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Original Research

Anthropometric Characteristics in Newborns with a History of Chronic Energy Deficiency (CED) in Pregnancy: A Descriptive Study

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ABSTRACT

Background: *Chronic energy deficiency (CED) in pregnant women is a nutritional condition characterized by an upper arm circumference (UAC) of less than 23.5 cm, reflecting a long-term deficit in energy and protein intake. CED can increase the risk of low birth weight (LBW) and stunting in infants. Therefore, monitoring the nutritional status of pregnant women is important to prevent infant growth disorders. The objective of this study was to determine the anthropometric characteristics of newborns with a history of CE during pregnancy at the Bayat Community Health Center, Klaten District.*

Methods: *This study used a quantitative descriptive design. The population consisted of all infants with a history of KEK pregnancy at the Bayat Community Health Center from January to December 2021. The sampling technique used total sampling of 112 infants. The research instrument used medical record documentation sheets, and data analysis was performed univariately using frequency distribution.*

Results: *Most infants had normal weight (86.6%), normal length (73.2%), and normal circumference (93.8%). Maternal characteristics showed that the majority were aged 20–35 years (91.1%), had a high school education (55.4%), were unemployed (76.8%), had an interbirth interval of < 2 years (59.8%), were primiparous (52.7%), had Hb levels ≥ 11 g/dl (86.6%), and had mature pregnancies (93.8%).*

Conclusion: *The anthropometric measurements of newborns tended to be normal and were related to maternal characteristics, especially birth interval ≥ 2 years, which had the highest proportion of babies with normal weight (81.3%), length (67.9%), and head circumference (79.5%). It is recommended that health workers increase monitoring of nutrition in pregnant women with KEK and educate them on the ideal birth interval to support optimal infant growth and development.*

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INTRODUCTION

Pregnancy is an important physiological process for the continuity of generations, but at the same time it also poses various health risks for mothers and fetuses. One of the nutritional problems often experienced by pregnant women is Chronic Energy Deficiency (CED), a condition in which mothers lack energy and protein intake for a long time. CEE is usually identified through an upper arm circumference (UAC) measurement of less than 23.5 cm, which reflects poor nutritional status during pregnancy (Indonesian Ministry of Health, 2018). This condition increases the risk of low birth weight (LBW), fetal growth disorders, and complications during childbirth.

According to the 2018 Riskesdas, the prevalence of pregnant women with CME in Indonesia reached 17.3% (Indonesian Ministry of Health, 2018). In Central Java Province, this figure showed an increase from 9.11% in 2015 to 10.70% in 2017, while in Klaten District, it was recorded at 17.8% in 2021. The government has implemented various interventions through nutrition monitoring and supplementary food provision at community health centers, but the prevalence of ME is still quite high (Musni, Malka, & Asriyani, 2017). This condition shows that chronic malnutrition in pregnant women remains a challenge in efforts to reduce the risk of pregnancy complications and growth disorders in newborns.

Chronic energy deficiency has a significant impact on fetal growth and pregnancy outcomes. Pregnant women with CEM are at risk of giving birth to babies with low birth weight, below-normal length, and smaller head circumference compared to babies of mothers with good nutritional status (Aminin & Lestari, 2014; Nasution & Nurdianti, 2014). This condition illustrates that CHN can inhibit intrauterine development and increase infant morbidity rates. Previous studies have also shown a significant relationship between the nutritional status of pregnant women and the incidence of LBW and asphyxia in infants (Agustini, 2014).

Several studies have assessed the relationship between maternal LiLA and infant birth weight, but there are still limited studies examining the relationship between LiLA and other anthropometric parameters such as length and head circumference of newborns (Pomalingo et al., 2018). In fact, infant anthropometric measurements are important indicators that describe overall intrauterine growth. The lack of research on the relationship between maternal KEK and these three anthropometric parameters is the basis for the need for further research to strengthen the scientific evidence on the impact of KEK on infant growth from birth (Rahmawati, 2021; Mulyana, 2018).

This study is novel because it not only assesses the relationship between maternal KEK and birth weight, but also describes the complete anthropometric characteristics of newborns, including weight, length, and head circumference. The results of this study are expected to serve as a basis for health workers in monitoring the nutritional status of pregnant women and preventing the risk of infant growth disorders. Therefore, the purpose of this study was to determine the anthropometric characteristics of newborns with a history of KEK at the Bayat Community Health Center, Klaten Regency.

MATERIALS AND METHODS

This study used a quantitative descriptive design with a retrospective approach. This design was chosen because it is suitable for describing the anthropometric characteristics of newborns based on existing data without intervening in the variables under study. The descriptive approach allows researchers to provide a factual description of the weight, length, and head circumference of newborns with a history of chronic

energy deficiency (CED) in the working area of the Bayat Community Health Center, Klaten Regency. This design is considered the most relevant for identifying data distribution patterns and the characteristics of mothers with a history of CED objectively.

The study was conducted at the Bayat Community Health Center, Klaten Regency, because this area has a fairly high incidence of CME based on reports from the local Health Office. The location was chosen based on the availability of complete medical records for both pregnant women and newborns. The study was conducted from July to December 2022, which included the stages of permit application, secondary data collection, data analysis, and final report preparation.

The population in this study was all newborns of mothers with a history of KEK pregnancy recorded at the Bayat Community Health Center from January to December 2021. The sampling technique used total sampling, where the entire population was used as the research sample because the number was limited and the data was available in its entirety. Based on medical records, 112 infants were found to meet the inclusion criteria, so all of them were used as research samples. The use of total sampling is expected to provide a comprehensive picture of the anthropometric characteristics of newborns in the study area.

The inclusion criteria in this study included infants born to mothers with a history of KEK, having complete medical record data on anthropometry (weight, length, and head circumference), and being recorded in the Bayat Community Health Center's nutrition and maternal and child health information system in 2021. Exclusion criteria included incomplete infant data or data not recorded in the database. The main variables of the study were the anthropometric characteristics of newborns (weight, length, and head circumference) with a history of KEK pregnancy, while additional variables included maternal characteristics such as age, education, occupation, parity, Hb level, birth interval, and gestational age.

The research instrument used a data recapitulation sheet developed from the SIMPUS Nutrition and KIA format of the Bayat Community Health Center. The data collected was secondary and taken retrospectively from the medical records of pregnant women with KEK and the anthropometric data of newborns. Content validity testing was conducted through consultation with the supervising lecturer and community health center nutrition officers to ensure the suitability of the indicators with the research variables. The reliability of the instrument was maintained by ensuring consistency in data recording and the use of official data sources from SIMPUS. The data collection procedure included the stages of obtaining permission, collecting medical record data, and systematically recording the data in the recapitulation sheet.

The collected data were analyzed univariately using frequency distribution and percentages to describe the characteristics of the mothers and the anthropometric measurements of newborns. Data processing was carried out through the stages of editing, coding, scoring, and tabulating according to descriptive statistical procedures. This study has obtained ethical approval from the Health Research Ethics Committee of Dr. Moewardi Surakarta Hospital with Number: 916/XI/HREC/2022. During the research, the researchers upheld the principles of research ethics, which include respect for privacy and confidentiality, as well as maintaining anonymity by not including the respondents' personal identities in the data sheets (Notoatmodjo, 2018).

RESULTS

Table 1. Characteristics of Pregnant Women with a History of Chronic Energy Deficiency (CED) at Bayat Community Health Center (n = 112)

Characteristics of Mothers	Category	Frequency (n)	Percentage (
Age	< 20 years	1	0.9
	20–35 years	102	91.1
	> 35 years old	9	8.0
Education	Elementary	2	1.8
	Junior High School	22	19.6
	High School	62	55.4
	Higher Education	26	23.2
Employment	Not working	86	76.8
	Working	26	23.2
Birth interval	< 2 years	7	6.3
	≥ 2 years	105	93.8
Parity	Primipara	59	52.7
	Multipara	52	46.4
	Grand multipara	1	0.9
Hemoglobin level (g/dL)	< 11	15	13.4
	≥ 11	97	86.6
LILA (cm)	< 23.5	112	100.0
	≥ 23.5	0	0.0
Gestational age	Premature (< 37 weeks)	7	6.3
	Mature (≥ 37 weeks)	105	93.8

Table 1. Shows that most mothers with a history of KEK were of productive age (20–35 years) (91.1%) and had a high school education (55.4%). Most respondents were not working (76.8%) and had a birth interval of ≥ 2 years (93.8%). The majority of pregnant women were primiparous (52.7%) with hemoglobin levels ≥ 11 g/dL (86.6%) and all had LILA < 23.5 cm as an indicator of KEK. The most common gestational age was mature (≥ 37 weeks) at 93.8%. These results indicate that KEK does not only occur in mothers with low social status, but can also be experienced by mothers of productive age and with a secondary education level.

Table 2. Anthropometric Measures of Newborns Based on Maternal Characteristics with a History of KEK at Bayat Health Center (n = 112)

Anthropometric Variable	Category	Frequency (n)	Percentage (%)
Birth weight (grams)	Normal (≥ 2500)	97	86.6

Anthropometric Variable	Category	Frequency (n)	Percentage (%)
	Low birth weight (< 2500)	15	13.4
Birth length (cm)	Normal (≥ 48)	82	73.2
	Short (< 48)	30	26.8
Infant head circumference (cm)	Normal (33–35)	105	93.8
	Abnormal (<33 or >3)	7	6.2

Table 2 shows that most newborns from mothers with a history of KEK had normal birth weight (86.6%), normal birth length (73.2%), and normal head circumference (93.8%). Although all mothers experienced KEK based on LILA measurements, most babies were born with normal anthropometric measurements, especially in mothers with hemoglobin levels ≥ 11 g/dL and mature gestational age. These findings suggest that other factors such as parity, birth interval ≥ 2 years, and maternal Hb status also play a role as protective factors against fetal growth disorders.

DISCUSSION

This study shows that most pregnant women with a history of KEK are of reproductive age, have a secondary education, and are not employed. Although all respondents experienced KEK based on upper arm circumference measurements, most of the babies born had normal anthropometric measurements. These results show that factors such as good hemoglobin levels, mature gestational age, and sufficient birth spacing also provide protection against the risk of low birth weight and fetal growth disorders. These findings reinforce the evidence that KEK does not always have a direct impact on infant anthropometric measurements if there are other supportive maternal factors (Rahmawati, 2021; Purba, 2019).

The results of this study are in line with the findings of Pomalingo et al. (2018), who reported that pregnant women aged 20–35 years tend to have KEK, but most are still able to give birth to babies with normal birth sizes. The productive age factor provides stable biological and hormonal conditions to support fetal growth and development. In addition, upper secondary education plays an important role in a mother's ability to understand pregnancy nutrition information. Good nutritional knowledge helps mothers maintain their food intake and adherence to iron tablet consumption during pregnancy (Aprianti et al., 2018; Musni et al., 2017).

Employment and economic status also affect the nutritional status of pregnant women. Research shows that the majority of mothers are unemployed, and some of them experience KEK. This condition illustrates limited access to nutritious food and a lack of dietary diversity. Unemployed mothers depend on their husbands' income, making them vulnerable to energy and protein deficiencies. Conversely, working mothers have a greater chance of meeting their nutritional needs because they have financial independence, although excessive workloads also have the potential to increase stress and energy requirements (Musni et al., 2017; Sirait et al., 2017).

Birth spacing and parity also affect pregnancy outcomes. Birth spacing of ≥ 2 years and primiparity are associated with better infant anthropometric measurements. Adequate birth spacing allows mothers to replenish their nutrient reserves and improve their

physiological readiness for the next pregnancy (Handayani, 2011). In addition, mothers with hemoglobin levels ≥ 11 g/dL tend to give birth to babies with normal weight and length. This condition highlights the importance of regular Hb checks and iron supplementation during pregnancy to prevent anemia and complications in the fetus (Rahmaniar, 2013; Aminin et al., 2014).

These findings have important implications for efforts to improve maternal and infant health at the primary care level. KEK prevention programs are not sufficient with only the provision of supplementary foods, but also need to be accompanied by nutrition education, routine LILA monitoring, and counseling on ideal birth spacing. These efforts are in line with the recommendations of the Indonesian Ministry of Health (2018) in the maternal nutrition monitoring program to prevent LBW and stunting. Improving knowledge and nutritional assistance for pregnant women is expected to reduce the incidence of KEK and result in babies with optimal anthropometric measurements.

This study used secondary data from nutrition and maternal and child health reports from 2021, so it could not directly control for confounding factors such as daily nutrient intake, physical activity, and socioeconomic status. In addition, the descriptive design did not allow for cause-and-effect analysis. Therefore, further research is recommended using an analytical design with direct measurements of respondents and consideration of other factors such as macronutrient intake and maternal health status. The results of this study can be used as a basis for community health centers to strengthen KEK screening and nutritional counseling for pregnant women using a local data-based approach (Notoatmodjo, 2018; Indonesian Ministry of Health, 2018).

CONCLUSION

The results showed that most pregnant women with a history of KEK were of productive age, had a secondary education, were unemployed, and had normal hemoglobin levels and an interbirth interval of ≥ 2 years. Although all mothers experienced KEK based on upper arm circumference measurements, most of the babies born had normal anthropometric measurements, including weight, length, and head circumference. This condition illustrates that maternal factors such as good hemoglobin levels, sufficient birth spacing, mature gestational age, and maternal nutritional knowledge play an important role in supporting fetal growth. Therefore, efforts to prevent KEK should focus on continuous nutrition education starting from adolescence, monitoring the nutritional status of pregnant women through regular LILA and Hb examinations, and strengthening counseling programs at health centers to promote maternal nutritional readiness before and during pregnancy.

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