

The Effect of SEKAR (*Sumber Edukasi Anemia yang Relevan*) Card-Based Nutrition Education on Knowledge and Iron Intake in Pregnant Women

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Abstract

Anemia in pregnant women is one of the most common public health emergencies, especially in low- and middle-income countries, such as Indonesia. This study aims to determine the effect of SEKAR (*Sumber Edukasi Anemia yang Relevan*) card-based nutrition education on knowledge and iron intake in pregnant women at the Mangkupalas Samarinda Health Center. The type of research used is an experimental study with a pre-test and post-test research design with the control group. A total of 36 pregnant women were taken into samples divided into 2 groups, namely 18 interventions and 18 controls based on inclusion and exclusion criteria. Nutrition education variables were obtained using SEKAR cards and leaflets containing information about anemia. The knowledge was obtained using a structured questionnaire that had been validated and a pregnant woman's iron intake was obtained using a 24-hour in-depth food recall interview. Data were analyzed using the Wilcoxon and Mann-Whitney tests. Results show that the effect of nutrition education using SEKAR on the knowledge of pregnant women ($p = 0.003$), and iron intake ($p = 0.031$). Leaflet media did not affect knowledge ($p = 0.072$) and iron intake ($p = 0.078$). There was a significant difference between SEKAR cards and leaflets on knowledge improvement ($p = 0.001$) and there was no significant difference between the use of SEKAR card media and leaflets on iron intake ($p = 0.516$). Media SEKAR is superior and effective was used in this study. It is hoped that there will be continuous nutrition education.

Keywords: SEKAR, Pregnant Women, Knowledge, Iron Intake, Anemia

Key Messages:

- Anemia is still a priority health problem in developing countries. This needs serious treatment because this problem will have an impact on the health of the mother and baby
- SEKAR card media is an educational tool developed by researchers which has had a lot of influence in increasing the knowledge of pregnant women

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1. Introduction

Anemia is a condition in which the number of red blood cells (or oxygen-carrying capacity) is not enough to meet the body's physiological oxygen needs(1). Anemia is a major public health problem globally, affecting an

estimated 1.6 billion people worldwide. It is especially common among pregnant women, with a prevalence of 36.5% (2). About one in three women of reproductive age 15–49 years suffer from anemia globally (3). Anemia is a public health problem that significantly affects people from all backgrounds. Anemia affects about one-third of non-pregnant women, 41.8% of pregnant women, and more than a quarter of the world's population. It will threaten human health, and social and economic development in both developing and developed countries(4).

Basic Health Research reported nationally the prevalence of anemia in pregnant women in Indonesia in 2013 was 37.1 and increased in 2018 by 48.9% (5). Indonesia's Health Profile in 2019 illustrates the coverage of giving Blood Added Tablets in Indonesia in 2018 at 81.42% (5). Anemia is characterized by a low number of red blood cells or hemoglobin concentration per unit g / dL in peripheral blood serum. WHO classifies anemia in pregnant women if the Hb concentration drops < 7 g / dL is called severe anemia, 7.0 - 9.9 g / dL is called moderate, 10.0 - 10.9 d / dL is called mild, and 11 - >11 g / dL is called normal (1). The American College of Obstetricians and Gynecologists (ACOG) defines anemia during pregnancy based on hematocrit values, not hemoglobin levels. A pregnant woman is considered anemic if her hematocrit value drops below 33% during the first day or third trimester or below 32% during the second trimester(6).

Iron Deficiency Anemia (IDA) that is not treated properly will harm the health of the mother and fetus. Chronic iron deficiency can impair maternal health, cause fatigue, and threaten maternal health and the safety of the mother and fetus(7). Anemia in pregnant women will have an impact on growth and development that is not optimal in the fetus in the womb and has the potential to cause complications in pregnancy and childbirth, even causing maternal and infant death during childbirth(8). Previous research revealed pregnancy disorders (preeclampsia, eclampsia), bleeding, and stunted delivery are common causes of maternal morbidity and mortality(9). For every woman who dies from pregnancy or childbirth-related causes, there are about twenty more people who come close to maternal harm(10).

Research by Girma et al. (2022) in Ethiopia found income, nutritional information, maternal occupation, family size, nutritional knowledge, and food intake contribute to the incidence of anemia in pregnant women(11). Various methods can be used to prevent and overcome health problems in pregnant women, one of which is by providing nutrition education. Nutrition education affects the increase in knowledge of pregnant women and the attitude and ultimate goal of achieving individual behavior change in maintaining healthy behavior and playing an active role in realizing an optimal degree of health.

Researchers used SEKAR cards as an educational medium in this study. SEKAR is an abbreviation of the word known in Indonesian as “Sumber Edukasi Anemia yang Relevan” which means “Relevant Anemia Education Resources” which contains information about anemia and the uniqueness of this media contains more images than writing, thus providing interaction for respondents to be able to reread as well as simulate so that they are more relaxed in receiving counseling materials. The delivery of material using SEKAR cards can be done more interactively and encourage participants to play an active role in the learning process. The use of SEKAR cards in the form of picture cards can invite participants to explore their experiences about the images on the card, ensure partnerships between researchers and participants, ensure interaction between education participants, and continuity and ensure that what is learned is following the needs felt by participants and is locally specific. This study aims to determine the effect of SEKAR card-based nutrition education on increasing knowledge and iron intake of pregnant women at the Mangkupalas Samarinda health center.

2. Methods

This type of research is a quasi-experimental study with a pre-test and post-test research design with the control group. This research was conducted in the working area of the Mangkupalas Health Center which consists of 3 villages, namely Mosque Village, Tenun Village, and Mangkupalas Village, Samarinda City in March – June 2023.

A total of 36 pregnant women were sampled based on Federer's formula. 36 pregnant women were divided into 2 groups, namely 18 pregnant women in the intervention group and 18 in the control group. The intervention group will be given a SEKAR card while the control group will be given a media leaflet. The sample selection is selected after establishing inclusion and exclusion criteria. The inclusion criteria are pregnant women in good health, pregnancy age trimester II-III, pregnant women who have never attended a class for pregnant women and are willing to be respondents. The exclusion criteria are pregnant women with complications who are not willing to be respondents.

Nutrition education variables were obtained using the SEKAR card. This card contains information about anemia, while the control group uses a leaflet containing information about anemia that is the same as the SEKAR card. Knowledge variables are obtained using structured questionnaires that have been tested for validity and reliability, if respondents answer correctly then point 1, and if wrong point 0. Iron intake of pregnant women was obtained using food recall interviews 3x24 hours at non-consecutive times (before and after education). Food recall results were inputted into Nutrisurvey 2007. The average results of iron intake for pregnant women divided by 3 days with the recommended consumption of 180 mg (because it is added with the consumption of blood-added tablets), then compared with adequacy based on the recommendations of the 2019 Daily Value Score. The data analysis used was the Wilcoxon and Mann-Whitney tests. The research was conducted after obtaining ethical clearance and a research permit from the Samarinda City government.

Overview of SEKAR cards

The SEKAR Card stands for " Sumber Edukasi Anemia yang Relevan" in the context of Indonesian discussion which means "Relevant Anemia Education Resources". The naming of this card is an idea and idea from the author who then assembled the main discussion about anemia and poured it into the form of a card. This SEKAR card contains information about the definition of anemia, food sources of anemia, causes of anemia, balanced nutrition for pregnant women, blood tablets added to pregnant women, signs of anemia, and facts and myths about Fe supplementation. The uniqueness of this card is that it contains pictures and explanations about anemia in pregnant women. The researcher claims the name SEKAR in the Indonesian context because it is a copyright of local products developed based on ideas, ideas, and names of the authors. SEKAR card media presents material that has been arranged more attractively and contains a set of images depicting health information with predetermined goals. The number of SEKAR cards used in this study was 16 cards, consisting of 8 (eight) cards containing pictures and 8 (eight) cards containing writings about nutrition education for pregnant women. The material used for the SEKAR card is aristocrat with a size of 7 cm x 12.5 cm.

The use of the SEKAR card is to divide participants into 2 (two) groups, the first group is given a SEKAR card containing pictures, and the second group is given a SEKAR card containing writing. Then every pregnant woman who gets a SEKAR card in the form of a picture will express an opinion about the picture on the card then the pregnant woman who holds the SEKAR card with the writing listens to match with the SEKAR card containing the writing. After all the cards got their respective pairs, the researcher concluded the content of the material that had been submitted through the SEKAR card. The SEKAR card is attached at the end of this research manuscript (after reference).

3. Results

Based on table 1, shows that in the intervention group, the age of pregnant women was the most in the age category of 26-30 years as many as 7 pregnant women (38.8%), while in the control group between the ages of 21-25 years and 31-40 with 6 people each (33.3%). Then the gestational age of mothers in the intervention group was the highest in the second trimester, namely 14 people (77.7%), and the control group each 9 people (50%).

The work of mothers was dominated as a household in the intervention group, namely 16 people (88.9%) as well as the control group of 17 people (94.4%). Furthermore, at the level of maternal education, the majority were found with high school education 10 people (55.5%) in the intervention group and 8 people in the control group (44.4%).

Table 1 Characteristics of Pregnant Women

Characteristics of Young Women	Group			
	Intervention (n 18)		Control (n 18)	
	n	%	n	%
Age (years)				
21 – 25	4	22.2	6	33.3
26 – 30	7	38.8	5	27.8
31 – 40	5	27.8	6	33.3
41 – 45	2	11.2	1	5.6
Gestational Age				
Second Trimester	14	77.7	9	50
Third Trimester	4	22.2	9	50
Work				
Housewives	16	88.9	17	94.4
Private	2	11.1	1	5.6
Education				
Primary school	3	16.7	4	22.2
Junior High School	2	11.1	4	22.2
High School	10	55.5	8	44.4
D3/Bachelor	3	16.7	2	11.2

Table 2 average knowledge scores after the pre-test and post-test in the intervention group increased from 74.44 to 93.33 after the intervention. While the control group also increased from 69.40 to 80.00. Iron intake in the intervention group rose from 53.71 to 63.13 post-intervention. While the control group also increased from 62.40 to 62.02.

Table 2 Influence between variables

Variable	Intervention Group (n=18)			Control group (n=18)		
	Mean ± Std. Deviation		<i>p</i>	Mean ± Std. Deviation		<i>p</i>
	Pre Test	Post Test		Pre Test	Post Test	
Knowledge	74.44 ± 19.470	93.33 ± 8.402	0.003	69.4 ± 19,545	80 ± 14,552	0.072
Iron Intake	53.7 ± 12,650	63.13 ± 6.3456	0.031	52.4 ± 14,876	62.01 ± 7,815	0.078

Table 3 illustrates the average knowledge score of pregnant women after education in the intervention and control groups showing that the intervention group was superior to the control group with a mean rank value of 23.89 while the control was 13.11 with a *p*-value of 0.001. This shows that there is a significant difference between SEKAR media and leaflet media. SEKAR media is more effectively used in increasing the knowledge of pregnant women. Iron intake was 19.64 in the intervention group while in the control group was 17.36. The result of a *p*-value of 0.516 showed no difference between SEKAR media from leaflet rice on iron intake.

Table 3 Differences between variables in the control and intervention groups

Group	Mean Rank	<i>p</i>
Knowledge		
Control	13.11	0.001
Intervention	23.89	
Iron Intake		
Control	17.36	0.516
Intervention	19.64	

4. Discussion

This research was conducted in the working area of the Mangkupalas health center. Researchers chose the location of the study based on data from the Samarinda City Health Office which showed the achievement of giving Blood Added Tablets to pregnant women in the Mangkupalas Health Center Working Area in 2019 of 68.10% and the incidence of anemia of pregnant women by 24.55%. In 2020, data on pregnant women who received Blood Added Tablets decreased by 31.67% with an anemia percentage of 21.22%. The achievement of giving Blood Added Tablets to pregnant women in 2021 was 66.07% and the incidence of anemia was 18.25%. The achievement of giving Blood Added Tablets at the Mangkupalas Health Center is the second bottom of the 26 Public Health Centers in Samarinda. The hope is that this research provides new insights to pregnant women to prevent anemia so that the mother and fetus can grow healthy accompanied by normal nutrition.

Nutrition education on the knowledge of pregnant women

Nutrition education is a series of learning processes carried out both formally and informally that aims to educate, provide knowledge related to the importance of nutrition in life, and have a positive influence in developing the potential of every human being, with the hope that what is conveyed can be done well. Nutrition education or counseling is an educative approach to produce individual or community behaviors needed to increase knowledge and improve food intake(12). There are many types of extension media, in determining the media should adjust to the characteristics of the audience so that what is conveyed can be received effectively(13).

The results of the study in both intervention and control groups showed a mean before education was 74.44 which means enough, then after being given education using SEKAR card media the knowledge of pregnant women increased by an average of 93.33 which means good. Non-parametric analysis tests using the Wilcoxon test obtained a *p*-value of 0.003 which means that education using SEKAR card media affects increasing the knowledge of pregnant women. The control group showed a mean value of 69.40 to 80.00 with a *p*-value of 0.072 which means H_a was rejected and H_o was accepted, meaning there was no significant effect of providing nutrition education using leaflet media on the knowledge of pregnant women.

Health administration efforts are only in the form of efforts to treat disease and restore health. Then gradually developed towards unity in comprehensive, integrated, and sustainable health development efforts that include promotive (improvement), preventive (prevention), curative (healing), and rehabilitative (recovery) efforts (14). Understanding the compatibility of health delivery methods is the main thing in providing good feedback from respondents. It is very important to design nutrition education programs that are effective and adapted to this population(15). Nutrition education is part of preventive medicine.

SEKAR educational cards have many advantages among their shapes such as pocketbooks with a size of 7 cm x 12.5 cm presented in the form of pictures and sentences that are not dense so that readers are not heavy to understand. In addition, this card has an appeal in terms of color and unique design, and in its use, there is a section where participants must be more interactive in expressing opinions about the contents of the card obtained during the delivery of education so that respondents are interested and expected to remember it. This research is in line with Aqilatul Munawaroh's research (2019) conducted in Semarang City that there is a

significant influence between interventions using pocketbooks and increasing knowledge of pregnant women in preventing anemia(16). The existence of interaction in this study is a factor in the emergence of passion for pregnant women in the intervention. The process of delivering education through SEKAR cards is very effective in raising the enthusiasm of respondents to express opinions about anemia material. This card is specially designed to attract respondents to interact with each other so that discussions can run smoothly. This research is supported by a study by Septiana (2019) in Pontianak which states that nutritional knowledge increased significantly after the picture card intervention in the treatment group. It is also corroborated by the latest findings of Haniyyah Prastia Putri (2021) in East Jakarta that there is a significant influence of intervention media using videos with increased knowledge of anemia(17).

Notoatmojo (2017) in his book suggests learning experiences and learning processes can affect knowledge. Increased knowledge can be influenced by the learning process and educational media is a tool used by educators to help demonstrate something in the learning process. The prevention and treatment of anemia in pregnant women by delivering important information to increase the knowledge of pregnant women to behave healthily so that anemia can be prevented as early as possible and if it has occurred then anemia can be treated(18). Media leaflets in the control group were considered to not affect this study. In the control group, researchers only distributed leaflet media, and respondents themselves would read and understand it without any other interaction. This is what distinguishes the two interventions. However, this research is not in line with the research of Asmaruddin Pakhi (2018) in Makassar which found the influence of leaflet media with increased knowledge(19).

We also found the intervention group was 23.89 superior based on mean rank value than the control group of only 13.11. The result of the Mann-Whitney test is p -value = 0.001. SEKAR media is more effective than leaflet media. We revealed that the implementation of nutrition education using SEKAR cards makes respondents more interactive in expressing opinions and more relaxed because the concept of using SEKAR cards is included in the game category. Educational media by applying amber and sound (interactive) is better at providing information(20).

Play is a physical activity or imagination carried out by a person or group of people without any compulsion to get pleasure using various concrete objects in the surrounding environment. Research by Uzşen and Didar Başbakkal in Turkey (2019) found that game-based nutrition education affects knowledge enhancement(21). One of the efforts to increase maternal knowledge is to carry out health promotion using interactive media. Researchers assume the use of SEKAR cards is suitable for delivering education because of their attractive design and ease of use in any condition. We found respondents' interest in SEKAR cards was more dominant than leaflets.

Nutrition education on iron intake of pregnant women

Nutrition education is important during pregnancy to maintain the health of the mother and the baby she is carrying(22). The delivery of iron information is considered very important in the population of pregnant women. Iron is an important micronutrient involved in important processes such as erythropoiesis, immune response, and most importantly during pregnancy the development of the placenta and fetus. It is an essential element present in humans contained in oxygen-carrying proteins (hemoglobin) and enzymes that catalyze important reactions (e.g. cytochrome and myeloperoxidase) (23).

Based on the results of research in the intervention group, there was an increase in the mean value of iron intake from 53.7 to 63.13 with a p -value of 0.031. This finding shows the effect of SEKAR education cards on the iron intake of pregnant women. This study is supported by Jamilah (2023) in Surabaya which shows an increase in iron intake in pregnant women after the intervention of the pregnant women program class(22). This is also supported by the Karnataka (2023) study in India which showed an increase in iron intake after gaming interventions and demonstrations(24).

Knowledge is an important domain in shaping behavior. Knowledge is the result of knowing that occurs

after someone senses a certain object. Sensing occurs through the five human senses, including the senses of sight, hearing, smell, taste, and feeling knowledge can be said to be a very important domain in the formation of actions carried out by a person(25). We suggest that the interaction in SEKAR-based nutrition education provides additional insight to pregnant women so that knowledge changes their consumption patterns so that there is an increased iron intake. These results are also corroborated by our findings which show a significant relationship between SEKAR-based nutrition education and increased knowledge of pregnant women.

On the SEKAR card, we attach a source of iron. We believe the enthusiasm of pregnant women in asking for iron sources is a positive attitude that encourages changes in behavior and diet. Apart from that, the average job of mothers is as housewives. Their daily lives are full at home and from the results of the recall we found enough consumption. Mothers who are at home are more free to eat the food they want. The latest study by Rinda Istiqumilaily (2023) in Banyuwangi found that adequate food consumption prevents anemia in pregnant women(26).

While in the controversy group, the mean value was 52.4 to 62.01 with a p-value of 0.078. This shows no effect of nutrition education using leaflet media on the iron intake of pregnant women. This research is in line with Herman's (2020) study that there is no difference in the diversity of vegetable and fruit foods after education using leaflets (27). The results showed that the average iron intake of pregnant women after being given education through SEKAR card media and leaflets the average iron intake of the intervention group was superior to the media leaflet with a mean rank value of 19.64 while the mean rank of the media leaflet was 17.36. Based on research in the field when providing education using leaflets, respondents seemed interested in this media, researchers assumed this was due to the attractive leaflet design and simpler presentation of the material. However, the use of leaflets at the time of research was only distributed to respondents and then they read and then filled out knowledge questionnaires. The results of the statistical test using the Mann-Whitney test are p -value = 0.516 which means there is no significant difference between the use of SEKAR card media and leaflets. Statistically, there is no difference between SEKAR card media with leaflets. But judging from the mean rank, SEKAR card media is superior to leaflet media.

5. Conclusion

There is an influence of nutrition education using SEKAR card media on increasing knowledge and iron intake of pregnant women. While leaflets do not affect increasing knowledge and iron intake in pregnant women. The SEKAR card was more effective and superior in its use in increasing knowledge, while in iron intake these two interventions, namely SEKAR and leaflet, did not show a significant difference. But when viewed from the mean rank, SEKAR cards are superior to leaflets. The findings of this study conclude that nutrition education that includes interaction with the audience effectively increases knowledge. A person's knowledge will determine the behavior in their nutritious diet and health. We hope that this finding will be empirical evidence for promoting nutrition education in the community so that this activity is sustainable. Anemia prevention strategies should be integrated. The involvement of health academics, health practitioners, and stakeholders is considered a strong step to cut the chain of anemia in pregnant women.

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Conflicts of Interest: All authors contributed to the writing of the final script. The authors state that they have no

conflict of interest.

Ethical Clearance

Health Polytechnic Research Ethics Commission, Ministry of Health, East Kalimantan with number: DP.04.03/7.1/7842/2023

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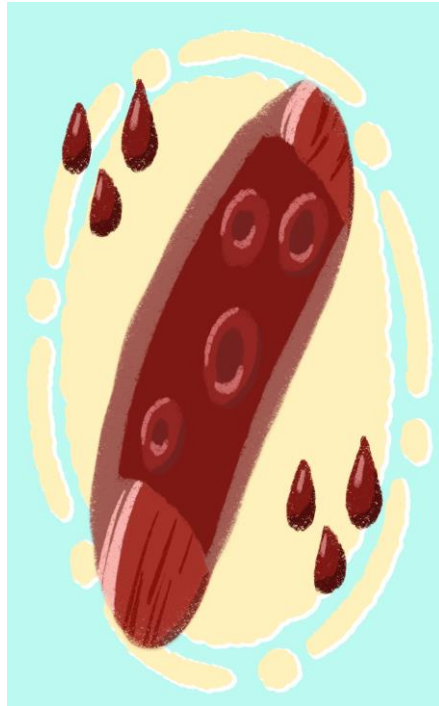
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ATTACHMENT



First Card Cover



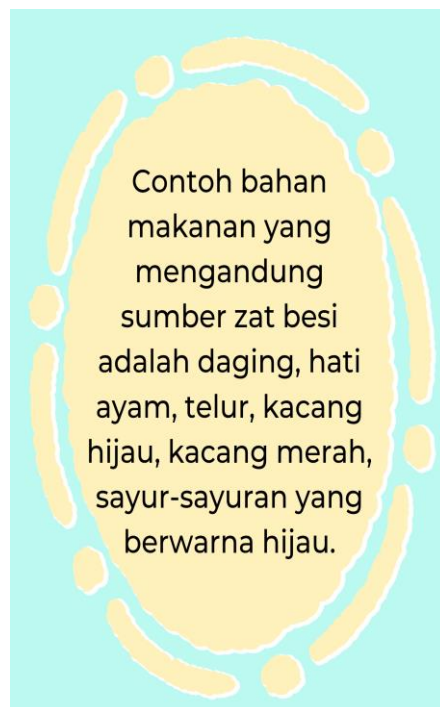
Second Card



Third Card



Fourth Card



Fift Card



Sixth Card

Asupan zat besi yang tidak sesuai dengan kebutuhan dan penyerapan yang tidak baik dapat menyebabkan anemia.

Seventh Card



Eighth Card

Upaya pencegahan anemia pada ibu hamil
Perbanyak konsumsi makanan kaya zat besi dan protein, seperti hati, telur, unggas, daging, ikan, kacang-kacangan, sayuran hijau dan buah berwarna merah atau kuning
Makan beraneka ragam makanan bergizi seimbang.

Ninth Card



Tenth Card

Anemia pada kehamilan dapat membahayakan ibu dan janin, plasenta menjadi tipis dan ini mempengaruhi ukuran tubuh bayi.

Eleventh Card



Twelfth Card

Ibu hamil sangat rentan mengalami anemia karena meningkatnya kebutuhan tubuh akan zat besi seiring dengan bertambahnya usia kehamilan.

Thirteenth Card



Fourteenth Card

Tablet Tambah Darah tidak hanya diminum pada saat pusing dan tidak enak badan, tapi ibu hamil harus rutin meminumnya secara teratur.

Fifteenth Card



Sixteenth Card

Tanda-tanda anemia pada ibu hamil:

1. Lesu, lelah, letih, lemah, lunglai (5L)
2. Kelopak mata pucat
3. Lidah dan bibir pucat
4. Mata berkunang-kunang
5. Pusing

Seventeenth Card