



Health Promotion Using Jigsaw Cooperative Method for Enhancing Knowledge and Attitude on Anemia Prevention among Adolescents in Gunungkidul

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ABSTRACT

Based on census data from Gunungkidul Health Department in 2022, 3 out of 10 female adolescents have anemia. Anemia is a health problem requiring more attention due to its influence on health and pregnancy complications among women in their reproductive age. Anemia among adolescents is related to their health knowledge and attitude. Health promotion using the cooperative jigsaw method is one of the effective methods to gain new knowledge among adolescents. This study aims to find the effectiveness of the cooperative jigsaw method on anemia prevention knowledge and attitude among female adolescents. This study uses quasi-experiment with pre-posttest using control group. Using probability sampling, 60 female students from SMKN 1 Wonosari and SMKN 3 Wonosari are gathered to be this study's respondents. The result shows that the average knowledge in the jigsaw cooperative group is 37,65 while in the conventional group is 23,35 with a P-value = 0,001. The average increase on attitude on the jigsaw cooperative group is 43,42 while in the conventional group is 17,58 with a P-value = 0,000. There is a significant difference in the average increase of knowledge and attitude in the cooperative jigsaw group on anemia prevention among female adolescents. Based on this, the cooperative jigsaw method is expected to be used as a method in health education.

Keywords: cooperative jigsaw, adolescents, anemia

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1.BACKGROUND

Anemia is a complex health problem related to adolescents' knowledge, attitude, and behavior in maintaining their health. An unbalanced lifestyle and eating patterns are factors causing the high

incidence of anemia in adolescents (Khobibah, Nurhidayati, Ruspita, & Astyandini, 2021). Adolescents are a vulnerable group who still need a lot of knowledge, information and broad access to health. Counseling and conventional

health education have been provided to adolescents in various ways such as in the classroom, community, Etc. (Rahayu, et al., 2019)

Anemia in adolescence, especially in women, significantly increases the risk of impaired physical function during pregnancy and reproductive age (Khobibah et al., 2021). Prevention programs such as distributing Fe (iron) tablets to adolescents are one of the priority programs targeting young girls at junior high school, high school, and equivalent levels, as well as women outside of school. This program aims to break the chain of nutritional problems and prevent health complications due to anemia (Suprayitna, Sulistiawati, & Mentari, 2022). In 2022, the prevalence of anemia in Yogyakarta will reach 37.90%. The high prevalence of anemia requires more attention, especially in health promotion.

Several factors can determine the success of health education, such as the methods, materials delivered, resource persons or educators, and the media used (Puspikawati et al., 2021). The selection of methods and media used when providing health promotion determines the success of providing health promotion. The methods and media must be adjusted to the target to achieve optimal results. Cooperative learning can encourage students to actively

participate by exchanging ideas in a positive atmosphere and accordance with the philosophy of constructivism (Singaravelu, 2021). Providing appropriate health promotion in the scope of secondary education is expected to be a solution to increasing knowledge, attitudes, and behavior in young women aged 15-19 years in preventing anemia (Suprayitna et al., 2022).

Another 2014 Rofiqoh researcher who researched the jigsaw method concluded that this jigsaw method makes students more cooperative and enthusiastic during the learning process. With the jigsaw method, the level of knowledge according to Bloom's taxonomy will be achieved up to the evaluation stage. Fellow members and the teacher will hold the evaluation stage. Compared to the conventional method, the jigsaw method will make students understand, analyze, apply, synthesize, and evaluate learning.

Learning the jigsaw model uses a work pattern like a saw. Namely, students can carry out learning activities cooperatively to achieve the same goal. Students can express opinions, manage information together, and communicate effectively. Each group member plays an active role and is responsible for the group's success, achieving the material learned and delivering the material to the

group (Singaravelu, 2021). Education conditions and supports students to develop and optimize their potential through activity and creativity. The dynamics between teachers and between students can be formed through quality communication and interaction to form multi-way traffic communication in the educational process (Puspikawati et al., 2021).

The preliminary study was carried out by distributing questionnaires containing five questions regarding knowledge, attitudes, and behavior toward anemia prevention to 10 female students and evaluating the educational process in the classroom with teachers at SMKN 1 Wonosari. Based on the preliminary study results, students' knowledge about anemia is still fundamental, and the teacher's teaching process still uses conventional teacher-centered methods with a one-way nature. The students said that this method limited students from being active in class and looking for material and did not have the opportunity to discuss the material with other friends.

Based on these conditions, health workers and health educators are responsible for providing reproductive health materials using appropriate methods for adolescents to prevent anemia,

including understanding signs, symptoms, causes, effects, and ways to prevent anemia.

2. METHODS

The study used a quasi-experimental quantitative research method with an intervention and control group design that was given pre and post-test to young women at SMKN 1 Wonosari and SMKN 3 Wonosari in October 2022. Researchers used a questionnaire to observe, measure and record the level of knowledge and attitudes in the intervention and control before and after being given the jigsaw cooperative learning method. The instrument used was obtained from Brian Sri Prahastuti's research in 2019. The sampling technique used probability sampling of 60 respondents according to the inclusion and exclusion criteria. Data analysis in the study used the Paired T-test to compare the average increase in knowledge, attitudes, and behavior of female students about preventing anemia before and after being given learning in each learning method, namely in learning the jigsaw method and conventional methods. Paired T-test was conducted to compare the average increase in knowledge, attitudes and behavior of female students before and after being given the jigsaw learning method compared to conventional learning

methods. The Wilcoxon Signed Rank Test was carried out to measure the comparison of the average increase in knowledge and attitudes before and after the intervention was given. The Mann-Whitney test was

carried out to determine the value of the difference in the average increase in knowledge and attitude in the intervention and control groups.

3. RESULTS

Table 1. Comparison of Knowledge and Attitude Pre-Test Results between Intervention and Control Groups

Variable	Group	Mean	Different mean
Knowledge	Intervention	7,9000	0,2333
	Control	8,1333	
Attitude	Intervention	26,8333	0,2334
	Control	27,0667	

In examining the average pretest value regarding knowledge of anemia prevention, the intervention group was lower than the control group with a difference of 0.2333. For examining anemia prevention attitudes, the intervention

group had a lower average value than the control group, with a difference of 0.2334. The results of the average difference in both knowledge and attitude variables show almost the same number.

Table 2. Comparison of Knowledge and Attitude Post-Test Results between the Intervention and Control Groups

Variable	Group	Mean	Different mean
Knowledge	Intervention	9,3667	0,8334
	Control	8,5333	
Attitude	Intervention	33,9000	5,9000
	Control	28,0000	

In comparing knowledge and attitude post-test results, the average post-test results in the intervention group were higher than the control group. The post-test results on anemia prevention knowledge in the intervention group were higher than the control group, with an

average difference of 0.8334. The results of the post-test attitudes regarding the prevention of anemia in the intervention were higher than the conventional learning method group, with an average difference of 5.9000.

Table 3. Comparison of Average Increase in Knowledge and Attitudes about Prevention of Anemia Before and After Learning the Jigsaw Method and Learning the Conventional Method

Variable	Mean	Std. Deviation	T	Sig. (2-tailed)	CI 95	
					Lower	Upper
Pre-test	27,0667	2,34790	-2,2328	,027	-1,75338	-0,11328
Post-test	28,0000	2,70376				

These results show a difference in the average value of attitude improvement in the control group before and after being given education using conventional

learning methods. There was an increase in the mean prevention of anemia in the control group by 0.93333.

Table 4. The median value of the knowledge variable in the control group before and after being given learning with conventional methods

Variable	N	Wilcoxon Statistic	P-value	Estimated Median
Pre-test knowledge (control)	30	465,0	0,000	8,000
Post-test knowledge (control)	30	465,0	0,000	9,500

There is a difference in the median value of the knowledge variable in the control group before and after being given learning with conventional methods. There

was an increase in the median value of anemia prevention knowledge after being given conventional learning methods 0.500.

Table 5. The median value of the knowledge variable in the intervention group before and after being given education using the cooperative jigsaw method

Variable	N	Wilcoxon Statistic	P-value	Estimated Median
Pre-test knowledge (intervention)	30	465,0	0,000	8,000
Post-test knowledge (intervention)	30	465,0	0,000	8,500

Based on the table above, there is a difference in the median value of the knowledge variable in the intervention group before and after being given education using the cooperative jigsaw

method. There was an increase in the median value on the subject of anemia prevention knowledge after being given the jigsaw cooperative learning method of 1.500.

Table 6. The median value of the attitude variable in the intervention group after being given learning with the cooperative jigsaw method

Variable	N	Wilcoxon Statistic	P-value	Estimated Median
Pre-test attitude (intervention)	30	465,0	0,000	26,50
Post-test attitude (intervention)	30	465,0	0,000	34,00

There is a difference in the median value of the attitude variable in the intervention group after being given learning with the cooperative jigsaw

method. There was an increase in the median value on the subject of prevention of anemia after being given the jigsaw cooperative learning method of 7,500.

Table 7. The value of difference in the average increase in students' knowledge in the jigsaw cooperative learning method compared to conventional learning methods

Learning methods	N	Mean Rank	Sum of Rank	Mann-Whitney U	P-value
Conventional	30	23,35	700,50	235,500	0,001
Cooperative Jigsaw	30	37,65	1129,50		

From the data above, increasing knowledge using conventional methods has an average value of 22.35 while the cooperative jigsaw method has an average value of 37.65. The difference in the increase in scores on the pretest and

posttest in the knowledge variable of students with the cooperative jigsaw method compared to the conventional method obtained a significance value of 0.001 ($p < 0.05$).

Table 8. The value of difference in the average increase in students' attitudes in the jigsaw cooperative learning method compared to conventional learning methods

Learning methods	N	Mean Rank	Sum of Rank	Mann-Whitney U	P-value
Conventional	30	17,58	527,50	62,500	0,000
Cooperative Jigsaw	30	43,42	1302,50		

Based on the table above, an increase in attitude with the conventional method has a mean-rank value of 17.58 and with the cooperative jigsaw method, a mean rank

value of 43.42 is obtained. In comparing the difference in the increase in pre-test and post-test scores on the attitude variable using conventional and cooperative jigsaw

methods, a significance of 0.000 was obtained ($p < 0.05$).

4. DISCUSSION

The research was conducted on female students at SMKN 1 Wonosari and SMKN 3 Wonosari. This research was conducted to determine the effectiveness of the jigsaw cooperative learning method compared to conventional learning methods to increase students' knowledge and attitudes about preventing anemia. The research design was divided into two groups, namely the experimental group and the control group. Researchers evaluated the results of the pre-test and post-test after being given the intervention to see the effectiveness of the cooperative jigsaw method for health promotion to prevent anemia in adolescents.

Comparison of Knowledge and Attitude Pre-Test Results between Intervention and Control Groups

The results showed that the value of the Intervention group with the jigsaw learning method in the pre-test of the knowledge variable, the highest score was 10, the lowest was six and the mean pre-test was 7.9000. In comparison, the pre-test results in the control group with conventional learning methods on the knowledge variable obtained the highest

score of 10, the lowest six and the pre-test mean of 8.1333. This figure indicates that the mean pre-test value of the knowledge variable in the Jigsaw learning method group obtained lower results than the conventional learning method group. The results of the pre-test of knowledge regarding the prevention of anemia in the jigsaw learning method group were lower than the conventional learning method group, with an average difference of 0.2333

The study found that the difference in the pre-test results in the two groups, namely the experimental group and the control group, obtained similar results. The average difference in the results of the pre-test variables of knowledge and attitudes obtained almost the same number, equal to 0.233. The pre-test results showed that female students had almost the same ability regarding knowledge and prevention of anemia.

Comparison of Knowledge and Attitude Post-Test Results between the Intervention and Control Groups

The results showed that the post-test score of the intervention group had the highest knowledge score of 10, and the lowest was 8, with an average post-test score of 9.3667. In the control group, the post-test results on the knowledge variable obtained the highest score of 10, the lowest

score of 7, and the average post-test score of 8.5333. These results indicate that the average post-test score on the knowledge variable in the intervention group with the cooperative jigsaw method is higher than the control group with conventional learning methods.

On the results of the post-test values in the variable knowledge of anemia prevention, the intervention group got higher results compared to the control group, with an average difference value of 0.8334. Higher scores in the intervention group were also found for the knowledge and attitude variables.

From the analysis results, in the intervention group, the highest score was 40 for the attitude variable, the lowest was 27, and the average post-test score was 33.9000. In the control group with the conventional method, the highest score was 32, the lowest was 24, and the average post-test score was 28,000. The average value of the intervention group using the suitable jigsaw method was higher than the conventional method group, with an average difference of 5.9000.

These results are to Slavin's theory, which states that cooperative learning methods can help students interact more actively and positively. This learning method can also optimize and develop learning abilities, potential, interest in the

activity, and creativity to ensure dynamics in the learning process (Singaravelu, 2021).

Comparison of Average Increase in Knowledge and Attitudes about Anemia Prevention before and After Health Promotion in the Intervention and Control Groups

Based on the analysis of the intervention group's scores, there was an increase in the mean pre-test of 8,000 and 9,500 in the post-test. There was an increase in the mean value of the anemia prevention variable in the intervention group after being given health promotion using the jigsaw learning method of 1.500.

There are differences in increasing knowledge in the experimental group before and after learning with the jigsaw learning method. The statistical test results obtained a P-value of 0.000, so there was a difference in increasing knowledge in the experimental group before and after learning with the jigsaw learning method.

From the analysis of the intervention group, it was found that there was an increase in the median value regarding anemia prevention attitudes after providing learning with the cooperative jigsaw method of 7.500 with a p-value of 0.000. So there are differences in the increase in attitude in the intervention

group before and after learning with the cooperative jigsaw method.

Based on data analysis using the Wilcoxon Signed Rank Test, the value of the control group using the conventional method, the median estimated result at the pre-test is 8.00, and the post-test is 8.500. There was an increase in the median value of the anemia prevention knowledge variable in the control group after being given learning with conventional methods with a difference in the value of 0.500 with a p-value of 0.000 ($p < 0.05$) so that there were differences in increasing knowledge before and after learning with conventional methods in the control group.

From the results of data analysis using the Paired T-test, in the control group, the average pre-test was 27.0667, and the post-test was 28.000. There was an increase in the median value of the knowledge variable about preventing anemia in the control group after the conventional learning method was 0.93333. The significance test results obtained a p-value of 0.027 ($p < 0.05$), so it can be concluded that there are differences in increased attitudes in the control group before and after learning with conventional methods

Differences in Average Differences in Increasing Knowledge and Attitudes of Students in the Jigsaw Cooperative Learning Method Compared to Conventional Learning Methods

From the results of statistical tests on the variables knowledge of students in the conventional group, the mean rank value was 23.25, and the increase in knowledge using the cooperative jigsaw method was 37.65. The results of the analysis of the differences in the increase in pretest and posttest scores on the increase in knowledge variable of female students in the intervention group had a higher mean rank than the conventional group with a significance value of 0.001 ($p < 0.05$). There is a difference in the average value of increasing knowledge of anemia prevention using the jigsaw cooperative learning method compared to conventional methods.

In the student attitude variable, the mean rank in the student attitude variable in the control group was 17.58, and the increase in attitude using the cooperative jigsaw method had a mean rank value of 43.42. The mean rank pretest and posttest in the cooperative jigsaw group were higher than the conventional group, with a significance value of 0.000 ($p < 0.05$). So there is a difference in the average value of increasing student attitudes towards

anemia prevention with the jigsaw cooperative learning method compared to conventional methods. The mean difference in attitude improvement in the intervention group with the cooperative jigsaw method was higher than the average difference in the control group with the conventional method.

This study's results align with the jigsaw cooperative learning theory, which is more effective than the conventional method, which can be seen from the higher average difference value compared to the conventional group. The cooperative jigsaw method stimulates students to develop a frame of mind through peer discussions during the learning process compared to conventional methods, which are teacher-centered educators.

To the results of research by Singaravelu (2021), learning jigsaw learning can improve thinking, creativity, and coordination skills through cooperative work. Cooperative learning invites students to actively think to improve learning completeness and student performance in class. Using the jigsaw method also helps group members better understand the topic being discussed through an active discussion process so that all students are actively involved in the learning process. Each group member also tries to prepare a good

learning process to form better teamwork to achieve the same goal, namely increasing knowledge and attitudes towards preventing anemia in adolescents at SMKN 1 Wonosari and SMKN 3 Wonosari.

5. CONCLUSION

This study shows differences in the average level of knowledge and attitudes of young women before and after giving health promotion about preventing anemia with the cooperative jigsaw method. Based on this, the cooperative jigsaw method is expected to be used as a method in health education.

AUTHOR CONTRIBUTIONS

Substantial contributions to conception, data collection, and analysis: Renidya Asyura Muttabi Deya Fa'ni, Nadia Dian Rosanti, Dinar Rizqi Perwitasari,. Writing: Renidya Asyura Muttabi Deya Fa'ni . Manuscript revisions: Renidya Asyura Muttabi Deya Fa'ni, Nadia Dian Rosanti.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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