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# Effect of Local Culture-based Nutrition Education on Compliance with Iron and Folic Acid Supplementation in Female Adolescents

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**Abstract**

The non-compliance of female adolescents with the consumption of iron and folic acid supplementation (IFAS) poses a challenge to reducing the incidence of anemia. Therefore, this study aimed to determine the effect of nutrition education using the local culture-based approach on the level of knowledge and attitudes regarding awareness, interest, evaluation, trial, and adoption dimensions, as well as compliance of female adolescents in consuming IFAS. The intervention was conducted using a quantitative quasi-experimental design approach. The sample comprised 68 and 58 senior high school girls in the control and intervention groups. The intervention group received IFAS and local culture-based nutrition education for 12 weeks and followed up after four weeks; while, the control group was given a leaflet and IFAS. Univariate analysis was conducted to analyze the participants' characteristics; while, bivariate analysis used an independent T-test. The multivariate analysis was carried out using multiple linear and logistic regression analyses. The study showed a statistically significant increase in knowledge and attitudes scores in the intervention group (p-value<0.01) compared to the control group. In conclusion, the compliance with IFAS in the intervention group was 82.8%.

**Keywords:** compliance, female adolescent, iron and folic acid supplementation, local culture, nutrition education

## Introduction

Anemia is a global public health problem.[1] According to the World Health Organization (WHO), in 2018, a prevalence of anemia above 20% to 39.9% is considered a moderate public health problem.[2] While, in Indonesia, the 2018 Indonesian Basic Health Research showed a prevalence of 23.7%, with 27.2% in women and 20.3% in men.[3] Generally, anemia is common among women, especially female adolescents. Based on the survey conducted by the Health Office of Ogan Komering Ilir (OKI) District, South Sumatra Province, in 2019, the prevalence among female adolescents was relatively high (25.63%), comprising 15.12%, 9.79%, and 0.72% in the mild, moderate, and severe categories, respectively.[4]

Anemia among female adolescents is higher than among males. Anemia in adolescents has a negative impact on decreased immunity, study concentration, fitness, and productivity.[5] In addition, anemia experienced by young women, in particular, will have a more serious impact, considering that they are prospective mothers who will become pregnant and give birth to a baby, thus increasing the risk of death for mothers giving birth to premature babies and low birth weight babies (LBW).[5]

Anemia is characterized by a decrease in the functional erythrocyte count or hemoglobin.[6] In adolescence, not only does the illness affect health status, but it also has long-term effects.[7] Although the underlying causes vary, non-compliance with iron and folic acid supplementation (IFAS) consumption contributes to the high prevalence. It is proven by the 2018 Indonesian Basic Health Research data showed that out of 76.2% of female adolescents consuming IFAS, only 1.4% consume 52 tablets in one year, and 81% receive IFAS at school.[3] Compliance with IFAS consumption is related to factors such as less awareness and knowledge of anemia and IFAS among female adolescents.[8-11] Therefore, intervention related to nutrition education is needed to improve the knowledge of female adolescents about anemia and IFAS.

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A previous study showed that education intervention effectively improves compliance among target populations.[12] However, the media must be considered to ensure effective information delivery to adolescents. Social media as an information medium is one of the alternatives due to its popularity among adolescents, including platforms such as Instagram.[13] Providing education with a local culture-based approach can also increase the enthusiasm of the target population.[14]

Based on the preliminary study, female adolescents in OKI District prefer local cultural traditions, such as *kelakar* or jokes.[15] A form of humor widely practiced in South Sumatra Province using the Palembangnese language is well known as the term *betok*.[16] Therefore, this study aimed to determine the effect of local culture-based nutrition education on improving knowledge, attitudes, and compliance with IFAS consumption among female adolescents. These findings were expected to serve as a comprehensive intervention, such as an education model for improving compliance with IFAS consumption among female adolescents.

## Method

This study used a quantitative approach with a quasi-experimental design to determine the effect of local culture-based nutrition education on improving knowledge, attitudes, and compliance with IFAS consumption among female adolescents. The minimum required sample was determined by a formula of two population proportions on one side with a significant level of 5%, power test of 80 %, P1 of 93%, and P2 of 65%. P1 was compliance with iron supplement tablets from the intervention group, and P2 was compliance with iron consumption tablets from the control group. Based on the formula, a minimum sample of 41 for each group was obtained. To anticipate the dropout, 30% was added, so the minimum number of samples per group was 53.

The intervention was conducted for 12 weeks, with a 4-week follow-up period to observe the resistance to behavioral change. This study was conducted with the Iron Deficiency Anemia Prevention and Control Program for Female Adolescents implemented by the OKI District's Health Office. The intervention group was given IFAS and local culture-based nutrition education. The nutrition education provided used the Awareness, Interest, Evaluation, Trial, and Adoption (AIETA) behavioral change stage. It was applied in videos based on local culture containing humor and education. In comparison, the control group received IFAS as part of the prevention program of the Indonesian Ministry of Health. It was based on the existing program of OKI District, providing subsidized IFAS for female adolescents aged 11-18 years, distributed through schools.[17]

This study was conducted in OKI District for six months, from November 2021 to April 2022. The location was purposively selected based on the relatively high prevalence of anemia. The prevalence among female adolescents was relatively high (25.63%), comprising 15.12% (in the mild), 9.79% (moderate), and 0.72% (severe).[4] The participants were female adolescents attending senior high schools, including 44 schools across 18 subdistricts. Public senior high schools were selected as the samples to reduce bias due to differences in characteristics between public and private schools, which were quite distant. The inclusion criteria for schools were public schools that had received the IFAS program from the government and were at least 10 kilometers apart from one another. The exclusion criteria for schools were schools currently being used as the object of another study and were difficult to access (located in remote areas).

The sample was female students who met the inclusion and exclusion criteria. The selection was performed using simple random sampling. The inclusion criteria for the sample were female students grade 11, aged 15-17 years, experiencing menstruation, owned a smartphone and an Instagram account, and obtained parental consent to participate in this study. While, the exclusion criteria for the sample were female students with a body mass index (BMI) ≤-3 SD. The schools and samples were selected using cluster and simple random sampling.

Local culture-based nutrition education intervention was conducted for 12 weeks using Instagram as the medium. Education was delivered through local culture-based videos on the Instagram account named @remaja.bebasanemia. The videos were shared through Instagram stories, a feature on Instagram. The intervention group received six videos, with a frequency of once every two weeks and approximately 3-5 minutes per video, for 12 weeks. While, the control group only received nutrition education provided by the health office's staff during IFAS distribution.

The IFAS was used as an intervention was blood-boosting tablets containing 60 mg of FeSO4 and 400 mcg of folic acid, following the government program. The policy of providing IFAS to female adolescents was carried out once a week throughout the year, using a blanket approach. The IFAS was given once at the beginning of this study in 16 tablets. Compliance with IFAS consumption was monitored by counting the remaining tablets and through control cards. Participants' characteristics (age, body weight, height, and BMI) were measured in week 0 (pre-test). Knowledge and attitude variables were measured repeatedly: at week 0 (pre-test), week 13 (post-test 1), and week 17 (post-test 2). Subsequently, the compliance variable, such as IFAS side effects and parents, teachers, and peer support, was measured in week 17.

**Table 1. Participants' Characteristics**

| Variable | Control (n = 68) | | Intervention (n = 58) | |
|---|---|---|---|---|
| | Mean±SD | Min–Max | Mean±SD | Min–Max |
| Age (years) | 16.15±0.55 | 15–18 | 15.95±0.71 | 14–18 |
| Body weight (kg) | 48.36±9.51 | 35.30–86.70 | 47.83±8.56 | 37.200–71.90 |
| Body height (cm) | 151.76±5.25 | 135.60–162.00 | 153.04±6.12 | 140.50–169.00 |
| Body mass index (kg/m²) | 21.04±4.14 | 15.10–33.80 | 20.49±3.47 | 15.60–30.40 |

**Note:** SD = Standard Deviation

The collected data were processed using computerized statistics programs and analyzed using univariate analysis to evaluate the participants' characteristics (age, body weight, height, and BMI). Subsequently, a bivariate analysis was conducted using an independent T-test to examine differences in knowledge and attitude outcomes in control and intervention groups. The Chi-squared test was applied to assess the differences in compliance with IFAS. At the same time, the multivariate analysis included multiple linear regression in determining the intervention model's effectiveness on knowledge and attitudes.

While, the effectiveness of compliance with IFAS was determined through logistic regression analysis. Multivariate analysis was carried out through several stages: first, the full model; at this stage, all independent and dependent variables were included in the modeling. Second, confounding selection; confounding variables from the initial modeling results (full model) with p-values>0.05 were issued gradually, starting from the largest p-value. The main independent variable shall not be excluded from modeling. After gradual expenditure on the confounding variable, if the main independent variable changes in relative risk (RR) value of >10%, the excluded confounding variable is reinserted in the modeling, and the variable is a confounding variable. However, if the main independent variable does not experience a change in RR value of >10%, then the confounding variable is excluded from the model. The confounding selection remains until no more variables with p-values of >0.05.

Third, the final model would be analyzed after the confounding selection stage was completed, and a final model that can be interpreted will be obtained. Interpret the results by considering the value of the p-value and the strength of the relationship in the variables related to the dependent variable seen in the magnitude of the RR value. This multivariate analysis of RR values has been controlled by the variables in the modeling.

## Results

The participants' characteristics were divided into two groups: intervention and control. The general profile of the subjects included individual characteristics such as age, body weight, height, and BMI before intervention (baseline), as shown in Table 1.

Table 1 shows that the youngest average age was in the intervention group at 15.95 years. Based on body weight, the lowest was found in the intervention group at 47.83 kg, while the lowest average height was obtained in the control group at 151.76 cm. While, the lowest BMI was found in the intervention group at 20.49.

In post-test 2, the results of nutrition intervention on the knowledge of female adolescents showed significant differences (p-value<0.05) between the control and intervention groups, except for the trial dimension. While, the comparison of pre-test and post-test 2 results showed significant mean differences (p-value<0.05) between the groups, except for the awareness dimension, as presented in Table 2.

The effect of the intervention on attitudes, as indicated in the average attitude scores before, after, and one month after intervention between groups, showed significant differences in post-test 2, except for the awareness dimension (p-value>0.05). While, comparing pre-test and post-test 2 results between groups showed significant differences only in the interest and evaluation dimensions (p-value<0.05), as presented in Table 3.

The percentages of female adolescents who were compliant with consuming IFAS in intervention and control groups were 82.80% and 60.30%, respectively. The percentage of compliant female adolescents in the intervention group was 22.5% higher than the control group. However, when compared, both groups were statistically significantly different (p-value<0.01). Based on the multivariate analysis, intervention on knowledge showed that the intervention group had a higher knowledge score of 6.45 points than the control group after being controlled by parent support and side effect, as shown in Table 4.

The intervention group had a higher attitude score of 6.36 points than the control group after being controlled by knowledge, parent support, and side effect. For every 1 increase in the knowledge score, the attitude score in-

**Table 2. Description of Mean Knowledge Score**

| Knowledge Score | | Control (n = 68) | Intervention (n = 58) | p-value |
|---|---|---|---|---|
| | | Mean±SD | Mean±SD | |
| Total | Pre | 11.18±1.65 | 9.72±1.58 | <0.001* |
| | Post 1 | 10.94±1.81 | 11.95±1.77 | 0.001* |
| | Post 2 | 11.68±1.46 | 12.81±1.78 | <0.001* |
| | %Δ (Pre-Post1) | (-2.14%) -0.24±2.44 | (22.8%) 2.22±1.99 | <0.001* |
| | p-value (Pre-Post1) | 0.424 | <0.001* | |
| | %Δ (Pre-Post2) | (4.47%) 0.50±2.09 | (31.8%) 3.09±2.02 | <0.001* |
| | p-value (Pre-Post2) | 0.047* | <0.001* | |
| | Δ (Post1-Post2) | 0.74±1.93 | 0.86±2.23 | 0.917 |
| | p-value (Post1-Post2) | 0.004* | 0.005* | |
| Awareness | Pre | 2.47±0.76 | 2.34±0.98 | 0.770 |
| | Post1 | 2.60±0.55 | 2.48±0.84 | 0.842 |
| | Post2 | 2.76±0.49 | 2.52±0.65 | 0.013* |
| | %Δ (Pre-Post1) | (5.26%) 0.13±0.88 | (5.98%) 0.14±0.94 | 0.763 |
| | p-value (Pre-Post1) | 0.241 | 0.299 | |
| | %Δ (Pre-Post2) | (11.74%) 0.29±0.95 | (7.26%) 0.17±1.01 | 0.477 |
| | p-value (Pre-Post2) | 0.014** | 0.197 | |
| | %Δ (Post1-Post2) | (6.15%) 0.16±0.59 | (1.21%) 0.03±1.02 | |
| | p-value (Post1-Post2) | 0.029** | 0.918 | |
| Interest | Pre | 2.12±0.68 | 2.14±0.69 | 0.909 |
| | Post1 | 2.12±0.70 | 2.41±0.82 | 0.008* |
| | Post2 | 2.12±0.76 | 2.55±0.68 | 0.001* |
| | %Δ (Pre-Post1) | (0%) 0.00±0.88 | (13.08%) 0.28±1.06 | 0.070 |
| | p-value (Pre-Post1) | 0.982 | 0.037** | |
| | %Δ (Pre-Post2) | (0%) 0.00±0.93 | (19.16%) 0.41±0.79 | <0.001* |
| | p-value (Pre-Post2) | 0.971 | <0.001** | |
| | %Δ (Post1-Post2) | (0%) 0.00±0.86 | (5.81%) 0.14±0.83 | |
| | p-value (Post1-Post2) | 0.919 | 0.227 | |
| Evaluation | Pre | 2.32±0.76 | 1.14±0.44 | <0.001* |
| | Post1 | 1.24±0.71 | 2.57±0.75 | <0.001* |
| | Post2 | 2.24±0.81 | 2.62±0.67 | 0.003* |
| | %Δ (Pre-Post1) | (-46.98%) -1.09±.05 | (125.44%) 1.43±0.98 | <0.001* |
| | p-value (Pre-Post1) | <0.001** | <0.001** | |
| | %Δ (Pre-Post2) | (-3.88%) -0.09±0.68 | (129.82%) 1.48±0.90 | <0.001* |
| | p-value (Pre-Post2) | 0.426 | <0.001** | |
| | %Δ (Post1-Post2) | (80.65%) 1.00 ± 1.01 | (1.95%) 0.05±1.01 | |
| | p-value (Post1-Post2) | <0.001** | 0.704 | |
| Trial | Pre | 2.18±0.42 | 2.24±0.54 | 0.379 |
| | Post1 | 2.60±0.52 | 2.45±0.50 | 0.072 |
| | Post2 | 2.41±0.41 | 2.55±0.53 | 0.102 |
| | %Δ (Pre-Post1) | (19.72%) 0.43±0.61 | (9.38%) 0.21±0.81 | 0.105 |
| | p-value (Pre-Post1) | <0.001** | 0.058 | |
| | %Δ (Pre-Post2) | (11.01%) 0.24±0.63 | (13.84%) 0.31±0.75 | 0.419 |
| | p-value (Pre-Post2) | 0.003** | 0.004** | |
| | %Δ (Post1-Post2) | (-7.31%) -0.19±0.71 | (4.08%) 0.10±0.79 | |
| | p-value (Post1-Post2) | 0.053 | 0.317 | |
| Adoption | Pre | 2.09±0.59 | 1.86±0.66 | 0.037* |
| | Post1 | 2.38±0.69 | 2.03±0.32 | <0.001* |
| | Post2 | 2.15±0.60 | 2.57±0.68 | <0.001* |
| | %Δ (Pre-Post1) | (13.88%) 0.29±0.86 | (9.14%) 0.17±0.68 | 0.369 |
| | p-value (Pre-Post1) | 0.008** | 0.059 | |
| | %Δ (Pre-Post2) | (2.87%) 0.06±0.83 | (38.17%) 0.71±0.86 | <0.001* |
| | p-value (Pre-Post2) | 0.577 | <0.001** | |
| | %Δ (Post1-Post2) | (-10.08%) -0.24±0.90 | (26.11%) 0.53±0.73 | |
| | p-value (Post1-Post2) | 0.037** | <0.001** | |

**Notes:** SD = Standard Deviation, *Significant at the 0.05 significance level between groups, **Significant at 0.05 significance level within the group

creased by 0.23 points after being controlled by the group, parent support, and side effect, as shown in Table 5. The multivariate analysis of the effects of intervention, knowledge, and attitude on IFAS consumption compliance showed that participants with the intervention did not affect compliance (p-value>0.05), as presented in Table 6.

**Table 3. Description of Mean Attitude Score**

| Attitude Score | | Control (n = 68) | Intervention (n = 58) | p-value |
|---|---|---|---|---|
| | | Mean±SD | Mean±SD | |
| Total | Pre | 43.44±4.27 | 43.71±4.15 | 0.601 |
| | Post 1 | 42.47±4.58 | 45.09±3.80 | <0.001* |
| | Post 2 | 42.41±5.33 | 45.84±4.43 | <0.001* |
| | %Δ (Pre-Post1) | (-2.14%) -0.97±5.46 | (3.15%) 1.38±2.96 | 0.002* |
| | p-value (Pre-Post1) | 0.144 | 0.001* | |
| | %Δ (Pre-Post2) | (-2.37%) -1.03±5.78 | (4.89%) 2.14±4.95 | 0.003* |
| | p-value (Pre-Post2) | 0.177 | 0.006* | |
| | %Δ (Post1-Post2) | (-0.14%) -0.06±4.31 | (1.68%) 0.76±3.89 | 0.250 |
| | p-value (Post1-Post2) | 0.808 | 0.204 | |
| Awareness | Pre | 9.12±1.42 | 8.62±1.58 | 0.072 |
| | Post1 | 8.41±1.19 | 8.67±1.13 | 0.311 |
| | Post2 | 8.87±1.41 | 8.86±1.34 | 0.933 |
| | %Δ (Pre-Post1) | (-7.79%) -0.71±1.60 | (0.58%) 0.05±1.52 | 0.005* |
| | p-value (Pre-Post1) | 0.01** | 0.943 | |
| | %Δ (Pre-Post2) | (-2.74%) -0.25±2.03 | (2.78%) 0.24±1.53 | 0.142 |
| | p-value (Pre-Post2) | 0.296 | 0.236 | |
| | %Δ (Post1-Post2) | (-2.13%) -0.18±1.85 | 0.83±2.26 | 0.005* |
| | p-value (Post1-Post2) | 0.007** | 0.348 | |
| Interest | Pre | 8.44±1.46 | 8.09±1.85 | 0.482 |
| | Post1 | 8.22±1.48 | 8.86±1.36 | 0.021* |
| | Post2 | 8.26±1.56 | 8.91±1.44 | 0.023* |
| | %Δ (Pre-Post1) | (-2.61%) -0.22±1.95 | (9.64%) 0.78±2.09 | 0.009* |
| | p-value (Pre-Post1) | 0.314 | 0.007** | |
| | %Δ (Pre-Post2) | (-2.13%) -0.18±1.85 | (10.26%) 0.83±2.26 | 0.005* |
| | p-value (Pre-Post2) | 0.375 | 0.008** | |
| | %Δ (Post1-Post2) | (0.49%) 0.04±1.20 | (0.56%) 0.95±1.67 | |
| | p-value (Post1-Post2) | 0.884 | 0.895 | |
| Evaluation | Pre | 8.53±1.18 | 8.52±1.35 | 0.975 |
| | Post1 | 8.03±1.13 | 8.81±1.13 | <0.001* |
| | Post2 | 7.99±1.23 | 9.05±1.28 | <0.001* |
| | %Δ (Pre-Post1) | (-5.86%) -0.50±1.49 | (3.40%) 0.29±1.36 | 0.003* |
| | p-value (Pre-Post1) | <0.013** | 0.108 | |
| | %Δ (Pre-Post2) | (-6.33%) -0.54±1.58 | (6.22%) 0.53±1.71 | 0.001* |
| | p-value (Pre-Post2) | 0.008** | 0.031** | |
| | %Δ (Post1-Post2) | (-0.49%) -0.04±1.39 | (2.72%) 0.24±1.43 | |
| | p-value (Post1-Post2) | 0.977* | 0.133 | |
| Trial | Pre | 9.09±1.23 | 9.52±1.27 | 0.028* |
| | Post1 | 9.29±1.29 | 9.64±1.15 | 0.086 |
| | Post2 | 9.07±1.56 | 9.76±1.39 | 0.008* |
| | %Δ (Pre-Post1) | (2.31%) 0.21±1.71 | (1.26%) 0.12±1.52 | 0.665 |
| | p-value (Pre-Post1) | 0.372 | 0.695 | |
| | %Δ (Pre-Post2) | (-0.11%) -0.01±1.72 | (2.52%) 0.24±1.84 | 0.701 |
| | p-value (Pre-Post2) | 0.945 | 0.380 | |
| | %Δ (Post1-Post2) | (-2.37%) -0.22±1.62 | (1.24%) 0.12±1.57 | |
| | p-value (Post1-Post2) | 0.237 | 0.586 | |
| Adoption | Pre | 8.26±1.25 | 8.97±1.21 | 0.003* |
| | Post1 | 8.51±1.12 | 9.10±1.28 | 0.007* |
| | Post2 | 8.22±1.29 | 9.26±1.15 | <0.001* |
| | %Δ (Pre-Post1) | (3.03%) 0.25±1.57 | (1.56%) 0.14±1.47 | 0.564 |
| | p-value (Pre-Post1) | 0.207 | 0.540 | |
| | %Δ (Pre-Post2) | (-0.48%) -0.04±1.58 | (3.23%) 0.29±1.64 | 0.604 |
| | p-value (Pre-Post2) | 0.980 | 0.236 | |
| | %Δ (Post1-Post2) | (-3.41%) -0.29±1.37 | (1.76%) 0.16±1.56 | |
| | p-value (Post1-Post2) | 0.070 | 0.456 | |

**Notes:** SD = Standard Deviation, *Significant at the 0.05 significance level between groups, **Significant at 0.05 significance level within the group

## Discussion

A previous study showed that most female adolescents were unaware of anemia, its symptoms and impacts, and did not know the appropriate actions to handle this illness.[18] In this study, the female adolescents did not receive education on anemia and were mostly given incomplete or inadequate health information, which can determine their knowledge level. According to previous

**Table 4. Effect of Intervention on Knowledge**

| Variable | Initial Model | | | Final Model | | |
|---|---|---|---|---|---|---|
| | β | p-value | (95% CI) | β | p-value | (95% CI) |
| Group (Intervention) | 6.40 | 0.007 | (1.78–11.03) | 6.45 | 0.002 | (2.33–10.57) |
| Fathers' education (high) | 0.69 | 0.742 | (-3.43–4.81) | - | - | - |
| Mothers' education (high) | -0.41 | 0.838 | (-4.39–3.57) | - | - | - |
| Parent support (yes) | -2.43 | 0.288 | (-6.93–2.07) | -2.23 | 0.284 | (-6.24–1.88) |
| Teacher support (yes) | 0.40 | 0.866 | (-4.35–5.16) | - | - | - |
| Peer support (yes) | -0.19 | 0.929 | (-4.49–4.10) | - | - | - |
| Side effect (no) | 4.69 | 0.014 | (0.79–8.66) | 4.69 | 0.014 | (0.95–8.44) |
| Constant | 71.82 | 0.000 | (62.27–81.38) | 72.24 | 0.000 | (65.59–78.88) |

**Note:** CI = Confidence Interval

**Table 5. Effect of Intervention and Knowledge on Attitude**

| Variable | Initial Model | | | Final Model | | |
|---|---|---|---|---|---|---|
| | β | p-value | (95% CI) | β | p-value | (95% CI) |
| Group (Intervention) | 6.03 | 0.027 | (0.69–11.39) | 6.36 | 0.010 | (1.54–11.18) |
| Knowledge | 0.23 | 0.027 | (0.03–0.44) | 0.23 | 0.023 | (0.03–0.44) |
| Fathers' education (high) | 2.24 | 0.340 | (-2.39–6.86) | - | - | - |
| Mothers' education (high) | 0.40 | 0.858 | (-4.06–4.87) | - | - | - |
| Parent support (yes) | -2.33 | 0.366 | (-7.39–2.75) | -1.62 | 0.492 | (-6.27–3.03) |
| Teacher support (yes) | 0.60 | 0.822 | (-5.94–4.73) | - | - | - |
| Peer support (yes) | -0.45 | 0.853 | (-5.27–4.36) | | | |
| Side effect (no) | -6.19 | 0.008 | (-10.69–1.67) | -6.35 | 0.004 | (-10.67– -2.02) |
| Constant | 95.01 | 0.000 | (76.85–113.19) | 98.44 | 0.000 | (82.05–114.83) |

**Note:** CI = Confidence Interval

**Table 6. Effect of Intervention, Knowledge, and Attitude on Compliance with Iron and Folic Acid Supplementation**

| Variable | Initial Model | | | Final Model | | |
|---|---|---|---|---|---|---|
| | β | p-value | (95% CI) | β | p-value | (95% CI) |
| Group (intervention) | 0.69 | 0.185 | 2.01 (0.72–5.65) | 0.65 | 0.167 | 1.92 (0.87–5.34) |
| Knowledge (good) | -0.73 | 0.109 | 0.48 (0.19–1.18) | - | - | - |
| Attitude (good) | 0.76 | 0.097 | 2.15 (0.87–5.29) | - | - | - |
| Fathers' education (high) | 0.83 | 0.089 | 2.29 (0.88–5.98) | 0.76 | 0.088 | 2.14 (0.89–5.13) |
| Mothers' education (high) | -0.43 | 0.349 | 0.65 (0.27–1.59) | - | - | - |
| Parent support (yes) | 1.20 | 0.020 | 3.35 (1.20–9.28) | 1.21 | 0.010 | 3.38 (1.33–8.55) |
| Teacher support (yes) | 0.09 | 0.873 | 1.09 (0.38–3.09) | - | - | - |
| Peer support (yes) | 0.13 | 0.788 | 1.14 (0.44–2.92) | - | - | - |
| Side effect (no) | 0.25 | 0.595 | 1.28 (0.52–3.15) | - | - | - |
| Constant | -0.33 | 0.576 | | -0.24 | 0.493 | |

**Note:** CI = Confidence Interval

literature, female adolescents had very low knowledge about anemia,[19] and only consumed IFAS during menstruation.[15] A study on compliance attitudes of female adolescents towards IFAS consumption revealed that most participants showed a non-compliant attitude when consuming IFAS.[20]

The results of this study illustrated that nutrition interventions with local culture-based nutrition education (*kelakar betok*) in post-test 2 measurements could increase knowledge in all dimensions of awareness, interest, evaluation, trial, and adoption. However, compared to the group control, dimensions of knowledge did not differ significantly on the dimensions of awareness and trials. The stage of behavioral change in the awareness dimension explains that a person begins to realize and know the given stimulus or object.[20] The information in the awareness stage video showed a scene about a young woman who is physically shown to have a pale face, un-

able to concentrate while studying in class, then this young woman gets a low score. The young woman then asked the teacher to level up her grades. Seeing the condition of the young woman, the teacher suspects that the young woman is suffering from anemia, and then there is a dialogue between the young woman and the teacher, in which the teacher explains anemia (the definition of anemia, symptoms of anemia, and the effects of anemia). This situation indicated that the education video did not effectively elevate knowledge about the link between excessive blood loss during menstruation and anemia.

Similarly, at the knowledge trial stage in the intervention group at post-test 2, the percentage of young women who answered the correct knowledge statement, the smallest proportion, was in the statement that taking iron tablets could be stopped if the body felt fresher so that the scenes in the educational video at the trial stage did not yet have the leverage to increase knowledge, regarding taking iron tablets which should be continued even though they have felt a positive impact so that they do not come back again. This result showed that the educational video did not effectively elevate knowledge of continuing IFAS consumption to avoid the recurrence of anemia even after feeling the positive effect.

In the interest knowledge stage, the intervention group significantly increased the percentage of participants who answered correctly about the statement that anemia can lower intelligence. The result suggested that participants' knowledge about anemia and its effect on intelligence was low before intervention. However, the knowledge increased after intervention, which indicated a significant improvement in the interest dimension. In the evaluation knowledge stage, the intervention group had the highest percentage increase in participants who answered consuming IFAS makes the appearance fresher correctly. This condition suggested that the evaluation video highly raised knowledge of consuming IFAS to improve appearance. In the adoption knowledge stage, the intervention group had the highest percentage increase in participants who answered correctly about the statement that IFAS can be consumed at night before sleeping to avoid side effects.

The effect of the intervention on attitude showed that nutritional intervention with *kelakar betok* in post-test 2 improved attitudes in the dimensions of awareness, interest, evaluation, and trial. However, compared to the control group, the increase is not significantly different on the dimensions of awareness, trial, and adoption. The effect of the local culture-based nutritional intervention on attitudes in the awareness dimension significantly differed between the control and intervention groups in the first measurement (p-value = 0.005). In the second measurement, there was no significant difference between both groups. This result indicated that the educational video did not have enough leverage to improve awareness attitudes. It occurred when the attitudes of female adolescents regarding awareness were still low but increased significantly after intervention.

However, an insignificant increase was observed in the second measurement because there was already a significant increase in the first measurement. Before entering the trial phase, changes in behavior occurred in the evaluation dimension. In this study, the change in attitude scores in the evaluation dimension significantly differed between the control and intervention groups in the first and second measurements (p-value<0.001). This result suggested no longer an increase in attitude scores at the trial stage due to changes in evaluation attitudes. Therefore, the trial can occur simultaneously, causing educational video intervention to become insignificant in changing trial attitudes.

The results indicated that local culture-based nutrition intervention did not increase attitude scores in the adoption dimension. At the adoption attitude stage in the intervention group during post-test 2, the smallest proportion of correct attitude statements was found: "I will continue to take IFAS even when I have to buy them myself." Therefore, the adoption stage video did not have the leverage to improve attitudes toward that statement. It was also related to the characteristics of the parents who had low-income levels, resulting in the inability to buy IFAS independently because other, more important things needed to be prioritized.

Local culture-based nutrition education intervention media was developed using the local language and packaged with humor. This communication approach was common at every societal level in South Sumatra, making it easy for female adolescents to understand the information. Nutrition education intervention can create a fun learning atmosphere that encourages female adolescents' interest and motivation to understand the information conveyed.[21] Therefore, they will be more inclined to practice the information received.

This study's results indicated that intervention in nutrition education using local cultural jokes could increase compliance with IFAS consumption. In the intervention group, compliance with IFAS consumption was 82.80%, 22.5% higher than in the control group (p-value=0.010). This result referred to a previous study that grouped compliance as consuming at least 70% of the total IFAS.[11] The average number of IFAS participants in the intervention group consumed 13 tablets. According to WHO, compliance with IFAS consumption was when the target consumed at least 80% of the required IFAS.[6] This study found that increased IFAS consumption compliance was followed by increased knowledge and attitude. Based on the results of multivariate analysis, knowledge and attitude did not affect IFAS consumption compliance.

These results were in line with a study in which compliance of female adolescents after being given health education via videos and reminders on WhatsApp was mostly in the moderate category (56%).[22] According to a previous study; there were differences in the level of compliance with IFAS consumption in the group that was given the explanation video intervention (p-value<0.001).[23] Another study also revealed increased compliance in the group given the diary education: the intervention group had a compliance rate of 32%, and the control group had 4% (p-value<0.05).[24] According to a previous study, the group that received IFAS intervention and the communication program had an IFAS compliance rate of 11%, where the compliance rate of the intervention group was higher than the control group (9%).[25]

*Kelakar betok* is a nutritional education media packaged to entertain, also known as edutainment. This edutainment media is suitable for school-age children because it can develop their imagination and make learning fun.[26] The advantage of *kelakar betok* is that the target group is not compelled to learn, as the information is conveyed through humor or funny stories. The concept of entertainment is more dominant and allows the target group in education to learn and enjoy. It can also be used in nutrition education, making learning fun and not boring.

Based on the Theory of Stress Adaptation Model for school-age children, humor is essential for developing physical, cognitive, and psychological health.[26] The ability of a child to participate in humoral intervention depends on their age and stage of development.[22] Not only the intervention given with humor or jokes provide humorous stimuli, but also it makes laughter and be a therapeutic effect.[27] Humorous interventions that seem funny will make children feel better and make them laugh. Therefore, this is the healthiest and most powerful factor for maintaining a life balance.[28] When the target groups like the message, they feel more relaxed, energetic, responsive, fearless, and open to learning.[29] This is because feelings of joy can make children think positively, overcome problems, and adapt more easily to the information they receive.[21]

This study gave nutrition education intervention with *kelakar betok* in video form. The video was a powerful tool for increasing the reach and effectiveness of health promotion programs.[30] Based on Dale's Cone of Experience Theory, students will remember 10% of what they read, 20% of what they hear, 30% of what they see, 50% of what they hear and see, 70% of what they say, and 90% of what they say and do.[31] This study used video media which was part of the audio-visual media. Hence, according to Dale's Cone of Experience theory, at least 50% of female adolescents can remember the message conveyed.[31]

When carried out effectively, health information conveyed through audio-visual media can convey information and empower targets to make positive health decisions and change behavior.[32] Therefore, this study used social media, specifically Instagram, to convey nutritional information on anemia and IFAS. Based on the preliminary study, this platform was the most preferred media for female adolescents in finding and obtaining information.[15] Nutrition education for adolescents can be delivered by using media that follows the preferences of young women to attract the attention and interest of adolescents and make it easier for them to receive and absorb nutrition information.

## Conclusion

This study shows that intervention using a local culture-based approach (*kelakar betok*) increased knowledge in terms of dimensional interest, evaluation, and adoption, as well as attitudes based on dimensional interest and evaluation. The results indicate that intervention can encourage female adolescents to comply with the consumption of IFAS to prevent anemia. Local cultures such as *kelakar betok* can be developed as a medium in nutrition education to increase compliance with iron supplements consumption so that other regions can adapt to their respective local cultures as long as the community maintains the local culture and provides a sense of humor and joy.

### Abbreviations

OKI: Ogan Komering Ilir; WHO: World Health Organization; IFAS: Iron and Folic Acid Supplementation; BMI: Body Mass Index; RR: Relative Risk; SD: Standard Deviation; CI: Confidence Interval.

### Ethics Approval and Consent to Participate

This study was ethically approved by the Ethics Committee for Research and Community Health Services at the Faculty of Public Health, Universitas Indonesia, with the number Ket-454/UN2.F10.D11/PPM.00.02/2021.

### Competing Interest

The authors declared that there are no significant competing financial, professional, or personal interests that might have affected the performance or presentation of the work described in this manuscript.

### Availability of Data and Materials

All information and related materials from this study are accessible and can be given by the primary author.

### Authors' Contribution

AR, KSD, TKR, and DMU designed the study, developed a data instrument for data collection analysis, and drafted the manuscript. RDJ and ASS contributed to the proofreading. BSL, DHP, and CMD contributed to the interpretation of results, as well as the reviewing and editing of

the article. All co-authors reviewed and approved the final manuscript before submission.

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