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## Literature Review: Relationship of Chronic Energy Deficiency in Pregnancy and Low Birth Weight

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### Abstract

**Background:** Pregnant women with poor nutritional status or experiencing chronic energy deficiency (CED) tend to give birth to low birth weight babies (LBW). This study aims to analyze the relationship between chronic energy deficiency in pregnancy and low birth weight.

**Subjects and Methods:** The method used is to collect and analyze related research articles, with the publication of

articles in the last 15 years, and is major research.

**Results:** There is a relationship between chronic energy deficiency in pregnancy and the occurrence of low-birth-weight babies. This is because during pregnancy there is an additional requirement for fulfilling nutrition for the development and growth of the fetus.

**Keywords:** Chronic Energy Deficiency (CED), Pregnancy, Low Birth Weight (LBW)

### Background

The Infant Mortality Rate is an important indicator in determining the level of public health because it can describe the health of the population's health in general. LBW is a major factor in increasing neonatal mortality, morbidity, and disability in infants, and children born with LBW have a long-term impact on their lives in the future. LBW according to WHO statistical data indicators are babies who weigh <2500 g, regardless of gestational age (Dewey, 2011) <sup>[6]</sup>.

In general, LBW is influenced by two factors, namely maternal factors and fetal factors. Maternal factors that influence the incidence of LBW are the mother's age during pregnancy (35 years and the spacing of pregnancies is too short), the condition of the mother (previous history of LBW, working too hard, socio-economic status, nutritional status, smokers, drug users, alcohol), and mothers with health problems (severe anemia, pre-eclampsia, infections during pregnancy) while the baby's factors are congenital defects and infections during pregnancy (Departemen Kesehatan RI, 2009) <sup>[4]</sup>. In addition, age, parity, pregnancy spacing, weight gain, anemia, and pre-eclampsia also have a significant effect on LBW (Dian, 2012) <sup>[5]</sup>.

Nutritional status during pregnancy greatly affects the growth of the fetus in the womb. The nutritional status of pregnant women requires special attention to prevent unwanted things. One of the things that must be considered is the condition of Chronic Energy Deficiency (CED). CED is a condition in which a person experiences poor nutritional status due to a lack of consumption of food sources of energy containing macronutrients (Febriyeni, 2017) <sup>[8]</sup>.

There are several methods that can be used to determine the nutritional status of pregnant women, including monitoring weight gain during pregnancy, measuring upper arm circumference, and measuring blood hemoglobin levels. Measurement of upper arm circumference is intended to determine whether a person has a risk of chronic energy deficiency, if the upper arm circumference is <23.5 cm, it means that the woman has a risk of CED, and is expected to give birth to a low-birth-weight baby (Arisman, 2010: 8) <sup>[1]</sup>.

### Subjects and Methods

This study uses a study design literature *review*. The method used is to collect and analyze related research articles. Literature screening was carried out based on predetermined inclusion and exclusion criteria. Inclusion criteria included research articles on the relationship between chronic energy deficiency and low birth weight, published articles in the last 15 years, and primary studies. Exclusion criteria included articles in systematic reviews and literature reviews. By searching for articles using keywords, namely Chronic Energy Deficiency (CED), Pregnancy, Low Birth Weight (LBW).

## Results and Discussion

### Chronic Energy Deficiency in Pregnancy

Pregnancy causes increased energy metabolism. Therefore, the need for energy and other nutrients increases during pregnancy. This increase in energy and nutrients is needed for the growth and development of the fetus, the increase in the size of the uterine organs, and changes in the composition and metabolism of the mother's body. A deficiency of certain nutrients needed during pregnancy can cause the fetus to not grow properly. The needs of pregnant women will increase than usual, where the exchange of almost all ingredients occurs very actively, especially in the third trimester, due to an increase in the amount of consumption, it is necessary to increase especially the consumption of food sources of energy to meet the needs of the mother and fetus. Consuming fewer calories will lead to malnutrition or commonly called Chronic Energy Deficiency (CED) (Supariasa, 2018) [22].

Supariasa (2012) [21] shows that Upper Arm Circumference is a type of anthropometric examination used to measure the risk of CED in women of childbearing age, including adolescents, pregnant women, nursing mothers, and couples of childbearing age. Whereas the upper arm circumference threshold for women of childbearing age with the risk of CED is 23.5 cm and if it is less than 23.5 cm the woman will experience CED.

*Research Southeast Asian Food and Agricultural Science and Technology* conducted from August 2010 to August 2011, an independent institution under the auspices of the Bogor Agricultural Institute (IPB) showed that 6 out of 10 pregnant women in Indonesia experience a lack of intake of micronutrients which can hinder the health of children in the future, such as iron, zinc, vitamin A, vitamin C, and folic acid (Faculty of Health Sciences UMS Surabaya, 2012) [7].

### LBW

The infant mortality rate is the number of babies who die before reaching the age of 1 year expressed in 1,000 live births in the same year. One of the causes of the high infant mortality rate (IMR) is the low birth weight (LBW) (Ministry of Health of the Republic of Indonesia, 2016). The 2017 WHO definition regarding LBW is a baby born weighing  $\leq 2500$  gr. WHO explains that 60–80% of the Infant Mortality Rate (IMR) that occurs is caused by LBW. WHO has committed and is working to reduce the incidence of LBW by 30% in 2025. LBW classification according to (Proverawati, 2010) [18]: Low Birth Weight Babies (LBW) with a birth weight of 1500–<2500 grams, Very Low Birth Weight Babies (BBLSR) with a birth weight of 1000–<1500 grams, and Extremely Low Birth Weight Babies (BBLER) with a birth weight of fewer than 1000 grams. So far, there has been a decrease in the LBW rate in the world, when compared to the previous year, which was 2.9%. This is proven by the decrease that occurred from 2012 to 2019, from 20 million to 14 million LBW (Ferdiyus, 2019) [9].

The serious impact that LBW can have on the quality of future generations, one which can slow down the growth and development of children into adulthood, and can affect the decline in children's intelligence (Maryati, 2011) [16]. The biggest risk is stunting or short stature. Stunting not only results in short children but intellectually they are also unable to compete with children who are born with normal weight and have adequate nutrition in the first 1,000 days of life. The long-term impact of LBW is the risk of chronic

diseases such as obesity, diabetes, or heart disease as adults (Badan Pusat Statistik., 2020: 131) [3]. Providing regular nutrition counseling by nutrition workers at the puskesmas and posyandu cadres is needed as an effort to prevent stunting (Meinar Sari *et al.*, 2021) [10].

### Relationship of Chronic Energy Deficiency in Pregnancy to LBW

Pregnant women with nutrition and health problems can have an impact on the health and safety of mothers and babies as well as the quality of the babies born. According to research conducted by Ice Aan Solihah *et al.*, (2018) [11], states that CED in pregnant women is one of the factors that causes LBW births. Pregnant women who experience CED are at risk of giving birth to LBW babies due to nutritional imbalances or malnutrition which causes the mother to experience a decrease in blood pressure. Blood volume is important for carrying nutrients and oxygen to the fetus through the placenta. If the blood volume decreases, the cardiac output is inadequate, resulting in insufficient nutrition to the fetus, and causes a small placenta, and there is an oxygen circulation disorder which results in stunted fetal growth or LBW (Ice Aan Solihah *et al.*, (2018) [11].

This is in line with research conducted by (N Fitriyah, *et al.*, 2022) [17], which stated that there was a relationship between maternal age and CED status with the incidence of LBW, and CED status was the most dominant variable related to the incidence of LBW.

The problem of LBW is related to the mother's health condition during pregnancy, including the condition of her nutritional status which reflects inadequate energy and protein consumption. Birth weight is a reflection of the health and nutritional status during pregnancy and the antenatal care received by the mother. Poor maternal nutrition before pregnancy or in women who are pregnant more often results in low birth weight babies or stillbirths and causes birth defects. Besides that, LBW can also cause brain growth retardation, anemia in newborns, and susceptibility to infection. (Yuli Kusumawati and Mutalazimah, 2014) [24].

An imbalance between intake to meet energy needs and expenditure is a specific cause of CED (Kristiyanasari, 2010) [13]. This was also supported by research conducted by Sumiati regarding "Chronic Energy Deficiency (CED) in Pregnant Women with Low Birth Weight Babies (LBW) at the Palu City Health Center in 2015". This research showed that the percentage of pregnant women who had CED was 69 (23.8%) and LBW babies were 58 (20%). There is a significant relationship between CED in pregnant women with LBW with a value of  $p = 0.000$ . CED is a risk factor for the incidence of LBW. Pregnant women with CED have 4 times the risk of giving birth to babies with LBW. (Sumiati, 2016) [20].

The results of this literature review are in accordance with the statement that the nutritional intake of pregnant women is insufficient and insufficient to provide for the physiological needs of pregnancy, namely hormonal changes, and increased blood volume for fetal growth so that the supply of nutrients to the fetus is reduced. As a result, the growth and development of the fetus are hampered and the birth weight is low (Ma'rifah, 2011 and Qobadiyah, *et al.*, 2012) [15].

Birth weight is also related to the fulfillment of nutrition during pregnancy, one of which is the need for

macronutrients. Nutritional needs increase with increasing gestational age, growth, and development of the fetus along with changes in the mother's body tissue and metabolism. Fetal growth and development accelerate in the third trimester of pregnancy, so sufficient energy and protein intake is required. The level of nutritional adequacy during pregnancy affects birth weight (Arkkola, 2009) <sup>[2]</sup>.

### Conclusion

The results of a review of several journals stated that there was a relationship between chronic energy deficiency in pregnancy and the occurrence of LBW. This is because during pregnancy there is an additional requirement for fulfilling nutrition for the development and growth of the fetus. The occurrence of LBW is one of the causes of the infant mortality rate. For this reason, it is necessary to address it by improving nutritional needs to prevent LBW and suppress infant mortality rate.

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