

Analysis of the clinical factors affecting the quality of life in children with acyanotic congenital heart disease

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Analysis of the clinical factors affecting the quality of life in children with acyanotic congenital heart disease

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ABSTRACT

Introduction. Acyanotic Congenital Heart Disease (ACHD) significantly impacts the quality of life of affected individuals. Physical and psychological challenges associated with the disease often limit normal activities and result in social isolation, thereby affecting social integration.

Objective. Analyze clinical factors that influence the quality of life in children with acyanotic congenital heart disease in Southeast Asia, and inform targeted management strategies.

Materials and Methods. This descriptive-analytical study utilized total sampling to assess quality of life in 74 ACHD patients aged 2-18 years treated at Dr. Soetomo Hospital, Surabaya, between February and July 2021. Data were collected using the PedsQL Inventory 3.0 Cardiac Module questionnaire, focusing on dimensions such as cardiac issues, therapy, cognitive function, and communication.

Results. The overall mean quality of life score was 73.89 ± 9.79 , with notably lower scores observed in cardiac issues and therapy I (72.92 ± 18.20), cognitive function (59.53 ± 18.40), and communication (71.40 ± 24.21). A significant difference was found in quality of life scores across diagnosis types, with combined diagnoses showing the lowest mean quality of life (56.48 ± 1.85) compared to other types ($p=0.014$).

Conclusions. Key domains negatively impacting quality of life in ACHD patients include cardiac-related problems, cognitive challenges, and communication difficulties. Patients with combined diagnoses experience a significantly lower quality of life than those with other ACHD types, highlighting the need for targeted interventions to improve their well-being.

Keywords: ACHD, quality of life, PedsQL, cardiac module, congenital heart disease

Abbreviations:

ACHD – Acyanotic Congenital Heart Disease

ASD – Atrial Septal Defect

CHD – Congenital Heart Disease

LSD – Least Significant Difference

PDA – Patent Ductus Arteriosus

PedsQL – Pediatric Quality of Life Inventory

QoL – Quality of Life

VSD – Ventricular Septal Defect

INTRODUCTION

Congenital heart disease (CHD) remains one of the most common congenital anomalies, affecting approximately 1.2 million newborns globally each year out of an estimated 135 million live births [1]. In Indonesia, CHD has a prevalence rate of about 9 per 1,000 live births, resulting in roughly 43,200 cases annually [2]. A significant number of these cases involve acyanotic congenital heart disease (ACHD), a subtype that does not immediately cause cyanosis but still profoundly impacts the physical and psychological health of affected children [3].

Children with ACHD encounter numerous challenges beyond physical health. Due to the chronic nature of the disease, these children often experience delayed physical development, reduced physical capabilities, and social isolation [4]. Such conditions frequently lead to a lack of social acceptance, particularly in school environments, potentially resulting in long-term social exclusion [3]. Physical and psychological limitations linked to ACHD can also decrease participation in regular activities, further complicating social integration and negatively impacting overall quality of life (QoL) [5].

Assessing QoL in children with ACHD has therefore become crucial for designing interventions that address their unique physical, emotional, and social needs [6]. Research in this field underscores the significance of QoL assessments in pediatric CHD populations. For instance, Uzark et al. conducted a study in Cincinnati, USA, revealing considerable QoL deficits in children with heart disease as perceived by both the children and their parents [5]. Similarly, Ariani et al. highlighted the need for QoL assessments in Indonesian pediatric CHD patients to support more effective care strategies [6].

While global studies have explored QoL impacts in pediatric CHD, there is limited research focused specifically on ACHD in Southeast Asia, particularly in Surabaya, Indonesia [7]. This study aims to address this gap by evaluating the QoL of ACHD patients treated at Dr. Soetomo Hospital, Surabaya. By focusing on this population, we aim to provide insights that can inform targeted management strategies and improve the well-being of children with ACHD.

MATERIALS AND METHODS

This study uses a descriptive analytic type by obtaining data through a questionnaire that covers several aspects, namely heart problems and therapy I, therapy II, physical appearance, cognitive problems, communication, and anxiety, in patients with acyanotic congenital heart disease (left-to-right shunt). The population sampled in this study were parents of patients with acyanotic type congenital heart disease (left-to-right shunt) aged 2–18 years who underwent treatment at RSUD Dr. Soetomo for the 2019–2020 period. The sample in this study was part of the population studied, namely parents of patients with acyanotic congenital heart disease (left-to-right shunt) who met the criteria for selecting research samples.

Inclusion criteria were patients aged 2–18 years with acyanotic congenital heart disease (left-to-right shunt) at RSUD Dr. Soetomo and who were willing to be research subjects by signing informed consent. Acyanotic congenital heart disease (left-to-right shunt) patients with neurodevelopmental disorders or other medical comorbid conditions and abnormalities with

complex disease (e.g., pneumonia, atrioventricular septal defect, Eisenmenger syndrome) were excluded. Determination of the sample size in this study used a total sampling technique, namely all population data that met the sample criteria. Sampling was done by consecutive sampling [8].

The independent variable in this study is the type of congenital heart disease consisting of PDA, ASD, VSD, and combination. Meanwhile, the dependent variable in this study is the quality of life in children consisting of aspects of heart problems and therapy I, therapy II, physical appearance, anxiety, cognitive, and communication. The instrument used in this study is primary data obtained from survey results using the Pediatric Quality of Life Inventory 3.0 Cardiac Module (PedsQL™ Cardiac Module), a validated tool for assessing the quality of life in pediatric cardiac patients [9]. This research was conducted at Dr. Soetomo Hospital during February–July 2021. Data were collected using an instrument in the form of a questionnaire regarding patient quality of life conducted on parents of patients with acyanotic congenital heart disease (left-to-right shunt) who came to Dr. Soetomo Hospital in the 2019–2020 period [10].

RESULTS

This study uses descriptive analytic type by obtaining data through a questionnaire that covers several aspects, namely heart problems and therapy I, therapy II, physical appearance, cognitive problems, communication, and anxiety, in patients with acyanotic congenital heart disease (left to right shunt). The population sampled in this study were parents of patients with acyanotic type congenital heart disease (left to right shunt) aged 2-18 years who underwent treatment at RSUD Dr. Soetomo for the 2019-2020 period. Inclusion criteria are patients aged 2-18 years with acyanotic congenital heart disease (left to right shunt) at RSUD Dr. Soetomo and willing to be a research subject by signing informed consent. Acyanotic congenital heart disease (left-to-right shunt) patients with neurodevelopmental disorders or other medical comorbid conditions and Abnormalities with complex diseases (Pneumonia and Atrioventricular Septal Defect, Eisenmenger Syndrome) was excluded. The instrument used in this study is primary data obtained from survey results using the PedsQL Inventory 3.0 Cardiac Module questionnaire which will be given to parents of patients with acyanotic type congenital heart disease (left to right shunt) at RSUD Dr. Soetomo. This research was conducted at Dr. Soetomo Hospital during February - July 2021.

Table 1. Patient characteristic with Quality of Life

From (Table 1) it shows that out of a total of 74 patients, there were 48 female patients

	Kolmogorov-Smirnov ^a			Shapiro-Wilk ^b		
	Statistic	df.	Sig.	Statistic	df.	Sig.
Sex						
Male	.98	26	.200*	.966	26	.528
Female	.66	48	.2000*	.969	48	.233
Age						
Toddler	.082	27	.200*	.970	27	.592
Young Children	.117	16	.200*	.945	16	.419
Children	.148	20	.200*	.957	20	.490
Adolescence	.112	11	.200*	.977	11	.947
Diagnostic						
PDA	.137	15	.200*	.946	15	.466
VSD	.135	28	.200*	.936	28	.087
ASD	.122	28	.200*	.966	28	.485
Mixed	.175	3		1.000	3	1.000
Diagnosis of Duration						
<1 years	.117	37	.200*	.945	37	.065
1-5 years	.114	20	.200*	.979	20	.923
>5 years	.160	17	.200*	.914	17	.118
Nutritional Status						
Underweight	.109	36	.200*	.962	36	.253
Normoweight	.083	32	.200*	.973	32	.593
Overweight	.267	6	.200*	.859	6	.186
Comorbidities						
Yes	.135	18	.200*	.898	18	.053
No	.081	56	.200*	.970	56	.183

(64.9%) while 26 male patients (35.1%) and It shows that out of a total of 74 patients, 27 patients (36.5%) were toddlers, 16 patients (21.6%) were young children, 20 patients (27.0%) were children, and 11 patients (14.9%) were adolescents. Out of a total of 74 patients, 28 patients (37.8%) were diagnosed with VSD and ASD respectively, 15 patients (20.3%) with PDA, and 3 patients (4.1%) with combined diagnosis. In a total of 74 patients, 37 patients (50.0%) were diagnosed at <1 year old, 20 patients (27.0%) at 1-5 years old, and 17 patients (23.0%) at >5 years old. A total of 74 patients were found with a nutritional status of less than 36 patients (48.6%), patients with good nutritional status were 32 patients (43.2%), and patients with excess nutritional status were 6 patients (8.1%). There were 56 patients (75.7%) who did not have comorbidities while 18 patients (24.3%) had comorbidities.

From 74 patients with Acyanotic congenital heart disease (left to right shunt) at RSUD Dr. Soetomo, the results of quality of life were obtained through online interviews with parents / guardians of patients using the PedsQL Inventory 3.0 Cardiac Module questionnaire within the last month. Quality of life data on patients is covered in 27 questions which are divided into several aspects, namely aspects of heart problems and therapy I (7 questions), therapy II (5 questions), physical appearance (3 questions), anxiety (4 questions), cognitive (5 questions), and communication problems (3 questions). Each question has 5 answer options, namely 0 = never; 1 = almost never; 2 = sometimes; 3 = often; 4 = almost always. These options will be transformed into a 0-100 scale with the following score composition: 0 = 100; 1 = 75; 2 = 50; 3 = 25; 4 = 0. The result of the assessment is taken from the summation of all points from each aspect and then divided by the number of questions answered. A higher score indicates a better quality of life.

Table 2. Aspects of Heart Problems and Therapies I

Therapies I	Answers Frecuency					Mean	SD
	0	1	2	3	4		
Problem 1	46	7	13	7	1	80.41	28.15
Problem 2	47	8	16	3	0	83.45	23.87
Problem 3	7	13	35	17	2	52.03	23.68
Problem 4	18	11	23	8	14	53.72	35.27
Problem 5	63	7	4	0	0	94.93	13.07
Problem 6	52	6	15	0	1	86.49	22.74
Problem 7	24	11	18	11	10	59.46	35.52
Total						72.92	18.20

(Table 2) shows that in the cardiac and therapeutic aspects of problem 1, namely “difficulty breathing during exercise or body movement”, the highest score was obtained in option 0, namely 46 patients. The average of the total score of problem 1 is 80.41 ± 28.15 . In problem 2, namely “chest pain or pressure during activity”, the highest value was obtained in

option 0, namely 47 patients. The average of the total score of problem 2 is 83.45 ± 23.87 . In problem 3, namely “easy to catch a cold”, the highest value was obtained in option 2, namely 35 patients. The average of the total score of problem 3 is 52.03 ± 23.68 . In problem 4, namely “fast heart rate”, the highest score was obtained in option 2, namely 23 patients. The average of the total score of problem 4 is 53.72 ± 35.27 . In problem 5, namely “the child's lips look blue when running”, the highest score was obtained in option 0, namely 63 patients. The average of the total score of problem 5 is 94.93 ± 13.07 . In problem 6, namely “waking up at night because of difficulty breathing”, the highest score was obtained in option 0, namely 52 patients. The average of the total score of problem 6 is 86.49 ± 22.74 . In problem 7, namely “needing more rest than his friends”, the highest value was obtained in option 0, namely 24 patients. The average of the total score of problem 7 is 59.46 ± 35.52 . The average of all problems in this aspect is 72.92 ± 18.20 .

Table 3. Aspects of Heart Problems and Therapies II

Therapies II	Answers Frequency					Mean	SD
	0	1	2	3	4		
Problem 1	58	7	6	2	1	90.20	21.43
Problem 2	59	6	8	1	0	91.55	18.17
Problem 3	33	12	27	2	0	75.68	24.12
Problem 4	53	15	6	0	0	90.88	15.80
Problem 5	30	8	25	4	7	66.89	32.87
Total						83.04	14.31

(Table 3) shows that in the aspect of therapy II problem 1, namely “refusing to take heart medication”, the highest score was obtained in option 0, namely 58 patients. The average of the total score of problem 1 is 90.20 ± 21.43 . In problem 2, namely “difficult to take heart medication”, the highest value was obtained in choice 0, namely 59 patients. The average of the total score of problem 2 is 91.55 ± 18.17 . In problem 3, namely “forgetting to take heart medication”, the highest value was obtained in option 0, namely 33 patients. The average of

the total score of problem 3 is 75.68 ± 24.12 . In problem 4, namely “heart medication makes him feel uncomfortable”, the highest score was obtained in option 0, namely 53 patients. The average of the total score of problem 4 is 90.88 ± 15.80 . In problem 5, namely “worrying about the side effects of the medicine”, the highest value was obtained in choice 0, namely 30 patients. The average of the total score of problem 5 is 66.89 ± 32.87 . The average of all problems in this aspect is 83.04 ± 14.31 .

Table 4. Quality of life based on aspects of physical appearance problems

Physical Appearance	Answer Frequency					Mean	SD
	0	1	2	3	4		
Problem 1	61	4	9	0	0	92.57	16.92
Problem 2	49	5	16	3	1	83.11	25.88
Problem 3	41	8	19	3	3	77.36	29.02
Total						84.35	16.89

(Table 4) shows that in the aspect of physical appearance problem 1, namely “feeling ugly in appearance”, the highest score is obtained in option 0, namely 61 patients. The average of the total score of problem 1 is 92.57 ± 16.92 . In problem 2, namely “don't like it when other people see their surgery scars”, the highest score was obtained in option 0, namely 49 patients. The average of the total score of problem 2 is 83.11 ± 25.88 . In problem 3, namely “embarrassed when others see his body”, the highest value was obtained in option 0, namely 41 patients. The average of the total score of problem 3 is 77.36 ± 29.02 . The average of all problems in this aspect is 84.35 ± 16.89 .

Table 5. Quality of life based on aspects of anxiety problems

Anxiety	Answer Frequency					Mean	SD
	0	1	2	3	4		
Problem 1	49	11	13	0	1	86.15	21.95
Problem 2	47	10	15	1	1	84.12	23.62

Problem 3	42	12	15	3	2	80.07	26.81
Problem 4	19	6	24	18	7	54.05	32.85
Total						76.10	21.21

(Table 5) shows that in the anxiety aspect of problem 1, namely “feeling anxious while waiting for a doctor”, the highest score was obtained in option 0, namely 49 patients. The average of the total score of problem 1 is 86.15 ± 21.95 . In problem 2, namely “feeling anxious when you have to go to the doctor”, the highest value was obtained in choice 0, namely 47 patients. The average of the total score of problem 2 is 84.12 ± 23.62 . In problem 3, namely “feeling anxious when having to go to the hospital”, the highest score was obtained in option 0, namely 42 patients. The average of the total score of problem 3 is 80.07 ± 26.81 . In problem 4, namely “feeling anxious when having to go to the hospital”, the highest score was obtained in option 2, namely 24 patients. The average of the total score of problem 4 is 54.05 ± 32.85 . The average of all problems in this aspect is 76.10 ± 21.21 .

Table 6. Quality of life based on aspects of cognitive problems

Cognitive	Answer Frequency					Mean	SD
	0	1	2	3	4		
Problem 1	25	6	25	15	3	61.82	31.57
Problem 2	10	10	42	7	5	54.39	25.29
Problem 3	32	8	25	8	1	70.95	28.68
Problem 4	15	8	35	13	3	56.42	27.47
Problem 5	13	11	31	13	6	54.02	28.97
Total						59.53	18.40

(Table 6) shows that in the cognitive aspect of problem 1, namely “deciding to do something when someone disturbs”, the highest score is obtained in choices 0 and 2, namely 25 patients each. The average of the total score of problem 1 is 61.82 ± 31.57 . In problem 2, namely “difficulty with math tasks”, the highest score was obtained in option 2, namely 42

patients. The average of the total score of problem 2 is 54.39 ± 25.29 . In problem 3, namely “difficulty in writing / making school assignments”, the highest score was obtained in option 0, namely 32 patients. The average of the total score of problem 3 is 70.95 ± 28.68 . In problem 4, namely “difficulty focusing on something”, the highest score was obtained in option 2, namely 35 patients. The average of the total score of problem 4 is 56.42 ± 27.47 . In problem 5, namely “trying to remember what has been read”, the highest score was obtained in option 2, namely 31 patients. The average of the total score of problem 5 is 54.02 ± 28.97 . The average of all problems in this aspect is 59.53 ± 18.40 .

Table 7. Quality of life based on aspects of communication problems

Communication	Answer Frequency					Mean	SD
	0	1	2	3	4		
Masalah 1	31	17	13	9	4	70.95	31.25
Masalah 2	29	13	21	10	1	69.93	28.66
Masalah 3	34	11	20	8	1	73.31	28.47
Total						71.40	24.21

(Table 7) shows that in the communication aspect of problem 1, namely “telling doctors and nurses about what they feel”, the highest score was obtained in option 0, namely 31 patients. The average of the total score of problem 1 is 70.95 ± 31.25 . In problem 2, namely “asking questions to doctors and nurses”, the highest score was obtained in option 0, namely 29 patients. The average of the total score of problem 2 is 69.93 ± 28.66 . In problem 3, namely “explaining their heart problems to others”, the highest score was obtained in option 0, namely 34 patients. The average of the total score of problem 3 is 73.31 ± 28.47 . The average of all problems in this aspect is 71.40 ± 24.21

Table 8. Quality of life based on all aspects

Aspects	Min.	Max.	Mean	SD
Heart Problems and Therapies I	29.00	100.00	72.92	18.20

Therapies II	40.00	100.00	83.04	14.31
Physical Appearance	41.67	100.00	84.35	16.89
Anxiety	0.00	100.00	76.10	21.21
Cognitive	25.00	100.00	59.53	18.40
Communitacion	8.33	100.00	71.40	24.21

(Table 8) shows that in aspects of heart problems and therapy I has an average of 72.92 ± 18.20 , aspects of therapy II problems have an average of 83.04 ± 14.31 , aspects of physical appearance problems have an average of 84.35 ± 16.89 , aspects of anxiety problems have an average of 76.10 ± 21.21 , aspects of cognitive problems have an average of 59.53 ± 18.40 , and aspects of communication problems have an average of 71.40 ± 24.21 .

Table 9. Overall quality of life of patients

	Min.	Max.	Mean	SD
Quality of life in patients with Acyanotic type congenital heart disease (left to right shunt)	54.63	91.67	73.89	9.79

It can be seen in (Table 9) that the quality of life in patients with acyanotic type congenital heart disease (left to right shunt) at RSUD Dr. Soetomo Surabaya has an average of 73.89 ± 9.79 from a total of 74 respondents. Aspects that have values below the average quality of life value are considered to be problem aspects that have a negative impact on the patient's quality of life. Thus, in general, aspects of Heart and Therapy I, Cognitive, and Communication are problem aspects that have a negative impact on the patient's quality of life.

Analysis of differences in quality of life based on the type of diagnosis in patients with acyanotic type congenital heart disease (left to right shunt) was performed using the One Way Anova statistical test on the SPSS program. This is because the quality of life data based on the type of diagnosis meets the applicable requirements, namely the sample comes from more than 2 independent groups, is normally distributed, and has a homogeneous variant.

Table 10. Differences in Quality of Life Based on Diagnosis Type

Diagnostic	Mean ± SD	P
PDA	75.74 ± 10.65^a	0.014
ASD	74.50 ± 9.65^a	
VSD	74.14 ± 8.44^a	
Kombinasi	56.48 ± 1.85^b	

¹ aP>0.05 compared with PDA, ASD, and VSD groups;

bP=0.002 compared with PDA and ASD, P=0.003
compared with VSD



(Table 10) shows that the significance value of the One Way Anova test is 0.014 ($p < 0.05$). Thus, it can be concluded that there is a difference in the average quality of life of at least one of the four types of diagnosis. To find out which type of diagnosis has a difference in quality of life, a further test is required in the form of Fisher Least Significant Difference (LSD). In the type of PDA diagnosis, there is a mean quality of life of 75.74 ± 10.65 , in the type of ASD diagnosis, there is a mean quality of life of 74.50 ± 9.65 , in the type of VSD diagnosis, there is a mean quality of life of 74.14 ± 8.44 , and in the type of combination diagnosis, there is a mean quality of life of 56.48 ± 1.85 . In the type of diagnosis of PDA, ASD, and VSD there is no significant difference in the average quality of life. Whereas in the combined diagnosis type, there was a significant difference with other types, which was 0.002 ($p < 0.05$) when compared with PDA and ASD, and 0.003 ($p < 0.05$) when compared with VSD.

19 DISCUSSION

The findings of this study emphasize the diverse impacts of acyanotic congenital heart disease (ACHD) on pediatric patients' quality of life (QoL). Cardiac issues, cognitive impairments, and communication challenges were identified as critical factors contributing to reduced QoL. Previous research highlights similar patterns, noting that congenital heart defects significantly impair physical, emotional, and social functioning in children [5]. These findings underscore the necessity for multidimensional assessment and intervention approaches [3].

The low scores in the cognitive domain (mean = 59.53 ± 18.40) are particularly concerning, as they suggest potential neurodevelopmental delays. Such delays may result from chronic hypoxia or repeated hospitalizations, as supported by studies documenting the association between congenital heart defects and delayed academic performance or attentional deficits [11]. Similar findings indicate that prolonged exposure to medical stressors can disrupt normal neurodevelopmental trajectories [12].

Communication difficulties (mean = 71.40 ± 24.21) were another significant factor affecting QoL. These challenges limit the ability of children to express symptoms, engage socially, or participate actively in peer-related activities [13]. Studies have linked communication challenges in pediatric ACHD populations to increased isolation and anxiety, further exacerbating QoL deficits [6].

The study also found that patients with combined diagnoses exhibited the lowest QoL scores (mean = 56.48 ± 1.85), significantly below those of other groups. This finding is consistent with earlier research demonstrating that the complexity of combined cardiac conditions amplifies both physical and psychological stress, leading to poorer overall outcomes [1]. Such conditions place a higher burden on caregivers and the healthcare system, further highlighting the need for targeted interventions [14].

Anxiety (mean = 76.10 ± 21.21) emerged as another notable area of concern. Fear related to medical procedures and the unpredictability of health outcomes contributes to heightened anxiety levels in these children, as documented in multiple studies [15]. Psychological counseling and stress management interventions have been shown to reduce anxiety and improve QoL in similar populations [10].

The results of this study emphasize the importance of implementing a multidisciplinary approach to addressing the QoL challenges faced by pediatric ACHD patients. Tailored interventions, including cognitive and communication therapies, as well as targeted programs for those with combined diagnoses, have demonstrated effectiveness in enhancing well-being [5]. Furthermore, incorporating family support structures and caregiver education can mitigate stress and foster better outcomes for both children and their families [17].

CONCLUSION

From an analytical descriptive study of quality of life in children aged 2–18 years with acyanotic congenital heart disease (ACHD) at RSUD Dr. Soetomo Surabaya for the 2019–2020 period, reviewed using the PedsQL Inventory 3.0 Cardiac Module, the average QoL score was 73.89 ± 9.79 based on data from 74 respondents. Aspects scoring below this average are considered to have a negative impact on the patients' QoL. Key findings include:

1. Aspects of heart problems and therapy I were rated as having a poor impact, with an average score of 72.92 ± 18.20 .
2. Aspects of therapy II problems were rated as having a non-bad impact, with an average score of 83.04 ± 14.31 .
3. Aspects of physical appearance problems were rated as having a non-bad impact, with an average score of 84.35 ± 16.89 .
4. Aspects of anxiety problems were rated as having a non-bad impact, with an average score of 76.10 ± 21.21 .
5. Aspects of cognitive problems were rated as having a poor impact, with an average score of 59.53 ± 18.40 .
6. Aspects of communication problems were rated as having a poor impact, with an average score of 71.40 ± 24.21 .
7. A significant difference ($p = 0.014$) was observed in QoL among diagnostic types, with the combined diagnosis group showing the lowest mean QoL score and significant differences compared to all other groups.

These findings highlight the necessity of targeted, multifaceted interventions to improve the QoL for children with ACHD, particularly those with combined diagnoses or cognitive and communication challenges.

CONFLICT OF INTEREST

The authors declare they have no conflict of interest

AUTHOR'S CONTRIBUTIONS

Conceptualization: Mahrus Abdur Rahman; Methodology: Taufiq Hidayat; Software: Bagas Triambodo; Validation: Mahrus Abdur Rahman; Formal analysis: I Ketut Alit Utamayasa;



Investigation: Ketut Alit Utamayasa; Resources: I Ketut Alit Utamayasa; Data curation: Prima Hari Nastiti; Writing—original draft preparation: Prima Hari Nastiti; Writing—review and editing: Prima Hari Nastiti; Visualization: Bagas Triambodo; Supervision: Mahrus Abdur Rahman; Project administration: Taufiq Hidayat; Funding acquisition: Taufiq Hidayat.

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