



## The Effect of Zinc and Vitamin C Additional on Healing Process of Second Degree Perineal Wound in Postpartum

Authors

Listyaning Eko Martanti\*<sup>1</sup>, Noor Pramono<sup>2</sup>, Sri Wahyuni<sup>1</sup>, Imam Djamaluddin Mashoedi<sup>1</sup>, Donny Kristanto Mulyantoro<sup>3</sup>, Dyah Fatmasari<sup>1</sup>

<sup>1</sup>Poltekkes Kemenkes Semarang, Semarang, Indonesia

<sup>2</sup>RSUP dr. Kariadi Semarang, Indonesia

<sup>3</sup>Balai Penelitiandan Pengembangan Akibat Kekurangan Iodium

\*Corresponding Author

Listyaning Eko Martanti

Email: [echie.okay@gmail.com](mailto:echie.okay@gmail.com)

### ABSTRACT

**Background:** The intake of nutrients is one of the important factors affecting the wound healing process, one of which is zinc and vitamin C

**Objective:** To assess the effects of zinc and vitamin C additional on healing process of second degree perineal wound in postpartum.

**Methods:** The design of this study used experiments with a post test only control group design. With a simple random sampling technique, 50 respondents were selected from the population, consisting of 24 respondent were given zinc with a dose 20 mg, 1x1 daily for 7 days and 26 respondent were given vitamin C with a dose 100 mg, 1x1 daily for 7 days. Data analysis with Mann Whitney test.

**Result:** The addition of vitamin C to postpartum mothers with second degree perineal wound have a shorter duration of healing time than postpartum mothers who given zinc, i.e (8,15 days for vitamin C group and 9,13 days for zinc group) and have better perineal wound score where in vitamin C group the respondents that healed are 16 (61,5%) than zinc group where the respondents that healed are 7 (29,2%) in 7th day of assessment.

**Conclusion:** The addition of vitamin C is better in shortening the healing process of the second degree perineal wound compared to the addition of zinc

**Keywords:** Vitamin C, Zinc, Wound Healing Process, Perineal Wound, Postpartum.

### Introduction

Wound healing normally requires proper nutrition whereas the process depends on the availability of protein, vitamin C, and zinc. Lack of such nutrients in the body can cause longer wound healing process and increase the risk of infection <sup>[1]</sup>.

According to <sup>[2]</sup>, infection is the fourth leading cause of Maternal Mortality Rate (MMR) in Indonesia, which is 7.3%. Therefore nutritious have an

important role, for example, vitamin C and zinc in the wound healing process, especially Perineal wound. The perineal wound is the damage that occurs in the perineum which is divided into 4 categories, and in this research, the perineal wound that studied was second degree perineal wound <sup>[3]</sup>.

Vitamin C itself has a role to enhance the immune system and helps the process of collagen synthesis for the wound healing process. This is also

supported by studies that suggesting the formation of collagen is more dense in the wound healing process by subcutaneous vitamin C injection of 500 mg / kgBW around the dermal incision wound in mice. This dose is converted to 200 g so that the given is 9 mg (0.09 mL).

The role of vitamin C is also as a cofactor for Proline and Lysine hydroxylase enzymes in the hydroxylation reaction which will convert Proline and Lysine into procollagen into Hydroxyproline and Hydroxylysine in fibroblasts in the process of collagen synthesis<sup>[1]</sup>. While Zinc is also important for the formation of epithelium, collagen synthesis and unify collagen fibers in the wound healing process, protecting proteins from free radicals, protect cells from the damage.

The treatment of perineal wound which has been given is amoxicillin 500 mg 3x1 daily for 3 days, mefenamic acid 500 mg 2x1 daily for 3 days, Fe tablet 60 mg 3x1 daily for 15 days, vitamin A 200.000 SI 1x1 daily for 2 days with wound healing time 8-10 days So hopefully with the administration of vitamin C or zinc can shorten the wound healing time<sup>[4]</sup>.

## Methods

### Design

This research is a quantitative research with experimental research design and used posttest only control group design which is done in Independent Midwifery Practice in Semarang city on November 2016 until February 2017.

### Population and sample

The population in this study were postpartum mother with second degree perineal wound in Semarang city as much as 189 respondents and by using simple random sampling by computer got 52 respondents as a sample. But from 52 respondents there were 2 respondents (the 30th and 51st respondents) who dropped out in the zinc group due to intervention by the shaman and one respondent could not be visited because the baby on the third day is referred to the hospital.

### Instrument

Zinc and vitamin C used are generic drugs and given in the form of tablets with zinc dose as much as 20 mg and vitamin C as much as 100 mg which is then given 1x1 daily for 7 days start from the first day of postpartum. Assessment of wound healing using the REEDA score with indicators of assessment was redness, edema, ecchymosis, drainage, and wound approximation, then the five indicators are assessed with 3 categories of good wound healing (score 0), insufficient wound healing (score 1-5), and poor wound healing (score > 5)<sup>[5]</sup>. Perineal wound assessment was performed on Day 1, 3rd, 5th, 7th, 10th postpartum.

### Intervention

The samples were chosen based on the inclusion criteria and divided into 2 groups namely the zinc group and the vitamin C group. The treatment of the samples was done according to the sequence of randomization block with the aid of the computer so that 26 respondents who received zinc therapy with doses of 20 mg 1x1 daily for 7 days and 24 Of respondents who received vitamin C therapy with dose of 100 mg 1x1 daily for 7 days. In this study used comparator control group with literature study, where known perineal wound healing duration was 8,04 days<sup>[6]</sup>.

### Data Analysis

Characteristic in this research (age, hemoglobin levels and upper arm circumference are test by analytical comparative test, independent for age and upper arm circumference, meanwhile hemoglobin levels are test by mann whitney test.

Criteria assessment of healing score and perineal wound healing duration are test by mann whitney test because both data are not normally distributed.

### Ethical Consideration

This research has been approved by the ethics committee of Poltekkes Kemenkes Semarang with No.008/KEPK/Poltekkes-Smg/EC/2017 and each research subject examined in this study has first received and approved the informed consent from the researcher.

**Results**

**Table 1** Characteristic Frequency Distributions by Age, Hemoglobin Levels, and Upper Arm Circumference.

No	Variable	Zinc Group	vitamin C Group	P
1	Age (years)			
	Mean (SD)	28.25 (5.45)	29.00 (5.00)	0.614
	Median	29.50	29.00	
	Minimum	20	21	
	Maximum	38	39	
2	Hemoglobin levels (g/dl)	10.93 (0.66)	10.76 (0.71)	0.263
	Mean (SD)	10.70	10.50	
	Median	10	10	
	Minimum	12	12	
	Maksimum			
3	upper arm circumference(cm)	25.75 (1.71)	26.65 (2.38)	0.136
	Rerata (SB)	25.50	26.50	
	Median	24	22	
	Minimum	29	30	
	Maksimum			

1,3independent t test

2 Mann Whitney

based on table 1 above, it was found that all variables (age, Hemoglobin levels, and nutritional status) were have p value > 0,05. These means there is no difference in characteristic between both groups (zinc and vitamin c) in age, hemoglobin levels and nutritional status.

**Table 2** Means of perineal wound healing score in day 1st, 3rd, 5th, 7th and 10th days.

Group	Zinc	Vitamin C	P Value
Day 1			
Mean (SD)	15 (0,00)	15 (0,00)	1,000
Median	15	15	
Minimum	15	15	
Maximum	15	15	
Day 3			
Mean (SD)	6.25(2.36)	5.73(2.18)	0.517
Median	6.00	6.00	
Minimum	3	3	
Maximum	11	11	
Day 5			
Mean (SD)	4.21(1.96)	3.27(1.97)	0.034
Median	3.50	2.00	
Minimum	1	1	
Maximum	7	8	
Day 7			
Mean (SD)	1.83(1.66)	0.85(1.35)	0.018
Median	2.00	0.00	
Minimum	0	0	
Maximum	5	5	
Day 10			
Mean (SD)	0 (0,00)	0 (0,00)	1,00
Median	0	0	
Minimum	0	0	
Maximum	0	0	

Based on table 2 above, it was found that 1st day and 3rd day the perineal wound healing score in both groups are not significantly difference (p value > 0,05), but in 5th day and 7th day, the perineal

wound healing score in both group are significantly difference (p value < 0,05), meanwhile mean values of perineal wound healing score in vitamin C group are smaller than zinc group ( 3,27 for vitamin C and 4,21 for zinc group in 5th day and 0,85 for vitamin C group and 1,83 for zinc group in 7th day).

**Table 3** Perianeal Wound Healing Duration Based on REEDA Score.

Days	Zinc Group		Vitamin C Group	
	Heal	Not Heal	Heal	Not Heal
Day 1	-	-	-	-
Day 3	-	-	-	-
Day 5	-	-	-	-
Day 7	7 (29,2%)	17(70,8%)	16(61,5)	10(38,5%)
Day 10	100%	-	100%	-

Based on table 3, the respondents that have healed in 7th day in zinc group are 7 respondents (29,2%) and in vitamin C group are 16 respondents (61,5%). Then in 10th days both respondents in zinc group and vitamin C group are all healed.

**Table 4** The Differences of Perineal Wound Second Degree Healing Score in Zinc and Vitamin C Groups (REEDA Score = 0)

Variable	Zinc group	Vitamin C group	p-value
Wound Healing (days)			
Mean (SD)	9.13(1.39)	8.15(1.49)	0.023
Median	10.00	7.00	
Minimum	7	7	
Maximum	10	10	

\*Mann Whitney test

Table 4 shows that p value of wound healing was 0,023 (pvalue < 0,05) that means there was significant difference in wound healing score between the two groups. Whereas, based on mean value, the data showed that respondents in vitamin C group have shorter duration of perineal wound healing than zinc group (8,15 for vitamin C group and 9,13 for zinc group).

**Discussion**

The results show that vitamin C group have better results in shortening the healing process of perineal wound second degree (8,15 days for vitamin C group and 9,13 days for zinc group) table 4 and based on REEDA score, vitamin C group in 7th day have more healed respondents ( 16 respndents) than zinc group (7 respondents) table 3.

Vitamin C is better at shortening the wound healing time because vitamin C functions in the formation of collagen, the proliferation of fibroblasts, and angiogenesis<sup>[7],[8]</sup>. The benefits of vitamin C is evidenced by research on the role of vitamin C 100 mg in wound healing. During the proliferative phase, vitamin C contributes to the synthesis, maturation, secretion and collagen degradation<sup>[9]</sup>.

Previous research on the role of vitamin C in wound healing was done on 20 pigs divided into two groups: the group that consumed vitamin C after the incision (wound) and the group before and after the incision (wound) who consumed vitamin C. The results showed that although the differences between the groups were not statistically significant, The data clearly indicate that animals receiving high doses of vitamin C exhibit faster recovery and greater wound integrity<sup>[10]</sup>. The effects of fortified protein supplements containing arginine, vitamin C, vitamin E, and zinc on the healing of chronic ulcer pressure suggest that enriched nutritional supplements can improve overall healing of ulcer pressure<sup>[11]</sup>.

Meanwhile Zinc is a group of trace elements required for wound healing. Zinc as a cofactor of DNA polymerase and RNA, is involved in protein synthesis and cell proliferation. Zinc is also a cofactor in the metalloproteinase matrix activity and is involved in immune function, collagen synthesis, superoxide dismutase, and as an antioxidant. The redistribution of zinc on wound healing occurs on the body according to the weight of the wound. To improve the zinc deficiency status requires administration of zinc sulfate 4-10 µg daily. So that the wound healing procedure is indicated to be added zinc supplement<sup>[12]</sup>. This is corroborated by studies suggesting that zinc deficiency due to heredity or diet may lead to pathological changes and delayed wound healing<sup>[13]</sup>.

The role of zinc for wound healing has been shown in previous studies of some experimental animals. It has been reported that zinc accumulation of healed tissue occurs in response to increased local need for zinc in cured tissue when zinc works on fibroblast

replication, collagen synthesis, and collagen cross linking<sup>[14]</sup>.

The role of vitamin C in the process of absorption of iron in the body can also affect wound healing, where postpartum mother with anemia causes wound healing process becomes inhibited where this function is not owned by zinc.<sup>[15]</sup> In addition, limitations in this study such as nutritional intake through food recall is not researched and observations on the 8th and 9th days do not lead to the assessment of wound healing to be less accurate.

### Conclusions

The addition of vitamin C to postpartum mothers with second degree perineal wound have a better results based on REEDA score, where in vitamin C group the respondents that healed are 16 (61,5%) compare to zinc group where the respondents that healed are 7 (29,2%). In the duration of healing, vitamin C group also have better results compare to zinc group where the perineal wound healing duration are 8,15 days for vitamin C group and 9,13 days for zinc group).

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