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Determinants of Chronic Energy Deficiency (CED) in Pregnant Women in the Lere Health Center Working Area, Palu City in 2021-2023

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A B S T R A C T

Chronic energy deficiency (CED) in pregnant women has an impact on the fetus in the womb. Data on pregnant women with KEK cases in Palu City ranks third with 985 (12.74%). Lere Health Center is ranked eighth, with the number of CED pregnant women of 64 people (10.47%) in 2022 and 48 people (39.3%) in 2023. This research aims to determine the Determining Factors of Chronic Energy Deficiency (CED) in Pregnant Women in the Lere Community Health Center Working Area, Palu City. 2021-2023. The research method used a case-control design with a retrospective approach and was carried out at the Lere Community Health Center, Palu City. The population of all pregnant women in 2021-2023 is 314 people. The sample was 172, divided into 86 cases (CED) and 86 controls (not CED). The sampling technique uses purposive sampling. The research uses secondary data from medical record books: univariate and bivariate data analysis using the chi-square test. Based on bivariate analysis, the study results showed that maternal age and education factors were unrelated to the incidence of CED in pregnant women, with a p-value of 0.197 and 0.130, respectively. In contrast, the factors of parity and maternal HEG condition were related to the incidence of CED with p-values of 0.004 and, respectively. 0.001. The conclusion is that the determinants of chronic energy deficiency in pregnant women in the Lere Community Health Center work area are the Parity factor and HEG Condition. It is recommended that the Community Health Center provide education regarding the factors that can cause CED in pregnant women.

Introduction

Chronic energy deficiency (CED) in pregnancy is when pregnant women experience malnutrition, especially in terms of energy and protein, which lasts for a long time and causes health problems during pregnancy. This is characterized by a LILA size < 23.5, which is caused by poor quality nutritional intake consumed by pregnant women (Simbolon et al., 2018). Chronic energy deficiency in pregnant women will have an impact on the fetus, namely the occurrence of Intrauterine Growth Retardation (IUGR), abortion, low birth weight, premature babies, birth defects, the short physical growth of toddlers (stunting), and even death (Bakri & Sri, 2021). Meanwhile, in mothers, it can cause death during childbirth indirectly because it reduces the strength of the muscles that help with childbirth, resulting in bleeding, prolonged labor, and infection (Amil, 2022).

The World Health Organization (WHO, 2018) reports that the prevalence of anemia and Chronic Energy Deficiency (CED) in pregnancy globally ranges from 35-75% (Noviana Sari et al., 2023). In developing countries such as Bangladesh, India, Indonesia, Myanmar, Nepal, Sri Lanka, and Thailand, the prevalence of CED ranges from 15-47% (Alwan et al., 2023). The prevalence of CED a

mong Indonesian women of childbearing age (WUS) aged 15 to 19 is 33.5% for pregnant women and 36.3% for non-pregnant women, per Riskesdas statistics (2018). In contrast, the prevalence of CED in women aged 45–49 was found to be 11.1% in pregnant women and 6% in non-pregnant women (Balitbangkes RI, 2018). The incidence of CED among pregnant women in Indonesia has varied over the past five years, ranging from 17.3% in 2018 to 17.9% in 2019, 9.7% in 2020, 8.7% in 2021, and 8.41% in 2022, according to the Ministry of Health's annual report. Based on these data, it can be said that during the past five years, the prevalence of CED in pregnant women has fluctuated. The 2022 prevalence of CED among pregnant women in Indonesia (8.41%) falls into the intermediate level (5–9.9%) as compared to WHO health targets (Kemenkes, 2022).

Central Sulawesi Province Health Profile data (2022) shows that 64,849 pregnant women and 8,131 experienced CED. Palu City is in third place with the number of CED pregnant women, namely 985 or (12.74%), and Parigi Moutong Regency is in first place with CED pregnant women, 1,493 (Dinas Kesehatan Provinsi Sulawesi Tengah, 2022). Based on data from the Palu City Health Office (2022), of the 7,774 pregnant women in Palu City, 985 CED pregnant women (12.74%) have increased compared to 2021. Of the 7,818 pregnant women in Palu City, 949 are CED pregnant women (12.14%). Lere Health Center is in eighth place with a number of pregnant women as many as 516, and there are 64 pregnant women with CED (10.47%) in 2022 in 2023, the number of pregnant women will be 122, there will be 48 pregnant women who experience CED (39.3%) (Dinkes Kota Palu, 2023).

Factors contributing to the incidence of CED in pregnant women vary, including maternal age, education, parity, and hyperemesis gravidarum (Wubie et al., 2020). This multifaceted influence collectively contributes to the prevalence of CED incidence in pregnant women (Erna K. Wati, Retno Murwani, 2024). Age can increase the risk of CED. Pregnant women under 20 tend to have high nutritional needs because their bodies are still in the growth period. This often leads to competition between maternal and fetal growth nutritional needs, so there is a risk of CED. At the same time, mothers > 35 years old begin to decline the body's ability to absorb and utilize nutrients, thus increasing the risk of CED. Previous research has shown a significant relationship between maternal age and the incidence of CED (Andini, 2020). This is in line with research conducted by Silfia et al. (2020), stating that there is a relationship between age, family income, and parity in the incidence of chronic energy deficiency in pregnant women at the Lariang Health Center in 2020 (Silfia et al., 2022).

The level of education of pregnant women also plays a very important role. The higher a pregnant woman's education, the better her knowledge. However, if a pregnant woman's knowledge is low, it will affect the mother's ability to obtain sufficient information about her health. Apart from that, one of the causes of CED is mothers who are pregnant too often (Parity) because too many pregnancies can deplete pregnant women's nutritional reserves, and the reproductive organs are not yet as perfect as they were before pregnancy, so nutritional deficiencies can occur (Balkis Fitriani Faozi, 2022). Previous studies have shown a significant association between parity and the incidence of CED in pregnant women (Humairoh, M., Hamid, S. A., & Amalia, 2023). Another cause of CED is hyperemesis gravidarum, where a pregnant woman experiences nausea and vomiting > 10 times (1 x 24 hours), which causes the

pregnant woman to become dehydrated and even causes electrolyte disturbances and weight loss. (Nena Muryani, Eka Afrika, 2022).

The above theory is in line with research by Muryani, Eka Afrika (2022) at the Danu Mulya Community Health Center, Pulau Rimau District, Banyuasin Regency, that there is a relationship between education, knowledge, diet, and Hyperemesis Gravidarum on the incidence of chronic energy deficiency in pregnant women (Nena Muryani, Eka Afrika, 2022). Based on the study results above, researchers are interested in knowing the determinants of chronic energy deficiency in pregnant women in the Lere Health Center work area, Palu City, in 2021-2023.

Method

Type of Research This is quantitative research with a case-control study design and a retrospective approach. This research was conducted at the Lere Health Center, Palu City, in May 2024. The dependent variables in this study were the incidence of chronic energy deficiency in pregnant women, and independent variables included education, parity, maternal age, and hyperemesis gravidarum. The population in this study is all pregnant women at the Lere Health Center in 2021-2023, totaling 314 people. The sample in this study is 172, which are divided into two groups, namely the case sample (pregnant women with CED), totaling 86 people, and the control sample (pregnant women without CED), totaling 86 people, with a ratio of 1:1. Sampling technique uses Purposive sampling with inclusion criteria for pregnant women that are recorded in complete register/medical record books and pregnant women who are recorded to have routine examinations at the Lere Health Center while the exclusion criteria are that pregnant women are recorded to have complications that can affect nutritional status such as gestational diabetes, chronic hypertension or preeclampsia, medical records of pregnant women who only do one visit (not detected as routine patients). The research used secondary data sourced from KIA register books, cohorts, and medical records at the Lere Health Center in Palu City. The instrument in this study used a format containing the mother's name, age, parity, education level, and hyperemesis gravidarum condition. The data analysis in this study uses univariate data analysis and bivariate data analysis using the chi-square test.

Ethical approval for this research was obtained from the Palu Health Research Ethics Commission.
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Results

The results of this study present data regarding the research variables, namely education, parity, maternal age, Hyperemesis Gravidarum (HEG) condition and the incidence of CED in Table 1 shows that, of the 172 respondents in this study, the maternal age of most of the respondents was not at risk (aged 20 - 35 years), namely 114 respondents (66.3%), with secondary education (SMA), 101 respondents (58.7%).), were in their second pregnancy (multiparous) or more, 112 respondents (65.1%)

experienced Hyperemesis Gravidarum, 88 respondents (51.2%) and the incidence of CED was 50% experienced CED, and 50% did not.

Table 1. Frequency Distribution of Maternal Age, Education, Parity, HEG In Pregnant Women

Variable		Frequency	Percentage (%)
Mother's Age			
	No risk	114	66,3
	Risky	58	33,7
Education			
	Tall	57	33,1
	Intermediate	101	58,7
	Base	14	8,2
Parity			
	Primigravida	60	34,9
	Multigravida	112	65,1
HEG			
	Did not Experience	84	48,8
	Experience	88	51,2
CED incident			
	Non-CED	86	50
	CED	86	50
Total		172	100

The statistical test using chi-square aims to determine the occurrence of chronic energy deficiency in pregnant women. The details are presented in table 2 below:

Table 2. Determinants of Chronic Energy Deficiency (CED) in Pregnant Women in the Lere Community Health Center Working Area

Variable		Pregnant Women				*p-value*
		Control (Non CED)		Case (CED)		
		n	%	n	%	
Mother's Age						
	No risk	53	61,6	61	70,9	0,197
	Risky	33	38,4	25	29,1	
Education						
	High	34	39,5	23	26,7	
	Moderate	44	51,2	57	66,3	0,130
	Low	8	9,3	6	7,0	
Parity						
	Primigravida	21	24,4	39	45,3	0,004
	Multigravida	65	75,6	47	54,7	
HEG						
	Did not Experience	61	70,9	23	26,7	0,001
	Experience	25	29,1	63	73,3	
Total		**86**	**100**	**86**	**100**	

Based on Table 2, it shows that the age of pregnant women with the most SEZs is at risk age (70.9%), the most educational factors are moderate/secondary education (66.3%), the highest parity is multigravida (54.7%) and mothers with hyperemesis gravidarum (73.3%). Meanwhile, based on the Chi-Square test results, the factors related to the incidence of CED in pregnant women are the Parity Factor with a p-value (of 0.004) and the HEG factor with a p-value (0.001). Meanwhile, the age factor of the p-value (0.197) and the maternal education factor of the p-value (0.130) were unrelated to the incidence of CED in pregnant women.

Discussion

The analysis results show that age is unrelated to the incidence of Chronic Energy Deficiency (CED), with the chi-square test results showing a significance of p = 0.197. This is in line with a meta-analysis study, which stated that research also found no relationship between age and the incidence of chronic energy deficiency (CED) (Sumiati et al., 2020). This may be due to information technology advances, which have made information easier to obtain. Even though pregnant women are young or older, pregnant women can get a lot of health information to prevent chronic energy deficiency. Consultation services and questions regarding health information can be obtained easily online without having to meet directly with health workers. Today's technological advances also make it possible to provide food sources and supplements that can improve nutritional status so that SEZ conditions do not occur.

Several published research results have shown a correlation between maternal age and chronic energy deficiency (CED) incidence. Research conducted at the Lariang Community Health Center found a significant relationship between the age of pregnant women and CED (Silfia et al., 2022). Likewise, research at the Simpang Limbur Community Health Center, Jambi, on 31 pregnant women found the same thing (Rosita & Rusmimpong, 2022). Physically and psychologically, many pregnant women aged < 20 years are not ready to face pregnancy. This age is still a period of growth and development in young adulthood, which also requires nutrition. During pregnancy, food competition occurs between the fetus and the mother. (Rosita & Rusmimpong, 2022; Silfia et al., 2022). Meanwhile, pregnant women over 35 years old tend to experience anemia due to the influence of decreasing iron reserves in the body due to the fertilization period (Silfia et al., 2022). Pregnant women are busy taking care of their family and children, some of whom may still be toddlers, so inadequate nutrition and rest can also cause risks if pregnancy occurs at the age of over 35 years (Rosita & Rusmimpong, 2022).

The statistical test results in this study did not show a relationship between education and the incidence of Chronic Energy Deficiency (CED). This is in accordance with research conducted by Olivia et al., which showed that there was no meaningful relationship between the level of education of pregnant women and the incidence of CED (Hasanah et al., 2023; Prasetyo et al., 2023).

Several studies are in line with the results of this research. Research conducted in Sukabumi, West Java (Auranissa et al., 2024). Likewise, research was conducted in Siak Kecil District, Bengkalis Regency, on pregnant women at the Lubuk Muda Community Health Center (Ervinawati et al., 2019).

Women's knowledge plays an important role in decision-making and subsequent behavior. Knowledge can be influenced, among other things, by age, educational background, experience, and employment (Triyawati & Yuliani, 2023). Adequate education will be directly proportional to good knowledge. The higher the education, the easier it is for a person to receive information, so the more knowledge the individual has, and vice versa. Research on pregnant women in the Balen Bojonegoro Health Center Area (Triyawati & Yuliani, 2023). and research at the Lam Hasan Community Health Center, Peukan Bada District, Aceh Besar Regency, found that low-educated pregnant women had a 13.2 times greater chance of experiencing CED than those with higher education (Husna et al., 2020).

Research at the Pekutatan Jembrana Bali Community Health Center even shows that pregnant women with low education are 2.5 times more likely to suffer from malnutrition compared to pregnant women with higher education. (Fibrila et al., 2023).

Education allows mothers to understand information related to nutritional needs during pregnancy (Yanti et al., 2023). Mothers with education tend to know better about the importance of healthy eating patterns, iron supplementation, and CED prevention (Majidah et al., 2021; Prasetyo et al., 2023). In this study, most pregnant women had secondary education, which provided an adequate knowledge base for pregnant women to understand the importance of nutritional intake, such as calories, protein, and iron needed during pregnancy. Nowadays, knowledge does not always come from education. In this digital era, access to information can be obtained from various media. Research has shown that the level of knowledge among pregnant women is strongly influenced by the environment and the availability of information (N et al., 2023). In addition, using tools such as the Maternal and Child Health (MCH) book has proven effective in increasing knowledge about pregnancy care, regardless of a woman's education level (Yonni Siwi et al., 2023).

Parity refers to the number of times a woman gives birth to a fetus with a gestational age of 24 weeks or more, regardless of whether the child was born alive or stillborn (Fibrila et al., 2023; Safitri et al., 2023). The chi-square test showed a significant relationship between parity and CED ($p = 0.004$). These findings indicate that pregnancy needs serious attention because it can affect the nutritional status of pregnant women, which has the potential to affect the health of the mother and fetus.

This is in line with several existing studies which show that higher parity is associated with an increased risk of Chronic Energy Deficiency (Fibrila et al., 2023; Safitri et al., 2023). Multigravid women may also face challenges in maintaining adequate nutrient intake and absorption, which is important for preventing CED during pregnancy. Repeated pregnancies can also deplete the body's nutritional reserves, thereby contributing to malnutrition (Angkasa & Iswarawanti, 2021).

There is also research at the Ketapang Inpatient Health Center that shows that there is no relationship between parity and the incidence of Chronic Energy Deficiency. (Fauziah & Febriyanti, 2023). This study groups parity into a risk group (having > three children) and a non-risk group (having ≤ 3 children). This is linked indirectly to the economic condition of the family, where the higher the mother's parity, the higher her economic needs, and this will influence food consumption patterns, ultimately impacting the pregnant woman's nutritional status.

Women with high parity tend to have irregular or unbalanced eating patterns due to busyness and increased responsibilities due to having more children. They also have a shorter recovery time between pregnancies, which can cause fatigue and worsen overall health (Puspitasari et al., 2023). Every pregnancy requires adequate nutritional intake to support fetal growth and development. If a woman has multiple pregnancies, the need for additional nutrition and support increases, which can lead to decreased nutritional quality or lack of energy during pregnancy (Jouanne et al., 2021). This is in line with research by Utami et al. (2023), who found a relationship between age and parity and the incidence

of CED in pregnant women in the working area of the Gaji Community Health Center in 2022 (Utami et al., 2023).

Hyperemesis gravidarum can have a profound impact on the nutritional status of pregnant women, potentially affecting the health of the mother and fetus. The results of the analysis show that pregnant women with hyperemesis gravidarum (HEG) have a higher prevalence of Chronic Energy Deficiency (CED) compared to pregnant women without HEG. The chi-square test results show a significant relationship between HEG and CED Conditions ($p < 0.001$). This is in line with previous research, which shows that excessive nausea and vomiting can interfere with nutritional intake and cause energy deficiency.

The findings of this study are consistent with other studies showing that hyperemesis gravidarum is a risk factor for CED. For example, research by Muryani et al. (2022) at a Community Health Center on Rimau Island, Banyuasin Regency, found that respondents who experienced hyperemesis gravidarum were seven times more likely to experience CED than respondents who did not experience hyperemesis gravidarum. Likewise, research conducted in Kampar Regency found the same thing: the relationship between Hyperemesis Gravidarum and the incidence of CED (Sintia et al., 2021).

Hyperemesis gravidarum is a severe form of nausea and vomiting during pregnancy. It can cause chronic energy deficiency due to associated complications such as malnutrition, electrolyte imbalance, and weight loss exceeding 5% of pre-pregnancy body weight (Parihar & Singh, 2019). Hyperemesis gravidarum can be associated with chronic energy deficiency due to severe and prolonged vomiting and related complications leading to malnutrition, electrolyte imbalances, and weight loss, ultimately impacting maternal and fetal health.

Hyperemesis gravidarum is not a direct cause of CED. However, the impact of hyperemesis gravidarum often results in dehydration, electrolyte disturbances, and malnutrition, where one of the indicators for assessing nutritional status is the occurrence of CED (Muryani et al., 2022). Treatment of hyperemesis gravidarum focuses on restoring hydration, correcting electrolyte imbalances, and ensuring adequate fluid and nutritional intake to reduce the risks associated with chronic energy deficiency (CED) (Stokke et al., 2015). It is also necessary to provide food that emphasizes complex carbohydrates, especially in the morning, and avoid foods that contain lots of fat and fried foods to avoid and minimize nausea and vomiting. However, you still have to pay attention to the nutritional content of each food eaten by the mother so that the nutritional needs of the mother and fetus are met (Sintia et al., 2021). It can be concluded that medical and nutritional interventions and comprehensive prenatal care that includes managing symptoms of hyperemesis to ensure adequate nutritional intake can help reduce and prevent the incidence of CED.

Conclusions

This research shows that the determinants of chronic energy deficiency (CED) in pregnant women in the Lere Health Center Working Area, Palu City, during the 2021-2023 period are influenced by the

relationship between parity and the condition of hyperemesis gravidarum (HEG). These findings indicate that these two factors are important in determining the risk of CED. In contrast, this study did not find a significant relationship between maternal age and education level and the incidence of CED. Thus, the main focus in preventing CED must be managing factors related to parity and health conditions during pregnancy. It is recommended that the Community Health Center provide education regarding the factors that cause CED in pregnant women so that pregnant women with CED can be prevented and for further research to be able to carry out a more in-depth analysis using a multivariate approach to explore interactions between various other risk factors, such as socio-economic status. access to health services, and diet of pregnant women.

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