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The Effect of Parenting Alliances and Demographic Characteristics on Nutritional Status in Children with Avoidant Restrictive Food Intake Disorder in Malang Regency, Indonesia

Yoyok B. Prasetyo [1,2], Nursalam[3], Rachmat Hargono[4], Ahsan[5], Kumboyono[5]

[1]*Student of Program Doctoral, Health Science, Faculty of Public Health, Airlangga University, Surabaya, Indonesia*
[2]*Department of Nursing Program Study Community, Nursing Science Faculty, Muhammadiyah Malang University, Malang, Indonesia*
[3]*Nursing Faculty, Airlangga University, Surabaya, Indonesia*
[4]*Department of Health Science and Behavioral Science, Public Health Faculty, Airlangga University, Surabaya, Indonesia*
[5]*Program Study of Nursing Science, Medical Faculty, Brawijaya University, Malang, Indonesia*

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CORRESPONDENCE

E-mail: yoyokbekti2@gmail.com

A B S T R A C T

Avoidant restrictive food intake disorder (ARFID) is an eating problem in children, causing nutritional deficiency, obstructing growth, and development. This study investigates the correlation between demographic characteristics and parenting alliance to nutritional status in children with ARFID in Malang Regency. This analytic observational study used a cross-sectional approach from December 2018 to March 2019. There were 245 respondents with multistage sampling. Parenting alliance was quantified using questionnaires, and the children's nutritional status was quantified using anthropometry, categorized based on Z-score weight-for-age. Data analysis used Pearson correlation coefficients and Multiple linear regression with α=0.05. The result showed no correlation between parenting alliance and children's nutritional status ($p>0.05$). The multiple linear regression analysis demonstrated that children's nutritional status was influenced by a child's age (β = -0.156, p=0.020) and the number of children in a family (β = -0.263, p=0.029). In conclusion, parenting alliance is not directly related to children's nutritional status in children with ARFID. Nevertheless, the child's age and the number of children in a family affect their nutritional status.

INTRODUCTION

Avoidant restrictive food intake disorder (ARFID) is a feeding disorder in a child aged 1 to 3 years old, with symptoms including a poor ability to eat food related to their age, irregular eating schedule, and refusal to eat. Children's eating problems are generally associated with sensorial factors like taste, smell, and appearance (Nicely *et al.*, 2014). Typical symptoms of ARFID in children include psychological disorders, such as anxiety and responses to a lack of parenting (Strandjord *et al.*, 2015). Advanced symptoms of children suffering from ARFID can involve significant weight loss, nutritional deficiency, high reliance on enteral nutrition and oral supplementation, and psychosocial function disorder. Further, long-term problems with physical, social, emotional, and cognitive development may result in identity and self-esteem disorders in adolescence. Children suffering from ARFID experience growth and development disorders, such as stunting and wasting (Campbell and Peebles, 2014).

The prevalence of stunting and wasting in Indonesia in 2007, 2010, and 2013 was 36.8%, 35.6%, and 37.2%, respectively (Health Research and Development Agency, Republic of Indonesia, 2013). Stunting and wasting occur due to failure to meet nutritional or energy requirements. Therefore, fulfilling a child's dietary needs requires a good parenting alliance. Moreover, the prevalence of ARFID in several countries,

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including Japan, with approximately 11%, 12.4% in Canada in 2013, 22.5% in the United States in 2012, and 5–23 % in the UK in 2014 (Nicely *et al.*, 2014). Several factors are predicted to cause ARFID, such as caregiver disruption, interaction between mother and children, and environmental and psychological stress (Sacrato, Pellicciari and Franzoni, 2010; Campbell and Peebles, 2014). In addition, parental child neglect and abuse are other contributing factors. A previous study by Væver, Smith-Nielsen & Lange provided data on the conflict of affection in the parent-child relationship, which ranged between 13–82% (Væver, Smith-Nielsen and Lange, 2016).

Parenting alliance is defined as the equal involvement and role of each parent in a child's health, including respecting each other's decisions and maintaining good communication. Good parenting lessens tension when nurturing children with ARFID (Frank *et al.*, 2017). The higher the parents' stress level, the higher the probability of an eating disorder (Verkleij *et al.*, 2015). Previous studies have revealed that children's feeding style is influenced by their parental feeding style (Helland, Bere and Øverby, 2016). Parents with low stress levels are more sensitive to reading the signals given by their children and providing an appropriate response (Lavallée *et al.*, 2017). Thus, the parental response can influence a child's feeding style. Further, A poor feeding style will lead to insufficiency in a child's nutritional status.

A lack of parenting alliance may lead to conflict in a family. Habib et al. found that 33% of conflicts in a family potentially led to health problems in children (Habib *et al.*, 2014). Fathers and mothers reported that they started to encounter issues in parenting, especially eating problems, when their children were 2 years old (24%) to 4 years old (18%) (Damayanti, 2015). The biggest obstacle in a parenting alliance is accepting each other's point of view. Parents tend to refuse to change their minds, particularly during conflict. Parents nurturing a child with ARFID tend to have a conflictual family (Cullinane and Novak, 2013).

Malang Regency is the second biggest city in East Java. This city exhibited a fluctuating percentage of malnutrition, and undernutrition was reported to have escalated during 2005–2007, declined during 2007–2009, and fluctuated during 2010–2014. The prevalence of undernutrition in 2010 was 7.10%, which then decreased to 5.52% in 2014. A similar decline was also found in malnutrition cases—3.40% in 2010 and 0.87% in 2014. Therefore, this study investigates the correlation between demographic characteristics and parenting alliance to nutritional status in children with ARFID in Malang Regency. This study's results will raise awareness and expand knowledge on how to avoid nutritional problems in children.

METHOD

This research was an analytic observational study using a cross-sectional approach. It was conducted from December 2018 to March 2019 at three Public Health Centers (PHC) in the Malang District Health Office:

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Karangploso PHC, Singosari PHC, and Ardimulyo PHC. The sample size was determined using the rule of thumb in Structural Equation Modelling (SEM), where the estimated parameters were multiplied by 5 or 10. The sample size in this study was 245, and a multistage sampling was applied, where sampling was conducted gradually. The first stage determined the Public Health Center; the second stage determined the Integrated Health Service Post (IHSP) (n = 229). This study used simple random sampling to select as many as 20% of IHSP (n = 46). The third stage determined families with children with ARFID (n = 245 families). The inclusion criteria were parents with children with ARFID (less than 5 years old), and the children did not have chronic diseases or congenital disabilities of their digestive system. The exclusion criteria were parents with children suffering from ARFID with complications, other chronic diseases, and congenital disabilities of their digestive system.

Data was collected using questionnaires for parental alliance that included eight items with three indicators: (1) providing care for children (three questions); (2) fulfilling children's elimination needs (two questions); (3) communicating with children (three questions). The assessment used a Likert scale to quantify the level of participants' answers: 1 – never; 2 – rarely; 3 – occasionally; 4 – frequently; 5 – very frequently. ARFID has recently been added to the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, 5th edition) as a new class of eating disorders (EDs) that has implications for nutritional disorders, such as malnutrition and undernutrition. Nutritional status was quantified using the anthropometric values of weight and age. Furthermore, nutritional status data were categorized based on Z-score weight-for-age: malnutrition = <-3.0 standard deviation (SD); undernutrition = -3 to <- -2.0 SD; normal nutrition = -2 to 2 SD; excessive nutrition ≥ 2 SD.

Data was analyzed using IBM SPSS Statistics 23 with $p<0.05$ as a significance level. Demographic data on mother-child relationships was presented in a frequency distribution (percentage). Data on parenting alliance and nutritional status were presented in mean value ± SD. The comparison of parenting alliance and children's nutritional status between working and non-working mothers was analyzed using the Mann-Whitney test. One-way analysis of variance (ANOVA) and Kruskal-Wallis test was applied to examine the differences in parenting alliance and nutritional status among demographic groups. Pearson correlation coefficients were used to analyze the correlation between parenting alliance and children's nutritional status. Multiple linear regression was used to examine the impact of demographic characteristics and parenting alliance on children's nutritional status. This research was reviewed and approved by an institutional review board or ethics committee, with approval letter No: 333/KEPK. All respondents gave their informed consent to participate in this research.

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RESULT

Demographic Characteristics

According to the result (Table 1), working mothers' ages ranged from 36 to 45 years (28.9%), while the group of non-working mothers' ages were 26 to 35 years (81.3%). Most working mothers were university graduates (41.9%), while most non-working mothers had graduated from senior high school (85.4%). Working mothers tended to have one child (27.9%), while the non-working mothers had more than one child (81.6%). The working mothers' family income was mainly more than 2 million IDR/month (28.6%), while the non-working mothers' group was less than 1 million IDR/month (80.4%). Interestingly, most children who suffered from ARFID in the working mothers' group were girls (24.4%). In contrast, in the non-working mothers' group, most of the children who suffered from ARFID were boys (80%). In addition, the children suffering from ARFID in the group of working mothers were preschool-age (27.9%), while in the group of non-working mothers, they were toddlers (80.4%).

Table 1. The Demographic Characteristics of Working Mothers (n=55) and Non-Working Mothers (n=190) who had Children with ARFID

Mother-Child Demographic Characteristics		Working Mothers n (%)	Non-working Mothers n (%)
Mother's age	17 – 25 years old	16 (26.2)	45 (73.8)
	26 – 35 years old	26 (18.7)	113 (81.3)
	36 – 45 years old	13 (28.9)	32 (71.1)
Education	Primary School	12 (24.0)	38 (76.0)
	Junior High School	17 (22.7)	58 (77.3)
	Senior High School	13 (14.6)	76 (85.4)
	University	13 (41.9)	18 (58.1)
Number of children	One	29 (27.9)	75 (72.1)
	More than one	26 (18.4)	115 (81.6)
Family income	Less than 1 million IDR/month	11 (19.6)	45 (80.4)
	1 to 2 million IDR/month	26 (20.6)	100 (79.4)
	More than 2 million IDR/month	18 (28.6)	45 (71.4)
Children's sex	Boy	22 (20.0)	88 (80.0)
	Girl	33 (24.4)	102 (75.6)
Children's age	Infant	5 (26.3)	14 (73.7)
	Toddler	31 (19.6)	127 (80.4)
	Preschool	19 (27.9)	49 (72.1)

The Score of Parenting Alliance and Children's Nutritional Status

The parenting alliance consisted of three indicators, including providing care for children (10.1±6.2), fulfilling children's elimination needs (6.4 ± 2.0), and communicating with children (12.65 ± 2.80). Parenting alliance in fulfilling children's elimination needs showed significant differences between working and non-working mothers, with a total score p=0.037 (p<0.05). However, there were no significant differences (p>0.05) in children's nutritional status between the group of working (-0.79 ± 0.98) and non-working mothers (-0.94 ± 1.21) (Table 2).

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Table 2. Mean Score of Parenting Alliance and Nutritional Status in All Respondents (n = 245), Working Mothers (n=55), and Non-Working Mothers (n=190) who had Children with ARFID

Variable	All Respondents (Mean ± SD)	Working Mother (Mean ± SD)	Non-working mother (Mean ± SD)	*p*
Parenting alliance	2.6 ± 6.2	30.1 ± 6.7	29.5 ± 6.1	0.300
Provide care for children	10.1 ± 2.7	10.1 ± 2.7	10.7 ± 2.7	0.600
Fulfill children's elimination needs	6.4 ± 2.0	6.4 ± 2.0	5.5 ± 2.2	<0.001
Communication with children	12.6 ± 2.8	12.6 ± 2.8	12.7 ± 2.7	0.700
Children's nutritional status*	-0.9 ± 0.9	-0.8 ± 0.1	-0.9 ± 1.2	0.300

* Z-score weight-for-age: malnutrition ≤ -3.0 SD; undernutrition = -3 to < -2.0 SD; normal nutrition = -2 to 2 SD; excessive nutrition = > 2 SD

The Effect of Demographic Characteristics on Parenting Alliance and Nutritional Status in Children with ARFID

The result showed that the highest score of parenting alliance on the mother's age was found in mothers aged 26 to 35 years (30.58 ± 5.24). This score significantly differed between mothers' age groups, p=0.023 (p<0.05). In contrast, there were no differences in children's nutritional status scores between mothers of different ages; all groups had normal nutritional status. In addition, parenting alliance was strongly determined by the maternal education p=0.026 (p<0.05). In contrast, family income, children's sex and age, and maternal employment did not influence parenting alliance. Furthermore, demographic characteristics, such as mother's age, maternal education, number of children, family income, maternal employment, and children's sex and age, were not differentiating factors and were not included as factors influencing children's nutritional status (p>0.05) (Table 3).

Table 3. The Differences of Parenting Alliance and Children's Nutritional Status Based on Mother-Child Demographic Characteristics (n = 245)

Mother-Child Demographic Characteristics	Parenting Alliance	Children's Nutritional Status
Mothers' age		
17 – 25 years old	29.2 ± 7.3	-0.1 ± 1.1
26 – 35 years old	30.6 ± 5.2	-0.9 ± 1.2
36 – 45 years old	27.4 ± 6.8	-0.1 ± 1.2
F	5	1.1
p	<0.001	1.000
Maternal education		
Primary school	29.4 ± 6.8	-1 ± 1.1
Junior High School	28.1 ± 6	-1.01 ± 1.14
Senior High School	30.6 ± 5.6	-0.9 ± 1.2
University	31.1 ± 6.8	-0.4 ± 0.1
F	2.8	0.9
p	<0.001	0.100
Number of Children		
One	29.6 ± 6.3	-0.7± 1.2
More than one	29.7 ± 6.1	-1.0 ± 1.1
F	0	0.1
p	0.800	0.100
Family Income		
Less than 1 million IDR/month	28.8 ± 6.4	-1 ± 1
1 to 2 million IDR/month	29.2 ± 6.5	-1 ± 1.1
More than 1 million IDR	31.2 ± 5.2	-0.6 ± 1.3

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Mother-Child Demographic Characteristics	Parenting Alliance	Children's Nutritional Status
F	2.9	1
p	0.100	0.100
Children's sex		
Boy	29.1 ± 6.5	-0.9 ± 1.2
Girl	30.1 ± 6	-0.9 ± 1.1
F	1.7	1.4
p	0.200	0.600
Children's age		
Infant	26.3 ± 8.5	-0.4± 1.1
Toddler	29.9 ± 6.1	-0.9 ± 1.2
Preschool	29.9 ± 5.6	-1.1 ± 1.1
F	3	1.4
p	0.100	0.10
Maternal employment		
Working	30.1 ± 6.7	-0.8 ± 0.1
Non-working	29.5 ± 6.1	-0.9 ± 1.2
F	0.4	1.4
p-value	0.300	0.400

The Correlation between Parenting Alliance and Nutritional Status in Children with ARFID

The result showed that there was no correlation between parenting alliance and children's nutritional status in children with ARFID ($p>0.05$) (Table 4).

Table 4. The Correlation between Parenting Alliance and Children's Nutritional Status (r/*p*)

Variable	Children's Nutritional Status
Parenting alliance	0.1 / 0.1
Provide care for children	0.1/ 0.1
Fulfill children's elimination needs	0 / 0.7
Communication with children	0.1 / 0.1

The Effect of Demographic Characteristics and Parenting Alliance on Nutritional Status in Children with ARFID

The multiple linear regression analysis demonstrated that children's nutritional status was influenced by a child's age and the number of children in a family (Table 5). Child's age and number of children in a family were predicted to correlate negatively with children's nutritional status ($\beta = -0.156$, $p=0.020$; $\beta = -0.263$, $p=0.029$, respectively). On the other hand, the mother's age, cooperation in fulfilling children's elimination needs, cooperation in communicating with children, and parenting alliance did not affect children's nutritional status.

Table 5. Multiple Linear Regression Analysis of Demographic Characteristics and Parenting Alliance on Children's Nutritional Status

Variable	B	SE	β	t	*p*
Constant	-1.4	0.6		-2.4	<0.001
Mother's age	0	0	0.1	1.0	0.300
Children's age	-0.2	0.1	-0.2	-2.3	<0.001
Number of children in a family	-0.3	0.1	-0.2	-2.2	<0.001
Parenting alliance	0	0	0.2	0.8	0.400
Fulfill children's elimination needs	-0.1	0.1	-0.1	-0.8	0.400
Communication with children	0	0.1	0	0.2	0.900

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DISCUSSION

The Impact of Demographic Characteristics on Parenting Alliance and Nutritional Status in Children with ARFID

This study showed that most mothers ranged in age from 26 to 35 years old, which is considered a transition period in intellectual and social growth. At this age, mothers tend to learn more about themselves and are more responsible for their children with ARFID. Age is an indicator of a person's maturity, and therefore, the older one gets, the more knowledge and experience one gains about appropriate behavior for educating children. An age range of 20–35 is the best for parenting roles. Those younger or older may not perform parenting roles optimally due to physical and psychological aspects. In addition to physical factors, a mother's age also affects her psychological condition. Very young mothers may not be ready to manage childcare skills adequately. Moreover, they will have more characteristics of young people and less maternal nature. Furthermore, children who live with young parents receive more lenient parental supervision, as young parents tend to be more tolerant of their children (Federal Interagency Forum on Child and Family Statistics, 2017).

Lack of parental supervision results in poor feeding styles for children. An indulgent/permissive feeding style is a parenting style in which parents pamper their children by giving them whatever food they want whenever they want it. Caregivers provide several diets that do not satisfy children's nutritional intake (Kerzner *et al.*, 2015), sometimes without dietary limitations (Gerards and Kremers, 2015; Van Der Horst and Sleddens, 2017). The permissive feeding style is characterized by inconsistent supervision, avoiding affection, and punishment (Ebrahimi *et al.*, 2017). The main characteristic of permissive feeding is that caregivers provide high support and low control over children's behavior. In addition, parents have a positive attitude and do not punish children for bad behavior (Van Der Horst and Sleddens, 2017), resulting in a lack of nutritional intake due to poor feeding style.

Children's age is also a demographic factor. Most children with ARFID in this paper were toddlers (1–3 years old), known to be the transition age for children related to diet and motor development. ARFID symptoms in both infants and toddlers are the refusal to eat, irregular eating schedule, and poor ability to eat food that is not appropriate for their developmental stage. Children aged six months to 3 years can have infantile anorexia, shown by refusing to eat, inability to control hunger and fullness, easy environmental distraction, and impaired growth and development. Children also experience a transition in their eating habits during this age, from being fed by their parents or caregivers to eating by themselves. Children learn to put food in their mouths and identify their hunger and glut in this transition period. Caregivers who try to keep feeding children when they refuse to eat can cause them to feel depressed while eating (Merwin, 2011).

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This study shows that most mothers had a senior high school and university education. A good maternal education supports mothers in accessing information related to good feeding style and parenting compared to mothers with lower family income and education. Therefore, mothers with a lower education were more likely to have children suffering from stunting (Dessie *et al.*, 2019). Education can improve mothers' capabilities for processing information and developing the ability to nurture their children. Mothers with a good education can optimally utilize health facilities, interact effectively with health professionals, follow parenting recommendations, and maintain environmental cleanliness. In addition, they tend to use their household resources to benefit their children. They also tend to follow health professionals' recommendations regarding children's diet and feeding schedule, which can improve children's nutritional intake and establish regular eating schedules (Dessie *et al.*, 2019).

Family income potentially is associated with a mother's education, as it may help them be accepted into a profitable company or obtain a better occupation. Higher family income may improve and support children's growth and development. However, challenges faced by working mothers include providing warmth, affection, and care for their children. When they can prevail against these challenges, they can develop a positive bond with their children and positively influence their children's growth. Good communication in a family can create a harmonious family that is open to one another and trusting one another. On the other hand, poorly educated mothers tended to force their children to eat any food, whereas well-educated mothers practiced a good parenting style and supplied the recommended diet (Sacrato, Pellicciari and Franzoni, 2010).

The results of this study showed that most respondents were non-working mothers. Non-working mothers likely had more time to care for children suffering from ARFID through good interaction and communication. It can improve a mother's ability to nurture her children's health. The non-working mother plays a significant role in caring for and arranging the dietary intake of her family. On the other hand, the working mother tends to have limited time for the care and arrangement of her children's food intake, which leads to undernutrition. Previous studies demonstrated that the children aged 6–60 months with undernutrition were mainly children of a working mother (22.44%), compared to a non-working mother (19.9%) (Putri, Sulastri and Lestari, 2015).

Well-developed communication between parents and children is essential to monitor, understand, and manage children's development. Open communication makes children feel valued, loved, and cared for by their parents. In addition, continuous, effective, and efficient communication creates intimacy, openness, and greater affection between parents and children, allowing parents to monitor their children's physical and psychological development. One way to develop good communication and interaction is by being a good listener without making a special schedule to meet or gather (Mufidah, 2008).

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Recent studies revealed that mother-child demographic factors did not influence children's nutritional status. Cullinane and Novak (2013) described how dietary problems in children were affected by children's social experiences and parent-child interaction, as these contribute to the formation of children's feeding style. Blaine *et al.* (2015) added that responsive interaction might result in a good feeding style, especially with toddlers. During this period, toddlers learn how to feed themselves and taste various new foods. Therefore, children's nutritional status was mainly determined by feeding style in the family (O'Connor *et al.*, 2017).

Khodaveisi *et al.* (2017) reported that demographic characteristics, such as family income and maternal education, were not related to children's nutritional status; nevertheless, those factors were related to feeding style in the family. A good family income and a well-educated mother might improve the capability of providing good-quality food regularly, since parents in this demographic were more open to receiving and filtering new information related to good practices for raising toddlers. By contrast, children raised in a low-income family tend to experience obstacles during their development because of the mother's nurturing behavior. The Ministry of Health Republic of Indonesia has explained that children need strong family support for growth and development (Indonesia Ministry of Health, 2012). Well-educated parents are more likely to raise their children with consideration for their personalities, emotions, and age.

The Correlation between Parenting Alliance and Nutritional Status in Children with ARFID

This investigation revealed no correlation between parenting alliance and nutritional status in children with ARFID. Nutritional status was mainly influenced by socio-economic characteristics, including the mother's education, occupation, number of children in a family, family income, and parenting style (Putri, Sulastri and Lestari, 2015). Parenting alliance was considered an indirect factor that creates good feeding habits in children with ARFID. Parents parenting children with ARFID tend to feel pressured and tense. Therefore, a good parenting alliance can support the mother and reduce her tension and stress, both physically and psychologically, thus helping her provide better care to her children (Frank *et al.*, 2017).

By reducing stress levels, parents will be more sensitive to reading signals from their children (such as drowsiness, fussiness, sensitivity, anger, boredom, and hunger). Parental sensitivity is an interactive process in which parents can: (a) recognize signals from their baby; (b) interpret the signals adequately; (c) identify an appropriate response; (d) carry out an appropriate response according to the situation. On the other hand, higher stress levels linearly resulted in a higher probability of behavioral issues in children (Verkleij *et al.*, 2015).

The Correlation between Demographic Characteristics and Nutritional Status in Children with ARFID

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This study revealed that factors influencing the nutritional status of children with ARFID were age and the number of children in a family. The child's age was predicted to affect nutritional status negatively. The younger the child with ARFID, the higher the potency of the nutritional problem. This result is supported by a previous study, which found that most children with ARFID were toddlers and infants. More importantly, the interaction between infants and their mothers was the main predictor of children's behavior (Van Der Horst and Sleddens, 2017). Hence, habituating children to eat a healthy nutritional intake is essential in a good infant feeding style (Walton *et al.*, 2017). Conversely, a poor feeding style may lead to future dietary problems. Prior studies described that feeding style was determined by the parent, including restrictions on consuming unhealthy food and coercion to consume large quantities of food (Helland, Bere and Øverby, 2016).

Furthermore, the number of children in a family was predicted to affect children's nutritional status in this investigation. The higher the number of children, the higher the possibility of children with undernutrition. Parents with fewer children would develop an authoritative parenting pattern or be more responsive, leading to good mother-child communication and interaction (Putri, 2023). By applying authoritative parenting, parents will be able to meet the nutritional needs of their children with full responsibility. Kerzner *et al.* (2015) describe this type of parenting as involving a caregiver who comprehends the appropriate time and place to feed the children and the proper amount of food to be fed. Van Der Horst and Sleddens (2017) add that some responsive ways to encourage children to develop a good feeding pattern are making food plating more appealing and giving appropriate compliments.

A good feeding pattern has positive results in children, such as controlling the amount of food, speaking positively about food, developing correct table manners, and responding correctly to hunger signals. Caregivers should express appreciation following a child's achievement and not force children into eating behaviors. A good feeding pattern is characterized by children who love to eat fruits and vegetables and hate junk food (Kerzner *et al.*, 2015). An authoritative feeding style influences eating behavior through a child copying the parents' healthy feeding pattern, which should restrict unhealthy food (Hansson *et al.*, 2016).

The characteristics of an authoritative feeding style are warm interaction/relationship between caregivers and children; encouragement and providing children with a sense of freedom; good communication; explicit expressions of love and affection; the existence of rational rules that impact positively on children's eating behavior in terms of independence; social responsibility; and good adaptability (Kimble, 2014). In addition, this type of feeding style is also characterized by a caregiver who is sensitive to children's needs and avoids punishment in the parenting process. In addition, they raise their children with

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warmth, kindness, and intimacy, and they respect children's opinions within certain limits (Ebrahimi *et al.*, 2017).

Mothers who raise many children tend to control their children dominantly, have less communication, and fall short in fulfilling their children's needs. They tend to develop a controlling feeding style characterized by over-controlling children's food by forcing them to eat or limiting their access to delicious food. Such actions counterproductively affect children's self-regulation skills concerning food intake. At first, this pattern looks beneficial, but it will have a counterproductive impact in the long term. Children will eat fewer fruits and vegetables, leading to a higher risk of dietary problems, both undernutrition and excessive nutrition. Accordingly, controlling the feeding style is essential to improving healthy feeding habits (Kimble, 2014).

The controlling feeding style is like the authoritative feeding style, which is a pattern where parents strongly demand that children eat well but with low responsiveness, provide low support but exhibit substantial behavioral control, and often fail to explain to children the reasons behind their instructions and are overprotective (Ebrahimi *et al.*, 2017). This pattern is characterized by a lack of a reciprocal relationship between parent and child, and the caregiver takes excessive control over the eating behavior (forcing, pressing, or limiting food intake) (Gerards and Kremers, 2015).

CONCLUSION

Parenting alliance was not directly related to nutritional status in children with ARFID. Nevertheless, the children's nutritional status was affected by a child's age and the number of children in a family. Although parenting alliance is not related to the nutritional status of children, this aspect is essential in determining parenting patterns for children. Parenting alliance will set a good feeding style and positively impact the growth and development of children. Further research should analyze the influence of family feeding style on nutritional status in children.

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Evaluation of the Adolescent *Posyandu* in the Working Area of Puskesmas Wonokerto I, Pekalongan Regency

Rinda Febriyanti[1], Ardiana Priharwanti[2], Wahyuningsih[3], Yuniarti[4]

[1,2,3,4] *Public Health Study Program, Faculty of Health Sciences, University of Pekalongan*

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CORRESPONDENCE

E-mail: rindafebriyanti1022@gmail.com

A B S T R A C T

The Adolescent *Posyandu* is a form of mentoring and coaching designed to help teenagers avoid negative behaviors that may harm themselves or others. In the current digital era, where information can be easily accessed through the internet and social media, the implementation of Adolescent *Posyandu* faces various challenges. This study aimed to evaluate the implementation of the Adolescent *Posyandu* in the working area of *Puskesmas* Wonokerto I, Pekalongan Regency. This descriptive qualitative research used in-depth interviews in which the data were analyzed using the Context–Input–Process–Product (CIPP) model. At the context stage, the program had not been fully achieved due to low participant coverage, uneven target distribution, and environmental factors such as peer influence and cadre roles that affected participation. At the input stage, not all cadres had attended training, and the number of cadres did not meet the technical guidelines. At the process stage, scheduling was constrained by the busy schedules of officers, and activities were incomplete. Monitoring and evaluation by the health center were also limited. At the product stage, there were no innovative activities to increase adolescents' awareness and participation. *Puskesmas* Wonokerto I needs to optimize the development of Adolescent *Posyandu* activities by improving human resources, facilities, monitoring, and innovative approaches.

INTRODUCTION

According to the World Health Organization (WHO), adolescents account for 18% of the world's population, or approximately 1.2 billion people. Adolescents aged 10–24 years currently represent the largest demographic group globally, with nearly 90% living in developing countries. Regions such as South Asia, Sub-Saharan Africa, and Latin America have particularly high adolescent populations. Population growth in developing countries significantly influences the overall number of adolescents worldwide (WHO, 2022).

Adolescent reproductive and sexual health is a critical issue for national development, considering both the size of the adolescent population and the long-term consequences of related health problems. Today's adolescents remain vulnerable to issues such as early marriage, limited knowledge of reproductive and sexual health, early and unintended pregnancies, sexually transmitted infections (STIs) including HIV/AIDS, unsafe abortion, and gender-based violence (BKKBN, 2021).

Prominent health challenges among adolescents are often related to the so-called TRIAD KRR—sexuality, HIV/AIDS, and drug use. Data from the National Narcotics Agency show that there are 115,404 drug users in Indonesia, with 51,986 of them aged 16–24 years. Among these, 5,484 are secondary school students and 4,055 are university students (Aldo et al., 2023).

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The 2015 Indonesia Global School-Based Student Health Survey (GSHS) reported that 41.8% of male students and 4.1% of female students aged 12–18 years had smoked, with 32.82% of smokers starting at age 13 or younger. In addition, 14.4% of male students and 5.6% of female students had consumed alcohol, while 2.6% of male students had used drugs. Risky sexual behavior was also reported, with 8.26% of male students and 4.17% of female students having engaged in sexual intercourse. Such behaviors increase the risk of STIs, unwanted pregnancies, and unsafe abortions. Data from the Directorate General of Disease Control and Environmental Health (DG P2PL) between 1987 and March 2017 indicate that the high incidence of AIDS in the 20–29 age group suggests that initial exposure to HIV often occurs during adolescence (Ruwayda & Izhar, 2021).

According to the Indonesian Ministry of Health, new cases of HIV/AIDS continue to rise. In 2020, there were 8,639 reported cases; in 2021, 5,750 cases; and from January to March 2022, 1,907 cases. Across the years, the 20–29 age group consistently accounts for the largest proportion of cases, with an average of 30.7%. The Indonesian Pediatric Association (IDAI) reported that between January and June 2022, approximately 1,188 children in Indonesia were HIV-positive. These findings indicate that this age group engages in behaviors that make them highly vulnerable to contracting or transmitting HIV/AIDS (Ministry of Health RI, 2022).

The Adolescent Posyandu (Integrated Health Post for adolescents) is a form of mentoring and coaching designed to help teenagers avoid negative behaviors that could harm themselves or others. As a community-based public health activity, it specifically targets adolescents aged 10–18 years, providing regular health monitoring and promoting healthy life skills (Ministry of Health, 2018).

In the working area of Puskesmas Wonokerto I, the Adolescent Posyandu was established in 2019 and is implemented in all eight villages: Bebel, Wonokerto Wetan, Sijambe, Pesanggrahan, Pecakaran, Api-Api, Wonokerto Kulon, and Tratebang. Activities are conducted monthly in each village, involving 2–5 cadres and one village midwife as the program facilitator. According to the guidelines, activities include measurements of height and weight, blood sugar tests, mid–upper arm circumference measurements, hemoglobin (Hb) checks, health counseling, physical fitness exercises, and completion of intelligence forms for new participants. Attendance per village typically ranges from 15–20 adolescents each month, though participation varies.

Data from Puskesmas Wonokerto I indicate that the total adolescent population in the working area is 5,171, consisting of 2,878 adolescents aged 10–14 years (1,467 males and 1,411 females) and 2,293 adolescents aged 15–18 years (1,180 males and 1,113 females). The highest recorded participation was in December 2023, with 114 attendees—only 5.7% of the total adolescent population. This shows that, while the Adolescent Posyandu is conducted monthly in every village, participation remains low.

A preliminary survey identified several challenges in the implementation of the Adolescent Posyandu. The most prominent issue is the limited number of personnel. Although the program has been running since 2019, each Posyandu only has 2–3 cadres, which hinders optimal implementation. In addition, there is a lack of innovative activities, particularly important in the current digital era, given that adolescents are the primary target group. The use of technology for disseminating information and providing education is minimal, reflecting a shortage of human resources capable of adapting activities to modern needs. Furthermore, most cadres are no longer in the adolescent age group, which reduces the appeal of the program. Adolescents tend to feel more comfortable interacting with peers; therefore, the presence of peer-aged cadres could create a more open and supportive environment. Peer cadres can also offer perspectives that are more relevant and relatable, thereby increasing the effectiveness of the program in delivering health messages and motivating positive health behaviors.

Another factor contributing to low participation is the lack of public awareness about the Adolescent Posyandu, coupled with irregular scheduling of activities. Limited understanding of the benefits and timing of the program poses a significant barrier to attendance. More targeted and intensive educational efforts are needed to raise awareness of the program's existence and benefits. Facility limitations also remain a challenge, as most equipment is borrowed from integrated service posts for other groups, and essential tools for hemoglobin and blood sugar testing are lacking. As a result, some planned health services are not implemented; current activities are limited to blood pressure checks, height and weight measurements, mid–upper arm circumference measurements, and health counseling. Interviews with adolescents revealed that their primary motivation for attending was to check their health and interact with peers.

Considering these challenges, this study seeks to evaluate the implementation of the Adolescent Posyandu, identifying both inhibiting and supporting factors. The evaluation applies the Context–Input–Process–Product (CIPP) model to ensure a systematic and structured assessment of the program.

METHOD

This study employed qualitative research design with a descriptive approach. The aim was to conduct an in-depth analysis for evaluating the implementation of Adolescent Posyandu activities using the Context–Input–Process–Product (CIPP) evaluation model. Data was collected through observation and in-depth interviews with 13 informants, consisting of one program coordinator, eight Adolescent Posyandu cadres, two active adolescent participants, and two inactive adolescent participants. Data analysis began with the review of documents related to the Adolescent Posyandu. The document review served as a reference for analyzing interview data and guiding the interview process. For the interview data, transcripts were produced by replaying the recordings, listening attentively, and transcribing the spoken words verbatim. The transcripts were then carefully read by the researchers, followed by data reduction. Data reduction

involved creating abstractions, extracting and recording information relevant to the study context while omitting unnecessary words without altering the core meaning. The resulting abstractions were coded and grouped based on thematic similarity. Once coding was complete, the data were presented, and conclusions were drawn by identifying patterns and similarities in meaning.

RESULT

Context

1. Purpose

Based on the results of the study, the objectives of implementing the Adolescent *Posyandu* include early detection and monitoring of adolescent growth and development, providing health education, conducting health supervision, and preventing risk behaviors such as promiscuity. However, the activities carried out have not fully complied with the technical guidelines for the Adolescent *Posyandu*. Certain activities, such as health services, have not been implemented, which has led to suboptimal outcomes. As a result, the overall goals of the Adolescent *Posyandu* have not been achieved effectively.

2. Environment

Factors influencing the participation of adolescents in the *Posyandu* within the *Puskesmas* Wonokerto I area include peer influence and the role of *Posyandu* youth cadres. Adolescents often attend the *Posyandu* because their friends also participate or because they receive invitations from cadres. Both factors are crucial in supporting the achievement of the program's objectives. In addition to environmental factors, adolescents' knowledge serves as an internal factor affecting their level of participation. A lack of awareness about the existence of the Adolescent *Posyandu* results in some adolescents not attending its activities. This was confirmed through interviews conducted with participants who were inactive in the program.

3. Target

The target of the Adolescent *Posyandu* program is the entire adolescent population within the *Puskesmas* working area. Observations during implementation showed that participants were generally adolescents aged 10–19 years. However, in the Adolescent *Posyandu* of Sijambe and Bebel villages, children aged nine years old were also found to be participating.

Input

1. Human Resources

The number of Adolescent *Posyandu* officers in quantity is now sufficient because the number of participants is small. But not in accordance with the amount that should be on the technical instructions. In addition, judging from the human resources in this program for cadres, not all of them attended the training.

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2. Infrastructure

The infrastructure available for Adolescent *Posyandu* activities is still inadequate. The village provides venues and health promotion media, while the *Puskesmas* supplies equipment for examinations such as weighing scales, height measurement tools, mid–upper arm circumference tapes, and waist circumference tapes, which are distributed to the villages. However, these tools are shared with *Posyandu* services for toddlers and the elderly and are not specifically designated for the Adolescent *Posyandu*. For equipment such as sphygmomanometers, hemoglobin (Hb) testers, and blood sugar test kits, cadres or village midwives who own them occasionally lend them for use. The lack of hemoglobin strips and blood sugar test supplies has constrained the provision of routine health services during Adolescent *Posyandu* activities.

3. Funding

Funding for Adolescent *Posyandu* activities is sourced from both the village and the *Puskesmas*. Village funds are used for supplementary feeding and cadre transportation, but they do not cover the cost of purchasing essential health service equipment such as hemoglobin strips, resulting in irregular implementation of these services. The *Puskesmas* allocates funds for cadre incentives. However, in Pecakaran Village, activities are still hampered due to the village not routinely providing funds for the Adolescent *Posyandu*, which has led to inconsistent provision of supplementary feeding and disrupted activity implementation. No alternative funding sources have been pursued to address these shortages.

Process

1. Planning

Preparation for Adolescent *Posyandu* activities is typically conducted several days to one week before the scheduled date. This includes setting the activity schedule, preparing the necessary infrastructure, and disseminating information through village invitations, WhatsApp group announcements, and public address systems at local prayer halls (*musholla*) on the day of the event. Coordination for these activities is handled by village midwives and cadres during special meetings, where tasks are assigned. However, planning remains constrained by the busy schedules of both village midwives and cadres, resulting in the absence of a fixed monthly schedule.

2. Organizing

The organizational structure of the Adolescent *Posyandu* does not align with the technical guidelines. The number of cadres in each *Posyandu* should be five, but most have only two to three. There is also no formal core management team comprising a chairperson, vice-chairperson, secretary, treasurer, and members.

3. Implementation

In practice, Adolescent *Posyandu* activities generally consist of registration, weight measurement, height measurement, blood pressure checks, and health counseling provided by midwives. Health services such as hemoglobin testing, distribution of iron tablets, vitamin supplementation, and counseling by both cadres and *Puskesmas* officers are not routinely carried out due to limited resources and infrastructure. In Api-Api Village, health counseling occurs but is conducted only once every few months. Supplementary feeding (PMT) is available in most *Posyandu*, except in one village where funding constraints prevent regular provision. Some villages, such as Pesanggerahan and Bebel, include additional activities like group outings to the beach as a strategy to increase participation. In Sijambe Village, counseling is conducted alternately by cadres and midwives, and new educational innovations, such as games and prize distribution, have been introduced. These activities, tailored to participant age, cover topics beyond reproductive health, including mental health and current health issues, contributing to higher and more stable attendance compared to other villages.

4. Monitoring and supervision

Monitoring and supervision by Adolescent *Posyandu* officers are conducted at the end of each activity to assess implementation and provide input for the following month. Internal monitoring is carried out regularly in some villages (Sijambe, Bebel, Api-Api, and Wonokerto Kulon), while in others (Pesanggerahan, Pecakaran, and Wonokerto Wetan) it is absent. Monitoring by the *Puskesmas* involves monthly reporting from village midwives via the *Posyandu* Information System (SIP). However, there is no quarterly evaluation; the *Puskesmas* Wonokerto I conducts evaluations only once a year. Neither the village administration nor the *Puskesmas* provides direct supervision beyond these reporting procedures.

Product

1. Coverage of Adolescent *Posyandu* Participants

The program's coverage cannot be accurately calculated against its target population because no specific target percentage has been established. Participation can only be assessed by comparing the number of attendees to the total adolescent population in the *Puskesmas* working area. Observations and document reviews revealed that the latest report in 2023 recorded 113 participants in the Adolescent *Posyandu*. This low level of attendance is one of the indicators of the program's suboptimal goal achievement.

2. Activity Results

The Adolescent *Posyandu* has contributed to increasing adolescents' knowledge of health. However, participants often find the delivery of health materials boring and monotonous, as it is mainly presented through lectures, resembling classroom lessons. The irregular schedule of activities further affects participation rates. In terms of health outcomes, there has been no significant improvement requiring treatment from health facilities among participants. Pregnant adolescents under the age of 20 have sought

independent examinations at the *Puskesmas*. Overall, the impact of the Adolescent *Posyandu* is not yet strongly felt by the community, especially adolescents as the main target group, due to the less-than-optimal implementation of activities. This is further compounded by the fact that two new Adolescent *Posyandu* units only began operating in 2024.

DISCUSSION

Context

The primary objectives of the Adolescent *Posyandu* are to monitor adolescent health and provide health counseling. The target group for this program in the working area of Puskesmas Wonokerto I is the entire adolescent population aged 10–18 years. Factors influencing participation include peer influence and the role of *Posyandu* youth cadres, both of which play a crucial role in encouraging attendance and supporting program goals.

Input

The number of personnel in the Adolescent *Posyandu* is adequate relative to the small number of participants, but it does not meet the requirements stated in the technical guidelines. Furthermore, not all cadres have attended the necessary training, which limits their knowledge and ability to implement activities effectively. Infrastructure is also insufficient; available equipment includes height and weight measurement tools, mid–upper arm circumference tapes, abdominal circumference tapes, and sphygmomanometers, most of which are borrowed from *Posyandu* for toddlers and the elderly. The lack of specific infrastructure for the Adolescent *Posyandu* has hindered the provision of hemoglobin and blood sugar checks, making it difficult to conduct regular health services. Funding comes from both the village and the *Puskesmas*, with village allocations used for supplementary feeding and cadre transportation, and *Puskesmas* funds used for cadre incentives. However, in some villages, such as Pecakaran, irregular village funding disrupts both supplementary feeding and program implementation.

Process

Several weaknesses remain in the planning, organizing, and implementing stages of the Adolescent *Posyandu* in the working area of *Puskesmas* Wonokerto I. Planning is hampered by the busy schedules of officers, resulting in an inconsistent monthly activity schedule. Implementation is also suboptimal, with incomplete health services due to limited resources and infrastructure. Organizationally, the program does not follow the technical guidelines, lacking a formal core management structure with defined roles such as chairperson, secretary, and treasurer. While cadres assist each other and adjust their duties based on availability, this informal arrangement reduces efficiency. Monitoring and supervision by internal officers are conducted at the end of each activity, but *Puskesmas* evaluations occur only once per year, and there

is no additional supervision from either the village administration or the *Puskesmas*. To improve program effectiveness, the management process needs to be strengthened from planning through monitoring.

Product

The Adolescent *Posyandu* has been implemented in the working area of Puskesmas Wonokerto I, but its activities are not fully aligned with the technical guidelines. Of the five core activities, one is not conducted due to resource limitations. Low program coverage is also a concern; given the large adolescent population in Pekalongan Regency, the percentage of participants is far below the target. These gaps have reduced the program's potential to achieve its intended goals.

CONCLUSION

The limited resources available for the Adolescent Posyandu have resulted in suboptimal program implementation in the working area of Puskesmas Wonokerto I. Contributing factors include an insufficient number of cadres, inadequate infrastructure, and the lack of consistent monitoring and supervision from both the village administration and the Puskesmas. These constraints have led to low participant coverage and less-than-optimal activity outcomes. In addition, the fact that many cadres are no longer in the adolescent age group has reduced the appeal of the program to its target audience. The absence of training for all cadres has also limited their knowledge, particularly regarding the implementation of the five core Posyandu activities. To enhance program effectiveness, it is necessary to strengthen cadre development, improve facilities, ensure regular monitoring, and incorporate innovative, youth-friendly approaches to better engage adolescents and increase their participation.

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Evaluating the effectiveness of Red Ginger Aromatherapy Essential Oil (*Zingiber Officinale Var Rubrum*) in treating Emesis Gravidarum in Pregnant Women

Rahayu Eryanti Kusniyanto[1], Elizabet Catherine Jusuf[2], Christine Hetharia[3], Hasriani Saleng[4]

[1,3,4]*Midwife Professional Education, Megarezky University, Makassar, Indonesia*
[2]*Department of Obstetrics & Gynecology, Hasanuddin University, Makassar, Indonesia*

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CORRESPONDENCE

E-mail: rahayueryanti@gmail.com

A B S T R A C T

Emesis gravidarum is vomiting during pregnancy, mainly caused by increased Human Chorionic Gonadotropin (hCG) in the endocrine system. This paper evaluates the effectiveness of red ginger aromatherapy essential oil (*Zingiber Officinale var Rubrum*) in treating *emesis gravidarum* among pregnant Women in the first trimester. The research was quasi-experimental using a one-group Pretest-Posttest design. The sample was 30 respondents using purposive sampling. Pregnant women in the 1st trimester who experienced emesis gravidarum inhaled red ginger essential oil aromatherapy using a diffuser once a day for 7 days. The instrument used was the Pregnancy Unique Questionnaire of Emesis (PUQE) to determine the severity of nausea and vomiting in pregnant women. Data were analyzed using the dependent t-test with α=0.05. The results showed that before giving red ginger essential oil aromatherapy, 30 respondents (100%) had mild nausea and vomiting. After intervention, 28 (80%) respondents had no nausea and vomiting, and 2 (20%) had mild nausea and vomiting. In addition, the average PUQE score in respondents before giving red ginger essential oil aromatherapy was 9.13, while after intervention, the mean PUQE score was 5.80. The dependent t-test obtained p=0.000 ($p<\alpha$), indicating that red ginger essential oil aromatherapy significantly affected the severity of nausea and vomiting in pregnant women. In conclusion, red ginger essential oil aromatherapy can significantly reduce the severity of nausea and vomiting in pregnant women. Thus, it can be used as a non-pharmacological therapy to treat emesis gravidarum in pregnant women.

INTRODUCTION

Pregnancy is a conception process, which is also known as fertilization. Fertilization is the union of male sperm with female ovum (Pramesti, Surtikanti and Puspita, 2020). In the first trimester of pregnancy, nausea and vomiting often occur, which is usually called emesis gravidarum (Sriyani and Utami, 2021). Emesis gravidarum is vomiting during pregnancy, mainly caused by increased Human Chorionic Gonadotropin (hCG) in the endocrine system during pregnancy in the gestational period of 12 – 16 weeks. The increased hCG hormone production maintains the corpus luteum during the early stages of pregnancy and produces estrogen and progesterone. The first week of pregnancy is when hCG levels reach their highest levels. Emesis Gravidarum that cannot be treated will cause hyperemesis gravidarum. Hyperemesis gravidarum can result in an increased risk of low birth weight, premature birth, dysmaturity, and even perinatal death (Nithiyasri *et al.*, 2020).

Pregnancy with emesis gravidarum according to the World Health Organization (WHO) reaches 12.5% of all pregnancies in the world with varying incidence rates, starting from 0.3% in Sweden, 0.5% in California, 0.8% in Canada, 10.8% in China, 0.9% in Norway, 2.2% in Pakistan, and 1.9% in Turkey.

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Meanwhile, the incidence of emesis gravidarum in Indonesia in 2015, out of 2,203 pregnancies, was 543 pregnant women who experienced emesis gravidarum (Sriyani and Utami, 2021).

Treatment for Emesis gravidarum depends on the severity of the symptoms. Treatment can be carried out using pharmacological or non-pharmacological methods. Ginger is a traditional medicinal plant with a million benefits known for a long time. Rhizome has many benefits, including being used as a cooking spice, drink, and candy, and it is also used in traditional medicinal ingredients. The chemical ingredients in ginger that can treat nausea and vomiting include essential oils, which have a refreshing effect and produce an aroma that blocks the gag reflex. Ginger makes a spicy taste that warms the body and promotes sweat. The antiemetic effect is also caused by diterpentenoid components, namely gingerol, shaogaol, galanolactone. In addition, it can be used as ginger powder extract, ginger candy, or ginger essential extract for aromatherapy (Putri *et al.*, 2017).

Aromatherapy is a therapeutic modality or alternative treatment using pure aromatherapy plant extracts from volatile plant fluids and other aromatherapy compounds from plants. Aromatherapy provides a calming, refreshing effect and can help pregnant women overcome nausea. It can be used as a solution to treat nausea and vomiting in pregnant women, especially in the first trimester (Rahayu and Sugita, 2018).

Ginger (*Zingiber Officinale var Rubrum*) contains essential oils, vitamin A, and bitter resin. The essential oil content has a refreshing effect and blocks the effects of vomiting. It can also improve blood circulation, and the nerves work well, so that the head feels light, and nausea and vomiting can be suppressed. According to research Pramesti et al., ginger can be used as aromatherapy to relieve nausea and vomiting in chemotherapy patients. The results showed decreased vomiting levels after giving ginger aromatherapy to post-chemotherapy patients. Before intervention, 28 (87.5%) of respondents experienced moderate nausea, and after giving ginger aromatherapy, 28 (87.5%) experienced mild nausea and vomiting (Pramesti, Surtikanti and Puspita, 2020). This paper evaluates the effectiveness of red ginger aromatherapy essential oil (*Zingiber Officinale var Rubrum*) in treating Emesis Gravidarum among pregnant Women in the first trimester.

METHOD

The research was quasi-experimental using a one-group Pretest-Posttest design. It was conducted at the Abepura Jayapura Papua Regional Hospital from October 2022 to December 2022. The sample was 30 respondents using purposive sampling. Pregnant women in the 1st trimester who experienced emesis gravidarum inhaled red ginger essential oil aromatherapy using a diffuser once a day for 7 days. The instrument used was the Pregnancy Unique Questionnaire of Emesis (PUQE) to determine the severity of nausea and vomiting in pregnant women. Data were analyzed using the dependent t-test with α=0.05.

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RESULT

Table 1 shows that 25 respondents (83%) are 21-35. In addition, 23 (77%) have low levels of education (elementary school), 27 (90%) are non-working mothers, and 14 (47%) are primigravida.

Table 1. The Characteristics of Respondents

The Characteristics of Respondents	n	%
Age		
<20 or >35	5	17
20-35	25	83
Education Levels		
Low	23	77
High	7	23
Maternal occupation		
Working mother	3	10
Non-working mother	27	90
Parity		
Primigravida	14	47
Multigravida	12	40
Grande multigravida	4	13

Before giving red ginger essential oil aromatherapy, 30 respondents (100%) had mild nausea and vomiting. After intervention, 28 (80%) respondents had no nausea and vomiting, and 2 (20%) had mild nausea and vomiting (Table 2).

Table 2. Frequency Distribution of Symptoms of Nausea and Vomiting Before and After Giving Red Ginger Essential Oil Aromatherapy

Symptoms of Nausea and Vomiting	Pretest		Posttest	
	n	%	n	%
No nausea and vomiting	0	7	28	80
Mild nausea and vomiting	30	93	2	20

The average PUQE score in respondents before giving red ginger essential oil aromatherapy was 9.13, while after intervention, the mean PUQE score was 5.80. The dependent t-test obtained p=0.000 ($p<\alpha$), indicating that red ginger essential oil aromatherapy significantly affected the severity of nausea and vomiting in pregnant women (Table 3).

Table 3. Effect of Giving Red Ginger Essential Oil Aromatherapy on PUQE Scores

PUQE Score	n	Mean	SD	p
Pretest	30	9.13	1.521	0.000
Posttest	30	5.80	1.246	

DISCUSSION

Most pregnant women with emesis gravidarum in this paper were aged 20-35 years (Table 1). It is in line with research, which stated that the older a person is, the less often they experience nausea and vomiting. It is because individuals more than 35 years old have more stable emotions, experience in dealing with nausea and vomiting, so they are better prepared to face pregnancy. Apart from the psychological,

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physical can also influence the occurrence of nausea and vomiting. Pregnancy at an early age or before the age of 20 years potentially results in nausea and vomiting due to immature reproductive organs.

Initial therapy for emesis should be conservative, accompanied by dietary changes, emotional support, and alternative treatments such as herbs. Traditional concoctions can be used by drinking a cup of warm ginger. In India, ginger is a drink to treat nausea in pregnant women. Ginger can be consumed in various forms, such as drinks, candy, or sweets (Handayani and Rahmawati, 2017).

This paper showed that red ginger essential oil aromatherapy decreased the severity of nausea and vomiting in pregnant women (Table 3). This study's results align with research by Rika Handayani (2022) that boiled ginger water effectively relieves nausea and vomiting in pregnancy (Asmirah *et al.*, 2022). Another study also demonstrated that giving red ginger extract water could reduce the frequency of emesis gravidarum in pregnant women in the first trimester at the Kibin Public Health Center (Asmirah *et al.*, 2022).

In addition, an investigation conducted by Nugrahani (2015) regarding the effectiveness of giving ginger tea with grapefruit juice on the frequency of nausea and vomiting in pregnant women in the first trimester in the working area of the Adan-Adan Health Center, Kediri Regency, found a more significant decrease in the frequency of nausea and vomiting after giving ginger tea compared to grapefruit juice. The average frequency of nausea and vomiting of respondents after giving ginger tea was 1.62. Meanwhile, the average frequency of nausea and vomiting in respondents after giving grapefruit juice was 2.00 (Nugrahani, 2015). Thus, ginger is an alternative non-pharmacological therapy for daily use to reduce symptoms of nausea and vomiting. In addition, it is also easy to obtain (Oktaviani, Indrayani and Dinengsih, 2021).

CONCLUSION

Red ginger essential oil aromatherapy can significantly reduce the severity of nausea and vomiting in pregnant women. Thus, it can be used as a non-pharmacological therapy to treat emesis gravidarum in pregnant women.

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Family Support in Accompanying Post-Stroke Patients Undergoing Physiotherapy: Assessed from the Onset of the Stroke

Veronika Debi Purnomo[1], Mei Rianita Elfrida Sinaga[2]

[1,2] *Sekolah Tinggi Ilmu Kesehatan Bethesda Yakkum, Yogyakarta, Indonesia*

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CORRESPONDENCE

E-mail: mei@stikesbethesda.ac.id

A B S T R A C T

Stroke is a disease with a prevalence of 10.9% in 2018, which increased by 3,9% over the last five years, leading to complications such as weakness of physical limbs. Family support influences post-stroke patients' recovery through emotional, appreciation, instrumental, and information support. This study describes family support in accompanying post-stroke patients undergoing physiotherapy after 1-6 months of the stroke attack. The results showed that most respondents were aged 56-65 years (43.1%), male (52.9%), and retired/not working (31.4%). In addition, they had a senior high school education (39.2%), and the type of stroke was ischemic stroke or non-hemorrhagic stroke (62.8%). Family support in accompanying post-stroke patients undergoing physiotherapy after 1-6 months of the attack was mainly in the good category, namely 48 respondents (94.1%). The most significant type of family support was emotional support, as shown by the choice "always" in item 2, with 50 respondents. In conclusion, family support in accompanying post-stroke patients undergoing physiotherapy after 1-6 months of the stroke attack is good, especially in emotional support. Thus, families should maintain and increase family support so that post-stroke patients have the motivation to undergo routine checkups and physiotherapy.

INTRODUCTION

Stroke is a medical emergency. The sooner stroke treatment is implemented, the better its outcomes will be (Pinzon, 2016). According to the WHO, stroke is a neurological disease that causes very rapid clinical symptoms in the form of focal and global neurological deficits. It lasts more than 24 hours and can be fatal. One of the four most crucial non-communicable diseases is cardiovascular disease, namely, coronary heart disease and stroke.

According to 2018 World Stroke Organization data, 13.7 million new strokes occurred, and around 5.5 million people died from stroke every year. Its prevalence varies by region, with 7 million (3%) in the United States, while in China, it was around 1.8% in rural areas and 9.4% in urban areas. Globally, China, like Africa and North America, had a relatively high mortality from stroke, namely 19.9% (Kemenkes RI Infodatin, 2019). In Indonesia, stroke is the third leading cause of death after heart disease and cancer. Based on the 2018 Indonesian Basic Health Research, the prevalence of stroke increased from 7% to 10.9% compared to 2013. Nationally, the prevalence of stroke in Indonesia in 2018, based on a doctor's diagnosis at age ≥15 years, was 10.9% or 2,120,362 people. Its prevalence increased by 3.9% in the last five years (Ferawati *et al.*, 2020). Based on age, individuals with stroke were mainly aged 55-64 years (33%), while the least were aged 15-24 years. Men and women had almost the same proportion of stroke events. In addition, 29.5% of individuals with stroke had education levels of elementary school. Its

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prevalence in urban areas was also greater (63.9%) compared to those living in rural areas (36.1%) (Kementerian Kesehatan RI, 2018). Furthermore, three provinces in Indonesia with the highest prevalence were East Kalimantan (14.7%), Yogyakarta (14.6%), and North Sulawesi (14.2%) (Kemenkes RI Infodatin, 2019). Its prevalence in Yogyakarta was high because of the many older people (Kementerian Kesehatan RI, 2018).

Stroke can cause various complications, including physical weakness, which generally occurs in the arms and legs. This weakness disrupts daily activities, so physiotherapy is crucial to train stroke survivors' muscles and body movements (Sudarsini, 2017). About 30% of individuals with stroke die within three months, and less than 20% experience severe disabilities. However, over 50% of them survive and can be independent in self-care. Factors affecting recovery depend on the severity of the brain injury (such as the type of stroke and part of the body affected), complications, and the patient's self-care abilities before the stroke. The patient's attitude, support from family/nurses, and appropriate rehabilitation can also significantly impact stroke recovery (Ferawati *et al.*, 2020). In one hospital in Yogyakarta, Post-stroke patients undergoing physiotherapy had the highest number of visits. The number was among the top three highest visits from 2018 to 2022. The post-stroke patients undergoing physiotherapy experienced complications such as motor disorders, and around 65% to 85% experienced sensory disorders (Bashori, 2023).

The recovery of stroke survivors undergoing physiotherapy is influenced by family support because it is a need for patients. The support is needed in the form of comfort, attention, and appreciation from other people (Dewi, 2023). Stroke survivors undergoing physiotherapy need family support to help them, particularly with activities in their daily lives. The preliminary study of six patients at one of the large hospitals in Yogyakarta interviewed six patients who regularly came for physiotherapy for their physical recovery and a medical rehabilitation doctor who routinely checked these six patients. Three of the six patients said their family accompanied them during physiotherapy. In contrast, two said that they came alone during physiotherapy because they felt able to go alone, and one said they came alone because their family had moved away since the stroke attack. This study describes family support in accompanying post-stroke patients undergoing physiotherapy after 1-6 months of the stroke attack. The results of this research can become a reference for future research to develop research relating to family support in accompanying patients.

METHOD

This research design was descriptive quantitative with a cross-sectional approach. The population was 59 post-stroke patients undergoing physiotherapy after 1-6 months of the stroke attack. The researcher used. purposive sampling, with a total sample of 51 respondents who met the inclusion criteria. Data collection

was carried out for 1 month using a closed questionnaire. The family support questionnaire was adopted from Yunita's research questionnaire (Yunita, 2022). The validity test obtained r = 0.331–0.684, and a reliability test with a Cronbach's Alpha value of 0.628. Thus, the family support questionnaire was valid and reliable. It consisted of 12 statements with four components of family support: emotional support in items 1 and 2, appreciation support in items 3 and 4, instrumental support in items 5 to 8, and information support in items 9 to 12. It used a Likert scale with four answer choices: always, often, sometimes, and never. The scoring was: always (4), often (3), sometimes (2), and never (1). The categorization of family support was: good with a score range of 37-48, moderate with 25-36, and poor with a range of 12-24. The test used a univariate test with frequency distribution. This research obtained ethical approval from the Health Research Ethics Committee, Bethesda Hospital, Yogyakarta, Indonesia, with certificate number 10/KEPK-RSB/III/24.

RESULT

Table 1. The Characteristics of Post-Stroke Patients Undergoing Physiotherapy after 1-6 months of the stroke attack

Characteristics of Respondents	Frequency (n)	Percentage (%)
Age		
17 – 25 years	0	0
26 – 35 years	1	2
36 – 45 years	3	5.9
46 – 55 years	14	27.4
56 – 65 years	22	43.1
> 65 years	11	21.6
Sex		
Female	24	47.1
Male	27	52.9
Education		
No School	0	0
Elementary School	5	9.8
Junior High School	3	5.9
Senior High School	20	39.2
Diploma	7	13.7
Bachelor	12	23.5
Postgraduate	4	7.9
Occupation		
Civil servant/Soldier/Police	7	13.7
Self-employed/Entrepreneur/Trader	5	9.8
Private-Employee/Laborer/Farmer/Fisherman	13	25.5
Retirement/Not working	16	31.4
Other	10	19.6
Type of stroke		
Hemorrhagic	5	9.8
Non-Hemorrhagic	46	90.2
Total	51	100

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Table 1 demonstrates that most respondents are aged 56-65 years (43.1%), male (52.9%), and retired/not working (31.4%). In addition, they have a senior high school education (39.2%), and the type of stroke is ischemic stroke or non-hemorrhagic stroke (62.8%).

Table 2. The Type of Family Support in Accompanying Post-Stroke Patients Undergoing Physiotherapy after 1-6 months of the stroke attack

The Type of Family Support	Answer Choices				Total
	Always	Often	Sometimes	Never	
Emotional Support					
Item 1	40	4	5	2	51
Item 2	50	0	1	0	51
Appreciation Support					
Item 3	35	10	6	0	51
Item 4	43	4	4	0	51
Instrumental Support					
Item 5	43	4	2	2	51
Item 6	45	4	1	1	51
Item 7	46	2	1	2	51
Item 8	44	5	1	1	51
Information Support					
Item 9	42	5	3	1	51
Item 10	47	2	1	1	51
Item 11	41	7	2	1	51
Item 12	37	8	2	4	51
Total	513	55	29	15	612

Table 2 indicates that the most significant type of family support in accompanying stroke survivors after 1-6 months of the stroke attack who are undergoing physiotherapy is emotional support, as shown by the answer choice "always" in item 2, with 50 respondents.

Table 3. Family Support in Accompanying Post-Stroke Patients Undergoing Physiotherapy after 1-6 months of the attack

Family Support	Frequency (n)	Percentage (%)
Good	48	94.1
Moderate	2	3.9
Poor	1	2
Total	51	100

Table 3 shows that family support in accompanying post-stroke patients undergoing physiotherapy after 1-6 months of the stroke attack is mainly in the good category, namely 48 respondents (94.1%).

DISCUSSION

The Characteristics of Respondents

In this investigation, almost half of post-stroke patients undergoing physiotherapy after 1-6 months of stroke attack were in the 56-65 year age group (Table 1). Older age will increase the stroke risk factors (Ferawati *et al.*, 2020). It is also supported by the result of Indonesian Basic Health Research in 2018,

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which found that the most individuals with stroke were aged 55-64 years (33%), while the least were aged 15-24 years.

In addition, half of the male respondents experienced a stroke compared to females, namely 27 respondents (52.9%). Men are more susceptible to stroke than women because women tend to have healthier heart conditions and blood vessels, especially those of childbearing age (Ferawati *et al.*, 2020). The authors also noticed that during visits to the medical rehabilitation clinic, more men visited to undergo physiotherapy.

Furthermore, 39.2% of the respondents' education was senior high school education (Table 1). Individuals with a low level of education potentially had more strokes than individuals with a higher level of education. It is also following the results of the 2018 Indonesian Basic Health Research, which stated that the prevalence of stroke tended to be higher in people with low education. Low education may also indicate that a person's knowledge of maintaining a lifestyle and preventing stroke is low.

Moreover, most of the respondents' occupations in this paper were retired or not working (31.4%). Someone with low education had low knowledge about stroke prevention and tended to have a low income, making it challenging to prevent and treat stroke (Kementerian Kesehatan RI, 2018). Thus, low income is an obstacle to someone getting stroke treatment.

The type of stroke that was most experienced in this paper was a non-hemorrhagic stroke, with as many as 46 respondents (90.2%). Initial study in the hospital's Medical Records Department revealed that the most common type of stroke was a non-hemorrhagic stroke. Patients with hemorrhagic stroke potentially can increase mortality compared to non-hemorrhagic stroke, so that the life expectancy is greater in patients with ischemic stroke.

The Type of Family Support

Optimal family support manifests in attitudes, actions, and acceptance of family members in the form of informational support, appreciation or assessment support, instrumental support, and emotional support. Therefore, family support is an interpersonal relationship that involves the attitudes, actions, and acceptance of family members so that someone can feel cared for (Friedman, 2014).

Regarding emotional support, 50 respondents in this research chose the answer option "always" in item 2. They felt their family still loves and pays attention to them during illness. Emotional support is where the family acts as a safe and peaceful place to rest and for recovery, and helps mastery of emotions (Safira Nahar Fitriana and Padoli, 2021). This research aligns with a study that revealed that emotional support was the most dominant family support component (Sudrajad, 2021). Similar results were also found in Mamonto's (2019) research, showing that the most predominant type of family support was emotional support, namely 20 respondents (90%) (Mamonto, 2019). Emotional support is crucial for patients, as the

family should provide more attention to the patient during the illness. The family is a safe and comfortable place for patients who can support recovery and help patients control their emotions.

In addition, 43 respondents chose the answer option "always" in item 4. They believed that their family understood the illness they were experiencing. Appreciation support is appreciation given by family members according to the conditions they are experiencing, where this support is in the form of a positive response from the people around them (Safira Nahar Fitriana and Padoli, 2021). Mamonto's (2019) research also showed that 16 respondents (72.7%) received appreciation support. The appreciation support potentially increases the patient's motivation and ability to undergo physiotherapy. With motivation, stroke survivors will be more enthusiastic about and will have a desire to recover.

Regarding instrumental support, 46 respondents in this paper chose the answer option "always" in item 7. They said that the family helped with all financial costs. Instrumental support is assistance given directly, for example, by giving or lending money and providing direct assistance to carry out specific tasks (Safira Nahar Fitriana and Padoli, 2021). A previous Mamonto (2019) study showed that 16 respondents (72.7%) received instrumental support. Thus, the family in this investigation could provide time and facilities for the patient's stroke treatment. The family was an intermediary between the patient and health services by dropping off and picking up for checkups and then doing physiotherapy. The family was also a financial source in stroke treatment because the stroke survivors could not work.

Furthermore, 47 respondents chose the answer option "always" in item 10. They mentioned that the family reminded them to check up, take medicine, exercise, and eat. Information support assists in providing information and ideas through the communication process. It provides advice, direction, and feedback (Safira Nahar Fitriana and Padoli, 2021). The research results of Mamonto (2019) showed that 13 respondents (59.1%) received information support. The informative support in this research mainly was that the family always informed stroke survivors about the results of examinations and treatment from doctors. The family explained things that stroke survivors did not understand related to their illness and physiotherapy. Thus, the information support can increase patients' knowledge about their health and the recovery process.

Family Support

Family support for post-stroke patients undergoing physiotherapy after 1-6 months of the stroke attack was mainly good, namely 94.1% (Table 3). Family support plays an essential role in a patient's recovery. It is a form of providing support to family members who are experiencing problems. Family provides maintenance and emotional support to achieve the welfare of family members and meet psychosocial needs (Potter and Perry, 2015). This study's result aligns with research by Fitriana et al. (2021), showing that individuals with hypertension had good family support. An investigation also revealed that the most stroke survivors undergoing physiotherapy received good family support, namely 40 respondents (80%)

(Purba, 2018). In addition, similar results from Unak's research (2021) showed good family support in post-stroke patients in the Outpatient Installation, namely 41 respondents (56.2%) (Unak, 2021). Good family support by families to stroke survivors indicates paying attention to feeding them, accompanying them to see a doctor and undergo physiotherapy, and reminding them to check up and take medication. Family support can be an influential factor in determining an individual's health beliefs and values and finding good treatment. Family support is crucial for post-stroke patients undergoing physiotherapy because it will motivate the patient with the family's attention.

CONCLUSION

Family support in accompanying post-stroke patients undergoing physiotherapy after 1-6 months of the stroke attack is good, especially in emotional support. Thus, families should maintain and increase family support so that post-stroke patients have the motivation to undergo routine checkups and physiotherapy.

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The Correlation between Sleep Quality and Blood Glucose Levels in Patients with Type 2 Diabetes at Dr. Chasan Boesoirie Regional Public Hospital, Ternate, North Maluku

Mariam Umar[1], Andi Surya Kurniawan[2], Achmad Dafir Firdaus[3]

[1,2,3]*Bachelor of Nursing Study Program Maharani College of Health Sciences*

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CORRESPONDENCE

E-mail: mariamumar.m2s@gmail.com

A B S T R A C T

Diabetes is characterized by hyperglycemia due to insulin deficiency or resistance, causing chronic complications in various organs. Poor sleep quality can worsen insulin resistance and increase the risk of complications of diabetes. This study analyzes the correlation between sleep quality and blood glucose levels in patients with type 2 diabetes at Dr. Chasan Boesoirie Regional Public Hospital, North Maluku. This study used a cross-sectional design. It was conducted from June 2024 to July 2024 at Dr. Chasan Boesoirie Regional Public Hospital. The population was 800 patients with type 2 diabetes at Dr. Chasan Boesoirie Ternate Hospital. There were 89 respondents by consecutive sampling. The instruments used the Pittsburgh Sleep Quality Index (PSQI) for sleep quality and GlucoDr for blood glucose levels. Data analysis used the Chi-Square test with a significance level of 0.05. The results showed that most respondents had moderate sleep quality, with 54 respondents (60.7%). In addition, most respondents have blood glucose levels in the poor category, with blood sugar levels >160 mg/dL, as many as 59 respondents (66.3%). The Chi-Square statistical test analysis showed a p=0.011 (p<0.05). Thus, there was a correlation between sleep quality and blood glucose levels in type 2 diabetes patients. In conclusion, sleep quality correlates with blood glucose levels in patients with type 2 diabetes at Dr. Chasan Boesoirie Regional Public Hospital, North Maluku. Further research should explore other factors affecting blood glucose control in people with type 2 diabetes.

INTRODUCTION

Diabetes is a metabolic disease characterized by increased blood glucose levels due to impaired insulin secretion or resistance. It can be classified into several types of diseases: type 1 diabetes, type 2 diabetes, gestational diabetes, and other types of diabetes. Type 2 diabetes is the most common type, around 90-95% (American Diabetes Association, 2023). Type 2 diabetes is increasingly becoming a global health problem with increasing prevalence. In 2021, the International Diabetes Federation (IDF) reported that 537 million adults suffered from diabetes, projected to reach 783 million by 2045. Indonesia is ranked fifth with the highest number of sufferers in the world after China, India, Pakistan, and the United States. In Indonesia, individuals with diabetes were diagnosed at the age of 20-79 years.

There was an increased prevalence of diabetes in Indonesia. Indonesian Basic Health Research data in 2018 showed an increase from 6.9% in 2013 to 8.5% in 2018 for residents aged ≥15 years diagnosed through blood tests. Jakarta Province recorded the highest prevalence at 3.4%, while East Nusa Tenggara recorded the lowest at 0.9%. In North Maluku Province, the prevalence of diabetes increased from 1.5% in 2013 to 1.8% in 2018, with the number of individuals with diabetes reaching 9,907 cases, and the prevalence based on all ages increased from 1.0% in 2013 to 1.2% in 2018. In Ternate City,

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there were 2,975 cases of diabetes in 2021, with 54 deaths, 1,154 new patient cases, and 4,683 older people in 2019 (Kemenkes RI, 2019, 2020; IDF, 2021; Dinas Kesehatan Kota Ternate, 2022; Suratman, Armijn and Nur, 2023).

The number of individuals with diabetes continues to grow so rapidly that there should be much research aiming to reduce its number and minimize the impact of diabetes complications, which are closely related to blood sugar levels that are too high and can lead to death. Handling steps to reduce complications of type 2 diabetes can be done in various ways, one of which is by controlling the four main pillars in the form of education, medical nutrition therapy, physical exercise (physical activity, sports, and rest), and pharmacological interventions (PERKENI, 2021).

Lack of physical activity, unhealthy diet, and poor sleep quality are some risk factors that can affect blood glucose levels in people with type 2 diabetes (Nasution, Andilala and Siregar, 2021). Inadequate sleep can increase blood glucose through impaired regulation of insulin hormones and glucose metabolism. It can also worsen health conditions, increase the risk of cardiovascular complications, nerve disorders, and decreased quality of life in people with diabetes (Mesarwi *et al.*, 2021).

A previous study by Sumah (2019) on the relationship between sleep quality and blood sugar levels in patients with type 2 diabetes at Dr. M. Haulussy Ambon Regional Hospital obtained a p=0.000 (α<0.05), indicating a significant relationship between sleep quality and blood sugar levels in type 2 diabetes patients. It provides insight into the importance of sleep quality in managing diabetes. Good sleep quality in type 2 diabetes patients enhances nursing care, enabling nurses to provide education focused on rest and sleep needs.

METHOD

This study used a cross-sectional design. It was conducted from June 2024 to July 2024 at Dr. Chasan Boesoirie Regional Public Hospital. The population was 800 patients with type 2 diabetes at Dr. Chasan Boesoirie Ternate Hospital. There were 89 respondents by consecutive sampling. The instruments used the Pittsburgh Sleep Quality Index (PSQI) for sleep quality and GlucoDr for blood glucose levels. Data analysis used the Chi-Square test with a significance level of 0.05. This study obtained ethical approval from the Poltekkes Kemenkes Ternate with the certificate number UM.02.03/6/477/2024 on May 28, 2024.

RESULT

Dr. Chasan Boesoirie Regional Public Hospital, located on Jl. Cempaka, Tanah Tinggi Subdistrict, Ternate City, is a type B hospital owned by the North Maluku Provincial Government. In addition to being a

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referral hospital for the North Maluku region, this hospital also functions as a teaching hospital for medical students at Khairun University, Ternate Ministry of Health Polytechnic of Health, and North Maluku Muhammadiyah University. Outpatient services include 22 polyclinics, such as internal medicine, general surgery, pediatrics, and heart. In addition, inpatient services comprise 16 wards, including VIP rooms and Pavilions.

Table 1. Characteristics of Respondents Based on Age, Diabetes Duration, Sex, Education, and Occupation in Diabetes Patients at Dr. Chasan Boesoirie Regional Public Hospital, Ternate, North Maluku

Characteristics of Respondents	Frequency (n)	Percentage (%)
Age (Years)		
30-60	71	79.8
>60	18	20.2
Diabetes Duration		
3 Month - 1 Year	19	21.3
>1 Year	70	78.7
Sex		
Male	38	42.7
Female	51	57.3
Education		
Elementary school	9	10.1
Junior high school	15	16.9
Senior High School	40	44.9
University	25	28.1
Occupation		
Not Working	21	23.6
Farmers	8	9
Laborers	3	3.4
Self-Employed	17	19.1
Private Employees	7	7.9
Civil servants	23	25.8
Indonesian National Armed Forces	1	1.1
Retirees	9	10.1

Of the 89 respondents, almost all were 30-60 years old, namely 71 respondents (79.8%), where the age range used was based on the age of the inclusion criteria that had been set. In addition, almost all respondents had diabetes for more than 1 year, namely 70 respondents (78.7%). Most respondents were women, namely 51 respondents (57.3%). Almost half of the respondents had a high school education level, namely 40 respondents (44.9%). Furthermore, a few respondents had jobs as civil servants, namely 23 respondents (25.8%) (Table 1).

Table 2. Frequency Distribution and Percentage of Sleep Quality in Patients with Type 2 Diabetes at Dr. Chasan Boesoirie Regional Public Hospital, Ternate, North Maluku

Sleep Quality	Frequency (n)	Percentage (%)
Good	8	9
Moderate	54	60.7
Poor	27	30.3
Total	89	100

Table 2 shows that most respondents have moderate sleep quality, with 54 respondents (60.7%).

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Table 3. Frequency Distribution and Percentage of Blood Glucose Levels in Patients with Type 2 Diabetes at Dr. Chasan Boesoirie Regional Public Hospital, Ternate, North Maluku

Blood Glucose Levels	Frequency (n)	Percentage (%)
Good	0	0
Moderate	30	33.7
Poor	59	66.3
Total	89	100

In addition, Table 3 demonstrates that most respondents have blood glucose levels in the poor category, as many as 59 respondents (66.3%).

Table 4. Results of Analysis of the Correlation between Sleep Quality and Blood Glucose Levels in Patients with Type 2 Diabetes at Dr. Chasan Boesoirie Regional Public Hospital, Ternate, North Maluku

Variable	*p*
Sleep Quality Blood Glucose Level	0.011

The Chi-Square statistical test analysis showed a p=0.011 (p<0.05). Thus, there was a correlation between sleep quality and blood glucose levels in type 2 diabetes patients at Dr. Chasan Boesoirie Regional Public Hospital, Ternate, North Maluku (Table 4).

DISCUSSION

Sleep Quality

Most patients with type 2 diabetes at Dr. Chasan Boesoirie Ternate Regional Public Hospital, North Maluku, had moderate sleep quality (60.7), with some experiencing poor sleep quality (30.3%) and a few having good sleep quality (9.0%) (Table 2). The PSQI questionnaire score showed that respondents generally had difficulty sleeping, felt hot at night, often woke up, and did not use sleeping pills. Poor sleep quality negatively impacts diabetes management because sleep disorders inhibit glucose metabolism, worsening the disease.

This study's results align with research conducted by Tantero et. al (2016), which showed that individuals with type 2 diabetes had moderate sleep quality. They often woke up at night and were sleepy during the day. However, this study differs from the study by Najatulla, Hendra and Maulana (2015), which found that 72.2% people with type 2 diabetes in a wound care specialist clinic with poor sleep quality, who did not feel refreshed after waking up, tended to have abnormal blood sugar levels.

Poor sleep quality in patients with type 2 diabetes can seriously affect their disease management. Quality sleep is crucial for maintaining metabolic balance, including regulating blood glucose levels. Lack of sleep or poor sleep quality can disrupt this mechanism, potentially worsening the disease.

Blood Glucose Levels

Most patients with type 2 diabetes at Dr. Chasan Boesoirie Ternate Regional Public Hospital had a poor category of blood glucose levels (66.3%), with blood sugar levels >160 mg/dL, indicating uncontrolled

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hyperglycemia (Table 3). This condition increases the risk of diabetes complications such as blood vessel damage, neuropathy, and nephropathy. High blood glucose levels trigger symptoms such as polyuria, polydipsia, and polyphagia, which interfere with daily activities. Thus, it is crucial to find more effective interventions in monitoring and controlling blood glucose levels in people with diabetes.

This study aligns with the research conducted by Romadoni and Septiawan (2016), which showed that most respondents (71.7%) had high blood glucose levels, while only 4.3% had low blood glucose levels. In people with diabetes, the body's ability to respond to insulin can decrease, or the pancreas stops producing insulin, which causes hyperglycemia. If blood glucose levels are too high, the kidneys cannot reabsorb all the filtered glucose, so that glucose appears in the urine.

The high prevalence of patients with type 2 diabetes who have high blood glucose levels indicates a serious problem in managing the disease. High blood glucose levels are an indicator of uncontrolled hyperglycemia, which can worsen diabetes complications such as blood vessel damage, neuropathy, and nephropathy. This study emphasizes the importance of more effective interventions in diabetes management, especially in monitoring and controlling blood glucose levels. High blood glucose levels can trigger symptoms such as polyuria, polydipsia, and polyphagia, which interfere with daily activities. In contrast, stable blood glucose levels are essential as an energy source for body cells.

The correlation between Sleep Quality and Blood Glucose Levels in Patients with Type 2 Diabetes

This paper showed a significant correlation between sleep quality and blood glucose levels at Dr. Chasan Boesoirie Ternate Regional Public Hospital, North Maluku, with a $p = 0.011$. This study revealed that most respondents had high blood sugar levels and moderate sleep quality. Many respondents slept less than 7 hours daily, mostly civil servants and women who played dual roles as working mothers. Inadequate sleep patterns, frequent waking up at night, and lack of sleep can disrupt sleep quality and potentially worsen blood glucose conditions.

This study is in line with the research of Sukamto *et al.* (2018) involving 4,241 respondents, showing a relationship between sleep duration and glycemic control. Lack of sleep potentially reduces insulin sensitivity and interferes with blood glucose tolerance. During NREM sleep, the body experiences a decrease in body temperature, a reduction in urine secretion, and a decrease in heart and respiratory rates. However, in people with diabetes mellitus, blood glucose levels increase while glucose in cells decreases. The kidneys excrete glucose, causing polyuria and polydipsia, often interfering with nighttime sleep. Irregular sleep patterns can affect insulin hormone levels and increase stress hormones, ultimately interfering with insulin function. Therefore, maintaining stable blood sugar levels is very important for people with diabetes to maintain good sleep quality.

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Good sleep quality is crucial because it affects the production of catecholamines in the sympathetic nervous system. During sleep, sympathetic nervous system activity increases, producing epinephrine, norepinephrine, and melatonin. Sleep disorders, such as sleep apnea, can obstruct airflow in the respiratory tract, trigger hypoxia, and reduce normal sleep duration. In this study, poor sleep quality in patients with type 2 diabetes was associated with frequent urination at night, hot flashes, and overeating before bedtime. These factors could disrupt sleep patterns and increase blood sugar levels due to uncontrolled eating habits and high urination frequency at night.

This study, although well-conducted, had several limitations. It could not control other factors affecting sleep quality and blood glucose levels. In addition, there was a potential for information bias due to respondents' simple responses and the subjective nature of their responses when answering the questionnaire.

CONCLUSION

Sleep quality correlates with blood glucose levels in patients with type 2 diabetes at Dr. Chasan Boesoirie Regional Public Hospital, North Maluku. To improve the quality of care, nurses should enhance their knowledge and skills through special training on sleep quality management for patients with diabetes. Patients with diabetes must maintain good sleep patterns and have regular health check-ups. Hospitals could pay more attention to evaluating the sleep quality of patients with type 2 diabetes through sleep disorder examinations and education related to blood glucose level fluctuations. Further research should explore other factors affecting blood glucose control in people with type 2 diabetes to obtain more comprehensive research results.

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The Correlation between Stress and Mental-Emotional Disorders in Older Adults at the Geriatric Polyclinic of Udayana Level II Hospital, Denpasar

Ni Luh Putu Suardini Yudhawati[1], Silvia Intan Wardani[2], Desak Made Serinadi[3], Triyana Puspa Dewi[4], Neil Madulara Martin[5]

[1,2,3,4] *Stikes Kesdam IX/Udayana, Denpasar, Bali*
[5] *Iligan Institute of Technology, Philipine*

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CORRESPONDENCE

E-mail: yudhawatisebastian@gmail.com

A B S T R A C T

Mental-emotional disorder in older adults may arise as a result of stress that is not adequately managed. This study analyzes the correlation between stress and mental-emotional disorders in older people at the Geriatric Polyclinic of Udayana Level II Hospital, Denpasar. It used a quantitative method with a cross-sectional approach. The population consisted of 337 older adult patients receiving treatment at the Geriatric Polyclinic of Udayana Level II Hospital, with a sample size of 183 individuals. The sampling technique was purposive sampling. The Perceived Stress Scale (PSS-10) was an instrument to measure stress, and the Self Rating Questionnaire (SRQ-20) for mental-emotional disorders. The univariate analysis described the characteristics of the respondents, and the bivariate analysis evaluated the correlation between both variables using Spearman's rank correlation. Almost half of the respondents were 65-74 years old, 78 respondents (42.6%). Half of them were female, 99 respondents (54%). In addition, 62 or 33.88% of respondents graduated from a Senior High School. Most respondents experienced a moderate stress level of 134 respondents (88.5%) and mental-emotional disorders of 158 respondents (86.3%). Most respondents with moderate stress levels experienced mental-emotional disorder (66.12%). The Spearman's Rank Correlation obtained p=0.036 (p<0.05), indicating a significant correlation between stress levels and mental-emotional disorder in older people. Stress levels correlate with mental and emotional disorders in older people at the Geriatric Polyclinic of Udayana Level II Hospital, Denpasar. Efforts to recognize stress early, especially in older adults, are essential.

INTRODUCTION

Government Regulation of the Republic of Indonesia Number 43 of 2004 defines older people as individuals who have reached 60 years or older (Kemensos RI, 2012; Kemenkes RI, 2017). The changes experienced by older people include physical, cognitive, and psychosocial. Physical or biological changes can be observed at the cellular level in all body organs. The body system functionally might decrease activity during this phase (Eliyana *et al.*, 2023). So, there is a reduction of physical strength, stamina, and appearance (Yoost and Crawford, 2019). Depression in older people may occur because of those various changes. However, it is difficult to monitor due to symptoms different from those of someone younger (Listyorini *et al.*, 2024).

Indonesia has been facing an aging population since 2021 because 1 in 10 citizens in Indonesia is older. Their population was large in Yogyakarta Province (16.69%), followed by East Java and Central Java Province. The National Social Economic Survey 2023 revealed that every 17 older people lived dependently to 100 productive age population. Statistics Indonesia stated that the population reached

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11.75% of the total population, with males (47.72%) less than females (52.82%) (Badan Pusat Statistik, 2023). The preliminary study at the Geriatric Polyclinic of Udayana Level II Hospital in March 2024 obtained data on the number of older adults in the Geriatric Polyclinic, namely 337 people.

The changes with age may trigger mental and emotional disorders that possibly change the behavior of older people, one of them is in the form of stress. In addition, the mental disorder that started to appear is feelings of worthlessness, loneliness, or loss (Aji, 2023). The unmanaged stress among older people can potentially lead to depression due to various interactions of biological, psychological, and social factors. Depression may appear and is not easy to detect because most of the complaints in older adults only focus on physical discomfort (Wisnusakti and Sriati, 2021). Manungkalit and Sari (2020) found in their research that mental disorder in the form of depression was significantly affected by stress. Compared to anxiety, stress has a more substantial impact on those incidents in older adults, especially in nursing homes. Yuziani and Maulina (2018) also performed a similar study in Lhokseumawe, which reinforced that stress levels and the level of depression had a strong correlation. The study found that on average, the elderly experience mild stress with a moderate level of depression.

Generally, the research on stress in older people has not extensively discussed its relation to mental disorders. Mental-emotional disorders encompass depression, anxiety, somatic, cognitive, and energy decline. This study analyzes the correlation between stress and mental-emotional disorders in older people at the Geriatric Polyclinic of Udayana Level II Hospital, Denpasar. The result of this study can be a foundation for developing knowledge regarding stress and mental-emotional disorders in older people.

METHOD

This study used a quantitative method with a cross-sectional approach to identify and analyze stress and mental-emotional disorders in older people. The population consisted of 337 older adult patients receiving treatment at the Geriatric Polyclinic of Udayana Level II Hospital, with a sample size of 183 individuals calculated using the Slovin formula. The sampling technique was purposive sampling. The authors applied inclusion and exclusion criteria to determine the research sample. Inclusion criteria included: 1) Older people (>60 years); 2) Cooperative and able to communicate well; 3) Patients with Social Security Agency on Health (*Badan Penyelenggara Jaminan Sosial Kesehatan* or BPJS) funding or self-funded; 4) Willing to become research respondents as evidenced by signing the informed consent. Exclusion criteria were: 1) Older adult patients with stroke or severe illness with complete self-care dependency levels; 2) Patients who consumed antianxiety and antidepressant medicines; and 3) Patients who refused to be respondents. After being declared ethically eligible with Certificate Number: 001/EC-KEPK-SK/II/2024 by the Ethical Committee of Stikes Kesdam IX/ Udayana, the research data were collected by conducting

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direct interviews with respondents who met the inclusion criteria and agreed to become respondents. The Perceived Stress Scale (PSS-10) was an instrument to measure stress, and the Self Rating Questionnaire (SRQ-20) for mental-emotional disorder. Then, the data were subjected to univariate analysis to describe the characteristics of the respondents and bivariate analysis to evaluate the correlation between both variables using Spearman's rank correlation.

RESULT

Table 1 demonstrates that almost half of the respondents are 65-74 years old, 78 respondents (42.6%). Half of them are female, 99 respondents (54%). In addition, 62 or 33.88% of respondents graduated from a Senior High School.

Table 1. Characteristics of Respondents by Age, Sex, and Education

Characteristics of Respondents	Frequency (f)	Percentage (%)
Age (years old)		
60-64	61	33.3
65-74	78	42.6
75-92	44	42.1
Sex		
Male	84	46
Female	99	64
Education		
None	2	1.09
Elementary School	36	19.67
Junior High School	56	30.60
Senior High School	62	33.88
University	27	14.75

Table 2 reveals that most respondents experience a moderate stress level of 134 respondents (88.5%) and mental-emotional disorders of 158 respondents (86.3%).

Table 2. Stress Levels and Mental-Emotional Disorders in Older People

Variables	Frequency (f)	Percentage (%)
Stress levels		
Mild	28	15.3
Moderate	134	88.5
Severe	21	11.5
Mental-Emotional Disorders		
No	25	13.7
Yes	158	86.3

Most respondents with moderate stress levels experienced mental-emotional disorders (66.12%). The Spearman's Rank Correlation obtained p=0.036 (p<0.05), indicating a significant correlation between stress levels and mental-emotional disorders in older people (Table 3).

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Table 3. The Correlation between Stress Levels and Mental-Emotional Disorders in Older People and Spearman's Rank Correlation Result

		Mental-Emotional Disorders				*p*
		No Mental-Emotional Disorders		Mental-Emotional Disorders		
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)	
Stress levels	Mild	9	4.92	19	10.38	
	Moderate	13	7.10	121	66.12	0.036
	Severe	3	1.64	18	9.83	
Total		25	13.64	158	86.33	

DISCUSSION

Most respondents in this study experienced a moderate stress level (Table 2). Stress is an accumulation of various symptoms of emotional disorder. When someone experiences stress, there is an imbalance between the needs and abilities to fulfil. They are perceived only as a disease symptom nowadays because of the development and change that require adaptation. Many problems appear due to stress-related difficulties, obstacles, and failures (Buanasari, 2019). Depression, anxiety, psychosis, and other related issues may appear as an effect of continuous mental-emotional disorders (Felson, 2023). Stress is a causative factor of emotional disorder that can be faced with a fight or flight response. The emotional mental disorders due to stress are usually a development and accumulation of previous stressful events (Wang *et al.*, 2021). Numerous physical and mental disorders can result from stress. The results are concentration issues, trouble making decisions, guilt feelings, persistent concern, and forgetfulness, which are symptoms of mental illnesses (NHS, 2022). Physical aging is a natural part of growing older, but the physical stress that older people endure might increase their risk of mental health issues (Gates, 2024).

Furthermore, most older adults in this study experienced mental-emotional disorders (Table 2). Older adults with mental-emotional disorders may exhibit symptoms like erratic mood swings, impatience, a tendency to take offense easily, disappointment, and sadness. Mental disorders such as anxiety in older adults are often accompanied by depression or bipolar disorder, leading to hoarding syndrome and post-traumatic stress (Gates, 2024). They require someone to visit them, talk to them, and greet them warmly. They are also delighted when their counsel is taken seriously (Maulina, 2017).

Moreover, this paper showed a significant correlation between stress levels and mental-emotional disorders in older people (Table 3). It is in line with a study that found that mental disorder in older people in the form of depression was significantly influenced by stress (Manungkalit and Sari, 2020). The research by Slimmen *et al.* (2022) revealed that perceived stress significantly interacted with mental wellness to achieve a good coping mechanism and emotional stability. Furthermore, Petrova and Khvostikova (2021) found that reactive depression in older adults was caused mainly by intensive traumatic events that induce stress, such as loss, loneliness, and feeling useless. Compared to anxiety, stress has a more substantial impact on the occurrence of mental disorders such as depression in older

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adults, especially those living in institutions like nursing homes. Javadzade *et al.* (2024), through their research, provided an intervention to reduce stress using a mindfulness-based stress reduction (MBSR) program for elderly individuals with depression. Their research proved that the intervention was beneficial in reducing depression and improving emotional regulation. Moreover, the intervention could reduce sleep disturbances in older people. Thus, stress management is crucial to prevent mental and emotional disorders, one of which is depression.

CONCLUSION

Stress levels correlate with mental-emotional disorders in older people at the Geriatric Polyclinic of Udayana Level II Hospital, Denpasar. Efforts to recognize stress early, especially in older adults, are essential. Furthermore, stress management is critical to minimizing the negative impact of the emergence of mental and emotional disorders in older adults.

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The Effect of Audiovisual Education about HIV/AIDS on HIV/AIDS Knowledge in Senior High School 1 Rasau Jaya Students

Afifah Fauziah[1], Nadia Rahmawati[2], Ikbal Fradianto[3]

[1] *Undergraduate Study Program in Nursing, Faculty of Medicine, Tanjungpura University*
[2] *Maternity Nursing Department, Faculty of Medicine, Tanjungpura University*
[3] *Community Nursing Department, Faculty of Medicine, Tanjungpura University*

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CORRESPONDENCE

E-mail: afifauziah123@gmail.com

A B S T R A C T

Adolescents are vulnerable to various health risks, including HIV/AIDS. Kubu Raya Regency had a significant increase in HIV/AIDS cases, highlighting the need for health education. This study analyzes the effect of audiovisual education about HIV-AIDS on the HIV/AIDS knowledge in Senior High School 1 Rasau Jaya students. It was a pre-experiment with a one-group pre-test and a post-test design without using a control group. The population was 488 students of the 11th and 12th grades of Senior High School 1 Rasau Jaya, with a sample size of 60 students. Data collection was conducted offline by providing audiovisual education about HIV/AIDS and distributing questionnaires. The instrument for knowledge of HIV/AIDS used the 18-item HIV Knowledge Questionnaire (HIV-KQ-18). Data analysis used the Wilcoxon test. The respondents were 15-19 years old, male (63.3%), and 12th grade (51.7%). They had been exposed to information about HIV/AIDS (86.7%), the most common source of information being the internet (60.7%). The median pre-test knowledge score was 50.00, increasing to 77.70 in the post-test. The Wilcoxon test resulted in p=0.000 (p<0.05), indicating a difference in HIV/AIDS knowledge before and after audiovisual education about HIV/AIDS in students. Therefore, there was a significant effect of audiovisual education about HIV/AIDS on HIV/AIDS knowledge in students. In conclusion, Audiovisual education about HIV/AIDS affects HIV/AIDS knowledge in Senior High School 1 Rasau Jaya students. These findings underscore the importance of innovative educational approaches, like audiovisual media, in enhancing adolescents' understanding of HIV/AIDS.

INTRODUCTION

Adolescents are individuals in the transitional phase from childhood to adulthood, and during this time, they are full of complex physical, emotional, and social changes (Hapsari, 2019). According to the World Health Organization (WHO), adolescents are between 10 and 19 years old (WHO, 2022). Adolescents are in a phase where they are more vulnerable to various health risks, especially in terms of sexual and reproductive health, including the risk of HIV/AIDS (Faridah, 2020).

Human immunodeficiency virus (HIV) is a virus that works by weakening the human body's immune system, leading to the disease known as Acquired Immunodeficiency Syndrome (AIDS). AIDS is a collection of medical conditions that indicate a decline in the immune system, often accompanied by opportunistic infections and cancer. Until now, AIDS has not been curable (Kemenkes, 2018).

It is estimated that around 39 million people were living with HIV by the end of 2022, with the number of individuals ranging from 33.1 to 45.7 million (WHO, 2023). Based on the integrated HIV and AIDS recording and reporting system (*Sistem Informasi HIV AIDS* or SIHA) in the Executive Report on the

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Development of HIV AIDS and Sexually Transmitted Infections (STIs) Disease for the first quarter of 2022, West Kalimantan Province has 10,859 people living with HIV (Kemenkes, 2021).

Data from the Ministry of Health Republic Indonesia in 2022 showed that West Kalimantan was among the top 20 provinces with the highest number of people living with HIV/AIDS (PLWHA) in Indonesia (Kemenkes, 2022). Based on the report from the Kubu Raya District Department of Health Office, there was a significant increase in incidence rates of HIV/AIDS, from 0.70% in 2019 to 1.10% in 2020. This figure far exceeded the 2020 Strategic Plan (*Rencana Strategis* or Renstra) target of only 0.21% (Dinkes Kubu Raya, 2020).

The lack of knowledge among adolescents about HIV/AIDS poses a serious threat. It highlights the need for intervention, as this lack of knowledge becomes a significant challenge in combating the disease. Limited knowledge can lead to misconceptions about PLWHA, encouraging risk behaviors. Further, it can increase the chances of HIV transmission (Nurwati and Rusyidi, 2019). The highest incidence rate of AIDS was in the age group of 20-49 years (Kemenkes, 2021). The incubation period of HIV takes about 5-10 years. Thus, the first contact with HIV was most likely to occur during adolescence (Husaini, Panghiyangani and Saputra, 2017). So, providing health education to adolescents is crucial to prevent the spread of HIV/AIDS.

Interventions through audiovisual media have become an urgent necessity for health education among adolescents (Rahmawati, 2018). The educational video, a groundbreaking initiative at both national and international levels, demonstrates a strong content validity index (CVI) ranging from 0.8 to 1.00, with agreement rates of 80% to 100%. Expert input is also critical to enhance the quality of the video (Vasconcelos *et al.*, 2023). Audiovisual media, such as films, videos, and infographics, enhanced adolescents' knowledge about child marriage (Dewie, *et al.* 2022). Audiovisual resources have gained increasing attention in education due to their potential to improve students' learning experiences. A previous study also highlighted that these resources provided valuable insights and supported students' intention to utilize them within a conceptual framework (Al-Maroof *et al.*, 2022). Thus, it is essential to incorporate audiovisual tools to facilitate effective learning and engagement. This study analyzes the effect of audiovisual education about HIV-AIDS on the HIV/AIDS knowledge in Senior High School 1 Rasau Jaya students. The research potentially contributes insights and knowledge for readers and future researchers related to the influence of audiovisual education on the knowledge levels of HIV/AIDS.

METHOD

This research was a pre-experiment with a one-group pre-test and a post-test design without using a control group. The population was 488 students of the 11th and 12th grades of Senior High School 1 Rasau Jaya, with a sample size of 60 students. This research was conducted at Senior High School 1

Rasau Jaya in July 2024. Data collection was undertaken offline by providing audiovisual education about HIV/AIDS and distributing questionnaires. The instrument for knowledge of HIV/AIDS used the 18-item HIV Knowledge Questionnaire (HIV-KQ-18), which was adapted into Indonesian by Arifin *et al.* (2023). The results of the data normality test showed that one of the data sets was not normally distributed ($p<0.05$), so an alternative test was conducted using the Wilcoxon Signed Rank test. Ethical approval has been obtained from the Ethics Review Board (ethical clearance certificate number: 5773/UN22.9/PG/2024) of the Faculty of Medicine, Universitas Tanjungpura, ensuring adherence to research protocols. Ethical considerations included respecting human dignity, privacy, and subject confidentiality. It also ensured justice, inclusivity, and balanced harm and benefits.

RESULT

The results included the characteristics of respondents by age, class, sex, exposure to information about HIV/AIDS, and the source of information. In addition, the respondents' knowledge scores before and after audiovisual education about HIV/AIDS were analyzed based on age, sex, class, and exposure to information about HIV/AIDS. Furthermore, the Wilcoxon test results were used to determine the effectiveness of audiovisual education about HIV/AIDS on HIV/AIDS knowledge in students.

Table 1. Characteristics of Respondents by Age

Characteristics of Respondents	Min	Max	Mean	n
Age	15	19	16.70	60

Table 1 shows the respondents' age range of 15-19 years and an average age of 16.70.

Table 2. Characteristics of Respondents by Class, Sex, Exposure to Information about HIV/AIDS, and The Source of Information

Characteristics of Respondents		Frequency	Percentage (%)
Class	11'th grade	29	48.3%
	12'th grade	31	51.7%
Sex	Male	38	63.3%
	Female	22	36.7%
Exposure to Information about HIV/AIDS	Exposed	52	86.7%
	Not Exposed	8	13.3%
Sources of Information	Friends	7	11.5%
	Television	7	11.5%
	Internet	36	60.7%
	Others	10	16.4%
Total		60	100%

Table 2 demonstrates that half of the respondents are in the 12th grade, 31 students (51.7%). In addition, most respondents are male, 38 students (63.3%). Moreover, 52 students have been exposed to information about HIV/AIDS (86.7%), the most common source of information being the internet (60.7%).

Table 3. Knowledge Scores Before and After Audiovisual Education about HIV/AIDS by Age, Sex, Class, and Exposure to Information about HIV/AIDS

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Respondent Characteristics	Median Pre-Test	Mean Pre-Test	Median Post-Test	Mean Post-Test
Age				
15 Years	55.50	57.37	77.70	79.57
16 Years	52.75	53.49	77.70	77.73
17 Years	44.40	50.16	77.70	79.44
18 Years	50.00	43.70	74.95	74.25
19 Years	50.00	50.00	88.80	88.80
Sex				
Male	50.00	49.80	77.70	77.87
Female	50.00	52.74	77.70	78.99
Class	50.00	49.57	77.70	77.72
11th Grade	55.00	52.11	77.70	78.80
12th Grade				
Exposure to Information about HIV/AIDS				
Exposed to Information	50.00	52.20	77.70	79.22
Not Exposed to Information	38.85	42.31	69.40	72.18

The age group with the highest average pre-test score was 15 years old, with a score of 57.37, while the highest post-test score was in the 19-year-old group with a score of 88.80. Female students had higher average pre-test and post-test scores than male students, with 52.74 in the pre-test and increasing to 78.99 in the post-test. In addition, respondents in the 12th grade had an average pre-test score of 52.11, higher than the 11th grade. Both experienced an increase in knowledge, with post-test scores of 78.80 for 12th-grade students and 77.72 for 11th-grade students. Among students who had been exposed to information about HIV/AIDS, there was an increase in knowledge, with a pre-test score of 52.20 and a post-test score of 79.22 (Table 3).

Table 4. Wilcoxon Test Results on the Influence of Audiovisual Education about HIV/AIDS on HIV/AIDS Knowledge

Knowledge Scores	n	Median	Min-Max	Positive Rank	Negative Rank	*p*
Pre-Test	60	50.00	27.7-77.7	30.50	0.00	0.000
Post-Test	60	77.70	55.5-100			

The median pre-test knowledge score was 50.00, increasing to 77.70 in the post-test. The Wilcoxon test resulted in p=0.000 (p<0.05), thus Ho is rejected, indicating a difference in HIV/AIDS knowledge before and after audiovisual education about HIV/AIDS in students. Descriptive analysis showed an average positive rank of 30.50 and a negative rank of 0.00, meaning increased HIV/AIDS knowledge. Therefore, there was a significant effect of audiovisual education about HIV/AIDS on HIV/AIDS knowledge in Senior High School 1 Rasau Jaya students (Table 4).

DISCUSSION

The age range of respondents in this research was 15-19 years, categorized as the adolescent age group (Table 1), with the highest average scores of HIV-AIDS knowledge after audiovisual education about HIV/AIDS being in students aged 19 years, with an average of 88.80 (Table 3). It is in line with the factors

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influencing knowledge, according to Notoatmodjo (2018), age affects a person's comprehension and mindset. As people age, their comprehension and mindset develop, improving their knowledge.

In addition, most respondents were 12th-grade students (Table 2). The 12th-grade students had a higher average pre-test score (52.11) compared to 11th-grade students (49.57) (Table 3). It demonstrates that 12th-grade students already had a better fundamental understanding of HIV-AIDS before participating in this investigation. It may be caused by factors such as previous learning experiences, cognitive maturity, or exposure to HIV/AIDS information outside the school environment. In line with the research by Suprayitna, Fatmawati and Albayani (2020), age, education, and environment affected adolescent knowledge about HIV/AIDS. However, both groups showed a significant increase in knowledge after the intervention, with post-test scores reaching 78.80 for the 12th and 77.72 for the 11th grades, indicating that audiovisual education about HIV/AIDS was efficacious in improving students' understanding of HIV/AIDS, regardless of their initial level of knowledge. This finding aligns with the research by Ramadhani and Ramadani (2020), which showed that audiovisual media effectively enhanced adolescents' knowledge. Thus, this paper's significant increase in HIV/AIDS knowledge indicates that the health educational program designed for this study has successfully achieved its objectives.

Moreover, most respondents in this study were male (Table 2). However, this research showed an interesting difference between male and female students regarding knowledge levels before and after the intervention. Female students had higher average pre-test and post-test scores than male students (Table 3). It is in line with the research by Berek *et al.* (2019), which demonstrated that female adolescents tended to have a more comprehensive understanding of HIV/AIDS compared to male adolescents. It may be due to social and cultural factors that provide more opportunities for girls to access information and discuss topics related to reproductive health, including HIV/AIDS.

Most Senior High School 1 Rasau Jaya students were exposed to Information about HIV/AIDS (86.7%), mostly sources of information from the internet (Table 2). This finding is in line with the study by Kuriawati and Kurniawati (2019), which indicated that adolescents independently used the internet to seek information about HIV/AIDS. Most accessed the internet daily for an average of 2-5 hours and had been doing so for more than 2 years. Respondents in this study who had previously obtained information, whether through the internet or other sources, tended to have a higher HIV/AIDS knowledge (average pre-test score of 52.20) and experienced a more significant increase in knowledge after intervention (average post-test score of 79.22) compared to students who had never been exposed to information about HIV/AIDS (Table 3). Therefore, the initial exposure to information from various sources can serve as a strong foundation for enhancing students' understanding of HIV/AIDS.

There was a variation in the initial level of knowledge before intervention among students. The median score of knowledge about HIV/AIDS in respondents before audiovisual education about HIV/AIDS was

50.00, with the maximum score being 77.7, and the minimum being 27.7 (Table 4). It indicated a significant knowledge gap regarding HIV/AIDS among students, with a low average score. Which found a significant difference in the initial level of respondents' knowledge about HIV-AIDS before health education. In addition, the findings of Widarma *et al.* (2017) pointed out that almost half of adolescents had insufficient knowledge about HIV/AIDS before health education (48.7%). Thus, it indicates that most students do not yet have a comprehensive understanding of HIV, its transmission methods, and effective prevention. Therefore, it is necessary to implement an HIV/AIDS education program, which will be a crucial first step in raising students' awareness and knowledge, as well as increasing their skills to protect themselves from the risk of exposure to HIV/AIDS.

After audiovisual education about HIV/AIDS, there was a significant increase in knowledge about HIV/AIDS (Table 4). It is in line with the research by Sabhita *et al.* (2022), which found that the educational video method significantly impacted the increase in knowledge and changes in adolescents' attitudes towards health. The median knowledge score increased to 77.70, with a range of scores between 55.5 and 100. This increase indicated that audiovisual media, which involve both auditory and visual aspects, had successfully stimulated better understanding among the learners. The video media effectively activate various senses, making the information conveyed easier to remember and understand (Nadek *et al.* 2014).

There was a significant effect of audiovisual education about HIV/AIDS on HIV/AIDS knowledge in Senior High School 1 Rasau Jaya students (Table 5). This finding is in line with the research by Sabhita *et al.* (2022), which showed that the use of videos as a health education medium was efficacious in improving understanding and changing adolescents' attitudes towards HIV/AIDS. The study by Anggraini *et al.* (2022) also indicated a very significant relationship between the use of video learning methods and the increase in knowledge and changes in adolescents' attitudes towards HIV/AIDS. This research proves that audiovisual media can be an effective medium to achieve one of the goals of the three main programs of the School Health Unit (SHU), which is to improve the health status of students. The SHU at Senior High School 1 Rasau Jaya should continue to develop the HIV/AIDS education program by utilizing various innovative media. Audiovisual media can motivate students to adopt healthy behaviors by providing engaging and easily understandable information.

CONCLUSION

Audiovisual education about HIV/AIDS affects HIV/AIDS knowledge in Senior High School 1 Rasau Jaya students. Future research could include affective aspects such as attitudes and behaviors, using a

longitudinal design to observe long-term changes, and considering family support and the school environment. More comprehensive instruments with simple questionnaire language should be developed so students can easily understand.

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Estimating Correlation Between Emotional Regulation and Independence in Early Childhood

Apriyani Puji Hastuti[1], Vanesya Ivana[2], Aloysia Ispriantari[3], Domingos Soares[4]

[1,2,3] Department of Nursing, Faculty of Health Science, Institute Technology Science and Health RS dr Soepraoen, Malang, Indonesia
[4] Department of Nursing, Faculty of Health Science, Instituto Superior Crystal Timor Leste

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CORRESPONDENCE

E-mail: ns.apriyani@gmail.com

A B S T R A C T

One of the aspects of childhood independence is managing emotional turmoil. Emotion regulation is an individual's style in determining what emotions they feel, when and how to describe them, and recognizing these emotions. This research estimates the correlation between emotional regulation and independence in early childhood. This research design used analytics with a cross-sectional approach. The population was 86 mothers with young children in the Ciptomulyo Malang Public Health Center (PHC) working area. There were 80 samples with a purposive sampling technique. The inclusion criteria were children living with their parents. The instrument for emotional regulation was the Emotional Regulation Questionnaire for Children and Adolescents (ERQ-CA), and for early childhood independence was the Child Independence Questionnaire. The results showed that parents had an authoritarian parenting style (85%). They had expressive suppression in emotion regulation (92.5%) and an independent category of early childhood independence (57.5%). The Spearman Rank test obtained p=0.002 (p<0.05) and the r=0.625. Thus, there was a significant correlation between emotion regulation and early childhood independence. In conclusion, emotion regulation affects early childhood independence. Further research could evaluate children's social and cultural context and individual characteristics, providing deeper insight into the factors influencing early childhood independence.

INTRODUCTION

Every family has a different parenting style. Generally, parenting is an interaction pattern between parents and children (Haryono *et al*. 2018). The parenting type includes parents' attitudes and behavior when interacting with their children (Haryono *et al*. 2018). Based on Ayun (2017), parenting patterns are not just about fulfilling physical needs (food, drink, clothing, etc.) and psychological needs (love and emotions), but also include child norms, which are called interaction patterns, so that children can live in harmony with their environment. The children's social emotions are influenced by their parents' parenting styles and the outcomes of parent-child interactions (Haryono *et al*. 2018). Based on Khusuniyah (2018), parents, especially mothers, play a significant role in shaping children's social-emotional and future educational patterns. The psychological environment, particularly the family, is essential in forming a child's personality. Parent-child relationships within the family are critical throughout childhood and adulthood. The role of parents is to encourage interaction between parents and children. Vasilyeva and Shcherbakov (2016) refer to the functional role of parents as the social role of the family towards children, consistent with family life, family behavioral norms, traditions, and existing interpersonal relationships.

Based on Erikson's review in Putri and Lestari (2021), social and cultural factors influence growth and development, including changes in children's independence. The change must be understood as the

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interrelation of three different systems: the somatic, ego, and social systems. This somatic system consists of all the biological techniques necessary for personal purposes. The ego system contains processing centers for thinking about things and ideas. In addition, the social system includes how people become part of themselves in society. As stated by Havinghurst in Putri & Lestari (2021), one aspect of children's independence is the child's ability to regulate emotional turmoil. This process of controlling emotions is called emotional regulation. Emotion regulation is an individual's style in determining what emotions they feel, when and how to describe them, and recognizing these emotions (Putri and Lestari, 2021).

The results of the National Socioeconomic Survey (*Survei Sosial Ekonomi Nasional* or SUSENAS) conducted by Statistics Indonesia (2020) stated that as many as 3.73% of toddlers received inappropriate parenting patterns. Based on the survey, 15 provinces had inappropriate parenting patterns or below the national average (Badan Pusat Statistik, 2020). Based on a preliminary study on Putra Harapan Kindergarten, RW 02 area, Ciptomulyo Village, Sukun District, Malang City, the authors interviewed one of the teachers and 43 students from Kindergarten A1, Kindergarten A2, and Kindergarten B. The study showed that each student had different attitudes towards socializing. Some children still could not control their emotions; some cried, withdrew, found it difficult to talk, and were angry. However, a few could explain their feelings. To deal with all students' attitudes, the teacher calmed them down, tried to dig up information on why children behaved like that, and distracted them with fun things such as playing games or toys.

The family, especially parents, has a vital role in developing a child's personality, including the emotional aspect. Newborn babies depend significantly on their environment, especially their father and mother. Parents should utilize this dependency to create a home environment as the child's first social environment. Children spend most of their lives with their families, so parents are responsible for the first few years of their lives. Observing various behaviors that children repeatedly show in interactions with father and mother, older siblings, and other adults, children will learn these behaviors and try to imitate them. Parents should regularly monitor their children to help them grow and develop emotional regulation (Kementerian Kesehatan RI, 2014). They need to learn the parenting style they apply to their children. They must also be good examples because memory will be stored and duplicated in the child's brain during daily activities. Improving good interaction and communication between parents and children is critical. This research estimates the correlation between emotional regulation and independence in early childhood.

METHOD

This research design used analytics with a cross-sectional approach. The population was 86 mothers with young children in the Ciptomulyo Malang Public Health Center (PHC) working area. There were 80 samples with a purposive sampling technique. The inclusion criteria were children living with their

parents. The instrument for emotional regulation was the Emotional Regulation Questionnaire for Children and Adolescents (ERQ-CA). The questionnaire comprised two emotional regulation domains: cognitive reappraisal and expressive suppression. In addition, an instrument for early childhood independence was the Child Independence Questionnaire, modified from previous research (Juhairiyah, 2019). Data analysis used Spearman's rho with the SPSS 30 for Mac application to determine the correlation between emotional regulation and independence in childhood. This research received ethical clearance from the Institute of Science and Health Technology Ethics Commission, Dr. Soepraoen Hospital, Malang, with certificate number 015/028/II/EC/KEPK/2024.

RESULT

The research was conducted at Putra Harapan Kindergarten, Malang. This kindergarten is in the Working Area of the Ciptomulyo PHC, Malang. There were five permanent teachers at Putra Harapan Kindergarten and one extracurricular teacher. The number of students at Kindergarten Putra Harapan Malang was 80, divided into several classes, namely Kindergarten A1 with 24 children, Kindergarten A2 with 16 children, and Kindergarten B with 40 children.

Table 1. Characteristics of Respondents

Characteristics of Respondents	Frequency (n)	Percentage (%)
Age		
20- 30 years old	20	25
31- 40 years old	42	52.5
51- 60 years old	18	22.5
Sex		
Male	24	30
Female	56	70
Occupation		
Civil servants/ Indonesian National Armed Forces/ Indonesian National Police	2	2.5
Private sector employees	24	30
Self-employed	20	25
Not working	34	42.5
Education		
Elementary school	8	10
Junior high school	14	17.5
Senior high school	52	65
Higher education	6	7.5
Duration of Marriage		
1-10 years	40	50
11- 20 years	30	37.5
> 20 years	10	12.5
Type of Family		
Nuclear Family	62	77.5
Extended Family	10	10
Divorce	8	12.5
Parenting Style		
Permissive	2	2.5
Authoritarian	68	85
Democratic	10	12.5

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Table 1 shows that half of respondents are parents of early childhood with an age range of 31-40 (52.5%), most are mothers (70%), almost half of them are parents who do not work (42.4%), most have Senior High School (65%), half of them had been married for 1-10 years (50%), and most are nuclear family (77.5%). In addition, most respondents applied the authoritarian parenting style (85%).

Table 2 Emotional Regulation and Early Childhood Independence

Variable	Frequency (n)	Percentage (%)	r/*p*
Emotion regulation			
Expressive Suppression	74	92.5	
Cognitive Reappraisal	6	7.5	
Early childhood independence			0.625/0.002
Not independent	0	0	
Moderate	34	42.5	
Independent	46	57.5	

Most respondents had expressive suppression in emotion regulation (92.5%) and an independent category of early childhood independence (57.5%). The Spearman Rank test obtained p=0.002 (p<0.05) and the r=0.625. Thus, there was a significant correlation between emotion regulation and early childhood independence.

DISCUSSION

Most respondents in this study applied the authoritarian parenting style (Table 1). The relationship between parenting styles and early childhood independence is not always direct and easy to predict. Although parenting styles influence the development of various skills in children, the child's independence is also influenced by internal and external factors. Children with a more confident and courageous temperament tend to be more independent, even though the parenting style they receive may not be very supportive. In addition, social factors, such as experience in an educational environment or interactions with peers, also contribute to the formation of independence. For example, children who are given more frequent opportunities to make their own decisions at home or school will be more accustomed to responsibility and more independent.

In controlling emotions, a person needs to be able to regulate them. Emotional regulation can be interpreted as a way for individuals to face their emotions when they feel them and how they express them (Gross, 2010). In addition, it is also defined as the ability to evaluate and change emotional reactions to behave in a certain way that is appropriate to the situation. Parents must direct their children in regulating emotions, starting from the simplest things, such as how parents help their children recognize the emotions or feelings they feel. To understand children's feelings, they need to be given an understanding of the various emotions. After the child learns it, the child can express the feeling. Parents must also teach their children about controlling emotional reactions so that emotional regulation within the child can run well.

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Most respondents in this investigation had expressive suppression in emotion regulation (Table 2). In developmental theory, a child's emotional regulation is influenced by several factors other than parenting. Attachment theory states that a secure emotional relationship between a child and caregiver can underline a child's ability to manage emotions. Children with secure attachments are more likely to have good emotional regulation skills because they feel safe to express their feelings and learn how to manage them. However, other theories suggest that a child's temperament, social skills, and social environment can influence a child's emotional regulation. Specifically, the information processing theory suggests that children's ability to recognize and interpret their feelings and respond appropriately depends mainly on their cognitive and social development.

Most respondents had an independent category of early childhood independence (Table 2). According to developmental psychology theory, early childhood independence is influenced by parenting style. The theory of social-emotional development, as explained by Erikson in Putri & Lestari (2021), especially in the "Autonomy versus Shame and Doubt" stage at an early age, emphasizes the importance of providing balanced freedom between support and control from parents to support the development of independence. Children learn to be independent in various aspects at this age, from managing themselves to doing simple tasks. In the context of parenting, this theory suggests that parents who provide support but still give children freedom to explore can help children feel more confident and independent. However, other factors such as the child's temperament or the broader social context (e.g., social environment, interactions with peers) may also influence the level of independence that develops. Furthermore, the information processing theory explains that children who are more frequently involved in activities that require problem solving and decision making tend to have a higher level of independence, even though the parenting provided is less supportive. Thus, although parenting style is essential, other factors can influence a child's independence.

There was a significant correlation between emotion regulation and early childhood independence (Table 2). Parents have different methods for growing independence in early childhood. Some parents allow their children to carry out daily activities independently, a learning process, but some tend to assist their children. Independence is an individual attitude acquired cumulatively during development, where individuals will continue to learn to behave independently in various environmental situations, so that individuals will ultimately be able to think and act independently (Tjandraningtyas, 2004). It is an effort to train children to solve problems. Further, it is the ability to manage all our possessions, manage time, walk and think independently, and take risks and solve problems. Early childhood independence can be evaluated from the child's habituation and ability in physical abilities, self-confidence, responsibility, discipline, sociability, willingness to share, and control of emotions (Dianne, 2008). Furthermore, the indicators of independence for kindergarten children are habits consisting of physical ability, self-

confidence, responsibility, discipline, good at socializing, willing to share, and controlling emotions (Brewer, 2006).

CONCLUSION

In conclusion, emotion regulation affects early childhood independence. Further research could evaluate children's social and cultural context and individual characteristics, providing deeper insight into the factors influencing early childhood independence.

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The Effect of Religious Music Therapy on Reducing Menstrual Pain Among Midwifery Students: A Non-Pharmacological Approach

Lailatul Khusnul Rizki[1,2], Feby Kartika Sari[3], Fritria Dwi Anggraini[4], Siska Nurul Abidah[5]

[1] *Doctoral Student, Public Health Science Program, Universitas Sebelas Maret, Surakarta, Indonesia*
[2,4,5] *Lecturer, Department of Nursing and Midwifery, Universitas Nahdlatul Ulama Surabaya, Indonesia*
[3] *Undergraduate Program of Midwifery, Faculty of Nursing and Midwifery,Universitas Nahdlatul Ulama Surabaya, Indonesia*

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CORRESPONDENCE

E-mail: lailarizki91@student.uns.ac.id

A B S T R A C T

Primary dysmenorrhea is a common menstrual disorder affecting women of reproductive age, particularly adolescents and young adults. Many students experience menstrual pain, potentially interfering with academic and daily activities. This study investigates the effectiveness of religious music therapy in reducing the intensity of primary dysmenorrhea among undergraduate midwifery students at Universitas Nahdlatul Ulama Surabaya. This research used a pre-experimental design with a one-group pretest-posttest approach. The population was all third-semester undergraduate midwifery students who experienced primary dysmenorrhea. The sample consisted of 33 students, selected through purposive sampling. The intervention was a 30-minute religious music therapy session conducted during the first or second day of menstruation. The intensity of primary dysmenorrhea was measured using the Numeric Rating Scale (NRS). Data analysis used the Wilcoxon Signed-Rank Test with a significance level of $\alpha = 0.05$. Before the intervention, most participants experienced moderate menstrual pain (63.6%), while a few reported mild (30.3%) and severe (6.1%). After the intervention, most respondents reported mild menstrual pain (78.8%), and a few had moderate (21.2%). The Wilcoxon test result obtained p=0.000, showing a statistically significant reduction in menstrual pain after the religious music intervention. Religious music therapy effectively reduces the intensity of primary dysmenorrhea. It is potentially a non-pharmacological therapy to manage menstrual pain.

INTRODUCTION

Dysmenorrhea is one of the most common gynecological complaints among women of reproductive age, particularly adolescents and young adults. It is characterized by painful menstruation due to uterine contractions and is classified into two types: primary and secondary dysmenorrhea. Primary dysmenorrhea occurs without any identifiable pelvic pathology and usually begins during adolescence, while secondary dysmenorrhea results from underlying conditions such as endometriosis or uterine fibroids (Dawood, 2006; Iacovides *et al.,* 2015).

Globally, more than 50% of menstruating women experienced some degree of menstrual pain, with approximately 10–20% reporting pain severe enough to interfere with daily activities (WHO, 2013). In Indonesia, the prevalence of dysmenorrhea was notably high. Data from the Indonesia Demographic and Health Survey: Adolescent Reproductive Health indicated that up to 72.89% of young women had menstrual pain, with primary dysmenorrhea rates of 54.89% in East Java (PIK-KRR, 2020). Among college students, dysmenorrhea often leads to decreased academic performance, absenteeism, concentration issues, and reduced quality of life (Andersch and Milsom, 1982; Puspita, 2022).

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The standard management of primary dysmenorrhea generally involves pharmacological interventions such as nonsteroidal anti-inflammatory drugs (NSAIDs) or hormonal contraceptives. Although effective, these treatments are not free from side effects, including gastrointestinal discomfort, allergic reactions, and potential long-term hormonal imbalances (Komariyah *et al.,* 2020). Thus, there has been growing interest in non-pharmacological approaches that are safer, more natural, and culturally appropriate.

One such alternative is music therapy. It is the clinical and evidence-based use of music interventions to accomplish individualized therapeutic goals. Music can stimulate the autonomic nervous system, affect hormonal responses, and reduce pain perception by triggering the release of endorphins and promoting relaxation (Nilsson, 2009). In recent years, religious music therapy—a spiritual care, as a culturally resonant intervention—has gained attention. Religious music, especially when aligned with the listener's beliefs, may enhance emotional comfort, reduce anxiety, and contribute to a spiritual well-being, indirectly resulting in lower pain perception (Simanullang *et al.,* 2020; Rahmanti and Pratiwi, 2021).

Several studies have reported the effectiveness of religious music therapy in various clinical contexts, including reducing labor pain, improving sleep quality, and managing stress (Widiyono, 2021). However, research specifically targeting its use in managing primary dysmenorrhea remains limited, particularly among young women in educational settings such as midwifery schools. Considering the high prevalence of primary dysmenorrhea among students and the need for non-pharmacological and culturally sensitive interventions, this study investigates the effectiveness of religious music therapy in reducing the intensity of primary dysmenorrhea among undergraduate midwifery students at Universitas Nahdlatul Ulama Surabaya.

METHOD

This research used a pre-experimental design with a one-group pretest-posttest approach, aimed at determining the effectiveness of religious music therapy in reducing pain intensity among students experiencing primary dysmenorrhea. This design was chosen due to its practicality in educational settings and its capacity to observe the effect of a single intervention. The study was conducted at the Undergraduate Midwifery Program of Universitas Nahdlatul Ulama Surabaya. Data collection occurred over two months, from March to April 2024, during the respondents' menstrual cycles. The population was all third-semester undergraduate midwifery students who experienced primary dysmenorrhea. The sample consisted of 33 students, selected through purposive sampling, based on the following inclusion criteria: (1) Female students aged 18–22 years; (2) Having a regular menstrual cycle; (3) Diagnosed or self-reported primary dysmenorrhea; and (4) Willing to participate and complete informed consent. Exclusion criteria included: (1) Use of pain-relieving medication within 12 hours before intervention; and (2) History of psychiatric disorders or hearing impairment.

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The intervention was a 30-minute religious music therapy session conducted during the first or second day of menstruation, when pain was at its peak. The music was Islamic religious songs with a slow tempo (60–80 bpm) and a calming instrumental background. The sessions were held in a quiet room on campus, with respondents seated or lying comfortably while listening to music through external speakers at medium volume (around 60 dB).

The intensity of primary dysmenorrhea was measured using the Numeric Rating Scale (NRS), which ranges from 0 (no pain) to 10 (worst possible pain). Respondents were instructed to mark their perceived pain level before the intervention (pre-test) and immediately after the intervention (post-test). The scale was interpreted as follows: (1) 1–3: Mild pain; (2) 4–6: Moderate pain; and (3) 7–10: Severe pain. A structured observation sheet was used to document respondents' demographic information and NRS scores. Quantitative data were analyzed using the Wilcoxon Signed-Rank Test to assess differences in pain levels before and after the intervention. Statistical analysis was conducted with SPSS version 26, with a significance threshold set at $\alpha = 0.05$. The study received ethical approval from the Health Research Ethics Committee of Universitas Nahdlatul Ulama Surabaya (Certificate Number 0059/EC/KEPK/UNUSA/2025). All respondents received explanations about the study objectives, procedures, risks, and benefits, and gave written informed consent before participation. Confidentiality and the right to withdraw at any time were ensured throughout the study.

RESULT

Characteristics of Respondents

A total of 33 female midwifery students participated in this study. Table 1 shows that half of the respondents were 20-21 years old (51.5%) and all had regular menstrual cycles (100%).

Table 1. Characteristics of Respondents by Age and Menstrual Cycle

Characteristics of Respondents	Frequency (n)	Percentage (%)
Age (years old)		
18–19	10	30.3%
20–21	17	51.5%
≥ 22	6	18.2%
Menstrual Cycle		
Regular	33	100%
Irregular	0	0%

The Intensity of Primary Dysmenorrhea Before and After Intervention

The intensity of primary dysmenorrhea was measured using the Numeric Rating Scale (NRS) before and after the religious music therapy intervention. Before the intervention, most participants experienced moderate menstrual pain (63.6%), while a few reported mild (30.3%) and severe (6.1%). After the intervention, a significant shift was observed, with most respondents reporting mild menstrual pain

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(78.8%), and a few had moderate (21.2%). Thus, students experiencing moderate to severe menstrual pain dropped from 69.7% before intervention to only 21.2% after. In addition, the proportion of students with mild menstrual pain increased from 30.3% to 78.8%, showing a shift toward lower pain intensity after listening to religious music (Table 2).

Table 2. The Intensity of Primary Dysmenorrhea Pre- and Post-Intervention

Menstrual Pain	Pre-Test (n/%)	Post-Test (n/%)
Mild (1–3)	10 (30.3%)	26 (78.8%)
Moderate (4–6)	21 (63.6%)	7 (21.2%)
Severe (7–10)	2 (6.1%)	0 (0%)
Total	33 (100%)	33 (100%)

Statistical Analysis

The Wilcoxon Signed-Rank Test analyzed the significance of changes in the intensity of primary dysmenorrhea before and after the intervention. This non-parametric test is appropriate for comparing two related samples (pre-test and post-test scores) in a small sample size.

Table 3. Wilcoxon Signed-Rank Test Results

Measurement	Mean Rank	Sum of Ranks	Z	p-value
Post-Test < Pre-Test	17.00	561.00	-5.010	0.000**

The Wilcoxon test result obtained p=0.000, showing a statistically significant reduction in menstrual pain after the religious music intervention. Thus, it was evident that religious music therapy has a clinically meaningful effect on reducing the menstrual pain associated with primary dysmenorrhea.

DISCUSSION

The results showed that most respondents (63.6%) experienced moderate menstrual pain before the intervention, while most (78.8%) experienced only mild after the intervention. In addition, no respondents reported severe menstrual pain post-intervention (Table 2). Thus, it indicates a notable clinical improvement. These results are consistent with several previous studies, which showed the efficacy of music therapy in reducing various types of pain, including menstrual, labor, and postoperative pain (Nilsson, 2009; Simanullang *et al.,* 2020).

This study found that religious music therapy significantly reduced the intensity of primary dysmenorrhea among midwifery students (Table 3). This finding aligns with previous national and international research demonstrating the effectiveness of music interventions in pain reduction. Studies by Simanullang et al. (2020), Rahmanti & Pratiwi (2021), and Nilsson (2009) supported the analgesic benefits of music in both obstetric and surgical contexts. Similarly, a meta-analysis by Lee (2016) highlighted music's consistent role in alleviating various types of pain, including menstrual pain, through multiple biopsychosocial pathways.

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From a neurophysiological standpoint, music influences the limbic system, including the amygdala and hypothalamus, playing crucial roles in processing pain-related emotional and sensory stimuli. Listening to calming music can increase the production of endorphins, the body's natural opioids, which bind to opioid receptors and reduce pain perception. It also stimulates the parasympathetic nervous system, reducing heart rate, muscle relaxation, and stress hormone suppression (Kemper and Danhauer, 2005; Nilsson, 2009). This mechanism is consistent with the Gate Control Theory of Pain, which posits that non-painful stimuli (such as music) can "close the gate" to painful input in the spinal cord, thereby suppressing pain signals before they reach the brain (Melzack and Wall, 1965).

The unique value of religious music lies not only in its auditory effects but also in its spiritual meaning. Respondents in this study listened to Islamic nasheed music with themes of surrender, peace, and divine presence. These elements may enhance emotional comfort, reduce anxiety, and strengthen spiritual coping mechanisms, contributing to lowering pain perception. This opinion supports the biopsychosocial model of pain, emphasizing that pain is influenced by biological, psychological, and social—including spiritual—factors (Gatchel *et al.*, 2007). Moreover, in culturally religious populations such as Indonesia, spiritual resonance increases the acceptance and effectiveness of interventions. As Halim (2003) states, communities are more likely to internalize and sustain culturally congruent health practices.

Compared to other non-pharmacological interventions such as warm compresses, aromatherapy, or exercise, religious music therapy offers several advantages. It is non-invasive, cost-effective, simple to implement, and can be practiced independently without clinical supervision. While methods like aromatherapy rely on specific materials or environmental settings, religious music can be accessed with minimal resources and offers dual benefits, physiological relaxation and spiritual upliftment. This intervention is highly relevant in educational settings with low resources (Karyati, Lestari and Septiani, 2014; Komariyah, Supriyadi and Andayani, 2020).

This finding highlights the potential of religious music therapy as a holistic, culturally responsive intervention in reproductive health, particularly for adolescent and young adult women. Integrating such methods into midwifery education and practice can empower students with self-care and promote non-pharmacological pain management. It is crucial in preparing future midwives to provide woman-centered care grounded in both evidence and empathy.

CONCLUSION

Religious music therapy is effective in reducing the intensity of primary dysmenorrhea among midwifery students. It is due to the physiological effects of the release of endorphins and autonomic relaxation, as well as culturally, by the emotional and spiritual comfort from religious content. As a simple, low-cost, and culturally accepted method, it holds promise as a non-pharmacological pain management strategy.

Religious music therapy should be promoted as a supportive, non-pharmacological method for managing dysmenorrhea in midwifery education. Despite its promising results, this study has limitations. The pre-experimental design without a control group limited the ability to infer causality. The small, homogeneous sample also restricted generalizability. Future studies should adopt randomized controlled designs, include control groups, and explore religious music therapy among interreligious or cultural settings to assess broader applicability.

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Analysis of Risk Factors Associated with Bullying Among Adolescents in Junior High Schools in Gresik Regency

Suyanto[1], Riski Dwi Prameswari[2], Havy Wardana[3], Tomi Indarto[4], Anik Nur Kholifah[5]

[1] *Faculty of Law, Universitas Gresik, Gresik, Indonesia*
[2] *Faculty of Health Sciences, Universitas Gresik, Gresik, Indonesia*
[3,4,5] *Gresik Municipality Regional Development Planning, Research, and Development Agency*

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CORRESPONDENCE

E-mail: soe.unigres@gmail.com

A B S T R A C T

Bullying is a serious problem, as it can have a long-term impact on severe psychological issues, such as low self-esteem, depression, aggression, and school refusal, potentially leading to dropping out of school. Adolescence is a transitional phase from childhood to adulthood. This age group is more at risk of becoming perpetrators or victims of bullying. This research analyzes the risk factors associated with the history of bullying among adolescents in Junior High Schools in Gresik Regency. This paper was an analytical descriptive study conducted from October to November 2024. The population was all 7th-grade Junior High School students in the 2024/2025 academic year in Gresik Regency. The sample consisted of 150 respondents, selected using a simple random sampling technique. The instruments were observation sheets and questionnaires to analyze factors associated with the history of bullying in adolescents, including both bullying perpetrators and victims. Data analysis used the Pearson correlation test. There was no correlation between aggressive behavior (p=0.101), school climate (p=0.296), peers (p=0.557), and knowledge about the impact of bullying (p=0.667) with a history of bullying (p<0.05). However, there was a significant correlation between personality (p=0.002), family (p=0.021), and mass media (p=0.001) with a history of bullying (p>0.05). In conclusion, risk factors associated with the history of bullying are personality, family, and mass media.

INTRODUCTION

Bullying behavior is currently of great concern to educators, parents, and society. Bullying is a form of aggressive behavior that is carried out repeatedly and aims to hurt, dominate, or humiliate other parties who are considered weaker (Ramlah, 2023). This action can be implemented in physical violence, verbal taunts, social exclusion, or spreading rumors, and can even extend to the digital realm in the form of cyberbullying (Goa, 2025). Among Junior High School adolescents, bullying is one of the most serious social problems because it concerns psychological well-being and personality development in adolescence (Syamsul *et al.*, 2024). Adolescence is a transitional phase or transition from childhood to adulthood, ranging from 10 to 19 years old. This age group is more at risk of becoming perpetrators or victims of bullying. Adolescents potentially can commit acts of bullying, primarily through friendship relationships at school, and often lack the supervision of schools and parents. Bullying can impact life among students (Nafi'ah, 2024).

Adolescence is a period of transition from childhood to adulthood that includes mental, emotional, and physical maturity. It is also a stage of development that must be passed with various difficulties. Currently, the psychological condition of adolescents is precarious. Because this period is a phase of self-

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discovery (Natalia, 2023). Schools are essential in an adolescent's psychological, social, and emotional development. Bullying is a serious problem because it can have a long-term impact on severe psychological issues, such as low self-esteem, deep depression, aggression, and school refusal. In addition, it can result in children refusing school, leading to dropping out of school (Revita and Twistiandayani, 2025).

According to the *Federasi Serikat Guru Indonesia* (FSGI), bullying cases throughout 2023 were spread across 12 provinces, covering 24 districts or cities. Based on regional distribution, schools in the East Java region were the most reported areas related to bullying cases. Bullying cases reported in East Java include Gresik, Pasuruan, Lamongan, Banyuwangi, and Blitar districts. One of the forms of bullying is violent behavior by adolescents at school. According to data from the Ministry of Women Empowerment and Child Protection (MoWECP), cases of violence in East Java reached 1,333 cases throughout 2024, where Gresik Regency became the third city with 116 reported cases of violence in East Java.

Bullying seems to have become a culture among teenagers at school, which makes these cases still occur. There is a sense of revenge from the victims of bullying that potentially makes them become the next bullying perpetrator. The lack of legal knowledge in children makes them not think about the impact of their behavior because of the lack of legal awareness of the laws governing legal protection in bullying (Rifa'i et al., 2024). If this continues, it will become a criminal offense among adolescents. The role of the social environment is critical to shaping the personality of teenagers. School is the second educational environment after family. Effective bullying prevention is a collaboration between schools, parents, and the community. Conducting early detection of bullying cases, holding bullying awareness programs, making anti-bullying policies, and providing legal awareness education can potentially prevent bullying cases in adolescents. This research analyzes the risk factors associated with the history of bullying among adolescents in Junior High Schools in Gresik Regency. The study results will serve as a basis for developing more targeted bullying prevention policies or programs at the school, family, and local government levels. Schools should be safe spaces that support children's development, free from intimidation, violence, and social discomfort.

METHOD

This study was an analytical descriptive study. It was conducted in several Junior High Schools in Gresik Regency. The research was conducted from October to November 2024. Data collection was done by distributing questionnaires. The instruments were observation sheets and questionnaires to identify, explore, and analyze factors associated with the history of bullying in adolescents, including both bullying perpetrators and victims. The questionnaire had been tested for validity and reliability. The population was all 7th-grade Junior High School students in the 2024/2025 academic year in Gresik

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Regency. The sample consisted of 150 respondents, selected using a simple random sampling technique. The inclusion criteria were 13-14 years old, active 7th-grade Junior High School students, and domiciled in Gresik Regency. Data analysis used the Pearson correlation test to analyze the correlation between variables.

RESULT

The research location was one Public Junior High School, one Private Junior High School, and 1 Islamic Boarding School in the northern, central, and southern parts of Gresik Regency. It was chosen because it had a representative population from various demographic, social, economic, and environmental backgrounds.

Table 1. Characteristics of Respondents by Sex and Age

Characteristics of Respondents	Frequency (n)	Percentage (%)
Sex		
Male	51	34
Female	99	66
Age (years old)		
12	62	41
13	69	46
14	19	13
Total	150	100

Table 1 shows that the respondents are 51 males (34%) and 99 females (66%). In addition, the age group is 62 respondents aged 12 years old (41%), 69 aged 13 years old (46%), and 19 aged 14 years old (13%). Thus, most respondents are females and 13 years old.

Table 2. Analysis of factors associated with a history of bullying

	Variables	*p*
History of Bullying	Personality	0.002
	Aggressive Behavior	0.101
	Family	0.021
	School Climate	0.296
	Mass Media	0.001
	Peers	0.557
	Knowledge about the impact of bullying	0.667

There was no correlation between aggressive behavior (p=0.101), school climate (p=0.296), peers (p=0.557), and knowledge about the impact of bullying (p=0.667) with a history of bullying (p<0.05). However, there was a significant correlation between personality (p=0.002), family (p=0.021), and mass media (p=0.001) with a history of bullying (p>0.05) (Table 2).

DISCUSSION

This study found an association between personality and the history of bullying (Table 2). This finding aligns with previous research, which showed a relationship between Big Five personality and bullying

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behavior (Wedhayanti, 2024). Several factors cause bullying behavior in the school environment, including personal and situational factors. Personal factors are all characteristics of students, including personality, attitudes, and genetics. They consistently persist in students at all times and situations (Dharmawan *et al.*, 2024). The phenomenon of bullying in social classes cannot be separated from the personality of individuals. Someone who initially follows individuals with a difficult personality can become one of them later. Most bullying victims usually have a weak personality and are unable to fight back against those who bully them. Assessing personality is essential to prevent bullying that is increasingly rampant among adolescents (Wedhayanti, 2024).

This paper also found a correlation between family and mass media with the history of bullying (Table 2). The first external factor that affects bullying is the family. Children who are victims of bullying feel afraid to tell their families. In addition, there is a lack of communication patterns between children and parents. According to Soejanto (2001), a communication pattern is a simple description of the communication process that shows the relationship between one communication component and another. Communication patterns can be interpreted as a relationship between two or more people regarding the correct method of sending and receiving messages so that the message can be understood (Gunawan, 2013). Mass media, including movies, music with aggressive content, and video games, can also model bullying behavior. Therefore, the social environment plays a vital role in shaping violent behavior. Besides external factors, Internal factors causing bullying are mental and emotional health. Mental and emotional health is a person's condition related to active self-adjustment in facing and overcoming problems by maintaining self-stability. Children who are bullied will feel depressed both physically and mentally, and will have difficulty interacting, fear, and lack of confidence (Freska, 2023).

However, this investigation found no relationship between aggressive behavior and the history of bullying (Table 2). Bullying could impact a person's psychology (Diannita *et al.*, 2023). Previous research demonstrated that the victims of bullying generally had a lack of self-confidence. Students who were receiving mild bullying behavior had relatively low self-confidence. The students could not express their feelings and had a bad past. In addition, they experienced bullying in and outside the school environment (Kundre and Rompas, 2018). Factors that affect healthy self-confidence are openness, confidence, safety, and having the opportunity to express their ideas and feelings. This paper also exhibited no correlation between school climate and peers and the history of bullying (Table 2). An unhealthy social environment has too many demands, a lack of respect for other people's opinions, and a lack of opportunity to express their ideas and feelings. According to Kustanti (2015), most students at all levels of education experienced bullying, including being called unwanted nicknames. This investigation also showed no relationship between knowledge about the impact of bullying and the history of bullying (Table 2). Bullying will have dire consequences for the victims, witnesses, and perpetrators. The effects of bullying

behavior will even leave a mark on the child until they are an adult. The adverse effects that can occur in the victims of bullying are anxiety, loneliness, low self-esteem, low levels of social competence, depression, social withdrawal, mental and emotional disorders, and decreased academic achievement (Fajri, Arif and Syam, 2025). Therefore, it is essential to pay attention to the impact received by victims of bullying so that they do not become traumatized, which can result in mental health disorders.

Victims of bullying can experience various kinds of disorders, including low psychological well-being, where there is a sense of discomfort in the victim, and low self-esteem. Moreover, they experience poor social adjustment, fear of going to school, and do not even want to go to school. They are also away from relationships, and even having the desire to commit suicide rather than having to face pressure and insults (Agisyaputri, Nadhirah and Saripah, 2023). Bullying in schools is one of the causes of stress in learners. Students who are victims of bullying can feel embarrassed, afraid, and often hide the bullying experiences from parents or teachers (Wahyu Nurhayati, 2025). The rapid development of the Industrial Revolution can impact children's personality or morality. Therefore, parents must be able to shape their children's mindset, teach them to filter good news or information, and teach them to think positively. In Industry 4.0, children are spoiled by technology and everything instantaneous (Pratama, 2019). This situation can change the character of the nation's next generation. Therefore, it is necessary to have an education that can shape students' character to become highly moral children to avoid all problems related to bullying behavior.

CONCLUSION

Risk factors associated with a history of bullying are personality, family, and mass media. All of these factors have an essential role in determining the frequency and intensity of bullying behavior among adolescents. Therefore, interventions that focus on increasing empathy, self-control, and improving family communication are strategic steps in reducing the incidence of bullying.

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Effectiveness of *Areca Catechu* (Betel Nut) Extract on the Mortality of *Aedes Aegypti* and *Anopheles* Larvae: A Laboratory Experimental Study

Rolyn Frisca Djamanmona[1], Yowel Kambu[2], Nurul Kartikasari[3], Alva Cherry Mustamu[4]

[1,2,3,4] *Departement of Nursing, Health Polytechnic of Health Ministry, Sorong, Southwest Papua, Indonesia*

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CORRESPONDENCE

E-mail: rolyndjamanmona@poltekkessorong.ac.id

A B S T R A C T

Vector-borne diseases such as dengue fever and malaria continue to pose significant global public health challenges. The increasing resistance of mosquito vectors to synthetic insecticides underscores the urgency for exploring plant-based larvicidal alternatives. This study evaluates the effectiveness of *Areca catechu* (betel nut) extract on the mortality of *Aedes aegypti* and *Anopheles* spp. In addition, it analyzes the concentration at which its toxic effect is most optimal. Furthermore, it compares the extract's efficacy against *Aedes aegypti* and *Anopheles* spp. This investigation was a laboratory-based experimental study employing a post-test only control group design. One thousand two hundred third-instar larvae (600 A. aegypti, 600 Anopheles spp.) were randomly assigned to six groups: five treatment groups (from 1000to 10,000 ppm concentrations) and one negative control. Larvae were exposed to *Areca catechu* seed extract for 24 hours. Mortality data were analysed using one-way ANOVA with Bonferroni post-hoc tests, and LC_{50} and LC_{90} values were estimated via probit regression. Larval mortality increased significantly with extract concentration (p<0.001). At a 10,000-ppm concentration, mortality reached 100% in A. aegypti and 98% in Anopheles spp. Notably, *A. aegypti* exhibited greater susceptibility, with lower LC_{50} values (3180.42 ppm vs 3536.55 ppm). These differences were statistically significant across nearly all concentration levels. Thus, *Areca catechu* extract demonstrates potent, dose-dependent larvicidal activity against *Aedes aegypti* and *Anopheles spp*. The extract at 10,000 ppm within 24 hours achieved 100% mortality in *Aedes aegypti* and 98% in *Anopheles* spp. Furthermore, *Aedes aegypti* indicates a higher susceptibility to the extract.

INTRODUCTION

Mosquito-borne diseases, such as dengue hemorrhagic fever (DHF) and malaria, persist as significant global public health challenges. According to the World Health Organization (WHO), over 390 million dengue infections occur annually. At the same time, approximately 241 million cases of malaria were reported worldwide in 2021, with most cases concentrated in tropical and subtropical regions (WHO, 2022). The primary vectors of these diseases are *Aedes aegypti* and *Anopheles* spp., which thrive in stagnant and unhygienic aquatic environments. The increasing resistance to synthetic insecticides, along with their ecological and toxicological consequences, highlights the urgent need for the development of eco-friendly and effective plant-based vector control alternatives (Onen *et al.*, 2023; de Oliveira *et al.*, 2025; Kasman *et al.*, 2025).

One promising approach is the utilization of botanical insecticides derived from bioactive plant compounds. In recent years, scientific interest has grown in phytochemicals such as alkaloids, flavonoids, tannins, and saponins as potential natural larvicides. *Areca catechu* L. (betel nut) contains these compounds. It has demonstrated potential as an efficient biopesticide. Experimental studies reported that

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betel nut extract could induce significant mortality in *Aedes aegypti* larvae, with death rates reaching 100% at a 10% concentration within 12 hours of exposure (Martianasari and Hamid, 2019; Bharathithasan *et al.*, 2021; Aziz, Badruttamam and Rikadyanti, 2023).

Developing broad-spectrum botanical larvicides is essential to support integrated vector management (IVM) strategies. Prior investigations examined the larvicidal properties of *Areca catechu* extract against mosquito larvae. However, comparative studies assessing its efficacy against the primary vector species—*Aedes aegypti* and *Anopheles* spp.—are limited. Moreover, the lack of comprehensive data on the toxicity and effective concentration of *Areca catechu* extract for *Anopheles* larvae needs further investigation. Previous studies were often limited in scale and scope, with only a few studies employing robust randomized controlled experimental designs or testing a wide range of extract concentrations. For instance, Sembiring et al documented the larvicidal effects of young betel nut fruit on *Aedes* spp., but did not assess its impact on *Anopheles* spp. (Sembiring and Hasan, 2020).

Previous literature has demonstrated that bioactive compounds in plant extracts such as betel nut, soursop leaves, and citronella may serve as effective larvicides. However, the degree of efficacy and optimal concentrations vary across studies (Hossain *et al.*, 2021; Rahman, Naday and Utami, 2021; Kuka *et al.*, 2023; Syahputra and Ginting, 2024). Ongoing debates also concern the standardization of toxicity thresholds and the duration of exposure required to achieve maximal larvicidal effects.

Thus, there is a need for research that broadens the spectrum of target mosquito species and enhances methodological rigor to produce findings that can be practically implemented in community settings. The primary objective of this study is to evaluate the effectiveness of *Areca catechu* (betel nut) extract on the mortality of *Aedes aegypti* and *Anopheles* spp. larvae through a laboratory-based experimental design involving varying extract concentrations. In addition, it analyzes the concentration at which its toxic effect is most optimal. Identifying an optimal concentration of *Areca catechu* extract capable of inducing maximum larval mortality within a short exposure time can be a recommendation for developing sustainable, plant-based larvicide formulations. Furthermore, this paper compares the efficacy of the extract against *Aedes aegypti* and *Anopheles* spp.

This research can contribute to the literature on the larvicidal efficacy of *Areca catechu* while supporting ecologically based vector control strategies. It potentially provides a foundation for formulating plant-derived larvicides that are both effective and community-applicable. Its innovative contribution lies in the comparative approach across two vector species and the efficacy assessment under controlled laboratory conditions, thereby ensuring replicability and field evaluation potential.

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METHOD

The study employed a laboratory-based experimental design, specifically a post-test only control group design. This design was selected to facilitate identifying causal relationships between administering the *Areca catechu* extract (intervention) and measurable outcomes, while minimizing measurement bias due to prior observation. The independent variable in this study was the concentration of areca nut seed extract, with variations of 1000 ppm, 3000 ppm, 5000 ppm, 7000 ppm, and 10,000 ppm. The dependent variable was the mortality rate of *Aedes aegypti* and *Anopheles* spp. larvae after 24 hours of treatment. The authors used a Single-Blind approach, wherein the larval observers were unaware of the treatment groups to prevent information bias. A simple randomization procedure was employed to assign larvae to treatment groups to minimize selection bias.

The study focused on third instar larvae of *Aedes aegypti* and *Anopheles* spp., sourced from laboratory-reared colonies at the Integrated Laboratory, Poltekkes Kemenkes Sorong. Inclusion criteria specified active larvae aged 5–7 days (Third Instar) without morphological abnormalities. Exclusion criteria encompassed immobile larvae before treatment and those with bodily deformities. The sample size was calculated using Federer's formula for experiments with a completely randomized design (CRD):

$$(t-1)(r-1) \geq 15,$$

where t represents the number of treatments (five concentrations of *Areca catechu* extract plus one control, totaling 6), necessitating a minimum of 4 replications. Each group comprised 25 larvae, resulting in 6 groups × 4 replications × 25 larvae = 600 larvae per mosquito species. A randomized block design sampling technique was employed to control inter-batch variability. Larval recruitment adhered to a standardized schedule for incubation and development. The research was conducted at the Microbiology Laboratory of Poltekkes Kemenkes Sorong in a single center setting from January to March 2025. This site was selected due to its compliance with biosafety standards and the availability of mosquito culture units.

The *Areca catechu* seed extract was prepared through maceration in 96% ethanol for 72 hours, followed by filtration and evaporation using a rotary evaporator at 45–50°C to obtain a concentrated extract. The intervention involved combining the extract with 100 ml of water in a glass beaker containing 25 test larvae, with concentrations varying from 1000 to 10,000 ppm. Each group underwent a single 24-hour exposure session. The intervention protocol was designed for the Template for Intervention Description and Replication (TIDieR), incorporating a single 24-hour exposure session, a one-time administration frequency, a standardized number of larvae (25 per unit), and consistent concentration and volume across groups. All larvae were obtained from the same batch to ensure biological homogeneity. Laboratory personnel were trained according to standard operating procedures (SOPs) that covered larval inoculation

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and mortality documentation. Protocol adherence was monitored through routine observations and daily data audits. Single blinding was implemented at the observer level to mitigate information bias. The negative control consisted of distilled water (Aquadest), while a synthetic larvicide, temephos 0.02 ppm, served as the positive control. The intervention timeline is depicted in Figure 1.

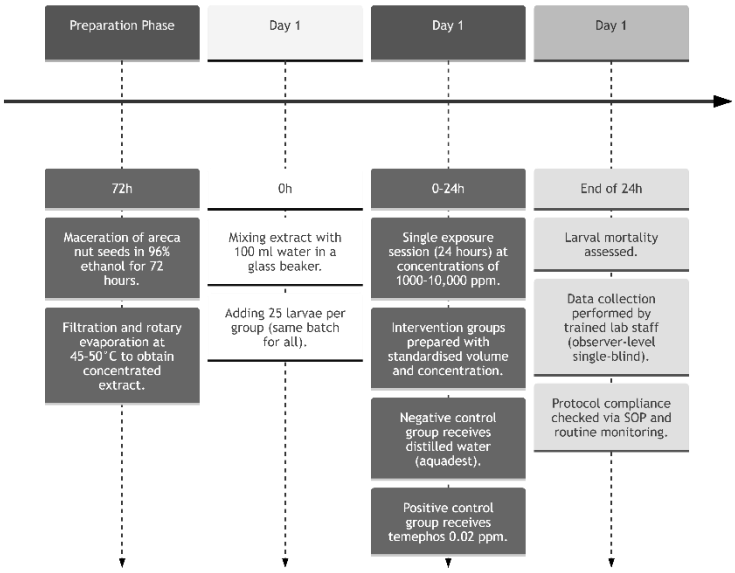

Figure 1. Timeline of Intervention Procedure with *Areca catechu* seed extract

Larval mortality data were systematically recorded using a standardized observation form, specifically a Case Report Form (CRF). Mortality was defined as the absence of movement or response to mechanical stimulation for 30 seconds or more. Observations were conducted with a 3× magnifying glass and sterile entomological tweezers. Data collection was carried out by two trained laboratory technicians and verified through a double-entry system. The procedural validity was benchmarked against the guidelines established by the World Health Organization (WHO, 2005), while interobserver reliability was evaluated using Cohen's Kappa, with a value exceeding 0.85. Quality control was maintained through daily audits and cross-verification. Data management was executed using Excel 365 software, incorporating password protection, encrypted cloud-based storage, and weekly backups on the internal server of Poltekkes Kemenkes Sorong. Instances of missing data that constituted less than 5% were addressed using complete case analysis. The data collection spanned four weeks, during which daily logbook entries were made, and hard copy forms were archived.

Data were analyzed using Jamovi version 2.4.8, with statistical significance established at $p<0.05$. The primary analysis employed a One-Way ANOVA to evaluate differences in larval mortality among treatment groups, followed by Bonferroni post-hoc tests to identify significantly different groups. The Authors utilized the Kruskal–Wallis test for data not normally distributed. The secondary analysis

involved estimating LC_{50} and LC_{90} values through Probit regression. Missing data were addressed via listwise deletion due to their minimal proportion. No interim analysis was conducted, as the study design was short-term and involved a single intervention session. A per-protocol comparison approach was applied, as no dropouts or crossover interventions existed.

Ethical approval for this study was obtained from the Health Research Ethics Committee of Poltekkes Kemenkes Sorong, certificate number: 014/KEPK/FKM-UX/I/2025. As the research involved mosquito larvae and did not include human or vertebrate animal subjects, informed consent was deemed unnecessary. Experimental data was securely stored with encryption, ensuring the absence of identifiable information. The study was free from conflicts of interest and was self-funded by the authors. Raw data can be accessed upon request through the institutional repository, with access limited to scientific purposes. Any significant amendments to the protocol will be submitted to the ethics committee for approval. Safety monitoring procedures were not implemented due to the minimal risk and the exclusion of higher-order organisms in this study.

RESULT

The Number of the Samples

This study employed 1,200 mosquito larvae, comprising 600 *Aedes aegypti* larvae and 600 *Anopheles* spp. larvae. Each species was divided into six groups: five treatment groups exposed to varying concentrations of *Areca catechu* seed extract (1,000 ppm, 3,000 ppm, 5,000 ppm, 7,000 ppm, and 10,000 ppm), and one negative control group (without extract). Each group consisted of 25 larvae, with four replicates per group.

Table 1. The Number of the Samples

Mosquito Species	Number of Larvae per Group	Number of Groups	Total Larvae
Aedes aegypti	25	6	600
Anopheles spp.	25	6	600

Table 1 presents the distribution of larvae by species, the number of treatment groups, and the total number of larvae used in the study. Most larvae were in the third instar stage, exhibiting normal morphological features and motor activity before intervention. All larvae originated from the same laboratory colony to ensure biological homogeneity.

Larval Mortality After *Areca catechu* Seed Extract Exposure

The experiment assessed larval mortality after 24 hours of exposure to different *Areca catechu* seed extract concentrations. Statistical analysis was performed using one-way ANOVA and a Bonferroni post-hoc test to determine significant differences between groups.

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Table 2. Mean Larval Mortality (%) After 24 Hours of *Areca catechu* Seed Extract Exposure

Concentration (ppm)	*Aedes aegypti* (mean ± SD)	*Anopheles* spp. (mean ± SD)
1000	26% ± 4.08	22% ± 5.20
3000	48% ± 3.54	42% ± 4.15
5000	76% ± 2.94	70% ± 3.67
7000	92% ± 2.16	88% ± 2.92
10000	100% ± 0.00	98% ± 1.15
Control (0 ppm)	2% ± 0.88	3% ± 1.22

The ANOVA test revealed statistically significant differences ($p<0.001$) in larval mortality for *Aedes aegypti* and *Anopheles* in the treatment groups. Post-hoc comparisons indicated that the most pronounced differences occurred at 5,000 ppm and above compared to lower concentrations and the control (Table 2).

Subgroup Analysis by Mosquito Species

Further analysis was conducted to compare the response of each mosquito species to identical concentrations of the *Areca catechu* seed extract.

Table 3. Comparison of Larval Mortality Between Species and the Independent t-test Result

Concentration (ppm)	Mean Mortality Difference (%) *	*p*
1000	4.00	0.042
3000	6.00	0.015
5000	6.00	0.008
7000	4.00	0.021
10000	2.00	0.098

* Mean Mortality Difference = Mean Mortality of *Aedes aegypti* − *Anopheles* spp.

Aedes aegypti generally exhibited slightly higher larval mortality rates than *Anopheles* at all *Areca catechu* seed extract concentrations. These differences were statistically significant at nearly all concentration levels ($p<0.05$), except at the highest concentration of 10,000 ppm (Table 3).

Estimation of LC_{50} and LC_{90} Values

To assess the toxicological effectiveness of the *Areca catechu* seed extract, a Probit regression analysis was conducted to estimate the lethal concentration values required to induce 50% (LC_{50}) and 90% (LC_{90}) mortality among larvae.

Table 4. LC_{50} and LC_{90} Values for *Areca catechu* Seed extract

Species	LC_{50} (ppm)	LC_{90} (ppm)
Aedes aegypti	3180.42	5832.77
Anopheles spp.	3536.55	6248.93

The LC_{50} and LC_{90} values were lower in *Aedes aegypti*, indicating that this species was more sensitive to all concentrations *of catechu* seed extract than *Anopheles* spp (Table 4).

DISCUSSION

This study demonstrated that the *Areca catechu* extract exhibited significant larvicidal efficacy against *Aedes aegypti* and *Anopheles* spp. Larvae. The increasing concentrations of the extract directly correlated

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with elevated larval mortality. Mortality rates reached 100% for *Aedes aegypti* and 98% for *Anopheles* at a concentration of 10,000 ppm within 24 hours. This finding was statistically significant ($p<0.001$) and consistent across treatment groups (Table 2). Thus, the results of this study reinforce *Areca catechu*'s potential as a natural larvicide due to its bioactive compounds.

The LC_{50} and LC_{90} values confirmed that *Aedes aegypti* was more sensitive to the extract than *Anopheles* spp. (Table 4). The result aligns with the study's aim to compare the toxicity of *Areca catechu* seed extract against both tropical disease vectors. This study's aim is particularly relevant given the increasing resistance of mosquito vectors to synthetic larvicides and the growing demand for natural, biodegradable, and sustainable vector control agents. This finding strengthens the idea that *Areca catechu* is a competent and applicable phytolarvicide within environmentally based vector management strategies.

The substantial larvicidal efficacy of *Areca catechu* extract is likely attributable to its secondary metabolites, including arecoline, tannins, flavonoids, and saponins. Those are recognized for their insecticidal and neurotoxic properties. Arecoline, the principal alkaloid in the seed, has been demonstrated to disrupt the larval nervous system, resulting in paralysis and subsequent death. Tannins and saponins function as antinutrients and biological surfactants, damaging cell membranes and interfering with the larvae's osmoregulatory processes (Bharathithasan *et al.*, 2021; Sun *et al.*, 2024). These findings align with previous studies that reported the larvicidal activity of *Areca catechu* extracts against *Aedes* spp., where mortality rates reached 90–100% at higher concentrations (Noya, Rahardjo and Prakasita, 2022; Nawarathne and Dharmarathne, 2024).

This study's novel contribution demonstrated that such larvicidal effectiveness also extends to *Anopheles* spp., although with slightly reduced sensitivity. A noteworthy finding was the significant difference in mortality between the two species. *Aedes aegypti* exhibited higher mortality rates at equivalent concentrations compared to *Anopheles* spp. This discrepancy may be due to interspecies differences in cuticular physiology, integument permeability, and neural sensitivity.

Research by Lu et al. indicated that variability in the expression of detoxification enzymes, such as cytochrome P450, could influence larval tolerance to toxic agents (Lu, Song and Zeng, 2021). Several findings diverged from initial expectations, notably the inability of 10,000 ppm to achieve 100% mortality in *Anopheles* spp. It may be attributed to biological variability among larvae, microenvironmental resilience, or inconsistent exposure due to larval movement. Thus, ensuring uniform extract distribution and meticulously monitoring microenvironmental conditions during experiments is essential. Theoretically, this research enhances the understanding of plant-derived secondary metabolites as biological insecticidal agents.

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This paper corroborates ecotoxicological theories that phenolic compounds and alkaloids can induce significant physiological disruptions in target organisms through enzyme inhibition and cellular membrane damage (Rahman *et al.*, 2021; Ecevit *et al.*, 2022; Nisa *et al.*, 2024; De Rossi *et al.*, 2025; Elbouzidi *et al.*, 2025). It also advocates integrating ethnobotanical knowledge into developing modern, locally based larvicidal solutions. The practical implications of this study are substantial, particularly for Integrated Vector Management (IVM) programs.

Areca catechu extract, locally accessible and easily processed, represents a promising alternative to conventional insecticides—cost-effective, effective, safe, and community-empowering. The potential for ethanol- or water-based formulations in liquid or solid forms presents opportunities for environmentally friendly household larvicide products. Implementing these study findings could be advantageous in regions endemic to dengue and malaria, particularly rural areas with limited access to synthetic larvicides. Moreover, the ecological impact of plant-based larvicides is anticipated to be less detrimental to non-target organisms and aquatic ecosystems than organophosphate compounds such as temephos. So, the urgency of transitioning to ecologically based vector control strategies is critical, aligning with the Sustainable Development Goals (SDGs), notably Target 3.3 (combating communicable diseases) and Target 3.9 (reducing exposure to hazardous chemicals).

However, this study presented several limitations that warrant consideration. Firstly, the laboratory-based design did not fully replicate the natural environmental conditions of larval habitats, such as temperature variations, pH, predators, or other environmental contaminants. Secondly, the 24-hour exposure duration might be inadequate to capture sub-lethal and long-term toxic effects, such as disruptions in larval development or adult mosquito reproduction. Thirdly, although the sample size was statistically sufficient, its generalizability across larval populations from different geographic regions remains limited. Future studies are recommended to include semi-field and field trials to assess the stability and efficacy of the extract under more complex environmental conditions. Toxicological assessments on non-target organisms such as fish, plankton, and amphibians are also necessary to evaluate ecological risks. Additionally, studies on extract formulation and encapsulation techniques are essential to enhance the stability of active compounds and facilitate practical application. Evaluating the extract's efficacy against other mosquito species, such as *Culex quinquefasciatus*, may also help establish a broader spectrum of activity.

CONCLUSION

Areca catechu extract demonstrates potent, dose-dependent larvicidal activity against Aedes aegypti and Anopheles spp. The extract at 10,000 ppm within 24 hours achieved 100% mortality in Aedes aegypti and

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98% in Anopheles spp. Furthermore, Aedes aegypti indicates a higher susceptibility to the Areca catechu seed extract. This paper validates the bioactive potential of phytochemical constituents such as arecoline, saponins, and tannins in vector control. In addition, the comparative approach across multiple vector species represents a novel contribution, addressing a key gap in the current literature. Despite methodological constraints—including the absence of field validation and limited species range—the study establishes a foundational basis for developing sustainable, plant-derived larvicidal agents. Future investigations should focus on semi-field evaluations, formulation stability, and scalability for public health implementation. The findings offer practical relevance for integrating phytochemical-based strategies into community-level vector control programs, particularly in dengue and malaria-endemic regions, thereby supporting eco-friendly and sustainable disease prevention frameworks.

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Formation of Self-Concept and Labeling in Adolescents

Nurannisa Sawitri[1], Ati Kusmawati[2]

[1,2] Study Program of Social Welfare Science, Faculty of Social and Political Sciences, University of Muhammadiyah Jakarta, Indonesia

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CORRESPONDENCE

E-mail: ninisninis481@gmail.com

A B S T R A C T

Labeling can be formed due to a negative gap in their social environment among adolescents. The formation of self-concept is also obtained from interaction with the social environment. This paper investigates the correlation between labelling and self-concept formation in adolescents. It used the correlational quantitative method to analyze the correlation between variables. It was conducted from February to March 2024 at the Islamic Junior High Schools, MTs. Miftahul Huda and MTs. Baitis Salmah in Ciputat District. The population was 228 students aged 12 - 16 years from the two schools. It was selected using a stratified random sampling technique. Data collection used a questionnaire. Data analysis utilized SPSS version 22. Based on the t-test results, the t-count value of 10.213 was greater than the table value of 1.978, and p=0.000 ($p<0.05$), so labeling significantly influenced the formation of self-concept. Based on the results of the F test, the calculated F value was 104.302 with a significant level of 0.000 ($p<0.05$). The regression coefficient of the labelling variable was 0.844, indicating the direction of influence of the labelling variable on the self-concept variable was positive. The coefficient test showed that the coefficient of determination (R Square) was 0.440, indicating that labeling significantly contributed to self-concept formation in adolescents by 44% and other factors influence the remaining 56%. Thus, the effect of labeling on self-concept formation among adolescents is quite significant and has a positive impact.

INTRODUCTION

Adolescence is a period of significant curiosity in trying new things and seeking identity through forming an individual's self-concept. Their introduction to the environment will be broader, and they will meet with various individuals. The good or bad environment in which an individual joins will impact the development of the individual. Suppose the environment is good and has a positive direction. In that case, the individual will also get good things, and vice versa.

However, they often get labels or nicknames from other people during adolescence. Labeling is an assessment given to an individual so that it becomes an identity for that individual. This condition will impact the individual, resulting in a change in role, tending to follow according to the label given. If an individual is negatively labeled, it will affect their expectations of themselves and their psychological and self-concept. In negative labeling, individuals will think they are worthless and cannot do anything because they already have thoughts following the negative label. It will indirectly affect the self-concept of adolescents (Meilanda, 2020).

Interactions and experiences from the environment will form a self-concept in individuals. A view, thoughts, and feelings about oneself grow an individual's self-image, self-esteem, self-role, self-ideal, and self-identity. In the interaction process, an individual will get reciprocity from others, such as receiving

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responses or perceptions about themselves. It will become their assessment of self-concept. Adolescence is the best period for forming a self-concept because the various things they go through and the transition to adulthood allow them to find their identity. They will also experience physical changes that form a self-image and become the basis for forming self-concept (Dongoran and Boiliu, 2020).

Edwin M. Lemert has two assumptions regarding labeling: (1) Labels are intended not because individuals are against the norm; (2) Labels are intended because they deviate from existing norms. In the labeling process, an identity is given to an individual or group due to another individual's judgment. Labeling can be found anywhere, including in the school environment. Students in adolescence are still in the stage of self-discovery. They explore various new things. Adolescence is also a transitional period to adulthood. During the period, they will face all the problems of becoming adults (Bernburg, 2010).

Carl Rogers explains the theory of self-concept. It is an individual's process of fulfilling desires and expectations and solving problems through self-actualization. A good environment can support self-conception in individuals. Rogers adds that the self-actualization process requires a combination of self-image and the ideal self to become the concept of congruence. If these two things contradict or are not in line, an individual will experience incongruence. According to McLeod, this condition is because the self-image is how individuals see the image or picture of themselves now, while the ideal self is how they see themselves in the future (Nurhavina, 2022). This paper investigates the correlation between labelling and self-concept formation in adolescents.

METHOD

This study used the correlational quantitative method to analyze the correlation between variables. It was conducted from February to March 2024 at the Islamic Junior High Schools, MTs. Miftahul Huda and MTs. Baitis Salmah in Ciputat District. The population was 228 students aged 12 - 16 years from the two schools. The sample consisted of 135 respondents, 76 of whom were MTs. Miftahul Huda and 59 from MTs. Baitis Salmah. It was selected using a stratified random sampling technique. Data collection using a questionnaire was tested to be valid and reliable. There were 15 questionnaire statement items for the labelling variable and 20 for self-concept. Data analysis was conducted using SPSS version 22.

RESULT

Half of the respondents were male (53.3%), and almost half were female (46.7%). In addition, respondents aged 12 years (1.5%) and 16 years (3.7%) were smaller numbers than respondents aged 13 years (18.5%), 14 years (36.3%), and 15 years (40%) (Table 1).

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Table 1. Characteristics of Respondents by Sex and Age

Characteristics of Respondents	Frequency (n)	Percentage (%)
Sex		
Male	72	53.3
Female	63	46.7
Age (years old)		
12	2	1.5
13	25	18.5
14	49	39.3
15	15	40
16	16	3.7
Total	135	100

Based on the t-test results, the t-count value of 10.213 was greater than the table value of 1.978, and p=0.000 (p<0.05), so H0 was rejected, and Ha was accepted. Thus, labeling had a significant influence on the formation of self-concept in adolescents at MTs. Miftahul Huda and MTs. Baitis Salmah (Table 2).

Table 2. Hypothesis testing (T-test)

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	18.945	4.434		4.273	.000
	labeling	.844	.083	.663	10.213	.000

a. Dependent Variable: self-concept

Based on the results of the F test, the calculated F value was 104.302 with a significance level of 0.000 (p<0.05), so there was an influence of labeling on the formation of self-concept in respondents as a whole from the variable indicators used (Table 3).

Table 3. Hypothesis testing (F-test)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10009.191	1	10009.191	104.302	.000[b]
	Residual	12763.209	133	95.964		
	Total	22772.400	134			

a. Dependent Variable: self-concept
b. Predictors: (Constant), labeling

The regression coefficient of the labelling variable was 0.844, indicating that for every 1% increase in labeling value, the value of self-concept increases by 0.844. The regression coefficient was positive, so the direction of influence of the labelling variable on the self-concept variable was positive (Table 4).

Table 4. Statistical test (simple linear regression test)

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	18.945	4.434		4.273	.000
	labeling	.844	.083	.663	10.213	.000

a. Dependent Variable: self-concept

The coefficient test showed that the correlation or relationship value (R) was 0.663, and the coefficient of determination (R Square) was 0.440, indicating that labeling significantly contributed to self-concept

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formation in adolescents at MTs. Miftahul Huda and MTs. Baitis Salmah by 44% and the remaining 56% is influenced by other factors (Table 5).

Table 5. Statistical test (determination coefficient test)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.663[a]	.440	.435	9.796

a. Predictors: (Constant), labeling
b. Dependent Variable: self-concept

DISCUSSION

This investigation revealed the correlation between labelling and self-concept formation in adolescents. One of the impacts of labeling is a decrease in an individual's confidence level. In Tasnim's research (2020), according to Munawaroh, labelers gave labels or nicknames to an individual based on physical, family background, behavioral, and intelligence aspects. These various aspects can be a source of labeling, because labelers only see the outside picture of an individual. It is supported by the author's findings that teenagers were labeled based on these four aspects, and they get the labels from the school environment. The labels given will become a perception for the teenager in interpreting their current situation. Further, it makes teenagers have low self-confidence, doubt their abilities, and feel depressed. It is not always in negative labels; positive labels also affect their self-concept. Self-concept is formed from the interaction and reciprocity between individuals and their environment.

Based on the results of previous research by Nugrahaeni *et al.* (2019); Hariandika, (2022); and Nurhavina, (2022), deviant behavior in adolescents formed social labeling and affected the self-conception of adolescents. Those studies analyzed labeling and self-concept formation in adolescents in public schools. This study's novelty revealed that labeling's influence on forming adolescent self-concept could also occur in the school environment with Islamic values.

Individuals with a positive self-concept will have good psychology, while individuals with a negative self-concept will have psychological problems. For example, individuals labeled 'naughty' then see themselves according to the assessment of the labelers. This study's findings show that labeling significantly affected self-concept formation in adolescents at Islamic Junior High Schools. This finding supports the results of labeling theory by Edwin M. Lemert and self-concept theory by Carl Rogers. Rogers' self-concept theory states that self-concept is formed from an individual's experience and assessment.

According to Edwin M. Lemert, there are two assumptions in labeling theory. The first assumption states that labeling is intended for behavior that does not deviate from norms. This study supports Edwin's first assumption because, for example, the label 'lazy' can occur not because of a deliberate act against the norm, but because it is an internal condition of the individual. Meanwhile, the second assumption is that labeling is intended to reinforce deviance and is already against the norm. The findings of this study also

support Edwin's second assumption, because, for example, the label 'naughty' reinforces the occurrence of deviations from the norm that occur from the influence of perceptions of the label. In addition, this finding is proven by Edwin's assumption of labeling theory and supported by research by Burlian (2016), which shows that labeling can occur in any situation in individuals (Burlian, 2016).

According to Carl Rogers, a combination of self-image and ideal self is essential to achieve self-actualization and create congruence. Still, if the two structures are not interrelated, there will be incongruence. The findings of this study are also supported by Nurhavina's opinion (2022), which says that incongruence occurs due to obstacles in an individual's self-actualization process. In addition, the self-image in individuals who get a negative label does not affect their ideal self in achieving self-actualization.

CONCLUSION

The effect of labeling on self-concept formation among adolescents at MTs. Miftahul Huda and MTs. Baitis Salmah is quite significant and has a positive impact, indicating that if an individual is labeled negatively, their self-concept will become negative.

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Evaluation of INA-CBGs Tariffs in BPJS Outpatients as an Effort to Control Quality and Costs at the ENT Polylinic of Surabaya Islamic Hospital

Andi Roesbiantoro[1], Budhi Setianto[2,3], Agus Aan Adriansyah[4], Rizka Dany Afina[5], Diah Retno Kusumawati[6], Nikmatus Sa'adah[7]*

[1,5,6] Department of Medicine, Faculty of Medicine, Universitas Nahdlatul Ulama Surabaya, 60237 Surabaya, East Java, Indonesia
[2] Head of Administration and Human Resources, RS Islam Surabaya Ahmad Yani, 60243 Surabaya, East Java, Indonesia
[3,4] Department of Public Health, Faculty of Health, Universitas Nahdlatul Ulama Surabaya, 60237 Surabaya, East Java, Indonesia
[7] Dentistry Professional Study Program, Faculty of Dental Medicine, Institut Ilmu Kesehatan Bhakti Wiyata, Kediri, Indonesia

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CORRESPONDENCE

E-mail: budhisetianto@unusa.ac.id

A B S T R A C T

This study aims to analyse shifts in demographic profiles and evaluate INA-CBGs tariffs in BPJS outpatients at the ENT Polylinic of Surabaya Islamic Hospital from 2023 to 2024. It was a quantitative descriptive design with an evaluative approach. The population included all medical records and hospital cost information. The sample was selected based on specific criteria reflecting dominant cases during 2023 and 2024. Data collection techniques involved a documentary study of BPJS claim files in TXT format. Data analysis was performed by comparing INA-CBGs rates with unit costs calculated using the Activity-Based Costing (ABC) method. Results showed a shift in demographic profile in BPJS outpatients at the ENT Polylinic of Surabaya Islamic Hospital from 2023 to 2024, with an increase in females and the age groups of adults and older people. Hospital costs for consultation decreased, while nursing, medications, and equipment rental increased. Despite the overall decline in outpatients handled by the ENT Polylinic, hospitals could still increase the difference between hospital costs and claims. It indicates an improvement in claim management efficiency. In conclusion, hospitals should adapt to changes in patient demographic profiles, which are increasingly dominated by older people with chronic disease risks, potentially increasing the cost burden. The results of this study could be a basis for developing more adaptive service management strategies, emphasizing the strengthening of primary care, chronic disease control, and the implementation of an integrated health information system to ensure hospital efficiency and service quality.

INTRODUCTION

Implementing the National Health Insurance (*Jaminan Kesehatan Nasional* or JKN) program managed by the Social Security Agency on Health (*Badan Penyelenggara Jaminan Sosial Kesehatan* or *BPJS Kesehatan*) has brought significant changes to the healthcare financing system (Cheng *et al.*, 2025). The Indonesian Case-Based Groups (INA-CBGs) payment system has become the tertiary referral hospitals' standard claim mechanism. This mechanism pays healthcare costs in packages based on the patient's diagnosis, aiming to enhance efficiency, control costs, and maintain the quality of healthcare services (Widayati and Estiningtyastuti, 2022). However, in the ENT (Ear, Nose, and Throat) Polyclinics, an imbalance existed between INA-CBG rates and actual hospital costs (Roesbianto *et al.*, 2022). This imbalance can cause hospital funding deficits, ultimately affecting the quality of patient service.

Previous research showed that the difference between INA-CBG and hospital costs could reach an average of IDR 60,174 per patient (Roesbianto *et al.*, 2022). Although seemingly minor, it becomes significant when accumulated over a high number of annual visits. The ENT Polyclinic is a strategic service unit that

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handles chronic diseases such as otitis media, sinusitis, tinnitus, and hearing disorders. Those diseases are prevalent among adult and elderly populations, impacting health and reducing patients' quality of life and productivity (Edi Kurnawan *et al.*, 2025).

Therefore, evaluating the INA-CBG rates in BPJS outpatients at the ENT Polyclinic is crucial. The issue at the ENT Polyclinic of Surabaya Islamic Hospital was cost deficits in specific hospital services (Putra *et al.*, 2024). The actual costs for medical procedures, equipment use, medications, and medical staff in ENT outpatient services often exceed the rates paid by BPJS based on INA-CBGs. This imbalance has two main impacts: first, an increasing financial burden on hospitals, which poses a risk to the sustainability of services; second, the potential for a decline in service quality due to resource constraints, limited service time, or the reduction of treatment components to control costs (Suprapto, Nita and Hermansyah, 2023).

A study by Putri and Fonna (2023) found that public hospitals serving JKN patients experienced significant disparities between INA-CBG rates and hospital costs for specific polyclinics. This mismatch prompted hospitals to implement cross-subsidies or service restrictions, ultimately impacting patient quality and satisfaction. Rahayu et al. (2022) emphasise that the tariff-cost gap must be systematically analysed to enable hospitals to design integrated quality and cost control strategies.

The urgency of this research lies in the need for data-driven interventions to prevent those ongoing systemic imbalances between tariffs and hospital costs. If not promptly evaluated and managed, the imbalance will reduce service quality, worsen hospital cash flow, and threaten the sustainability of funding for specialised outpatient services such as the ENT Polyclinic. Therefore, a thorough evaluation is needed to ensure that INA-CBGs reflect actual hospital costs and continue to guarantee service quality. This study aims to analyse shifts in demographic profiles and evaluate INA-CBGs tariffs in BPJS outpatients at the ENT Polylinic of Surabaya Islamic Hospital from 2023 to 2024.

METHOD

This study was a quantitative descriptive design with an evaluative approach. It was conducted at the ENT Polyclinic of Surabaya Islamic Hospital. The population in this study included all medical records and hospital cost information of BPJS outpatient ENT patients. The sample was selected based on specific criteria reflecting dominant cases during 2023 and 2024. Data collection techniques involved a documentary study of BPJS claim files in TXT format, which contained information about INA-CBGs tariffs, patient characteristics, and the consistency of codes and diagnoses to identify potential tariff differences between the two years. If necessary, qualitative interviews were conducted with management staff and medical personnel to obtain practical perspectives on implementing quality and cost control in the field. Data analysis was performed by comparing INA-CBGs rates with unit costs calculated using the

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Activity-Based Costing (ABC) method. Furthermore, the efficiency and quality of services were analysed based on indicators such as waiting time, drug availability, and completeness of medical procedures provided. This approach can provide a comprehensive overview of the effectiveness of the tariff system in supporting efficient and quality services.

RESULT

Table 1 indicates demographic shifts between 2023 and 2024. Female respondents increased more significantly than males, though both grew in number. Age distribution shows decline in infants, children, and adolescents, while adults, pre-elderly, and elderly groups rose notably, suggesting a 2024 profile dominated by older age groups.

Table 1. Patient Demographic Profiles at the ENT Polylinic of Surabaya Islamic Hospital in 2023 and 2024

Patient Demographic Profiles	2023		2024	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Sex				
Male	798	41	884	40.6
Female	1,133	59	1,294	59.4
Age Group				
Infants	16	1	9	0
Toddler	271	12	292	13
Children	198	8	146	6
Teenagers	523	22	222	10
Adults	411	18	538	23
Pre-elderly	411	18	522	23
Elderly	512	22	575	25
Total	2,342	100	2,304	100

From 2023 to 2024, hospital cost proportions shifted. Consultation fees, while still dominant, decreased by about 4%. Nursing costs rose significantly (from 1% to 5%), hospital costs increased by 2%, and equipment rental grew to 2%. Meanwhile, accommodation and radiology costs dropped by 2% and 1%, respectively. Overall, total hospital costs increased with a more diverse distribution, shifting from consultation services toward supporting aspects like nursing, medicine, and equipment rental.

Table 2. Hospital Costs in the ENT Polylinic at Surabaya Islamic Hospital in 2023 and 2024

Hospital Services	2023 (IDR)	Percentage (%)	2024 (IDR)	Percentage (%)
Non-Surgical Procedures	8,920,000	3	5,260,000	2
Consultation service	116,300,000	45	131,122,900	41
Nursing	2,025,000	1	14,505,000	5
Support	60,000	0	1,583,000	0
Radiology	4,315,000	2	4,592,700	1
Laboratory	250,000	0	840,000	0
Ticket	58,010,000	23	65,510,000	21
Medicine	66,224,954	26	88,767,225	28
Equipment Rental	375,000	0	5,489,300	2
Total	256,479,954	100	317,670,125	100

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Table 3 demonstrates that overall, the number of patients handled by the ENT Outpatient Clinic decreased from 2023 to 2024. However, the total cost difference between INA-CBGs tariffs and hospital costs increases, indicating improvements in INA-CBGs claim management and an increase in the value of claims for several types of services. Although the number of patients with minor chronic diseases decreases, the financial burden remains high. This situation indicates that patients are still highly dependent on these services. Thus, chronic disease control strategies should be strengthened to make hospital financing more efficient.

Table 3. The Cost Differences between INA-CBGs Tariffs with Hospital Costs in 2023 and 2024

Hospital Services	2023				2024			
	n	Hospital costs (IDR)	INA-CBGs (IDR)	Differences (IDR)	n	costs (IDR)	INA-CBGs (IDR)	Differences (IDR)
Minor Chronic Illness	1,896	255,334,824	390,386,400	135,051,576	1,719	223,213,980	352,686,600	129,472,620
Ear, nose, mouth, and throat Procedures	105	17,297,000	33,904,500	16,607,500	119	17,719,539	38,085,500	20,365,961
Ear, Nose, Mouth, and Throat Tests	70	27,123,700	21,987,000	5,136,700	29	5,568,056	9,089,200	3,521,144
Consultation or Other Examinations	66	6,929,181	10,137,600	3,208,419	1	795,400	424,300	-
Other Minor Acute Illnesses	27	3,462,900	5,775,300	2,312,400	62	8.897.979	13,241,700	4,343,721
Total	2,164	310,147,605	462,190,800	152,043,195	1,930	256,194,954	413,527,300	157,332,346

There was an increase in the number of ENT procedures and cost differences. It had a positive impact because the cost differences between claims and hospital costs were quite profitable, thereby increasing the positive contribution to hospital finances. In contrast, the hospital incurred losses in 2023 for ENT tests because the hospital costs were higher than the INA-CBGs claims received. However, in 2024, the hospital no longer incurred losses for ENT tests (Table 3).

Consultation or other examination services in 2023 still yielded profits. Still, a significant decline in 2024 resulted in losses due to higher hospital costs than the claims received. Thus, re-evaluating the funding model for consultation services is crucial. Meanwhile, hospital services for other minor acute illnesses increased and provided additional hospital profits because claims were higher than the hospital costs. This condition presents a positive opportunity to enhance those services. In summary, despite the decrease in the number of patients handled by the ENT Polyclinic, the hospital managed to maintain an increase in INA-CBG claims. The main challenge was in consultation services, which incurred losses, necessitating a thorough evaluation of the INA-CBGs tariff and claim mechanisms (Table 3).

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DISCUSSION

Demographic data of BPJS outpatients at the ENT Polyclinic showed a shift from 2023 to 2024. There was an increase in the number of women outpatients. In addition, there was a decrease in the younger age groups and an increase in the adult to elderly age groups (Table 1). This pattern aligns with findings from a previous study at Surabaya Islamic Hospital, which noted that most ENT outpatients were over 50 years old and mostly diagnosed with mild chronic conditions (Arifin *et al.*, 2021). The increasing proportion of adults to elderly patients is likely linked to the characteristics of patients who frequently require repeated care or management of chronic conditions.

In addition, national data from the ENHANCE study published in 2025 showed that age and gender were the main predictors of healthcare utilisation in Indonesia. Older people groups tended to use outpatient and inpatient services more frequently (Cheng *et al.*, 2025). They also found that BPJS membership status (contributory or subsidised) did not significantly influence the use of primary care services, but age was the dominant factor. Thus, the changing demographic distribution of BPJS outpatients at the ENT Polyclinic in Surabaya, becoming the age group of older people by 2024, is not merely a local phenomenon but aligns with national trends: increasing healthcare utilization by the adult to the elderly age group, and the high prevalence of mild chronic diseases managed through outpatient clinics.

The hospital costs in the ENT Polyclinic in 2024 showed a significant shift from 2023. Despite a decrease in percentage, consultation services remained the most crucial hospital cost. In contrast, nursing and medication services showed a substantial increase. Equipment rental also increased by a larger percentage in 2024. However, accommodation and radiology services experienced a relative decline (Table 2). This phenomenon aligns with the findings of Mustafidah and Indrawati (2021). The finding identified a significant correlation between age and the utilisation of BPJS health services (p=0.011), while sex did not significantly influence (p=0.638). Given that adults and older people increasingly dominate the patient population, Sari (2023) believes there will be an increase in nursing costs and therapeutic drugs reflecting adaptation to clinical needs in older age.

That opinion is further supported by a study on polypharmacy prescribing in elderly patients. The study confirmed that older adults tended to consume more complex and multi-item drug therapies, significantly increasing pharmaceutical costs (Anggraini, 2023). Increased nursing and medications service reflects a patient profile with mild chronic conditions and repeated treatments. That might also be a reason why diagnostic services like radiology have declined. The more varied hospital cost distribution reflects the healthcare financing system's response to patient demographic profile and changes in care needs.

This paper showed that hospital cases decreased from 2023 to 2024, yet the cost difference between hospital costs and claim revenue increased (Table 3). It reflects improvements in claim management

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efficiency, although certain services still incur losses. For example, in consultation services during 2024, a negative cost difference indicated that the hospital costs were higher than the claims received. This situation aligns with the findings of the National Health System Research Institute (Kristian *et al.*, 2021), which demonstrated that the commitment-based capitation model in the JKN scheme was ineffective in reducing hospital costs due to the high number of chronic patients. In addition, a study by Imansyah et al. (2022) also revealed a negative correlation between revenue from BPJS patients and hospital financial performance indicators, indicating that the dominance of JKN claims could suppress the profitability of healthcare services (Rantung, Palandeng and Mengko, 2018).

Furthermore, chronic diseases continue to dominate the number of visits, indicating a high financial burden, despite the positive difference in hospital costs and claims (Suryani, Ciptono and Satibi, 2017). It underscores the importance of strengthening promotive and preventive services. Minimum funding for basic health services is often inadequate, leaving hospitals to bear the curative burden (Roesbianto *et al.*, 2022). A report by Fuady et al. (2024) also indicated that funding for promotive and preventive activities in Indonesia remains significantly lower than curative services, even though the activities potentially can reduce the burden of chronic care. On the other hand, acute care services in this investigation showed a positive trend in cost differences between hospital costs and claims (Table 3), indicating opportunities to strengthen these services. Angell et al. (2021) support this finding with the opinion that without preventive interventions, even mild cases can contribute significantly to the cost burden in the JKN program (Marhenta, Satibi and Wiedyaningsih, 2018).

Thus, despite the overall decline in outpatients handled by the ENT Polylinic, hospitals could still increase the cost difference between hospital costs and claims (Table 3). However, improvement strategies are crucial to avoid future losses, particularly for services with negative cost differences (Astuti, 2017). Optimising the role of primary care services, such as public health centres, and implementing an integrated electronic recording system are crucial steps to reduce hospital workload and improve cost efficiency. A study showed that implementing an Electronic Medical Record (EMR) system reduced operational costs and improved service quality (Djafar and Lellu, 2021).

CONCLUSION

In conclusion, hospitals should adapt to changes in patient demographic profiles, which are increasingly dominated by older people with chronic disease risks, potentially increasing the cost burden. This situation is relevant to national challenges in maintaining the sustainability of the JKN scheme and improving service quality based on accreditation. The results of this study could be a basis for developing more adaptive service management strategies, emphasizing the strengthening of primary care, chronic

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disease control, and the implementation of an integrated health information system to ensure hospital efficiency and service quality.

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