Proceeding Paper

THE RELATIONSHIP OF LENGTH OF BREASTFEEDING WITH HEAD CIRCUMFERENCE IN BABIES AGED 1-7 MONTHS IN THE WORKING AREA OF THE KUALA LEMPUING PUSKESMAS, BENGKULU CITY

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Abstract

Mother's milk (ASI) is the most perfect food containing the nutrients needed by babies to fulfill the baby's needs, growth and development. Head circumference measurements are often used to indicate brain size and volume. The aim of this study was to determine the relationship between the duration of breastfeeding and the head circumference of babies aged 1-7 months in the working area of the Kuala Lempuing Health Center, Bengkulu City. The design used was a *cross sectional approach* on 43 samples of babies who met the inclusion criteria. Head circumference measurement data was obtained using a measuring tape, duration of breastfeeding was collected by interviewing mothers using a 14-item closed-ended questionnaire. The 43 samples obtained were taken using the *Purposive Sampling technique.* The *Spearman correlation* test was used to analyze the relationship between variables. The average duration of breastfeeding for babies aged 2 months, with babies aged 1 month receiving the most breast milk. The average head circumference is 40.12 cm with an average of 40.34 cm for male babies and 39.90 cm for female babies. The results showed a significant relationship between the duration of breastfeeding and head circumference in babies aged 1-7 months in the working area of the Kuala Lempuing Community Health Center, Bengkulu City in 2024 (p=0.000) and shows a positive direction (r=0.623) which means the longer the breastfeeding period, the more normal the head circumference will be. In conclusion, prolonged breastfeeding will be related to the size of the baby's head circumference

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INTRODUCTION

Mother's milk is the most perfect food containing the nutrients needed by babies to fulfill the baby's needs, growth and development. Breast milk is very perfect as a source of nutrients for the baby's growth. (Ara et al., 2018). Breastfeeding is necessary to fulfill the baby's needs in everything, starting from carbohydrates in breast milk in the form of lactose, fats containing lots of polyunsaturated fatty acids, the main protein is lactaalbumin which is easily digested, the vitamin and mineral content is high in a calcium-phosphate ratio of 2 to 1 which is the ideal condition for breast milk calcium absorption is food that has

high nutrients and energy that is easily digested by babies (Astuti et al., 2020)**.**

Exclusive breastfeeding administered during the initial six months of life is crucial in addressing the nutritional requirements of infants, as infants under six months are incapable of mastication and consequently cannot consume solid foods (Rahma et al., 2021). The introductory section must be concise while delineating the study's objective and providing essential background context. It should explicitly articulate the hypothesis or purpose statement, elucidating the rationale behind the development of the hypothesis or purpose and the significance attributed to it by the author. Inclusion of references should be strictly relevant, omitting any data or conclusions derived from the reported work.

Globally, WHO and UNICEF 2018 stated that the level of exclusive breastfeeding is very low at 41%. Data taken from the 2022 Indonesian Nutrition Status Survey (SSGI) provided exclusive breastfeeding only 52.2%, which decreased from 52.5% in the previous year, a decrease of 0.3% from the previous year (SSGI, 2022). In the Bengkulu Province, data collected from the Central Statistics Agency for the city of Bengkulu in 2022 indicated that 67.84% of infants were exclusively breastfed, reflecting an increase of 5.54% over the preceding two years. A preliminary investigation conducted by the researchers within the jurisdiction of the Kuala Lempuing Community Health Center, Bengkulu City, in January 2024, revealed that 4 (40%) infants were exclusively breastfed, while 6 (60%) received partial breastfeeding

Anthropometric evaluations of neonates serve as critical metrics for assessing intrauterine growth and development, providing a reliable indicator of their overall health status (Ignatius Ikemefuna et al, 2020). Anthropometric measurements used for babies include 3 parts: height, weight and head circumference (Gorohi et al., 2018).

Head circumference in early childhood development is associated with many nutritional factors, including protein energy, macronutrients and breastfeeding. The American Academy of Pediatrics recommends that head circumference be measured eight times during the first 2 years of life (Nicolaou et al., 2020). The measurement of head circumference during early childhood development is intricately linked to various nutritional factors, encompassing protein energy, macronutrient intake, and breastfeeding practices. The American Academy of Pediatrics advocates for the measurement of head circumference on eight occasions throughout the initial two years of life (Nicolaou et al., 2020). Head circumference serves as a proxy for quantifying brain size and volume (Koshy et al., 2021). According to the Ministry of Health, infants exhibiting a head circumference of less than 33 cm are classified as having microcephaly. Furthermore, the normative growth trajectory of head circumference, as assessed by age-specific z-scores, is observed to be superior in infants who are exclusively breastfed compared to their non-exclusively breastfed counterparts (Ara et al., 2018).

Research in India (2020), found a strong relationship between breastfeeding and head circumference. Research (Ivanda Glanny Anidya., 2020). Research conducted by Rahma (2021) elucidates that infants aged 6 to 9 months who are exclusively breastfed present with normal head circumferences in contrast to those who are not exclusively breastfed. Exclusively breastfed infants demonstrate a normal head circumference that is 5.4 times greater than that of infants who are not subjected to exclusive breastfeeding.

In light of the aforementioned background concerning the duration of exclusive breastfeeding and its association with head circumference, the researchers endeavored to undertake a study aimed at investigating the correlation between breastfeeding duration and head circumference in infants aged 1 to 7 months within the operational domain of the Kuala Lempuing Health Center, Bengkulu City, in 2024.

MATERIALS AND METHODS

This research employs quantitative analytical methods with a cross-sectional design to ascertain whether a relationship exists between the duration of breastfeeding and head circumference in infants aged 1 to 7 months. The independent variables in this study comprise the duration of breastfeeding, while the dependent variable is head circumference. The population under study includes all mothers with infants aged 1 to 7 months residing in the jurisdiction of the Kuala Lempuing Community Health Center, Bengkulu City, totaling 114 respondents. Sampling used the *Purposive Sampling technique* which resulted in 39 samples with a reserve sample of 4 respondents, a total of 43 samples.

Data collection was carried out by interviewing characteristics data including identity, including name, age, gender, weight at birth, current weight, body length at birth, current body length and duration of breastfeeding taken using a closed questionnaire. Head circumference data was measured using a measuring tape. Univariate analysis is presented in tabular and narrative form. Bivariate analysis was used to determine the relationship between the variables duration of breastfeeding and head circumference. Statistical tests use the Spearman correlation test to test the relationship between two nominal variables and measure the strength of the relationship between one variable and another using SPSS 25 software.

Ethical Approvals

This research has passed the ethical feasibility of the Bengkulu Health Polytechnic with number: KEPK.BKL/200/04/2024

RESULTS AND DISCUSSION

Univariate Analysis

Based on Table 1 The average age of babies in the Kuala Lempuing Puskesmas is 3.78 months, The highest age is 7 months and the lowest is 1 month. The average duration of breastfeeding is 2 months, with a minimum duration of 1 month and a maximum of 7 months.

The average head circumference of babies in this study area is 40.12 cm, with an average of 40.34 cm for male babies and 39.90 cm for female babies. The smallest head circumference of a baby boy is 35 cm and the largest is 45 cm, while the smallest head circumference of a baby girl is 35 cm and the largest is 48 cm.

Table 1: Description of duration of breastfeeding with head circumference and age in babies aged 1-7 months

Variable	Mean	± SD	Min	Max
Baby's age (months)	3.78	1.91	1	7
Duration of breastfeeding (months)	2.00	1.89	1	7
Head Circumference (cm)				
Boys	40.34	2.63	35	45
Girls	39.90	2.90	35	48
Total	40.12	2.73	35	45

Most babies (44.2%) received full breast milk at the age of 1 month, but the number decreased in the following months. At 2 months of age, only 9.3% of babies are still fully breastfed, and this continues to decline to 2.3% at 7 months of age. From the results of the interviews, it was found that 29 babies (67.5%) received exclusive breast milk and 14 babies (32.5%) in the study area did not receive exclusive breast milk. This is caused by several interrelated factors, namely maternal factors, baby factors, and socio-economic factors.

Based on the head circumference category, 30 babies (69.76%) had normal head circumference, 9 babies (20,93%) had head circumference below normal (microcephaly), and 4 babies (9.30%) had head circumference above normal (macrocephaly). A baby's head circumference can be used as an indicator to predict brain growth. In non-pathological conditions, the more optimal the process of brain growth and development in babies, the larger the baby's head circumference will be (Syahadah et al., 2021). Head circumference is an easy, valid and low-cost anthropometric measurement with a positive correlation with intracranial and brain volume in children up to six years of age (Giacomini et al., 2023).

Maternal factors that can influence exclusive breastfeeding include the mother's lack of knowledge about exclusive breastfeeding. Tradition factors and early marriage factors. Socio-economic factors also influence it. Based on the results of interviews, most mothers cannot provide breast milk exclusively because they have to work, which requires their babies to be entrusted to their families. Therefore, mothers can give their babies formula milk as an alternative. The duration of breastfeeding is the time given by a

mother to breastfeed her child, starting from the start of breastfeeding until the child is weaned (Purba et al., 2017)

This research is in line with the findings of Fariba Gorohi, et al. (2018) that there are differences between the head circumference growth indicators of babies who were breastfed and those who were given formula milk at the ages of 1 month, 3 months, 6 months, 9 months and 12 months (Gorohi et al., 2018). Another study in Iraq concluded that babies who were fed breast milk for the first six months of life had a higher weight, height and head circumference than babies who were fed exclusively formula milk (Weli, 2021).

Bivariate Analysis

Based on Table 2 , the statistical analysis executed through the Spearman correlation test yielded a p-value of 0.000, which is less than the 0.05 threshold, indicating a statistically significant relationship between the duration of breastfeeding and head circumference in infants aged one to seven months within the jurisdiction of the Kuala Lempuing Puskesmas, Bengkulu City, in 2024. Statistical test results Also obtained was r = 0.623, indicating a strong relationship with a positive pattern, meaning that the longer breast milk is given, the more normal the head circumference is.

Table 2: Relationship between duration of breastfeeding and head circumference in babies aged 1-7 months

Variable	Head circumference	
	r	**p**
Length of Breastfeeding	0.623	0,000

Breast milk represents a complex and dynamic biological fluid, characterized by substantial concentrations of glucocorticoids, cortisol, and cortisone. Furthermore, a study conducted on Australian children indicated that the levels of cortisol and cortisone in breast milk correlate with head circumference up to twelve months of age (Giacomini et al., 2023). The practices surrounding breastfeeding and head circumference reflect the implications of breastfeeding on the composition of microbiota. Nutritional intake holds significant importance in modulating the gut microbiota, particularly during the critical first 1000 days of life. Empirical evidence suggests that children who are breastfed tend to possess a microbiome profile that is more advantageous to their health (Giacomini et al., 2023).

The outcomes of this study corroborate the findings of Anindya et al. (2019) in the Kaliwates sub-district of Jember Regency, where a significant relationship between breastfeeding and head circumference was established, indicating that infants who are breastfed are more likely to exhibit normal head circumferences (Anindya et al., 2019). Additional research articulates the existence of differences in the growth indicators of head circumference between infants nourished with breast milk and those provided with formula milk at the ages of one month, three months, six months, nine months, and twelve months

(Gorohi et al., 2018).

CONCLUSION

Most babies receive exclusive breast milk with an average duration of breastfeeding for babies aged 2 months with a duration of at least 1 month and a maximum of 7 months. Most babies have a normal head circumference with the average head circumference for male babies being 40.34 cm, while for female babies 39.90 cm. The duration of breastfeeding is related to head circumference in babies aged 1-7 months in the working area of Kuala Lempuing Puskesmas, Bengkulu City**.**

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Declaration of Interest Statement

The authors declare that they have no conflict of interests.

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