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Video Education and Leaflets to Improve Knowledge, Attitudes, and Adherence to Iron Supplementation

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Abstract: Anemia among adolescent girls remains a health concern due to increased iron requirements during growth and menstruation, while adherence to iron supplementation remains inconsistent. School-based distribution of iron tablets without structured education may limit adolescents' understanding of their benefits, recommended consumption schedule, and management of potential side effects. This study aimed to assess changes in knowledge, attitudes, and adherence to iron supplementation following education delivered through video or leaflet. A two-group quasi-experimental pretest-posttest study was conducted among 70 adolescent girls from SMP Negeri 2 Huamual and SMP Negeri 7 Huamual, with 35 participants in each group. Participants at SMP Negeri 2 received leaflet-based education, whereas those at SMP Negeri 7 received video-based education. Knowledge and attitudes were reassessed three days after the intervention, while adherence was evaluated after one month. Within-group changes were analyzed using the Wilcoxon signed-rank test. Knowledge, attitudes, and adherence improved significantly in both groups (all $p < 0.001$). In the video group, the proportion of participants with good knowledge increased from 0% to 97.1%, favorable attitudes from 0% to 100%, and adherence from 2.9% to 100%. The corresponding changes in the leaflet group were 0% to 85.7%, 2.9% to 88.6%, and 14.3% to 80.0%, respectively. Both educational media may support school-based iron supplementation programs. The superiority of either medium, however, cannot be established because no direct between-group analysis of changes was available.

Keywords: Adherence; adolescent girls; iron supplementation; leaflet; video education

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Introduction

Anemia among adolescent girls is associated with increased iron requirements during growth, menstrual blood loss, inadequate dietary intake, and irregular adherence to iron supplementation. These conditions may adversely affect physical capacity, concentration, and reproductive health before pregnancy (Foley, 2025; World Health Organization, 2025). School-based iron supplementation is one of the sstrategies used to prevent anemia in Indonesia, but program effectiveness depends on more than the availability of iron tablets. Adolescent girls need to understand why supplementation is necessary, the recommended weekly schedule, how the tablets should be taken, potential side effects, and what to do when a scheduled dose is missed(Y et al., 2024).

National data indicate that receiving iron tablets does not necessarily translate into consumption according to recommendations (Kementerian Kesehatan RI Badan Penelitian dan Pengembangan, 2019). This challenge may be more pronounced in areas where

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access to health services and health information is limited, as tablet distribution may occur without adequate accompanying education. A similar situation was observed in Huamual District, West Seram Regency. Both schools included in this study had received iron tablets from the local community health center, but structured anemia education had not been implemented. Distance from health facilities, road conditions, and limited connectivity further restricted the sources of health information available to students.

Educational media should be selected according to the characteristics of adolescents and the resources available within schools. Leaflets are relatively inexpensive, easy to distribute and retain for later reference, and do not require electricity or internet access. Videos combine visual and auditory information and can illustrate health-related processes and behaviors more concretely. Previous studies have reported improvements in anemia-related knowledge and attitudes following audiovisual education (Nuraeni et al., 2023; Siswati et al., 2022), while reminder applications, teacher support, and structured education have been associated with better adherence to iron supplementation (Ningtyias et al., 2020; Septiana et al., 2025; Syahrina et al., 2018) The outcomes of educational interventions may nevertheless depend on message content, opportunities for repeated exposure, support from healthcare providers, and the continued availability of supplements.

Iron deficiency during adolescence has implications beyond fatigue and reduced physical endurance. A systematic review has identified associations between iron status, anemia, and cognitive and academic outcomes, although the strength of evidence varies according to study design and type of intervention (Samson et al., 2022). These findings support the integration of education into iron supplementation programs so that adolescents understand the purpose of supplementation, appropriate consumption practices, and the role of adherence.

Previous anemia education studies have used various approaches, but some have employed single-group designs, involved populations with different characteristics, or focused primarily on short-term changes in knowledge and attitudes. Evidence from rural schools with limited access to health information remains relatively limited, particularly studies that assess knowledge, attitudes, and iron supplementation adherence within the same evaluation framework. Offline educational approaches are particularly relevant in settings where digital connectivity cannot be assumed.

This study evaluated two educational media implemented in two schools, with knowledge and attitudes assessed three days after the intervention and adherence assessed after one month. Its contextual contribution lies in evaluating educational approaches that can be delivered offline within school health programs in a geographically constrained setting. The study aimed to assess changes in knowledge, attitudes, and adherence to iron supplementation following video- or leaflet-based education among adolescent girls in Huamual District, West Seram Regency.

Method

Study Design and Setting

This study employed a two-group quasi-experimental pretest-posttest design (Peat & Barton, 2005). The study was conducted from February to March 2023 at SMP Negeri 2 Huamual and SMP Negeri 7 Huamual in West Seram Regency, Maluku Province, Indonesia. Both schools are located within the service area of the Tanah Goyang Community Health Center. SMP Negeri 2 Huamual received leaflet-based education, whereas SMP Negeri 7 Huamual received video-based education. The intervention was allocated at the school level rather than at the individual participant level. No individual randomization or allocation concealment was performed. Allocation was performed at the school level, with no individual randomization or allocation concealment.

Participants and Sampling

The study population comprised all 70 adolescent girls enrolled at the two participating schools. Total sampling was applied, resulting in 35 participants in each group. Eligible participants were female students enrolled at either school who were present at baseline data collection, agreed to participate, and were available for follow-up assessment through one month.

Participants who declined participation, were absent during the educational session or assessment, transferred to another school, or did not complete follow-up were considered ineligible for the complete analysis. The original study report documented no refusals, exclusions, or losses to follow-up. All 70 participants were included in both the pretest and posttest data, indicating complete follow-up for the reported analyses. No a priori sample size calculation was reported.

Educational Interventions and Data Collection

Both educational media were developed by the researchers. The leaflet contained information on the definition and consequences of anemia, the benefits of

iron supplementation, the recommended schedule and method of consumption, and supporting illustrations. The video covered anemia, hemoglobin, anemia prevention, the benefits of iron supplementation, appropriate consumption practices, precautions, and potential side effects.

Each group attended one researcher-facilitated educational session at school. Participants at SMP Negeri 7 Huamual received video-based education, whereas those at SMP Negeri 2 Huamual received the leaflet, which they were allowed to retain for subsequent reference. The duration of the educational sessions and whether participants in the video group had access to repeated viewing were not documented. Following the educational intervention, each participant received four iron tablets for weekly consumption over one month.

Knowledge, attitudes, and adherence were assessed at baseline before the intervention. Knowledge and attitudes were reassessed three days after the educational session, whereas adherence was evaluated one month later.

Knowledge was measured using 15 true-or-false items, with a score of 2 assigned to each correct response and 1 to each incorrect response. Total scores of 15–20 were categorized as poor, 21–25 as moderate, and 26–30 as good. Attitudes were assessed using 15 yes-or-no items, yielding total scores ranging from 15 to 30 and classified using the same category thresholds. Adherence was assessed by participant self-report using five yes-or-no items. No objective adherence measures, such as pill counts, returned packaging, monitoring cards, or directly observed consumption, were used.; scores of 5–7 were classified as non-adherent and scores of 8–10 as adherent.

The complete wording of the questionnaire items was available in the appendix of the original thesis. Item-level validity statistics, content validity indices, reliability coefficients, and formal validation data for the educational media were not available. These limitations were therefore considered when interpreting the measurements.

Participant identifiers were kept consistent between the pretest and posttest assessments to allow paired analysis. Questionnaires were administered at school according to the study schedule. The original study documentation did not specify assessor blinding, supervision during questionnaire completion, completion time, or procedures for handling missing responses; therefore, these procedures are not reported as having been implemented.

Statistical Analysis and Ethical Considerations

Data were summarized using frequencies, percentages, means, standard deviations, and ranges, as appropriate. Normality of the total outcome scores was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Because the score distributions did not meet the assumption of normality, paired pretest and posttest total scores for knowledge, attitude, and adherence were compared within each intervention group using the Wilcoxon signed-rank test. Categorized outcomes were used for descriptive presentation and were not used as input variables in the Wilcoxon analysis. No direct statistical comparison of changes between the leaflet and video groups was performed; therefore, the analysis was interpreted as evidence of within-group change rather than comparative effectiveness between the two educational media. Statistical significance was set at $\alpha = 0.05$, and values reported as $p = 0.000$ in the statistical output were presented as $p < 0.001$.

Ethical approval was obtained from the Health Research Ethics Committee of Universitas Muhammadiyah Purwokerto (KEPK/UMP/26/II/2023). Written informed consent was obtained before participation.

Result and Discussion

Participant Characteristics

All 70 adolescent girls were included in the analysis, with 35 participants in each of the leaflet and video groups. Participants were 11–15 years old. In the leaflet group, 11-year-old participants constituted the largest age category (45.7%), whereas 12-year-old participants were the largest age category in the video group (31.4%). Farming was the most frequently reported parental occupation in both groups, accounting for 51.4% and 57.1% of participants in the leaflet and video groups, respectively. Individual-level baseline data sufficient to formally assess comparability between the groups were unavailable. Consequently, differences in post-intervention outcomes should be interpreted as descriptive rather than as evidence of comparative effectiveness.

Changes in Knowledge Following Video- and Leaflet-Based *Education*

Table 1. Distribution of Knowledge, Attitudes, and Adherence Before and After the Educational Intervention

Variable and category	Leaflet pre, n (%)	Leaflet post, n (%)	Video pre, n (%)	Video post, n (%)
Knowledge				
Poor	**5 (14.3)**	**0 (0.0)**	**7 (20.0)**	**0 (0.0)**
Moderate	**30 (85.7)**	**5 (14.3)**	**28 (80.0)**	**1 (2.9)**
Good	**0**	**30 (85.7)**	**0**	**34 (97.1)**

Variable and category	Leaflet pre, n (%)	Leaflet post, n (%)	Video pre, n (%)	Video post, n (%)
	(0.0)		(0.0)	
Attitudes				
Poor	4 (11.4)	0 (0.0)	5 (14.3)	0 (0.0)
Moderate	30 (85.7)	4 (11.4)	30 (85.7)	0 (0.0)
Good	1 (2.9)	31 (88.6)	0 (0.0)	35 (100.0)
Adherence				
Non-adherent	30 (85.7)	7 (20.0)	34 (97.1)	0 (0.0)
Adherent	5 (14.3)	28 (80.0)	1 (2.9)	35 (100.0)

Knowledge improved following both educational interventions. Before the intervention, none of the participants in either group were classified as having good knowledge. After the intervention, the proportion with good knowledge increased to 85.7% in the leaflet group and 97.1% in the video group. The Wilcoxon signed-rank analysis confirmed significant pretest-posttest changes in both the leaflet ($Z = -5.217$, $p < 0.001$) and video ($Z = -5.021$, $p < 0.001$) groups (Table 2).

These findings indicate that structured education was followed by improved understanding of anemia and iron supplementation with either delivery format. Similar improvements in knowledge have been reported following motion-video education (Feeley et al., 2023; Hansen et al., 2024) and audiovisual interventions among adolescents (Siswati et al., 2022). Video can integrate narration, illustrations, and sequential information, which may facilitate understanding of concepts such as the relationship between iron and hemoglobin, the recommended supplementation schedule, and the management of potential side effects. Leaflets offer a different advantage because participants can retain the material and revisit the information after the educational session.

Table 2. Wilcoxon Signed-Rank Test of Pretest–Posttest Total Scores Within Each Intervention Group

Group	Variable	Z	p-value
Video	Knowledge	−5.021	<0.001
	Attitudes	−5.207	<0.001
	Adherence	−5.218	<0.001
Leaflet	Knowledge	−5.217	<0.001
	Attitudes	−5.207	<0.001
	Adherence	−5.167	<0.001

Although the proportion of participants with good knowledge at posttest was numerically higher in the video group, this difference should not be interpreted as evidence that video was more effective than leaflet-based education. No direct statistical comparison of changes between groups was available, and each intervention was implemented in a different school. The present data therefore provide stronger evidence for improvement following structured education within each group than for the superiority of either educational medium.

Changes in Attitudes Following Video- and Leaflet-Based Education

Attitudes showed a similar pattern. The proportion of participants classified as having good attitudes increased from 2.9% to 88.6% in the leaflet group and from 0% to 100% in the video group. Within-group changes were statistically significant for both the leaflet ($Z = -5.207$, $p < 0.001$) and video ($Z = -5.207$, $p < 0.001$) groups.

Education addressing susceptibility to anemia, the benefits of supplementation, and potential side effects may influence adolescents' perceptions of iron supplementation. Health Belief Model-based interventions among female students have similarly reported improvements in perceived benefits, barriers, self-efficacy, and anemia-prevention behaviors (Stanikzai et al., 2026).

The timing of the posttest should nevertheless be considered. Attitudes were assessed only three days after the educational intervention. Responses obtained within this short interval may partly reflect recent recall of the educational content or socially desirable responses. Longer follow-up is needed to determine whether these changes persist after the immediate influence of the educational session has diminished.

Changes in Iron Supplementation Adherence

Self-reported adherence increased during the one-month follow-up period one month after the intervention. The proportion of adherent participants increased from 14.3% to 80.0% in the leaflet group and from 2.9% to 100% in the video group. Wilcoxon signed-rank tests indicated significant within-group changes in both the leaflet ($Z = -5.167$, $p < 0.001$) and video ($Z = -5.218$, $p < 0.001$) groups.

Table 3. Iron Supplementation Adherence Scores at Baseline and One Month After the Educational Intervention

Group	Assessment	Mean	SD	Range	Mean change (posttest − pretest)
Leaflet	Pretest	6.46	0.886	5–9	2.57
	One month	9.03	1.124	7–10	
Video	Pretest	6.63	0.877	5–9	2.88
	One month	9.51	0.507	9–10	

Mean adherence scores increased from 6.46 ± 0.886 to 9.03 ± 1.124 in the leaflet group, corresponding to a mean difference of 2.57. In the video group, the mean score increased from 6.63 ± 0.877 to 9.51 ± 0.507, corresponding to a mean difference of 2.88. The numerically larger increase in the video group should remain a descriptive observation because no direct between-group test of change was performed.

During the one-month follow-up, each participant received four tablets intended for weekly consumption because each participant received four tablets intended for weekly consumption during follow-up. Previous studies in Indonesia have reported improvements in knowledge and adherence following educational and reminder-based interventions (Bahana et al., 2023), while teacher support has been associated with regular iron supplementation among schoolgirls (Nuradhiani et al., 2017). Structured education may reduce uncertainty about the purpose and schedule of supplementation and provide guidance for managing concerns associated with tablet consumption.

The observed improvement cannot, however, be attributed solely to the educational media because education was accompanied by the provision of iron tablets. Adherence was also based on self-report rather than pill counts, monitoring cards, returned packaging, or directly observed consumption. The results may therefore reflect both behavioral change and reporting effects.

Practical Implications, Strengths, and Limitations

The findings support the feasibility of using both video and leaflet education in settings where continuous internet access cannot be assumed. Leaflets require minimal infrastructure and can be taken home for repeated reading, whereas videos can standardize educational messages and visually demonstrate recommended practices when audiovisual equipment is available. Selection of the medium should therefore consider school resources and implementation conditions rather than relying solely on differences in posttest percentages.

For school-based implementation, educational activities could be integrated with a designated weekly supplementation day, monitoring of tablet consumption, documentation of side effects, and periodic reinforcement by teachers and healthcare providers. From a community midwifery perspective, education can also address menstrual experiences, dietary practices, symptoms suggestive of anemia, and practical barriers to supplementation. Adolescents with persistent symptoms or suspected anemia should be referred for clinical assessment.

The study has several methodological limitations. Allocation was non-random, each intervention condition was represented by only one school, and no non-education control group was included. The sample was small, no a priori sample size calculation was reported, and follow-up was limited to one month. Evidence regarding the validity and reliability of the measurement instruments and educational media was unavailable, while adherence was assessed through self-report. Hemoglobin and other indicators of iron status were not measured, preventing assessment of whether the observed behavioral changes were accompanied by improvements in anemia or iron status. Future multisite studies should use validated instruments, objective measures of adherence, longer follow-up, and direct between-group analyses of change.

Conclusion

Video- and leaflet-based education were both followed by improvements in knowledge, attitudes, and adherence to iron supplementation among adolescent girls in Huamual. These findings support the integration of structured education into school-based iron supplementation programs, particularly in settings where educational strategies need to remain accessible without continuous internet connectivity. The choice of educational medium should be adapted to available school resources and implementation conditions.

The findings do not establish the superiority of video over leaflet-based education because the interventions were implemented in different schools and no direct between-group analysis of change was performed. Future studies should involve multiple schools, longer follow-up, validated measurement instruments, and objective measures of adherence. Including hemoglobin or other indicators of iron status would also help determine whether improvements in knowledge and supplementation behavior are accompanied by measurable changes in anemia-related outcomes.

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Author Contributions

Ervina Elny Frisillya Kuhuparuw: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Visualization, Writing – Original Draft, and Writing – Review & Editing. Fitriani Mediastuti: Conceptualization, Methodology, Supervision, Validation, and Writing – Review & Editing. Sunartono: Methodology, Supervision, Validation, and Writing – Review & Editing. All authors have read and approved the final version of the manuscript and agree to be accountable for the integrity of the work.

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Conflicts of Interest

The author declares no conflict of interest.

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