Effectiveness of Interactive Learning via Multimedia Technology with Family Support Program among Pregnant Women with Anemia: A Quasi-Experimental Study

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Abstract: Anemia is a common health problem during pregnancy and has a major impact on pregnant women, their babies, and the economy. Thus, interventions to alleviate anemia are necessary. This quasi-experimental study aimed to determine the effects of interactive learning via multimedia technology with a family support program involving self-care behaviors and hematocrit values among pregnant women with anemia. Participants were 50 pregnant women who attended the antenatal unit at a regional hospital in Southern Thailand and met inclusion criteria. The experimental group (n = 25) received interactive learning via multimedia technology with a family support program for four weeks in addition to routine care, while the control group (n = 25) received only routine care. The research instruments to collect the data were the Demographic Characteristics and Obstetrical Questionnaire and the Self-care Behavior Questionnaire. Data were analyzed using descriptive statistics, Chi-square test, independent t-test, paired t-test, Wilcoxon signed ranks test, and Mann-Whitney U test.

      The results showed that after completion of the intervention program, the participants in the experimental group had a significantly higher mean score on self-care behaviors and hematocrit values than before the intervention. When comparing the two groups after completion of the program, only the mean score on self-care behaviors in the experimental group was significantly higher than those of the control group, whereas the hematocrit values were not significantly different between the two groups. The results of this study suggest that interactive learning via multimedia technology with a family support program can help pregnant women with anemia improve their self-care behaviors. However, the program should be tested with different groups of pregnant women with anemia before it is widely used in practice.

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Introduction

      Anemia during pregnancy is a crucial and common health problem among pregnant women

worldwide,[1] including Thailand, which still struggles with this problem.[2] Physiological changes during pregnancy are factors that affect pregnant women and lead to iron deficiency anemia, which eventually affects women and children.[3] In Thailand, the prevalence of pregnancy anemia was 17.33%, with the highest prevalence in the lower southern region at 15.98%, above the national target of 10%.[2] Several studies have shown that iron deficiency, folic acid deficiency, chronic bleeding due to parasites,[3] improper intake of food and iron supplements, and lowered self-care behaviors of pregnant women are the main causes of anemia in pregnancy.[4]

Anemia can lead to maternal health problem such as feeling easily exhausted and a higher risk for preeclampsia,[3] hemorrhage, and heart failure in labor and the postpartum period.[5] Gestational anemia is also associated with low birth weight, anemia in infants, increased rates of premature birth and infants' mortality.[5-9] Therefore, the Thai government has established a protocol to try to solve the problem of anemia during pregnancy. However, the rate of pregnancy anemia is still higher than the national target.[10]

A literature review revealed that gestational anemia can be managed if pregnant women adopt appropriate self-care behaviors in three ways, namely, 1) taking iron supplements properly,[11] 2) eating iron and folate-rich foods and avoiding foods that interfere with iron absorption,[12] and 3) preventing anemia from other causes.[4] Studies to encourage pregnant women with anemia to engage in appropriate forms of self-care behaviors, include 1) individual education,[12] 2) an educational intervention,[13] 3) transactional programs through home visits and LINE application,[14] 4) an educational support program,[15] and 5) a balanced diet and iron supplementation program.[16] However, most of these studies are still based on the one-way communication of healthcare professionals. An interactive learning model that involves two-way communication between health care professionals and pregnant women may help improve their self-care behaviors.[17] In addition, family support may help pregnant women maintain positive attitudes toward self-care and improve their awareness of their ability to care for themselves.[18-21] Therefore, this study investigated whether interactive educational games on the LINE application together with family support could improve self-care behaviors and alleviate anemia in pregnant women with anemia.

Review of Literature and Conceptual Framework

According to the Thai Ministry of Public Health, anemia in pregnancy is defined as a condition in which a pregnant woman's body has a hematocrit level of < 33 milligrams percent or a hemoglobin level of < 11 grams per deciliter.[2] Anemia can be diagnosed in a number of ways, but most commonly by screening to determine the hemoglobin and hematocrit levels in the pregnant woman's blood.[4]

Substantial evidence has shown that knowledge of anemia in pregnant women and appropriate self-care behavior can reduce anemia the pregnancy period.[12-16] Thus, the promotion of knowledge and appropriate self-care behavior in pregnant women are necessary. In this study, we applied Bandura's Social Cognitive Theory,[22] Cobb's Concept of Social Support,[18] and a review of relevant literature to guide the intervention. The Social Cognitive Theory assumes that a person learns through observation or imitation of others and also through media. Learners can interact or communicate during learning in two-way communication, namely interactive learning.

Interactive learning according to Bandura's concept consists of four steps: attention, retention, reproduction, and motivation. Each step has its own purpose, such as motivation to change self-care behaviors, revision of the content or knowledge received, practice, and encouragement from health care professionals and family. A learning process would optimize pregnant women's self-care behavior[22] and practicing this can reduce the anemia problem.[13] The learning outcomes of interactive learning have been found to be higher than those of learning through lectures alone.[17]

Family support that shows a pregnant woman learns that she is loved (emotional support), accepted (esteem), and an important person (network support),[18] can empower such women to engage in appropriate self-care behaviors.[19-21,23] However, there are few studies that involve family members in particular programs or the engaging family in supporting a pregnant woman in appropriate self-care behaviors during pregnancy.

This study focused on the interactive learning via multimedia technology with a family support program consisting of a four-step learning process. Each step has its own purpose, such as the motivation to change self-care behaviors, revision of the content or knowledge received, practice, and encouragement by the health professional and the family. The results provide evidence for possible midwifery care that can improve self-care behaviors to reduce and prevent anemia during pregnancy to reduce adverse childbirth outcomes corresponding to the COVID-19 pandemic situation. Pregnant women are provided with the material resources to support self-study as long as they are limited to attending the antenatal clinic (ANC).

Study Aim

The aim of this study was to determine the effectiveness of the Interactive Learning via Multimedia Technology with Family Support Program (ILMT-FS) in improving self-care behaviors and hematocrit values among pregnant women with anemia.

Methods

Design: This study used a quasi-experimental pretest-posttest design with a comparison group. This report follows Transparent Reporting of Evaluations with Non-randomized Designs (TREND).[24]

Sample and setting: The sample consisted of pregnant women with anemia attending antenatal care at a tertiary hospital in south Thailand. The sample was selected using the purposive selection method. Inclusion criteria were 1) hematocrit levels below 33%, 2) gestational age below 28 weeks, 3) aged between 19 and 35 years, 4) normal thalassemia carrier screening and no other blood diseases, 5) no other complications such as medical and obstetrical problems, 6) literacy and ability to communicate in Thai, and 7) ability to be contacted by telephone and via the LINE application. Inclusion criteria for family members were husband or mother, who could participate in the study. Pregnant women were excluded if they had health complications during pregnancy and could not participate in the study.

The sample size was calculated using a power analysis from similar studies,[12] and in the current study the effect size for sample size calculation was set at .80. A power of .80 and alpha .05 required 25 pregnant women per group, assuming a 10% pregnancy loss. A total of 56 pregnant women who met the inclusion criteria and gave informed consent to participate were included, 28 for both the control and experimental groups. To avoid the contamination of the intervention, the data collection was completed with the control group first, then started with the experimental group.

Of the 56 eligible cases, four women (1 experimental group, 3 control groups) developed COVID-19 infection, and two (experimental group) could not participate in the program until the end of the study. Thus, a total of 50 pregnant women participated in the study, 25 in the control group and 25 in the experimental group (**Figure 1**).

Ethical Considerations: Ethical approval for the study was granted by the Ethics Committee of the Center for Social and Behavioral Sciences, Institution Review Board, Prince of Songkla University, under approval number PSU IRB 2021-st-Nur 011 (internal) and by the Human Research Ethics Committee of the study hospital, approval number HYH EC 076-64-02. Before the study was conducted, all participants were informed of the purpose of the study, the procedures for conducting the study, the benefits and risks of participating, and could decide whether or not to participate at any time during the conduct of the study.
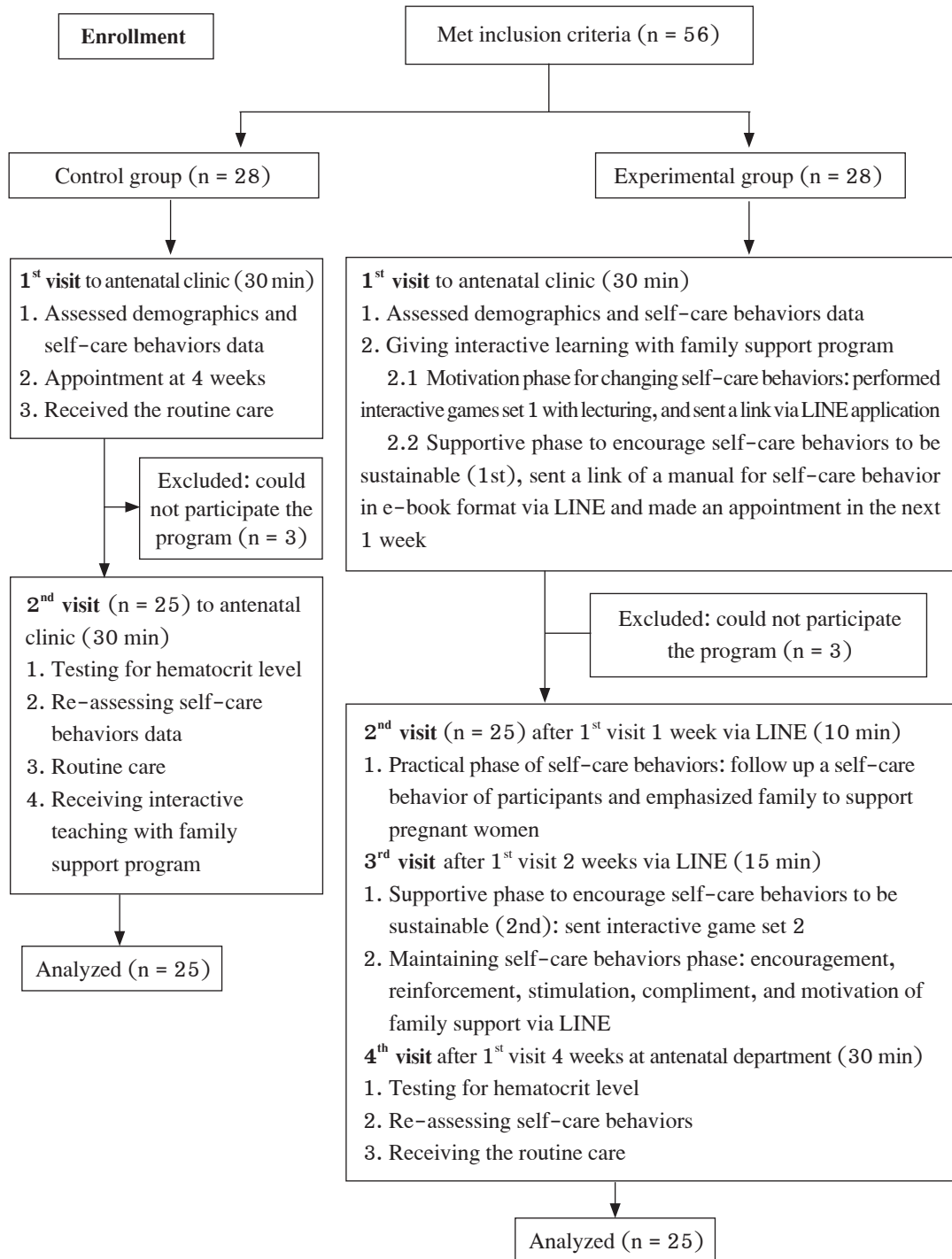
Figure 1. Diagram of the study process

All information obtained in the study was kept confidential. The results of the study were presented in general terms, and the names of the participants were not mentioned. If a pregnant woman was evaluated to be at risk for complications, the primary investigator (PI) arranged for the pregnant women to receive an additional examination and diagnosis by an obstetrician. If the obstetrician determined that the pregnancy posed a risk, the pregnant woman was excluded in accordance with the requirements of the study, with no impact on treatment and no further consequences.

Research instruments consisted of two parts: data collection instruments and the intervention program.

Instruments for data collection comprised the Demographic Characteristics and Obstetrical Questionnaire, and the Self-care Behavior Questionnaire.

The *Demographic Characteristics and Obstetrical Questionnaire* was developed by the PI and was used to collect data on 1) age, marital status, family characteristics, educational level, occupation, sufficient income to cover current expenses, and 2) obstetric history, including gestational age, number of pregnancies, gestational age at first visit ANC, and hematocrit values before and after receiving the intervention.

The *Self-care Behavior Questionnaire* (SCBQ) was developed by the PI based on the literature review. The questionnaire asked about the behaviors performed to reduce anemia in pregnancy. There were 16 items divided into three: taking iron supplements correctly (6 items), eating foods rich in iron and folates and avoiding foods that interfere with iron absorption (5 items), and preventing the occurrence of anemia from other causes (5 items). Examples of items are: "I have taken the iron supplement according to my treatment plan without forgetting it," "I eat foods high in iron, such as red meat, offal, seafood, egg yolks, and fish," and "I always wash my hands before eating." Scoring for each behavior is based on the frequency of performance ranging from 1 (less than once a week), 2 (1-2 days/week), 3 (3-5 days/week), and 4 (6-7 days/week). The overall score ranges from 16 to 64, with a higher score indicating a higher frequency of performing self-care behavior to reduce anemia. The SCBQ was reviewed for content validity by three experts:

a nurse experienced in caring for pregnant women, a nurse educator, and an obstetrician. The content validity index (CVI) was 1.00. The questionnaire was pilot-tested with 30 pregnant women who met the same criteria as the study sample and were not enrolled in the study; the Cronbach's alpha coefficient was .73.

Hematocrit levels (HCT) of the participants were determined by the laboratory at the study hospital, to accredited standards. A low red blood cell percentage of less than 33% was considered anemia. The HCT was tested at the first visit of ANC and at 30-33 weeks of pregnancy. If pregnant women had anemia, they needed to have the HCT value checked every 4-6 weeks to follow the progression of anemia.

Intervention program: The ILMT-FS was developed by the PI based on Bandura's Social Cognitive Theory,[22] Cobb's Social Support,[18] and a related literature review. It consists of four phases: 1) the motivation phase to change self-care behavior. Here, knowledge is provided through games of interactive learning, set 1, a multiple-choice model in which each of the 9 questions lasts 45 seconds. If a participant chooses the wrong answer, the correct answer is displayed and explained; 2) a support phase to promote sustainable self-care behavior through a process of reviewing knowledge of self-care behavior to reduce anemia, using the LINE application. A self-care behavior manual in e-book format and the second set of learning games in match-up format with 6 items were used; 3) the practical phase of self-care behavior. Here, the participants practiced self-care with their family, which provides emotional support, appreciation, and network support, such as food requests, taking iron supplement tablets daily, helping to prepare healthy food, housework, and earning income; 4) the last phase involves maintaining self-care behaviors, with encouragement and compliments from the nurse and family, so that the pregnant woman takes care of herself appropriately throughout the pregnancy. The intervention program was reviewed by three experts in obstetrics and gynecology. The details and implementation of the program are shown in **Figure 1.**

Routine care: Routine prenatal care was provided by a nurse midwife and an obstetrician. Routine care activities include: 1) health examination; 2) physical examination; 3) laboratory tests at the appropriate gestational age; and 4) health education. Participants in both groups received routine antenatal care.

Data collection: After receiving approval from the study site, the PI contacted the head nurse of the antenatal clinic to ask for permission to implement the study and to explain its goals and the recruitment process. The study was conducted during the period July to December 2021. The nurses in the antenatal care unit recruited the pregnant women and family members who met the inclusion criteria and sent them the invitations to participate. After receiving the list of pregnant women interested in participating in the study, the PI explained the details of the study and requested the signing of informed consent forms. The PI then collected baseline data, including demographic and obstetric characteristics, self-care behavior scores, and HCT values, as well as post-test data in the control group until completion. Thereafter, ILMT-FS was implemented by the PI in the experimental group.

Data analysis: Descriptive statistics were used to analyze the demographic and obstetric characteristics of the sample. The Chi-square and independent t-tests were used to examine differences in demographic and obstetric data. Before performing the statistical analysis, the assumptions of normality distribution were tested. The normality distribution of self-care behaviors was not met. Therefore, the Mann-Whitney U test was used to compare the means of self-care behaviors between the experimental and control groups, and the Wilcoxon signed ranks test was used to compare the pretest and posttest mean scores of the two groups. The data of hematocrit values met the assumption of normal distribution, so the paired t-test was used to compare the hematocrit values before and after participation, and the independent t-test was used to compare the hematocrit values between the groups. A significance level of .05 was set.

Results

The total number of participants was 50, 25 in both the experimental and control groups. Demographic data regarding age, marital status, educational level, occupation, and sufficient income to cover current expenses did not differ statistically significantly between experimental and control groups. For obstetric data, gestational age, order of pregnancy, first visit to ANC, and hematocrit values were not significantly different between the two groups (**Table 1**).

Table 1. Comparisons of demographic characteristics and obstetrical information of participants between the control and experimental groups

Variables	Control (n = 25)		Experimental (n = 25)		χ^2/ t	p-value
	n	%	n	%		
Age (years)	M = 26.80, SD = 5.39		M = 26.64, SD = 3.87		.90[b]	.12
Marital status						
Married	25	100	25	100	N/A	
Family characteristic					1.28[a]	.26
Nuclear	10	40	14	56		
Extended	15	60	11	44		
Educational level					.89[a]	.93
Primary school	5	20	3	12		
Secondary school	10	40	11	44		
High school/ Vocational Certificate	8	32	8	32		
Diploma/ High Vocational Certificate	1	4	2	8		
Bachelor degree	1	4	1	4		

Table 1. Comparisons of demographic characteristics and obstetrical information of participants between the control and experimental groups (Cont.)

Variables	Control (n = 25)		Experimental (n = 25)		χ^2 / t	p-value
	n	%	n	%		
Occupations					4.56[a]	.50
Housewife	8	32	10	40		
Employee	11	44	11	44		
Farmer	2	8	0	0		
Own business	4	16	3	12		
Other	0	0	1	4		
Sufficient income to cover current expenses					.35[a]	.60
Sufficient	15	60	17	68		
Insufficient	10	40	8	32		
Gestational age (weeks)	M = 26.66, SD = .63		M = 26.75 SD = .64		.17[b]	.29
Order of pregnancy					.95[a]	.81
Primigravida	5	20	5	20		
Secondary gravida	7	28	5	20		
Third gravida	7	28	10	40		
Multipara	6	24	5	20		
First ANC visit					1.28[a]	.26
Before 12 weeks	10	40	14	56		
After 12 weeks	15	60	11	44		

[a]Chi-square, [b]Independent t-test, ANC = Antenatal care

For the effectiveness of the intervention program, it was found that the experimental group's mean rank scores of total self-care behaviors and for taking iron supplements correctly, eating foods rich in iron and folate, and avoiding foods that interfere with iron absorption, increased significantly at posttest compared to baseline, whereas preventing the occurrence of anemia from other causes did not change significantly (**Table 2**). A comparison between the two groups found that total mean rank of self-care behaviors and all aspects in the experimental group were significantly higher than those of the control group (**Table 3**).

Table 2. Wilcoxon signed ranks test for comparisons of self-care behavior scores before and after intervention in each group

Variable (After–Before)	N	Mean Rank	Z	p-value
Taking iron supplements properly				
Control group			−.07	.94[a]
Negative ranks	12	12.71		
Positive ranks	12	12.29		
Ties	1			
Experimental group			−3.42	.001[a]
Negative ranks	13	19.65		
Positive ranks	35	26.30		
Ties	2			

Table 2. Wilcoxon signed ranks test for comparisons of self-care behaviors score before and after intervention in each group (Cont.)

Variable (After-Before)	N	Mean Rank	Z	p-value
Eating foods high in iron and folate, and avoiding eating foods that interfere with iron absorption				
Control group			-.02	.84
Negative ranks	13	12.08		
Positive ranks	11	13.00		
Ties	1			
Experimental group			-3.58	.001
Negative ranks	13	18.46		
Positive ranks	35	26.74		
Ties	2			
Preventing anemia, caused by other factors				
Control group			-2.06	.06
Negative ranks	14	10.43		
Positive ranks	5	8.80		
Ties	6			
Experimental group			-.67	.50
Negative ranks	15	18.80		
Positive ranks	16	18.83		
Ties	19			
Overall self-care behaviors				
Control group			-.79	.43
Negative ranks	14	12.68		
Positive ranks	10	12.25		
Ties	1			
Experimental group			-3.15	<.01
Negative ranks	15	19.77		
Positive ranks	34	27.31		
Ties	1			

Table 3. Mann-Whitney U test for comparisons of self-care behaviors between control and experimental groups

Variable	Control (n = 25) Mean rank	Experimental (n = 25) Mean rank	z	p-value
Taking iron supplements				
Before	25.48	25.52	-.01	.99
After	15.12	35.88	-5.34	<.001
Eating foods high in iron and folate, and avoiding eating foods that interfere with iron absorption				
Before	25.64	25.36	-0.7	.95
After	14.92	36.08	-5.54	<.001
Preventing the occurrence of anemia				
Before	23.74	27.26	-9.1	.36
After	16.58	34.42	-4.83	<.001
Overall self-care behaviors				
Before	24.62	26.38	-.43	.67
After	14.14	36.86	-5.76	<.001

It was found that the mean hematocrit value increased significantly from baseline after participation in the program in the experimental group, but not in the control group. However, the post-test hematocrit value was not significantly different between the experimental and control groups (**Table 4**). Additional analysis using Chi-square statistics showed that after the intervention, ten women in the experimental group recovered from anemia, compared with only six of the 25 in the control group.

Table 4. Comparison of mean values of hematocrit between control and experimental groups and between before and after receiving the intervention in each group

Hematocrit	Control (n = 25)				Experimental (n = 25)				t	p-value
	Min	Max	M	SD	Min	Max	M	SD		
Before	26.30	32.90	30.80	1.82	25.70	32.80	31.00	1.86	−.39[a]	.69
After	26.50	35.80	31.26	2.49	25.70	38.00	31.98	2.81	−.96[a]	.34
t			−.82[b]				−2.19[b]			
p-value			.42				.04			

[a]Independent t-test, [b]Paired t-test

Discussion

Findings from this study demonstrated that the interactive learning using multimedia technology combined with a family support program improved self-care behaviors but not anemia in pregnant women. The three aspects of self-care behavior were 1) taking iron supplements correctly, 2) eating foods rich in iron and folate and avoiding foods that interfere with iron absorption, and 3) preventing the occurrence of anemia from other causes. In terms of overall self-care behaviors and self-care behavior in all three of these aspects, the experimental group showed a better result than the control group.

The ILMT-FS program based on the social cognitive theory[22] allows pregnant women, families, and the nurse to interact and ask questions at each step of the program, so it was possible for the PI to clearly define the format, process, and plan for imparting knowledge to the participants and repeating the knowledge more than once. Combined with family support[18] and thorough exploration of self-care behaviors, appropriate self-care behaviors for pregnant women with anemia can be promoted.

In addition, components of the program, such as knowledge, were provided through the LINE application, a popular communication channel.[14] It is fast and convenient to use. It provides two-way communication that can be used all the time and can deliver messages in many forms such as pictures, videos, and games,[25] allowing health professionals to communicate to help pregnant women to fulfill the purpose of communication or bring about behavior change.[17]

The usefulness of interactive games could also help pregnant women easily and quickly understand the content and objectives of the topic being learned and achieve the learning outcomes in the desired manner.[26] In addition, the games included the correct answers to the questions so that the women could put their knowledge into practice and apply this correctly in real-life situations.[25-28]

The program also included a self-care behavior manual to reduce anemia in the form of an electronic book (e-book) that collects answers to questions in educational games and sample images of menus with beautiful colors were sent to the women for review. These visual stimuli could pique their interest.[29] The book provides easy access to information. It is

flexible in terms of time of use and serves as a guide for implementation to achieve the desired outcomes. A previous study[30] confirms our finding that electronic manuals improve post-learning test scores.

We found that the program could help pregnant women to apply the knowledge appropriately for their own care. Therefore, the interactive learning method is one of the learning approaches that can improve the communication process. It is the best way of conveying information and can help pregnant women analyze, summarize, and interpret the information they receive better than other forms of learning.[17,31] The results are consistent with a previous study[13] in which Bandura's Social Cognitive Theory[22] was used as a guide for training pregnant women with anemia. This helped them develop medication and dietary habits significantly better than before participating in the program.

Crucially, the ILMT-FS includes family members to engage in an emotional appreciation and network support for the pregnant woman. Family support can encourage them and increase their confidence to make decisions to implement self-care behaviors as recommended. The results of the study suggest that enhancing self-efficacy through a husband support program may be another option for improving dietary behaviors in pregnant adolescents.[32] This is consistent with previous studies that have shown that social support through family emotional information services and objects positively correlates with self-care behaviors in pregnant women[19] and that family support can promote nutrition behaviors in pregnant women.[21]

After participation in the program, participants' hematocrit values were significantly higher than at baseline, consistent with a previous study.[33] When comparing between groups, the hematocrit value was not significantly different from that of the control group. Similar to a previous study, it was found that the pregnant women who received a food program did not have a statistically significant increase in hematocrit levels compared with those who received routine care.[34] This is likely due to the fact that all pregnant women received an iron supplement (200 mg/day) according to the guidelines of the Department of Public Health.[35] In addition, it could be because most women in the third trimester of pregnancy have physiologic anemia due to plasma volume increasing faster than red cell mass.[3] This could be the reason why HCT levels are not statistically significantly different between the experimental and control groups.

Therefore, providing interactive education via multimedia technology and engaging family support could improve self-care behaviors related to adequate and appropriate nutrition to prevent anemia during the third trimester of pregnancy. Importantly, this study contributes to the Thai Health Department protocol to reduce and prevent the incidence of anemia during pregnancy.

Limitations

In this study, the PI provided the intervention and collected all the data. This may lead to unconscious bias and affect the internal validity of the result, especially self-care behavior. A second limitation is the restriction of generalizability to those who have access to the Internet or Wi-Fi. A third limitation is that 96% of pregnant women in this study had an education level below a bachelor's degree, and findings may not be applicable to more educated women.

Conclusion and Implications for Nursing Practice

The ILMT-FS can encourage pregnant women with anemia to increase their self-care behaviors but not their hematocrit level. Nurse midwives can learn the procedures and methods to implement this intervention to apply in the care of pregnant women in prenatal care by providing interactive knowledge along with family support. The program can be used by pregnant women by simply scanning the QR code prepared at

the screening station. Using the LINE application, they can access knowledge at any time and in any place.

According to the massive COVID-19 pandemic, the guideline of the Department of Disease Control, Thailand has reduced hospital waiting times for all patients. This means that interactions between health care professionals and pregnant women are shorter. Interactive learning with a family support program that has an interactive online form could be an alternative way to promote health literacy among pregnant women so they can develop appropriate self-care behaviors. However, before implementation in practice, the intervention needs to be tested in different groups of women with anemic pregnancies, for example, in teenage pregnancies or in mothers of advanced age.

Acknowledgments

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ประสิทธิผลของโปรแกรมการให้ความรู้อย่างมีปฏิสัมพันธ์ผ่านสื่อเทคโนโลยีร่วมกับการสนับสนุนจากครอบครัวต่อพฤติกรรมการดูแลตนเอง และค่าฮีมาโตคริตในหญิงตั้งครรภ์ที่มีภาวะโลหิตจาง: การวิจัยกึ่งทดลอง

สร้อยฟ้า ปิ่นสุวรรณ วรางคณา ชัชเวช* โสเพ็ญ ชูนวล

บทคัดย่อ: ภาวะโลหิตจางเป็นปัญหาสุขภาพในระยะตั้งครรภ์ที่พบได้บ่อย และส่งผลกระทบต่อหญิงตั้งครรภ์ ทารก และระบบเศรษฐกิจเป็นอย่างมาก ดังนั้นภาวะโลหิตจางในหญิงตั้งครรภ์จึงมีความจำเป็นที่ต้องได้รับการแก้ไข การวิจัยกึ่งทดลองครั้งนี้มีวัตถุประสงค์เพื่อศึกษาประสิทธิผลของโปรแกรมการให้ความรู้อย่างมีปฏิสัมพันธ์ผ่านสื่อเทคโนโลยีร่วมกับการสนับสนุนจากครอบครัว ต่อพฤติกรรมการดูแลตนเอง และค่าฮีมาโตคริตในหญิงตั้งครรภ์ที่มีภาวะโลหิตจาง กลุ่มตัวอย่างคือ หญิงตั้งครรภ์จำนวน 50 ราย ที่มาฝากครรภ์ ณ หน่วยฝากครรภ์โรงพยาบาลศูนย์แห่งหนึ่งในภาคใต้ ประเทศไทย และมีคุณสมบัติตามเกณฑ์การคัดเข้า กลุ่มทดลอง (n = 25) ได้รับโปรแกรมการให้ความรู้อย่างมีปฏิสัมพันธ์ผ่านสื่อเทคโนโลยีร่วมกับการสนับสนุนจากครอบครัว และการพยาบาลตามปกติ เป็นระยะเวลา 4 สัปดาห์ ส่วนกลุ่มควบคุม (n = 25) ได้รับการพยาบาลตามปกติเพียงอย่างเดียว เครื่องมือที่ใช้ในการเก็บข้อมูล ได้แก่ แบบสอบถามข้อมูลทั่วไปและข้อมูลการตั้งครรภ์และการคลอด และ แบบสอบถามพฤติกรรมการดูแลตนเองเพื่อลดภาวะโลหิตจาง ค่าดัชนีความตรงเชิงเนื้อหา (CVI) ของแบบสอบถามพฤติกรรมการดูแลตนเองเท่ากับ 1.00 ค่าความเที่ยงเท่ากับ .73 วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา สถิติไคสแควร์ สถิติที่คู่ สถิติวิลคอกสันไซน์ แรงค์ เทส และสถิติแมนวิทนีย์ ยูเทส

　　ผลการวิจัยพบว่าหญิงตั้งครรภ์ในกลุ่มทดลองมีคะแนนพฤติกรรมการดูแลตนเอง และค่าฮีมาโตคริตเพิ่มสูงขึ้นกว่าก่อนได้รับโปรแกรมฯ อย่างมีนัยสำคัญทางสถิติ เมื่อเปรียบเทียบระหว่างสองกลุ่มพบว่า หลังได้รับโปรแกรมฯ มีเพียงคะแนนพฤติกรรมการดูแลตนเองของกลุ่มทดลองที่สูงกว่ากลุ่มควบคุม ขณะที่ค่าฮีมาโตคริตมีความแตกต่างอย่างไม่มีนัยสำคัญทางสถิติ ผลการวิจัยครั้งนี้แสดงให้เห็นว่าโปรแกรมการเรียนรู้ผ่านสื่อเทคโนโลยีร่วมกับการสนับสนุนจากครอบครัว สามารถช่วยให้หญิงตั้งครรภ์ที่มีภาวะโลหิตจางมีพฤติกรรมการดูแลตนเองที่เหมาะสมได้ อย่างไรก็ตามควรมีการทดสอบโปรแกรมฯ กับหญิงตั้งครรภ์ที่มีภาวะโลหิตจางในกลุ่มอื่นๆ ก่อนที่จะนำไปประยุกต์ใช้ในการดูแลหญิงตั้งครรภ์ต่อไป

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