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THE RELATIONSHIP BETWEEN ENERGY, NUTRIENT INTAKE, AND OCCUPATIONAL STATUS WITH CHRONIC ENERGY DEFICIENCY (CED) IN PREGNANT WOMEN

Hubungan antara Energi, Asupan Gizi, dan Status Pekerjaan dengan Kekurangan Energi Kronis (KEK) pada Ibu Hamil

Meilinasari Meilinasari[1], Rosmida M. Marbun[1], Sa'diah M. Karina[1], Fairuz Dhia Rabbani[1], Gurid Pramintarto Eko Mulyo[2]
[1]Department of Nutrition, Poltekkes Kemenkes Jakarta II
[2]Department of Nutrition, Poltekkes Kemenkes Bandung
*Email: srmeilina07@gmail.com

ABSTRAK

Kurang Energi Kronis (KEK) adalah suatu kondisi pada ibu hamil dengan ukuran LILA kurang dari 23,5 cm. Terjadinya KEK dipengaruhi oleh asupan energi dan nutrisi, pengetahuan gizi, penyakit menular, pendapatan keluarga, jumlah anggota keluarga, pengendalian kehamilan, paritas, dan pemberian makanan tambahan (PMT). Menurut data Riskesdas 2018, prevalensi KEK pada ibu hamil di Kabupaten Banyumas mencapai 16,03 persen. Penelitian ini bertujuan untuk mengetahui hubungan antara asupan energi dan nutrisi dengan status pekerjaan terhadap kejadian CED pada ibu hamil di Kabupaten Sumbang. Penelitian ini menggunakan metode cross-sectional dengan 92 sampel yang dipilih melalui systematic random sampling. Data asupan energi dan nutrisi dikumpulkan dengan menggunakan food recall 3x24 jam, status pekerjaan dengan wawancara menggunakan kuesioner, dan data KEK untuk ibu hamil dengan mengukur LILA. Analisis menunjukkan bahwa sebagian besar wanita hamil (75-92%) memiliki asupan energi dan nutrisi yang tidak mencukupi (makro dan mikro, kecuali vitamin A). Sebagian besar wanita hamil (87%) tidak bekerja, dan 13% menderita CED. Analisis bivariat menunjukkan hubungan antara asupan energi (p=0,05) dan karbohidrat (p=0,034) dengan kejadian CED pada ibu hamil serta tidak ada hubungan antara protein, lemak, vitamin B1, vitamin A, asupan zat besi, dan status pekerjaan terhadap kejadian CED pada ibu hamil (p>0,05). Disimpulkan bahwa asupan energi dan karbohidrat terkait dengan CED pada ibu hamil. Peningkatan status gizi ibu hamil harus ditingkatkan dengan memanfaatkan pangan lokal serta edukasi gizi berkelanjutan.

Kata kunci: *asupan gizi, energi, ibu hamil, kekurangan energi kronis*

ABSTRACT

Chronic Energy Deficiency (CED) is pregnant women condition with Upper Arm Circumference (UAC) size of less than 23.5 cm. The occurrence of CED is influenced by energy and nutrient intake, nutritional knowledge, infectious diseases, family income, number of family members, pregnancy control, parity, and complementary feeding. According to the 2018 Riskesdas data, the prevalence of CED in pregnant women in the Banyumas District reached 16.03 percent. This study aimed to determine the relationship between energy and nutrient intake and employment status on the incidence of CED in pregnant women in the Sumbang District. This study used a cross-sectional method with 92 samples selected through systematic random sampling. Data on energy and nutrient intake were collected using a 3x24-hour food recall, employment status by interviewing using a questionnaire, and CED data for pregnant women by measuring UAC. The analysis showed that most pregnant women (75–92%) had insufficient intake of energy and nutrients (macro and micro, except for vitamin A). Most pregnant women (87%) do not work, and 13% suffer from CED. The bivariate analysis showed relationship between energy intake (p=0.05) and carbohydrates (p=0.034) with the CED incidence in pregnant

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women. The result showed there was no relationship between protein, fat, vitamin B1, vitamin A, iron intake, and employment status on the CED incidence in pregnant women (p>0.05). It was concluded that energy and carbohydrate intake were related to CED in pregnant women. Improving pregnant women's nutritional status should be improved by utilizing local food as well as sustainable nutrition education.

Keywords: *chronic energy deficiency, energy, nutrient intake, pregnant women*

INTRODUCTION

Chronic Energy deficiency (CED) is a condition of malnutrition that can occur during pregnancy and is caused by a long-term lack of energy[1]. This condition is characterized by an upper arm circumference of pregnant women less than 23.5 cm. Pregnant women who experience CED are at risk of experiencing a longer duration of labour (parturition) due to decreased muscle strength that helps the delivery process, severe bleeding after childbirth, and can even lead to maternal death. In a study by Ningrum and Puspitasari in Ciamis, as many as 4.3 per cent of pregnant women who experienced CED experienced premature delivery, and 11.4 per cent of mothers had to give birth by surgery[2].

In the study by Diana et al. in East Java, the nutritional status of pregnant women correlates with maternal, maternal and postpartum mortality[3].Apart from impacting mothers, SEZ conditions can also impact babies conceived and born, with risks of premature birth, congenital disabilities, low birth weight (LBW), and even neonatal death. In research by Ekowati et al. in Situbondo, East Java, it is known that SEZ conditions have a significant relationship and can increase the risk of mothers having babies with LBW babies[4]. CED can affect the growth and development of the fetus, including physical, brain, and metabolic growth which can increase the risk of contracting non-communicable diseases when growing up[5]. In addition to energy and nutrient intake, several factors influence the occurrence of CED in pregnant women, including knowledge about nutrition, infectious diseases, family income, number of family members, antenatal care, parity, and complementary feeding[6].

According to UNICEF, the causes of malnutrition, including CED, are divided into direct and indirect causes. The direct causes of CED conditions in pregnant women are insufficient intake of energy and nutrients and infectious diseases. Meanwhile, the indirect causes of SEZ include the availability of food at home to inadequate environmental hygiene and sanitation[7]. Based on data from the Total Diet Study in 2014, the average level of energy adequacy in adults aged 19-55 years in rural and urban areas in Central Java reached 75.4 percent with energy sufficiency of 73.4 per cent for the female population so that it is still included in the less category (70 - <100% AKE). The average protein adequacy level for adults aged 19-55 years in rural and urban areas in Central Java reaches 101.6 percent, with a protein adequacy of 97 percent for the female population, so it can be said that the protein intake of adult women aged 19-55 years in rural areas is sufficient. and urban Central Java is still lacking[8]. In research by Dictara et al., in Bandar Lampung, it was proven that energy and protein intake had a significant relationship with the incidence of CED[9]. Meanwhile, the intake of fat and carbohydrates for the female population in rural and urban areas of Central Java was 52.1 grams and 226.5 grams, respectively[8].

Regarding the intake of micronutrients, Apondi's research et al., in Kenya proved that vitamin A was significantly related to the nutritional status of pregnant women according to the *Upper Arm Circumference (UAC) measurement*[10]. Vitamin A plays an important role in the development of the embryo. Its requirements will increase in the third trimester due to the rapid growth of the fetus at this stage[11]. In Tomeys' research et al . in Central Sulawesi. It is proven that iron[12]. Iron is useful for the production of hemoglobin, which

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plays a role in the transfer of oxygen from the lungs to all body tissues. Regarding employment status, the results of Rafiani's research in 2020 show that there is a significant relationship between employment status and CED for pregnant women in the City of Banjarmasin[13].

On the one hand, mothers who work outside the home will have less time than mothers who do not work, so they tend not to pay attention to the food they consume[14]. However, working mothers can increase their knowledge due to wider social interaction and more experience than mothers who do not work and stay at home. This knowledge and experience can influence the type and amount of food pregnant women consume. Basic Health Research data shows that the prevalence of CED in pregnant women in Indonesia reaches 17.3 percent [15]. The percentage of incidence of CED in pregnant women in Central Java Province reached 20.0 percent, while the prevalence in Banyumas Regency reached 16.03 percent [15]. Based on the 2021 Performance Report of the Ministry of Health, the prevalence of CED in pregnant women in Indonesia fell to 8.7 per cent, with the prevalence in Central Java Province reaching 6.7 percent. According to the WHO public health threshold, the problem of CED in pregnant women in Indonesia is still included in the moderate category of public health problems with a prevalence range of 5 - 9.9 percent [16].One of the strategic goals in the National Medium-Term Development Plan (RPJMN) 2020 – 2024 is to improve maternal and child health, which is translated into the Strategic Plan of the Ministry of Health by reducing the number of maternal deaths per live birth and cases of Chronic Energy Deficiency (CED) related to community nutrition[17]. These two goals were set due to the still high number of maternal deaths in Indonesia, which reached 7,389 deaths in 2021 and was the highest in Southeast Asia[18]. The purpose of this study was to determine the relationship between energy and nutrient intake, both macro and micro, as well as the mother's employment status with the incidence of CED in pregnant women in Sumbang District, Banyumas Regency, Central Java Province

METHODS

This quantitative study used a descriptive observational design and a *cross-sectional approach*. This approach aims to study the relationship between the incidence of CED, energy and nutrient intake, and the employment status of pregnant women in Sumbang District. The research was conducted in the Sumbang District area, Banyumas Regency, Central Java Province, Indonesia on April 23-28, 2018. The sample in this study was pregnant women living in the Sumbang District area, totalling 92 people. Samples were obtained using a *systematic random sampling method* which was taken randomly by following systematically, such as the distance of the order in which the samples were taken. This research was conducted ethically, with approval obtained from the Ethics Committee of the Politeknik Kesehatan Jakarta II (No. LB/02.01/I/KE/31/205/2018).

The independent or independent variables in this study were the intake of energy and nutrients, both macro and micro and the employment status of pregnant women. The macronutrients included include protein, fat, and carbohydrates, while the micronutrients discussed in this study included the intake of vitamin B1, vitamin A, and iron (Fe). This study's dependent or dependent variable is the incidence of CED in pregnant women. Sample characteristics include age, parity, and education level of pregnant women. Data on the age of pregnant women is divided into groups less than 20 years, groups 21-25 years, groups 26-30 years, and groups more than equal to 31 years. Parity data is the number of living children or the number of pregnancies that can reach the stage of giving birth to babies who can live outside the womb and are divided into parity groups 0 (nullipara), 1-2 children (primipara and multipara), and ≥ two children (multipara). The education level of pregnant women is divided into elementary school groups (graduated and not graduated), junior high school and high school and above. Energy and nutrient

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intake data were collected using a standardized form of 3x24 hour *food recall interviews*. The intake data is then compared with the 2019 RDA and is grouped into a poor category if <80 per cent of the Adequacy Nutritional Rate (RDA), enough if the intake reaches 80-110 per cent of the RDA, and more if the intake is more than 110 percent of the RDA.

Data on the employment status of pregnant women were obtained through direct interviews with pregnant women, and the results were grouped into groups of women who did not work and women who worked. Data on Chronic Energy Deficiency (CED) incidence were obtained by measuring pregnant women's upper arm circumference. Pregnant women are said to have CED if their LILA size is less than 23.5 cm. The research data were analyzed by univariate and bivariate analysis. From the univariate analysis, the results were obtained in the form of a percentage of each group for each variable, both independent and dependent variables. Bivariate analysis was performed using the *chi-square* and *Fischer's exact tests* to see whether there was a significant relationship between the independent and dependent variables

RESULT

Table 1. Sample Characteristics

Characteristics	n	%
Age		
<20 years	9	9,8
21 – 25 years	26	28,3
26 – 30 years	28	30,4
≥ 31 years	29	31.5
Parity		
0	19	20,7
1 – 2 children	67	72,8
>2 children	6	6,5
Level of education		
S.D. (Graduated & Not Completed)	3	3,3
junior high school	49	53,3
high school and above	40	45.5
Total	92	100

Based on Table 1 which contains the characteristics of the sample, the largest age group is the age group ≥ 31 years with 29 people in the sample (31.5%), followed by the age group 26 – 30 years with 28 people (30.4%), the age group 21 – 25 years with 26 people (28.3%), and the age group <20 years with 9 people (9.8%). Based on maternal parity, most of the 67 samples (72.8%) had given birth to 1-2 children who could live outside the womb, 19 samples (20.7%) had never given birth or were also called nulliparas, and 6 the sample (6.5%) had given birth to more than 2 children who could live outside the womb. Of the 92 samples, more than half or 49 samples (53.3%) had education up to the junior or junior high school level, followed by 40 samples (45.5%) who had equivalent education and above senior high school, and 3 samples (3.3%) had primary school level education, either passed or failed.

Table 2 showed the distribution of energy and nutrient intake data, occupational status, and the incidence of CED in pregnant women in Sumbang District. Based on the energy adequacy of the sample, most or 85 samples (92.4%) had insufficient energy intake (<80% RDA) and only 7 samples (7.6%) had adequate energy intake (>80% RDA). Most or 73 people in the sample (79.3%) had insufficient protein intake (<80% RDA) and 19 people (20.7%) had sufficient protein intake (≥80% RDA). Of the 92 samples, 70 of them (76.1%) had fat intake which was classified as lacking (<80% RDA) and 22 samples (23.9%) had sufficient fat intake (≥80% RDA). Based on data on carbohydrate intake, 81 samples (88%) had insufficient carbohydrate intake (<80% RDA)

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and only 11 samples (12%) had sufficient carbohydrate intake. In terms of vitamin intake, 83 samples (90.2%) were classified as having insufficient intake of vitamin B1 and 9 samples (9.8%) had sufficient intake of vitamin B1. In addition, more than half or 64 people in the sample (69.6%) had sufficient intake of vitamin A and 28 people in the sample (30.4%) had insufficient vitamin intake. In terms of mineral intake, most of the 84 samples (91.3%) had insufficient iron intake and only 8 samples (8.7%) had sufficient iron intake. Based on data on the employment status of pregnant women, most of the mothers or 80 samples (87%) did not work and had the status of housewives (IRT), while 12 pregnant women (13%) worked outside the home. Based on the results of LILA measurements of pregnant women, the majority or 80 pregnant women (87%) have normal nutritional status and 12 mothers (13%) fall into the category of Chronic Energy Deficiency (CED).

Table 2. Distribution of Energy and Nutrient Intake, Employment Status, and Incidence of Chronic Energy Deficiency (CED) among Pregnant Women in Sumbang District

Variable	n	%
Energy Intake		
Not enough	85	92.4
Enough	7	7,6
Protein Intake		
Not enough	73	79.3
Enough	19	20,7
Fat Intake		
Not enough	70	76,1
Enough	22	23,9
Carbohydrate Intake		
Not enough	81	88.0
Enough	11	12.0
Intake of Vitamin B1		
Not enough	83	90,2
Enough	9	9,8
Vitamin A Intake		
Not enough	28	30,4
Enough	64	69,6
Iron Intake		
Not enough	84	91.3
Enough	8	8,7
Job status		
Doesn't work	80	87.0
Work	12	13.0
Incidence of Chronic Energy Deficiency (SEZ)		
Chronic Energy Deficiency (SEZ)	12	13.0
Normal (Not CED)	80	87.0
Total	92	100

The results of the analysis of the relationship between variables are shown in Tables 3 and 4. Analysis using the Fischer exact test in Table 3 showed that there was a significant or significant relationship between energy intake (p=0.005) and carbohydrate intake (p=0.034) with the incidence of CED in pregnant women in Subdistrict Sumbang marked p value <0.05. However, there was no significant relationship between protein intake (p=0.707), fat intake (p=0.471), vitamin B1 intake (p=1.000), vitamin A intake (p=0.333), and iron intake (p=0.279) with the incidence of CED in the sample marked with a value of p> 0.05. In table 4, it is shown that there was no significant relationship

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between the mother's employment status and CED for pregnant women in Sumbang District with p=0.354 (p>0.05).

Table 1 Distribution of Energy and Nutrient Intake based on SEZ Occurrences in Pregnant Women in Sumbang District

Intake	CED incidence in pregnant women				Total		p-value
	CED		Normal				
	n	%	n	%	n	%	
Energy Intake							
Not enough	8	9,4	77	90.6	85	100	0.005
Enough	4	57,1	3	42,9	7	100	
Protein Intake							
Not enough	9	12,3	64	87.7	73	100	0.707
Enough	3	15,8	16	84,2	19	100	
Fat Intake							
Not enough	8	11,4	62	88.6	70	100	0.471
Enough	4	18,2	18	81.8	22	100	
Carbohydrate Intake							
Not enough	8	9,9	73	90,1	81	100	0.034
Enough	4	36,4	7	63,6	11	100	
Intake of Vitamin B1							
Not enough	11	13,3	72	86.7	83	100	1,000
Enough	1	11,1	8	88.9	9	100	
Vitamin A Intake							
Not enough	2	7,1	26	92.9	28	100	0.333
Enough	10	15,6	54	84.4	64	100	
Iron Intake							
Not enough	10	11,9	74	88.1	84	100	0.279
Enough	2	25.0	6	75.0	8	100	

Relationships were analyzed using Fischer's exact test
The relationship is significant if the p-value <0.05

Table 2Distribution of Occupational Status with SEZ Occurrences among Pregnant Women in Sumbang District

Job status	CED incidence in pregnant women				Total		p-value
	CED		Normal				
	n	%	n	%	n	%	
Doesn't work	12	15.0	68	85.0	80	100	0.354
Work	0	0.0	12	100.0	12	100	

Relationships were analyzed using Fischer's exact test
The relationship is significant if the p-value <0.05

DISCUSSION

The results of this study indicate that 92.4 percent and 79.3 percent of the sample of pregnant women have energy and protein intake which are classified as deficient. The results of another study by Hendrayatna on pregnant women visiting the Baros Health Center , Serang Regency stated that 58.8 percent of the sample had insufficient energy intake (<80% requirement) and 91.2 percent of pregnant women had insufficient protein intake (<80% requirement [19]. The energy of pregnant women will increase as needed to meet the energy needs of the growing fetus [20]. Apart from ensuring that the fetus grows and develops properly, this increased need is also due to the physiological changes in the body of pregnant women who are ready to give birth and breastfeed. This is evidenced by an increase in the adequacy of energy and other nutrients according to the trimester of pregnancy in the 2019 RDA. In the first trimester, additional energy requirements are 180 kcal and 300 kcal in the second and third trimesters [21]. Lack of protein intake during pregnancy is known to cause embryonic death, limited fetal growth,

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and decreased growth after birth due to deficiency of certain amino acids needed for cell metabolism and function [22]. On the one hand, in the first trimester, the obstacle to meeting these additional needs that often occurs is gastrointestinal symptoms such as nausea and vomiting which reduce appetite and intake.

In this study, 76.1 percent of pregnant women had low fat intake (<80% RDA) and 88 percent of women had low carbohydrate intake (<80% RDA). The results of Ranijah 's research on pregnant women at the Multiwahana Health Center in Palembang showed that 51.1 percent of pregnant women had low fat intake and 62.2 percent of pregnant women had low carbohydrate [23]. Triglycerides and cholesterol are types of fat found in food. Triglycerides and cholesterol during pregnancy play an important role in maintaining pregnancy and fetal growth. Cholesterol is used to build cell membranes in the placenta and acts as a precursor to bile and steroid hormones for the developing fetus. In a study in China, there were indications that adequate fat[24]Carbohydrates function as fuel to carry out the metabolic functions of the mother's and fetus' bodies. Restricting carbohydrate intake during pregnancy can increase fat intake which increases saturated fat levels and insulin resistance. Excessive lipid exposure during pregnancy is associated with fetal growth and excess fetal adipose tissue, it is a risk factor for obesity in children and metabolic diseases[25].

In addition to macronutrients, this study also discusses the intake of micronutrients, namely vitamins and minerals. The results of this study indicate that 90.2 percent of pregnant women have inadequate intake of vitamin B1 and 69.6 percent of pregnant women have sufficient intake of vitamin A. Deficiency of vitamin B1 during pregnancy can affect the neurochemistry of the fetus and the cognitive development of the child in the future [11]. Regarding vitamin A intake, the results of Kusumawati's research et al . of pregnant women in Petobo, South Palu showed that the average intake of vitamin A for pregnant women only reached 575.6 mg (<80% RDA)[26]. Vitamin A deficiency can cause early fetal death, congenital defects, retarded fetal growth, increased risk of insulin resistance as an adult, increased risk of hearing loss, and the risk of schizophrenia[11]. This study showed that as many as 91.3 percent of the pregnant women studied had insufficient iron intake (<80% RDA). The results of research by Kusumawati and Rahardjo on pregnant women in Banyumas, Central Java showed that 93.4 percent of pregnant women had iron [27]. Adequate iron[28].

In this study, most or 87.0 percent of pregnant women did not work or had the status of housewives (IRT). Results on another study by Auliana et al., on pregnant women in the provinces of Papua and West Papua shows that 73.3 percent of pregnant women do not work [14]. Pregnancy can be a hindrance at work considering there are several symptoms that can interfere with concentration and comfort at work such as nausea and vomiting, fatigue, and frequent urination. Pregnant women are advised to avoid working conditions such as exposure to hazardous materials, standing for long periods of time, lifting heavy objects, excessive noise, and extreme temperatures such as too hot or too cold.

Energy intake variable has a significant relationship with the incidence of CED in pregnant women. Similar results were shown in Hendrayatna's study of pregnant women at the Baros Health Center, Serang Regency, namely that there was a significant relationship between energy intake and the incidence of CED in pregnant women[19]. In Megauleng's research et al., on pregnant women in the working area of the Bunggoro Health Center, South Sulawesi, different results were shown, namely that there was no significant relationship between energy intake and the incidence of CED in pregnant womenThis difference can be attributed to the relatively large difference in the number of samples, namely this study using twice the number of samples compared to the comparative study and differences in intake data collection methods in the study at the Bungoro Health Center , South Sulawesi Province, which only used a 2x24 hour *recall ,*

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while This study used a 3x24 hour *recall* which better describes the average daily energy intake of pregnant women. Lack of energy intake when compared with the need for a prolonged period not only increases the risk of CED in pregnant women, but also the risk of LBW [29].

Based on the results of the analysis, it was shown that the protein intake variable did not have a significant relationship with the incidence of CED in pregnant women in Sumbang District. Almost similar results were shown in research by Wiyono et al., on pregnant women at Kemranjen, Banyumas, that is, there is no significant relationship between protein intake and the incidence of CED in pregnant women [1]. In Dictara's research et al. in the working area of the Sukaraja Health Center, Bandar Lampung City, different results were shown, namely that there was a significant relationship between protein intake and CED in pregnant women [9]. intake data with research in Bandar Lampung using the SQ-FFQ questionnaire and 3x24 hour *food recall* for research in Sumbang District. The 3x24 hour *food recall* method can better describe the average daily protein intake of pregnant women, while the FFQ method only describes the pattern of protein intake of pregnant women[9].

In this study, fat intake was shown to have no significant relationship with the incidence of CED in pregnant women in the Sumbang District area. Similar results were shown in Ranijah 's study of pregnant women at the Palembang Multiwahana Health Center, namely that there was no significant relationship between fat intake and CED in pregnant women[23]. However, in Prasetyo's study in North Pontianak District on pregnant women, different results were shown, namely that there was a significant relationship between fat intake and the incidence of CED in pregnant women [30]. This difference could be due to differences in the frequency of *food recalls* which was conducted with research in North Pontianak which only used 1x24 hour *recall* . This does not reflect the mother's overall intake considering that energy and nutrient intake will change every day. In addition to the amount of fat consumed, pregnant women should also pay attention to the type of fat consumed, bearing in mind that there is a relationship between saturated fat intake during pregnancy and the percentage of body fat mass of the baby at birth, which is a factor influencing the occurrence of insulin resistance as an adult [31].

In a study of pregnant women in Sumbang District, there was a significant relationship between carbohydrate intake and the incidence of CED in pregnant women. Almost similar results were shown in Hermadani 's study of pregnant women in the working area of the Public Health Center Gorang Gareng, Magetan that carbohydrate intake has a significant relationship with CED in pregnant women [32]. However, in Dictara et al . in the Sukaraja Health Center area, Bandar Lampung City, different results were shown, namely there was no significant relationship between carbohydrate intake and the incidence of CED in pregnant women[9]. intake data collection method factor that has been described related to protein intake, there are certain criteria in the study of pregnant women in Bandar Lampung, namely that pregnant women as samples must be in the first and second trimesters while research on pregnant women in Sumbang District is carried out in the first and second trimesters. one through the third trimester. In addition to having an impact on fetal development, consumption of a low-carbohydrate, high-protein, and high-fat diet during pregnancy has been shown to be associated with an increased risk of allergic events in infants up to 2 years of age[33].

In this study, there was no significant relationship between vitamin B1 and vitamin A intake with the incidence of CED in pregnant women. Vitamin B1 plays an important role in delivering energy to nerve cells to produce nucleic acids, *myelin*, and *neurotransmitters* both in the mother and fetus as well as in energy metabolism by being one of the cofactors in the process of ATP production, namely the coenzyme of pyruvate dehydrogenation process[34]. These results prove that vitamin A intake is not related to

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the nutritional status of various groups, both pregnant women and young women. However, different results were shown in Othoo's research et al . on the nutritional status based on LILA of pregnant women in Kenya that there is a significant relationship between intake of vitamin A and the nutritional status of pregnant women according to LILA [10]. This difference can be caused by differences in environmental conditions between the two places, namely, Kenya on the African continent and Indonesia on the Asian continent and differences in intake data collection methods, namely using a semi-structured questionnaire for research in Kenya and a standardized *food recall questionnaire* for research in Indonesia. Vitamin A is known to play an important role in the formation of fetal vision health and maintaining maternal vision health which is less related to the incidence of CED in pregnant women [11].

The results of this study indicate that there is no significant relationship between iron intake and the incidence of CED in pregnant women. Similar results were shown in a study by Kurniasari et al. on pregnant women in the city of Semarang, that is, there is no significant relationship between iron. However, in the study by Tomeys et al. of pregnant women in Labuan, Central Sulawesi, the results showed that there was a significant relationship between iron [12]This difference is caused by differences in the method of collecting food intake used, namely the use of a combination of *food recall* and semi-quantitative FFQ for the study in Labuan while this study only used 3x24 hour *food recall.* Lack of iron intake can cause iron deficiency with feeling weak and tired as one of the signs. This feeling of weakness and fatigue can cause reduced activity and reduced use of energy for activities so that it can cause weight gain due to negative energy balance. In addition to these effects, iron deficiency can also cause the thyroid gland to become underactive leading to weight gain due to slower metabolism [35]. Weight gain will have an impact on the size of a person's arm circumference.

It is known that the employment status variable has no significant relationship with the incidence of CED in pregnant women in Sumbang District. Similar results were shown in research by Auliana et al. on pregnant women in the provinces of Papua and West Papua, that is, there is no significant or significant relationship between work status and nutritional status based on LILA for pregnant women[14]. However, the results of this study are different from those of Rafiani's research et al. in the Sei Mesa Health Center, Banjarmasin City, namely there is a significant relationship between employment status and the incidence of CED in pregnant women[13]. This difference could be due to differences in sources of information summarized in the study in Banjarmasin, but did not become a variable in the study in Sumbang District. In addition, the large number of samples belonging to the at-risk category (≥ 35 years), up to 41.6 percent compared to only 31.5 percent in the study in Sumbang District, could also be a factor contributing to the difference in the results of the study.

CONCLUSION

The research results on pregnant women that have been carried out, it can be concluded that there is a significant or significant relationship between energy and carbohydrate intake and the incidence of CED in pregnant women in Sumbang District. However, no meaningful or essential relationship exists between the intake of other nutrients (protein, fat, vitamin B1, vitamin A, and iron) and employment status on the incidence of CED in pregnant women in Sumbang District. Intake of energy and nutrients, except for vitamin A, is still less than the RDA, and most pregnant women do not work.

It is necessary to form a class for pregnant women to provide nutrition education in terms of increasing intake of energy and nutrients as well as monitoring of pregnancy health by health workers by involving Integrated Healthcare Center cadres to motivate pregnant women to meet their intake of energy and nutrients through the use of local food ingredients.

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