ORIGINAL ARTICLE

MICRONUTRIENT INTAKE AND PERCEIVED BARRIERS AMONG ANAEMIC PREGNANT WOMEN IN ACEH, INDONESIA

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Background: Estimating vitamin, mineral intakes related to anaemia and describing perception regard pregnancy diet, accessibility to foodstuff among first ANC visitor of anaemic pregnant women aged above 20 years in Province Aceh, Indonesia. **Methods:** A cross sectional mix-method of quantitatively and focus group discussion (FGD) was conducted at two municipalities having more than 40% anaemic pregnancy. One hundred fifty-eight anaemic pregnant women were interviewed regarding socio-demographic and three days of 24-hours food recall, in addition to FGD at each municipality using FGD guidelines about nutritional anaemia. Food recall data was analysed using software NutriSurvey Indonesia, deficiency is defined as daily intake below 77% recommended dietary allowances (RDA) Indonesia. The FGD result was analysed by content analysis and clarified with representative quotes. **Result:** Prevalence of deficiencies intake were folate (98.7%), vitamin B_6 (91.1%), vitamin B_2 (90.5%), iron (89.2%), zinc (87.3%), vitamin E (84.8%), vitamin C (79.7%), vitamin A (74.1%), copper (67.1%) and vitamin B_{12} (30.4%). Anaemic pregnant women noticed to consume more amount of food during pregnancy, and preferred to access foodstuff at shop nearby the house. **Conclusion:** Other than low iron intake, more than 90% anaemic pregnant women were also deficiency in folate, vitamin B_6 and vitamin B_2. Perceived of less acknowledgement about affordable cost micronutrient-rich food, high cost of quality-food, sufficient to varieties foodstuff at neighbourhood shop prevents them from making correct food choices subsequently barrier to the food access and intake.

Keywords: Anaemic pregnancy; Vitamin and mineral intake; Perception

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INTRODUCTION

Indonesia is one of developing countries that has 48.9% anaemic pregnant women at all age; of 15–24 years (86.4%), of 25–34 years old (33.7%), of 35–44 years (33.6%) and aged of 45–54 (24%).[1] Prevalence of anaemic pregnancy more than 40% is considered as severe health problem by World Health Organization.[2]

Pregnancy anaemia is indicated with haemoglobin level below 11 g/dl. Although the haemoglobin concentration in normal pregnancy decreases with dilution as the volume of circulating blood increases, prolonged anaemia is highly contributory to predispose premature delivery, perinatal mortality, risk of death during delivery and postpartum.[2] Effective intervention to reduce anaemia among pregnant women are through iron supplementation, dietary diversification and treatment related diseases.[3]

Iron deficiency anaemia (IDA) is the most common anaemia globally, however some micronutrients (vitamin and mineral) such as folic acid, vitamin A, B_2, B_6, B_{12}, C, E, Copper (Cu) and Zinc (Zn) also had characterized anaemic pregnancy in developing countries. It has been observed in Bangladesh, China, Sudan, Nigeria, and Thailand.[4] These micronutrients are rolled in haemoglobin synthesis and iron absorption in the blood.[3,4]

Anaemic pregnancy was experienced by 45.5% pregnant women in province Aceh, Indonesia.[5] Unfortunately there is a lack of anaemic pregnancy data based on age risk in Aceh. However, the demographic data showed that mostly women in Aceh married at aged of 19–24 years (53.2%),[6] hence a large in number of women in Aceh experienced pregnancies at age of above 20 years is the rationale population for present study.

It is little known about micronutrient intake related to anaemia among anaemic pregnant women in province Aceh. Present study aims to estimate vitamin, mineral intake compares to recommended dietary allowances (RDA) Indonesia and to describe perception regarding pregnancy diet, accessibility to the foodstuff. This study information will be useful to initiate more awareness about nutritional anaemia included in maternity program.

MATERIAL AND METHODS

It is a cross-sectional mix-method study of two parts; quantitatively part was assessing socio- demographic and pregnancy characteristics, estimating vitamin and mineral intake, while Focus Group Discussion (FGD) part was elaborating perception of nutrient intake during pregnancy.

Study was enrolled at two municipalities in province Aceh, Indonesia with prevalence ≥40% of anaemic pregnancy. It was purposively to anaemic pregnant women indicated by Sahli's haemoglobinometer method,[7] aged more than 20 years and first antenatal care (ANC) visitor at government health care unit during March-April 2018. Among 383 first ANC visitors, there were 158 visitors having anaemia (haemoglobin level 9 g/dl-10 g/dl) (Figure 1). A written consent in Indonesia language was given to get their approval, indeed the total sampling was applied (n=158). Ethical clearance of study was collected from the Medical and Health Research Ethics Committee (MHREC) Faculty of Medicine, Universitas Gajah Mada Indonesia (KE/FK/0609/EC/2017).

The socio–demographic, pregnancy characteristic and food recall data collection were performed by a trained interviewer at each municipality. Variables in this part are categorized and presented in number and percentage. Interviewer was woman having nutrition diploma education and experienced of 2–3 times food recall survey. Content validity of 24 hours–food recall is according to literature review and implemented for three days (non-consecutive of 2 weeks days and 1 week end day).[8] Every interview session took about 20–45 minutes.

Food recall data were analysed by NutriSurvey software to generate vitamin and mineral intake in grams, milligram or micrograms per day, followed with average intake of three days calculation. Intake is inadequate for average intake <77% of RDA and adequate for average intake ≥77% of RDA Indonesia. [9]

The FGD session at each municipality was guided by a trained and experienced moderator in performing FGD on nutritional anaemia, education of magister in community nutrition. Moderator introduced topics for discussion and helped the group to participate in a lively and natural discussion. It was implemented in each group of seven anaemic pregnant women of first part (quantitative part), education of 12th grades, willing to participate and commit to actively speaking.

Discussion guidelines were focused on gathering information about perception of the need to increase intake of high-quality micronutrient-rich foods, and perception of accessibility to foodstuff regard cost of foodstuff and market place,[10] according to Health Belief Model theory to find out perceived barriers towards nutrient intake.[11] The field notes were performed during the FGD and each session took almost two hours.

Perceptions were analysed by reviewing answers line by line and performing data coding through two stages.[12] The first stage was generating numerous category codes without limiting the number of codes. The research team list emerging ideas, drawn relationship diagrams and identified keywords used by participants frequently as indicators of important themes. The second stage was focusing on coding where the research team eliminated, combined or subdivided the coding categories identified in the first step to present the themes. The themes were illustrated with selected quotes and translated into English.

RESULTS

Of 158 study participants, mean age was 28.5±(3.51) years, majority were in ranged of 25–29 years, completed 9th grades education, housewives, monthly family income of above poverty line, living as nuclear family and mean family size was 3.3±(1.27). Gestational enrolment ranged of 14–20 weeks, and experienced the 2nd–3rd of pregnancy predominantly (Table-1).

Micronutrients intake were deficits compared to daily recommendations intake. Vitamin B deficiency was present in 30.4% and copper in 67.1% of anaemic pregnancy, while a lack of other vitamins and minerals suffered by more than 70% of participants (Table-2).

The nutrition guidelines of Indonesia divided food into five groups of carbohydrate-food, protein animal-food, protein plant-food, vegetables and fruits.[13] Three days of food recall record indicated that all food group intakes were less than 3-4 portions per day predominantly (Table-3).

Fish and chicken eggs were the most frequent animal-food. Protein plant-food mentioned in present study was tofu and *tempeh* (traditional food originating from Indonesia made through fermentation process of soybeans). In vegetables group were kale, spinach, cassava leaves, mustard greens and fruits group of bananas, papaya, guava, *salak*, orange and mango.

Regarding FGD result about pregnancy diet, it showed consensus on consuming more amount of food than before pregnant, however participants admitted less information about the nutrient needs during pregnancy and nutritional value of food. One participant said *"I eat more but I do not know if food with particularly content (nutrient) need to consume*

due to the pregnancy". Another said *"..., it cannot be supported with the kind of good-food because we do not know which ones is good or bad for pregnancy".*

The "good-food" was expressed as "nutritious food" and "food content of vitamin", participant were familiar to these terms from health worker. These terms were elaborated as diet composed of animal food, vegetables, fruit and pregnancy milk. Red meat (beef) was discussed as high-quality food followed with chicken and fish. Spinach was mentioned as good source of vitamin while orange, banana, papaya and mango were particularly fruit consumed. Most of them emphasized that milk was not priority (economic constraint) and personally dislike of drinking it.

Several participant statement *"Red meat is a very good-food so is the reason of highly- price, it is energy enhancing food". "Spinach enriched with vitamin; all vegetables are good for health". "Banana and Papaya are always available (not seasonal fruit), low in price and good for digestion, oranges is rich with vitamin C, and many people in surroundings owned mango trees"*

Participants stated sources of general health understanding was from health worker, family, friends and college student went for field study in their neighbourhood. Concerning accessibility to foodstuff, all FGD participants believed that majority women in their village were habit to buy foodstuff at their neighbourhood shop which is specifically meant to fit in to the needs and desires of the local community.[14] The shop distance was identified within 20–30 minutes of walking for back and forth, several perceived favourable to access by walking, while others perceived importance to prevent transportation expenses as underlying reasons of shopping at neighbourhood. One of them said *"I do not have a vehicle to go to the city market because my husband uses it to go to work, so I shop near my house. Taking rickshaw is expensive fare, it is better to use the money for buying more food (than spent it for transportation)"*

It was discussed that the shop provided several types of fish, vegetables and cooking ingredients, while beef, poultry, seafood other than fish either fruits were not available. Participants defined main daily menu must at least consist of fish and vegetable, hence the neighbourhood shop was considered reliable to provide foodstuff for their daily menu. A participant shared *"This shop provides everything I need such as onions, chilies and other spices as well. The vegetables, chicken eggs, fish and salted fish were also there. The shop does not provide fruits".*

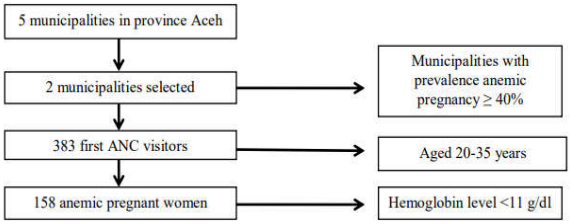

Figure-1: Study area and participant selection

Table-1: Socio demographic and pregnancy characteristics

Socio demographic		Number	Percent
Age (years)	20–24	55	34.8
	25–29	66	41.8
	30–35	37	23.4
Education level	9th grades	86	54.4
	12th grades and higher	72	45.6
Occupation	Housewife	143	90.5
	Working	15	9.5
Type of family	Nuclear	122	77.2
	Extended	36	22.8
Monthly family	Under poverty line	66	42
income	Above poverty line	92	58
Pregnancy characteristics			
Gestational age (weeks)	14–17	74	46.8
	18–20	84	53.2
Number of pregnancies	Primigravida (1st)	43	27.3
	Multigravida (2nd-3th)	68	43.0
	Grande multigravida (≥4th)	47	29.7

Table-2: Vitamin and mineral intake

Nutrient	RDA of 2nd trimester	Average intake	% Excess/deficit	Pregnant women intake	
				Inadequate n (%)	Adequate n (%)
Iron (mg)	35	9.84	-71.9	141 (89.2)	17 (10.8)
Folic acid (µg)	600	117.13	-80.5	156 (98.7)	2 (1.3)
Vitamin A (µg)	800	416.42	-47.9	117 (74.1)	41 (25.9)
Vitamin B2 (mg)	1.6	0.73	-54.4	143 (90.5)	15 (9.5)
Vitamin B6 (mg)	1.7	0.80	-52.9	144 (91.1)	14 (8.9)
Vitamin B12 (µg)	2.6	2.07	-20.4	48 (30.4)	110 (69.6)
Vitamin C (mg)	85	43.07	-49.3	126 (79.7)	32 (20.3)
Vitamin E (mg)	15	4.90	-67.3	134 (84.8)	24 (15.2)
Copper (mg)	1	0.66	-34	106 (67.1)	52 (32.9)
Zinc (mg)	14	5.03	-64.1	138 (87.3)	20 (12.7)

Tabel-3: Frequency of food group intake

Frequency of serving	Protein animal-food		Protein plant - food		Vegetables		Fruits	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
3-4 portion every day	43	27.2	0	0	0	0	0	0
1-2 portion every day	108	68.3	63	39.9	65	41.1	38	24
Not every day	5	3.2	77	48.7	84	53.2	72	45.6
Not consume	2	1.3	18	11.4	9	5.7	48	30.4

DISCUSSION

Study was to describe vitamin and mineral intake related with anaemia and perception about pregnancy diet and accessibility to foodstuff among anaemic pregnant women. The iron deficiency status in current study was aggravated by another low vitamin and mineral intake. A review study in Indonesia has similar observations in some cities at Java provinces and also in Jayapura city of Papua province.[15]

Educational level, monthly income and nutrition information during pregnancy were identified as important predictors of knowledge of women on nutrition during pregnancy.[16] In our study, majority anaemic pregnant women were completed 9th grades, in reverse our participant monthly family income was above poverty line.

Overall frequency food groups intake of present population was less than guideline of ministry of health Indonesia; singleton pregnancy were recommended to eat protein animal-food such as meat (three times of serving, of 35 grams/serving) or fish (three times of serving, of 45 grams/serving) and protein plant-food such as tofu and *tempeh* (four times of serving, of 50 grams/serving), vegetables of four times of serving, of 100 grams/serving, and four times of serving, of 50 grams/serving for fruits.[13]

Food recall record showed limited intake of beef, chicken, offal because these considered as high-cost food at FGD session. In Pakistan, the low-income pregnant women were educated to mix the meat with vegetables or legume dish to enhance the intake of non–heme iron (source from plant).[17] Less intake of soy-based food similarly reported among pregnant women in China.[18] In contrast with study in Surabaya and Surakarta, cities in Java provinces Indonesia that found although less consumption of red meat, pregnant women consumed *tempeh* in every day.[19] Result of current study was in line with survey that reported high population of Indonesia (93.6%) were under eating vegetables and fruit.[20]

Another finding highlights that spinach was consumed foremost, it comprises of *phytate* which inhibit iron absorption, while intake vitamin C that help iron absorption particularly from non-heme-iron,[18] distressingly also less consumption. Both inadequate intakes as well as bioavailability might account for micronutrient deficiencies in this study.

The focus group discussion revealed agreement of anaemic pregnant women about consuming "good-food", "nutritious-food" or "food contained of vitamin" although not accompanied with sufficient knowledge. In Burkina Faso, Egypt, Ethiopia, India, Kenya, and Tanzania, pregnant women also recognized the importance of intake vitamins and quality of diet (consuming vegetables, fruits, meat, fish, eggs, and milk), yet this knowledge did not always translate into practice, often due to the financial capacity of the household.[21]

The neighbourhood shop was believed as reliable market to access foodstuff to be cooked for daily menu and preferred to access by walking (to prevent expenses). Contextual factors such as the availability of food retail outlets have been hypothesized to affect women's nutrition by limiting her food options.[22] Pregnant women in China also access the market that much closer to their home which assumed as responsible to low food diversity in diary's products, seafood and vegetables consumption.[18] Study in USA suggested that a woman's food environment, as measured by distance to supermarkets, grocery stores, and convenience stores was associated with diet quality during pregnancy.[14] Local communities need to take a comprehensive look at the food resources available to their residents and inform public health, community and economic development policies.[14,22]

CONCLUSION

The anaemic pregnancy was identical with multi-micronutrient deficiencies. Perceived of having less information about micronutrient–rich food, high price of high quality-food, sufficiency varieties of foodstuff provided at neighbourhood shop are barriers to nutrient intake. It is clearly need to promote types of low-cost micronutrient-rich food to pregnant population.

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AUTHORS' CONTRIBUTION

PN: Conception of study. SP: Data Analysis. RS: Supervision and Review. RK: Draft paper and data analysis

TW: Revised paper and tool development
FA: Data interpretation and review

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