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Effect Of Storage Time On Vitamin E Levels Contained In Expressed Breast Milk

Andi Meinar Dwi Rantisari Thayeb[1*], Ka'bah [2], Thaslifah[3], Nurul Hidayatul Fadillah[4]

[1]Program Studi S1 Farmasi, Fakultas Farmasi, Universitas Megarezky, Makassar Indonesia. [2]Program Studi D-IV Teknologi Laboratorium Medis, Fakultas Teknologi Kesehatan, Universitas Megarezky, Makassar Indonesia.
[3]Program Studi D-III Teknologi Laboratorium Medis, Fakultas Teknologi Kesehatan, Universitas Megarezky, Makassar Indonesia

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ABSTRACT

Breast milk is the gold standard for feeding babies because it contains nutrients and other non-nutritional components that are important for the growth and development of babies, one of which is vitamin E which functions to provide important antioxidant protection for newborn babies. Expressed breast milk when stored in the refrigerator can affect the quality or vitamin levels in the breast milk. The aim of this research is to look at the effect of storage time for expressed breast milk on Vitamin E levels. This type of research is analytical descriptive with an examination method using indirect Elisa. The sample criteria used in this study were healthy breastfeeding mothers who had babies aged 1-6 months. The results showed that there was a decrease in the average value of Vitamin E levels during storage for 1 day, 2 days and 3 days, where based on the results of the Anova statistical test, it was found that there was a decrease during 3 days of storage ($p<0.05$). It can be concluded that there is effect of storage time for expressed breast milk on vitamin E levels.

Corresponding Author:
Andi Meinar Dwi Rantisari Thayeb
Program Studi S1 Farmasi, Fakultas Farmasi, Universitas Megarezky, Makassar Indonesia
meinardwirantisari@unimerz.ac.id

INTRODUCTION

Children are the next generation and are the nation's investment, therefore the quality of the nation in the future is determined by the quality of today's children. Increasing human resources must start as early as possible, so one of the goals of the Sustainable Development Goals (SDGs) is to overcome mortality and malnutrition in children and call for "access to quality early childhood development". Exclusive breastfeeding means that the baby only receives breast milk without any additions including water, except for oral rehydration solutions, vitamin syrups, minerals, or medicines. Prevalence of exclusive breastfeeding aged 0-6 months in

Indonesia is estimated to reach 42%. 15,028 child deaths each year are attributed to poor breastfeeding practices. The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) recommend that breastfeeding begin within one hour of birth,

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continue without food or other fluids for the first six months of life, and continue with age-appropriate supplementary feeding until the baby is 2 years old [1].

Breast milk is a fluid secreted by the mother's breast glands in the form of the best natural food with high nutrition and high energy produced during pregnancy [2]. Recommendations regarding exclusive breastfeeding were declared more than 25 years ago and its benefits have been well documented throughout the world but global breastfeeding rates are still far from the expected targets. According to the World Health Organization, less than 40% of babies under 6 months are exclusively breastfed [3]. Exclusive breastfeeding coverage in several countries has quite varying ratios. Globally, the highest prevalence of exclusive breastfeeding includes sub-Saharan Africa, South Asia and parts of Latin America. The countries with exclusive breastfeeding coverage above 90% include Nepal, Rwanda, Ethiopia, Burundi and Guinea [4]

In the UK only 23% of mothers are breastfeeding exclusively at six weeks and only 1% at six months[5]. The 2010-2014 Community Nutrition Development Action Plan sets the indicator that 80.0% of babies aged 0-6 months receive exclusive breast milk. This target has also been set by the Indonesian Government since 2000, but in fact this figure has not been achieved until now. The 2018 Riskesdas results show that the proportion of breastfeeding patterns for babies aged 0-5 months in Indonesia is 37.3% exclusive breastfeeding, 9.3% partial breastfeeding, and 3.3% predominant breastfeeding [6].

According to the Indonesian Demographic and Health Survey (SDKI) in South Sulawesi Province with 24 districts/cities, the percentage of Early Breastfeeding Initiation (IMD) reached 39.9% (< 1 hour) and 7.9% (≥ 1 hour), while the percentage of exclusive breastfeeding reaching 38.5% (up to 6 months) and 55.0% (0 – 5 months) (IDHS, 2016) [7] These coverage figures indicate that although regulations and various programs have been implemented by the government and institutions or communities observing exclusive breastfeeding, coverage has still not reached the target set at 80% [7].

When it is not possible for the mother to breastfeed directly from the breast, expressed breast milk is often used and is preferred to formula milk. The use of donor breast milk is also increasingly being used for premature babies. Expressed breast milk donated from human milk banks undergoes a storage process, which may involve pasteurization and repeated freezing and thawing cycles, and this may affect the integrity of the expressed breast milk.[8].

The conditions in which mothers work are one of the challenges for breastfeeding mothers. Working mothers can still provide breast milk by expressing and storing breast milk in the refrigerator or freezer[9]. The storage process can preserve breast milk for some time. Preservation aims to maintain the quality of food ingredients. The quality of food itself can be seen from its nutritional quality. It is thought that prolonged storage of breast milk (ASI) can cause changes in the physical and chemical composition. With these chemical changes, it is very likely that there will be damage to the nutrients in breast milk.

The quality of expressed breast milk stored in the refrigerator or freezer can be measured chemically, physically and microbiologically. Steps or methods that can be used to extend the shelf life of milk are pasteurization, cooling/freezing, and heating.[10]. Expressed

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or expressed breast milk can be stored at room temperature for 6-8 hours, in a chiller at 4°C for 4 days and in a refrigerator/freezer at -18°C for 6 months [11].

Vitamin E provides important antioxidant protection for fetuses and newborns where it can stimulate the development of the immune system. Vitamin E concentrations are high, especially in colostrum. Vitamin E concentrations in breast milk decrease with mature breast milk and stabilize after the first month of lactation. It has been suggested that the decrease in vitamin E from colostrum to mature breast milk is associated with an increase in fat globule diameter, with a proportional decrease in tocopherol and other components of the fat-soluble membrane [12].

Vitamin E has a wide range of biological functions that vary according to the relevant isoform. Vitamin E functions as an antioxidant in the lipid phase, protecting phospholipid fatty acids from oxidation by harmful free radicals and thereby stabilizing cell membranes. As an antioxidant, vitamin E helps prevent oxidative stress, which is characterized by an excess of free radicals coupled with a decrease in the antioxidants available to quench these free radicals [13]

Vitamin E during breastfeeding has not been frequently reported in the literature. Low serum alpha tocopherol concentrations are observed in women in the immediate postnatal period, which is directly related to the vitamin E status of the newborn. During breastfeeding, in South Africa, 70% of breastfeeding women presented VED which shows the importance of studying these micronutrients during the breastfeeding phase as well as their relationship with breast milk [14].

METHOD

This type of research is descriptive analytical research where researchers will look at the effect of storage time on the levels of Vitamin E contained in expressed breast milk. Sampling was carried out in August-October 2022 at the Antang Public Health Center, Manggala Sub-District, Makassar and sample examination was carried outcarried out at HUM-RC (Hasanuddin University Medical Research Center). The population in this study were breastfeeding mothers recorded in the Antang Community Health Center, Manggala Sub-District of Makassar. Determining the sample size in this research used the convenience sampling method, with research subject selection techniques based on inclusion and exclusion criteria. The inspection tool used is *Elisa indirect.*

RESULTS AND DISCUSSION

Based on research that has been carried out, a total of 5 samples of expressed breast milk were obtained from breastfeeding mothers who visited the Antang health center with children aged 1-6 months. Based on the results of research conducted at the Hasanuddin University Medical Research Center (HUMRC) Laboratory, the following results were obtained:

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Table 1 Results of examination of vitamin E levels in breast milk Milk using the Elisa Method

Storage Time	Sample	Code Well	Rate Vitamin
1 day	A	A01	0.0596
	B	A02	0.0602
	C	A03	0.0549
	D	A04	0.0646
	E	A05	0.0658
2 days	A	A06	0.1019
	B	A07	0.1015
	C	A08	0.0622
	D	A09	0.0566
	E	A10	0.0631
3 days	A	A11	0.0852
	B	A12	0.0725
	C	B05	0.1012
	D	B06	0.1243
	E	B07	0.0843

Source: (Primary Data, 2022)

ANOVA

hasil

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.003	2	.001	4.246	.040
Within Groups	.004	12	.000		
Total	.006	14			

Figure 1. ANOVA statistical test results
Source: (Primary Data, 2022)

Multiple Comparisons

Dependent Variable: hasil
LSD

(I) Penyimpanan	(J) Penyimpanan	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
1	2	-.01604	.01115	.176	-.0403	.0082
	3	-.03248*	.01115	.013	-.0568	-.0082
2	1	.01604	.01115	.176	-.0082	.0403
	3	-.01644	.01115	.166	-.0407	.0078
3	1	.03248*	.01115	.013	.0082	.0568
	2	.01644	.01115	.166	-.0078	.0407

*. The mean difference is significant at the 0.05 level.

Figure 2. Multiple Comparison Statistical Test Results
Source: (Primary Data, 2022)

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Based on the statistical test table above using the Anova test, the sig value is obtained. 0.040, which means there is a real relationship between the distance between breast milk storage on the first, second and third days. The first stage carried out in this research was sample collection. Where samples were collected by taking them from breastfeeding mothers in the Antang Community Health Center environment. Samples were collected directly by respondents using a breast pump, then stored in plastic breast milk storage containers and delivered using a cooler bag containing an ice pack which is useful for maintaining optimal temperature during sample transportation. The next stage is working using Indirect ELISA.

The sample used in this study was from breastfeeding mothers with babies aged 1-6 months. In this study, researchers wanted to see whether breast milk stored at a certain time would affect the vitamin levels in the breast milk, in this case vitamin E contained in breast milk. Based on the results of statistical tests using the Anova test, the sig value was obtained. 0.040, which means there is a real relationship between the distance between first and third days of breast milk storage. Therefore, it was continued to carry out post-hoc analysis tests using LSD.

In the post hoc test using LSD, the results showed that storage time 1 and 2 was -0.016, storage 2 and 3 was -0.0164 and storage 1 and 3 was -0.0324. So it can be said that Vitamin E levels in breast milk have decreased because all the results show a minus (-) number, which means there is a decrease. The significant value in this study was found to be below or less than 0.05, where the value obtained was 0.040, which means there was a significant influence between the storage distance for expressed breast milk on the first, second and third days. So it can be said that there is an influence on the storage time of expressed breast milk for several days on the levels of vitamin E contained in breast milk. This is because Vitamin E has fat-soluble properties. Vitamin E is alkaline and is not affected by acids at 100°C. Vitamin E is stable on heating but will still be damaged if the heating is too high. Vitamin E deficiency in babies can result in abnormalities that interfere with fat absorption.

Based on the research results, it can be concluded that although there is a decrease in the Vitamin E content in expressed breast milk, it can still be consumed by babies because it still contains a lot of nutrients. For a mother who stores her breast milk, it is very important to always pay attention to good and correct storage techniques for expressed breast milk and pay attention to the sterility of the container where expressed breast milk is stored, the storage temperature and not to re-store breast milk that has been warmed. Antibiotics or breast milk enhancing supplements taken by breastfeeding mothers can affect the quality of breast milk because the ingredients in antibiotics and supplements can enter breast milk through the blood.

The length of time you store breast milk will affect the nutritional levels contained in breast milk. Breast milk is a food that is easily damaged, damage occurs because the microbes in breast milk multiply and become more numerous so that these microbes can cause spoilage in breast milk so that the nutritional content of breast milk decreases over time [15].

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Mutaqin Lusi's research in 2019 stated that bacteriologically, storing expressed breast milk is safe for a period of 6 hours. The longer breast milk is stored, the more the quality of the breast milk decreases. Where expressed breast milk is stored must meet certain requirements [16; 17]. This is because there is influence or contamination from the milking place on the quality of the nutrients contained in breast milk. The physical condition of a house that meets health and comfort requirements is influenced by 3 (three) aspects, namely lighting, air ventilation, and indoor air temperature and humidity.

In Clawdya's research in 2017, the long storage time for expressed breast milk had a significant effect on protein content, the total number of bacteria in breast milk, the pH of breast milk and the color and aroma of breast milk. The ideal temperature for storing breast milk in a chiller is 4°C for 4 days and in the freezer at -18°C for 6 months[18].

CONCLUSION

In this study, it was concluded that there was a relationship between storage time and vitamin E levels in expressed breast milk In this study, the results showed that vitamin E could decrease based on storage time. Obtained sig value <0.05

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