

# TOTAL OF LACTOBACILLUS BIFIDUS IN BREASTFED INFANTS FROM NURSING MOTHERS INTERVENED WITH ZINC

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Original Research Article

TOTAL OF LACTOBACILLUS BIFIDUS IN BREASTFED INFANTS FROM NURSING MOTHERS INTERVENED WITH ZINC

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Abstract

**Background:** In pregnancy and nursing, zinc plays an important role, including fetal development and milk secretion. Zinc in the lactation process is a crucial modulator of the mammary gland, which is very important for successful lactation.

**Objectives:** The purpose of this study was to analyze the total of Lactobacillus Bifidus using Quantitative RT-PCR in the feces of breastfed infants from mothers who were given zinc tablets.

**Methods:** This type of research was experimental using a quasi-experimental post-test only with a control design and a quantitative approach. This research was carried out at Antang Perumnas Public Health Center, Kassi-Kassi Health Center, Jumpanang Baru Health Center and Bara-Barayya Health center from March 22 to June 22, 2021. The Population in this study were all newborns from mother with normal zinc levels in 2021 in the Makassar City Health Center area as many as 62 people. The sampling technique used purposive sampling, about 12 samples per group. To avoid dropout and increase power, the sample was then added with an estimated drop out of about 30%,  $12 + (30\% \times 12) = 15.6$ , rounded up to 16. Each group consisted of 16 samples for breastfed infants from mothers who obtained zinc tablets (intervention) and 16 samples for breastfed infants from mothers who did not obtain zinc tablets (control). This study uses an Independent Sample Test.

**Results:** This study showed that the group of breastfed infants from mothers obtaining zinc tablets had a higher mean value of 2947625215.62 compared to the control group of 162374516.97. There was a difference in the number of Lactobacillus in the intervention group after being treated with a statistically significant difference in the mean of -2785250698.65 by the Independent sample test analysis, the value of  $p = 0.009$  ( $\alpha < 0.05$ ), which means there was a significant difference between the intervention groups and control group.

**Conclusion:** The highest number of Lactobacillus was the intervention group which indicated a difference of Lactobacillus in the feces of breastfed infants from mothers who obtained zinc tablets.

**Keywords:** Self-management, quality of life, type 2 diabetes mellitus.

## INTRODUCTION

Breast milk (in Indonesian is *Air Susu Ibu*, abbreviated as ASI) is a natural food for infants and contains complete nutrition, easy to digest, and absorbs. Breast milk contains anti-infective and anti-allergic substances (Ahnfeldt et al., 2019; Arsyad, 2019; Lyons et al., 2020; Ray et al., 2019). There is an important role of zinc in pregnancy and nursing, including fetal development and milk secretion. Zinc in the lactation process is a key modulator of the mammary gland, which is very important for successful lactation. The mammary gland is a very special hormonal responsive tissue and has specific requirements regarding zinc needed to take up, redistribute, and secrete large amounts of zinc into breast milk to be distributed to infants for optimal zinc intake (Krebs, 1999; Lee et al., 2015).

Based on the research of Ade Wahyulian Wijaksono (2019), entitled the relationship between the amount of zinc and weight gain of pregnant women with the baby's birth weight at the Curup Hospital, Bengkulu Province, it shows a significant relationship between the amount of zinc for aterm pregnant women and the amount of zinc for newborn to them. The amount of zinc in pregnant women by 0.879% affects birth weight (Wijaksono et al., 2019). Thus, it can be interpreted that mothers who have normal amounts of zinc will give birth to infants with normal weight, and vice versa.

During the early breastfeeding initiation (in Indonesian is *Inisiasi Menyusui Dini*, abbreviated as IMD), infants will have a great opportunity to get colostrum which contains antibody secretory immunoglobulin A (Sig A), Bifidus factor, and commensal bacteria in breast milk which is higher than transitional breast milk and mature breast milk (Paramashanti et al., 2016; Tanash et al., 2014). Colostrum is the most prominent Lactic Acid Bacteria (LAB) source for infants, produced on days 1-4 (Hyrlova et al., 2021; McGuire & McGuire, 2015; Y.N. & P.A., 2019). Research conducted by Gomez Gallego (2016) concluded that the microbiota composition in breast milk shows a relationship between perinatal factors such as delivery history, lactation stage,

gestational age, nutritional status, and use of drugs and antibiotics (Gomez-Gallego et al., 2016).

Several genera of good bacteria belonging to the lactic acid bacteria (LAB) group are dominantly found in the feces of infants exclusively breastfed: *Lactobacillus*, *Streptococcus*, and *Bifidobacteria* (Hanidah et al., 2019; Liu et al., 2020; Łubiech & Twarużek, 2020; Wang et al., 2017; Zhang et al., 2020). *Lactobacillus bifidus* functions to convert lactose into lactic acid and acetic acid. These two acids make the digestive tract acidic. It inhibits microorganisms' growth, such as *E. coli* bacteria, which often causes diarrhea in infants (Calero et al., 2020; Du et al., 2020; P. & K., 2017; Patel & Dupont, 2015).

Based on the description above, the researcher conducted this study to analyze the total of *Lactobacillus bifidus* in the feces of breastfed infants from mothers who obtained zinc tablets.

## METHODS

### Study Design

This study used a quasi-experimental design, a post-test only with a control design, and a quantitative approach.

### Setting

This research was carried out at Antang Perumnas Public Health Center, Kassi-Kassi Health Center, Jumpanang Baru Health Center and Bara-Barayya Health center from March 22 to June 22, 2021.

### Research Subject

This research a part of study on zinc tablets for pregnant women. The population in this study were all newborns in the Makassar City Health Centers. The samples in this study involved newborns at the Antang Perumnas Public Health Center, Kassi-Kassi Health Center, Bara-Barayya Health Center, and Baidang Baru Health Center as many 62 people, which met the inclusion criteria and exclusion criteria of 32 respondents with purposive sampling technique. Samples were divided into 2 groups with a total of 16 samples per group.

Each group consisted of 16 samples of infants who were breastfed only from mother who received treatment with 20 mg of zinc tablet every day for 14 days in the third trimester of pregnancy with (intervention) and 16 samples of infants who were breastfed only from mother who did not receive treatment zinc tablets in the third trimester of pregnancy (control).

The inclusion criteria consisted of infants who were given early breastfeeding initiation, only breastfed from mothers who received zinc tablets in the third trimester, mothers who were willing to participate in the study and cooperatively, healthy newborn pervaginam, and no anatomical abnormalities.

**Instrument**

Data collection instruments were questionnaires for screening prospective respondents, informed consent sheets, respondent characteristics datasheets, breastfeeding management checklist sheets, and laboratory tests with Quantitative Real-Time PCR to analyze the amount of *Lactobacillus Bifidus* in infant feces.

**Data Analysis**

To analyze the characteristics of respondents using Chi-Square statistical analysis and analyze the number of *Lactobacillus bifidus* in infant feces using statistical analysis of Independent Sample Tests.

**Ethical Consideration**

This research was conducted after requesting ethical clearance and receiving ethical approval (exempted) from the biomedical research ethics commission of The Hasanuddin University Medical Faculty Makassar with letter Number 116/UN4.6.4.5.31/PP36/2021.

**RESULTS**

**Characteristics of Respondents**

Univariate analysis was conducted to determine the characteristics of the respondents' data in body weight, body length, gender (Table 1).

**Table 1.** Distribution of Frequency of Respondents (Baby) in the Antang Perumnas Public Health Center, Kassi-Kassi Health Center, Jumpanang Baru Health Center and Bara-Barayya Health center from March 22 to June 22, 2021.

Characteristics of Respondents	Intervention		Control		p-value
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)	
<i>Weight (Kilograms)</i>					
2.4-3.0	10	62.5	9	56.3	.500
3.0-3.6	6	37.5	7	43.7	
<i>Body Length (Centimeters)</i>					
45-50	13	81.3	15	93.8	.300
51-56	3	18.7	1	6.2	
<i>Gender</i>					
Male	4	25.0	8	50.0	.137
Female	12	75.0	8	50.0	

Sources: Primary Data of Questionnaire, 2021.

Based on Table 1, based on body weight, most respondents weighed 2.4 - 3.0 kg; in the group obtained zinc was 10 persons (52.6%) and 9 persons (47.4%) in the control group. On the characteristics of body length, most

respondents had a body length of 145 - 151 cm; specifically, about 13 persons (46.4%) in the intervention group and 15 persons (53.6%) in the control group. Furthermore, the dominant gender in the intervention group was male (12

persons/60.0%), and in the control group was equal between male and female, about 8 persons (66.7) of each. In the homogeneity test, all the characteristics of both groups were equivalent, with the *p*-value > .05.

*Differences in the Number of Lactobacillus in the Baby's Feces after being given Zinc Tablets*

Bivariate analysis was used to test differences in the number of *Lactobacillus* in the infant's feces from mothers who were given zinc tablets for the intervention group, and the control group was not given zinc tablets. However, the normality test was previously carried out, which concluded that the data were normally distributed, so the Independent Sample Test was used to see the difference. The analysis of the data obtained is presented in the form of Table 2.

Table 2 showed that the group of infants whom mothers breastfed obtained zinc tablets had a higher mean value of 2947625215.62 (2x10<sup>9</sup>) than the group of infants breastfed by mothers who were not given zinc tablets with a mean value of 162374516.97 (1x10<sup>8</sup>). Furthermore, there was a difference in the number of *Lactobacillus bifidus* in the intervention and control groups with a mean difference of -2785250698.65 (-2x10<sup>9</sup>), with *p*-value = .009 ( $\alpha < .05$ ), means a significant difference between the intervention group and the control group. Based on the analysis, which showed a *p*-value = .009 ( $\alpha < .05$ ), it means a difference in the number of *Lactobacillus bifidus* in the feces of breastfed infants from mothers who were obtaining zinc tablets.

**Table 2.** Differences in the Number of *Lactobacillus* in the Baby's Feces after being given Zinc Tablets in the Antang Perumnas Public Health Center, Kassi-Kassi Health Center, Jumpanang Baru Health Center and Bara-Barayya Health center from March 22 to June 22, 2021 .

Number of <i>Lactobacillus</i>	N	Mean ± SD	Mean	<i>p</i> -value
Intervention	16	947625215.62 +3988434819.82	2785250698.65	.009
Control	16	162374516.97 +251672477.49	2785250698.65	

Sources: Primary Data of Questionnaire, 2021 .

**DISCUSSION**

This study discusses the difference in *Lactobacillus bifidus* in the feces of breastfed infants from mothers who gained zinc tablets compared to those who were not gained zinc tablets. The number of colonies of lactic acid bacteria on the skin swabs around the breast areola, colostrum, and infant feces at early breastfeeding initiation. It concluded that the total LAB colonies on breast skin swabs, colostrum, and infant feces that were successful in early breastfeeding initiation were higher than without early breastfeeding initiation (E., 2018; Moreno, 2018; Shani et al., 2018).

In this research, there was elevated total *Lactobacillus* in the intervention group after being treated with a mean difference of -2785250698.65 (-2x10<sup>9</sup>) statistically with *p*-

value = .009 ( $\alpha < .05$ ). It means there was a significant difference between the intervention group and the control group.

There is a significant role of zinc in pregnancy and nursing, including fetal development and milk secretion. Zinc in the lactation process is a crucial modulator of the mammary gland, which is very important for successful lactation. The mammary gland is a very special hormonal responsive tissue and has specific requirements regarding zinc needed to take up, redistribute, and secrete large amounts of zinc into breast milk to be distributed to infants to get optimal zinc (Lee et al., 2015).

Zinc in pregnant women plays a role in supporting the growth and development of the fetus in the womb until it is born and grows until the age of toddlers and children. The



effects of hormonal changes and nutrient transport from mother to fetus result in a relatively decreased zinc concentration up to 15%-35% at the end of pregnancy. In pregnant women, zinc in pregnant women is 57% used by the fetus, 24% in the uterus, 6.5% in the placenta, 6.5% in maternal blood volume, 5% in breast tissue, and 1% in amniotic fluid (Ermita et al., 2019).

The fetus in the womb initially has a sterile gastrointestinal tract. However, immediately after birth, good bacteria colonize during the delivery process from the environment and the mother's birth canal. When the stool is examined a few hours after the baby is born, bacteria begin to be found, and the number will increase in the first week of birth as the baby gets colostrum and breast milk from the mother

Lactic acid bacteria (LAB) found in the feces of breastfed infants include *Bacillus*, *Lactobacillus*, *Streptococcus*, and *Bifidobacteria*. The largest lactic acid bacteria in the infant's body is obtained from breast milk, especially colostrum consumed by infants. The consumption of formula milk in infants often causes allergies and diarrhea because not all lactic acid bacteria in breast milk can be obtained from formula milk, such as the genus *Lactobacillus bifidus*.

This study concluded an increase of *Lactobacillus bifidus* in the infant's feces, with a  $p$ -value of .003 ( $\alpha < .05$ ). It means a difference in the number of *Lactobacillus bifidus* in the feces of infants who were breastfed from mothers who obtained zinc tablets.

### CONCLUSION

The number of *Lactobacillus bifidus* in the feces of infants from mothers who were obtained zinc tablets was higher. There was a difference in total *Lactobacillus Bifidus* in the infant's feces between the intervention and control groups. It proved that zinc tablets affect the increase of *Lactobacillus bifidus*.

### SUGGESTION

This research could be basic information for further research because of the importance

of giving zinc tablets for body resistance, overcoming high infant mortality problems, increasing the percentage of exclusive breastfeeding, and preventing stunting.

### ACKNOWLEDGMENT

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### DECLARATION OF CONFLICTING INTEREST

There is no conflict of interest in the writing.

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The funds used in this study are the researchers' personal funds.

### AUTHOR CONTRIBUTION

**Verawati Parmah:** Designed the study, collected and analyzed data, and contributes to the completion of the research and article.

**Wardihan Sinrang:** Supervisor contributes to the completion of the research and article.

**Suryani As'ad:** Supervisor contributes to the completion of the research and article.

**Muh. Nasrum Massi:** Supervisor contributes to the completion of the research and article.

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