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Analysis of exclusive breastfeeding and history of infectious diseases for wasting in children aged 12 - 59 months

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ABSTRAK

Latar Belakang: *Indonesia menghadapi beban tinggi wasting pada anak. Secara global pada tahun 2018, 1 dari 10 balita mengalami berat badan di bawah normal atau status gizi terlalu kurus untuk seusianya. Berdasarkan Survei Kesehatan Indonesia tahun 2023, prevalensi status gizi (BB/TB) pada anak usia 0-59 bulan di Indonesia mencapai 8,5%. Di Jawa Tengah prevalensi BB/TB tercatat sebesar 7,1% (wasting = 5,5% dan severely wasting = 1,6%), sementara Kudus memiliki prevalensi 8,7% di atas rata-rata Jawa Tengah. Banyak faktor yang diketahui berkontribusi terhadap wasting diantaranya: pemberian ASI eksklusif dan asupan vitamin A yang tidak memadai; pemberian MP-ASI yang kurang berkualitas; balita yang menderita sakit seperti diare, ISPA, kecacingan, dan penyakit infeksi lainnya; imunisasi tidak lengkap; keterlambatan penanganan balita yang sakit; dan lingkungan rumah yang kurang bersih.*
Tujuan: *Penelitian ini bertujuan untuk mengetahui hubungan antara pemberian ASI eksklusif dan riwayat penyakit infeksi (diare, ISPA, dan tuberkulosis) dengan kejadian wasting pada anak usia 12-59 bulan.*
Metode: *Desain penelitian yang digunakan adalah case control dengan 150 anak balita sebagai subjek penelitian (50 wasting dan 100 gizi normal). Pengambilan data dilakukan pengukuran BB dan TB menggunakan alat ukur digital, serta wawancara kepada orang tua/wali menggunakan kuesioner. Analisis data dilakukan secara univariat menggunakan distribusi frekuensi dan bivariat menggunakan chi-square.*
Hasil: *Variabel yang mempunyai hubungan dan secara signifikan dengan kejadian Wasting pada anak usia 12-59 bulan adalah pemberian ASI eksklusif (p-value=0.018). Sedangkan riwayat penyakit infeksi Diare (p-value=0.271), ISPA (p-value=0.950), dan Tuberkulosis (p-value=1.000) tidak mempunyai hubungan yang signifikan dengan kejadian Wasting di Kabupaten Kudus.*
Kesimpulan: *Pemberian ASI eksklusif pada anak balita mempunyai korelasi dengan kejadian wasting. Pemenuhan nutrisi balita dengan ASI eksklusif dapat menguatkan imunitas tubuh pada anak terhadap berbagai macam penyakit infeksi.*

KATA KUNCI*:* *wasting; ASI eksklusif; diare; ISPA; tuberkulosis*

ABSTRACT

Background: *Indonesia faces a high burden of wasting among children. Globally, 1 in 10 toddlers were underweight or wasting for their age in 2018. According to the 2023 Indonesian Health Survey, the prevalence of nutritional status (weight/height) among children aged 0-59 months in Indonesia reached 8.5%. In Central Java, the prevalence was 7.1% (wasting = 5.5% and severely wasting = 1.6%), while Kudus had a prevalence of 8.7%, above the Central Java average. Many factors are known to contribute to wasting, including inadequate exclusive breastfeeding and vitamin A intake; poor-quality complementary feeding (MP-ASI; illnesses such as diarrhea, acute respiratory infections (ARI), worm infections, and other infectious diseases; incomplete immunization; delayed treatment of sick toddlers; and poor household hygiene.*

Objectives: *This study aims to determine the relationship between exclusive breastfeeding and a history of infectious diseases (Diarrhea, ARI, and Tuberculosis) with the incidence of wasting in children aged 12-59 months.*

Methods: *This case-control study involved 150 children (50 with wasting and 100 with normal nutrition status). Data was collected through Weight measurement using digital scales, Height measurement using digital TB measuring instruments, and interviews with parents/guardians using questionnaires. The data analysis used was univariate using frequency distribution and bivariate using chi-square.*

Results: *The variable that has a significant relationship with the incidence of wasting in children aged 12-59 months is exclusive breastfeeding (p-value = 0.018). In comparison, the history of infectious diseases diarrhea (p-value = 0.271), ARI (p-value = 0.950), and tuberculosis (p-value = 1.000) did not have a significant relationship with the incidence of Wasting in Kudus Regency.*

Conclusions: *Exclusive breastfeeding in toddlers correlates with the incidence of wasting. Fulfilling toddler nutrition with exclusive breastfeeding can strengthen the child's body's immunity against various infectious diseases.*

KEYWORD*:* *wasting; exclusive breastfeeding; diarrhea; ARI; tuberculosis*

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INTRODUCTION

Indonesia faces a high burden of wasting among children, with more than 760,000 children under the age of 5 experiencing severe wasting. The Indonesian government has committed to reducing severe wasting in children from 10.2% to less than 7% by 2024. Wasting is a severe form of malnutrition that occurs when a child is too thin in proportion to their height/length and can even increase the risk of death in children up to 12 times (1). Globally, 1 in 10 toddlers were underweight or wasting for their age in 2018 (2). More than 49 million children under the age of five were affected by wasting, and almost 17 million children suffered from severe wasting (3).

According to the 2023 Indonesian Health Survey (SKI), the prevalence of nutritional status (weight/height) among children aged 0-59 months in Indonesia reached 8.5% (wasting = 6.4% and severely wasting = 2.1%). In Central Java, the prevalence was 7.1% (wasting = 5.5% and severely wasting = 1.6%), while Kudus had a prevalence of 8.7%, above the Central Java average.

Wasting has an impact on growth and development, so children with wasting are at three times higher risk of stunting than children with good nutrition. Many factors are known to contribute to wasting, including inadequate exclusive breastfeeding and vitamin A intake; provision of poor-quality complementary foods; toddlers who suffer from illnesses such as diarrhea, ARI, worms, and other infectious

diseases; incomplete immunization; late treatment of sick toddlers; and an unclean home environment (5).

In 2022, exclusive breastfeeding in Kudus for infants aged 0-6 months was 55.3%, lower than in Central Java Province (71.4%). This is a slight increase from 2021 (48.6%) but lower than 2020 (65%). The number of toddler diarrhea sufferers served in health facilities was 1,292, or 8.9% of the estimated diarrhea in health facilities. Of the number of toddler diarrhea sufferers served in health facilities, 100% had received oral rehydration solution and zinc. The estimated number of toddler pneumonia in 2022 in Kudus was 234 cases, and the realization was 178 (76.1%). Cases of childhood TB in Kudus in 2022 at the Health Center and Hospital were 381 children, which was higher than in 2021, which was only 147 children (6).

According to the Indonesian Ministry of Health (2015), Children Under Five Years Old (Toddlers) are defined as children over one year old, typically referred to as 12-59 months old (7). Based on the description above, the researcher aims to investigate the connection between exclusive breastfeeding and a history of infectious diseases (diarrhea, ARI, tuberculosis) and wasting in children aged 12-59 months in Kudus.

MATERIALS AND METHODS

The design of this study is observational analytic with a case-control approach. In 2023, the population of toddlers (0-59 months) with wasting in 3 (three) working areas of Kudus Health Centers was 981 thin toddlers and 7403 toddlers with normal nutrition, namely Undaan, Rejosari, and Rendeng Health Centers. Subjects were selected randomly (random sampling) based on age 12-59 months, namely 50 wasting children and 100 normal nutrition children (ratio 1:2).

The study used digital scales, digital height meters, and questionnaires from previous studies (8, 9) for data collection. Data collection involved measuring weight and height and conducting interviews with parents or guardians of toddlers aged 12-59 months using questionnaires. The infectious disease history questionnaire in this study only asked parents about the categories of diarrhea that their children had experienced in the last 1-3 months, history of ARI in the previous 3-6 months, and history of tuberculosis in the last 6 months to 2 years).

The data collected was then processed and analyzed using SPSS. The results were presented using frequency tables and percentages. The study used the chi-square test to assess the correlation between independent variables (exclusive breastfeeding and history of infectious diseases) and the dependent variable (incidence of wasting).

RESULTS AND DISCUSSIONS

This study was conducted on parents/guardians who have toddlers (aged 12 - 59 months), and the subjects of the study were toddlers with malnutrition (wasting) and normal nutrition in 3 (three) working areas of the Kudus Regency Health Center. The characteristics of the toddlers studied included age, gender, and nutritional status, while the parents' characteristics included age, gender, income, occupation, and education.

Table 1. Characteristics of Research Subjects

Characteristics	Case		Control	
	n	%	n	%
Toddler Age				
12 - 23 months	12	24	34	34
24 - 35 months	10	20	21	21
36 - 47 months	15	30	25	25
48 - 59 months	13	26	20	20
Toddler's Gender				
Boy	28	56	46	46
Girl	22	44	54	54
Parent/Guardian Age				
15 – 24 years	2	4	11	11
25 – 34 years	28	56	60	60
35 – 44 years	20	40	28	28

Characteristics	Case		Control	
	n	%	n	%
>45 years	0	0	1	1
Gender of Parent/Guardian				
Male	2	4	1	1
Female	48	96	99	99
Parent's Job				
Not Working	36	72	57	57
Working	14	28	43	43

Table 1 shows the characteristics of the research subjects (toddlers) according to age. The most-wasting category is 36-47 months old, totaling 15 children (30%), and the normal nutrition category is 12-23 months old, totaling 34 children (34%). According to gender, the most wasting toddlers are male, 28 children (56%), and normal nutrition toddlers are mostly female, totaling 54 children (54%).

Based on the age of the parents/guardians, it is the same between the case group (wasting) and the control group (normal nutrition); namely, the majority are aged 25-34 years. Most parents/guardians of toddlers with wasting and toddlers with normal nutrition in this study are female. The majority of the income of the parents of toddlers in this study is below the RMW or UMR (Rupiah Minimum Wage) (Rp 2,439,813). Based on the occupation of the parents of toddlers, most are IRT (Housewives), and the last education of the parents is High School/Vocational High School graduate or equivalent. Chi-square is a bivariate analysis test used in this research. Bivariate analysis based on the research results can be found in **Table 2** below.

Figure 1. Percentage of stunting by dietary diversity score

Variables	Case		Control		Total		OR	CI 95% (Lower – Upper)	p
	n	%	n	%	n	%			
Exclusive Breastfeeding							2.471	1.22 – 5.01	0.018
No	33	42.9	44	57.1	77	100			
Yes	17	23.3	56	76.7	73	100			
History of Diarrhea							1.631	0.78 – 3.43	0.271
Yes	17	41.5	24	58.5	41	100			
No	33	30.3	76	69.7	109	100			
History of ARI							1.098	0.53 – 2.29	0.950
Yes	35	34	68	66	103	100			
No	15	31.9	32	68.1	47	100			
History of TBC							1.000	0.09 – 11.3	1.000
Yes	1	33.3	2	66.7	3	100			
No	49	33.3	98	66.7	147	100			

Table 2 shows that the majority of toddlers aged 12–59 months who do not receive exclusive breastfeeding with wasting are 42.9% with a p-value <0.05, which means there is a statistically significant relationship (p-value = 0.018). A total of 48 toddlers (69.6%) with normal nutrition received positive nutritional parenting patterns (democratic and authoritarian) from parents, which are not significant (p-value = 0.602). Similar things are with wasting toddlers who have a history of diarrhea disease of 41.5% (p-value = 0.271), wasting toddlers who have a history of ARI disease, namely 34% (p-value = 0.950), and wasting toddlers who have a history of

tuberculosis disease of 33.3% (p-value = 1.000) the third history of the disease does not have a significant relationship with the incidence of wasting in toddlers aged 12–59 months in Kudus.

The research findings indicated a statistically significant relationship ($p < 0.05$) between exclusive breastfeeding and wasting, with a p-value of 0.018. Toddlers who do not receive exclusive breastfeeding are 2.47 times more likely to become wasting compared to those who do. The comparison results between the control and case groups showed that toddlers who did not receive exclusive breastfeeding had a lower wasting rate in the case group (42.9%) compared to toddlers with normal nutrition (control group) at 57.1%. The incidence of wasting in the control group (normal nutrition) was higher at 76.7% compared to wasting toddlers in the case group at 23.3% who received exclusive breastfeeding.

According to Wijiwinarsih et al., (2019). exclusive breastfeeding reduces the risk of wasting in children by 0.38 times. This difference is statistically significant ($p <0.001$) and is based on examining 4 (four) articles with case-control studies. In addition, other studies have shown that toddlers who do not receive exclusive breastfeeding tend to have a 3.223 times greater chance of experiencing wasting than toddlers who receive exclusive breastfeeding (12).

Exclusive breastfeeding for the first six months is an effective strategy for reducing the burden of wasting. In a 2019 study by Hasyim & Sulistianingsih, a significant relationship was found between exclusive breastfeeding and toddlers' nutritional status ($p = 0.046$) (13). Breastfeeding has a contribution in terms of saving children's lives. In addition, breast milk supports cognitive and sensory development in the short term. And protects babies from chronic and infectious diseases. Exclusive breastfeeding is said to reduce infant mortality due to diseases such as pneumonia and diarrhea and lead to faster recovery from illness. In the long term, breast milk can protect against non-communicable diseases such as diabetes, cardiovascular, and obesity (14).

After completing the questionnaire on exclusive breastfeeding, most of the toddlers in the study were given formula milk by their mothers, even though almost all of the mothers were not working. In addition, this shows that a high maternal education level does not guarantee that the child will not experience wasting (15). The lack of maternal awareness regarding exclusive breastfeeding for the first 6 months demonstrates a high percentage of infants not receiving it. This data shows that exclusive breastfeeding coverage for babies 0-6 months in Kudus (55.3%) in 2022 is less than the average coverage for Central Java Province (71.4%). There was a decrease from the previous year, with the coverage dropping from 65% in 2020 to 48.6% in 2021 (6).

Table 2 shows no correlation between history of diarrhea and wasting (p-value = 0.271), which is statistically not significant ($p \geq 0.05$). Toddlers with wasting who have experienced diarrhea (41.5%) are more than toddlers who have never had diarrhea (30.3%). In addition, a study by Purwadi et al. in 2023 found no significant relationship between experiencing diarrhea in the previous month and wasting (p-value = 0.209) (16). The present study's findings differ from prior research, which showed a significant link between diarrhea and wasting (17). The study at the Piyungan Health Center found that diarrhea significantly influences wasting in toddlers aged 6–59 months (p-value = 0.011) (18). Additionally, Zaba et al. (2021) discovered that children with a history of diarrhea are 2.4 times more likely to experience acute malnutrition (wasting) (19).

In 2020, Riswandha's study found no relationship between nutritional status and the incidence of diarrhea (20). Most mothers quickly treat their children with diarrhea by giving them oral rehydration solutions and taking them to healthcare facilities such as doctors or midwives. Since rehydration is the key to treating acute diarrhea, this approach will reduce the incidence of electrolyte imbalance problems in children.

Acute diarrhea lasts 7-14 days. A study by Yisak et al. (2015) found toddlers with recent diarrhea were at 3.9 times higher risk of wasting. Diarrhea duration can be affected by factors such as probiotics, zinc supplements, and nutritional treatment. Research suggests that combining probiotics and zinc supplements can reduce diarrhea frequency and duration by boosting the immune response and preventing the growth of harmful organisms (21). Diarrhea in children is

categorized as acute and can resolve on its own if it lasts less than 14 days without additional symptoms (22). It may not affect a child's nutrition as it does not hinder nutrient absorption.

The bivariate analysis found no significant relationship between ARI history and wasting incidence (p-value = 0.950). Toddlers with wasting exposure to acute respiratory infections (34%) were more likely to suffer from ARI than those who had never experienced ARI (31.9%). Referring to Table 2, of the 103 toddlers who had had ARI, 35 toddlers (34%) had wasting. This was because the respondents were in the recovery period for ARI between two weeks or one to three months during data collection. Even when individuals exposed to ARI do not experience wasting, wasting can be caused directly by infection status and inadequate food intake. Hence, it is essential to effectively address this issue to avoid future wasting (23).

Based on research by Rahayu et al. (2018), the results stated that toddlers with ARI have a 4x greater chance of experiencing wasting, and 85.7% of toddlers with wasting suffered from ARI in Reflinda's (2020) study (24, 25). However, the conclusion contradicts the findings of Nata & Setiadi (2023), where the statistical analysis shows that the p-value = 0.247, indicating that a history of ARI does not significantly affect the incidence of wasting in children (26). This contrasts with the results of a study by Asri & Nooraeni in 2020 (27). On the other hand, the research by Lawas et al. (2023) demonstrates a significant correlation between wasting and ARI (17).

Toddlers with ARI may have reduced appetite, which can affect their nutrition (28). Malnutrition is more common in children who have had ARI in the last two weeks (29). The study questionnaire did not ask about the duration of the child's ARI symptoms, only whether the toddler had experienced cough, runny nose, and fever. ARI typically lasts around 14 days, indicating the presence of an infection. Infectious diseases can affect a child's appetite and lead to malnutrition (22).

The study found no connection between a history of TB and wasting in toddlers (p-value = 1.000). Toddlers with wasting who had ever had TB were comparable to toddlers who had never had TB, which was 33.3%. Toddlers with TB were 1.000 times more likely to experience wasting. Out of 150 toddlers, 3 had TB - 1 with wasting and 2 with normal nutrition. So, the majority of toddlers aged 12–59 months in this study had never had TB and had normal nutritional status.

Research conducted by Lawas, et al., (2023) found no relationship between Pulmonary TB and wasting. Widyastuti et al. (2021) found a significant relationship (p-value = 0.020) between nutritional status and Pulmonary TB in children aged 1 to 5 years (30). According to a 2018 study by Putra Apriadi, et al., children under 5 with poor nutritional status are 1.8 times more likely to develop pulmonary TB. Specifically, they have a 3.31 times higher risk (31).

The risk of contracting tuberculosis (TB) and the possibility of latent TB (latent TB infection) becoming active TB are both influenced by dietary status. For healthy growth and development, children need adequate nutrition. Poor nutrition will affect the growth and development of the body's immune system, making children susceptible to disease. TB infection can cause malnutrition (weight loss and body shrinkage) (32).

The condition known as TB or wasting/consumption disease can be caused by factors such as decreased appetite, metabolic changes, and the body's inflammatory response (33). Treatment for TB patients can improve the body's defense system by reducing the number of bacteria in the body. Nutritional status also improves along with the body's defense system. A healthy diet can speed up the healing process and strengthen the immune system, thereby increasing the body’s capacity to fight disease infections (34).

The National TB Control Program in Indonesia uses Isoniazid, Rifampicin, and Pyrazinamide as a combination of Anti-Tuberculosis Drugs for six months for children. This drug is given daily for the first two months, then daily for the next four months, with Isoniazid and Rifampicin. The correct dose is calculated based on the child's weight. OAT treatment reduces the number of bacteria, strengthening the immune system of TB patients (35). Less nutrition is used to fight infection, and more is used to aid the healing process, progressively improving the nutritional condition of TB patients (36).

Research by Hendraswari, et al., (2023) concluded that children with a history of infectious diseases (diarrhea, worms, ARI, measles, pulmonary TB, and pneumonia) have a 1.03-fold increased risk of wasting compared to children without a history of infectious diseases (after being controlled with the variables of BB at birth and IMD) not statistically significant (37). Toddlers who are thin and suffer from infectious diseases may experience more severe symptoms and a longer recovery time than toddlers who are well-nourished. Similar to stunting, wasting in children increases their chances of suffering from non-communicable diseases such as diabetes and heart disease as adults.

Toddlers with infectious diseases may have symptoms like a bitter taste in their mouth and loss of appetite. These can affect their nutritional intake and potentially impact their growth. According to Soedarsono and Sumarmi (2021), infectious diseases can contribute to a toddler's being underweight (38). In their study, most toddlers had experienced diarrhea and Acute Respiratory Infection (ARI), leading to changes in food metabolism (39).

The limitation of this study is that data bias from the interview results cannot be denied or avoided because some respondents were accompanied by guardians/people who live in the same house as toddlers, such as grandmothers or grandfathers (not parents because they work). The researcher also did not conduct further research on other infectious diseases.

CONCLUSIONS AND RECOMMENDATIONS

Researching the nutritional status of wasting in Kudus is crucial due to the increasing number of wasting cases compared to the previous year. Preventing wasting is equally important as addressing stunting, as the current global focus primarily centers on treating wasting. Additionally, providing exclusive breastfeeding to toddlers is linked to the occurrence of wasting. Health workers should improve mothers' understanding of the benefits of exclusive breastfeeding for toddlers, considering the low rates in Kudus. Properly nourishing toddlers with exclusive breastfeeding can enhance their immune system, protecting them from various diseases, including bacterial and viral infections. Parents need to detect wasting early by regularly monitoring their child's growth and development, measuring their weight and height at the integrated health post every month to assess the nutritional status of toddlers.

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