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## The Efficacy and Safety of Azithromycin for Patients with Cystic Fibrosis: A Systematic Review

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### A B S T R A C T

Azithromycin has antimicrobial, immunomodulatory, and anti-inflammatory effects for chronic inflammatory processes in cystic fibrosis (CF). This systematic review evaluates the effectiveness and safety of azithromycin as a potential therapy for CF patients. The authors assessed the efficacy of azithromycin using the FEV1 and the drug's safety by comparing adverse effects. Furthermore, we also reviewed secondary outcomes, consisting of Forced vital capacity (FVC) values and pro-inflammatory indicators. In addition, they consist of exacerbations, bodyweight gain, and quality of life. The authors searched the published literature using online databases PUBMED and Cochrane Library published until March 9, 2021. The keywords were "Azithromycin" and "Cystic fibrosis" with the Boolean operator "AND" with no restrictions in publication year and research design. We conducted a critical study using the Critical Appraisal Skills Program (CASP) and Jadad score to minimize bias. Findings from eight journals showed that five studies reported increased mean FEV1 after giving azithromycin in patients with CF. Three studies notified increased FVC, and four research reported decreased pro-inflammatory indicators, namely CRP, IL-8, and neutrophils. Two papers reported a significant weight gain. Two studies informed improved the patients' quality of life. In addition, three publications did not report any significant or severe side effects. The most common adverse effect informed by the other four studies were rash in two studies, diarrhea in two studies, nausea, and fever in two studies. In conclusion, we consider azithromycin administration for CF patients is relatively safe and well-tolerated.

## INTRODUCTION

Cystic fibrosis (CF) is the most life-threatening autosomal recessive disease in the United States. It is the primary cause of pulmonary and gastrointestinal system morbidity in children, leading to death in young adults (Farrell *et al.*, 2017). CF can cause an abnormality in the liver, gastrointestinal system, and male reproductive system. However, lung disease is the primary cause of morbidity and mortality in this disease. Almost every patient has an obstructive pulmonary disease associated with a chronic infection which causes progressive loss of lung function (Rafeeq and Murad, 2017). The disrupted gene in CF is chromosome 7, which codes for the cystic fibrosis transmembrane conductance regulator (CFTR) protein. Cystic fibrosis transmembrane conductance regulator functions as an ion channel and controls the movement of salt and water in and out of epithelial cells. More than 1,000 mutations in the CF gene have been identified. The most common mutation is delta F508, where there is a deletion of three base pairs at position 508 (De Boeck, 2020).

At least one of 4,000 newborns in the United States has CF, and it seems that the incidence is increasing in European countries (Farrell *et al.*, 2017). Until recently, cystic fibrosis is rarely found in the non-Caucasian population. Data about the prevalence of cystic fibrosis in Indonesia has not been documented

in the literature yet. Still, the estimated cystic fibrosis incidence in Southeast Asians is 1: 9.000 to 1: 40.0000 in the Southeast Asian population living in Canada and the United States (Ahmed *et al.*, 2020).

CFTR gene regulates the ability of the normal sweat duct epithelium to absorb chloride. Mutation of the CFTR gene will cause a disruption of chloride transport in the epithelium, causing an increase of chloride in the sweat – therefore, clinical diagnosis to establish CF is the sweat chloride test. At the same time, the airway epithelium and the gastrointestinal tract require CFTR for chloride secretion. The inability to secrete chloride into the lumen, accompanied by the increased sodium absorption, leads to water osmotic resorption from the lumen and dehydration of the mucus layer that covers the mucosal cells. Mucociliary dysfunction and accumulation of very thick secretion will eventually block the activity of the "defensin" antibacterial substances produced by the epithelium. This condition predisposes the patient to recurrent infections. Patients with a homozygous F508 delta mutation (or one of the combinations of the two severe mutations) render CFTR dysfunctional. Further, it causes CF's severe clinical manifestation (classic cystic fibrosis) and an early pancreatic insufficiency with varying degrees of lung damage (Savant and McColley, 2019).

Babies with CF mostly have moderately severe respiratory symptoms, and some of them even need to be hospitalized. Cough, tachypnea, rhonchi, and wheezing are the most common clinical symptoms. Abnormalities in lung function initially indicate a pattern of obstruction, reduced flow rate, and increased lung volume. As the disease progresses, the total lung capacity is also impaired. The incidence of airflow reactivity in CF is estimated at 25-50%, several times higher than the incidence in the general population. At first, there was a *Staphylococcus aureus* colonization, but *Pseudomonas aeruginosa* became the predominant pathogen in most people. Mucus produced from the *Pseudomonas* pathogen is associated with a rapid decline in lung function. The earliest involved lesions are hyperplasia of the mucous glands in the bronchial epithelium, mucosa, and submucosal cellular. Then there are infiltrates with dilatation of the airways. Bronchiolectasis and bronchiectasis sometimes occur afterward (Klimova *et al.*, 2017; Savant and McColley, 2019).

Treatment for CF is drugs to improve cellular processing and facilitate chloride movement across ion channels. In addition, there is gene therapy capable of delivering functional CFTR directly to the lungs. Currently, antibiotics are still the most effective way to reduce clinical signs and symptoms of disease in most CF patients. Macrolide antibiotic is one of the antibiotics used in the long term. One of them is azithromycin (Rafeeq and Murad, 2017).

Azithromycin can inhibit bacterial growth by attaching to 23S RNA at the 50S unit of the bacterial ribosome to prevent the growth of bacterial polypeptides (Acosta *et al.*, 2021). It is an immunomodulator and anti-inflammatory drug. It increases the immune system against infection and reduces the inflammatory response triggered by internal and external factors in CF patients. It modulates host defense

and reduces inflammation by interacting with structural cells such as epithelial cells, smooth muscle cells, fibroblasts, neutrophils, and mononuclear leukocytes. It ensures transepithelial integrity and resistance to permeability induced by *P.aeruginosa* virulence factors. In addition, it reduces mucin secretion and attenuates inflammatory cytokine expression. Azithromycin inhibits interleukin-8 (IL-8) release in airway smooth muscle cells and attenuates fibroblast growth factor induced by vascular endothelial growth factor (Fonseca *et al.*, 2020; Thornton, Chin and Somayaji, 2021).

Azithromycin is one of the most potent drugs in treating CF patients. It is due to its pharmacological properties. This literature review study evaluates the effectiveness and safety of azithromycin as a potential therapy for CF patients. In this study, the authors assessed the efficacy of azithromycin using the FEV1 and the drug's safety by comparing adverse effects. FEV1 is a forced expiratory volume in the first second. Furthermore, we also reviewed secondary outcomes, consisting of Forced vital capacity (FVC) values and pro-inflammatory indicators. In addition, they consist of exacerbations, bodyweight gain, and quality of life. This systematic review can contribute to the more efficient use of therapy in managing CF, especially azithromycin as one of the regimens in CF management.

## METHOD

The authors searched the published literature using online databases PUBMED and Cochrane Library published until March 9, 2021. The keywords were "Azithromycin" and "Cystic fibrosis" with the Boolean operator "AND" with no restrictions in publication year and research design. Selection criteria were publication with randomized control trial (RCT), involved CF patients of all ages, and compared placebo with azithromycin. We conducted a critical study using the Critical Appraisal Skills Program (CASP) and Jadad score to minimize bias. The data analysis was presented in descriptive narrative and tabular form.

## RESULT

The results revealed the Jadad score (Table 1), demographic data of the research population (Table 2), research design (Table 3), summary of literature review findings (Table 4), and therapeutic safety (Table 5). Table 1 shows that six studies are considered high quality (Jadad scale  $\geq 4$  points) (Equi *et al.*, 2002; Wolter *et al.*, 2002; Saiman *et al.*, 2003; Clement *et al.*, 2006; Mayer-Hamblett *et al.*, 2018; Steinkamp *et al.*, 2018). Meanwhile, one study is relatively low quality (Jadad Score  $\leq 3$ ) (Jaffe *et al.*, 1998).

Table 1 The Jadad Score on each study

No	Author	Year	Randomization	Blinding	Withdrawal/Dropout	Jadad Score
1	Jaffe et al	1998	2	0	0	2
2	A Equi et al	2002	2	2	0	4
3	Wolter et al	2002	2	2	0	4
4	Saiman et al	2003	2	2	1	5
5	Clement et al	2006	2	2	1	5
6	Steinkamp et al	2008	2	2	1	5
7	Mayer-Hamblett et al	2018	2	1	1	4

There was a total of 616 patients assessed from seven RCT studies evaluating the effect of azithromycin on CF patients ranging from 1998 to 2018 (Jaffe *et al.*, 1998; Equi *et al.*, 2002; Wolter *et al.*, 2002; Saiman *et al.*, 2003; Clement *et al.*, 2006; Mayer-Hamblett *et al.*, 2018; Steinkamp *et al.*, 2018). Most participants in two studies (Jaffe *et al.*, 1998; Wolter *et al.*, 2002) were females, while most respondents in one study (Mayer-Hamblett *et al.*, 2018) were males. The participants' age ranged from 6 months old to 18 years old. However, four studies did not mention the participants' age (Equi *et al.*, 2002; Saiman *et al.*, 2003; Clement *et al.*, 2006; Steinkamp *et al.*, 2018) (Table 2).

Table 2 Demographic data of the research population

No	Author	Year	Intervention	Total Participants/participants who completed the study	Sex (Male/Female)	Age Range (Year)	Mean ± standard deviation or median age of the Participant (Year)
1	Jaffe et al	1998	azithromycin and placebo	7/7	3/4	6-18 years old	12,1
2	A Equi et al	2002	azithromycin and placebo	41/41	Not mentioned	8-18 years old	13,8
3	Wolter et al	2002	azithromycin and placebo	60/60	M: 29 people F: 31 people	18-44 years old	27,9
4	Saiman et al	2003	azithromycin and placebo	185/184	Not mentioned	6 years old - adult (19 subjects aged < 13 years old)	Not mentioned
5	Clement et al	2006	azithromycin and placebo	82/72	Not mentioned	>6 years old	11,0 ± 3.3
6	Steinkamp et al	2008	azithromycin and placebo	40/31	Not mentioned	>8 years old	23.7
7	Mayer-Hamblett et al	2018	azithromycin and placebo	227/221	M: 117 people F: 104 people	6 months-18 years old	Group azithromycin: 7.1±5.1 Group placebo: 6.8±5.0

Furthermore, the duration of azithromycin therapy ranges from 8 weeks to 18 months. The dose of azithromycin given varies in each study; one of the considerations was participants' age (Jaffe *et al.*, 1998; Equi *et al.*, 2002; Wolter *et al.*, 2002; Saiman *et al.*, 2003; Clement *et al.*, 2006; Mayer-Hamblett *et al.*, 2018; Steinkamp *et al.*, 2018).

Table 3 Research Design



No	Author	Year	Intervention	Washout Period	Duration of Azithromycin Therapy	Dose (D) Time (T) of Azithromycin Administration
1	Jaffe et al	1998	azithromycin and placebo	Not mentioned	Not reported	Not reported
2	A Equi et al	2002	azithromycin and placebo	Two months	Six months	D: 40 kg bodyweight: 250 mg daily, >40 kg bodyweight: 500 mg daily T: once a day
3	Wolter et al	2002	azithromycin and placebo	Not mentioned	Three months	D: 250 mg T: once a day
4	Saiman et al	2003	azithromycin and placebo	Not mentioned	Six months	D: 500 mg (bodyweight>40 kg), 250 mg (bodyweight<40 kg) T: 3 times a week (Monday, Wednesday, and Friday)
5	Clement et al	2006	azithromycin and placebo	Not mentioned	12 months	D: 500 mg (bodyweight>40 kg), 250 mg (bodyweight<40 kg) T: 3 times a week
6	Steinkamp et al	2008	azithromycin and placebo	Not mentioned	Eight weeks	D: (20-29 kg bodyweight: 500 mg, 30-39 kg bodyweight: 750 mg, 40-49 kg bodyweight: 1000 mg, and ≥50 kg bodyweight: 1250 mg) T: Once a week
7	Mayer-Hamblett et al	2018	azithromycin and placebo	Not mentioned	18 months	D: 10 mg/kg bodyweight, maximum 500 mg T: 3 × a week

Five studies (71,4%) reported increased mean FEV1 after giving azithromycin in patients with CF (Jaffe et al., 2018; A Equi et al., 2002; Wolter et al., 2002; Saiman et al., 2003; Clement et al., 2006). Three studies notified increased FVC (Jaffe et al., 2018; A Equi et al., 2002; Wolter et al., 2002), while the three others did not include FVC as the study result (Clement et al., 2006; Steinkamp et al., 2008; Mayer-Hamblett et al., 2018). Four studies informed a decrease in pro-inflammatory indicators, namely CRP, IL-8, and neutrophils (A Equi et al., 2002; Wolter et al., 2002; Clement et al., 2006; Steinkamp et al., 2008). In addition, two studies reported a significant weight gain in the azithromycin group (Saiman et al., 2003; Mayer-Hamblett et al., 2018). Furthermore, two studies reported improving the patients' quality of life by receiving Azithromycin treatment (Wolter et al., 2002; Steinkamp et al., 2008) (Table 4).

Table 4 Summary of literature review findings

No	Author	Publication Year	No. of Participant/No. of Participant who completed the study	Findings	Significance value (p)
1	Jaffe et al	1998	7/7	<ul style="list-style-type: none"> <li>The median increase in FEV<sub>1</sub> in the azithromycin group was 11% (3.6 - 13.4)</li> <li>The median increase in FVC in the azithromycin group was 11.3% (-5.5 – 24.7)</li> <li>Increased oxygen saturation in the azithromycin group from 65% to 93%</li> </ul>	<p>&lt; 0.03*</p> <p>&lt; 0.03*</p> <p>No report in p-value</p>

2	A Equi et al	2002	41/41	<ul style="list-style-type: none"> <li>Increased mean FEV<sub>1</sub> in the azithromycin group</li> <li>Increased FVC in the azithromycin group</li> <li>Decreased use of additional antibiotics in the azithromycin group</li> <li>The median absolute value of IL-8 in the azithromycin vs. placebo group was 9041 g/g sputum (95% CI – 70 889 – 73 800)</li> <li>Neutrophil estalase (95% CI -12 – 6)</li> </ul>	0.031* 0.032* 0.005* >0.05 >0.05
3	Wolter et al	2002	60/60	<ul style="list-style-type: none"> <li>Increased FEV<sub>1</sub> % pred in the azithromycin group</li> <li>Increased FVC of Azithromycin</li> <li>Reduced days on providing intravenous antibiotics when acute exacerbations in the azithromycin group</li> <li>Reduced days of intravenous antibiotic use at home in the azithromycin group</li> <li>Median CRP values in the azithromycin group were lower</li> <li>Improved quality of life in the azithromycin group</li> </ul>	0.047* 0.001* 0.009 0.037* <0.001* 0.042*
4	Saiman et al	2003	185/184	<ul style="list-style-type: none"> <li>Increased mean FEV<sub>1</sub> on day-168 in the azithromycin group 0.094 L 95% CI, 0.023-0.165</li> <li>Decreased exacerbation in the azithromycin group (hazard ratio 0.65; 95% CI, 0.44-0.95)</li> <li>Weight gain in the azithromycin group was 0.7 kg more than the placebo group (95% CI, 0.44-0.95)</li> </ul>	0.009* 0.03* 0.03*
5	Clement et al	2006	82/72	<ul style="list-style-type: none"> <li>Changes in FEV<sub>1</sub> % were predicted after 12 months in the azithromycin and placebo groups (mean SD -4.3 (17.9) % vs. -1.5 (5.4) %)</li> <li>Decreased exacerbation in the azithromycin group (95% CI, 0.32-0.79)</li> <li>Reduced use of oral antibiotics in the azithromycin group (95% CI, 0.36-0.85)</li> </ul>	No report in <i>p</i> -value < 0.005* < 0.01*
6	Steinkamp et al	2008	40/31	<ul style="list-style-type: none"> <li>Changes in the mean absolute FEV<sub>1</sub> from the baseline in the two groups were not significantly different</li> <li>FEV<sub>1</sub> decreased by 4.4% (SD 14.1%) in the azithromycin group and 5.2% (SD 11.2%) in the placebo group</li> <li>Improvement of serum CRP values in the azithromycin group (+0.9µg/ml)</li> <li>Improved quality of life in the azithromycin group (weight gain, respiratory symptoms, and eating disorders)</li> </ul>	0.708 0.826 0.019* <0.05*
7	Mayer-Hamblett et al	2018	227/221	<ul style="list-style-type: none"> <li>Change in mean FEV<sub>1</sub>% pred at 18 months (95% CI -7,76,4,34)</li> <li>Decreased exacerbations in the azithromycin group (95% CI 0.37, 0.83)</li> <li>Weight gain of 1.27 kg in the azithromycin group (95% CI 0.01-2.52)</li> </ul>	0.384 0.004* 0.046*

Table 5 indicates the adverse events of azithromycin. One study did not report any side effects (Jaffe *et al.*, 1998), and two studies did not report any significant or severe side effects (Equi *et al.*, 2002; Mayer-Hamblett *et al.*, 2018). The most common adverse effect reported by the other four studies were rash in two studies (Wolter *et al.*, 2002; Clement *et al.*, 2006), diarrhea in two studies (Saiman *et al.*, 2003; Clement *et al.*, 2006), nausea, and fever in two studies (Clement *et al.*, 2006, Steinkamp *et al.*, 2008).

Table 5 Therapeutic Safety

No	Author	Year	Therapeutic Safety
1	Jaffe et al	1998	Not reported
2	A Equi et al	2002	No side effects appeared during the study
3	Wolter et al	2002	Urticaria, neutropenia, rash
4	Saiman et al	2003	Nausea, diarrhea, and wheezing
5	Clement et al	2006	Headache, diarrhea, nausea, rash, and fever
6	Steinkamp et al	2008	Pain, fever, nausea, and sneezing
7	Mayer-Hamblett et al	2018	There were no severe side effects

## DISCUSSION

Cystic fibrosis (CF) is a fatal autosomal recessive genetic disease that mainly affects the lungs and digestive system (Fonseca *et al.*, 2020). A hereditary mutation in the cystic fibrosis transmembrane conductance regulator (CFTR) causes this disease. As a result, there are impaired sodium and bicarbonate ion transporters, causing an increase in pH and mucus viscosity (Patel, Bono, and Rowe, 2020). Increased mucus viscosity causes impaired mucociliary action and the accumulation of very thick secretion that prevents the activity of antibacterial substances produced by the epithelium. Most infants with CF have respiratory problems, so adequate therapy is needed to reduce respiratory symptoms (Rafeeq and Murad, 2017). Azithromycin is a therapy that has been used for a long time by clinicians to reduce bothersome respiratory symptoms in CF patients. Azithromycin has microbiological, immunomodulatory, and anti-inflammatory effects. After giving azithromycin, the improvement in lung function is assessed by the mean value of FEV<sub>1</sub> (Fonseca *et al.*, 2020).

This systematic review showed that most studies were conducted outside of Asia. It may be because the prevalence of CF in non-Caucasian populations is not widely reported (Ahmed *et al.*, 2020). In addition, six journals were conducted more than ten years ago, and only one study in 2018. Furthermore, five (71.4%) publications reported an increase in mean FEV<sub>1</sub> after giving azithromycin to patients with CF (Jaffe *et al.*, 2018; A Equi *et al.*, 2002; Wolter *et al.*, 2002; Saiman *et al.*, 2003; Clement *et al.*, 2006).

Inflammation is a significant focus in the pathogenesis of lung disease in CF. Therefore, preventing the overproduction of inflammatory factors is the primary strategy to improve lung function and survival rates. One of the most common worldwide prescribed anti-inflammatory drugs is azithromycin. Azithromycin is an anti-inflammatory agent. It inhibits the release of pro-inflammatory mediators, prevents neutrophil

aggregation, regulates mucus secretion, and prevents the formation of the *P.aeruginosa* biofilm matrix. In addition, there are reports that azithromycin in vivo can restore chloride efflux function in CF patients (Samson *et al.*, 2016).

The Cochrane study demonstrated that giving low-dose azithromycin for 6-12 months could improve lung function. In addition, it reduced exacerbations, the need for antibiotics, and gained weight in CF patients. Furthermore, five-year survival increased to 95% in patients with diffuse panbronchiolitis (Samson *et al.*, 2016). This efficacy of azithromycin is used as CF therapy to improve lung function. However, our findings revealed no significant change in mean FEV1 in the azithromycin group in the two studies. It may be due to the small number of samples studied (<60) and the wide variation in FEV1 assessments (Steinkamp *et al.*, 2008; Mayer-Hamblett *et al.*, 2018).

This literature review also assessed several secondary outcomes. One of them was the value of forced vital capacity (FVC). Three studies found a significant increase in FVC in the azithromycin group (Jaffe *et al.*, 2018; A Equi *et al.*, 2002; Wolter *et al.*, 2002). Meanwhile, another research did not include the FVC test (Clement *et al.*, 2006; Steinkamp *et al.*, 2008; Mayer-Hamblett *et al.*, 2018). In addition, four studies showed a significant reduction in the need for intravenous and oral antibiotics in the azithromycin group. In addition, they revealed decreased (c-reactive protein) CRP, Interleukin-8 (IL-8), and neutrophils in the azithromycin group. Furthermore, they found reduced recurrence/exacerbation rates in the azithromycin group (A Equi *et al.*, 2002; Wolter *et al.*, 2002; Clement *et al.*, 2006; Steinkamp *et al.*, 2008). Two studies demonstrated significant weight gain and quality of life in the azithromycin group (Saiman *et al.*, 2003; Mayer-Hamblett *et al.*; 2018). The last secondary outcome evaluated was the quality of life. Two studies described the improved quality of life in CF patients receiving azithromycin intervention. Quality of life assessment consisted of respiratory disorders, eating disorders, and emotional complaints (Wolter *et al.*, 2002; Steinkamp *et al.*; 2008).

This research also indicated that azithromycin had good therapeutic safety to improve lung function in CF patients. In all studies reviewed, three studies (42.8%) did not report any significant adverse events from using azithromycin (Jaffe *et al.*, 1998; A Equi *et al.*, 2002; Mayer-Hamblett *et al.*, 2018). Meanwhile, other publications informed that the adverse events were urticarial and neutropenia. Its adverse events were also gastrointestinal disturbances, wheezing, fever, and rash (Wolter *et al.*, 2002; Saiman *et al.*, 2003; Clement *et al.*, 2006; Steinkamp *et al.*, 2008).

## CONCLUSION

In conclusion, we consider azithromycin administration for CF patients is relatively safe and well-tolerated. Further research should evaluate the long-term effects of Azithromycin in CF patients.

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## Analysis of Knowledge and The Ability to Use Poedji Rochjati Score Cards in Pregnant Women Among Cadres

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### A B S T R A C T

Cadres and health workers can collaborate in the early detection of pregnant women by using the Poedji Rochjati Score Card (PRSC) to reduce maternal and infant mortality rates. This study aims to analyze the correlation between knowledge and the ability to use Poedji Rochjati Score Card in pregnant women among cadres. This study used a quantitative design with an analytical survey method, and the approach was a cross-sectional study. The population was 33 cadres, while the sample was 33 respondents with a total sampling technique. The independent variable was the cadre's knowledge regarding PRSC, and the dependent variable was the cadre's ability to use PRSC in pregnant women. An instrument to measure the cadre's knowledge was a questionnaire. In addition, the assessment of the cadre's ability to use PRSC used an observation sheet. After the data were collected, there was a bivariate analysis using the chi-square statistical test with a value of 0.05. Results showed that most cadres had less knowledge regarding PRSC (78.8%) and could not use PRSC in pregnant women (84.8%). Most cadres with less knowledge regarding Poedji Rochjati Score Card could not use PRSC in pregnant women (78.8%). The statistical tests obtained  $p=0.000$  ( $p<0.05$ ). Thus, there was a correlation between knowledge and the ability to use PRSC in cadres. In conclusion, cadres' knowledge correlates with their ability to use PRSC. Cadres with less knowledge cannot use PRSC. So, it is necessary to increase cadres' understanding by providing education and training by health workers.

## INTRODUCTION

Cadres and health workers can collaborate in the early detection of pregnant women by using the Poedji Rochjati Score Card (PRSC) to reduce maternal and infant mortality rates. Cadres are the front liners in screening high-risk pregnant women. However, their lack of knowledge regarding PRSC is an obstacle to cooperating with midwives, especially in conducting early detection among pregnant women in the community (Rizki, Masruroh and Bhayusakti, 2022).

A study revealed that before cadre class, knowledge of PRSC in cadres was less (Retnaningtyas, 2022). So, it is necessary to provide audiovisual media counseling to improve cadres' skills in the early detection of pregnant women (Miswanti, Pratamaningtyas and Yanuarini, 2019). Thus, giving education to cadres could enhance their knowledge and skills in using PRSC.

Evaluation of the cadre's understanding and ability to use the Poedji Rochjati Score Card is crucial. When cadres can properly detect high-risk pregnant women early, health workers can more quickly provide health care. Thus, it can prevent pregnancy complications (Anggraini *et al.*, 2020).

Given that early detection of pregnant women by cadres has a vital role in maternal and infant health, the authors investigated the cadres' ability to use the Poedji Rochjati Score Card. This study aims to analyze

the correlation between knowledge and the ability to use Poedji Rochjati Score Card in pregnant women among cadres (Simanungkalit, Handayani and Akbar, 2021).

## METHOD

This study used a quantitative design with an analytical survey method, and the approach was a cross-sectional study. The population was 33 cadres, while the sample was 33 respondents with a total sampling technique. The independent variable was the cadre's knowledge regarding PRSC, and the dependent variable was the cadre's ability to use PRSC in pregnant women. An instrument to measure the cadre's knowledge was a questionnaire. The questionnaire contained fifteen multiple-choice questions about the meaning, function, and assessment steps of the Poedji Rochjati scorecard. It had been validated with the product-moment Pearson correlation. In addition, the assessment of the cadre's ability to use PRSC used an observation sheet. After the data were collected, there was a bivariate analysis using the chi-square statistical test with a value of 0.05. The hypothesis was accepted if the  $p < 0.05$ .

## RESULT

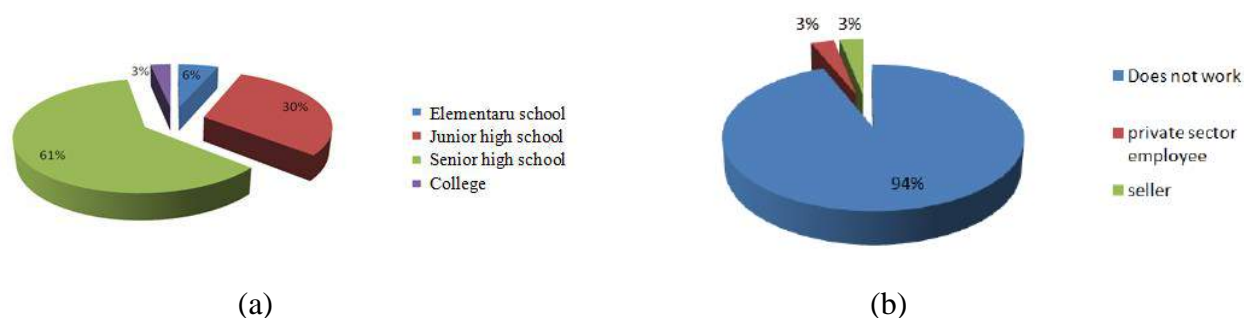


Figure.1 The characteristics of respondents based on education (a) and occupation (b)

Figure.1 shows that most of the respondents graduate from Senior High School (61%), and almost all of the respondents do not work or are housewives (94%).

Table 1. Cadre's knowledge regarding PRSC

Knowledge	Frequency	Percentage (%)
Less	26	78.8
Moderate	6	18.2
Good	1	3.0
Total	33	100

Table.1 reveals that most cadres have less knowledge regarding Poedji Rochjati Score Card (78.8%).

Table 2. Cadre's ability to use PRSC

Ability	Frequency	Percentage (%)
Incapable	28	84.8
Capable	5	15.2
Total	33	100

Table.2 demonstrates that most cadres cannot use Poedji Rochjati Score Card in pregnant women (84.8%).

Table 3. Cross-tabulation between variables and statistical test results

			Ability		Total	<i>p</i>
			Incapable	Capable		
Knowledge	Less	Count	26	0	26	0.000
		% Of Total	78.8%	.0%	78.8%	
	Moderate	Count	2	4	6	
		% Of Total	6.1%	12.1%	18.2%	
	Good	Count	0	1	1	
		% Of Total	.0%	3.0%	3.0%	
Total	Count	28	5	33		
	% Of Total	84.8%	15.2%	100.0%		

Most cadres with less knowledge regarding Poedji Rochjati Score Card could not use PRSC in pregnant women (78.8%). In addition, five of the 33 cadres could use PRSC (1 cadre had good knowledge, and four had moderate knowledge). The statistical tests obtained  $p=0.000$  ( $p<0.05$ ). Thus, there was a correlation between knowledge and the ability to use Poedji Rochjati Score Card in cadres (Table 3).

## DISCUSSION

Knowledge becomes the basis for a person to act. People who act without knowledge tend to forget what they are doing quickly. The finding in this paper found that most cadres had less knowledge. It might be due to cadres' education. It is in line with a previous study that found a significant association between cadres' education and their knowledge about the importance of Maternal and Child Health book data (Dharmawan, 2015).

Occupation causes a person to interact with other people, making it possible to exchange information. Most respondents in this paper did not work in the public area or were housewives. As housewives, cadres will rarely exchange information, especially about the Poedji Rochjati Score Card, with other people. However, prior research revealed no correlation between occupation and knowledge regarding stunting among cadres in Boyolali Regency (Wulansih and KM, 2021).

The knowledge that a person has will affect a person's ability to take action. This study found a correlation between knowledge and the ability to use the Poedji Rochjati Score Card in cadres. The cadres' ability to use Poedji Rochjati Score Card was related to their understanding. It is in line with a study conducted by Syamsianah and Winaryati (2013). The study showed an association between cadres' knowledge level and skills, with the Spearman rank test obtained  $p=0.001$ . Thus, increasing education, training, and providing information through print and electronic media is essential to enhance the cadre's



knowledge. Furthermore, cadres' skills in using the Poedji Rochjati Score Card can increase. As a result, cadres can potentially contribute to reducing maternal and infant mortality rates.

## CONCLUSION

In conclusion, cadres' knowledge correlates with their ability to use the Poedji Rochjati Score Card. Cadres with less knowledge cannot use Poedji Rochjati Score Card. So, it is necessary to increase cadres' understanding by providing education and training by health workers.

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## Risk Factors Associated with The Incidence of Low Birth Weight (LBW) at Haji Makassar Hospital in January-December 2018

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### A B S T R A C T

Low birth weight babies (LBW) are newborns whose body weight at birth is less than 2,500 grams regardless of gestational age. In 2015, the incidence of LBW in Makassar City was 690 cases. By knowing the risk factors for LBW, health workers and government can perform the targeted intervention in groups with a high risk to reduce the incidence of LBW. This paper analyzes the correlation between parity, maternal age, maternal occupation, maternal education, severe preeclampsia, premature rupture of membranes, and multiple pregnancies with the incidence of LBW. This study was analytical survey research with a cross-sectional approach. It was conducted at Haji Makassar Hospital for one month, using medical record data (secondary data). The population was 955 people who gave birth at the Haji Makassar Hospital in January-December 2018. Furthermore, the sample was 496 respondents with a purposive sampling technique. The bivariate analysis utilized the chi-square test. There was a significant correlation between parity ( $p=0.000$ ), severe preeclampsia ( $p=0.000$ ), and multiple pregnancies ( $p=0.000$ ) with the incidence of LBW. Meanwhile, there was no significant association between maternal age ( $p=0.134$ ), maternal occupation ( $p=0.398$ ), maternal education ( $p=0.306$ ), and premature rupture of membranes ( $p=0.956$ ) with the incidence of LBW. In conclusion, risk factors for LBW are parity, severe preeclampsia, and multiple pregnancies. Meanwhile, unrelated factors with LBW are maternal age, maternal occupation, maternal education, and premature rupture of membranes.

## INTRODUCTION

Low birth weight (LBW) babies are newborns whose body weight at birth is less than 2,500 grams regardless of gestational age (Sholeh *et al.*, 2014). The birth weight is the baby's weight in the first one hour of birth. The World Health Organization (WHO) reports that LBW babies contribute to 60-80% of all neonatal deaths and have a risk of death 20 times greater than babies with normal birth weight (Supiati, 2016). According to WHO, the neonatal mortality rate in 2015 was around 2.7 million deaths, or about 45% of all under-five deaths. Nearly one million neonatal deaths occur at birth, and two million neonatal died in the first week of life. In addition, WHO reveals that the proportion of child mortality in the neonatal period has increased worldwide over the last 25 years (WHO, 2016).

Indonesia Demographic and Health Survey (IDHS) in 2017 showed that the neonatal mortality rate was 15 per 1,000 births live, the infant mortality rate was 24 per 1000 births, and the under-five mortality rate was 32 per 1000 births live (Ministry of Indonesian Health, 2018). The direct causes of infant mortality in Indonesia are asphyxia (44-46%), low birth weight (15-20%), infection (24-25%), birth trauma (2-7%), and congenital disabilities (1-3%) (Nursusila, Majid and Ahmad, 2017).

The prevalence of LBW in South Sulawesi Province was ranked 7 (seven) out of 34 (thirty-four) provinces in Indonesia, with a percentage of 12% (Dinas Kesehatan, 2014). Furthermore, its incidence in 2015 increased to 4,697 infants (Dinas Kesehatan, 2016). The highest incidence of LBW in South Sulawesi Province was in Makassar City (690 cases), Gowa District (342 cases), and Luwu District (288 cases). Meanwhile, the lowest incidence was in Barru District (27 cases), Bantaeng District (47 cases), and Tanah Toraja District (65 cases) (Dinas Kesehatan, 2016).

By knowing the risk factors for LBW, health workers and government can perform the targeted intervention in groups with a high risk to reduce the incidence of LBW. The research found that the risk factors for LBW incidence were maternal, obstetric, fetal, and environmental (Atika and Ismawati, 2010; Trihardiani, 2011; Merzalia, 2012). In addition, a prior study in 302 samples revealed that parity factors, premature rupture of membranes, and hypertension increased the prevalence of LBW (Zahrah, Prasetyowati and Yuliawati, 2018).

Furthermore, in the Qur'an, the obligation of parents to their children is fulfilling children's welfare. It is stated in Surah An-Nisa (4) verse 9 as the word of Allah SWT:

لِيَخْشَ الَّذِينَ لَوْ اٰلَهُمْ ذُرِّيَّةٌ اٰمًا اَوْ اٰفُوا لِيَهُمْ لِيَتَّقُوا اللَّهَ الَّذِي هُوَ لَآ سَدِيدًا

It means:

"And let people fear Allah, even if they leave their children, who are weak, they worry about their (welfare) Therefore, let them fear Allah and speak the truthful words."

According to the opinion of scholars, the verse above explains that the unstable physical health condition and lack of child's intelligence due to lack of nutritious food are the responsibility of parents. Islamic law prohibits parents from leaving their offspring or abandoning children, causing parents to worry about their children's welfare (Abdullah, 2015).

From the description above, the authors were interested in researching the risk factors for low birth weight (LBW) in January-December 2018. The study was carried out at the Haji Makassar Hospital because Makassar is one of the cities in South Sulawesi with the highest incidence of LBW. In addition, Haji Makassar Hospital is a referral hospital in the city of Makassar with an increased incidence of LBW. This paper analyzes the correlation between parity, maternal age, maternal occupation, maternal education, severe preeclampsia, premature rupture of membranes, and multiple pregnancies with the incidence of low birth weight at Haji Makassar Hospital.

## METHOD

This study was analytical survey research with a cross-sectional approach. The independent variables were parity, maternal age, maternal occupation, maternal education, severe preeclampsia, premature rupture of membranes, and multiple pregnancies. In addition, the dependent variable was low birth weight

incidence. This research was conducted at Haji Makassar Hospital for one month, using medical record data (secondary data). The inclusion criteria were a wholly filled medical record. The population was 955 people who gave birth at Haji Makassar Hospital in January-December 2018. Furthermore, the sample was 496 respondents with a purposive sampling technique. Data analysis used univariate and bivariate analysis by SPSS Statistics software. The bivariate analysis utilized the chi-square test.

## RESULT

Univariate analysis determines the characteristics of respondents in this paper.

Table 1. The Characteristics of Respondents by Parity, Maternal Age, Maternal Occupation, Maternal Education, Severe Preeclampsia, Premature Rupture of Membranes, Multiple Pregnancy, and Intrauterine Growth Restriction.

The Characteristics of Respondents	Frequency	Percentage (%)
Parity		
Primigravida	406	82%
multigravida	90	18%
Maternal Age		
At-risk	138	28%
Not at-risk	358	72%
Maternal occupation		
At-risk	66	13%
Not at-risk	430	87%
Maternal education		
At-risk	222	45%
Not at-risk	274	55%
Severe Preeclampsia (SP)		
No SP	460	93%
SP	36	7%
Premature rupture of membranes (PROM)		
No PROM	493	99%
PROM	3	1%
Multiple Pregnancy (MP)		
No MP	466	94%
MP	30	6%
Intrauterine growth restriction (IUGR)		
Respondents' babies do not have IUGR	494	99%
Respondents' babies have IUGR	2	1%
Low birth weight (LBW)		
Respondents' babies have a normal birth weight	338	68%
Respondents' babies have LBW	158	32%

Table 1 shows that most mothers are primigravida (82%), are not of at-risk age (72%), and do not have at-risk occupation (87%) or at-risk education (55%). In addition, respondents do not have severe preeclampsia (93%), premature rupture of membranes (99%), and multiple pregnancies (94%). Furthermore, most of their babies do not have intrauterine growth restrictions (99%) and have normal birth weight (68%).

Furthermore, the bivariate test determines the correlation between the independent and dependent variables.

Table 2. Cross-tabulation between parity and the incidence of LBW and statistics test result

Variable	LBW		No LBW		Total		chi-square test <i>p</i>
	N	%	N	%	N	%	
Parity							
Primigravida	113	28%	293	72%	406	100%	0.000
Multigravida	45	50%	45	50%	90	100%	

72% of respondents with primigravida had babies with normal weight, and 28% had babies with LBW. In addition, 50% of respondents with multigravida had babies with normal weight, and 50% had babies with LBW. Furthermore, the chi-square test obtained  $p=0.000$ , indicating  $H_0$  was rejected or  $H_a$  was accepted. Thus, there was a correlation between parity and the incidence of LBW (Table.2).

Table 3. Cross-tabulation between maternal age and the incidence of LBW and statistics test result

Variable	LBW		No LBW		Total		chi-square test <i>p</i>
	n	%	N	%	N	%	
Maternal Age							
At-risk	37	27%	101	73%	138	100%	0.134
Not at-risk	121	34%	237	66%	358	100%	

73% of at-risk-age mothers had babies with normal weight, and 27% had babies with LBW. In addition, 66% of not-risk-age respondents had babies with normal weight, and 34% had babies with LBW. Furthermore, the chi-square test obtained  $p=0.134$ , indicating  $H_0$  was accepted or  $H_a$  was rejected. Thus, there was no correlation between maternal age and the incidence of LBW (Table 3).

Table 4. Cross-tabulation between maternal occupation and the incidence of LBW and statistics test result

Variable	LBW		No LBW		Total		chi-square test <i>p</i>
	n	%	N	%	N	%	
Maternal occupation							
At-risk	24	36%	42	64%	66	100%	0.398
Not at-risk	134	31%	296	69%	430	100%	

64% of working mothers (at risk) had babies with normal weight, and 36% had babies with LBW. In addition, 69% of housewives (not at-risk) had babies with normal weight, and 31% had babies with LBW. Furthermore, the chi-square test obtained  $p=0.398$ , indicating  $H_0$  was accepted or  $H_a$  was rejected. Thus, there was no correlation between maternal occupation and the incidence of LBW (Table 4).

Table 5. Cross-tabulation between maternal education and the incidence of LBW and statistics test result

Variable	LBW		No LBW		Total		chi-square test <i>p</i>
	n	%	N	%	N	%	
Maternal education							
At-risk	76	34%	146	66%	222	100%	0.306
Not at-risk	82	30%	192	70%	274	100%	

66% of mothers with low education (at-risk) had babies with normal weight, and 34% had babies with LBW. In addition, 70% of mothers with higher education (not at-risk) had babies with normal weight, and 30% had babies with LBW. Furthermore, the chi-square test obtained  $p=0.306$ , indicating  $H_0$  was

accepted or  $H_a$  was rejected. Thus, there was no correlation between maternal education and the incidence of LBW (Table 5).

Table 6. Cross-tabulation between severe preeclampsia and the incidence of LBW and statistics test result

Variable	LBW		No LBW		Total		chi-square test <i>p</i>
	n	%	N	%	N	%	
Severe Preeclampsia (SP)							
No SP	129	28%	331	72%	460	100%	0.000
SP	29	81%	7	19%	36	100%	

72% of respondents with no severe preeclampsia gave birth to normal birth weight babies, and 28% delivered LBW babies. In addition, 81% of mothers with severe preeclampsia gave birth to LBW babies, and 19% had normal birth weight babies. Furthermore, the chi-square test obtained  $p=0.000$ , indicating  $H_0$  was rejected or  $H_a$  was accepted. Thus, there was a correlation between severe preeclampsia and the incidence of LBW (Table 6).

Table 7. Cross-tabulation between premature rupture of membranes and the incidence of LBW and statistics test result

Variable	LBW		No LBW		Total		chi-square test <i>p</i>
	n	%	n	%	n	%	
Premature rupture of membranes (PROM)							
No PROM	157	32%	336	68%	493	100%	0.956
PROM	1	33%	2	67%	3	100%	

68% of mothers with no premature rupture of membranes gave birth to normal birth weight babies, and 32% delivered LBW babies. In addition, 67% of mothers with premature rupture of membranes gave birth to normal babies, and 33% had LBW babies. Furthermore, the chi-square test obtained  $p=0.956$ , indicating  $H_0$  was accepted or  $H_a$  was rejected. Thus, there was no correlation between premature rupture of membranes and the incidence of LBW (Table 7).

Table 8. Cross-tabulation between multiple pregnancies and the incidence of LBW and statistics test result

Variable	LBW		No LBW		Total		chi-square test <i>p</i>
	n	%	N	%	N	%	
Multiple Pregnancy (MP)							
No MP	132	28%	334	72%	466	100%	0.000
MP	26	87%	4	13%	30	100%	

72% of respondents with no multiple pregnancies delivered normal birth weight babies, and 28% gave birth to LBW babies. In addition, 87% of mothers with multiple pregnancies had LBW babies, and 13% delivered normal birth weight babies. Furthermore, the chi-square test obtained  $p=0.000$ , indicating  $H_0$  was rejected or  $H_a$  was accepted. Thus, there was a correlation between multiple pregnancies and the incidence of LBW (Table 8).

## DISCUSSION

This study found a correlation between parity and the incidence of LBW ( $p=0.000$ ). It is in line with previous research by Zahrah, et al. (2018) that showed an association between mother's parity and LBW incidence ( $p= 0.024$ ). A study by Annisa (2017) also revealed a significant relationship between maternal parity and the incidence of low birth weight (LBW) infants at the Siti Khadijah Islamic Hospital Palembang ( $p= 0.025$ ). Maternal parity affects thinning in the reproductive system due to frequent childbirth. Higher maternal parity decreases the endometrium quality. Repeat pregnancies will affect the distribution of nutrients to the fetus, so there is a decrease in the number of nutrients compared to previous pregnancies (Mahayana, Chundrayetti and Yulistini, 2015).

In addition, mothers with multigravida have a 6.588 times greater risk of experiencing anemia. The more often a woman becomes pregnant and gives birth, the greater the risk of experiencing anemia because pregnancy depletes iron reserves in the body. Furthermore, anemic pregnant women have the potential to give birth to babies with low birth weight (Rizkah and Mahmudiono, 2017). Mothers with multigravida can prevent their babies from low birth weight by counseling in antenatal care regularly. In addition, family planning programs can prevent multigravida (Lestari, Ulfa and Maryam, 2015).

This paper revealed no significant correlation between maternal age and the incidence of LBW ( $p= 0.134$ ). This study is in line with previous research conducted by Maulinda, et al., (2021), indicating no significant relationship between maternal age and the incidence of LBW ( $p= 0.310$ ). In addition, a study by Noni and Elvi (2017) revealed that mothers with no at-risk-age for the incidence of LBW were more than mothers with at-risk-age for the incidence of LBW. Our findings also showed that mothers who were not at-risk were more likely to give birth to LBW babies.

In addition, this research indicated no significant association between maternal occupation and the incidence of LBW ( $p=0.398$ ). It is in line with a prior study by Noni and Elvi (2017), revealing no significant relationship between a mother's work and the incidence of LBW ( $p= 0.728$ ). Physical work is associated with the role of a mother who has additional work outside of household work to increase family income (Laili *et al.*, 2022). Pregnant working mothers spend more energy and thoughts, potentially affecting their pregnancy check-ups. They sometimes forget to do a pregnancy check on time because of a lot of busyness.

Our finding also indicated no significant association between maternal education and the incidence of LBW ( $p=0.306$ ). It is in line with previous research by Noni and Elvi (2017), showing no significant relationship between a mother's education and the incidence of LBW ( $p=0.728$ ). Education is an activity and a person's effort to improve his personality by fostering an individual's potential in spiritual, thinking, feeling, intention, creativity, and conscience. Someone with higher education has a high possibility of health knowledge because they get more information about health than someone with low education.

Health knowledge can encourage healthy living behavior and fulfillment of maternal nutrition during pregnancy.

On the contrary, low-educated individuals will get less information about the importance of nutrition intake during pregnancy (Noni and Elvi, 2017). However, someone with low education doesn't mean having insufficient knowledge. It is because increasing knowledge is not only obtained in formal education. The more advanced times and increasingly sophisticated technological developments make it easier for mothers to access and get information even though their education history is low. Moreover, the excellent role of health workers in providing education during antenatal visits can enhance the mother's understanding of the mother's and fetus's health (Noni and Elvi, 2017).

In addition, the study result found that severe preeclampsia was associated with the incidence of LBW ( $p=0.000$ ). It is in line with a study by Wen et al., (2019). The study revealed that preeclampsia was a risk factor for LBW ( $p= 0.040$ ). Furthermore, mothers with severe preeclampsia have 2,166 times the chance of babies born with low birth weight. It is because pregnant women with preeclampsia experience decreased uteroplacental perfusion and hypovolemia. In addition, there are vasospasm and damage to endothelial cells of the placental vessels. Abnormalities of placental blood vessels in preeclampsia or eclampsia mothers can cause chronic hypoxia and impaired distribution of nutrients to the fetus. As a result, fetal growth retardation and low birth weight (LBW) often occur (Lestari, Ulfa and Maryam, 2015).

Furthermore, there was a significant relationship between multiple pregnancies and the incidence of LBW ( $p= 0.000$ ). It is in line with previous research by Triana (2016), revealing that mothers with multiple pregnancies were 15 times more at risk of giving birth to babies with LBW (95% CI 4.8-45.1). In addition, studies also showed that multiple pregnancies were associated with LBW incidence (Merzalia, 2012). Fetal growth in twin pregnancies is susceptible to inhibition due to excessive uterine stretching due to the size of the fetus, placentas, and more amniotic fluid, causing premature parturition (Fadlun, Feryanto and Suslia, 2012). On average, the weight of 1 fetus in twin births is lighter than that of a single fetus, which is less than 2500 grams, with the weight differences of each twin fetus between 50-100 grams.

Our findings also indicated no significant association between premature rupture of membranes (PROM) and the incidence of LBW ( $p=0.956$ ). It contrasts with research by Zahrah et al. (2018), showing a correlation between PROM and the incidence of LBW ( $p= 0.010$ ). A study by Wijaya and Darusalam, (2022) also found that PROM correlated with LBW incidence ( $p= 0.008$ ). Premature rupture of membranes is a rupture of the membranes before labor begins; the opening is less than 3 cm in primipara and less than 5 cm in multipara. It potentially causes LBW because of infection originating from the



vagina/cervix, causing biomechanics to occur in the amniotic membrane as proteolytic cells (Varney, M.Kriebs and L.Gegor, 2007).

There was no significant correlation between PROM and the incidence of LBW in this study because the more dominant factors causing LBW were severe preeclampsia (18%), multigravida (50%), and multiple pregnancies (16%). Some efforts for mothers with PROM to prevent giving birth to babies with LBW are giving antibiotics to prevent infection and routine monitoring in the hospital until the amniotic fluid no longer comes out. So the mother can maintain her pregnancy (Zahrah, Prasetyowati and Yuliawati, 2018).

## CONCLUSION

Risk factors for LBW are parity, severe preeclampsia, and multiple pregnancies. Meanwhile, unrelated factors with LBW are maternal age, maternal occupation, maternal education, and premature rupture of membranes. Further research should analyze determinant factors of LBW at Haji Makassar Hospital in different year periods.

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## The Effect of Peer Group Support on Motivation to Quit Smoking Among Adolescents

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### A B S T R A C T

Adolescents use cigarettes without considering the consequences and lack awareness about the dangers of using cigarettes. Peer group support potentially motivates to quit smoking in adolescents. It can empower group members by providing a role model to increase motivation. This paper analyzes the effect of peer group support on motivation to quit smoking among adolescents. It was quasi-experimental research with a post-test and pre-test one-group design. The population was smoking adolescents. In addition, there were 37 respondents with purposive sampling. The inclusion criteria were male teenagers aged 12-16 years and active smokers. The independent variable was peer group support, and the dependent variable was motivation to quit smoking. The instrument to assess motivation to quit smoking was the Richmond Test. Data analysis utilized paired t-test with  $\alpha=0.05$ . There was an increase in the mean value of motivation to quit smoking before and after the intervention. In addition, paired t-tests obtained  $p=0.030$  ( $p < 0.05$ ), indicating a significant difference in pre-test and post-test. Thus, there was an effect of peer group support on adolescents' motivation to quit smoking. In conclusion, peer group support can increase adolescents' motivation to quit smoking. Nurses could enhance motivation for smoking cessation through peer support interventions so there is a change in smoking behavior in adolescents. Further study should use a control group and a larger sample size.

## INTRODUCTION

The number of smokers worldwide continues to increase. It was estimated to be around 1,1 billion (Susanto, Pratiwi and Sunardi, 2020; Almaidah *et al.*, 2021). In 2019, The World Health Organization (WHO) stated that tobacco kills more than 8 million people annually. Worldwide, countries in the Association of Southeast Asian Nations (ASEAN) are regions with 10% of the population of smokers and contribute 20% of tobacco-related deaths. Furthermore, Indonesia has the highest number of smokers among ASEAN countries (Drope, Neil and Schluger, 2018).

National surveys conducted in 2013 and 2018 showed that tobacco use in Indonesia was still relatively high among adults and adolescents as a vulnerable age group (WHO, 2020). The increased number of smokers in Indonesia was not only in the adult age group but also adolescents. The prevalence of smoking behavior among adolescents aged 15 years and over in 2013 was 36,3%, in 2016 was 32,8%, and in 2018 was 33,8%. Furthermore, its prevalence in Central Java was 27,70% in 2020 (Kemenkes RI, 2018; BPS Indonesia, 2020).

The cause of smoking in adolescents is transitioning from childhood to adulthood, as indicated by various biological, psychological, and social changes. These changes affect the behavior of adolescents in the community. Changes in adolescent behavior can tend in the positive or negative direction. One of the

negative behaviors in adolescents is smoking (Bukit, 2019; Almaidah *et al.*, 2021). Adolescents use cigarettes without considering the consequences and lack awareness about the dangers of using cigarettes. An investigation revealed that teenagers smoked because of a desire to experiment, join friends, curiosity, loneliness, look fantastic, and imitate parents. In addition, they wanted to have fun, relieve tension, be self-proof, be a symbol of maturity, and seek inspiration. Furthermore, other reasons included reducing stress and boredom, prestige, environmental influence, the mouth tasting sour or as a dessert, and enjoyment (Prihatiningsih *et al.*, 2020).

Smoking is a behavior that is harmful to health, but there are still many people who smoke. Even people start smoking when they are teenagers. Smoking is a detrimental behavior seen from various points of view, both for oneself and others around them. It causes a decline in health and impacts the young generation's quality of life (Sulastri and Rindu, 2019).

Motivation is essential to quit smoking behavior. It is an ability or factor contained in humans to cause, direct, and organize their behavior. In addition, it is an action or condition that arises from within a person, so it can inspire someone to do activities. A study found that smokers with high motivation had more success in smoking cessation (Bacha *et al.*, 2018). Thus, motivation in smokers potentially encourages smoking cessation. Motivation is a psychological process reflecting the interaction between attitudes, needs, perceptions, and decisions that occur in a person. Predisposing factors associated with being highly motivated in smoking cessation were health education about smoking, awareness about the disadvantages of smoking, smoke-free policies, health workers' advice, warnings about the dangers of tobacco, cigarettes' high price, and negative emotions about cigarettes (Dhumal *et al.*, 2014).

Knowledge forms a supportive attitude and affects the motivation of adolescents. A learning process in the group can increase understanding among peers. Thus, peer group support is an effort to change health behavior through a peer group emphasizing behavior change. In this method, there are interactions in groups. Individuals will feel similarities and develop a social sense through personality development (Rofi'ah *et al.*, 2017).

Peer group support can meet the psychological needs of teenagers, consisting of adjusting, accepting, exchanging ideas, and sharing feelings, opinions, and experiences. Those needs are vital in developing and improving their self-concept. Through peer group support, adolescents can find life values as a guide to life and the need to become more independent, especially regarding health. The strong influence of peer groups is because adolescents are mainly outside the home with their peers. So, the effect of peers on attitudes, speech, interests, appearance, and behavior is more significant (Akuiyibo *et al.*, 2021).

In summary, peer group support potentially motivates to quit smoking in adolescents. It can empower group members by providing a role model to increase motivation. Based on this background, this paper analyzes the effect of peer group support on motivation to quit smoking among adolescents.

Low birth weight (LBW) babies are newborns whose body weight at birth is less than 2,500 grams regardless of gestational age (Sholeh *et al.*, 2014). The birth weight is the baby's weight in the first one hour of birth. The World Health Organization (WHO) reports that LBW babies contribute to 60-80% of all neonatal deaths and have a risk of death 20 times greater than babies with normal birth weight (Supiati, 2016). According to WHO, the neonatal mortality rate in 2015 was around 2.7 million deaths, or about 45% of all under-five deaths. Nearly one million neonatal deaths occur at birth, and two million neonatal died in the first week of life. In addition, WHO reveals that the proportion of child mortality in the neonatal period has increased worldwide over the last 25 years (WHO, 2016).

Indonesia Demographic and Health Survey (IDHS) in 2017 showed that the neonatal mortality rate was 15 per 1,000 births live, the infant mortality rate was 24 per 1000 births, and the under-five mortality rate was 32 per 1000 births live (Ministry of Indonesian Health, 2018). The direct causes of infant mortality in Indonesia are asphyxia (44-46%), low birth weight (15-20%), infection (24-25%), birth trauma (2-7%), and congenital disabilities (1-3%) (Nursusila, Majid and Ahmad, 2017).

## METHOD

This study was a quasi-experimental research with a post-test and pre-test one-group design. It did not have a comparison group, but the pre-test could provide a basis to analyze the changes after intervention. In post-test, there was a comparison before and after the intervention. The population was smoking adolescents. There were 37 respondents with purposive sampling. In addition, the inclusion criteria were male teenagers aged 12-16 years and active smokers. The independent variable was peer group support, and the dependent variable was motivation to quit smoking. The instrument to assess motivation to quit smoking was the Richmond Test. Data analysis used paired t-test because the normality test using Kolmogorov-Smirnov showed that the data distribution was normal ( $p > 0.05$ ).

## RESULT

The univariate analysis described the motivation to quit smoking before and after the peer group support. Meanwhile, the bivariate analysis analyzed the differences in motivation to quit smoking before and after the intervention.

Table.1 Motivation to quit smoking in adolescents and statistics test result

Variable	Mean	Std. Deviation	<i>p</i>
Motivation to quit smoking before intervention	5.09	1.35	0.030
Motivation to quit smoking after intervention	5.59	1.60	

There was an increase in the mean value of motivation to quit smoking before and after the intervention. In addition, paired t-tests obtained  $p=0.030$  ( $p < 0.05$ ), indicating a significant difference in pre-test and post-

test. Thus, there was an effect of peer group support on motivation to quit smoking in adolescents (Table.1).

## DISCUSSION

This study found the motivation to quit smoking increased significantly after peer group support. One of the efforts in smoking cessation is to increase motivation. A prior study revealed that highly motivated smokers were more successful in quitting smoking than those less motivated (Woelandari, 2020). Motivation is a person's strength (energy) leading to persistence and enthusiasm in doing the activity, both originating from within the individual (intrinsic motivation) and from outside the individual (extrinsic motivation) (Alamsyah, J. and Hidayat, 2021). High motivation is crucial to the success of quitting smoking. Experts have developed various attempts to quit smoking. The first thing to do is to identify awareness and intention in smokers, then motivate them to stop smoking (Sulastri, Herman, and Darwin, 2018).

Our finding showed an effect of a peer support group on motivation to quit smoking in adolescents. A peer support group is the support given by someone who has experienced emotional difficulties to someone experiencing the same challenges by listening to complaints and sharing their experiences. So, individuals can meet their psychological needs, such as developing and improving their self-concept. Through this method, group members can also find life values as a way of life. In addition, social needs are crucial to increasing motivation to behave in a healthy life (Khamida, Nurjanah and Ainayah, 2019).

High motivation will lead to more lasting behavior. A peer group potentially can provide support and motivation. It offers new values that will ultimately affect an individual's emotions or affective components of attitudes. In addition, the conative component in attitude concerns the individual's desire to act according to the person's beliefs. It affects a person's motivation to do something (Ford *et al.*, 2013; Rahayu and Yunarsih, 2020).

Peer group empowerment in motivating to carry out healthy behavior is quite effective for adolescents because peer group has a more substantial influence on group behavior. It is the primary key to physical activity in adolescents. The peer group is beneficial in motivating someone by feeling in the same boat in fulfilling needs and goals, so it influences habits. In addition, it also provides strong support for adolescents, both individually and in groups, to create behavioral changes (Davison and Jago, 2014; Cherrington *et al.*, 2015; Jaelani *et al.*, 2018).

Peer group support is a program provided by peers as trained counselors to help their friends with obstacles in self-development. In addition, it has the potential to develop social self-concept among adolescents. Furthermore, it has the function of providing guidance and overcoming challenging life

problems. Thus, peer serves as social support (Afandi, Indarwati and Hadisuyatmana, 2012; Sari and Ariani, 2021), significantly increasing adolescents' motivation to quit smoking.

Peer group support is vital because of the rapid development of the mindset among teenagers in Indonesian culture in the current era. By having peers, teenagers can get a lot of motivation to solve their issues. However, conflicts in friendship relationships in the peer group are inevitable. Thus, It takes maturity to overcome them (Astuti, Dewi and Sumarwoto, 2018; Mujiyati and Adiputra, 2018).

## CONCLUSION

In conclusion, peer group support can increase adolescents' motivation to quit smoking. Nurses could enhance motivation for smoking cessation through peer support interventions so there is a change in smoking behavior in adolescents. Further study should use a control group and a larger sample size.

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## The Correlation Between Feeding Patterns and The Incidence of Stunting in Children Aged 0-59 Months

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### A B S T R A C T

Stunting is one of the severe problems in Indonesia. One of its causes is a lack of nutritional intake during infancy. In addition, maternal parenting, especially in feeding patterns, will affect the children's growth and development. This study aims to determine the correlation between feeding patterns and the incidence of stunting. The research design used correlational analytics. The population was stunted children aged 0-59 months at Kalibuntu Village, Probolinggo Regency. In addition, there were 66 respondents in this study with total sampling. The independent variable was feeding patterns, while the dependent variable was the incidence of stunting. Data collection was carried out using a questionnaire on feeding patterns that respondents' mothers filled out. In addition, the authors measured respondents' height and assessed with a WHO (World Health Organization) growth chart to collect data on the incidence of stunting. Data analysis used the Spearman rank rho test. Almost half of the respondents had inappropriate feeding patterns (42.4%). In addition, most of the stunted children's height was categorized as short (85.3%). 15.2% of stunted children with inappropriate feeding patterns had very short height. In addition, 56.1% of respondents with appropriate feeding patterns were categorized as short. The Spearman rank rho test obtained  $p=0.000$ , indicating  $H_0$  was rejected and  $H_1$  was accepted. In addition, the value of the correlation coefficient was 0.439, showing a moderate correlation between both variables. In conclusion, feeding patterns correlate with the incidence of stunting among children aged 0-59 months in Kalibuntu Village, Probolinggo Regency.

## INTRODUCTION

Stunting in Indonesia is a severe problem at the village, sub-district, district, provincial, and national levels. Therefore, all parties should play an active role in reducing the prevalence of stunting. Indonesia is still ranked fifth as a country with a high stunting incidence. Until now, children with chronic malnutrition in Indonesia have reached 30 percent. The Basic Health Research in 2018 showed that the prevalence rate of stunting (short and very short) in children under five was 30.8% and in infants under two years old was 29.9%. That percentage in children under five decreased from 2019, with a prevalence of 37.2%. In addition, the Basic Health Research in East Java Province in 2018 revealed that the stunting prevalence rate was 32.81% or decreased compared to 2013, with a prevalence of 35.8% (Kementerian Kesehatan RI, 2020). Furthermore, The Basic Health Research in Probolinggo Regency in 2020 found that the stunting prevalence rate was 16.24%. That rate was lower compared to the strategic plan target of the District Health Office of 29%, the strategic plan of the East Java Provincial Department of Health of 25.2%, and Indonesia's National Medium-Term Development Plan of 28%.

Monitoring the nutritional status in children under five, especially stunting, is carried out twice a year, in February and August or the weighing month. Stunting prevalence in Probolinggo Regency in 2020 was

16.24% or 12,833 of the 79,497 children under five. A preliminary study conducted on September 25, 2021, at the Kraksaan Health Center showed that the stunting rate was 4.14% of 3896 children under five in February 2019 and 5.05% of 3759 in August 2019. Furthermore, the rate in Kalibuntu Village was 11.52% of 654 children under five in February 2019 and 11.09% of 622 in August 2019.

One of the causes of children under five stunting is a lack of nutritional intake during infancy (Kementerian Kesehatan RI, 2020). Two factors, direct and indirect, influence the nutritional status of children. The direct factors related to stunting are low energy and protein intake and not exclusively breast milk. In addition, missing the golden period (the first 1000 days of life) causes stunting in children under five. It can inhibit child growth and development. Nutrient intake in pregnancy and breastfeeding has a long-term impact until adulthood. Good nutrient intake can prevent stunting and malnutrition in children (Yuliana *et al.*, 2019).

Malnutrition in children is irreversible, so they need good quality food intake. Acute malnutrition in children can lead to physical weakness. In addition, chronic malnutrition in children, especially those that occur before two years, will impact physical growth disorder or become short (stunted). It is riskier if nutritional problems have begun to happen in the womb. Stunting will directly impact children and indirectly affect the resilience of the Indonesian state. The impacts include cognitive and psychomotor impairment, difficulty in science and sports, high risk for degenerative diseases, and low-quality human resources (Dasman, Hardimas, 2019).

Stunting must be immediately addressed before children are two years old because it has short and long-term impacts. The short-term effects of stunting are impaired growth and development (cognitive, motoric, and verbal) in children and more susceptibility to getting sick. In addition, there are increased health costs because children are susceptible to illness and have health problems, so they must always do examinations and treatment. Furthermore, one of the long-term impacts of stunting is an abnormal posture in adulthood because the height of a stunted child can only be corrected before two years old. In addition, stunting increase the risk of nutritional problems such as obesity, other diseases, and reproductive disease. Moreover, it declines the learning capacity and performance in school because the cognitive development in stunting children is less optimal than that of children their age. Productivity and working capacity also become less than optimal when adults (Apriani, 2019).

Some factors predisposing malnutrition in children are poor micronutrient quality, lack of food diversity and food intake sourced from animals, non-nutritive food, the low calories in complementary foods, and inadequate feeding pattern. After six months of age, each baby needs complementary foods. The introduction and administration of complementary foods should be carried out in stages according to the baby's and child's digestive abilities (Rahayu *et al.*, 2018). Thus, maternal parenting, especially in feeding patterns, will affect the children's growth and development. This study aims to determine the correlation

between feeding patterns and the incidence of stunting in children aged 0-59 months.

## METHOD

The population was stunted children aged 0-59 months at Kalibuntu Village, Probolinggo Regency. In addition, there were 66 respondents in this study with total sampling. The independent variable was feeding patterns, while the dependent variable was the incidence of stunting. Data collection was carried out using a questionnaire on feeding patterns that respondents' mothers filled out. In addition, the authors measured respondents' height and assessed with a WHO (World Health Organization) growth chart to collect data on the incidence of stunting. Data analysis used the Spearman rank rho test. An ethical clearance in this paper has been carried out at the Ethics Test Commission at STIKes Hafshawaty, Probolinggo Regency.

## RESULT

The univariate analysis described the feeding patterns and the incidence of stunting. Meanwhile, the bivariate analysis analyzed the correlation between both variables.

Table 1. Distribution of Frequency in Respondents based on Feeding Patterns and The Incidence of Stunting in Kalibuntu Village, Probolinggo Regency

	Frequency (n)	Percentage (%)
Feeding patterns		
Inappropriate	28	42.4
Appropriate	38	57.6
The incidence of stunting		
Very Short	11	16.7
Short	55	83.3
Total	66	100

Almost half of the respondents had inappropriate feeding patterns (42.4%). In addition, most of the stunted children's height was categorized as short (85.3%) (Table 1).

Table 2. Cross-Tabulation between Feeding patterns and The Incidence of Stunting and Statistic Test Result

Feeding Pattern	The Incidence of Stunting				Total	
	Very Short		Short		n	%
	n	%	n	%		
Inappropriate	10	15.2	18	27.3	28	42.4
Appropriate	1	1.5	37	56.1	38	57.6
Total	11	16.7	55	83.3	66	100.0
Spearman rank rho test	$p=0.000$		$r=0.439$			

15.2% of stunted children with inappropriate feeding patterns had very short height. In addition, 56.1% of respondents with appropriate feeding patterns were categorized as short. The Spearman rank rho test obtained  $p=0.000$ , indicating  $H_0$  was rejected and  $H_1$  was accepted. In addition, the value of the correlation coefficient was 0.439, showing a moderate correlation between both variables (Table 2). Thus,

there was a correlation between feeding patterns and the incidence of stunting among children aged 0-59 months in Kalibuntu Village, Probolinggo Regency.

## DISCUSSION

### Feeding patterns in children aged 0-59 months in Kalibuntu Village

Almost half of the stunting children in this study had inappropriate feeding patterns (Table 1). It was indicated that feeding patterns consisting of the diet, the type of food, and the amount of food given to children aged 0-59 months were inadequate or did not meet their needs. According to (Waryono, 2010), diet is a person's behavior such as attitudes, beliefs, and food choices in meeting food needs. The physiological, psychological, cultural, and social factors influence diet in individuals. A study by Ridha Cahya Prakhasita (2019) showed that the feeding patterns for children aged 0-59 months were influenced by maternal age, maternal education, maternal occupation, and family income. In addition, number of children, family members, and people living in the respondent's house also correlated with the feeding patterns. That study showed that most respondents aged 20-35 (65.2%), were graduated from elementary (59.1%), housewives (66.7%), and had two or three children (59.1%). In addition, their income was below the Regional Minimum Wage of Lumajang (78.8%), their family members were 1-4 people (87.9%), and the number of people living in the respondent's house was 1-4 people (60.6%).

Age indicates maturity in thinking, the more mature your age, the more mature your mindset. Mindset will underlie actions, including feeding patterns in toddlers. In addition, education indicates the respondents' knowledge of the children's needs. The understanding will be the basis for providing food to toddlers based on their needs. Furthermore, occupation relates to feeding patterns. Housewives have more time with their children under five, giving them more opportunities to feed their toddlers. Family income also shows the monthly income received to meet family needs, including the child's food intake. A high family income or equal to the Regional Minimum Wage will guarantee the mother can provide food following the toddler's needs. Moreover, the number of family members or people living in a house is related to meeting consumption needs. The consumption level will be higher in families with many family members. Thus, the ability to meet the needs of children under five tends to be not optimal because parents must divide their income with other family members' needs.

### The incidence of stunting in children aged 0-59 months in Kalibuntu Village

This paper revealed that most of the stunted children's height was categorized as short (Table 1). The stunting assessment measures height with a WHO growth chart (Kementerian Kesehatan RI, 2020). Risk factors for stunting are economic status, maternal intake during pregnancy, disease, and malnutrition in babies. Stunted toddlers will potentially not have optimal physical and cognitive development. Ridha Cahya Prakhasita (2019) also found that 74.1% of stunted children under five were categorized as short,

and 25.9% were classified as very short. A short body in a child below the WHO Child Growth Standards results from chronic malnutrition. Stunting is influenced by children's medical history, including poor nutritional intake, multiple infectious diseases, premature birth, and low birth weight. Inadequate intake in children usually does not occur after the delivery but starts from pregnancy. In the future, stunting can harm children, such as learning difficulties, fatigue, lack of activity, and the risk of other diseases.

The correlation between feeding patterns and the incidence of stunting in children aged 0-59 months in Kalibuntu Village

Our findings revealed a moderate correlation between feeding patterns and the incidence of stunting among children aged 0-59 months in Kalibuntu Village, Probolinggo Regency (Table.2). It is in line with a study by Bella, Fajar, and Misnaniarti (2020) in Palembang City among 100 mothers of toddlers from low-income families. The study found a significant association between feeding habits and the incidence of stunting in toddlers from low-income families ( $p=0.000$ ). It showed that 68.4% of mothers with poor feeding habits had stunted toddlers. Meanwhile, it revealed that only 19.8% of mothers with good feeding habits had stunted toddlers. In addition, Ridha's research (2019) also indicated a significant relationship between feeding patterns and the incidence of stunting in toddlers aged 12-59 months. According to Purwani, Erni, and Mariyam (2013), the diet plays an essential role in children's growth and development because food contains many nutrients. Inadequate nutrition impacts children's health and intelligence, especially in the developmental disorders, thin, short, and even malnutrition.

Dietary problems in toddlers impact the incidence of stunting. Diet determines the adequacy of nutrition for the child, a good diet results in adequate nutrition so the child can develop and grow well. In addition, good feeding habits depend on maternal skills in arranging menus to meet nutritional requirements. The authors found several facts about the feeding pattern of stunted children under five in this research. Some respondents said that they need consultation and nutritional assistance. In addition, some toddlers were used to consuming rice and vegetable soup only, and some only like to eat porridge up to two years old. Furthermore, there was less varied food diversification. Moreover, mothers in this paper preferred to buy foods without considering the nutrient content. Parents, especially mothers, must be concerned about toddlers' poor consumption patterns, such as excessive snacking habits. The type of food consumption also significantly determines the child's nutritional status. Toddlers are a vulnerable group, so the kind of food must follow the child's needs and digestibility. Varied foods and sufficient nutritional value are critical to avoiding a lack of nutrients in children. Parents should apply a good feeding pattern by giving a varied diet. In addition, it must schedule meal times so the child will get used to a healthy diet.

## CONCLUSION

In conclusion, feeding patterns correlate with the incidence of stunting among children aged 0-59 months in Kalibuntu Village, Probolinggo Regency. However, this study cannot be generally generalized because it may have different results in other places. Mothers with children under five should apply good feeding patterns for children to prevent stunting. In addition, health workers, especially midwives, could provide nutritional assistance to mothers with children under five, especially related to food menus to meet the needs of toddlers

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## Improving Maternal Skills to Provide Sex Education for Preschool Children Through Training with Audiovisual AIDS (AVA) Media

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### A B S T R A C T

Case of sexual exploitation and pedophilia among children in Indonesia are increasingly alarming problems. One effort to prevent those issues is providing proper sex education according to the child's age by the mother as their closest person. However, a preliminary study showed that 69% of mothers with preschool children had difficulty answering child's questions about their sexuality. Providing sex education can use various media. This study utilized AudioVisual Aids (AVA) media through sex educational videos for early childhood. This paper aims to analyze the maternal skills to provide sex education for preschool children through training with AVA media. This paper used a pre-experimental pre-posttest design. The population in this study was 234 mothers with preschool children in Early Childhood Education (ECD) and Kindergarten at Condong and Sumber Secang Village, Probolinggo Regency. There were 146 respondents with simple random sampling. The independent variable was training with AVA media, while the dependent variable was maternal skills to provide sex education for preschool children. The instruments were questionnaires, observation sheets, and videos. Data analysis utilized Fisher's exact test with  $\alpha=0.05$ . Before training with AVA media, 92.5% of respondents were unskilled in providing sex education for preschool children. Meanwhile, 76.7% of respondents were skilled in providing sex education for preschool children after the training. In addition, Fisher's exact test obtained  $p=0.048$ . There was a significant difference before and after training with AVA media. In conclusion, training with audiovisual media can enhance maternal skills to provide sex education for preschool children.

## INTRODUCTION

Case of sexual exploitation and pedophilia among children in Indonesia are increasingly alarming problems. It is the iceberg phenomenon with children as its victims. A child is an individual between 0-18 years, while early childhood is between 0-6. This age is a crucial period for forming sexual behavior and orientation of adolescents influencing their sexual life (Zhina, 2013; Anggraini, 2017). At this age, children should get protection, affection, education, and playtime (Alfatih, 2017). Parents' role is essential to educate them because they first acquire knowledge from parents, especially the mother as the closest person.

Data from the Indonesian Child Protection Commission (ICPC) showed that in 2016, Indonesia had 120 cases of sexual violence against children, and in 2017 were 116. In addition, there were 393 cases in East Java in 2017 and 117 in February 2018. In Boyolali, there were also four cases of sexual abuse in kindergarten. Moreover, data from the ICPC from January-April 2016 showed 35 cases in Probolinggo District, and the perpetrators mainly were the closest people, such as stepfathers, family, and neighbors (Ilmiah, Amelia and Azizah, 2019).

Sexual violence results in the onset of traumatic feelings in victims, poor self-confidence, pedophilia in adulthood, child prostitution, and criminality such as murder. The cause of a high number of sexual violence in children is a lack of knowledge about providing proper sex education to children. In addition, parents perceive that talking about sexuality with their children is taboo (Fatmawati, BM and Kusumawati, 2018).

A preliminary study on August 16, 2018, was conducted among six mothers at Raudatul Hasan early childhood and Kindergarten, five at Harapan Kita Desa Condong Kindergarten, and five at Al Hidayah Sumber Secang Kindergarten. The authors interviewed mothers about their skills to answer children's questions regarding why children had different sex with their friends, where they come from, why male and female clothes were not the same, and why girls and boys have different body parts. The results from 16 mothers showed that 11 mothers (69%) had difficulty answering their children's questions correctly, especially about where they came from and why they had a different sex and body parts.

The result of not providing early sex education according to the child's age will trigger sexual violence in children. Sexual violence in children will have short and long-term effects. Short-term impacts are feelings of guilt and self-blame, the shadow of events when children receive sexual violence, nightmares, insomnia, and fear of things related to abuse (including objects, smells, places, and visits by health workers). The long-term impacts are lack of self-esteem, sexual dysfunction, chronic pain, addiction, suicidal ideation, injury, somatic complaints, and depression. In addition, psychological disorders include post-traumatic stress disorder, anxiety, mental disorders including personality disorders and dissociative identity disorders, a tendency to become a victim and pedophile in adulthood, bulimia nervosa, and physical injury to children (Diana, 2017).

One effort to prevent those issues is providing proper sex education according to the child's age by the mother as their closest person. A previous study found that maternal education, occupation, and knowledge correlated with their skills in providing early childhood sex education (Haryono *et al.*, 2018). In addition, early sex education in children should begin at 4-6 years old, especially in Early Childhood Education (ECD), Kindergarten, and *Raudatul Athfal*, which integrates teaching, nurturing, protection, and health services, especially in the children's nutritional status (Anggraini, 2017).

Teaching wrong concepts of sex, how to take care of body parts, maintaining body hygiene, and interacting with others are parts of early childhood sex education. Knowledge, attitudes, and communication skills are essential in forming sexual behavior and orientation in preschool children (Sulistianingsih and Widayati, 2016). Providing sex education can use various media, including print and electronic media, singing, storytelling, and watching early childhood sex education videos. The novelty of this study was using Audiovisual Aids (AVA) media through sex educational videos for early childhood. The videos contained songs that are easy to remember and practice by mothers and their children. This



study aims to analyze the maternal skills to provide sex education for preschool children through training with AVA media.

*Raudatul Athfal* (n): early childhood formal education managed by the Ministry of Religion. It is equivalent to kindergarten.

## **METHOD**

This paper used a pre-experimental pre-posttest design. The population in this study was 234 mothers with preschool children in ECD and Kindergarten at Condong and Sumber Secang Village, Probolinggo Regency. There were 146 respondents with simple random sampling. The independent variable was training with AVA media, while the dependent variable was maternal skills to provide sex education for preschool children. The instruments were questionnaires, observation sheets, and videos. Data collection techniques began with explaining the study purpose and procedure, then providing an informed consent sheet for respondents. Next, the authors gave a questionnaire sheet. We explained how to fill out questionnaires to collect data on age, occupation, income, and maternal skills to provide sex education for preschool children before training with AVA media. AVA media contained sex educational videos for early childhood with songs and cartoon images showing children's body parts that could and could not be touched by others. After a day, we had a post-test on respondents to remeasure maternal skills to provide sex education for preschool children. Data analysis utilized Fisher's exact test with  $\alpha=0.05$ . This research has been approved by the Health Research Ethics Committee of STIKES Hafshawaty Pesantren Zainul Hasan with certificate number: KEPK/064/STIKesHPZH/IV/2019.

## **RESULT**

Most respondents in this study were 25-40 years old (74.7%). Furthermore, they were housewives (64.4%). They were in charge of caring for children and families at home and delivering children to school. In addition, they had income from IDR 500,000 to IDR 1,000,000 per month (45.9%). Housewives had a monthly income from their husbands (Table.1).

Table 1. The Characteristics of Respondents by Maternal Age, Maternal Occupation, and Maternal Monthly Income

The characteristics of respondents	Frequency (n)	Percentage (%)
Maternal age (Years)		
18-24	19	13.0
25-40	109	74.7
41-59	17	11.6
≥60	1	0.7
Maternal occupation		
Housewife	94	64.4
Laborer	8	5.5
Farmer	22	15.1
Self-employed	11	7.5
Private sector worker	8	5.5
Civil Servant	3	2.1
Maternal monthly income (IDR)		
<500,000	58	39.7
500,000-1,000,000	67	45.9
>1,000,000	21	14.4

Before training with AVA media, 92.5% of respondents were unskilled in providing sex education for preschool children (Table 2). Most respondents could not tell their children about the body parts that could and could not be touched by others. In addition, they did not comprehend the efforts children must make when experiencing sexual crimes. Furthermore, mothers could not use age-appropriate language in giving early sex education. Meanwhile, 76.7% of respondents were skilled in providing sex education for preschool children after the training (Table 2). Most respondents could properly give sex education to preschool children according to their age and with non-vulgar language. In addition, Fisher's exact test obtained  $p=0.048$ . There was a significant difference before and after training with AVA media (Table 2). Thus, there was the effect of training with AVA media on maternal skills to provide sex education for preschool children.

Table 2. The Effect of Training with AVA Media on Maternal Skills to Provide Sex Education for Preschool Children

Variable	Frequency (n)	Percentage (%)	<i>p</i>
Maternal skills before training with AVA media (pre-test)			0.048
Unskilled	135	92.5	
Skilled	11	7.5	
Maternal skills after training with AVA media (post-test)			
Unskilled	34	23.3	
Skilled	112	76.7	

## DISCUSSION

Sex education transfers information about matters related to the body and sexuality in males and females. Providing quality sex education needs to be pursued continuously. Sex education for preschool children aims to know about their body parts that will grow and develop with age, prevent violence or sexual crimes against children, reduce guilt and shame related to sexuality, and increase the child's response to sexual crimes. Techniques and strategies for sex education are adjusted to the local tribe or culture. One

of the benefits of giving sex education to children according to their age is increasing their knowledge and insight about sex correctly and clearly. So that children are aware of the reproductive organs, both male and female, and understand how to care for them. In addition, other benefits can prevent children from various possible sexual crimes from irresponsible people and provide a sense of responsibility to the children about their sexuality (Haryono *et al.*, 2018).

Maternal skills to provide sex education for preschool children is crucial because mothers are the first educator and the closest person to their children. Skill is an ability performed by a person through real and continuous action and can be done repeatedly by involving cognitive and technical skills (Salsabila, 2017). Internal and external factors affect maternal skills in providing sex education for preschool children. Previous studies revealed that the internal factors included maternal age, education level, occupation, socioeconomics, perceptions, attitudes, beliefs, and motivation (Salsabila, 2017; Fatmawati, BM and Kusumawati, 2018). In addition, the external factors were information sources, media, the school environment, the role of school teachers, and the learning curriculum (Aprilia, 2015; Hety, 2017). Furthermore, teacher skills in providing sex education for preschool children were influenced by age, education, knowledge, employment, tribe, and income (Haryono *et al.*, 2018).

Most respondents in this paper were from 25 to 40 years old (Table 1). The mother's age was in the early adult stage (Nurvianti, 2016). Early adulthood is a reasonably mature age and age that can quickly obtain or receive information from various sources (Notoatmodjo, 2014). The older the mother, the more experience with sexuality. However, not all older mothers were more skilled in providing early sex education (Aprilia, 2015; Nurvianti, 2016).

In addition, most respondents in this study were housewives (Table 1). Mothers not working in the public sector tend to have more spare time. They can monitor children and provide information about child sexuality in their spare time. However, not all housewives are skilled in providing sex education for children. In addition, it is still a taboo thing to talk about in some tribes in Indonesia.

Furthermore, most respondents in this study had income from IDR 500,000 to IDR 1,000,000 per month (Table 1). It is classified as middle socioeconomic. The higher the mother's income, the more easily access various sources and information media, including those related to child sexuality (Salsabila, 2017). Mothers with high family incomes may have a variety of information media. Various sources from print media (such as newspapers, magazines, and books) and electronic media (such as mobile, video, television, and radio) can give information to mothers. The ease of access allows mothers to enhance their understanding of the importance of sex education for preschool children.

Our findings revealed the effect of training with AVA media on maternal skills to provide sex education for preschool children (Table 2). Training in this study provided information by explaining directly about child sexuality. Child sexuality is everything related to the child's biological and physical aspects. The

materials of sex education for children aged 4-6 years are body parts that others cannot touch, body parts that parents can hold during urinating or defecating and bathing, and body parts that health workers can palpate with parents accompanying. In addition, the material consists of children's efforts when having unpleasant actions from strangers, such as groping a body covered in underwear (Salsabila, 2017). In addition, sex education for preschool children should introduce the differences in clothing use (such as skirts for females and pants for males) and play tools (such as cars for males and dolls for females) to avoid mistakes in child sexuality (Hety, 2017).

In addition, AVA media has the benefit of being a tool to make it easier for mothers to remember or see the contents of messages contained in the video so that it can make it easier for mothers to give sex education to their children after the training. A previous study also found improved teacher skills after training on how to provide early sex education to children by using various game media that children like including dolls, puzzles, and singing (Haryono *et al.*, 2018). Teachers and mothers are close people for preschool children because they interact daily with them. Those who have never been exposed to early childhood sex education information will have fewer skills. Meanwhile, those who have been exposed and get training will have better skills.

Information about child sexuality will determine child's knowledge and behavior of their sexuality. Game tools or audiovisual media that are interesting to children's concerns can make it easier for children to understand child sexuality. In addition, research showed that school environmental factors support the success of providing sex education to preschool children. The factors included the role of peers and school and the curriculum or learning process in schools that integrated with early sex education (Aprilia, 2015; Hety, 2017).

## CONCLUSION

In conclusion, training with audiovisual media can enhance maternal skills to provide sex education for preschool children. However, the limitations of this research were the lack of frequency in the training and the involvement of the child's close people, such as fathers, grandparents, grandmothers, and teachers. Mothers with preschool children should have the skills to provide early sex education to protect children from sexual crimes affecting their psychological development in adulthood. Furthermore, early sex education could be integrated with the learning process or curriculum in schools and supported by teachers and fathers as the closest person to the child other than the mother.

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## Parental Knowledge and Attitude as Associated Factors for Injury Prevention Practice in Preschool Children

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### A B S T R A C T

Children who like to explore the environment potentially cause injury, so injury prevention is essential. Parental knowledge and attitude influence the incidence of injury in children. This paper analyzes the correlation between parental knowledge and attitude toward injury prevention practice in preschool children. This research was a cross-sectional study. The population was parents who have children schooling in AI - Masithoh 04 Kindergarten. In addition, there were 40 samples with a total sampling method. The independent variables were parental knowledge and attitude, while the dependent variable was injury prevention practice. The instrument utilized questionnaires. A questionnaire for parental knowledge consisted of 24 multiple-choice questions. In addition, there were 14 questions for the parental attitude variable. Injury prevention practices were evaluated using the recall method with 14 questions. The statistical test used the Sommers correlation and the Lambda with a 95% confidence level. Respondents with less parental knowledge had less injury prevention practice (25%). The Sommers D test obtained  $p=0.001$   $r=0.447$ , indicating a positive and moderate correlation between parental knowledge and injury prevention practices. In addition, respondents with negative parental attitudes had poor injury prevention practices (47.5%). The Lambda test obtained  $p=0.000$   $r=0.650$ , meaning a positive and strong association between parental attitude and injury prevention practice. Parental knowledge and attitude correlate with injury prevention practice in preschool children. There should be an effort to improve parental knowledge, especially about the dangers of injury and its prevention.

## INTRODUCTION

Injury is the impact of an external agent causing physical and mental damage (Jamil, 2020). It is one of the leading causes of child morbidity and mortality worldwide. It includes traffic injuries, falls, burning, drowning, poisoning, and animal bites (Atak *et al.*, 2010). A prior study showed that environmental factor or unsafe place where children live was the most crucial element in the incidence of injury to children, followed by low maternal monitoring (Rahma *et al.*, 2020). In addition, the research found that mothers with less injury prevention had more frequent children experiencing injuries (Widyaningsih, 2014).

According to the World Health Organization (WHO), injuries resulted in 5.8 million deaths worldwide, and more than 3 million occurred in developing countries. In addition, the organization stated that no less than 875,000 children under 18 years old die annually due to intentional and unintentional injuries (Atak *et al.*, 2010). Unfortunately, the number of injuries has increased every year. Based on a survey by Basic Health Research, injury prevalence in 2007 was 7.5 percent to 8.2 percent in 2013. 5.4% of injuries occurred at school, and 36.5% at home.

A preliminary study in Al-Masithoh 04 Kindergarten, Sukodadi Village, Malang Regency, among 20 parents showed that all of their children had suffered an injury. The interview with those parents found that the most frequent injuries in children were falling (65%), followed by burn injuries (25%), choking on marbles (5%), and drowning (5%).

In addition, the interview revealed that parents allowed and did not forbid children when playing on the stairs. They also often did not wear helmets for various reasons when children participated in motorbike driving. Furthermore, they were often negligent in keeping a lighter far from children. It is because there was a game for children by burning paper and imitating a magician on TV. Moreover, a child nearly drowned because the parent did not put on a life vest. The child suddenly came into the adult pool because he followed his brother. A parent also locked the fence when the child was at home because of the house near the highway.

Several studies indicated that parental attitudes ignoring their children would impact children's safety (Indarwati, 2011; Jamil, 2020). An attitude is feelings and potential tendencies to react. It results from cognitive, affective, and conative components responding to each other in understanding, feeling, and behaving towards an object (Indarwati, 2011; Jamil, 2020). A previous study also found that lack of parental monitoring increased the risk of injury in children (Kusbiantoro, 2014). Injury is the impact of an external agent causing physical and mental damage (Indarwati, 2011). The risk factors for injury are host factors (parent and child factors that cause injury) and environmental factors (Kuschithawati, S., Magetsari, R., & Ng, 2007). Parents with less injury prevention practice impacted more frequent injuries in children (Widyaningsih, 2014). Injury is one of the leading causes of child morbidity and mortality worldwide.

Providing information to improve parental knowledge and skills is a prevention effort in household injury (Ikhlusal, Istadi and Wijayanti, 2015). It is vital for parents, especially mothers, to increase their understanding of changes in children's growth and development in each stage. So, there is injury prevention in children. Good parental knowledge could improve injury prevention (Indarwati, 2011). This paper aims to analyze the correlation between parental knowledge and attitude toward injury prevention practice in preschool children in Al-Masithoh Kindergarten, Wagir Malang.

## **METHOD**

This research was a correlational study with the cross-sectional approach. The population was parents who have children schooling in AL - Masithoh 04 kindergarten. In addition, there were 40 samples in this research with a total sampling method. The independent variables were parental knowledge and attitude, while the dependent variable was injury prevention practice. Furthermore, the statistical test used Sommers correlation to analyze the correlation between paternal knowledge and injury prevention

practice. Meanwhile, Lambda with a 95% confidence level to determine the association between parental attitude and injury prevention practice (Nursalam, 2016). The instrument utilized questionnaires. A questionnaire for parental knowledge consisted of 24 multiple-choice questions. In addition, there were 14 questions with a range of answer choices from 'very agree' to 'very disagree' for parental attitude. Injury prevention practices were evaluated using the recall method with a questionnaire consisting of 14 questions with 'yes' and 'no' choices.

## RESULT

Al - Masithoh Kindergarten is located in Sukodadi Village, Wagir District, Malang Regency. It has two teachers with 40 students in 2 classes. In the north, it is bordered by rice fields; in the south by a mosque. In addition, the west and the east were bordered by houses. Almost half of the respondents were 26-5 years old (45%), graduated from Senior High School (38%), and were housewives (43%). They also never had information about injury prevention (40%). In addition, most of the respondent's children were five years old (72.5%), girls (52.5%), and first children (40%). Falls were the most injury causes in respondents' children (82.5%) (Table 1).

Table 1. Characteristics of respondent and respondent's child

Characteristics of respondent	(f)	%	Characteristics of respondent's child	(f)	%
Age			Age		
17-25 years old	15	37.5%	Six years old	8	20%
26-35 years old	18	45%	Five years old	29	72.5%
46-55 years old	7	17.5%	Four years old	3	7.5%
Total	40	100%	Total	40	100%
Education			Gender		
Elementary	14	35%	Boy	19	47.5%
Junior High School	11	27%	Girl	21	52.5%
Senior High School	15	38%	Total	40	100%
Total	40	100%			
Occupation			Child order		
Private worker	15	37%	First	20	50%
Businessman	2	5%	Second	16	40%
Labor	6	15%	Third	2	5%
Unemployment /housewife	17	43%	> 3	2	5%
Total	40	100%	Total	40	100%
Source of information about injury prevention			Cause of injuries		
Never	16	40%	Motor Vehicle Crash	1	2,5%
Health Worker	10	25%	Burn	2	5%
Friend/other parents	6	15%	Fall	33	82.5%
Mass media	6	15%	Poisonous	2	5%
Other	2	5%	Chocking	1	2,5%
Total	40	100%	Household injuries	1	2.5%
			Total	40	100%

Most respondents had moderate parental knowledge (60%) and negative parental attitude (60%). In addition, almost half of them had less injury prevention practice (45%) (Table 2).



Table 2. Parental knowledge, parental attitude, and injury prevention practices

Variable	(f)	%
Parental Knowledge		
1. Good	3	7%
2. Moderate	24	60%
3. Less	13	33%
Total	40	100%
Parental Attitude		
1. Positive	16	40%
2. Negative	24	60%
Total	40	100%
Injury prevention practices		
1. Good	13	32%
2. Moderate	9	23%
3. Less	18	45%
Total	40	100%

Respondents with less parental knowledge had less injury prevention practice (25%). The Sommers D test obtained  $p=0.001$ . It means there was a correlation between parental knowledge and injury prevention practices in preschool children. In addition, the Gamma coefficient in the Somers D test was (+) 0.447, indicating that the correlation was positive and moderate strength. A Positive Gamma coefficient means that the higher the parental knowledge in respondents, the higher the injury prevention practice or vice versa (Table 3).

Table 3. Cross-tabulation between parental knowledge and injury prevention practice also statistical test result

Parental Knowledge	Injury Prevention Practice						Total		Statistical test Result
	Good		Moderate		Less		F	%	
	F	%	F	%	f	%			
Good	3	7.5	0	0	0	0	3	7.5	Sommers D $p=0.001$ $R = 0.447$
Moderate	8	20	8	20	8	20	24	60	
Less	2	5	1	2.5	10	25	13	32.5	
Total	13	32.5	9	22.5	18	45	40	100	

Respondents with negative parental attitudes had poor injury prevention practices (47.5%). In addition, the Lambda test obtained  $p=0.000$ , meaning there was a positive association between parental attitude and injury prevention practice in preschool children. Lamda correlation value (r) was (+) 0.650, indicating positive and strong correlation (Table 4).

Table 4. Cross-tabulation between parental attitude and injury prevention practice also statistical test result

Parental Attitude	Injury Prevention Practice						Total		Statistical Result
	Good		Moderate		Less		F	%	
	F	%	F	%	F	%			
Positive	14	35	1	2.5	1	2.5	16	40	Lambda $p=0.000$ $R=0.650$
Negative	0	0	5	12.5	19	47.5	24	60	
Total	14	35	6	15	20	50	40	100	

## DISCUSSION

The correlation between parental knowledge and injury prevention practice in preschool children

Our findings found that respondents with less parental knowledge had less injury prevention practice (Table 3). One of the factors that influence knowledge is the source of information. Almost half of the respondents never got information about injury prevention, and a small number got information from the mass media (magazines, newspapers, and tv) (Table 1).

In addition, this paper showed a positive and moderate correlation between parental knowledge about injury prevention and injury prevention practices in preschool children (Table 3). The better one's knowledge, the better the practice. Knowledge results from humans sensing or knowing about objects through their senses such as eyes, nose, and ears (Notoatmodjo, 2010). A study by (Atak *et al.*, 2010) revealed that knowledge was an associated factor for injury prevention practice in children. In addition, mothers with the highest incidence of child injury had low levels of education. Thus, high maternal education resulted in good knowledge.

Sources of knowledge can obtain from information someone receives (Hidayat, 2007). Providing information can be in the form of health education about the danger of injury and its prevention. This statement is supported by Widyaningsih research (2014), stating that one effort in injury prevention was improving knowledge.

The correlation between parental attitude and injury prevention practice in preschool children

This research revealed a positive and strong association between parental attitude and injury prevention practice in preschool children (Table.4). It is in line with a study by (Kusbiantoro, 2014). That study indicated a relationship between attitude and anticipation of injury to children. The parental attitude becomes a determinant of injury prevention practice in preschool children. Parents must have a positive or supportive attitude about injury prevention. One example is a parent who establishes the habit of wearing a helmet when riding a motorcycle to be a good role model to the children. Furthermore, age, personal experience, mass media, and education can affect attitudes (Nursalam, 2019).

Furthermore, a prior study also found a correlation between injury prevention practice and the incidence of injury (Indarwati, 2011). Thus, injury prevention practice in children is one of the essential factors in minimizing the incidence of injuries so that children can grow up healthy according to their growth and development stages. According to (Kusbiantoro, 2014), injury prevention practice was started with good parental knowledge, followed by positive attitudes.

Half of the respondent's children were the first children in the family (Table.1). It means half of the respondents did not have adequate experience. Individuals who lack experience tend to form a negative attitude towards that object (Wong *et al.*, 2009). Personal experience will leave a solid impression to create and influence appreciation. So a person must have experience related to the object of psychology

(Kuschithawati, S., Magetsari, R., & Ng, 2007). Thus, parents without experience in injury prevention in children tend to form a negative attitude. Meanwhile, parents with more than one child will have more experience creating positive attitudes.

Factors influencing practice include education, information sources, and attitudes. Thus, attitude is one of the essential factors that influence practice. In this study, respondents with negative parental attitudes had poor injury prevention practices (Table.4). Attitudes will determine how parents will protect their children from injury. Good parental monitoring can prevent the incidence of injury (Widyaningsih, 2014; Jamil, 2020). In addition, Kusbiantoro (2014) concluded that attitude was the most significant factor in injury prevention practice. Attitude is an action or practice that has not been implemented. Thus, negative parental attitudes will lead to less injury prevention practice in toddlers and vice versa.

In addition, information can affect practice. Almost half of the respondents in this paper never had information about injury prevention (Table.1). Knowledge from various sources and experiences from themselves or others are a stimulus to form an attitude before taking action (Atak *et al.*, 2010; Indarwati, 2011).

## CONCLUSION

Parental knowledge and attitude correlate with injury prevention practice in preschool children. There should be an effort to improve parental knowledge, especially about the dangers of injury and its prevention. Further research could use the observation method to evaluate injury prevention practice in parents.

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## Effect of Slow Stroke Back Massage on Patients' Anxiety Level

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### A B S T R A C T

Anxiety is a feeling of fear or anxiety from negative thoughts and excessive negative emotions that play a role in causing illness. This study aimed to determine the effect of Slow Stroke Back Massage on patient anxiety with various literature. The method used is Literature Review with database searches such as Google Scholar, Sage, and Pubmed. The journals used were 15 consisting of 6 national and 9 international journals. The results of the Literature Review Analysis showed that 15 journals stated there was a significant effect between Slow Stroke Back Massage in reducing anxiety. There is an effect of Slow Stroke Back Massage on reducing patient anxiety.

## INTRODUCTION

According to the American Psychological Association, anxiety is an emotional state that arises when individuals are stressed and is characterized by feelings of tension, thoughts that make individuals feel worried, and accompanied by physical responses such as a racing heart, raised blood pressure, and so on (Putri & Wibowo, 2020). Anxiety is a feeling of fear or nervousness from negative thoughts and excessive negative emotions that take a role in causing illness and making the patient's recovery hampered and can worsen the disease (Putri & Wibowo, 2020). Anxiety triggers irregular production of the hormone cortisol so that the hypothalamus increases the production of Corticotropin-Releasing Hormone (CRTH), which in turn causes weakness and decreases endurance (Pujiani and Kristiyawati, 2017).

One of the complementary or non-pharmacological therapies is Slow Stroke Back Massage. Slow Stroke Back Massage (SSBM) is a massage technique taught in nursing academy by massaging the patient's back using the palm, especially the thumb, in a circular motion. The massage movements were carried out 60 times/minute for 10 minutes in each session and were carried out for 3 consecutive days (Lindquist et al., 2018). Slow Stroke Back Massage (SSBM) activates faster transmission of A-beta sensory nerve fibers as neurotransmitters. The neurotransmitter reduces pain transmission, delivered through small diameter C and A-delta fibers while closing the gate for pain impulse transmission, so anxiety does not occur.

Massage will reduce emotions, reduce feelings of nervousness, and provide an outstanding balance to the activity of the parasympathetic nervous system and the sympathetic nervous system. Massage can also increase the pressure on the tissue, then the pressure will increase between the tissue and blood vessels so that it can cause the movement of fluid between the tissues and blood vessels which regulates blood pressure and anxiety can decrease (Peng *et al.*, 2015).

Based on the description, it is interesting to study further, which makes researchers interested in conducting a Literature Review on Slow Stroke Back Massage (SSBM) for Anxiety. The purpose of this study was to analyze and determine whether Slow Stroke Back Massage affects anxiety in patients.

## METHOD

This study design was *Literature Review*. Literature Review is a writing design by searching for literature from journals that have been published and reviewed. The Literature Review provides answers and opinions found in previous and current research. This literature search uses data or previous sources from existing databases such as Google Scholar, Sage, and Pubmed. It used keywords such as the effect of Slow Stroke Back Massage on anxiety. After obtaining the journals/articles, the articles were selected using the Inclusion Criteria and Exclusion Criteria. This process found 15 journals (6 National Journals and 9 International Journals). The data obtained will be used in a discussion to answer all the problems in this study. Data obtained from various anxiety patients collected in one document aims to answer the problems that have been formulated.

Table of Inclusion Criteria and Exclusion Criteria

Criteria	Inclusion	Exclusion
Population	Patient with Anxiety	Patient without Anxiety
intervention	Application of slow stroke back therapy	Application of other intervention
Outcome	Anxiety	without Anxiety
Period Journal	2016-2020	Other 2016-2020
Language	Indonesian and English	Other Language

## RESULT

Table of Result

No	Author/year	Journal title	Objective	Design & samples	Conclusion	Databases
1	Anggraeni, CG, Nurwanti, E.Nabil (2020)	The Effect of Slow-Stroke Back Massage on Anxiety in Patients with Pre-endoscopy in the Surgery and Anesthesia Installation of Dr. Sardjito Yogyakarta	Knowing the effect of back massage on anxiety scores in heart failure patients.	D: quasi experimental S: Purposive sampling V: Slow-Stroke Back Massage Against Anxiety in Pre-Endoscopy Patients I: Hamilton Anxiety Rating Scale (HARS) A: Wilcoxon Signed Rank Test.	There is influence Slow-Stroke Back Massage Against Anxiety in Pre-Endoscopy Patients with a P-Value for male respondents of 0.001 (P Value <0.05). Female respondents 0.002 (P Value <0.05)	Google Scholar

2	Putri, R. P., & Wibowo (2020)	Effect of Slow Stroke Back Massage (SSBM) on Anxiety in Patients with Diabetes Mellitus Type 2 in the Work Area of the Juanda Health Center, Samarinda City	Knowing the effect of Slow Stroke Back Massage on the Anxiety of Patients with Type 2 Diabetes Mellitus	D: pre-experimental with the design used is One Group Pretest-Posttest design. S: purposive sampling technique. V: slow stroke back massage on anxiety in patients with type 2 diabetes mellitus. I: DASS-Anxiety questionnaire. A: Paired Sample T-test	There is influence Slow-Stroke Back Massage Against Anxiety of patients with Type 2 Diabetes mellitus with P-Value 0.000 (P Value <0.05).	Google Scholar
3	Anuhgera, DE, Siregar, WW, Ritonga, NJ, & Pardede (2020)	Alternative Therapy for Pain Reduction and Anxiety Through Slow Stroke Back Massage (SSBM) At In-partum Stage I Active Phase	Knowing the effect of reducing pain and anxiety in in-partum patients through Slow Stroke back Massage.	D: quasi-experimental study S: purposive non-probability sampling technique. V: Slow Stroke Back Massage therapy to reduce pain and anxiety in the 1st stage of labor. I: numerical pain assessment scale and DASS (Depression, Anxiety and Stress Scale) A: Paired Sample T-test	There is influence Slow-Stroke Back Massage Against Anxiety in 1st stage of labor with a P-Value of 0.000 (P Value <0.05).	Google Scholar
4	Suwanto, Sugiyorini and Wiratmoko (2020)	Benson Relaxation Effectiveness and Slow Stroke Back Massage Against Anxiety Reduction In Hemodialysis Patients	Knowing the effect of Benson relaxation and Slow Stroke Back Massage on reducing anxiety in hemodialysis patients	D: quasi experimental one group pre-test and post-test S: purposive sampling V: Slow Stroke Back Massage therapy and Benson therapy for reducing anxiety in hemodialysis patients. I: that is HARS A: paired t-test.	There is influence Slow-Stroke Back Massage Against Anxiety in hemodialysis patients with a P-Value of 0.000 (P Value <0.05).	Google Scholar
5	Rohmah (2020)	The Effect of Cutaneous Stimulation of Slow Stroke Back Massage on Anxiety in Preoperative Patients in the Edelweiss Room of RSD Dr. Soebandi Jember	Knowing the Effect of Cutaneous Stimulation of Slow Stroke Back Massage on Anxiety in Preoperative Patients in the Edelweiss Room, Dr. Soebandi Jember	D: pre-experimental one-group pre-post-test design. S: Data sampling quota V: Cutaneous Stimulation Slow Stroke Back Massage and Anxiety. I: HARS A: Wilcoxon Signed Ranks Test	There is influence Slow-Stroke Back Massage Against Anxiety in Anxiety Preoperative Patients with P-Value 0.000 (P Value <0.05).	Google Scholar
6	Pujiani and	The	Knowing the	D: Quasy	There is influence	Google

Kristiyawati (2017)	Effectiveness of Slow Stroke Back Massage and Guided Imagination on Reducing Anxiety Levels in Pre-Surgery Patients at Pantiwilasa Citarum Hospital	Effectiveness of Slow Stroke Back Massage and Guided Imagination on Reducing Anxiety Levels in Pre-Surgery Patients at Pantiwilasa Citarum Hospital	experiment: pre-post design, S: purposive sampling V: slow stroke back massage therapy, Guided Imagination and Anxiety of pre-surgery patients I: independent t test	Slow-Stroke Back Massage Against Anxiety in Pre-Surgery Patients at Pantiwilasa Citarum Hospital with a P-Value of 0.000 (P Value <0.05).	Scholar
7 Jalalodini et al., 2016	The Effectiveness of Slow-Stroke Back Massage on Hospitalization Anxiety and Physiological Parameters in School-Age Children: A Randomized Clinical Trial Study	Knowing the effect of Slow Stroke Back Massage on the anxiety of school-aged children who are hospitalized.	D: Quasi experimental S: sequential sampling V: slow stroke back massage therapy for anxiety and physiology of school-age children who are hospitalized I: (STAIC). A: T-test and Chi-square	There is influence Slow-Stroke Back Massage Against Anxiety in hospitalized school-age children with P-Value 0.000 (P Value <0.05).	Sage
8 Elkheshen, Ahmed and Abdelgawad (2017)	The Impact of Slow-Stroke Back Message on Anxiety Level of Low Risk Parturient Mothers in the Fourth Stage of Labor	Knowing the effect of Slow Stroke Back Massage on maternal anxiety during the 4th stage of labor	D: quasi-experimental. Settings S: randomized controlled trial V: slow stroke back massage on fourth stage labor anxiety. I: STAI A: -	There is influence Slow-Stroke Back Massage Against Anxiety on the fourth stage of labor anxiety with P-Value 0.000 (P-Value <0.05).	Sage
9 Mohammadpourhodki, Sargolzaei and Basirinezhad (2019)	Evaluating the effect of massage based on slow stroke back massage on the anxiety of candidates for cataract surgery.	Evaluating the effect of SSBM on anxiety in pre-cataract surgery patients	D: quasi-experimental. S: randomized controlled V: slow stroke back massage on the anxiety of patients undergoing cataract surgery. I: Spielberger state anxiety trait questionnaire. A: Independent t test and chi-square test	There is influence Slow-Stroke Back Massage Against Anxiety on the anxiety of patients undergoing cataract surgery. with a P-Value of 0.000 (P Value <0.05).	Pubmed
10 Basiri et al. (2016)	Effect of slow stroke back massage on anxiety of older women with breast cancer undergoing chemotherapy	Knowing the effect of Slow Stroke Back Massage on patient anxiety. Elderly women with breast cancer	D: quasi-experimental study S: continuous sampling method. V: slow stroke back massage therapy on the anxiety of women with breast cancer who are	There is influence Slow-Stroke Back Massage Against Anxiety on the anxiety of women who are undergoing chemotherapy.	Pubmed



		who are undergoing chemotherapy.	undergoing chemotherapy. I: The data collection instrument is a geriatric anxiety scale used to measure the subject's level of anxiety.	with a P-Value of 0.001 (P Value <0.05).		
11	Jahdi et al. (2016)	The Effect of Slow-Stroke Back Massage on the Anxiety Levels of Iranian Women on the First Postpartum Day	Knowing the effect of Slow Stroke Back Massage on the anxiety level of postpartum women on the first day.	D: Controlled clinical trial S: binary block. V: slow stroke back massage in Iranian women after the first day of delivery. I: Spielberger's state anxiety inventory (STAI) questionnaire.	There is influence Slow-Stroke Back Massage Against Anxiety in first day postpartum women, with P-Value 0.001 (P Value <0.05).	Pubmed
12	Miladinia et al. (2016)	Anxiety Control in the Iranian Children with Chronic Leukemia: Use of a Non-drug Method	Knowing the effect of Slow Stroke Back Massage on children with Leukemia	D: In a randomized double-blind trial. S: children with chronic leukemia are placed in intervention or control group. V: control children's anxiety with non-pharmacological therapy I: Data collected using Revised Children's Manifest Anxiety Scale (RCMAS). A: ANOVA	There is influence Slow-Stroke Back Massage Against Anxiety in children with Leukemia with P-Value 0.001 (P Value <0.05).	Sage
13	Nahamin, Akbarbegloo and Habibipur (2016)	The Impact of Slow-Stroke Back Massage on Anxiety Among Patients Receiving Hemodialysis: A Randomized Clinical Trial	Knowing the effect of Slow Stroke Back Massage on the anxiety of patients undergoing hemodialysis.	D: experimental or a control group through simple random allocation. S: patients who will undergo hemodialysis V: evaluation of slow stroke back massage on the anxiety of patients who will undergo cataract surgery. A: Independent-Sample T-Test	There is influence Slow-Stroke Back Massage Against Anxiety in patients who will undergo cataract surgery with P-Value 0.001 (P Value <0.05).	Pubmed
14	Lali, Jouzi and Moghimian (2020)	The Effect of Back Massage on Anxiety	Knowing the effect of Slow Stroke Back	D: experimental S: convenience sampling method	There is influence Slow-Stroke Back Massage Against	Google Scholar

	Components of Mothers with Preterm Infants.	Massage on the anxiety of mothers with premature babies.	V: slow stroke back massage on the anxiety of mothers who gave birth to premature babies I: Lehrer & Woolfolk demographic and somatic, cognitive, and cognitive questionnaire. A: paired sample t test	Anxiety of mothers who gave birth to premature babies with a P-Value of 0.001 (P Value <0.05).	
15	Mohaddes, Ehsanpour and Ghezeljeh (2018)	The effect of slow-stroke back massage on anxiety in female patients with heart failure	determine the effect of Slow Stroke Back Massage on female patients with heart failure. D: quasi-experimental patients with heart failure randomized to control and intervention group. V: slow stroke back massage in heart failure patients I: Depression, Anxiety and Stress Scales (DASS-42) questionnaire. A: descriptive and inferential statistics	There is influence of Slow-Stroke Back Massage Against Anxiety in heart failure patients with P-Value 0.001 (P Value <0.05).	Sage

## DISCUSSION

The results showed that 15 journals (100%) stated the effect of Slow Stroke Back Massage on reducing anxiety with a significance value of P-Value <0.05. Based on the 100% percentage results obtained from 6 national and 7 international journals, as many as 9 showed an effect of Slow Stroke Back Massage with decreasing anxiety. Slow Stroke Back Massage (SSBM) will cause A-beta sensory nerve transmission as a neurotransmitter that reduces pain. Massage in the back area will trigger the release of endorphins, make you feel comfortable and calm, and reduce Anxiety (Putri, R. P., & Wibowo, 2020).

Stimulus Slow Stroke Back Massage (SSBM), which affects the peripheral nervous system, will be forwarded to the hypothalamus through the spinal cord pathway. The hypothalamus responds to these stimuli by secreting endorphins and reduces cortisol by releasing corticotropins. The activity reduces sympathetic nerve activity and increases parasympathetic nerve activity. The endorphins production will stimulate the production of hormones, namely serotonin and dopamine, which reduce anxiety and cause a relaxation response.

Massage will reduce emotions, reduce feelings of nervousness, and provide a great balance in the activity of the parasympathetic nervous system and the sympathetic nervous system (Elkhesheh, Ahmed and Abdelgawad, 2017). According to the researcher, massage can provide therapeutic benefits in various

body systems such as integument, musculoskeletal, cardiovascular, lymphatic and nervous. The implication of this research can be applied to patients because Slow Stroke Back Massage is an easy non-pharmacological action, and minimal complications make SSBM readily accepted by patients because the benefits can immediately be felt.

## CONCLUSION

Based on the literature review results of 15 journals consisting of 6 national journals and 9 international journals, it was found that there was an effect of Slow Stroke Back Massage on patient anxiety with p-value <0.05.

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## The Effect of Red Rosella Tea on Blood Glucose Individuals with Diabetes Mellitus Type II

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### A B S T R A C T

Red rosella petals had potential as diabetes therapy. Red rosella petals contain citric acid, malic acid, Vitamin C, anthosinins, proteins and flavonoids that act as antioxidants that help lower pancreatic beta-cell damage and improve insulin work. Red rosella petals can be dried without reducing the content in it. Practically, it is used as a beverage ingredient, namely tea. This research aimed to analyze red rosella tea's effect on blood glucose in individuals with diabetes mellitus type II. This research was pre-experimental research with one-group pre-post-test design approach. The population was 17 individuals in Ketawang Village, Gondang District. The sample was 14 respondents with a proportional stratified random sampling technique. The independent variable was rosella tea, and the dependent variable was blood glucose. The instruments were red rosella tea with Standard operating procedures. The data was analyzed SPSS 21 paired t-test with a significance level of 0.05. The results showed that 14 respondents had an average blood glucose level of 317,64 mg/dl before the intervention, while after giving red rosella tea for 7 days had an average of 222 mg/dl. In addition, the results of the paired t-test,  $p\text{-value} = 0.00 \leq \alpha (0.05)$ . Thus, there was an Effect of Red Rosella Tea on Blood Glucose in individuals with Diabetes Mellitus Type II. Red Rosella Tea can decrease Blood Glucose. Individuals with diabetes mellitus type II should consume red rosella tea routinely to avoid the complications of diabetes mellitus.

## INTRODUCTION

10<sup>th</sup> edition of the International Diabetes Federation (IDF) Atlas revealed that currently, at least 1 in 10 people or as many as 537 million people live with diabetes mellitus. If there is no intervention, this number is projected to increase, reaching 643 million in 2030 and 784 million in 2045. Diabetes mellitus type II affects more than 90 percent of patients worldwide. This disease has also caused 6.7 million deaths in 2021. It is estimated that 1 person dies every 5 seconds due to diabetes mellitus. In Indonesia, the number of people with diabetes mellitus continues to increase from 10.7 million in 2019 to 19.5 million in 2021. This year, Indonesia is ranked fifth with the highest number of people with diabetes mellitus globally, up from seventh place last year. This increase is very concerning.

The increase in the number of people with diabetes mellitus type II is caused by socioeconomic, demographic, environmental, and genetic factors. Some main drivers are urbanization, an aging population, reduced physical activity, and an increasing number of people who are obese or overweight. The number of people with diabetes with uncontrolled blood sugar increase alarmingly (Bistara et al., 2019).

Diabetes mellitus is a heterogeneous group of disorders characterized by elevated blood glucose levels or hyperglycemia (Padila, 2012). Individuals with diabetes mellitus can experience various long-term

complications if their diabetes is not managed correctly. Complications that have often occurred and are deadly are heart attacks, strokes, impaired kidney function, and nervous disorders (Bistara and Rusdianingseh, 2019). Individuals with diabetes mellitus undergo pharmacological and non-pharmacological treatment to avoid complications. Pharmacological treatment such as administration of anti-diabetic drugs. Meanwhile, non-pharmacological treatment can use herbal plants.

Herbal therapy is better because it is natural, cheap, and easy to get (Ambarwati, 2012). Herbal therapy contains lots of fiber and antioxidants, one of which is that the red rosella plant is easily bred and can grow anywhere (Hastuti and Kusnadi, 2016).

People with diabetes mellitus type II usually need insulin when diet, exercise, and oral antidiabetic medication do not help achieve their target blood sugar (Wijayanti et al., 2019). Individuals with diabetes mellitus type II need to be given appropriate therapy. This situation requires patients diagnosed with diabetes mellitus type II to keep blood glucose levels under control and avoid further complications (Suiraoaka, 2012). Patients with diabetes mellitus must regulate their diet and eat fiber-rich foods. Fiber can be obtained from vegetables and fruits (Herdiani and Wikurendra, 2020). Besides vegetables and fruits, it turns out that red rosella has a high fiber and antioxidant content, but the public does not know its many benefits and contents in it (Husna, 2014).

Red rosella petals help maintain the elasticity of blood vessel walls so that blood can flow smoothly and keep blood pressure stable. Rosella is also helpful as a diuretic. This function proves that red rosella petals can be used to lower blood pressure (Gilang, 2020). Red rosella petals have potential as a diabetes therapy. Red rosella petals have citric acid, malic acid, Vitamin C, anthosinins, proteins, and flavonoids that act as antioxidants that help lower pancreatic beta-cell damage and improve insulin work (Herdiani and Wikurendra, 2020). Practically, it is used as a beverage ingredient, namely tea. Compounds in red rosella can be antidiabetic, reducing serum creatinine, cholesterol, and glucose levels. Steeped water of red rosella petals, which people with diabetes routinely consume, can improve pancreatic cells, producing more insulin so that blood sugar can drop (Obat and Indonesia, 2010). This study aims to determine red rosella tea's effect in lowering blood glucose in individuals with diabetes mellitus type II.

## **METHOD**

This study was pre-experimental research with the One-Group Pre-Posttest design approach. This study in Ketawang Village, Gondang District, for one week. The Population was 17 individuals in Ketawang Village, Gondang District. The Sample was 14 respondents with a proportional stratified random sampling technique. The sampling technique used is proportional stratified random sampling with inclusion criteria determined by the researcher to get the number of samples from each hamlet, and then

carried out simple random sampling of each hamlet. The inclusion criteria in this study were individuals with diabetes mellitus type II who did not experience complications.

The independent variable was rosella tea, and the dependent variable was blood glucose. Each respondent gets a rosella tea twice daily in the morning at 08.00 AM and the afternoon at 04.00 PM for 7 days. Give red rosella tea 3 dried rosella petals with 200 cc of hot water. The instruments were red rosella tea with standard operating procedures. The measurement of the blood glucose was the glucometer merk Easy Touch was given before and after the individuals were given red rosella tea. The glucometer (merk Easy) in the research was carried out by restarting the code using the chip from the device to maintain the accuracy of the measurement results. The glucometer merk Easy Touch has a registration number from the Indonesian Ministry of Health, has a chip that can only be used on one device, is easy to use, easy to carry, and has an affordable price. The data was analyzed SPSS 21 paired t-test with a significance level of 0.05. An ethical clearance in this paper has been carried at the Ethics Test Commission at IIK STADA Indonesia, Kediri.

## RESULT

Table 1. Distribution of Frequency in Characteristics respondents (n=14)

Variable	N	%	p-value Pre	p-value Post
Age				
30-40 Years	1	7	0,333	0,333
41-50 Years	3	21		
51-60 Years	4	29		
>60 Years	6	43		
Gender				
Man	5	36	0,460	0,301
Woman	9	64		
Education				
No school	1	7	0,227	0,387
Elementary School	10	72		
Middle School	2	14		
High School	1	7		
Job				
Housewife	3	21	0,350	0,350
Farmer	3	21		
Entrepreneur	7	50		
Pensioners	1	8		
Long Suffered				
1-5 Years	8	57	0,719	0,260
6-10 Years	5	36		
>10 Years	1	7		
Food Diet				
Yes	2	14	0,514	0,260
No	5	36		
Sometimes	7	50		
Sport				
Often	2	14	0,473	0,260
Seldom	10	72		
Never	2	14		

Drugs Consumed				
No	9	64	0,301	0,301
oral	5	36		

Table 1. shows that most respondents are >60Years old (43%), most are female (64%), and most graduated from elementary school (72%). Most respondents are an entrepreneur (50%), long suffered 1-5 years (57%). In addition, they sometimes food diet (50%), seldom do sport (72%) and have no drug consumption (64%).

Table 2. Blood Glucose Before and After Red Rosella Tea (n=14)

Blood Glucose	n	Mean	Std. Dev
Before intervention	14	317.64	95.76
After intervention		222.00	108.90
Paired t-test		P value = 0,000	

Table 2 shows that the average blood glucose level was 317,64 mg/dl before giving red rosella tea and the average blood glucose level was 222 mg/dl after giving red rosella tea. The paired t-test obtains p-value =  $0.000 \leq \alpha$  (0.005). Thus, there was a difference in blood glucose before and after giving red rosella tea.

## DISCUSSION

### The Effect of Red Rosella Tea on Blood Glucose Individuals with Diabetes Mellitus Type II

The paired t-test results obtained a p-value =  $0.000 \leq \alpha$  (0.050) and showed a difference in blood glucose before and after giving red rosella tea. Red rosella petals help reduce blood viscosity (lower blood sugar levels) and improve blood circulation. This can be seen from the pharmacological content in red rosella petals, namely citric acid, malic acid, vitamin C, anthocyanins, proteins and flavonoids (Andareto, 2015). The flavonoids consisting of gossy peptin, anthocyanins, and glucoside hibiscin act as antioxidants that help lower pancreatic beta-cell damage and improve insulin work (Husna, 2014). Compounds in rosella can be antidiabetic, reducing serum creatinine, cholesterol, and glucose levels. Steeped water of red rosella petals, which people with diabetes routinely consume, can improve pancreatic cells, producing more insulin so that blood sugar can fall (Herdiani and Wikurendra, 2020). People with diabetes mellitus must manage their diet well. People with diabetes mellitus must consume high fibers (Ambarwati, 2012). From this research, it is proven that the red rosella petals contain essential substances that are needed by the body, including vitamin A, vitamin C, calcium, essential proteins, and 12 kinds of amino acids, legin and arginine, which function to rejuvenate body cells (Herdiani and Wikurendra, 2020).

Monitoring blood glucose in individuals with diabetes mellitus type II is necessary to avoid complications (Bistara *et al.*, 2020). Consumption of red rosella tea helps lower blood sugar in people with diabetes mellitus. In this study, red rosella was used in dry form so that it was durable and maintained its content. It is expected that people with diabetes mellitus can consume red rosella tea every day but still take



medication. Dried red rosella is easy to obtain; the price is affordable, and red rosella plants are easy to grow around the house, so individuals with diabetes mellitus type II can consume red rosella tea easily.

## CONCLUSION

Red rosella tea can decrease blood glucose. Individuals with diabetes mellitus type II should consume red rosella tea routinely twice a day to avoid the complication of diabetes mellitus. The limitations of this study are that there is only one intervention group, the sample is small, the intervention time is only 7 days, and the authors have difficulty controlling confounding factors such as respondents taking drugs. Future research could use the control group to compare and control confounding factors.

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## Atherogenic Index Profiles as Predictor of Cardiovascular Risk in Premenopausal and Menopausal Women

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### A B S T R A C T

Cardiovascular disease was a disease with impaired function of the heart and blood vessels. Cardiovascular disease was more common in women. Postmenopausal women have a higher risk of cardiovascular disease than premenopausal women. This is because postmenopausal women lack the hormone estrogen regulating lipid metabolism factors. Decreased production of the hormone estrogen will cause changes in the lipid profile in the blood. Several studies have shown that assessment with the Atherogenic Index (IA) is a good predictor of cardiovascular disease. The atherogenic index was obtained by calculating the TG/HDL-C log. This assessment proved to be more sensitive in assessing the risk of cardiovascular disease compared to the respective lipid profile calculations. This study aimed to compare the profile of the Atherogenic Index in premenopausal women with menopause. This research used the Cross-Sectional Study research method which was presented in the form of data, tables, and narratives. The study results on each 40 menopausal and premenopausal women respectively showed that the comparison value of the atherogenic index in the two categories of subjects was  $<0.05$  (0.00). This showed that there is a significant difference in the mean atherogenic index between postmenopausal and premenopausal women.

## INTRODUCTION

Cardiovascular diseases are a group of impaired functions of the heart and blood vessels. It is most prevalent in the Indo-Pacific with 4,735,000 people. According to the World Heart Federation, CVD is estimated 1.8 million to cause deaths in Southeast Asia. In Indonesia, the number of morbidities and multi-morbidity due to CHD increases along with the increasing number of elderly people and South Sulawesi is the province with the 7th highest prevalence of heart disease, which is around 1.7% and stroke at 10.6% (Anorital, 2016; Ghani et al., 2016).

Cardiovascular disease affects more women with a higher risk of cardiovascular disease among postmenopausal women compared to premenopausal women because menopausal women experience a lack of the hormone estrogen which plays a role in regulating lipid metabolism factors (Swapnali et al., 2011). The decrease in the hormone estrogen causes physiological changes in the vascular system, body fat distribution, blood pressure and lipid profile, thus leading to the emergence of advanced risk factors such as dyslipidemia, overweight and hypertension which can indirectly lead to a high risk of cardiovascular disease during the postmenopausal period (Khakurel et al., 2018).

Decreased production of the hormone estrogen tends to increase the risk of changes in the lipid profile in the blood (Sherwood, 2014). Several studies have shown that assessment using the Atherogenic Index

(IA) is a good predictor of cardiovascular disease. The atherogenic index by calculating the TG/HDL-C log proved to be more sensitive in assessing the risk of cardiovascular disease than the lipid profile calculated individually. Few reports of traditional lipid profile women premenopausal and menopausal are available in South Sulawesi. Hence, the present study aims to assess the lipidemic status of premenopausal and menopausal women by calculating the atherogenic index of plasm.

## METHOD

The research type used was an analytic correlation with a cross-sectional study design involving 80 outpatient departments of the Parahita Clinic in Makassar from August to October 2021. The study population was premenopausal women aged 35-45 years old and menopause aged 46-60 years old at Antang Public Health Center. The samples of each study were 40 premenopausal and menopausal women based on the purposive sampling technique. Women with a history of irregular menses, pregnant women, cardiovascular disease, hypertension diabetes mellitus and were excluded from this study.

Respondents who met the requirements will fill out the informed consent and research questionnaire before taking and checking the levels of the Atherogenic Index (AI) and traditional lipid profile. Fasting blood sample was taken by venipuncture and was collected in a vacutainer no-additive tube. The Serum was analyzed for TG, HDL, and LDL. The AI was calculated by using the equation:  $\log (TG/ HDL-C)$ . Data processing was done by grouping respondents based on the characteristics of the research subject. The research data were then analyzed using statistical test software which was made in the form of a frequency distribution tabulation and independent t-test.

## RESULT

Based on the research results that have been carried out, the following results are obtained:

Table 1 Characteristics of Research Respondents (n=80)

Variable	n	%
Menopausal age (y.o)		
51-54	16	40
55-60	24	60
Premenopause (y.o)		
40-45	6	15
46-50	34	85
BMI Menopause (kg/m <sup>2</sup> )		
18-20	9	22,5
21-24	31	77,5
BMI Premenopause (kg/m <sup>2</sup> )		
18-20	8	20
21-24	32	80
Menopausal TG (mg/dL)		
< 150	23	57,5
≥ 150	17	42,5

Pre-menopausal TG (mg/dL)		
< 150	11	27,5
≥ 150	29	72,5
Menopausal HDL (mg/dL)		
< 45	17	42,5
≥ 45	23	57,5
Pre-menopausal HDL (mg/dL)		
< 45	1	2,5
≥ 45	39	97,5
Menopausal AI		
< 0,11	3	7,5
0,11 – 0,21	6	15
> 0,21	31	77,5
Pre-menopausal AI		
< 0,11	3	7,5
0,11 – 0,21	23	57,5
> 0,21	14	35

The examination results of Atherogenic Index (AI) levels (table 1) were then analyzed for frequency distribution based on the level of risk factors of the respondent group for cardiovascular events.

Table 2. Overview of Atherogenic Index Levels in Menopausal Women by Risk Category

Menopausal Women	f (%)	Atherogenic Index		Mean
		Min	Max	
Low risk	3 (7,5)	0,04	0,06	0,05
Moderate risk	6 (17,5)	0,14	0,24	0,19
High risk	31 (75)	0,28	1,02	0,78

Based on table 2 shows that the atherogenic index value in the postmenopausal women group as many as 6 people (75%) have a high risk of CHD disease and as many as 23 people (57.5%) women in the premenopausal group have a moderate risk of CHD (table 3).

Table 3. Overview of Atherogenic Index Levels in Premenopausal Women by Risk Category

Premenopausal women	f (%)	Atherogenic Index		Mean
		Min	Max	
Low risk	3 (7,5)	0,09	0,10	0,09
Moderate risk	23 (57,5)	0,11	0,21	0,17
High risk	14 (35)	0,25	0,7	0,48

The mean value of the atherogenic index in premenopausal and postmenopausal women was analyzed using an independent t-test. Based on the different tests, the p-value is obtained as shown in the table below:

Table 4. Comparison of the Atherogenic Index Profile of Menopausal and Premenopausal Women

Category	n	Atherogenic Index		Mean	p-value
		Min	Max		
Menopause	40	0,04	1,02	0,3	0,00
Premenopausal	40	0,09	0,7	0,27	

## DISCUSSION

Cardiovascular disease (CVD) is the leading cause of death in women, who have had increase risk factors for this disease after menopause and typically develop coronary heart disease several years later than any disease. In this study, there was a statistically significant increase in triglyceride in menopausal women compared to premenopausal women. Decreased estrogen hormone is closely related to the emergence of cardiovascular disease because an increase in cholesterol occurs simultaneously with an increase in renin-angiotensin activity which causes vasoconstriction and endothelial dysfunction. The menopause incidence in women is one of the determinants of the risk of experiencing coronary heart disease (CHD) (Ghani et al., 2016; Oemiyati & Rustika, 2015). Coronary heart disease can be detected early through the calculation of the atherogenic index (Ghani et al., 2016; Oemiyati & Rustika, 2015). The research subjects are women who have a normal BMI. BMI is an anthropometric tool that can be used to detect metabolic syndrome in addition to measuring waist circumference (Sumarni & Sari, 2018). Niroumand et al. (2015) in their research showed that plasma atherogenic index values had a significant correlation with abdominal circumference, BMI, and physical activity (p-value <0.05) on the incidence of CHD. The research by Kaniawati (2020) shows that there is a significant relationship between abdominal circumference and LDL levels, triglycerides, and plasma atherogenic index (AIP).

The results showed that as many as 29 premenopausal women and 17 menopausal women experienced an increase in triglyceride levels. Triglycerides from food will be absorbed in the intestine and will be synthesized in the liver, then secreted into the circulation in the form of Very Low-Density Lipoprotein (VLDL). VLDL will be converted into Intermediate Density Lipoprotein (IDL) and will be brought back to the liver to be metabolized into LDL which will carry cholesterol to peripheral tissues and the liver (Erizon & Karani, 2020; Sumarni & Sari, 2018). Menopause causes changes in lipid profile by increasing LDL (atherogenic) levels (Jim, 2013; Ma'rufi & Rosita, 2014). Women with triglyceride levels between 200-399 mg/dl have a 65% increased risk of death from cardiovascular events (Perhimpunan Dokter Spesialis Kardiovaskular Indonesia, 2015).

Premenopausal women (40-50 years old) are mostly at moderate risk, with as many as 23 people (57.5%) for CHD and postmenopausal women (51-60 years old) show about 31 people (75%) at high risk for CHD. A study by Bass et al in the Guidelines for Management of Cardiovascular Disease Prevention in Women found that triglyceride and HDL levels were strong predictors of death from cardiovascular disease. Women with HDL cholesterol levels <50 mg/dl had a 30% higher risk of death from cardiovascular events (Perhimpunan Dokter Spesialis Kardiovaskular Indonesia, 2015). Menopause causes HDL levels to decrease as cardioprotective or anti-atherogenic (Jim, 2013; Ma'rufi & Rosita, 2014). Atherosclerosis is a condition in the walls of the arteries which is characterized by the occurrence of fatty deposits. These deposits consist of cholesterol, fatty substances, cellular waste products, calcium,

and fibrin. Fat deposits in arteries cause thickening, stiffness, and narrowing of blood vessels. This situation causes reduced blood flow, the amount of oxygen and other nutrients reaching all parts of the body. Low levels of HDL in the blood are closely related to the oxidation process and endothelial dysfunction. HDL can stimulate the production of nitric oxide (NO) which functions in maintaining blood vessel tone (Erizon & Karani, 2020; Gunawan & Nada, 2017). HDL is a lipoprotein compound that helps carry cholesterol from tissues through the blood plasma to the liver and the constituent of HDL protein is apolipoprotein A1 (Apo A1) (Jim, 2013; Ma'rufi & Rosita, 2014).

The results showed that there was a significant difference ( $p$ -value = 0.00) in the atherogenic index value in premenopausal and postmenopausal women. The mean atherogenic index value in the postmenopausal women group was higher than the premenopausal women. The atherogenic Index of Plasma (AIP) obtained by Khanduker et al. (2018) was significantly higher (0,63) in postmenopausal women compared to premenopausal women (0,50). The increase in the atherogenic index in postmenopausal and premenopausal women is because that some of them have unhealthy lifestyles, such as eating high calories food, high in fat, and carbohydrates without being accompanied by physical activity that is carried out on an ongoing basis so that it becomes one of the causes increased triglyceride levels and decreased HDL in the body. The atherogenic index value is one of the strongest markers of the risk of atherosclerosis and CHD compared to the results of the parameters of each lipid profile. Research by Niroumand et al. (2015) and Kaniawati (2020) showed that the atherogenic Index of Plasma (AIP) was strongly associated with obesity (hip circumference and BMI) and physical activity ( $p < 0,005$ ). The atherogenic index value is not influenced by smoking habits, history of diabetes mellitus (DM), and hypertension (Edwards et al., 2017; K. A. Sari et al., 2020).

## CONCLUSION

According to research results that has been carried out, shows that there is a significant difference in the average atherogenic index value in postmenopausal and premenopausal women. Women entering menopause (premenopausal) age need to adjust their lifestyle to prevent the occurrence of CHD.

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## Perception and Knowledge of Covid 19 in Indonesia: An Intervention Study

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### A B S T R A C T

Coronavirus 2019 (Covid 19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV2). In Indonesia, coronavirus transmission still occurs in the community with a total case around 49.009 (at time of writing). This study purposed to know the effect of self-management education on changes in patient's perceptions and knowledge toward covid 19 transmission in East Java hospital. Data were obtained from 150 patients coming to clinics, from December 2019 – May 2020. Sampling was through a simple random sampling technique. Pretest data collection was to identify the perceptions and knowledge, then the intervention of self-management education was carried out and finally, the post-test conducted. Pretest and post-test data collection included a closed questionnaire, data analysis was performed with an independent T-test. (43,67%) respondents had an evaluation of the clean and healthy living behavior, (45,61%) respondents recognized the death risk due to Covid 19, (60,76%) had the perception of looking for information to get to know Covid 19 and (79,12%) of respondents had knowledge about covid 19 signs and symptoms, (79,67%) of respondents had awareness of clean and healthy living behavior. Changes of perception after intervention self-management education were become the treatment group. Self-management education could change the patient's perception and knowledge about covid 19 transmission. A Future research need to be carried out as a measure of community awareness and willingness, including more comprehensive methods of self-management education carried out in one or more interventions

## INTRODUCTION

Coronavirus is known as severe acute coronavirus 2 (SARS5CoV-2) acute respiratory syndrome (Rolison and Hanoch, 2015). In Indonesia the coronavirus transmission still occurs in the community, a total of 49,009 cases, an increase of 114 cases every day (at the time of writing), has now had a large impact on several aspects, ranging from the economic, social environment to affecting natural conditions (Xu *et al.*, 2021).

To prevent further spread of the virus, several studies on the management of the covid 19 pandemic have been carried out including four social studies (Ali *et al.*, 2020), for that reason, any health care provider can help provide information and put more attention on social distance and behavior that is useful to reduce the spread of the virus (Vos *et al.*, 2017). Covid management has been carried out through massive education and outreach to all elements of the community who will access public services online about the readiness of the community to face the new normal, this requires an attitude to be more agile and adaptive, one of which is about community compliance to follow the government's recommendations, namely all the activity was carried out under the Covid 19 health protocol (Ferdous *et al.*, 2020).

Perceptions and knowledge about infections and appropriate precautions can be used to control a pandemic (ALdowyan, Abdallah and El-Gharabawy, 2017; Ferdous *et al.*, 2020; Kang *et al.*, 2020). Currently the scientific community continues to research the possibility of vaccines and drugs to overcome the virulence of viral infections, it is hoped that good knowledge will be able to motivate individuals to make decisions in preventing and controlling the spread of the virus. Knowledge such as washing hands regularly, using hand sanitizers, wearing face masks, breathing etiquette, avoiding crowds, social distance and self-isolation when sick is very important to reduce widespread infections. Referring research (Graffigna *et al.*, 2020; Ali *et al.*, 2020) revealed that the individual's level of knowledge about infectious diseases can make them behave clean and healthy in ways that can prevent infection. As a result, individuals may need to be informed of the potential risk of infection to adopt appropriate precautions (Leal, 2020).

Self-management education refers to strategies that patients use in deciding on therapy, behavior and environment based on knowledge and skills related to health from health workers to improve their ability to care for themselves (ALdowyan, Abdallah and El-Gharabawy, 2017). Health workers advocate for patients to strengthen education and management in caring for themselves (Sureka *et al.*, 2020) thus it is expected that changes can occur in discipline and compliance in carrying out clean and healthy behavior. The study of self-management education is conducted on patients who are often not capable to manage their individuals' condition in dealing with illness (Haneef and Kalyanpur, 2020). The study purpose, in general, is to analyze the self-management education toward perception and knowledge of covid 19.

## **METHOD**

### **Setting and Participant**

Data collection used an online survey questionnaire to collect pre-test and post-test data. Respondents potentially entered the WhatsApp group and were asked to participate online. The snowball sampling technique was carried out to recruit more subjects registered at the polyclinic of 3 hospitals namely Bhayangkara Hospital, Sakinah Mojokerto Hospital and M Sholeh Probolinggo Hospital during the Covid 19 pandemic. The both online survey of pre-test and post-test data collection were carried out for 2 weeks; the pre-test from 3-14 January 2020, while the post-test from 17-25 June 2020, and found 150 subjects (pre-posttest). Subjects were divided into intervention groups that underwent self-management education and control groups who received usual care without self-management education. Each intervention group and control group contained 75 respondents. All subjects have the following criteria: (1) Ages over 20 years, (2) able to read and write, (3) alert and oriented and willing in the WhatsApp group. Subjects were rejected with the following criteria: (1) had a serious illness, such as cancer and heart failure, and (2) did not give consent.

## Study protocol

Subjects in the control group were treated with regular care and managed by each doctor and maintained access to normal health services, which included basic medical knowledge and skills education. Subjects in the intervention group received a structured simple education that is self-management education for three months because no significant results were obtained continued for six months referring to the research (Zhong *et al.*, 2020). The self-management education program focused on the subject's ability to conduct self-management in carrying out clean and healthy living behaviors and the subject's family members were encouraged to take part. In this education program was done through videos that were played for 15 minutes repeatedly, the material in the education program includes: (1) Wash hands with 6 steps, (2) Using masks, (3) Keeping a social distance, and (4) Avoiding crowds. After this session done, subjects received leaflets to support information for independent education in the coming months. The intervention group also received a standard 15 minutes telephone call in the last week of the intervention. The contents of this telephone call were based on the information contained in the leaflet, aiming to uphold the knowledge and skills about clean and healthy living behavior in the subjects' daily lives. The researcher kept detailed records of each telephone call. Subjects in the intervention group, or their family members, received standard notes in the last week. The contents of this text message were easy to understand and were based on self-management education programs. All subjects in the intervention group kept a diary containing what was covid 19 disease, coronavirus transmission, and prevention and breaking of the covid 19 transmission chain. The diary was given to researchers when the subjects came to the clinic every month.

## Control group

Subjects in the control group were treated with regular care and managed by each doctor and maintained normal access to general health according to the illness experienced by the patient, which included basic medical knowledge and education provided by a nurse. However, researchers did not provide material related to the distribution and breaking of the Covid 19 chain, education or skills in managing health. If the subject or family was a patient who always conducts examinations to the health service at the hospital where the study was carried out communication by telephone was assisted by the dispatcher from the hospital.

## Intervention group

Subjects in the intervention group received planned and structured self-management education about the spread and breaking of the Covid 19 chain for two months. This activity focused on the patients and family's ability to carry out self-management related to the distribution and breaking of the Covid chain 19. Self-management education was carried out independently including teaching through video, telephone follow-up, text messages and notes in a diary. During the 25 minutes of video learning, subjects

learned how to wash hands, use masks, not shake hands, social physical and distance. In addition, subjects were also trained on how to wash hands in 6 steps. After this session, subjects received leaflets as information for independent education in the next two months. The intervention group also received telephone calls in one, or two months from the hospital or a visit to the clinic. The contents of this telephone call were based on a pre-arranged booklet; that aimed to uphold the perceptions and knowledge of the distribution and breaking of the covid 19 chain and integrate it into everyday life. Researchers recorded in detail every information obtained through the telephone. Subjects in the intervention group, including their family members, received standard text messages after several weeks of discharge from the hospital or clinic. The contents of this text message were easy to understand and were based on self-management education activities. All subjects in the intervention group kept a diary containing clean and healthy living behaviors, including the spread and transmission of Covid 19 disease, and ways to prevent and maintain social distance and not follow the crowd. This diary was given to researchers in one and 2 months.

#### Questionnaire

Socio-demographic data were obtained from respondents about variables such as gender, age, marital status, ethnicity, educational qualifications, and religion. Knowledge of COVID-19 was assessed using five items adapted from the Ebola knowledge scale developed (Abolfotouh *et al.*, 2017). The knowledge component of COVID-19 includes COVID-19 sources, modes of transmission, symptoms, methods of prevention and control of infection, perception of death of COVID-19 and sources of information about COVID-19. Respondent's knowledge of COVID-19 was obtained by adding up the correct responses in item 1, source COVID-19, (true = [d]), number 2, transmission of COVID-19, (true = [a], and [b], [c] or [d]), item 3, prevention of COVID-19, (true = [b] and [d], [f] or [h]), item 4, symptoms of COVID19, (true = [a], [b] and [g]), and item 5, awareness of death COVID-19, (true = [a]), produces a maximum score of five. A score of 3 indicated a moderate level of knowledge about COVID-19, a score above 3 indicated a high level of knowledge (satisfying) about COVID-19 while a score of less than 3 indicated a low level of knowledge (unsatisfactory) about COVID-19. Average scores and standard deviations for the sample population were calculated to indicate the sample's level of knowledge. Likewise, scores above normally indicated high knowledge (satisfactory) and scores below normally indicated low knowledge (unsatisfactory) of COVID-19.

#### Ethical considerations

Ethics approval was obtained from the Health Research Ethics Commission of the Nahdlatul Ulama University in Surabaya, Nm 120/EC/KEPK/UNUSA/2019. Participants were fully involved in the research process, anonymous, voluntary and informed consent was obtained from all respondents.

## Statistical analysis

World Health Organization (WHO), instructing the prevention of the coronavirus' spread through hand washing, using masks, social distancing and physical distancing were arranged instruments for perception and knowledge of the prevention and spread of corona. The questionnaire was given during the pre-test and post-test. Data collected through the Google online format were then tabulated and analyzed statistically. The research process lasted for 3 months from January to April 2020, because the insignificant results of the intervention were continued 3 months until June, 2020 at Bhayangkara Hospital in Surabaya, Sakinah Mojokerto Hospital and M Sholeh Probolinggo Hospital in East Java. The collected data were then analyzed using the significance of a difference found between the intervention and control group was assessed by test or independent t-test. A p-value of  $<0.05$  was considered significant (Yu, Guo and Zhang, 2014).

## RESULT

### Survey Respondent

We received responses from 150 respondents, on 4 June 2020 the date of the last data collection in this study. We included 150 respondents from three hospitals in East Java who had completed the online questionnaire (completion rate 100%). Respondents aged between 25-60 years  $p = 0,028$ . There were 106 female respondents (70.7%) and respondents who had completed high school education (15.3%) and 34% worked in the private sector. Table 1 shows the distribution of respondent characteristics.

Table 1 Table Distribution Characteristic

Characteristic	Total	Control group	Treatment group	<i>p</i>
Sex:				
Male	44 (29,3)	22 (29,3)	22 (29,3)	0.028
Female	106 (70,7)	53 (70,7)	53(70,7)	
Age:				
>25 - ≤ 35	32 (21,3)	15 (20)	17 (22,6)	0.361
>35 - ≤ 45	56 (37,3)	24 (32)	32 (42,7)	
>45 - ≤ 60	62 (41,3)	36 (48)	26 (34,7)	
Profession:				
Housewife	26 (17,3)	11 (14,7)	15 (20)	0.574
Private sector / Employee	51 (34)	28 (38,3)	23 (30,7)	
Entrepreneur	29 (19,3)	12 (16)	17 (22,7)	
Driver	27 (18)	27(36)	10 (13,3)	
Unemployed	13 (8,4)	3 (5)	10 (13,3)	
Education level:				
Uneducated	23 (15,3)	11(14,7)	12(16)	0.108
Elementary school	32 (21,3)	15(20)	17 (22,7)	
Junior high school	50 (33,3)	23(30,7)	27 (36)	
Senior High School	27 (18)	19(25,3)	18 (24)	
College	7 (4,1)	7 (7,3)	0	

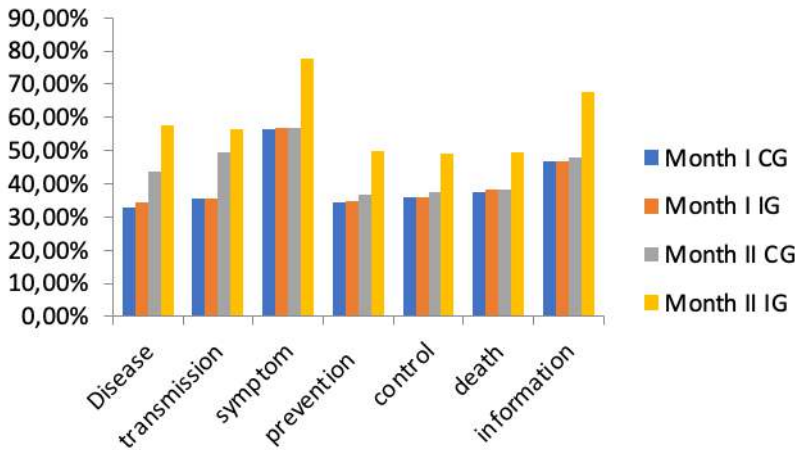


Fig.1 Perception of comparison between groups

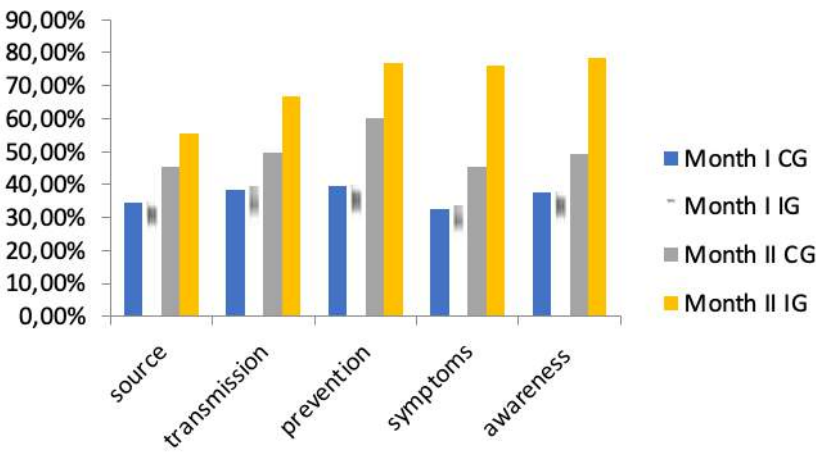


Fig.2 Knowledge of comparison between groups

### Perception of Covid 19

In the intervention group after two months the following results were obtained: about half of the respondents (57,4%) have a perception that Covid is a disease that originated in China, especially the city of Wuhan. While (55,4%) identify as an airborne disease, (77,89%) respondents' perceptions of the symptoms that occur in Covid 19, (45,65%) respondents' perceptions of ways of prevention and transmission, (43,67%) respondents have an evaluation of clean and healthy living behavior, (45,61%) respondents recognize the risk of death due to Covid 19, (60,76%) have the perception of looking for information to get to know Covid 19 (Fig. 1)

### Knowledge of Covid 19

Changes in knowledge in the intervention group after two months the following results were obtained; (56.75%) respondents knew the source of Covid 19 from animals circulating in the Wuhan City of China, and (62.43%) knowledge of the spread and transmission of the coronavirus, (78.34%) respondents'

knowledge of the prevention and breaking of the Covid 19 transmission chain, (79.12%) of respondents' knowledge of the signs and symptoms of covid 19, (79.67%) of respondents had awareness of clean and healthy living behavior (Fig.2)

## DISCUSSION

The study results indicate that self-management education is simple, structured, and able to improve patient perception and knowledge about the prevention and termination of the covid 19 transmission chain. The research subjects had better perception and knowledge about the prevention and termination of covid 19 in the intervention group than subjects in the control group over a period of three months; in addition, these differences are even more pronounced over the six months. The self-management education effect is not seen in one month but gradually increases as time passes by up to two months. This is not surprising, because changing perceptions and knowledge takes time. This study results confirm similar findings (Asaad *et al.*, 2019) and show that patients who receive health-related skills and knowledge through self-management education are encouraged to carry out positive and beneficial developments and integrate them into their daily lives. Thus, the effects of self-management education are cumulative and can be done through a long-term process. The self-management education purpose is to help patients manage the perception of covid 19 disease and knowledge about the prevention and termination of the covid 19 transmission chain through a healthy lifestyle (Zhong *et al.*, 2020).

### Perception

In this study, the subjects carried out the steps of prevention and transmission of Covid 19 disease which showed that self-management education that was designed correctly strategy was able to change the perception and knowledge of subjects about Covid 19 disease as well as the prevention and termination of the Covid 19 transmission chain (Asaad *et al.*, 2019). Finally, with the intensity of self-management education reduced, the patient's quality of life is still being improved. Once a patient's confidence in self-management education is established, in contrast to the belief that the subject' perception and knowledge will be able to change, improvements can be observed for a period of two months after observing the second intervention.

This study also shows that the element of self-management education is appropriate in breaking the Covid 19 transmission chain. Subjects in this study are parents who have limited energy to take on more activities because of limited energy and memory or other chronic diseases (Asaad *et al.*, 2019). Subjects were afraid when physical activity caused researchers to repeatedly remind them to follow the research process, so they sometimes avoided this activity. On the other hand, researchers persuade the subject to carry out these activities in daily life following the material that has been submitted in the intervention process. This intervention makes the subjects more confident to live with clean and healthy living

behaviors that are often washing hands, wearing masks, keeping a social distance, not doing a handshake, and not participating in the crowd (Yu, Guo and Zhang, 2014).

### Knowledge

This study also shows that self-management education can be implemented simply, with self-management education material through a video that can be watched while patients are in the clinic waiting room. When the subjects are at home, investigators strengthen each other's skills related to perceptions and knowledge about transmission and breaking of the Covid 19 transmission chain through WhatsApp groups, text messages and diaries, which are economical and easily accessible because of the WhatsApp groups popularity can change subject perceptions and knowledge.

These results are consistent with research (Tung *et al.*, 2013), which shows that improving patient cognition. Our study also confirms and extends the findings (Wardani *et al.*, 2022), who consider that self-management education which decides to make it first but still allows to be able to change the perceptions and knowledge of patients through self-management education, provides strong confidence in patients to maintain a clean and healthy life behavior (Voncken-Brewster *et al.*, 2013). Our study shows that there are many differences in implementing self-management education in variable structure and design. For example, our research focuses on self-management education on clean and healthy living behavior through video media that is played repeatedly but this is done to facilitate the intervention process (Effing *et al.*, 2007). This study also shows that investigators can rearrange and adjust the intensity of self-management education based on individual patient characteristics without affecting outcomes. Future research needs to be carried out as a measure of community awareness and willingness, including more comprehensive methods of self-management education carried out in one or more interventions (Kim and Youn, 2015; Bischoff *et al.*, 2012).

### CONCLUSION

Self-management education can be used as an alternative method in improving the independent care of the community with change in perception and knowledge about covid19 transmission chain. The novelty of self-management research can change people's perceptions and knowledge of breaking the chain of the covid 19 spread. Further research is the awareness and willingness of the community to practice clean and healthy living behaviors in their daily lives.

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## Pre-Pregnancy Body Mass Index and Gestational Weight Gain as Risk Factors for Low Birth Weight

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### A B S T R A C T

Low weight (LBW) is one of the perinatal complications with high infant mortality and morbidity. At Wonosamodro District in 2018, 4.8% of babies were born with LBW. One of the risk factors for LBW is maternal nutritional factors. This study aims to analyze the correlation between pre-pregnancy body mass index (BMI) and gestational weight gain with the incidence of low birth weight. This study was an analytic observational study using a case-control design. The population was all infants and toddlers with a history of LBW in the case group and normal birth weight (NBW) in the control group in Wonosamodro Sub-District, Boyolali District, born from September 2015 to September 2020. There were 102 samples with consecutive and matching sampling. The characteristics of respondents, BMI, and gestational weight gain processing were done by editing, coding, entry, cleaning, and tabulating. Then, the data analysis used the chi-square test. The study's results at 5% alpha showed that gestational weight gain significantly correlated with LBW incidence ( $p=0.000$ ). Meanwhile, pre-pregnancy BMI did not significantly correlate with LBW ( $p=0.096$ ). Mothers with less gestational weight were 5.3 times at risk of delivering LBW babies than mothers with normal gestational weight gain (OR =5.318 95% CI 2.122-13.326). Maternal weight gain during pregnancy is a risk factor for LBW in Wonosamodro Subdistrict, Boyolali District, while pre-pregnancy BMI is not. Further research should use the primary data collection method, a cohort design, a more significant number of samples, and random sampling and examine other variables.

## INTRODUCTION

Low birth weight (LBW) is one of the perinatal complications with high infant mortality and morbidity. The causes of low birth weight are high parity, poor mother's nutritional status during pregnancy, anemia, maternal age, infectious diseases, pregnancy complications, very short interpregnancy interval, maternal chronic disease, gender of the baby, multiple pregnancies, congenital malformations and low economic status (Bian *et al.*, 2013; WHO, 2014; Pramono and Paramita, 2015; Endalamaw *et al.*, 2018). In addition, risk factors for low birth weight are maternal nutritional factors, including low body mass index and inappropriate weight gain during pregnancy (Tabrizi and Saraswathi, 2012; Bian *et al.*, 2013; Endalamaw *et al.*, 2018).

Several studies have concluded that the nutritional status of pregnant women before and during pregnancy affects the newborn's weight. Pregnant women with poor nutrition or low body mass index (BMI) potentially harm pregnancy outcomes, such as babies with low birth weight and premature birth (Bhowmik *et al.*, 2019). Various factors influence gestational weight gain and directly affect pregnancy outcomes. Low gestational weight gain is associated with an increased risk of stunted fetal growth.

Monitoring nutritional status needs to be carried out by mothers from the beginning of pregnancy. If mothers with gestational weight gain of fewer than nine kilograms continue until delivery, it will increase at risk of giving birth to LBW babies (Yongky *et al.*, 2009; Ayensu and Reginald Adjetey Annan, 2016). Pre-pregnancy body mass index and gestational weight gain are modifiable risk factors for adverse pregnancy outcomes (Frederick *et al.*, 2008). Based on research from (Yu *et al.*, 2013), underweight pregnant mothers increased the risk of small fetuses by 1.81 times and LBW by 1.47 times. Thus, women with low gestational weight gain potentially had a baby with a low birth weight (Tabrizi and Saraswathi, 2012). On the other side, (Bhaskar *et al.*, 2015), in their investigation, stated that pre-pregnancy body mass index had no significant effect on the incidence of LBW in babies.

The number of LBW babies in 2015, based on United Nations International Children's Emergency Fund (UNICEF) and World Health Organization (WHO) data, was 20.5 million (UNICEF and WHO, 2019). From 2000 to 2015, the LBW birth rate in the world decreased slowly by 2.9%. In addition, the number of babies born with LBW in the ASEAN region decreased by 1.4%. Furthermore, Based on Basic Health Research, the incidence of LBW in Indonesia fell to 9% in 2019. At Wonosamodro District in 2018, 4.8% of babies were born with low weight, and then its number decreased by 0.5% to 4.3% in 2019. Meanwhile, from January to March 2020, LBW at Wonosamodro Sub-district was 6.3%. Its number was still higher than the Boyolali District prevalence rate of 4.5% in the same period. This study aims to determine the correlation between pre-pregnancy body mass index (BMI) and gestational weight gain with LBW incidence in Wonosamodro Sub-district, Boyolali District (Dinkes Boyolali, 2019).

## METHOD

This study was an analytic observational study using a case-control design. The population was all infants and toddlers with a history of LBW in the case group and normal birth weight (NBW) in the control group in Wonosamodro Sub-District, Boyolali District, born from September 2015 to September 2020. There were 102 samples with consecutive and matching sampling. The sample size was calculated using the case-control study sample size formula with 51 respondents. Then, the sample size of the control group used a ratio of 1: 1, namely 51 samples, so that the total number of respondents in this study was 102. In this study, the researchers applied for research permits to The National Unity and Political Agency of Boyolali District also the Boyolali District Department of Health Office. In addition, this paper has obtained ethical approval. Data collection was carried out from September to October 2020, starting with determining the samples in the case and control groups. The collected data was secondary data obtained from registers, medical records, and MCH books. The characteristics of respondents, BMI, and gestational weight gain processing were done by editing, coding, entry, cleaning, and tabulating. Then, the data analysis used the chi-square test with the SPSS computer program.

## RESULT

Most respondents' mothers were 20-35 years or non-risky age (79.4%), had education below senior high school or equivalent (75.5%), unemployment (71,6 %), gestational age at term (87.3%), and had normal height (91.2%) (Table 1).

Table 1. The Characteristics of Samples

Characteristics	LBW		NBW		Total	
	n	%	n	%	n	%
Maternal age (Years)						
< 20 or > 35	10	19.6	11	21.6	21	20.6
20 - 35	41	80.4	40	78.4	81	79.4
Maternal education						
< Senior high school	42	82.4	35	68.6	77	75.5
≥ Senior high school	9	17.6	16	31.4	25	24.5
Maternal occupation						
employee	14	27.5	15	29.4	29	28.4
unemployed	37	72.5	36	70.6	73	71.6
Maternal gestational age (Weeks)						
< 37	13	25.5	0	0	13	12.7
≥ 37	38	74.5	51	100	89	87.3
Maternal height (cm)						
≤ 145	6	11.8	3	5.9	9	8.8
> 145	45	88.2	48	94.1	93	91.2

The results showed that mothers with underweight and normal pre-pregnancy BMI gave birth to more babies with LBW than overweight pre-pregnancy BMI mothers. Thirteen of 22 mothers with underweight pre-pregnancy BMI gave birth to LBW babies. In addition, 60.8% of mothers with normal pre-pregnancy BMI delivered LBW babies. Meanwhile, 25.5% of overweight pre-pregnancy BMI mothers gave birth to babies with normal birth weight (Table 2).

In addition, thirty-six of 52 mothers with less weight gain during pregnancy delivered babies with low birth weight. The incidence of low birth weight was more common in mothers with less gestational weight gain. In contrast, babies with normal birth weight mainly were in mothers with normal weight gain during pregnancy, namely 26. In addition, 17.6% of mothers who were overweight during pregnancy also delivered babies with normal birth weights (Table 2).

Table 2. The correlation between maternal pre-pregnancy BMI and gestational weight gain during pregnancy with the incidence of LBW in Wonosamodro Sub-district, Boyolali District

Variable	LBW		NBW		Total		<i>p</i>	OR 95% CI
	n	%	n	%	n	%		
Maternal pre-pregnancy BMI								
Underweight	13	25.5	9	17.6	22	21.6	0.096	-
Normal	31	60.8	26	51	57	55.9		
Overweight	7	7.8	16	25.5	23	22.5		
Gestational Weight Gain								
Less	36	70.6	16	31.4	52	51.0	0.000	5.318 (2.122-13.326)
Normal	11	21.6	26	51	37	36.3		
Over	4	7.8	9	17.6	13	12.7		

Furthermore, the chi-square test in the gestational weight gain variable obtained  $p=0.000$ , indicating a significant correlation between maternal weight gain during pregnancy and the incidence of low birth weight. Mothers who experienced less weight gain were at 5.3 times the risk of giving birth to LBW babies compared to mothers with normal gestational weight gain. Meanwhile, the chi-square test in the maternal pre-pregnancy BMI variable obtained  $p=0.096$ , indicating no association between maternal BMI and the incidence of low birth weight.

## DISCUSSION

In this study, most mothers were housewives, and their recent educational history was junior high school or equivalent (Table 1). This condition can affect the mother's economic status and knowledge level, which also impacts the nutritional needs during pregnancy. One factor that affects the mother's nutritional status during conception is the social and economic condition before pregnancy and maternal health and nutrition (Mardalena and Suyani, 2016). Low socioeconomic levels do not directly impact the pregnancy outcome but rather a harmful condition for pregnancy, including issues of maternal anthropometrics and nutrition (Abu-Saad and Fraser, 2010). Maternal nutritional intake is fulfilled to meet the required energy, such as activity and metabolism (Nirbita, 2012), and for the fetus's and placenta's growth. So, unmet maternal nutritional needs during pregnancy can lead to less weight gain and the risk of low birth weight. This paper showed no significant correlation between maternal pre-pregnancy BMI and the incidence of LBW (Table 2). It is in line with a study by Bhaskar *et al.* (2015), with the same research design and analysis (chi-square) to determine the risk factors for LBW. The study was conducted at two hospitals with a larger sample size of 159 in each case and a control group. Data was collected using interviews and secondary data. The study revealed that most respondents had a normal BMI. In addition, most of the mothers who gave birth to LBW babies had a normal BMI in the case group. Furthermore, there was no significant relationship between maternal BMI and low birth weight ( $p=0.12$ ). Moreover, the study revealed that maternal height, first ANC visit, number of ANC visits, Fe and calcium supplementation, maternal education, disease during pregnancy, and hypertension were essential predictors of LBW. Meanwhile, maternal blood type AB and BMI were protective factors against the incidence of LBW. A prior study by Ojha and Malla (2007) also found that maternal BMI did not correlate statistically with LBW ( $p=0.28$ ). That study analyzed the correlation between anthropometry of pregnant women and the incidence of LBW using 154 samples in each case and a control group. Based on logistic regression analysis, only the maternal weight variable significantly affected the incidence of LBW. Mothers with low anthropometry (especially maternal weight and upper arm circumference) tended to have LBW babies. Among various risk factors in that study, low maternal anthropometric significantly influenced the incidence of LBW babies.

A normal pre-pregnancy BMI should reduce the risk of LBW compared to mothers with a low pre-pregnancy BMI (Tabrizi and Saraswathi, 2012). However, BMI was not associated with the incidence of LBW in this research because most of the mothers who give birth to LBW babies had a normal BMI. In this study, most mothers with normal pre-pregnancy BMI were 20-35 years old (Table.1). At that age, a lot of energy is essential for activity and metabolism. Maternal nutritional intake during pregnancy is vital to supply maternal needs and the growth and development of the fetus. So, even though the mother has a normal pre-pregnancy BMI, if the nutritional intake is unmet, she can experience less gestational weight gain and still be at risk of giving birth to an LBW baby.

Ronnenberg *et al.* (2003) mention in their research that maternal weight gain during pregnancy could affect the relationship between BMI before pregnancy and pregnancy outcome. Women with less pre-pregnancy BMI who experienced enough gestational weight gain potentially delivered babies with normal or near-normal weight. Good gestational weight gain might compensate for the adverse effects on fetal growth associated with low maternal BMI during early pregnancy (Abu-Saad and Fraser, 2010; Ludwig and Currie, 2010; Nnam, 2015).

On the other hand, several studies have concluded that the nutritional status of pregnant women before and during pregnancy affects low birth weight. Good nutritional status before pregnancy illustrates the availability of nutrient reserves in the body that is ready to support fetal growth during pregnancy. Based on a study by Sutan *et al.* (2014), there was a significant association between body mass index in early pregnancy and the incidence of low birth weight ( $p=0.002$ ). That study used matching sampling on the sex of the baby. In addition, it used a case-control design and a sample of 180 samples in each group. It showed that younger maternal age, lower BMI, prematurity, history of LBW infants, cesarean delivery, and gestational hypertension were significantly associated with LBW incidence. Younger maternal age, history of LBW infants, prematurity, and hypertension have been widely recognized as predictors of LBW infants.

Endalamaw *et al.* (2018) did a systematic review and meta-analysis of several studies conducted in Ethiopia examining LBW risk factors. The studies in that systematic review used cross-sectional, case-control, and cohort designs. That meta-analysis estimated LBW Ethiopia's national prevalence and its risk factors. It used 30 studies with 55,085 participants. Furthermore, it revealed that mothers with normal pre-pregnancy BMI had a lower risk of 5.6 times giving birth to LBW babies. Moreover, maternal age <20 years, interval pregnancy <24 months, BMI <18.5 kg/m<sup>2</sup>, and gestational age <37 weeks were LBW risk factors (Endalamaw *et al.*, 2018).

Total weight gain during pregnancy is the difference between pre-delivery and body weight before conception (Karima, 2012). A significant correlation between maternal weight gain during pregnancy and the incidence of low birth weight was found in this paper ( $p=0.000$ ). In addition, a previous study by

Nirbita (2012) also revealed an association between gestational weight gain and LBW incidence. The study used a case-control design with a 73-sample size for each case and the control group. However, the characteristics of that study were in contrast with this study. That study showed that most mothers had a high school education, so the respondent's education level was higher. In data analysis, the value of  $\chi^2$  did not match the requirements, so it used a correlation coefficient to determine the association between gestational weight gain (nutritional status) and LBW incidence. The correlation coefficient was 0.809 with a significance value of  $<0.0001$  ( $p < \alpha$ ), indicating a significant relationship between both variables with a very strong correlation.

A previous study by Anil *et al.* (2020) also indicated that mothers with less gestational weight gain had three times the risk of giving birth to LBW babies ( $p=0.0001$ , OR = 3; 95%, CI 1.9-4.8). The study used a case-control approach with a sample size of 123 in the case group and 246 in the control group. Cases and controls were randomly selected using a ratio of 1: 2. Its collecting data utilized interview and medical record data. Its population was mothers who delivered at a government health facility consisting of 28 maternity clinics and three hospitals. So, its sample, collecting data method, and population are more significant than this study.

Our findings showed that low weight gain during pregnancy increased the risk of low-birth-weight babies (Table 2). The Odds Ratio (OR) was 5.318 (95% CI 2,122-13,326), indicating mothers with less weight gain were 5.3 times at the risk of delivering LBW babies. Monitoring the maternal nutritional status is essential from the beginning of pregnancy. Mothers with a low nutritional status in early pregnancy are at risk of giving birth to small babies. Moreover, when it continues until delivery, which indicates by weight gain of fewer than 9 kilograms, the mother is more at risk of giving birth to an LBW baby (Yongky *et al.*, 2009; Ayensu and Reginald Adjetey Annan, 2016).

## CONCLUSION

In conclusion, maternal weight gain during pregnancy is a risk factor for LBW in Wonosamodro Subdistrict, Boyolali District, while pre-pregnancy BMI is not. Further research should use the primary data collection method, a cohort design, a more significant number of samples, and random sampling and examine other variables. Health workers, especially midwives, could use this study's results as information to prevent LBW incidence. Midwives should improve midwifery care for pregnant women, especially those related to nutrition for pregnant women, such as providing counseling on pre-conception nutrition, nutrition for pregnant women, nutritional intake, and supplements for pregnant women. Furthermore, it can be a recommendation for health program planning and implementation, especially for women of childbearing age and pregnant women, to reduce the incidence of LBW.



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