

The Influence of Giving Zinc Toward the Concentration of CD4 Serum and IGA Breast Milk on Postpartum Mother in Sudiang Raya Makassar, Indonesia

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Abstract

Breast milk contains various active factors, especially immunoglobulin/ antibody such as: IgA, IgG, and IgM, hormone, vitamin, cytokines, growth factors, component, prostaglandin, granulocyte, macrophages, and B lymphocyte and T lymphocyte. T lymphocyte cell is 80% of lymphocyte cell which is in breast milk and has phenotype of CD4 and CD8 in similar quantity. The antibody or main immunoglobulin in breast milk is IgA. Secretary of IgA (sIgA) protects mucosa membrane of digestive tract and respiratory. This research aims at knowing the influence of zinc toward the concentration of CD4 Serum and IgA breast milk on postpartum mother in Sudiang Raya, Makassar, Indonesia. Moreover, this research was experimental research by giving treatment/ intervention by zinc capsule to the postpartum mother for 3 months by Randomized Pre Test Post Test Control Group Design. This design was utilized to test the hypothesis which the researcher could control factors that would influence internal validity. The internal validity was controlled by observing regularly to the treatment and control group during the conducted research. Thus, the occurred events during the research could be recorded by the researcher. Meanwhile, the fault in measuring could be minimalized by not telling the gauge in a group which the subject was, measuring in more than once, and training the gauge so that he or she would be professional and would behave neutrally. The result of this research showed that there was a significant difference of IgA breast milk between control group and treatment group ($p < 0,05$). There was no significant difference of concentration of CD4 serum between control group and treatment group ($p > 0,05$). However, the conclusion of this research was there was an influence of giving zinc as an effort in improving baby's immune.

Key words: Breast milk, IgA, Zinc, CD4 serum

I. INTRODUCTION

The scientific research has proved that generally, infant who drinks breast milk has strong immune, hence, it produces the qualified human resource (Prabantini, 2010). If the nutrient that is transferred from the mother is less; particularly for micronutrient (vitamin A and zinc), it will increase the emergence of various diseases such as infection (Leon, dkk, 2009). It is supported by WHO (2009) which stated that about 15% from the child mortality case under five years old because they are not given breast milk and it is occurred in developing country. Lack of vitamin A (KVA) and zinc are closely related to the number of infection disease and high child mortality under five years old. (Adriani, 2012). Some researches contribute the real evidence that infants and children with minor xerophthalmia, have bigger risk in 2-3 times to suffer infection disease even it causes mortality (Anonymous, 2013). Study on small scale (1997-1999) in West Java, Central Java and Lombok shows that the prevalence of deficiency in zinc was about 6%-30% toward infants (Leon, et.al., 2009).

However, target range of 80% of giving breast milk in Indonesia is still far from the reality. Based on the basic health research (*Riskesdas-Riset Kesehatan Dasar*), the data of infant who gets exclusive breast milk is getting low (15.3%) in 2010. The infant who is in the age of 0 month and gets exclusive breast milk is 39.8%, while the child who is in the age of five months is 15.3%. The percentage of infant who gets exclusive breast milk decreases due to the rise of his / her age. Based on the result of basic health research (2013), giving breast milk in the age of 6 months is 30.2%. In addition, based on the basic health research (2010), giving vitamin A capsule to the baby who is in the age of 6-59 months is 69.8% (Balitbangkes, 2010) and in the result of basic health research (2013), giving vitamin A capsule is 75.5%, while national target is 90% (Balitbangkes, 2013).

In fact, it is found that almost 10 million of infants suffer lack of vitamin A (KVA) of subclinical (retinol serum $\leq 20\mu\text{g/dl}$) and among 60 thousands of them are with the symptom of bitot spot that are threatened to be blind. Subclinical KVA or retinol in low blood pressure is closely connected to the number of high infection disease, meanwhile, the mortality rate or infants' health status was impaired. High proportion of toddlers in this retinol serum of $< 20 \text{ mcg/100 ml}$ causes toddlers in Indonesia have high risk of xerophthalmia and decrease on the immune rate, thus, it will make the toddlers easier to suffer disease (Aritonang, 2010). Lack of vitamin A (KVA) and zinc are interrelated. If the zinc in the body is low, the structuring of retinol binding protein (RBP) that is occurred in the liver decreases. Furthermore, it causes a disturbance in the metabolism process of vitamin

A. Hence, the concentration of vitamin A in blood is low because RBT and transthyretin protein that bring retinol in the blood are brought to low tissue cell. On the other hand, lack of zinc causes the disturbance on the role of vitamin A in immune system for differentiation of T lymphocyte and B lymphocyte and a disturbance of integrity defense and function of mucosa surface. If the concentration of vitamin A and zinc are low, it can decrease the immune and cause the infants suffer easily the disturbance of their health status. In this case, one of the disturbances is they are easier to suffer a disease.

II. METHOD OF RESEARCH

This research was an experimental research by an intervention such as giving zinc capsule toward postpartum mother for 3 months, applying Randomized Pre Test Post Test Control Group Design plan. In addition, this research was conducted in the area of Public Health Center in Sudiang Raya, Makassar, South Sulawesi, Indonesia. The sample was 37 mothers who gave breast milk. The sample was chosen randomly in so that the postpartum mothers are represented proportionally. The variables in this research were the characteristics of mother (age, education, and occupation), the concentration of CD4 serum and IgA breast milk. An interview was conducted in the respondent's house independently. Statistical analysis was utilized to test the hypothesis which was paired samples of T-test and independent samples of T-test.

III. RESULT

A. Respondent's Characteristics

In this research, the respondent's age is a control group of 41.2% in the age of 25-<30 years old and a treatment group of 35.0% in the age of 30-<35 years old. The respondent's occupation in control group was housewife (76.5%). Meanwhile, the respondent in treatment group is also housewife (95%). Almost of mother's education was senior high school (35.3%) in control group and treatment group (45%).

B. Influence of Giving Zinc toward the Concentration of CD4

Result of statistic test showed that before giving an intervention, there was no significant difference in the concentration of CD4 serum on postpartum mother between in control group and in treatment group, with p-value = 0.259 ($p > 0.05$). After having intervention, there was significant difference in the concentration of CD4 serum on postpartum mother between control group and treatment group with p-value = 0.019 ($p > 0.05$).

An average change in CD4 serum on postpartum mother in control group was -1.68 ± 0.19 and treatment group was -0.30 ± 1.16 . It indicated that there was the decrease of CD4 serum on postpartum mother in control group and treatment group. In this case, the decrease of CD4 serum was more in control group rather than treatment group. Giving zinc could make slow decrease in the concentration of CD4 in treatment group rather than control group. An average decrease of the concentration of CD4 serum in control group was -1.68 ng/ml , meanwhile, in treatment group was -0.30 ng/ml . The difference of decrease was not significant different that was showed with p value was 0.063 ($p > 0.05$).

C. Influence of Giving Zinc toward IgA Breast milk

Before giving an intervention, an average value of IgA in breast milk on postpartum mother in treatment group was 77.58 ± 66.83 ; whereas, after having an intervention was 183.96 ± 166.25 . Result of statistic test showed that there was IgA change in breast milk on postpartum mother in treatment group with p-value was 0.025 ($p < 0.05$). Before giving an intervention, there was no significant difference in average value of IgA breast milk on postpartum mother between in control group and treatment group, with p-value = 0.120 ($p < 0.05$). Whereas, after giving an intervention, there was significant difference in the average value of IgA breast milk on postpartum mother between in control group and treatment group, with p-value = 0.036 ($p < 0.05$). An average change of IgA breast milk on postpartum mother in control group was -20.78 ± 4.74 ; while in treatment group was 82.59 ± 32.99 . It showed that by giving zinc, it would increase IgA breast milk on postpartum mother in treatment group. The difference of decrease was not significant different which was showed with p value was 0.017 ($p > 0.05$).

IV. DISCUSSION

A. The Concentration of CD4 Serum on Postpartum Mother

Based on the research, it was indicated that there was no significant difference of the difference of change in the concentration of CD4 serum between in control group and treatment group. Moreover, there was significant difference of the concentration of CD4 serum between before and after intervention in control group and there was no significant difference of the concentration of CD4 serum between before and after intervention in treatment group. Before giving an intervention, there was no significant difference in the concentration of CD4 serum between in control group and treatment; meanwhile, after an intervention, there was significant difference in the CD4 serum in both groups.

Furthermore, it was known that there was decrease of CD4 concentration after giving intervention that could be seen from the average value of CD4 concentration. The decrease of CD4 concentration was slower in treatment group. However, the decrease of this CD4 was still in normal. Hence, it could be concluded that giving zinc on postpartum mother could slow the decrease of CD4. Lymphocyte cell was a cell that had main role in specific immune system. T cell was in cellular immunity and B cell was in humoral immunity. In humoral immunity, CD4 was surface molecule of T cell helper that would integrate with B cell and it would stimulate proliferation and differentiation of B cell. In cellular immunity, CD4 activated macrophage to destroy intracellular microbes which infected a cell. Both of these immune systems related each other (Baratawidjaya, 2006). CD4 cell was a kind of leukocyte or lymphocyte and this was the important part from the immune system of human body. It was also known as T-4 cell, a helper cell or CD4 cell. When CD4 cell duplicated to resist any infection, the cell also made much duplication (Baratawidjaya, 2006). This was proven by slow decrease of the concentration of CD4 serum on postpartum mother in treatment group. Hence, it had small possibility to be ill or to suffer infection. Nevertheless, if the mother was infected, the leukocyte cell in the mother's body became active and created an antibody toward infection to protect the mother. Some leukocyte flowed to the mother's breast and made antibody and then, it was removed together with breast milk to protect the baby from infection. This was proved by the baby in treatment group who did not suffer infection.

B. The Concentration of Immunoglobulin A of Breast Milk on Postpartum Mother

The result showed that average value of IgA breast milk increased in treatment group, meanwhile, in control group, it decreased. IgA breast milk value in treatment group was higher than control group. The result of the research proved that giving zinc could increase IgA breast milk on postpartum mother. Zinc was influenced directly to the gastrointestinal system and indirectly to immune system. Zinc had a role to keep integrity of intestinal mucosa through the function in regenerating cell and stabilizing cell membrane. Besides, zinc also had role to the function immunity of T cell and the forming of antibody by B cell, and non-specific defense. Zinc was needed in biostimulin activity, which was non-peptide hormone that was secreted by epithelia thymus cell which was used for maturing T lymphocyte and producing interleukin. (Adriani and Wirjatmadi, 2012).

T lymphocyte cell was 80% from lymphocyte cell which was in breast milk. B lymphocyte cell produced immunoglobulin. Specifically, B lymphocyte cell produced secretory of IgA (sIgA) that had function to protect IgA from protein enzyme destroyer (trypsin, pepsin) in infant's gastrointestinal tract and gastric acid. Immunoglobulin in breast milk was not absorbed by infant; however, it had a role to strengthen the local system immune of gastrointestinal tract. B lymphocyte in mother's digestion tract was activated by bacteria in it. Then, lymphocyte would be active to immigrate to mammary gland that became plasma cell and produced antibody.

Breast milk had protection and contained antibody. Study conducted by Chen et.al. (2012), by using entry form toward mother who had infant in the age of 8 months, it showed clearly that the infant who never drank breast milk, she or he would suffer infection twice often rather than the infant who drank breast milk. As the effect, the infant should be treated at hospital more often than the infant who drank breast milk. Based on the interview in this research, it was obtained that there was no infection which was suffered by the infant / baby in treatment group because it was occurred the increase of antibody by IgA breast milk which could protect the baby. Whether, in control group, the baby suffered infection. This research was supported by the study conducted by Damayanti (2013) who stated that supplementation of vitamin A caused a little increase of breast milk retinol and serum retinol in first check, then, in second check, it would have no increase of breast milk retinol and serum retinol significantly on postpartum mother in *KEK (Kurang Energi Kronis- Lack of Energy Chronically)* and *Non KEK*. Supplementation of vitamin A was consumed by postpartum mother that could be used by the body to regenerate the cell after childbirth or directly to organ target which needed mucosa cells in reproduction system after childbirth. Supplementation of vitamin A would not increase the retinol in breast milk on postpartum mother in either *KEK (Lack of Energy Chronically)* or *Non KEK*.

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