

Midwife Support and Nutritional Adequacy for the Prevention of Anemia During Pregnancy

Mira Triharini¹, Nursalam¹, Agus Sulistyono² and Merryana Adriani³

¹Faculty of Nursing Universitas Airlangga, Kampus C Mulyorejo, Surabaya, Indonesia

²Dr. Soetomo General Hospital Surabaya, Indonesia

³Public Health Faculty, Universitas Airlangga, Surabaya, Indonesia

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Abstract: Healthy nutrition is very important for fetal development during pregnancy. A pregnant mother is expected to gain adequate energy, carbohydrates, proteins, vitamin C, and iron in daily food to prevent anemia. Many factors inhibit the fulfillment of nutrients during pregnancy. Support from midwives is needed to help mothers understand how to meet their nutritional needs. This study aims to observe the correlation of midwife support with nutritional adequacy to prevent anemia during pregnancy. A cross-sectional study was carried out on 125 pregnant women who had antenatal care at five community health centers in Surabaya. Data were collected using questionnaires and food recall over 24 hours. There was a significant correlation between the midwife support with energy adequacy ($r = 0.182$, $p = 0.042$), protein adequacy ($r = 0.222$, $p = 0.013$), and iron adequacy ($r = 0.208$, $p = 0.020$). Based on the Indonesian Recommended Dietary Allowances (RDA), the recommended adequacy of energy is 78.16%, carbohydrates 69.59%, protein 102.87%, vitamin C 118.29%, and iron 171.81%. There was a significant correlation between midwife support and energy, protein and iron adequacy to prevent anemia during pregnancy. Health education with appropriate methods can improve mothers' ability to meet nutritional adequacy during pregnancy.

1 BACKGROUND

Prenatal nutrition is essential for fetal development and long-term health in infants. Malnutrition and excess nutrients (obesity) during pregnancy, can affect fetal development, growth, and development of childhood and the risk of developing chronic diseases in adults (Ministry of Health, 2006; Imdad et al., 2017).

Weight gain during pregnancy indicates whether pregnant women have good nutritional status. An average weight gain of 12 kg is associated with reduced risks of complications during pregnancy and delivery and the risk of having low birth weight (LBW). The UK Committee on Medical Aspects of Food Policy (COMA) recommends that pregnant women eat foods that contain lots of thiamin, riboflavin, folate, vitamin A, vitamin C, vitamin D, energy, and protein (Cario & Haenel, 2006).

Many factors affect the fulfillment of nutrition during pregnancy. A study in Bangladesh found that knowledge, self-efficacy, social norms, support from husbands, and free supplements were associated

with maternal compliance of nutrition during pregnancy (Phuong H Nguyen et al., 2017). A study in Vietnam found that maternal compliance in micronutrient supplementation was influenced by ethnicity, occupation, parity, and support of health workers in counseling regarding adherence to supplemental consumption (Gonzalez-Casanova et al., 2017)

Physical changes experienced during pregnancy such as nausea, vomiting, constipation, and anemia affect pregnant women's nutrition (Gonzalez-Casanova et al., 2017). Anemia caused by iron deficiency is a major nutritional problem in pregnant women all over the world and is associated with low iron reserves in the body. Anemia in pregnant women can adversely affect the development and health of the fetus. Research shows an association between pregnancy anemia with prematurity, SGA, and stillbirth (Tandu-umba & Mbangama, 2015). The main cause of anemia is the lack of food containing iron, multiparity, and worm infections (Sharma & Shankar, 2010).

Eating habits during pregnancy can be influenced

by the knowledge and perception of pregnant women, so health education about healthy food is required (Khoramabadi et al., 2015). Health education on nutritional needs is very important pregnant women, especially teenage pregnant women who do not have the physical and psychological readiness to manage the pregnancy. A study shows that teenage pregnant women have lower weight gain as well as higher health risks than adult mothers (Phuong Hong Nguyen et al., 2017).

One's health behavior is related to interpersonal relationships. Social support from families, peers, and health workers affects the perceptions and beliefs of a person if they are encouraged to act on certain health behaviors (Pender, 2011). Physical and psychological changes experienced by pregnant women often cause anxiety, so emotional support is required. Support from midwives provides a sense of security and reduces the sense of rejection and loneliness during pregnancy (Ekström et al., 2015).

Until now, there have not been many studies that observe the relationship between midwife support given to pregnant women and the anemia prevention. This study aims to observe the relationship of midwives' support with nutritional adequacy to prevent anemia during pregnancy.

2 METHODS

2.1 Design Research

This study used cross-sectional design conducted in August–October 2017 on 125 pregnant women. The population of this study were pregnant women who attended antenatal care at five community health centers in the city of Surabaya, namely Jagir, MedokanAyu, Sidotopo Wetan, Asemrowo, and Gundih.

2.2 Sample

Multi-stage Random Sampling was used in this study. Samples were taken from five areas in Surabaya, where one community health center in each region was randomly selected. The sample size consisted of 125 pregnant women who attended antenatal care in community health centers and have been receiving iron supplements.

2.3 Measurement Tools

The data collected in this research include midwife support and nutritional adequacy. The demographic

characteristics questionnaire consists of several questions that include age, parity, education level income and gestational age. The questionnaires were prepared by researchers based on the theory of prevention of anemia of pregnant women and the Health Promotion Model (HPM) (Sharma & Shankar, 2010; Pender, 2011).

Midwife support was measured using a questionnaire based on The Health Care Climate Questionnaire (HCCQ) (Williams, Ryan & Deci, 1999). The six questions used a Likert scale with the following options: never, rarely, sometimes, often, and always. 'Midwife support' relates to the perception of pregnant women regarding the support given by health workers to pregnant women to promote anemia-prevention behavior. The alpha reliability was 0.945.

Nutritional adequacy consists of energy adequacy, carbohydrate, protein, vitamin C, and iron. Measurements were carried out with a questionnaire with a 24-hour food recall method, of which the results were measured in calories, grams, and mg, and then compared with the Indonesian Recommended Dietary Allowances (RDA), categorized $\geq 100\%$ = good; 80- <99% = medium; 70- <80% = less; <70% = deficit (Supariasa, Bakri, & Fajar, 2002).

Research data was collected by the provision of questionnaires regarding midwife support completed by pregnant mothers and interviewing participant to collect information about their nutrition over 24 hours through a food recall method. Data were collected from pregnant women who had attended an antenatal care visit in a community health center.

2.4 Ethical Considerations

Sampling was done after obtaining ethical approval from the health research ethics committee of the Faculty of Public Health Airlangga University, Surabaya, Indonesia (No 123-KEPK). Informed consent was carried out and pregnant women agreed to participate in this research. Any information obtained will only be used for research purposes and confidentiality is guaranteed.

2.5 Data Analysis

Data analysis was conducted using Spearman's rho to determine the relationship of midwife support with nutritional adequacy for the prevention of anemia.

Descriptive statistics used frequency, percentage, mean, and standard deviation to identify

demographic characteristics, midwife support, and nutritional adequacy. In all statistical analyses, a p-value <0.05 was considered significant. All data were analyzed using SPSS software.

3 RESULTS

3.1 Sociodemographic Characteristics

Table 1 shows sociodemographic characteristics and the adequacy of energy, carbohydrate, protein, vitamin C and iron. Most respondents (n = 85, 68%) were 25–35 years old. Most respondents (n = 89, 71.2%) had a parity of 1–3. Most respondents (n = 114, 91.2%) had secondary education. Most respondents (n = 86, 68.8%) had an income below 3 million rupiah per month. Most respondents (n = 108, 86.4%) had a gestational age below 37 weeks.

The greatest energy adequacy in age > 35 years

(83.9 ± 38.6), parity > 3 (86.9 ± 31.2), elementary education (81.4 ± 24.1), income ≥ 3 million rupiah (82.7 ± 35.9), and gestational age ≥ 37 weeks (79.8 ± 32.7).

The greatest carbohydrate adequacy in age <25 years (74.3 ± 51.1), nullipara (79.9 ± 47.4), secondary education (70.6 ± 36.2), income ≥ 3 million rupiah (74.9 ± 33.1), and gestational age ≥ 37 weeks (74.4 ± 39.5).

The greatest protein adequacy in age > 35 years (118.9 ± 67.8), parity > 3 (132.8 ± 17.5), elementary education (108.4 ± 39.6), income ≥ 3 million rupiah (107.7 ± 58.9), and gestational age ≥ 37 weeks (111.2 ± 43.9).

The greatest vitamin C adequacy in age> 35 years (154.9 ± 288.9), parity > 3 (509.8 ± 164.6), university education (188.9 ± 226.8), income ≥ 3 million rupiah (136.2 ± 176.1), and gestational age ≥ 37 weeks (188.9 ± 150.8).

Table 1: Nutrition adequacy in pregnant women.

No	n (%)	Energy	Carbohydrate	Protein	Vitamin C	Iron
		Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Age						
< 25 years	29 (23.2)	74.8± 27.0	74.3 ± 51.1	90.9 ± 38.1	83.5 ± 92.8	169.9 ± 89.0
25–35 years	85 (68)	78.6± 29.9	68.1± 27.3	105.1 ± 50.3	125.9 ± 159.5	172.1 ± 86.7
> 35 years	11 (8.8)	83.9± 38.6	68.2± 36.3	118.9 ± 67.8	154.9 ± 288.9	174.7 ± 74.3
Parity						
0	34 (27.2)	80.1 ± 30.6	79.9± 47.4	97.5 ± 46.2	136.5 ± 142.8	168.8 ± 78.4
1–3	89 (71.2)	77.2± 29.9	65.5± 28.6	104.3 ± 51.3	102.5 ± 158.5	169.6 ± 85.8
>3	2 (1.6)	86.9± 31.2	73.5± 18.9	132.8 ± 17.5	509.8 ± 164.6	322.3 ± 112.8
Education						
Elementary	16 (12.8)	81.4± 24.1	66.9± 29.2	108.4 ± 39.6	112.1 ± 189.1	160.9 ± 98.6
Secondary	98 (78.4)	77.6± 29.2	70.6± 36.2	102.1 ± 47.6	111.4 ± 148.6	172.2 ± 84.1
University	11 (8.8)	77.8 ± 44.2	64.6± 34.4	101.1 ± 78.4	188.9 ± 226.8	183.9 ± 85.7
Income						
< 3 million rupiah	86 (68.8)	76.1± 26.9	67.2± 35.7	100.8 ± 45.1	110.5 ± 155.8	166.8 ± 81.4
≥ 3 million rupiah	39 (31.2)	82.7± 35.9	74.9± 33.1	107.7 ± 58.9	136.2 ± 176.1	183.3 ± 94.8
Gestational age						
< 37 weeks	108 (86.4)	77.9 ± 29.6	68.8± 34.4	101.6 ± 50.5	188.9 ± 150.8	169.2 ± 91.2
≥ 37 weeks	17 (13.6)	79.8± 32.7	74.4± 39.5	111.2 ± 43.9	108.9 ± 216.4	188.5 ± 28.9

Table 2: Midwife support statements.

No	Statements	Never	Rarely	Sometimes	Often	Always
		n (%)	n (%)	n (%)	n (%)	n (%)
1	Gave me the opportunity to make choices in a nutritious food setting	2 (1.54)	2 (1.54)	12 (9.23)	47 (36.15)	62 (47.69)
2	Gave me the opportunity to tell my problems	0.00	1 (0.77)	8 (6.15)	35 (26.92)	81 (62.31)
3	Feel confident in my ability to maintain healthy pregnancy	0.00	0.00	6 (4.62)	46 (35.38)	73 (56.15)
4	Gave me the opportunity to ask questions about nutritious food and iron tablets	0.00	1 (0.77)	5 (3.85)	49 (37.69)	70 (53.85)
5	Listen to my story about the consumption of food and iron tablets that I take	0.00	2 (1.54)	9 (6.92)	41 (31.54)	73 (56.15)
6	Asked me what I had done before giving advice	1 (0.77)	2 (1.54)	11 (8.46)	46 (35.38)	67 (51.54)

The greatest iron adequacy in > 35 years (174.7 ± 74.3), parity > 3 (322.3 ± 112.8), university education (183.9 ± 85.7), income ≥ 3 million rupiah (183.3 ± 94.8), and gestational age ≥ 37 weeks 188.5 ± 28.9).

Of the midwife support statements, the majority of respondents stated that they always get support from their midwife: "The midwife gave me the opportunity to make choices in a nutritious food arrangement" (n = 62, 47.69%); "the midwife gave me the opportunity to express my problems" (n = 81, 62.31%); "midwives feel confident in my ability to maintain healthy pregnancy" (n = 73, 56.15%); "my midwife gave me an opportunity to ask about nutrition and iron tablets" (n = 70, 53.85%); "the midwife listened to my story about my food consumption and iron tablets" (n = 73, 56.15%); "my midwife asked me about what I had already done before giving advice" (n = 67, 51.54%) (Table 2).

Of the six midwife support statements, "Midwife gives me the opportunity to tell my problems" had the highest average score (4.57 ± 0.65) and "Midwife gives me the opportunity to make a choice in a nutritious food setting" had the lowest average score (4.32 ± 0.84) (Table 3).

Nutritional intake among pregnant women. The mean score of energy was 1968.67 kcal (95% CI 1817.69–2079.65), carbohydrate was 239.97 gram (95% CI 222.32–257.62), protein was 78.36 gram (95% CI 71.94–84.78), Vitamin C was 94.68 mg (95% CI 72.12–117.23), Iron was 61.36 mg (95% CI 55.85–66.88) (Table 4).

The mean score of midwife support was 26.75 (95% CI 26.2–27.3). The mean score of energy adequacy was 78,16% (95% CI 72, 82–83,46). There was a significant correlation of midwife support with energy adequacy ($r = 0.182$; $p = 0.042$). The mean score of carbohydrate adequacy was 69,59% (95% CI 63,40–75,79). There was no significant correlation of midwife support with carbohydrate adequacy ($r = 0.182$; $p = 0.042$). The mean score of protein adequacy was 102,87% (95% CI 94,09–111,66). There was a significant correlation of midwife support with protein adequacy ($r = 0.222$; $p = 0.013$). The mean score of vitamin C adequacy was 118,29% (95% CI 89,67–146,56). There was no significant correlation of midwife support with vitamin C adequacy ($r = 0.061$; $p = 0.502$). The mean score of iron adequacy was 171,81% (95% CI 156,65–186,97). There was a significant correlation of midwife support with iron adequacy ($r = 0.061$; $p = 0.502$) (Table 5).

Table 3: Item analysis of midwife support.

No	Item	Mean	SD
1	Gave me the opportunity to make choices in a nutritious food setting	4.32	0.84
2	Gave me the opportunity to tell my problems	4.57	0.65
3	Feel confident in my ability to maintain healthy pregnancy	4.54	0.59
4	Gave me the opportunity to ask questions	4.50	0.62
5	Listen to my story about the consumption of food and iron tablets that I take	4.48	0.70
6	Asked me what I had done before giving advice	4.39	0.78

Table 4: Nutritional intake among pregnant women.

No	Variable	Mean	SD	95% CI
1	Energy	1968.67 (kcal)	754.79	1817.69–2079.65
2	Carbohydrate	239.97(gram)	101.70	222.32–257.62
3	Protein	78.36 (gram)	36.98	71.94–84.78
4	Vitamin C	94.68 (mg)	129.96	72.12–117.23
5	Iron	61.36 (mg)	31.77	55.85–66.88

SD - standard deviation

Table 5: The relationship of midwife support with nutrition adequacy.

No	Variable	Mean	SD	95% CI	r	p-value
1	Midwife support	26.75	3.11	26.2–27.3		
2	Energy adequacy	78.16%	29,96	72.82–83.46	0.182	0.042
3	Carbohydrate adequacy	69.59%	34,99	63.40–75.79	0.054	0.553
4	Protein adequacy	102.7%	49,92	94.09–111.66	0.222	0.013
5	Vitamin C adequacy	118.29%	161,93	89.67–146.56	0.061	0.502
6	Iron adequacy	171.81%	85,62	156.65–186.97	0.208	0.020

SD - standard deviation; r = Spearman correlation coefficient; p < 0.05

4 DISCUSSION

Health workers have a role in promoting appropriate health education to improve pregnant women’s knowledge about anemia. Counseling techniques are suitable because of the two-way interaction, meeting the needs of pregnant women. The necessary techniques are two-way communication, fostering a good atmosphere, actively listening, asking questions, and facilitating (Kementerian kesehatan RI, 2013). Studies show that counseling techniques significantly influence the prevention of anemia in pregnancy (Triharini, Kusumaningrum and Octaviani, 2017). In conducting health education at community health centers, midwives often experience barriers meaning that the provision of health information does not achieve its potential. The research shows there are communication barriers between nurses and patients. Communication barriers can be caused by nurses, patients, and the environment (Norouzina et al., 2015).

The forms of support the midwives can provide to improve pregnant women’s diet include giving them opportunities to make choices in a nutritionally motivated environment, providing opportunities for complaints, confidence to maintain healthy pregnancy, an opportunity to ask questions about nutritious food problems and iron tablets, listen to pregnant women's stories about the consumption of iron foods and tablets, and asking what pregnant women have done before giving advice on eating nutritious food and taking iron. A study shows that nutrition education in pregnant women effectively increases knowledge about anemia, diet and hemoglobin (Al-tell et al., 2010). Health workers also need to develop appropriate forms of health promotion for pregnant women. A study describes interventions through group discussions and individual interviews for pregnant women to improve nutritional status (Setyowati, 2015).

Results of the research show that midwives promoting good health provide opportunities for pregnant women to ask questions and listen to the stories of other pregnant women. Environmental conditions such as heavy workload caused the majority of respondent to state that midwives are

unable to give adequate opportunities for promoting healthy dietary choices for pregnant women. Research shows that barriers to health promotion in anemic pregnant women may come from midwives who lack communication and clinical skills (Widyawati et al., 2015). Counseling by midwives is standard in antenatal care, but this has not been done optimally. A study shows the correlation of antenatal care with midwife knowledge and infrastructure in the service. The development of midwifery skills through training and improved infrastructure is needed to improve antenatal care (Purwaningsih et al., 2013)

Nutritious foods to prevent anemia need to include adequate energy, carbohydrates, protein, vitamin C, and iron. Several studies have proven that there is a correlation between nutrients and hemoglobin levels. Women with anemia show a low-energy diet, protein, folate, B12, iron, vitamin C and red meat (Thomson et al., 2011). Vitamin C is associated with iron. This is supported by studies looking at the correlation of hemoglobin levels with iron and vitamin C in adolescent girls with iron-deficiency anemia (Latheef & Vijayaraghavan, 2017). Many factors affect the fulfillment of nutritional needs. A study shows that the traditions of the Lombok Indonesian society influence nutritional fulfillment in pregnant women, so midwives need to take a cultural approach to health education to change behavior (Armini, Pradanie & Sudariani, 2008)

Several studies in various countries observe the nutritional adequacy of pregnant women. Research in Indonesia shows that 40% of pregnant women are at risk of inadequate energy and protein intake and 70% of pregnant women are at risk of inadequate vitamin A, calcium, and iron (Hartini, 2004). Insufficiency of vitamin C and iron is shown by research in the West North of Iran, but pregnant women have consumed sufficient amounts of energy and protein (Esmailzadeh, Samareh & Azadbakht, 2008). Research in Western Rajasthan India shows most pregnant women in the region have anemia. The average nutritional intake suggests a deficiency of protein, energy, and iron (Singh, Fotedar, & Lakshminarayana, 2009)

The results of this study found that protein, vitamin C and iron adequacy had an average above 100% compared with the Indonesian Recommended Dietary Allowances (RDA). Adequacy of protein is very important in pregnancy because it is needed for fetal growth (Liberato, Singh, & Mulholland, 2013). The high iron adequacy is supported by the compliance of most pregnant women in taking iron supplements. Each iron tablet contains the equivalent of 60 mg of elemental iron (in the form of ferro sulfate, ferro fumarate or ferro gluconate); and

0.400 mg of folic acid, which helps to prevent anemia (Kemenkes, 2014). A study supports that adherence to iron supplementation is associated with the incidence of anemia in pregnant women, but there are still pregnant women who are not compliant in taking iron tablets. One study showed that poor adherence to drinking iron supplements was influenced by the level of education and use of antenatal care services, so the role of midwives in providing health education is very important (Nisar, Dibley, & Mir, 2014; Mekuria et al., 2016). Improving midwives' ability to promote health promotion is essential. A study shows that midwife training has increased the confidence and knowledge of midwives in providing health promotion on nutrition, physical activity, and weight management in pregnant women (Basu et al., 2014).

5 CONCLUSIONS

There was a significant correlation between midwife support and energy, protein, and iron adequacy to prevent anemia during pregnancy. The practical implications of this research are the sources of information about the importance of social support for pregnant women to improve diet to meet the requirements of energy, carbohydrates, vitamin C, protein, and iron. Health workers need to develop techniques and health education materials to improve prenatal nutrition. Social and cultural values need to be given attention in providing health education because pregnant women's behavior is related to the beliefs held by the community. For further research, the implications of this study are to examine the internal and external factors that affect the performance of midwives in providing health promotion in pregnant women.

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