

## Conference Paper

# Relationship of Chronic Energy Deficiency, Birthweight and Exclusive Breastfeeding with Stunting in Kedungrejo Village, Pakis District, Malang

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In 2018, the average prevalence of stunting in Indonesia ranked sixth in the Asian region, at 36.4%. In the Java region, East Java ranked first with a stunting proportion of 32.81%. Malang is a district that has continued to experience an increase in the proportion of short nutritional status over the past three years: 22.9% in 2016, 28.3% in 2017 and 31.7% in 2018. Factors that affect stunting include income, education, economic status, number of family members, knowledge, exclusive breastfeeding, sanitation, clean water, health services, nutritional status of pregnant women, infections and birthweight. The purpose of this study was to determine the relationship of maternal nutritional status, birthweight and exclusive breastfeeding with the rate of stunting in Kedungrejo Village, Pakis District, Malang. This analytical observational study used a case-control design. The sample size of the case and control groups were 31 and 62 toddlers, respectively, selected using a purposive sampling technique. Data were analysed by Chi-square test. No significant relationship was seen between the maternal nutritional status and the rate of stunting ( $X^2$  value  $0.151 < X^2$  table 3.841), and the birthweight and the rate of stunting ( $X^2$  value  $0.427 < X^2$  table 3.841), however, there was a significant relationship between exclusive breastfeeding and the rate of stunting ( $X^2$  value  $10.747 > X^2$  table 3.841).

**Keywords:** the birthweight of babies, exclusive breastfeeding, mother's nutritional status, stunting

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Published: 25 March 2021

Publishing services provided by  
Knowledge E

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Selection and Peer-review under the responsibility of the ISMoPHS 2020 Conference Committee.

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## 1. Introduction

Children under five years old affected by stunting in the world reached 22.2% (150.8 million children under five) in 2017 [1, 2]. Meanwhile, the average incidence of stunting among children under five has decreased by 0.3%, so that it becomes 21.9% in 2018 and Asia ranks second, 31.9% [3]. Indonesia ranks sixth in the Asia Region, namely

at 36.4% [3]. According to Indonesia's health profile, the percentage of stunting on children aged 0 to 23 months in Indonesia in 2016 was 21.7% [4]. Based on Nutritional Status Monitoring data in Indonesia, the percentage of stunting under five was 29.6% higher than in the children under two years old group (20.1%) in 2017 [5]. The results of Indonesia's Basic Health Research ('Riskesmas') in 2018, the proportion of children under five who are stunted has increased to reach 30.8%. There are 18 provinces that have a high prevalence of stunting of 30% to 40%, one of which is East Java [6].

The prevalence of stunting in East Java Province reached 26.1% in 2016 [7]. In 2017, it amounted to 26.7% [8]. In 2018 also experienced an increase and ranked first with a higher proportion of children under five with stunting (32.81%) in Java [6]. Several districts in East Java are included in the focus of the 160 districts that will receive reduction interventions stunting integrated in 2019, one of which is Malang Regency [9].

Based on the 2018 Indonesian Basic Health Research, East Java Province, Malang Regency was one of the districts that has experienced an increase in the proportion of short and very short nutritional status. The proportion of stunting in Malang Regency was 22.9% in 2016 [10] in 2017 increased by 28.3% [5] and increased to reach 31.7% in 2018 [11]. Based on the results of observations by researchers at the Malang Regency Office of the incidence of stunting in February 2019, Puskesmas Pakis is the work area of the puskesmas with the sequence stunting 3rd highest of 39 health centres and an increase in the number of cases from 2018, namely 25.7% in weighing in February 2018, 27.3% in August 2018, and 30.7 % in February 2019.

The results of an interview conducted with one of the nutrition officers at the Pakis Health Center found that Kedungrejo Village was a focus location for handling stunting by the Malang District Health Office. The stunting rate in Kedungrejo Village in 2017 reached 38.2%, in February 2018 it was 53.1%, in August 2018 it was 81.8%, and decreased to 51.3% in February 2019. The incidence of stunting in the majority of Kedungrejo Village occurs in children under 2 years of age.

Based on the results of pilot study at the Pakis Health Center, it can be seen that the coverage of exclusive breastfeeding in Kedungrejo Village, Pakis District, Malang Regency over the last three years has fluctuated, namely 81.2% (2016), 85.9 % (2017), and 81% in 2018. In June 2019, the exclusive breastfeeding coverage in Kedungrejo Village was decreased again to 66.7%. This shows that the exclusive breastfeeding coverage in Kedungrejo Village, Pakis District, Malang Regency does not meet the national exclusive breastfeeding target (90%).

The nutritional condition of the mother before and during pregnancy can affect the nutritional status of the mother [16]. Mothers who have a history of chronic energy deficiency during pregnancy may hamper the growth process in the foetus, so the mother is at risk of having babies with low birthweight and risk of having a child stunting of 4.154 times [17, 18]. In addition, children who have a history of low birthweight will experience slower linear growth than children born with a history of normal birthweight [14]. Research Wellina, et al. (2016) regarding the risk factors for stunting said that the proportion of children aged two years with low birthweight tended to have a risk of stunting by 3.63 times than children under two years of age who had normal weight at birth. Another risk factor that affects the incidence of stunting is exclusive breastfeeding. Mother's milk has many benefits for babies because it contains nutrients for the process of growth and development of children [19]. Previous research that examined the problem of factors associated with the incidence of stunting; the results showed that children under five who did not receive exclusive breastfeeding during the first 6 months had a risk of 4.643 times the incidence of stunting [20].

This study aims to determine the relationship between chronic energy deficiency, birthweight, and exclusive breastfeeding with the incidence of stunting in Kedungrejo Village, Pakis District, Malang Regency.

## 2. Material and Method

This study used a case control approach (1:2), conducted at Kedungrejo Village, Pakis District, Malang Regency. The Case was children aged  $\geq 24$  to 59 months in 2020 and live at Kedungrejo who were diagnosed stunting by medical personnel during February to August 2019 and the Maternal and Child Health book filled completely. Control was healthy children aged 24 to 59 months in 2020 and live at Kedungrejo and Maternal and Child Health books filled completely. Chronic energy deficiency, birthweight, and exclusive breastfeeding as independent variables and stunting as a dependent variable. We used observation sheets and interview guidelines. Data analysis used the chi-square and logistic regression. This study was approved by the ethics committee of University of Muhammadiyah Malang, approval number: No.E.5.z/113/KEPK-UMM/V/2020.

## 3. Results

There were 93 respondents in this study, 31 (33.3%) respondents as case dan 62 (66.7%) respondents as control. Both cases and control majority had no chronic

energy deficiency, normal birthweight and had exclusive breastfeeding. In cases amount children who had mother with chronic energy deficiency were 25 (80.65%), normal birthweight 27 (87.10%), and had exclusive breastfeeding 30 (96.77%). Children among controls who had mother with chronic energy deficiency 52 (83.87%), had normal 58 (93.55%) and had no exclusive breastfeeding 71 (76.3%) Table 1.

TABLE 1: Characteristics of respondents.

Variable	Category	Case n (%)	Control n (%)	Total n (%)
Chronic energy deficiency	Yes	6 (19.35)	10 (16.13)	16 (17.2)
	No	25 (80.65)	52 (83.87)	77 (82.8)
Birthweight	Low birthweight	4 (12.90)	4 (6.45)	8 (8.6)
	Normal birthweight	27 (87.10)	58 (93.55)	85 (91.4)
Exclusive breastfeeding	Yes	1 (3.23)	21 (33.87)	22 (23.7)
	No	30 (96.77)	41 (66.13)	71 (76.3)

Source: Author's own work.

Bivariate analysis, only one variable show significant correlation, it's exclusive breastfeeding 0.001 ( $OR_c$  0.06). Chronic energy deficiency and birthweight didn't show significant relationship.

TABLE 2: Bivariate analysis.

Variable	P-value	$OR_c$	P-value	$OR_a$ (95%CI)
Chronic energy deficiency	0.698	1.25	–	–
Birthweight	0.434*	2.15	–	–
Exclusive breastfeeding	0.001	0.06	0.009	15.366 (1.957 – 120. 634)

\*Fisher's Exact test.

Source: Author's own work.

## 4. Discussion

### 4.1. The relationship between mother's chronic energy deficiency with stunting

This study found that most (80.65%) children who were stunted were born to mothers who did not experience chronic energy deficiency during pregnancy. The incidence of stunting in children aged 24-59 months in Kedungrejo Village, Pakis District, Malang Regency is influenced by post-birth factors. The result is supported by the previous theory which states that children who experience stunting can be caused by several factors, including prenatal factors, post-birth factors, and environmental factors (1) (12).

One of the post-birth factors that predisposes to stunting in Kedungrejo Village, Pakis District, Malang Regency was exclusive breastfeeding. This study found that 76.3% of

mothers did not exclusively breastfeed their children in both the case and control groups. Exclusive breastfeeding has an important role for babies aged 6 months because it contains complete nutrition for the baby, so that the growth process of babies who are given exclusive breastfeeding is more optimal (21). Meanwhile, children who did not receive exclusive breastfeeding for the first 6 months have a risk of 4.643 times experiencing stunting (20).

In addition to post-birth factors, nutritional problems in children can also occur due to the health status of the mother during pregnancy. Lack of maternal nutritional intake and inadequate health care during pregnancy can affect the growth and development of the foetus in the womb (22). Maternal nutrition with chronic energy deficiency experienced by mothers during pregnancy greatly affects the growth process of the foetus in the womb (23). Mothers who have a history of chronic energy deficiency will affect the first 1000 days of the child's birth. In addition, babies who will be born are at risk of being born with low birthweight (LBW) and low birth height (24).

The results of this study are not in line with the results of the analysis of previous studies. Previous research by Apriningtyas & Kristini (2019) who conducted research on children aged 6-24 months in Dukuhmaja Village, Songgom District, Brebes Regency, showed a p value of 0.01 ( $<0.05$ ) with OR of 7.028. The conclusion from this study is that prenatal factors associated with the incidence of stunting include maternal chronic energy deficiency during pregnancy and children born to mothers who have a history of KEK are at seven times greater risk of stunting (25). The difference in the results of the analysis of the two studies was caused by the difference in the age range of the study subjects. In previous studies using an age range of 6-24 months, while in this study using an age range  $\geq 24-59$  months.

The results of this study are also different to those of Ningtyas, et al. (2019) conducted on toddlers in the Karangayu Community Health Center in Semarang City. The study design used a cross sectional study with a sample of 115 mothers of children under five who registered in the posyandu. The results of this study showed a p value of 0.029 ( $<0.05$ ) OR 3.115. This means that a history of chronic energy deficiency in mothers is associated with stunting in children. The study also found that mothers with a history of chronic energy deficiency were three times more likely to have low birthweight babies, which can stunt their child's growth in later years (26).

Based on the description above, it can be seen that there are differences between previous studies conducted by Ningtyas et al. (2019) with research conducted by researchers. The difference lies in the research design used, the research subjects, and the number of research samples, so that it is possible to create different research

results. In the previous study using design cross-sectional with a total sample of 115 mothers of children under five who registered in the posyandu. Meanwhile, this study used a case control study design with a number sample of 93 children aged  $\geq 24$ -59 months (26).

Aldana-Parra, et al. (2020) conducted a study on children under 5 years of age. This study is a secondary analysis of a household survey in Colombia with national coverage during 2010. In its study it was found that stunted infants were most likely due to health impacts and poor nutritional intake during the first months of life in the womb (27)..

This study found that not all mothers who have a history of chronic energy deficiency are at risk of giving birth to babies with Low Birthweight. This is supported by the opinion expressed by Ningtyas, et al. (2019) that the condition of pregnant women who have a history of chronic energy deficiency can be overcome by improving nutritional intake during pregnancy, so that the foetus gets adequate intake while in the womb and the baby is born with normal weight (26). Apart from that, the analysis of findings carried out by Rabbani, et al. (2016) in Bangladesh also cited prenatal visits to doctors and maternal health care during pregnancy as important determinants of the incidence of stunting (28).

Thus it can be concluded that the efforts that can be made by pregnant women who have a history of chronic energy deficiency to increase foetal growth during pregnancy and reduce the risk of stunting in children are by optimizing prenatal care and improving nutritional intake during pregnancy.

#### **4.2. The relationship between birthweight and stunting**

This study found there was no significant relationship between low birthweight and stunting in Kedungrejo Village, Pakis District, Malang Regency. Low birthweight among babies have a 2.148 times greater risk of experiencing stunting than babies born at normal weight. Based on the study results revealed that 87.10% of children aged 24-59 months who suffered stunting comes from children who were born with normal weight.

This study found that the factor that plays a role in stunting in children aged 24-59 months in Kedungrejo Village, Pakis District, Malang Regency is the inaccurate parenting style of mothers in providing breast milk their children. This can be seen from the findings of research which showed that 76.3% of children did not receive exclusive breastfeeding. These findings are supported by Aridiyah et al. (2015) which states that the low level of exclusive breastfeeding can encourage stunting in children. Proper

breastfeeding for children can help maintain a child's nutritional balance and achieve normal child growth (29).

Based on the theory, the impact of children born with low birthweight has the opportunity to experience nervous system disorders, are at risk of experiencing malnutrition, and have low immunity, so they are prone to infectious diseases (30). Children with a history of low birthweight are at greater risk of infections, such as diarrhoea and acute respiratory infections. This infection can make the child more susceptible to complications later in life related to the incidence of stunting (31). According to Aridiyah, et al. (2015), children under five born with a history of low birthweight are more at risk of experiencing stunting than children born with normal birthweight (29).

This study is in line with the research of Astutik, et al. (2018) who conducted research on children aged 24-59 months. The results of his research showed a p value of 0.455 ( $> 0.05$ ) OR 1.647. History of low birthweight is not associated with the incidence of stunting in children under five (32). Aridiyah et al. (2015) who conducted research on children under five years of age 12-36 months in rural and urban areas in Jember Regency also said that low birthweight did not have a significant relationship with stunting (29).

Research Adhikari, et al. (2019) in children aged 0–59 months in Nepal showed different results from this study. The results of research by Adhikari, et al. (2019) shows p value  $< 0.01$  OR 1.64. This means that children aged 24-59 months are at higher risk for stunting than children aged 0-23 years. Children born below the mean size at birth had a 1.6 times more stunted risk of stunting compared to children who were above average size or larger at birth (31).

The results of this study are not in line with Aryastami, et al. (2017) which shows a p value of 0.001 ( $< 0.05$ ) OR 1.74. The study found that stunting was significantly higher in children born with low birthweight ( $< 2.5$  kg) compared to children with normal birthweight (33). Nkurunziza's research, et al. (2017) on children aged 6-23 months in Burundi showed that children who were considered by their mother to have a moderate birthweight or less at birth were at risk of stunting more than children who were considered to have a higher birthweight (p value 0.001, OR 1.5) (34).

The difference in research findings between this study and previous studies is influenced by the age range of the research subjects. Selection of study subjects with an age range  $\leq 24$  months has a significant relationship with the results of the study analysis. Meanwhile, researchers who chose research subjects with an age range  $\geq 24$  months had no significant relationship with the results of the research analysis. This is supported by the statement made by Astutik, et al. (2018) that there is an effect of

birthweight on the incidence of stunting, which is highest in babies aged 6 months of birth, then decreases until the age of 24 months (32).

According to Aridiyah, et al. (2015), the growth process in children who have a history of low birthweight can be improved by providing adequate nutrition and paying attention to the surrounding environmental conditions so that mothers must pay attention to nutritional intake and environmental conditions around the child in order to achieve normal growth.

### **4.3. The relationship between exclusive breastfeeding and stunting**

This study found that there was a significant relationship between exclusive breastfeeding and stunting in Kedungrejo Village, Pakis District, Malang Regency. This study also found that exclusive breastfeeding is a protective factor against the incidence of stunting. In children who were stunted 96.77% were children who did not receive exclusive breastfeeding at the age of 0-6 months, while those who received exclusive breastfeeding were 3.23%.

Theoretically, long-term breastfeeding creates major benefits for the health of both mother and child. Mothers who breastfeed are at a lower risk of developing chronic disease (35). In addition, breastfeeding positively influences children's development to reduce the risk of spectrum disorders autism and improve cognitive development. Exclusive breastfeeding has an important role for babies aged 6 months. The nutrients contained in breast milk are very complete for the needs of babies (21). The nutrients in breast milk are beneficial for the formation of brain cells that are optimal for the intelligence of the baby, protect the baby from infectious diseases (diarrhoea, coughs, colds, sore throat, and respiratory problems), avoid the risk of malnutrition, and iron deficiency. which can cause night blindness, and is beneficial for the growth of the teeth, palate, and jaw in children (36).

Exclusive breastfeeding is also related to the process of increasing the child's body length. The length of the child's body is influenced by the duration of breastfeeding. The longer the mother breastfeeds her child, the more optimal the child's growth will be in the second and third year of life (37). This shows that children who are exclusively breastfed can achieve good growth because for six months the child gets adequate nutrition or nutrients, both in volume, quantity, and quality according to the baby's needs (38). This statement is supported by Fitri (2018) that toddlers who are exclusively breastfed have a lower risk, namely 10% experiencing stunting (39).



Based on previous studies, research conducted by researchers in Kedungrejo Village, Pakis District, Malang Regency is similar to Wijayanti's research (2019) conducted in Desa Jadi Semanding District, Tuban Regency which shows a significant correlation between exclusive breastfeeding and the incidence of stunting in children aged 2 -5 years (40). Furthermore, research conducted by Fitri (2018) on toddlers at Puskesmas Lima Puluh Pekanbaru showed the results of a significant relationship between exclusive breastfeeding and the incidence of stunting in children under five at Puskesmas Lima Puluh Pekanbaru nilai (p value 0.021)(39).

According to research by Lestari, et al. (2018) conducted in several integrated health service clinics (posyandu) in Sangkrah, Surakarta, Central Java showed the results of research analysis with a p value of 0.010 (<0.05) and OR 0.201. In his study it was concluded that a history of non-exclusive breastfeeding in children aged 2-5 years had a significant association with stunting (41). Research Cetthakrikul, et al. (2018) in children under 5 years of age in Thailand reported that around 88.74% of children in Thailand in 2018 were not breastfed and 30.8% of children were breastfed for more than 12 months. In his study also stated that the duration of breastfeeding was positively associated with stunting (OR 1.57) (35).

Akombi research, et al. (2017) in children under 5 years in Nigeria also reported that breastfeeding duration was significantly associated with stunting. In his research, it was found that children who were breastfed for less than 12 months were more at risk of stunting and stunted growth compared to children who were breastfed for more than 12 months. This is due to cultural influences, exclusive breastfeeding status, socio-economic dynamics, initiation time of complementary feeding, quality of complementary feeding, and mother's educational status (42).

Furthermore, Takele, et al. (2019) who conducted a study on toddlers in Ethiopia showed that breastfeeding was significantly associated with the incidence of stunting in childhood. The study also stated that the high prevalence of stunting in children aged 24 to 59 months was 44.1% and the age range 12 to 23 months was 38.5%. The prevalence of stunting was 38.2% more in children who were not breastfed. In his study it was also observed that children who were not breastfed had 1,225 times the risk of stunting than children who were breastfed (43).

## 5. Conclusion

There was no significant relationship between the maternal nutritional status and birth-weight with the rate of stunting in Kedungrejo Village, Pakis District, Malang. Exclusive

breastfeeding was found as the predictor of stunting. Children who get exclusive breastfeeding can achieve good growth than children who are not exclusively breastfed.

## Acknowledgement

None

## Conflict of Interest

The authors declare that there is no conflict of interest.

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