JURNAL KEBIDANAN DAN KESEHATAN TRADISIONAL

Jurnal Kebidanan dan Kesehatan Tradisional
Volume. 6, Number. 2, September 2021
https://doi.org/10.37341/jkkt.v0i0.262

Original Research

Comparison of Nutritional Status Between Exsclusive Breastfeeding And Formula Milkfed In Infants 0-6 Month

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ABSTRACT

Background*: Malnutrion is compounded by the proliferation of processed foods like infant formula. This causes an increase in poor diets, obesity and a marked reduction in the number of mothers breastfeeding their babies. Results of a preliminary study at the Sungai Kakap Health Center on 20 Infants shows that malnutrition is higher in infants who are given formula milk than in infants who are exclusively breastfed were 4 vs 1.Aim of this study is to compare nutritional status between exclusive breastfeeding and formula milkfed.*

Methods: *This study used a comparative analytic design. This study's population was 39 Infants who get formula milk as a subject group at the Sungai Kakap Health Center. Sampel consist of 36 Infants exclusively breastfed (control) and 36 Infants formula milk as a subject choose by random sampling technic. The instrument used was a observational sheet and categorial sheet. The bivariate analysis used Mann Whitney*

Results: *The test results showed a comparasion nutritional status between exclusively breastfed and formula milk (p=0,016) on Infants 0-6 month and the average ranking of the group of Infants with exclusively breastfed is higher (41.50) than the group of Infants with formula milk (31.50), but malnutrion suffered at male baby than female*

Conclusion: *Used of varied and interesting tools about exclusive breastfeeding and counseling about best nutrition for Infants needs to be increased.*

ARTICLE HISTORY
Received : August 3th, 2021
Accepted : October 26th, 2021

KEYWORDS
exclusively breastfed; formula milk; baby; nutritional status;

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Cite this as: Yuliana, Y., & Glory, G. (2021). Comparison of Nutritional Status Between Exsclusive Breastfeeding And Formula Milkfed In Infants 0-6 Month. *Jurnal Kebidanan Dan Kesehatan Tradisional*, 52-61. https://doi.org/10.37341/jkkt.v0i0.262

INTRODUCTION

Every infant and child has the right to good nutrition under the Convention on the Rights of the Child, in many countries less than a fourth of infants have access to the required dietary diversity and feeding frequency. Inappropriate feeding practices contribute up to a third of all cases of child malnutrition. Undernutrition also is associated with 45% of child deaths (World Health Organization, n.d.). Prevalence of

malnutrition at infants in Indonesia, West Borneo and Kubu Raya Regency were 3.90%, 5.20% and 4.20% (Kes et al., 2019).

Malnutrition in infants causes fatique, weak, tired, lethargic, brain development disorders occur, the level of intelligence decreases. Long term causes low IQ, decreased mental development, weak physical condition, susceptible to various diseases such as ARI, diarrhea, tuberculosis, hepatitis, and so on. More nutrition causes delays in the development of gross and fine motor movements. Over nutrition at an early age can increase the risk of health problems such as type 2 diabetes, glucose metabolism disorders, heart disease, blood vessel blockage, and so on in adulthood (Kartini et al., 2014).

Proper infant nutrition is fundamental to a child's continued health, from birth through adulthood. Correct feeding in the first three years of life is particularly important due to its role in lowering morbidity and mortality, reducing the risk of chronic disease throughout their life span, and promoting regular mental and physical development. Malnutrion is compounded by the proliferation of processed foods like infant formula and products rich in salt, free sugars and trans fats. This causes an increase in poor diets, obesity and a marked reduction in the number of mothers breastfeeding their babies (World Health Organization, n.d.).

Breastfeeding is one of the most effective ways to ensure child health and survival. If breastfeeding were scaled up to near universal levels, about 820 000 child lives would be saved every year. Globally, only 40% of infants under six months of age are exclusively breastfed (Victora et al., 2016). Its happened too in Indonesia and Kubu Raya Regency coverage of infants who are exclusively breastfed at the age of 6 months only 65.16 % and 62.82% its lower than the national target of 80% (Kes et al., 2019).

The problem of infant nutrition in Indonesia is overcome by improving the granting of exclusive breast feeding (EBF). Extensive evidence has shown that breast milk (ASI) is the best source of nutrition for nearly all infants, contains complete nutrients such as carbohydrates, protein, fat, vitamins, minerals to support normal infant growth, digestive enzymes and hormones is very easily absorbed. In addition to these nutrients, it is rich in immune cells, including macrophages, stem cells, numerous as a immune system and as well as in brain development (Martin et al., 2016). Breastfeeding has been shown to be of critical importance to a child's development, including increased IQ, school performance and higher income in adult life (World Health Organization, n.d.).

Infant formulas are unique because they are the only source of nutrition for many infants during the first 4 to 6 months of life. They are critical to infant health because they must safely support growth and development (Deckelbaum et al., 2004). Infant formulas could be considered as more than just food caused intended as an effective substitute for infant feeding comes from cow's milk or soy milk which is formulated so that the composition is close to breast milk although it will not be exactly the same (Fikawati, 2015). Although similar to breast milk, several studies have reported that growth disorders such as malnutrition are more common in formula-fed infants.

Therefore, exclusive breastfeeding is the right choice and is highly recommended (Agria, 2012). Breastfed infants have different growth characteristics compared with formula-fed infants. They grow at slightly different rates and have a different body composition and may have a lower risk for later obesity (Deckelbaum et al., 2004). Mismatch of formula milk dosage can also lead to undernutrition or overnutrition.

The results of the study on 97 infants fed formula milk reported an average of 11.31 grams/serving, 12x/day, with good nutritional status (52.57%), over nutrition (37.11%), under nutrition (8.25%), poor nutrition (2.05%). There is a positive relationship between the discrepancy in the dose of formula milk and nutritional status. So the more inappropriate the dose of formula milk, the more abnormal the nutritional status. The mismatch of doses resulted in over nutrition by 69.70%, under nutrition by 24.24% and malnutrition by 6.06% (Kartini et al., 2014). In terms of disease transmission, the results of the study reported that infants who were not exclusively breastfed were more susceptible to infectious diseases, 100% diarrhea, 60% ear infections, 30% type 1 diabetes and 40% leukemia (Oktova, 2017).

The results of the study reported that infants who consumed formula milk before the age of 6 months had a 6.19 times greater risk of becoming obese because of the high protein content such as branched-chain amino acids (BCAAs) or amino acids that were given early so that it had an impact on increasing insulin secretion and modulating concentration Insulin-like Growth Factor-1(IGF-1) and IGF-1 hormones which have an impact on increasing preadipocyte differentiation and increasing the number of adipocytes in the child's body. Toddlers who consume formula milk >100 g/day are 7 times more likely to be obese compared to toddlers who consume <100 g/day (Utami & Wijayanti, 2016).

The results of a preliminary study by researchers at Sungai Kakap Health Center revealed that the coverage of exclusive breastfeeding in 2018 was 1,241 (56.64%) to 1,311 (58.26%). The description of nutritional status in exclusively breastfed infants was still found to be undernutrition in 2018 as many as 5 (0.40%), poor nutrition 1 (0.16%), over nutrition 1 (0.16%) and for malnutrition in 2019 as many as 4 (0.30%), malnutrition 1 (0.07%), and over nutrition 2 (0.15%). The results of observations and interviews with 20 infant divided by 13 male infant and 7 female infant in 2020 that shown 11 formula Milk-fed infant and 9 exclusively breastfed infant. Nutritional status found 4 infants who were given formula milk with poor nutrition.

This shows that malnutrition is higher in infants who are given formula milk than in infants who are exclusively breastfed. The aim of this study was to determine the difference in nutritional status between exclusive breastfeeding and formula milk for infants aged 0-6 months at Sungai Kakap Community Health Center in 2020.

MATERIALS AND METHOD

This study used a comparative analytic design. This study’s population was 72 infants whose at the Sungai Kakap Health Center. Sampel consist of 36 Infants exclusively breastfed (control) and 36 infants formula milkfed as a subject choose by random sampling technic. The bivariate analysis used Mann Whitney. The research conducted in Sungai Kakap Healthcare, as for a reason for choosing the location, namely because was still found to be undernourished and malnutrition between infants who were given formula milk than exclusively breastfed after do preeliminary study of 20 infants. And This research conducted in February until Juni 2020.

The instrument used was a observational sheet for check type of milk as a infants nutrition with interview mom of infants and writed a result of weight and height after measured and categorial sheet Z-Score about nutritional status for diagnosed. Data collection was carried out by researcher filling out observation list to determine the type of milk which baby get. Researcher also write value of weight and height infants after measured at the Sungai Kakap Health Center in 2020. Data were analyzed computerized

with 3 univariate steps to determine the frequency and percentage of each variable studied. Bivariate analysis to see the comparison between the independent variable and the dependent variable used the Mann Whitney test with a p value of 0.05.

RESULTS

This analysis is aims to describe variable independent namely knowing nutrition status from 36 Infants get with formula milk and 36 infants Exsclusive Breastfed

Table 1. Distribution Frequency of Nutritional Status of Infants Between Formula Milk and Exclusive Breast Feeding at Sungai Kakap Health Care

Nutritional Status	Exclusive Breastfed		Formula Milk	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Abnormal	9	25%	17	47%
Normal	27	75%	19	53%
Total	36	100%	36	100%

Table 1 above showns prevalence of abnormal nutritional status at Infants formula milk (47%) higher than exclusively breastfed were 47 % vs 25%. Prevalence of normal nutritional of exclusively breastfed higher than formula milk were (75%) vs (53%).

Table 2. Distribution Frequency Malnutrition Status infants whose get Formula Milk and Exclusive Breast Feeding indiceds by Sex

Nutritional Status	Exclusive Breastfed		Formula Milk	
	Male (n)	Female (n)	Male (n)	Female (n)
Malnutrion	2	4	4	1
Under nutrition	0	0	5	3
Over nutrition	3	0	2	2
Total	5	4	11	6

Table 2 above showns the prevalence of malnutrition and under nutrition was higher for males than females 16 vs 11 infants. Prevalence over nutritiont at male infants whose exclusive breastfed higher than male infants whose get formula milk fed 3 vs 2. But prevalence of Under nutrition of male infants whose get formula milk fed was higher than infants whose get exclusively breastfed 5 versus 0.

Table 3. The Average Rating Nutritional Status of Infants Between Formula Milk and Exclusive Breast Feeding at Sungai Kakap Health Care

Group	*Mean Rank*	*Sum of Rank*
Exsclusive Breast Fed	41.50	1494.00
Formula Milk	31.50	1134.00

In The Table 3 above shows mean rank of the group of infants exclusively breastfed is higher than formula milk fed were 41.50 vs 31.50.

Table 4. Differences in Nutritional Status of Infants Between Formula Milk and Exclusive Breast Feeding at Sungai Kakap Health Care

Variable	*Man-Whitney U*	*Wilcoxon W*	*Z*	*Asymp.Sig. (2-tailed)*
Nutritional Status	468.000	1134	-2.401	0.016

Table 4 above shown there was difference nutritional status at infants aged 0-6 months for exclusively breastfed and formula milkfed (P: 0.016) (P < 0.05) was calcucated by Man-Whitney test.

DISCUSSION

The study showed that the good nutrition at exclusive breastfeeding infants was higher than formula milk feeding infants were 75 % vs 53 %, but prevalence poor nutrition and overnutrition at EBF higher than and formula milk feeding were 17 % vs 0 % and 11 % vs 8 %. We also found prevalence malnutrition and poor nutrition at male infants was higher than female were 11 % vs 3% and 14 % vs 8 % and but overnutrition at male infants higher than female were 8% vs 0%. The explanation is male need more energy as well as any other nutrients for sufficient growth compared to girls (Karuniawati, M.Shoim Dasuki, 2016).

The study showed that the results support extensive evidence has shown that breast milk (ASI) is the best source of nutrition for nearly all infants, contains complete nutrients such as carbohydrates, protein, fat, vitamins, minerals to support normal infant growth, digestive enzymes and hormones is very easily absorbed. In addition to these nutrients, it is rich in immune cells, including macrophages, stem cells, numerous as a immune system and as well as in brain development (Martin et al., 2016). Based on this sudy shown the higher prevelance of good nutrion at infants because human breast milk is a complex matrix with a general composition of 87% water, 3.8% fat, 1.0% protein, and 7% lactose. The fat and lactose, respectively, provide 50% and 40% of the total energy of the milkon.

However, the composition of human breast milk is dynamic and changes over time, adapting itself to the changing needs of the growing child. For instance, during each nursing session, the milk that is expressed first (foremilk) is thinner with a higher content of lactose, which satisfies a baby's thirst, and following the foremilk, hindmilk, is creamier with a much higher content of fat for the baby's needs. Its can meet the nutrient infants need on quantity and quality (Martin et al., 2016). The nutritional status of infants is also influenced by the complete nutritional content contained in breast milk.

During early lactation, the protein content in human milk ranges from 1.4–1.6 g/100 mL, to 0.8–1.0 g/100 mL after three to four months of lactation, to 0.7–0.8 g/100 mL after six months. Moreover, milk fat is a carrier of taste and aroma. In general, human breast milk fat content ranges from 3.5% to 4.5% during lactation. Human breast milk also contains two essential fatty acids, linoleic acid (C18:2w6) at 15% and alpha-linolenic acid (C18:3w3) at 0.35%. These two essential fatty acids are, respectively, converted to arachidonic acid (AA, C20:4w6) and eicosapentaenoic acid (EPA, C20:5w3), the latter of which is further converted to docosahexaenoic acid (DHA, 22:6w3). AA, EPA and DHA are important for regulating growth, inflammatory responses, immune function, vision, cognitive development and motor systems in newborns.

Breastfeeding has been shown to be of critical importance to a child's development, including increased IQ, school performance and higher income in adult

life (World Health Organization, n.d.). The other hand study in Bangladesh shown 55 % of infants were exclusively breastfed during the first 6 months. If EBF was terminated during 0–2 months, 2–4 months the odds of becoming underweight were 2.16 and 2.01 times higher, respectively, than babies for whom EBF was not terminated. Lack of EBF up to 6 months of birth has adverse consequences on the health and nutritional status of children. A substantial proportion infectious disease and undernutrition could be prevented if EBF was ensured up to 6 months after birth. Our findings were consistent to the WHO (Khan & Islam, 2017).

The results of this study are in accordance with other study in Indonesia by Ramadhana report the good nutritional status of infants who are exclusively breastfed is 58.6% greater than the good nutrition of 41.4% of formula milkfed infants (Ramadhana et al., 2019). Other study in Semarang also found 6 Infants (8.3%) did not get exclusive breastfeeding and 66 Infants (91.7%) got exclusive breastfeeding. The results of statistical tests were carried out using the Fisher Excat Test and obtained a p value of 0.000 at a significance level of 5%. So it was concluded that there was a relationship between exclusive breastfeeding and the nutritional status of infants aged 6-12 months (Kartini et al., 2014).

Apart from being nutritious, breast milk also has a multiple protective effect on infectious diseases. First, breast milk has specific immunological properties that protect the baby from infection. Second, the antimicrobial composition, anti-inflammatory, immunomodulatory protection, and bioactive molecules and compounds of breast milk creates protection against infection. Third, breast milk promotes mucosal maturation, stimulates neonatal immune system; limiting exposure to foreign germs food antigens. Its extend by study in Bangladesh Lack of EBF increased the odds of diarrhea, fever and ARI. Among the babies aged 6 months or less 27.37% of diarrhea, 13.24% of fever and 8.94% of ARI could have been prevented if EBF was not discontinued (Khan & Islam, 2017).

The study showed that the malnutrition, poor nutrition, normal and overnutrition at Infants whose get formula milkfed at the Sungai Kakap Health Center in 2020 were 14 %, 22, % 53 % and 11 %. This result is according by article review statement cow's milk is the basis for most infant formula. However, cow's milk contains higher levels fat, minerals and protein compared to breast milk. Therefore, cow's milk must be filtered and diluted to more closely resemble the composition of human breast milk. Baby made from cow's milk the formula contains additional vegetable oils, vitamins, minerals and iron for consumption by most healthy people full term baby (Martin et al., 2016).

Based on study shown infants who get formula milk fed will have a kind of abnormal nutrition from malnutrion, poor nutrion until over nutrion. Its affect by many factor like missmatch dosage of formula and formula milk consumption time. Its proved by study in mexico report Exclusive breastfeeding of less than three months is associated with almost 4 more times in obese children. There was a difference in age of complementary feeding, duration of breast feeding, and formula milk consumption time for obese and non-obese children (Sandoval et al., 2016). On the other hand study in results obtained by the growth of infants who are exclusively breastfed are better enforced 18 (85.7 %) infant formula and enforced a total of 11 (52.4 %) baby, whereas growth babies who are not breastfed exclusively both enforced by 3 (14.3 %) formula and enforced by 10 (47.6 %) infants (Locitasari, 2014).

Its accordance with the theory of which states that the energy content in 100 ml of formula milk reaches 77.6 kcal/100 ml, higher than breast milk which is only 63.9 kcal/100 ml which has an impact on energy intake which is much greater than that of breast milk. Needs and causes obesity through the accumulation of adipose tissue. The results of the Mann Whitney U statistical test obtained significant results (p) 0.016 or probability below 0.05 (0.016 < 0.05) so that (Ha) was accepted, namely there was a difference in nutritional status between infants whose exclusively breastfed and formula milk fed for infants 0-6 months. Besides the higher prevalence of good nutrition of infants exclusively breastfed 0-6 month aged (75%).

Previous author's research in Kampung Dalam Health Center also found the difference in nutritional status between infants whose exclusively breastfed and formula milk fed for infants ≥ 6 months by z value of -3.894 with a significant (p) 0.000, but none of the infants had more over nutrition (Yuliana & Melyani, 2020). On the other hand study in Semarang report good nutrion on infants exclusively breastfed were (88,2%). Mann Withney test results get a z value of -2.694 with a significant (p) 0.020. So it shown there are differences in the nutritional status of infants aged 7 - 12 months who are exclusively and not exclusively breastfed (Atika et al., 2014).

Although efforts have been made to make nutrition-related outcomes of formula-fed infants more similar to those of breastfed infants, there has been limited progress with regard to bioactive components that can affect short- and long-term outcomes. Several bovine-milk proteins are similar to their human milk counterparts but may be present in lower concentrations. Enriched bioactive milk proteins need to be evaluated for their ability to exert functions in the formula-fed infant, and whether these functions will have long-term benefits (Lönnerdal, 2014).

Giving formula milk at the age of infants under 6 months will have an impact on the nutritional status of infants. If formula milk is too dilute it will result in less nutritional intake for the baby's body, and have an impact on weight gain so that the baby is classified as malnourished (Kartini et al., 2014). Infant formula milk is intended as an effective substitute for infant feeding comes from cow's milk or soy milk which is formulated so that the composition is close to breast milk although it will not be exactly the same. Formula milk is a liquid or powder with a certain formula, given to infants and children that functions as a substitute for breast milk. Formula milk has a very important role in infant food because it often acts as the only source of nutrition for Infants (Fikawati Sandra, 2015).

The other study proved the same result is nutritional status of infants with formula milkfed is higher than exclusively breastfed were 75.9% vs 24.1%. Prevalence malnutrion and poor nutrition of infants not exclusively breastfed were 9% vs 1.3% (Arifah et al., 2013). Exclusive breastfeeding is the main choice for infant nutrition because the composition of lactose, GI and calories are suitable for Infant's needs during the 6 month period, which is most appropriate for Infants because of its miraculous composition and can protect Infants from various infectious diseases so that Infants don't get sick easily and automatically the infants's nutritional status will remain stable. Formula milk is nutrition for Infants who do not get breast milk from the mother, it requires special skills from the mother or the person who takes care of the baby in the presentation and frequency of giving it so that it can become proper nutrition for Infants.

On this basis, we recomend midwife to improvement breastfeeding education to mothers and family. Guiding from midwives for mothers who fail to give breast milk.

Provide training to mothers on how to serve formula milk at the right dose for reduce the potential for malnutrition or overnutrition in infants. Because mismatch of formula milk dosage can also lead to poor nutrition or overnutrition.

CONCLUSION

Exclusively breastfed Infants have good nutrition than formula milf fed were 75 % vs 53 %. Statistical tests shown there was a difference between exclusive breastfed and formula milkfed on the nutritional status of infants aged 0-6 months p value 0.016. Prevalence malnutrition and poor nutrition at male infants was higher than female were 11 % vs 3% and 14 % vs 8 % and but overnutrition at male infants higher than female were 8% vs 0%. We recomend midwife to improvement breastfeeding education to mothers and family.

Guiding from midwives for mothers who fail to give breast milk. Provide training to mothers on how to serve formula milk at the right dose for reduce the potential for malnutrition or overnutrition in infants. Because mismatch of formula milk dosage can also lead to poor nutrition or overnutrition

ACKNOWLEDGEMENT

The researcher would like to thank the Director of the Panca Bhakti Pontianak Midwifery Academy, the Head and Nutritional Staff of the Sungai Kakap Health Center, who have provided assistance in terms of administration and funding for this research.

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