

ORIGINAL ARTICLE

Relationship between Mothers Birth Spacing and Incidence of Stunting in Children 24 - 59 months

Ricko Eliafiana¹, Tubagus Ferdi Fadilah²

ABSTRACTS

BACKGROUND

Stunting is one of the nutritional problems that occur in children under five years old. Based on maternal factors, the cause of stunting is a short birth spacing which results in a lack of energy recovery after giving birth to a previous child. This study aims to determine the relationship between birth spacing and stunting in children 24-59 months.

METHODS

A cross-sectional observational study was conducted with a total of 130 children who with their parent attended monthly visits to the Public Health Center of Grogol Petamburan District West Jakarta, Indonesia in September-November 2019. Data were collected using z scores and questionnaires. The Chi-square test was performed for data analysis.

RESULTS

The prevalence of stunting in this study was lower than the national prevalence and the incidence of stunting was higher in birth spacing below 2 years. Short interval birth spacing increases the risk of stunting. However, the relationship between child birth spacing and incidence of stunting in children 24-59 months was not statistically significant.

CONCLUSIONS

Short interval of birth spacing is not a direct cause of stunting as there are other related modifiable factors.

Keywords : birth spacing; stunting; children underfive

¹Undergraduate Program Faculty of Medicine Universitas Trisakti, Indonesia

²Pediatrics Departement Faculty of Medicine Universitas Trisakti, Indonesia

Corresponding to:

Tubagus Ferdi Fadilah
Pediatrics Departement Faculty of Medicine Universitas Trisakti, Indonesia
6281398032559
email: Tb_ferdi_md@trisakti.ac.id

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ABSTRAK

Hubungan antara Jarak Kelahiran dengan Stunting pada Anak 24-59 bulan**LATAR BELAKANG**

Stunting merupakan salah satu masalah gizi yang terjadi pada balita. Berdasarkan faktor ibu, penyebab stunting adalah jarak kelahiran yang pendek yang mengakibatkan kurangnya pemulihan energi setelah melahirkan anak sebelumnya. Penelitian ini bertujuan untuk mengetahui hubungan jarak kelahiran dengan stunting pada anak 24-59 bulan.

METODE

Penelitian menggunakan desain cross-sectional dilakukan dengan total 130 balita yang bersama orang tuanya kontrol bulanan ke Puskesmas Grogol Petamburan Jakarta Barat, Indonesia pada bulan September-November 2019. Pengumpulan data menggunakan z-skor dan kuesioner. Uji Chi-square dilakukan untuk analisis data.

HASIL

Prevalensi stunting dalam penelitian ini lebih rendah dari prevalensi nasional dan kejadian stunting lebih tinggi pada jarak kelahiran di bawah 2 tahun. Jarak kelahiran dengan interval yang pendek meningkatkan risiko stunting. Namun, hubungan antara jarak kelahiran anak dengan kejadian stunting pada anak 24-59 bulan secara statistik tidak signifikan.

KESIMPULAN

Jarak kelahiran yang pendek bukan merupakan penyebab langsung stunting karena ada faktor lain yang dapat dimodifikasi.

Kata kunci: jarak paritas; stunting; balita

INTRODUCTION

Stunting is one of the nutritional problems currently being experienced by children under five years old worldwide. In Indonesia, the incidence of stunting in children under five years old is a major nutritional problem because it has the highest prevalence compared to other malnutrition problems such as undernutrition, wasting, and overweight. Currently, the government of Indonesia is aggressively promoting a program to reduce the stunting prevalence because the impact is quite massive, especially for the quality of life, such as delayed brain development and poor physical growth, which in turn will have an impact on the country's overall economy. The trend of stunting in Indonesia tends to be static, the latest data from RISKESDAS (Riset Kesehatan Dasar) in 2018 showed the national prevalence of stunting and severe stunting in children under five years old was 30.8% with DKI Jakarta province having the lowest prevalence (17.7%).⁽¹⁾

A study by Takele et al. indicated that children aged between 24-59 months were at a higher risk of stunting than children aged 0-11 months.⁽²⁾ Also a study by Nshimiyiryo et al. showed that increasing age of child had a significant association with the incidence of stunting, the study reported children aged 6-23 months were at lower

risk of stunting than children aged 24-59 months.⁽³⁾ Several conditions that can cause stunting in children under five years old are maternal health and nutrition before and during pregnancy. Other maternal factors associated with stunting are the maternal short stature, short interval birth spacing, young maternal age, and a lack of nutrition during pregnancy.⁽⁴⁾ A study by Aramico also showed that determinant factors of stunting were birth spacing, feeding practice, culture and ethnicity, delayed breastfeeding initiation and complementary feeding, lack of mother's knowledge about complementary breastfeeding and infant diet, family planning practice, vaccination, and parent's education.⁽⁵⁾ One of the preventions of stunting based on maternal characteristics is by spacing births or extending the parity distance by 24 months according to World Health Organization (WHO) recommendation.⁽⁶⁾

Previous studies of the association between birth spacing and stunting are limited and have had conflicting results. A study by Dhingra and Pingali⁽⁷⁾ showed that later-born children with birth spacing under 3 years were at a disadvantage, firstborn children were taller compared to those born subsequently, however, that study did not use the WHO-recommended birth spacing cut-off. A cross-sectional study by S. Yaya et al.⁽⁸⁾ showed that children from short birth intervals were

associated with a higher risk of stunting and being underweight. This implies that infants born 24-36 months after the previous birth had a lower risk of reduction in the outcomes of undernutrition.

A study by Z. Dessie et al.⁽⁹⁾ showed that the preceding birth interval of children was a significant predictor of nutritional status. Children having birth interval less than 24 months had a higher risk of being wasting as compared with children having above 48 months birth interval. However, that study showed no association between birth spacing and stunting. The difference in results was also found in the study by H. Chungkham et al.⁽¹⁰⁾ showed that there was a relationship between birth spacing and stunting in the majority of regions in India, however, some regions showed that there was no relationship between birth spacing and stunting.

This study objective is to determine the relationship between birth spacing and the incidence of stunting in children 24-59 months with WHO-recommended cut-off for birth spacing and discuss specifically stunting in terms of child's nutritional status. Our study contributes to public health, especially in conducting maternal and child health education programs so that we can find out what factors play a role in the incidence of stunting in children 24-59 months.

METHODS

Research design

This study used an observational study with a cross-sectional design. This study measured the outcome which is stunting and the exposure which is birth spacing at the same time and the participants were selected based on inclusion and exclusion criteria set for the study explained in the study variables section. We used this study design because the data collection is relatively fast although the limitation of this design that we can not reveal a causal relationship between variables, however, it is sufficient to explain the distribution and relationship between variables. Data were collected in September-November 2019 at the Public Health Center of Grogol Petamburan District, West Jakarta, DKI Jakarta Province, Indonesia.

Study subjects

The population in this study are children

aged 24-59 months who accompanied by their parent visited the Public Health Center of Grogol Petamburan District, West Jakarta, Indonesia. The sample of this study consists of 137 children that met inclusion criteria using consecutive non-random sampling method and 7 samples were excluded due to exclusion criteria. The final samples in this study are 130 children aged 24-59 months.

Subject characteristics

The dependent variable is stunting and the independent variable is birth spacing. The subject characteristic in this study consists of child's age, gender, history of low birth weight, history of premature birth, maternal education level, maternal height, and maternal age during pregnancy. The inclusion criteria set in this study are children aged 24-59 months who were the youngest child and their parent agreed with signing the informed consent. The exclusion criteria are children aged 24-59 months with mental or physical disabilities, only child, and twins.

Study Variables

Stunting is defined as the nutritional status of children aged 0-59 months as measured by anthropometry based on body height-for-age z score (HAZ) < -2 SD. The data were taken from a questionnaire and height measurement then entered into the 2006 WHO child growth standards. For data analysis, it was transformed into dichotomous, coded 1 for stunting and severe stunting and coded 2 for non stunting.

Birth spacing is defined as the period between the two most recent consecutive births. The data were taken from a questionnaire and it was transformed into dichotomous, coded 1 for birth spacing ≥ 2 years and coded 2 for birth spacing < 2 years.

Maternal education is defined as the last formal education level attended by the mothers. The data were taken from a questionnaire and it was transformed into three categories, coded 1 for low education (junior high school and below), coded 2 for middle education (senior high school), coded 3 for high education (college).

Maternal height is defined as a measurement index, which was measured by standing using anthropometry and transformed into dichotomous, coded 1 for ≥ 152 cm and coded 2 for < 152 cm.

Maternal age during pregnancy is defined as the age of the mother when she was pregnant with the child who was the subject of this study. The data were taken from a questionnaire and transformed into dichotomous, coded 1 for ≥ 21 years old and coded 2 for < 21 years old.

Age is defined as the age of the child in months who were the subject of the study. It was categorized into three groups, coded 1 for 24-36 months, coded 2 for 37-48 months, and coded 3 for 49-59 months.

Gender is defined as child's gender and it was categorized into two groups and data were taken from a questionnaire and transformed into dichotomous, coded 1 for male and coded 2 for female.

Low birth weight is defined as a birth weight of fewer than 2,500 grams. The data were taken from a questionnaire and transformed into dichotomous, coded 1 for yes and coded 2 for no history of low birth weight.

Premature birth is defined as babies born alive before 37 weeks of pregnancy were completed. The data were taken from a questionnaire and it was transformed into dichotomous, coded 1 for yes and coded 2 for no history of premature birth.

Data Collection

The study instruments used for data collection were questionnaires and microtoise. The questionnaire consists of three sections. The first section is informed consent with name of child and their parent also a telephone number, if parents are willing to be participant, they sign the informed consent. The second section is questions related to subject characteristics namely child's age, gender, history of low birth weight, history of premature birth, birth spacing in years, maternal last formal education, and maternal age during pregnancy. The third section is height measurement result.

We used a microtoise which is a device to measure children and maternal height, the result was recorded in the questionnaire, and the child's age and height were converted into z-scores based on the 2006 WHO child growth standard to identify children who had stunting

Statistical analysis

The data analysis was performing the Chi-

square test with the SPSS program in Windows operating system. Univariate analysis was used to determine the distribution and the percentage of each variable. Bivariate analysis was used to determine the significant relationship between dependent and independent variable.

Ethical clearance

Ethical approval for this study was obtained from the Ethical Review Board of the Faculty of Medicine, Universitas Trisakti. Research ethical clearance was aimed to guarantee the confidentiality of subjects' results, as well as to protect and respect their individual rights. The author explained the aims, objectives, and how the data were collected to the subjects, then approval was requested by signing the informed consent form if the subjects agreed to participate in the study.

Table 1. Maternal Characteristics.

Variable	Category	Frequency	
		n	%
Maternal education	Low	50	38.5
	Middle	65	50.0
	High	15	11.5
Maternal height	≥ 152 cm	68	52.3
	< 152 cm	62	47.7
Maternal age during pregnancy	≥ 21 years old	100	76.9
	< 21 years old	30	23.1
Birth spacing	≥ 2 years	104	80.0
	< 2 years	26	20.0

From the maternal height characteristic, we found most mothers in this study had ≥ 152 cm (52.3%).

Table 2. Children characteristics.

Variable	Category	Frequency	
		n	%
Age	24-36 months	42	32.3
	37-48 months	43	33.1
	49-59 months	45	34.6
Gender	Male	76	58.5
	Female	54	41.5
History of low birth weight	Yes	10	7.7
	No	120	92.3
History of premature birth	Yes	9	6.9
	No	121	93.1
Stunting	Yes	36	27.7
	No	94	72.3

RESULTS

Table 1 shows that the majority of mothers in this study were highly educated (61.5%). The subject consisted of 130 who were grouped into maternal and children. The frequency distribution of the subject characteristics is presented in Table

Table 3. The relationship between birth spacing and stunting

Variable	Category	Stunting				Total	p
		Yes		No			
		n	%	n	%		
Birth spacing	≥ 2 years	27	26.0	77	74.0	104	0.378 [†]
	< 2 years	9	34.6	17	65.4		

[†]The statistical result using Chi-Square test with significance value p<0.05

1 and Table 2

From Table 3. showed the relationship between child birth spacing and incidence of stunting in children 24-59 months was not statistically significant.

DISCUSSION

Maternal characteristics

Maternal education is associated with the incidence of stunting in children as found in a study by A study by Mustamin et al.⁽¹¹⁾ Mothers with low education were more at risk of having stunted children. The maternal high education level can affect her nutrition knowledge, especially in providing the right type and amount of food so that the child can grow and develop optimally.

Maternal height is one of the factors that can cause stunting as found in A study by Fitriahadi⁽¹²⁾ that showed there was a significant relationship between maternal height and stunting where mothers with height under 150 cm have a higher risk of having a stunted child. A study by Fajariyah and Hidajah⁽¹³⁾ also showed mothers with short stature had higher risk of having a stunted child. One or both parents who are short due to a pathological condition (such as growth hormone deficiency) have a gene that carries a short stature trait, which increases the chance that the child will inherit the gene and become stunted. However, if the parents are short due to malnutrition or an acquired disease, the child is likely to grow to a normal height as long as they are not exposed to other risks.

Based on maternal age during pregnancy, most mothers were pregnant at the age ≥ 21 years old. Maternal age is one of the factors associated with infant morbidity and mortality as found in a study by Rahmawati et al.⁽¹⁴⁾ showed that there was a significant relationship between maternal age at pregnancy and stunting, the risk of stunting increases with maternal age < 20 years old or ≥ 35 years old at pregnancy. The age range of 20-

35 years old is the safest period for childbirth. Mothers who give birth at the age of under 20 years old have not developed reproductive organs optimally, this condition will increase the risk of premature delivery and fetal growth restriction which will cause stunting later.⁽¹⁵⁾

The birth spacing characteristic shows the most mothers had birth spacing ≥ 2 years (80.0%). The distribution of birth spacing in this study was similar to Sumiaty et al. ⁽¹⁶⁾ which was done in Central Sulawesi, Indonesia, showed the majority of the subject had a birth spacing of more than two years. This similarity is due to the same maternal education level who were already high.

Children characteristics

Table 2 shows the child’s age distribution in this study was evenly distributed in all age groups, with the largest group being aged 49-59 months (34.6%) and most children in were male (58.5%). Stunting is mostly found at the age of 24-36 months.⁽⁴⁾

Most children in this study had no history of low birth weight (92.3%). Low birth weight contributed to the incidence of stunting by 20%. Low birth weight is a baby born with a birth weight of fewer than 2,500 grams, this condition will have an impact on childhood if they cannot catch up with normal growth, one of the impacts is stunting.^(4,17)

Based on history of premature birth, most children in this study had no history of premature birth (93.1%). Prematurity is a condition where the gestational age is < 37 weeks. Growth in premature babies is delayed due to short gestational age and linear growth retardation in the womb, which is also associated with maternal malnutrition during pregnancy.⁽¹⁸⁾ Premature birth is associated with the incidence of stunting. Low birth weight and premature birth have a significant role as a cause of stunting because low birth weight babies have weaknesses in growth due to malnutrition. ^(19,20,21)

A study by Apriluana et al.⁽²²⁾ showed that the factor that had a major influence on the

incidence of stunting in children aged 0-59 months was low birth weight. A short birth spacing (<2 years) has a risk for mothers to give birth to low birth weight babies, but this can also occur in mothers with a birth spacing ≥ 2 years because other maternal factors can affect the fetus, such as malnutrition during pregnancy, therefore the birth spacing is a factor that does not directly affect the incidence of stunting because it can be modified by other factors.

The majority of children in this study were not stunting (72.3%) while the incidence of stunting in this study was 27.7%, this result was below the national prevalence in 2018, which was 30.8%.⁽¹⁾ Based on RISKESDAS 2018 data, there were 17.7% of children under five years old with stunting in the DKI Jakarta province. This showed that the stunting prevalence in this study was higher than the prevalence in the DKI Jakarta province.

Relationship between birth spacing and stunting

Table 3 shows children who have mother with birth spacing ≥ 2 years and not stunting are as many as 77 children (74%), while children who have mother with birth spacing < 2 years and not stunting are as many as 17 children (65.4%). The incidence of stunting was higher in children who have mother with birth spacing < 2 years (34.6%), but statistically not much different from the incidence of stunting in children who have mother with birth spacing ≥ 2 years (26%). From the Chi-square test, this study showed there was no significant relationship between mothers birth spacing and the incidence of stunting in children aged 24-59 months with $p=0.378$ ($p>0.05$). This result is similar to a study by Chungkham et al.⁽¹⁰⁾ showed that there was no relationship between birth spacing and stunting in children under five years old. The majority of subjects in this study had birth spacing ≥ 2 years. This condition is ideal and follows the WHO recommendation, birth spacing more than 3 years can lower the risk of stunting in children and it was a protective factor against stunting.^(23,24)

In contrary, a study by AbdulahYaseen E. et al.⁽²⁵⁾ found that there was a relationship between birth spacing and stunting, children with birth spacing less than 24 months have a higher

risk of stunting. Although the results of this study did not show a relationship between birth spacing and stunting, the incidence of stunting in children who have mother with birth spacing < 2 years was still relatively high, so we suggested to promote the recommended interpregnancy interval of at least 24 months to reduce adverse child health outcomes. The poor parenting pattern occurs when the birth spacing is less than two years. With the family planning program, the number and spacing of births can be adjusted according to WHO recommendations so that parents can have enough time and attention in terms of feeding practices, nurturing and prioritizing children's health especially in the first thousand days of a child's life.

The ideal birth spacing allows the mother to recover perfectly after giving birth to the previous child so that the mother can provide good parenting, especially in providing nutrition to the child. The birth spacing recommended by the WHO is at least 24 months after live birth which is also supported by the ideal breastfeeding time of up to two years. With the ideal birth spacing, the mother's health and nutritional condition can recover optimally and will have an impact on the quality of the fetus in subsequent pregnancies.^(5,23,26)

The strengths of this study include the use of WHO-recommended birth spacing cut-off and detailed discussion of stunting. However, several limitations of this study should be noted. First, this study used cross-sectional design which does not reveal causal relationships between the variables. Several risk factors were not excluded thus it might have caused an omission bias. In addition, several variables that might be significant risk factors for stunting in children under five years old were not investigated in this study, such as maternal nutritional status during pregnancy and history of infection during first thousand days of child's life

Further research is suggested to exclude factors that can modify the birth spacing, such as maternal factors which include a history of low birth weight, premature birth, maternal energy deficiency in pregnancy, maternal age at pregnancy < 21 years old, and factors that occur in the first day of life such as not receiving colostrum and exclusive breastfeeding. The Public Health Center

can improve the IEC program (Information, Education, Communication) regarding the health of children aged 24-59 months, especially nutritional health during the first thousand days of life and maternal nutritional health during pregnancy and lactation.

CONCLUSIONS

Stunting prevalence in this study was lower than national prevalence in Indonesia (27.7%) and the stunting incidence was highest in children who have mother with birth spacing < 2 years (34.6%) compared to those with birth spacing \geq 2 years, however, there was no significant relationship between birth spacing and the incidence of stunting among children aged 24-59 months ($p=0.378$) because the majority of children in this study have mother with birth spacing \geq 2 years.

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CONFLICT OF INTEREST

Disclose any personal financial interests related to the subject matters discussed in the manuscript here. For example, authors who are owners or employees of companies that market services described in a manuscript will be disclosed here. If there are no conflicts, please write "Competing interests: No relevant disclosures".

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