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ENERGY INTAKE AND WASTING AMONG CHILDREN AGED 6-59 MONTHS

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ABSTRAK : ASUPAN DAN PEMBUANGAN ENERGI PADA ANAK USIA 6-59 BULAN

Latar Belakang: Wasting merupakan kondisi kekurangan gizi yang disebabkan oleh rendahnya berat badan dan tinggi badan. Balita merupakan kelompok usia yang lebih rentan mengalami wasting dibandingkan kelompok usia lainnya. Wasting dapat menjadi salah satu penyebab utama morbiditas dan mortalitas. Prevalensi balita yang mengalami wasting di Kota Depok pada tahun 2016 sebesar 6,1%.

Tujuan: untuk mengetahui asupan energi dan faktor lain yang berhubungan dengan wasting di Kecamatan Bojongsari Kota Depok

Metode: Sampel penelitian diambil dari populasi penelitian yang memenuhi kriteria inklusi dan eksklusi. Kriteria inklusi penelitian adalah balita usia 6-59 bulan dan balita dengan z-score >-3 SD – 1SD yang berdomisili di Kecamatan Bojongsari Kota Depok. Sedangkan kriteria eksklusi adalah balita usia 6-59 bulan yang memiliki z-score <-3 SD. Sehingga jumlah sampel yang diperoleh sebanyak 251 balita yang diambil dengan menggunakan non-probability sampling dengan metode total sampling. Data yang memenuhi kriteria dalam penelitian dimasukkan ke dalam program IBM SPSS. Analisis data menggunakan uji Chi-square untuk menganalisis hubungan antara variabel dependen dan variabel independen dengan uji signifikansi statistik menggunakan nilai p < 0,05. Analisis regresi logistik multivariat untuk memperoleh faktor dominan terhadap kejadian wasting.

Hasil: Hasil analisis multivariat menunjukkan asupan energi merupakan faktor dominan kejadian *wasting* pada anak usia 6-59 bulan (*p-value* 0,035).

Kesimpulan: Balita dengan asupan energi yang tidak mencukupi memiliki risiko 6,2 kali lebih besar untuk mengalami kekurangan berat badan dibandingkan dengan balita dengan asupan energi yang cukup.

Saran: Hasil penelitian diharapkan dapat dijadikan sebagai bahan intervensi lebih lanjut yang spesifik dan sensitif dalam menanggulangi faktor-faktor yang berhubungan dengan perbaikan gizi buruk pada balita serta perlu dilakukan program edukasi kepada ibu balita untuk mengenalkan bentuk makanan pendamping ASI, frekuensi pemberian makanan pendamping ASI, dan melanjutkan program pemberian makanan tambahan pada balita yang mengalami wasting.

Kata Kunci : Asupan energi, children, wasting

ABSTRACT

Background: Wasting is a malnutrition based on low body weight to height. Children are an age group that is more susceptible to wasting compared to other age groups. Wasting can be one of the main causes of morbidity and mortality. The prevalence of children experiencing wasting in Depok City in 2016 was 6.1%.

Purpose: to determine energy intake and other factors related to wasting in Bojongsari Subdistrict, Depok City.

Methods: The research sample was taken from the research population that met the inclusion and exclusion criteria. The inclusion criteria for the study were children aged 6-59 months and children with a z-score >-3 SD - 1SD who live in Bojongsari District, Depok City. While the exclusion criteria were children aged 6-59 months who had a z-score <-3 SD. So that the number of samples obtained was 251 children taken using non-probability sampling with a total sampling method. Data that met the criteria in the study were entered into the IBM SPSS program. Data analysis used the Chi-square test to analyze the relationship between the dependent variable and the independent variable with a statistical significance test using a p value <0.05. Multivariate logistic regression analysis to obtain the dominant factor in the incidence of wasting.

Results: The nutritional status was 9.6% of children experienced wasting. The results of multivariate analysis showed that energy intake was the dominant factor in wasting in children aged 6-59 months (p-value 0.035).

Conclusion: Children with insufficient energy intake had a 6.2 times greater risk of wasting compared to children with sufficient energy intake.

Suggestions: The results of the study are expected to be further specific and sensitive interventions in addressing factors related to improving malnutrition in children and it is necessary to conduct educational programs for mothers of children to introduce the form of complementary foods, the frequency of feeding, and continue the program of providing additional food to children who experience wasting.

Kata kunci/Keywords: Energy intake, children, wasting

INTRODUCTION

Malnutrition among children remains a critical public health problem in parts of the world. Malnutrition is a health condition caused by a deficiency, excess, or adequacy of macronutrient intake or vitamins and minerals (Toma et al., 2023). The impacts of malnutrition include wasting, which is an acute malnutrition that has short-term and long-term consequences that are dangerous for children. Most commonly occurring wasting in children under the age of five, because the unavailability of sufficient food causes suboptimal growth in children and non-communicable diseases such as diarrhea (Chekol et al., 2022; Getu et al., 2023). Wasting is a form of malnutrition that reflects a child's weight that is too thin to their height, which is characterized by a z-score for weight/height of less than -2 Standard Deviations (SD) for wasting and a z-score for weight/height of less than -3 SD for severe wasting (Kementerian Kesehatan RI, 2020). Wasting children have a weak immune system, which makes them susceptible to infection and more severe disease after infection (Mertens et al., 2023). In addition, wasting can be associated with adverse and often unwarranted consequences, including decreased cognitive abilities, motor skills, social skills, decreased work productivity in adulthood, increased economic burden and increased risk of degenerative risk factors in adulthood (Wali et al., 2021; Werdani & Utari, 2020). Globally, in 2022 an estimated 45 million children under 5 years of age (6.8%) will experience wasting. The prevalence of wasting based on data from the 2022 Indonesian Nutritional Status Survey (SSGI) increased by 7.7% in Indonesia. Meanwhile, in West Java Province, the prevalence of wasting was 6.0% and Depok City with a higher prevalence of 6.1% (Kementerian Kesehatan RI, 2022; WHO, 2023).

UNICEF's conceptual framework makes it easier to understand the factors associated with wasting in children, such as direct factors including low energy and macronutrient intake, loss of intake due to infectious diseases, and. inappropriate feeding, Another factors maternal nutrient loss during pregnancy or when the child is born, and monotonous dietary patterns with low intake. Significant underlying factors include maternal characteristics such as Body Mass Index (BMI), height, socioeconomic status, and inadequate access to health services, sanitation and hygiene (Govender et al., 2021; WHO, 2023). During growth and development, children really need adequate nutritional intake such as energy and protein. Based on research conducted in Pagedangan District, Tangerang Regency, Banten Province, children who consume less energy (<80% RDA) have a 3.067 times risk of wasting (Werdani & Utari, 2020). This is also in accordance with research conducted by Syarfaini (2022), showing that there is a significant relationship between energy intake and the incidence of wasting in children (Syarfaini et al., 2022). Therefore, it is very important for children to obtain daily energy from a varied, healthy and balanced diet (Akombi et al., 2017).

Although various studies have mentioned factors that influence wasting in children, there has been no research conducted in this area. In relation to this, this study was conducted to analyze energy intake and factors that influence the incidence of wasting in children aged 6-59 months including completeness of immunization, birth weight, infectious diseases diarrhea, and Acute Respiratory Infection (ARI), protein intake, fat intake, carbohydrate intake and maternal education in Bojongsari, Depok.

RESEARCH METHODS

The type of research used in this study is a quantitative analytical survey with a cross-sectional research design. The population in this study were children in Bojongsari District, Depok City. The research sample was taken from the research population that met the inclusion and exclusion criteria. The inclusion criteria for the study were children aged 6-59 months and children with a z-score >-3 SD - 1SD who live in Bojongsari District, Depok City. While the exclusion criteria were children aged 6-59 months who had a z-score <-3 SD. So that the number of samples obtained was 251 children taken using non-probability sampling with a total sampling method. This research was conducted in 2023 in Bojongsari District, Depok City.

In this study, the dependent variable was nutrition status (WLZ or WHZ) indicator was obtained

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from anthropometric measurements. Body weight measurements measured using a digital scale with an accuracy of 1.0 kg and height was measured using a microtoise. Children under 2 years of age, the calculation of height plus 0.7 cm was converted into body length, then categorized by calculating and determining the Z-score using the WHO Anthro application. The independent variables in this study were complete immunization, birth weight, ARI, diarrhea, children food intake (energy and macronutrients) and maternal education. This study uses primary data with measurements of weight and height in children and interviews using questionnaires to mothers or caregivers of children to obtain characteristics and 1x24 hour recalls as a description of the level of nutritional adequacy of children.

Determination of the category of nutritional status of children namely into two wasting (-3SD - <-2SD) and normal (-2 SD - 1SD). The gender characteristics (male and female), complete immunization history (incomplete) and (complete). Birth weight is divided into low birth weight (<2500 grams), and normal birth weight (≥2500 grams). ARI disease in the last month is divided into two, namely experiencing ARI and not experiencing ARI, history of diarrhea in the last month (experiencing diarrhea and not experiencing diarrhea). Intake of energy, protein, fat and carbohydrates in children is categorized based on the 2004 Widya Karya Nasional Pangan dan Gizi (WNPG). The category, namely insufficient intake (<80% AKG) and sufficient (≥80% AKG). The mother's education level is divided into two, namely low (≤ Junior High School) and high (>Junior High School).

Data that meet the criteria in the study are entered into the IBM SPSS program. Data analysis used the Chi-square test to analyze the relationship between the dependent variable (wasting) and independent variables (complete immunization, LBW, history of ARI, history of diarrhea, energy intake, protein intake, fat intake, carbohydrate intake, and maternal education) with statistical significance using a value of p <0.05. Multivariate logistic regression analysis to obtain the dominant factor on the incidence of wasting. Independent variables and dependent variables that have p> 0.25 are still included in the multivariate model because these variables are substantively important to study.

This study was conducted with an ethical permit from the Research Ethics Committee and Community Engagement of Faculty of Public Health Universitas Indonesia, number: Ket-153/UN2.F10.D11/PPM.00.02/2023 dated 26, April 2023.

RESEARCH RESULTS

Table 1
Frequency Distribution of Characteristics Respondent

Characteristic	Frequency (n)	Presentation (%)
Nutrition Status		
Wasting	24	9.6
Normal	227	90.4
Age (months)		
6-11	42	16.7
12-36	100	39.8
37-59	109	43.4
Gender		
Male	126	49.8
Female	125	50.2
Immunization		
Incomplete	78	31.1
Complete	173	68.9
Birth Weight		
LBW (<2500 gram)	31	12.4
Normal (≥2500 gram)	220	87.6
History of ARI		
Yes	167	66.5
No	84	33.5

History of Diarrhea		
Yes	59	23.5
No	192	76.5
Energy Intake		
Insufficient (<80% AKG)	115	45.8
Sufficient (≥80% AKG)	136	54.2
Protein Intake		
Insufficient (<80% AKG)	17	6.8
Sufficient (≥80% AKG)	234	93.2
Fat Intake		
Insufficient (<80% AKG)	92	36.7
Sufficient (≥80% AKG)	159	63.3
Carbohydrate Intake		
Insufficient (<80% AKG)	149	59.4
Sufficient (≥80% AKG)	102	40.6
Mother Education		
Low (≤ Junior High School)	82	32.7
High (> Junior High School)	169	67.3

Table 1. Shows the number of children in this study as many as 251 children. The nutritional status of children was 9.6% of children experienced wasting compared to the nutritional status of normal children with a total of 227 children (90.4%). There were 42 children (16.7%) aged 6-11 months, 100 children (39.8%) aged 12-36 months and 109 children (43.4%) aged 37-59 months. Some of 126 children (49.8%) were male and 125 children (50.2%) were female. Some children had a history of incomplete immunization (31.1%). Based on birth weight 12.4% of children with low birth weight (<2500 grams). There were children who had a history of ARI in the last month (66.5%), diarrhea in the last month (23.5%). Children with insufficient energy intake (<80% AKG) were 45.8%. While low protein intake (<80% AKG) were 6.8%, insufficient fat intake (<80% AKG) were 36.7%, and insufficient carbohydrate intake (<80% AKG) were 59.4%. Children with low maternal education levels 32.7%.

Table 2
Bivariate Analysis Showing Factors Associated with the Incidence of Stunting in Children Aged 6-59 Months

Characteristic	Nutritional Status				*p-value*	OR (95% CI)
	Wasting		Normal			
	n	%	n	%		
Immunization						
Incomplete	8	33.3	70	30.8	0.985	0.892 (0.365-2.181)
Complete	16	66.7	157	69.2		
Birth Weight						
LBW (<2500 gram)	6	25	25	11	0.093	2.693 (0.978-7.418)
Normal (≥2500 gram)	18	75	202	89		
History of ARI						
Yes	16	66.7	151	66.5	1.000	1.007 (0.412-2.457)
No	8	33.3	76	33.5		
History of Diarrhea						
Yes	4	16.7	55	24.2	0.563	0.625 (0.205-1.909)
No	20	83.3	172	75.8		
Energy Intake						
Insufficient (<80% AKG)	20	83.3	95	41.9	**<0.001***	6.947 (2.300-20.985)
Sufficient (≥80% AKG)	4	16.7	132	58.1		
Protein Intake						
Insufficient (<80% AKG)	0	0	17	7.5	0.384	1.114 (1.067-1.164)
Sufficient (≥80% AKG)	24	100	210	92.5		

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Fat Intake						
Insufficient (<80% AKG)	16	66.7	76	33.5	**0.003***	3.974 (1.628-9.699)
Sufficient (≥80% AKG)	8	33.3	151	66.5		
Carbohydrate Intake						
Insufficient (<80% AKG)	20	83.3	129	56.8	**0.022***	3.798 (1.258-11.470)
Sufficient (≥80% AKG)	4	16.7	98	43.2		
Mother Education						
Low (≤ Junior High School)	9	37.5	73	32.2	0.763	1.266 (0.529-3.027)
High (> Junior High School)	15	62.5	154	67.8		

*significant , p<0.05

Table 2. Based on the results of bivariate analysis of complete children immunization shows no significant relationship between completeness of immunization and wasting events with p-value = 0.985. The results of the analysis show that there is no significant relationship between birth weight and wasting events in children aged 6-59 months with p-value = 0.093. The results of the statistical test show that there is no significant relationship between a history of ARI (p-value=1.0000), and diarrhea (p-value=0.563) in the last month with wasting events. The results of the analysis show that low energy intake is 6.94 times more likely to experience wasting (p-value = <0.001). The analysis show that there is no significant relationship between protein intake and wasting events (p-value = 0.384). There is a significant relationship between fat intake and wasting (p-value = 0.003). Children with low fat intake are 3.97 times more likely to experience wasting. Children with insufficient carbohydrate intake are at 3.80 times greater risk of wasting (p-value = 0.022). There is no significant relationship between maternal education and the incidence of wasting in children (p-value = 0.763).

Table 3
Final Multivariate Analysis Showing Factors Associated with the Incidence of Stunting in Children Aged 6-59 Months

Variable	B	SE	p-value	95% CI
Energy Intake	1.826	0.867	0.035	6.208 (1.124-33.978)
LBW	0.988	0.578	0.087	2.687 (0.865-8.342)
Complete Immunization	-0.001	0.492	0.998	0.999 (0.381-2.618)
ARI	0.056	0.489	0.909	1.058 (0.405-2.760)
Diarrhea	-0.305	0.621	0.624	0.737 (0.219-2.489)
Fat Intake	0.228	0.568	0.688	1.256 (0.412-3.824)
Carbohydrate Intake	-0.011	0.803	0.990	0.990 (0.205-4.776)
Mother Education	0.070	0.477	0.884	1.072 (0.421-2.730)

Table 3. Shows the final results of the multivariate analysis between risk factors and the incidence of wasting in children aged 6-59 months. The results of statistical tests that are significant with (p-value <0.05) after being controlled with other variables include, completeness of immunization, birth weight, history of ARI, history of diarrhea, protein intake, fat intake, carbohydrate intake, and maternal education. The dominant risk factor for the incidence of wasting is insufficient energy intake which has a 6,208 times higher risk of wasting (95% CI: 1.12-33.9) compared to children with sufficient energy intake.

DISCUSSIONS

Based on the results of this study, it shows that the dominant factor in the occurrence of wasting in children aged 6-59 months is energy intake. The results of a study conducted by Soedarsono in Surabaya stated that children with low energy intake levels are at 13.6 times greater risk of wasting (Soedarsono & Sumarmi, 2021). Another study conducted by Werdani found that children with low energy intake have a 3.067 times higher risk of wasting (Werdani & Utari, 2020). A study conducted in Polombangkeng, Takalar Regency also showed that there was a significant relationship between energy intake and wasting (p-value 0.000), where energy consumption is a factor that influences wasting on children's growth and development (Syarfaini et al., 2022).

The nutritional status of children can be influenced by the amount of nutrient intake from food and the absorption of nutrients in the body. Children who receive sufficient macronutrient intake can improve their nutritional status. Energy sources such as protein, carbohydrates and fat play a role in body metabolism and physical activity (Afifah, 2019). Energy functions to support the growth and metabolism of the body and plays a role in the process of physical activity. The energy consumed will enter the body according to the children's energy needs, if there is a lack of energy due to more energy being used than is consumed, the children's growth will be hampered (Sari, H.P. et al., 2023). Children who experience weight loss and poor nutritional status can experience weight loss if they consume macronutrient intake for a long period of time. This happens because the body will use up fat reserves that are used continuously. The body needs fat, carbohydrates, and protein to carry out its functions in the body, but if the body's energy intake is less than needed, a negative energy balance will occur (Rakhmatika et al., 2023). Based on the recommendation that carbohydrates make up 60% of energy needs, adequate intake affects overall energy intake. Children who lack carbohydrates can experience energy deficiency which causes weight loss which affects nutritional status and growth (Puspasari & Andriani, 2017).

The results of statistical tests showed no significant relationship between birth weight and wasting in children aged 6-59 months. This study is in line with Azmia and Triyanti's research in Cimpaeun Village which showed no significant relationship between birth weight and wasting (p-value 0.812) (Azmia & Triyanti, 2024). Children with low birth weight are at high risk of malnutrition during childhood. Children with normal weight are not susceptible to infection and do not experience wasting, children with low birth weight can be more susceptible to infection, diarrhea, acute respiratory disorders and can cause abnormal growth (Muliyati et al., 2021; Sari N.I.Y. & Maringga, 2022).

Based on the results of the analysis, it shows that there is no relationship between immunization history and wasting. Isabela's research at the Kesugihan Health Center, Ponorogo Regency, showed that the history of children immunization did not have a significant relationship with wasting. Immunization is one of the efforts to provide immunity to infants and children against disease (Isabella et al., 2024). Nutritional problems are not a direct result of immunization, incomplete immunization will cause long lasting infectious diseases. Even though children immunization is complete, inadequate environmental conditions and inadequate food intake make children vulnerable to infectious diseases (Erika et al., 2020).

The results of the study showed no relationship between a history of ARI and diarrhea with the incidence of wasting in children aged 6-59 months. This is in line with Purwadi's study showing that there was no statistically significant relationship between a history of ARI and the incidence of wasting (p-value 0.269) (Purwadi et al., 2023). Based on the results of the study, there was no relationship between diarrhea and the incidence of wasting in children. Children who had diarrhea, fever, and cough in the last 2 weeks were more likely to experience wasting than children who did not have these diseases. This is because infection significantly disrupts the nutritional status of children by disrupting their food intake, absorption, and metabolism. Diseases such as fever, cough, diarrhea and ARI increase the body's metabolic needs, thus requiring higher energy and nutrient intake. However, the accompanying symptoms, such as decreased appetite, difficulty breathing, and gastrointestinal disorders, often lead to reduced food consumption and nutrient absorption. In addition, the cyclical relationship between malnutrition and susceptibility to infections poses a long-term threat to the overall health and well-being of children (Asebe et al., 2024; Purwadi et al., 2023; Wasihun et al., 2018).

The results showed no relationship between maternal education level and the incidence of wasting in children aged 6-59 months. The higher mother's education, the easier it is for them to absorb information and apply it in their daily lives. Thus, the level of education can increase the knowledge, responsiveness and awareness of mothers in making decisions regarding family nutrition issues such as utilizing optimal, balanced and healthy foods, which

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JKM (Jurnal Kebidanan Malahayati), Vol 11, No. 2. February 2025,
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ultimately prevents the possibility of wasting (Tilahun et al., 2024; Toby et al., 2021).

This study implies that wasting is still a major public health problem that requires consistent interventions in cross-sector collaboration to address the problem of child malnutrition and to achieve sustainable development goals. There are limitations in this study, namely this study uses secondary data with a cross-sectional design so that it cannot see the causal relationship of independent and dependent variables. There is information bias from respondents who require memory in measuring the level of children nutrient intake using food recall regarding food ingredients consumed by children during the last 24 hours, history of child illness in the last month, and history of immunization.

CONCLUSION

Children aged 6-59 months who experienced wasting in this study were 9.6%. The results of the analysis showed that the dominant factor related to wasting in children aged 6-59 months in Bojongsari Subdistrict, Depok City was energy intake. Children with low energy intake levels were at 6.2 times greater risk of wasting. Nutrient intake needs to be considered as a factor related to wasting in children aged 6-59 months.

SUGGESTION

The results of the study are expected to be further specific and sensitive interventions in addressing factors related to improving malnutrition in children and it is necessary to conduct educational programs for mothers of children to introduce the form of complementary foods, the frequency of feeding, and continue the program of providing additional food to children who experience wasting.

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