



Zinc deficiency, vitamin A deficiency and malnutrition actually related to each other like a chain. If body suffer of zinc deficiency, serum retinol also decreased and resulting in vitamin A deficiency. Zinc deficiency can also lead to disruption of protein metabolism so malnutrition also occurs. Zinc deficiency can also reduce immunity, whereas malnutrition and low immunity was also interrelated.

## Methods

### Study design and population

This research applied an experimental design of double blind randomized tests (pre-test and post-test) on two groups (trial and control groups). Based on the inclusion criteria, samples of this study are 32 malnutrition pregnant women in their third trimester. The sample was randomly assigned to two groups, trial and control groups.

### Informed consent and ethical clearance

This study has obtained ethical clearance from ethical committee of the Public Health Faculty of Airlangga University. Any woman who is the subject of this study has been agreed to completing a written informed consent form.

### Supplement

Zinc and high-dose vitamin A supplementation were given to respondents who are malnutrition pregnant women in their third trimester.

### Data collection

Data were collected through questionnaire-based interviews, laboratory tests of blood samples and breast milk.

### Biochemistry assessment

Blood samples and breast milk were collected by medical analyst to know retinol and zinc levels in the breast milk of respondents.

### Statistical analysis

To analyze the differences each of the variables in two groups, independent samples T-test was used for ratio data scale. Normality of data distribution was tested with Kolmogorov-Smirnov test.

## Result

The results of this study showed that average of serum albumin in trial group was higher (2.93 – 0.20 µg/dl) with minimum 2.50 µg/dl and maximum 3.30 µg/dl than control group (2.91 – 0.21 µg/dl) with minimum 2.50 µg/dl and 3.30 µg/dl as maximum value. Test results using the Kolmogorov-Smirnov statistic showed p-value > 0.05 which means that data distribution is normal, data in both group is homogeneous. Based on T-test results with p-value < 0.797 concluded that there was no difference of serum albumin between trial group and control group (Table 1).

Based on the Table 1, we showed that average retinol levels of breast

milk in trial group was higher (6.72–7.07 µg/dl) with minimum 0.67 µg/dl and maximum 22.33 µg/dl than control group (6.57 – 3.83 µg/dl) with minimum 2.25 µg/dl and maximum 14.73 µg/dl. After statistical test using T- test to see the difference, it can be concluded that there was no difference retinol levels of breast milk between the trial and control groups (p < 0.948) (Table 1).

The average zinc levels of breast milk that obtained from this research are: in the trial group 35.7 – 10.60 µg/dl with minimum value of 20.92 µg/dl and 52.74 µg/dl as maximum value whereas in the control group, the average was 39.41 – 10.64 µg/dl with minimum value of 24.55 µg/dl and maximum value of 64.80 µg/dl. Different with albumin and retinol level, zinc levels of breast milk in trial group is lower than control group. Result of T-test showed that there was no difference in zinc levels of breast milk between the trial and control groups (p < 0.386) (Table 1).

## Discussion

### Albumin

Result of t-test showed that there was no difference of serum albumin between the trial group and the control group (p < 0.797). Foodstuffs that contain a lot of albumin from animal sources such as beef, fish, chicken, eggs and milk containing high levels of protein. While nuts and vegetables have a lower level of protein.

expected to have other potential that is increase immunity factors in breast milk.

#### Zinc levels of breast milk

The statistical results showed that there was no difference zinc level of breast milk between the trial and control groups. According to Krebs [14] study concluded that zinc supplementation has effect on zinc levels of breast milk after supplementation of 13 mg zinc/day for 6 months. But some studies have concluded that poor micronutrient intake and