2016). However, studies on applying the NHT technique in Islamic education remain limited, particularly in enhancing students' educational interaction in understanding religious values.

From a gap analysis, although there has been extensive research on cooperative learning across various disciplines, few studies have examined how the NHT technique can be applied in Islamic education. Most previous research has focused more on cognitive aspects, such as improving students' understanding of religious concepts, while the educational interaction aspect, which involves active engagement in discussions, knowledge sharing, and collective understanding building, has been explored less comprehensively. Furthermore, there is a lack of research on how this method can be effectively implemented in Islamic values-based learning, which requires a holistic approach encompassing cognitive, affective, and social aspects.

This study offers a new perspective by exploring the role of the NHT technique as a strategy to enhance concept comprehension and as a tool to strengthen educational interaction in Islamic education. It highlights how NHT can foster a more inclusive, participatory, and collaborative learning environment, allowing students to grasp religious material theoretically and internalize Islamic values through group discussion and cooperation. Thus, this research contributes to developing a more interaction-based learning model in Islamic education and provides practical recommendations for teachers implementing innovative teaching strategies.

B. METHOD

This study uses a Classroom Action Research (CAR) design with a participatory collaborative type (Madsen et al., 2020). Classroom Action Research is a form of self-reflection educators conduct in educational settings to improve rationality and fairness (Utomo et al., 2024). The collaborative research type involves all individuals responsible for improving education, expanding the collaborative group from those directly involved to as many others as possible impacted by the actions. The main goal of Classroom Action Research is to improve and enhance the professional services of teachers in handling the learning process, achieved by performing reflection to diagnose the situation (Stig et al., 2023).

The research was conducted at SMPN 34 Mukomuko, Desa Mekar Jaya, Kecamatan Air Rami, Kabupaten Mukomuko, Bengkulu. The researcher chose SMPN 34 Mukomuko as the research location because it is the researcher's workplace and close to the researcher's residence, making it easier to carry out the study. The research was conducted according to the Islamic education class schedule.

Data analysis in this study involved reflection in the Classroom Action Research cycle. The research ensures authenticity through reflection, which helps interpret the data. Data was analyzed using three interrelated components: reduction, display, and conclusion drawing. Data reduction involves selecting, focusing, simplifying, summarizing, and transforming raw field data into ready-to-present data. Data display refers to presenting the processed data in an organized format. Conclusion drawing allows the researcher to identify patterns and interpret the data.

The researcher uses triangulation to ensure data validity in this Classroom Action Research. This technique involves using external data to check or compare against the research data. This study uses source triangulation, which compares and cross-checks the credibility of information obtained from different sources. This method includes comparing data from documentation with other sources, methods, or theories.

C. RESULTS AND DISCUSSION

Result

1) Pre-test

The pre-test was conducted by presenting several questions to students about the material explained during the current week's or previous week's meeting. The pre-test results are displayed in Table 1.

Table 1. Pre-test Results

Sub-Variable	Indicator	4	3	2	1
Collaboration	Listen to and respect each group member's opinions.			√	
	Feels equally responsible for the group's success.			√	
	Each member understands and performs their tasks well.			√	
Courage to Express Ideas	Express ideas or opinions related to learning.			√	
	Accept different opinions within the group.				√
	Actively ask questions about concepts they do not understand.				√
Problem-solving	Use reasoning to solve problems by gathering facts.				√
	Find the most effective solutions to problems.			√	
	Collaborate to solve problems collectively.				√
Enthusiasm	Enthusiastically listens to presentations.			√	
	Take responsibility for assigned tasks.				√
	Eager to ask and answer questions.				√
	Total scores			12	6
	Average		1,5		

Based on the pre-test results, students lacked enthusiasm for Islamic education learning. Students were passive and reluctant to ask questions, respond, or share their opinions. They preferred listening to the teacher's explanation without genuinely understanding the information. Many students also appeared bored during Islamic education learning due to limited interaction between the teacher and students or among students. This was further reflected in the average pre-test score, which stood at 1,5.

2) Classroom Action on Cycle 1

In Cycle 1, minimal changes were observed among the students. Many students did not interact effectively within their groups or with the teacher. During this cycle, many groups lacked cohesion in responding to questions from the teacher. The results of Cycle 1 implementation are detailed in Table 2.

Table 2. Results of Classroom Action on Cycle 1

Sub-Variable	Indicator	4	3	2	1
Collaboration	Feels equally responsible for the group's success.		√		
	Each member understands and performs their tasks well.			√	
	Express ideas or opinions related to learning.		√		
Courage to Express Ideas	Accept different opinions within the group.				√
	Actively ask questions about concepts they do not understand.			√	
	Use reasoning to solve problems by gathering facts.			√	
Problem-solving	Find the most effective solutions to problems.				√
	Collaborate to solve problems collectively.			√	
	Enthusiastically listens to presentations.				√
Enthusiasm	Take responsibility for assigned tasks.			√	
	Eager to ask and answer questions.			√	
	Feels equally responsible for the group's success.			√	
	Total scores		6	14	3
	Average		1,91		

Based on the results of Cycle 1, the analysis revealed that minimal changes were still observed among students. Many students could not interact effectively within their groups or with the teacher. During this cycle, several groups struggled to answer the teacher's questions cohesively.

This was because many students did not fully understand the discussions within their groups, as they lacked interaction with other group members. Additionally, some students hesitated to ask questions and were afraid to express their opinions. In the discussions during this cycle, only a few students showed responsibility and performed well within their groups. The average score for educational interaction in Cycle 1 was 1.91.

3) Results of Classroom Action on Cycle 2

In Cycle 2, students began to adapt to the teaching method applied by the researcher. They showed improvement, overcoming their hesitation to ask questions and express their opinions. The results of Cycle 2 implementation are summarized in Table 3.

Table 3. Results of Classroom Action on Cycle 2

Sub-Variable	Indicator	4	3	2	1
Collaboration	Feels equally responsible for the group's success.	V			
	Each member understands and performs their tasks well.			V	
	Express ideas or opinions related to learning.		V		
	Accept different opinions within the group.			V	

Sub-Variable	Indicator	4	3	2	1
Courage to Express Ideas	Actively ask questions about concepts they do not understand.		V		
	Use reasoning to solve problems by gathering facts.	V			
Problem-solving	Find the most effective solutions to problems.			V	
	Collaborate to solve problems collectively.			V	
	Enthusiastically listens to presentations.				V
Enthusiasm	Take responsibility for assigned tasks.	V			
	Eager to ask and answer questions.			V	
	Feels equally responsible for the group's success.		V		
	Total scores	12	9	10	1
	Average		2,66		

The analysis of Cycle 2 results indicates that learning was implemented as planned. This was evident from the increased interaction between students and the teacher and among students in understanding the learning material and completing group tasks. Students became accustomed to actively participating in discussions, such as asking and answering questions about learning and its relevance to everyday life.

The learning outcomes showed that students were enthusiastic about completing their tasks within their respective groups. They even began assisting each other in completing the teacher's assignments. In this cycle, students adapted to the teaching approach applied by the researcher, overcoming their hesitation to ask questions and express opinions. The average score for educational interaction in Cycle II was 2.66.

4) Classroom Action on Cycle 3

Implementing Cycle 3 of Classroom Action Research showed that the learning process had run smoothly. The results for Cycle III are detailed in Table 4.

Table 4. Results of Classroom Action on Cycle 3

Sub-Variable	Indicator	4	3	2	1
Collaboration	Feels equally responsible for the group's success.	V			
	Each member understands and performs their tasks well.		V		
	Express ideas or opinions related to learning.	V			
Courage to Express Ideas	Accept different opinions within the group.		V		
	Actively ask questions about concepts they do not understand.	V			
	Use reasoning to solve problems by gathering facts.	V			
Problem-solving	Find the most effective solutions to problems.		V		
	Collaborate to solve problems collectively.		V		
	Enthusiastically listens to presentations.	V			
Enthusiasm	Take responsibility for assigned tasks.	V			
	Eager to ask and answer questions.	V			
	Feels equally responsible for the group's success.		V		
	Total scores	28	15		
	Average		3,58		

The analysis of Cycle 3 indicated that the learning process ran smoothly. This was evident from the enthusiasm displayed by students during the learning activities. With the implementation of cooperative learning, students became more active in the learning process. The average score for Cycle 3 reached 3.58, as shown in Table 4, reflecting a high educational interaction level.

This improvement was noticeable as students no longer relied solely on their peers. Each individual actively participated in their group. Students also confidently asked questions, and their peers responded accurately and appropriately without hesitation.

5) Comparison Across Cycles

The comparison of results across Cycles 1, 2, and 3 highlighted a significant improvement in students' educational interaction during Islamic Education learning. This demonstrates that the cooperative learning strategy effectively enhanced students' interactions in Islamic education at SMPN 34 Mukomuko. The comparison of outcomes across cycles is detailed in Table 5.

Table 5. Comparison of Results Across Cycles

Sub-Variable	Indicator	Averages			
		Pre-test	Cycle 1	Cycle 2	Cycle 3
Collaboration	Collaboration Each member feels equally responsible for the group's success. Each member understands and performs their tasks well.				
Courage to Express Ideas	Courage to Express Ideas Students can accept differences of opinion within the group. Students actively ask questions about concepts they do not understand.				
Problem-solving	Problem-solving Finds the most effective solutions to problems. Collaborates to solve problems collectively.	1,5	1,91	2,66	3,58
Enthusiasm	Enthusiasm Takes responsibility for assigned tasks. Eager to ask and answer questions.				

Based on the analysis, the Numbered Heads Together (NHT) technique positively impacts students' educational interaction in cooperative learning. This improvement can be seen from the group's active participation, discussion, and knowledge sharing. This technique effectively encourages students' involvement in the learning, where each group member is responsible for understanding the material and contributing to the discussion. This creates a more dynamic, inclusive, and collaborative learning environment so all students, including the less confident ones, can participate.

Discussion

This study aims to improve students' educational interactions by applying the cooperative learning strategy with the Numbered Heads Together (NHT) technique in Islamic education at SMPN 34 Mukomuko. The research findings show improved students' educational interactions over three cycles. Through the pre-test, students lacked interest in learning Islamic education because it seemed boring, which caused them to become passive. Conventional teaching methods, such as lectures, made students less active and bored, as they mostly listened and worked on tasks. As a result, students became more individualistic, with less interaction with the teacher or their peers.

Cooperative learning is a concept in which students work together in groups, helping each other to ensure everyone achieves their goals (Johnson & Johnson, 2016). This approach encourages students to work collaboratively within their groups. If one member fails, the group fails, and vice versa. Therefore, every student is fully responsible for their group.

The cooperative learning model with the NHT technique helps students develop their understanding and attitudes in line with real-life social situations (Ibrahim et al., 2015). Working together in groups enhances students' interest in learning, productivity, and aca-demic

achievements. Cooperative learning increases students' motivation and performance (Tran, 2019). This approach enables students to become more active and responsible for their learning activities. By applying the cooperative learning model, students become more con-fident in asking questions and expressing opinions directly.

However, despite its strengths, the NHT technique has some weaknesses. The co-operative learning model's weaknesses stem from internal and external factors. Internal factors include: (1) Teachers must prepare lessons thoroughly, requiring more effort, thought, and time; (2) To ensure smooth learning, adequate facilities, tools, and financial resources are needed; (3) During group discussions, the topic often expands beyond what is scheduled, causing a delay in completing the discussions; (4) In classroom discussions, sometimes one person dominates, leading other students to become passive (Widyaningtyas et al., 2018).

Applying the cooperative learning model with the NHT technique can optimize learning and foster positive relationships. Generally, applying the NHT technique follows these steps: numbering, asking questions, thinking together, and Answering. This was reflected in the average scores obtained after conducting Cycles 1, 2, and 3, where students appeared more enthusiastic and active in learning. As a result, interactions between the teacher and students and between students within their groups occurred more effectively. This is also supported by Rahmawati (2020), who determined whether there was an improvement in students' learning activities using the Numbered Heads Together model at elementary school. According to her study, students' learning activities gradually improved with each cycle. In Cycle 1, the first meeting showed 38% participation, and the second meeting increased to 51%. In Cycle 2, the first meeting reached 70%, and the second meeting reached 88%, with 31 students.

To improve students' educational interactions, a conducive learning environment is necessary where students actively participate in learning and interact with the teacher and their peers. One way to create such an environment is by applying the cooperative learning strategy (Chen & Kuo, 2019). Cooperative and conventional learning are very different (Tadesse et al., 2020). One key difference is that cooperative learning involves group-based learning, which allows students to interact more with their group members and value each other's opinions. Additionally, curiosity makes students more active in asking questions.

In contrast, conventional learning focuses mainly on the teacher's explanation, making the learning process passive. Cooperative learning also teaches students responsibility for their learning (Yusof et al., 2012). Therefore, a cooperative learning strategy makes students more active in constructing knowledge and taking responsibility for their progress.

Numbered Heads Together (NHT) is a type of cooperative learning designed to influence students' interaction patterns and as an alternative to conventional classroom structures (Yerizon & Putra, 2021). Spencer Kagan first developed Numbered Heads Together to engage more students in reviewing the material in a lesson and assessing their understanding (Muroga et al., 2023). This technique allows students to share ideas and consider the most accurate answers. It also encourages students to enhance their cooperation. The technique can be used in all subjects and for all age groups.

Educational interaction refers to reciprocal relationships between individuals, individuals with groups, or groups with groups (Zhang et al., 2017). In this context, interaction occurs during the learning process. Interaction involves communication between students and students and between students and the teacher, as they understand, discuss, ask questions, demonstrate, and practice the lesson material in class (Webb et al., 2014).

Interaction occurs in the classroom through communication, inseparable from the lesson content. The interaction is specific and relates directly to the material being taught. In a classroom, students have varied abilities some are creative, while others are static, so interaction between students is essential. Interaction typically involves four key elements: the communicator, the recipient, the message, and the medium. Therefore, interaction is communication, a term derived from communicare, meaning "to participate," "to inform," and "to make some-

thing common." Communication occurs when there is a mutual understanding of what is being discussed, with a common language used in the conversation (Fitriyah, 2020).

D. RESEARCH IMPLICATIONS AND CONTRIBUTIONS

1. Research Implications

This research has implications for schools and curriculum development. Schools can make the NHT technique one of the recommended learning models in Islamic education, especially to increase the effectiveness of discussion-based learning and collaboration. In addition, the research results can be the basis for teacher training to understand better how to implement cooperative learning strategies effectively in the classroom.

2. Research Contribution

This research provides practical guidance for Islamic education teachers to improve students' educational interaction. Using the NHT technique, teachers can build a more fun, interactive, and meaningful learning atmosphere, improving students' learning outcomes. In addition, this research can be a reference for curriculum developers in designing more dynamic and collaboration-based learning strategies.

This research also contributes to developing education research, especially exploring innovative learning methods for religious education subjects. The results of this study encourage further research that examines the effectiveness of other cooperative learning techniques, such as Think-Pair-Share or Jigsaw, in improving students' understanding of religious education materials. In addition, further studies can be conducted to see the impact of this technique in improving students' social and psychological aspects, such as their self-confidence, empathy, and communication skills in discussing Islamic values.

E. RECOMMENDATIONS FOR FUTURE RESEARCH DIRECTIONS

Future researchers can expand the scope of the study, such as applying the Numbered Heads Together (NHT) technique to subjects other than Islamic education or at different educational levels. Researchers could also develop a hybrid model by combining the Numbered Heads Together (NHT) technique with educational technology, such as digital applications, to facilitate implementation.

F. CONCLUSION

Numbered Heads Together (NHT) technique in cooperative learning significantly improves educational interaction in the classroom. This technique encourages students to actively participate, discuss, and share knowledge within the group, thus creating an inclusive and collaborative learning environment. Research shows that the NHT technique improves students' cognitive, social, and affective aspects, making it a holistic and relevant learning tool for Islamic education. The cooperative learning approach with NHT is aligned with Islamic education values, such as cooperation, deliberation, and shared responsibility, which makes this technique a learning method and media for internalizing Islamic values in students' daily lives.

Numbered Heads Together (NHT) technique in Islamic education learning effectively improves educational interactions between students and teachers and fellow students. With the division of roles in the group and a question-and-answer system that involves all members, students are more encouraged to understand the material more deeply. In addition, this technique helps develop critical thinking skills, cooperation, and responsibility in the learning process. NHT technique can overcome the participation gap in the classroom. Students who were previously less active or less confident in expressing their opinions became involved because each group member had an equal role in understanding and delivering the material.

This makes the learning atmosphere more fun and meaningful while strengthening the values of togetherness and tolerance in religious education learning.

This research confirms that cooperative learning with the NHT technique can be an effective alternative teaching method in Islamic education, especially in improving students' educational interaction. Therefore, this method can be recommended for various religious education learning materials to create a more dynamic learning atmosphere that fits the needs of students in the modern era.

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AUTHOR CONTRIBUTIONS STATEMENT

All authors discussed the results and contributed to the final manuscript. WAS: Conceptualization, Research framework & Writing - Original Draft. ICU: Conceptualization & Review. MY: Editing. RA: Conceptualization.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no significant competing financial, professional or personal interests that might have influenced the performance or presentation of the work described in this manuscript.

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