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ORIGINAL RESEARCH

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## BIRD'S NEST EXTRACT CREAM: TREATMENT FOR PERINEAL WOUND IN RATTUS NORVEGICUS

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### ABSTRACT

**Background:** Perineal rupture occurs almost in all the first labor and not infrequently in the next labor. Complex perineal wounds are at risk for non-healing and infection.

**Objective:** This study aims to determine the effect of bird's nest extract on perineal wound healing on *rattus norvegicus*.

**Methods:** This was a randomized posttest only group design conducted in October 2016 at Animal Laboratory Unit of Diponegoro University, Semarang, Indonesia. There were 30 samples recruited in this study, divided into three groups: 1) the control group (with povidone iodine 10% solution), 2) the first treatment group with a bird's nest 50% cream, and 3) the second treatment group with a bird's nest 70% cream. The Redness, Edema, Ecchymosis, Discharge, Approximation (REEDA) scale was used. Data were analyzed using descriptive statistics, frequency distribution, and one-way ANOVA.

**Results:** There were statistically significant mean differences between the three groups with p-value 0.000 (< 0.05). The time of the wound healing was 5-6 days for povidone iodine 10% group, 4-5 days for bird's nest 50% group, and 3 days for bird's nest 70% group. The degree of perineal wound density in the bird's nest 70% group (0.37) was also better than the bird's nest 50% group (0.13) and povidone iodine 10% group (0.02).

**Conclusion:** Bird's nest has a significant effect on wound healing process. Findings indicated that the bird's nest 70% extract was very effective to accelerate wound healing than bird's nest 50% extract and povidone iodine 10%.

**Keywords:** bird's nest, perineal wound, *rattus norvegicus*

### INTRODUCTION

Perineal tears mainly occur as a result of vaginal childbirth, which strains the perineum.<sup>1</sup> It is a spontaneous laceration of the skin, occurring when a baby's head

or shoulders are too large to pass through the vaginal opening.<sup>1</sup> This can take time to heal, which can experience discomfort and difficulty having bowel movement. Infection is also possible due to exposing

the tissue to bacteria.<sup>1</sup> In Indonesia, of 85% of women who give spontaneous vaginal delivery, approximately 52% of women experiencing spontaneous laceration, and 32-33% due to episiotomy.<sup>2</sup> Nationally, the incidence of perineal wound infections during the puerperium period was 2.7% and 0.7%, of which progressed to acute infection. Of these cases, 25-55% was caused by a birth canal infection.<sup>2</sup> This infection can occur because there are still many mothers who do not eat nutritious food, which slow the healing process of perineum.<sup>2</sup> Perineal rupture occurs almost in all the first labor and not infrequently in the next labor. It can be divided into rupture I, II, III, IV.<sup>3</sup>

The impacts if the perineal wound is not resolved such as infections, bleeding, and even postpartum maternal death.<sup>4</sup> Thus, the objective of perineal care is to prevent infection of reproductive organs caused by microorganisms entering through the open vulva or by proliferation of lochea container (bandages).<sup>5</sup>

There are many ways that have been developed for wound healing such as wound sewing, high doses of anti-septic use, and dressings using absorbent material.<sup>6</sup> But when examined further, it turns out this way of healing does not help and yet at risk of worsening wounds.<sup>6</sup> In everyday life, people will usually use anti-septic on the wound with the aim of keeping the wound to become sterile, such as hydrogen peroxide, povidone iodine acetic acid and chlorohexidine, which are always available in the medicine box. Anti-septic material such as povidone iodine is very effective in killing microbes, but on the other hand it can cause irritation to the wound. In addition, the substances contained in the anti-septic material will be considered as a foreign cell by the body because the components and its composition are different from the body cells. Thus, many people are looking for a safer alternative by switching to the

type of drug with ingredients from the natural environment.

Literature states that the use of drugs with natural ingredients is generally considered safer than the use of drugs with chemicals.<sup>7</sup> This is because the drugs coming from the natural environment have relatively few side effects compared to chemical drugs. For this study, bird's nest was used as a drug with natural ingredients. It is rich in collagen and amino acids such as leucine, lysine, glycine, glutamine, tyrosine, arginine, cysteine, histidine, tryptophan, and amino acids, as described as the building blocks of proteins that is beneficial to human body.<sup>8</sup>

Glycine serves as an anti-inflammatory to suppress the activation of transcription factors and the formation of free radicals of inflammatory cytokines.<sup>9</sup> Additionally, bird's nest also contains glycoprotein, which consists of 7.2% Nacetylglucosamine (galNac), 5.3% Nacetylglucosamine (glcNac), 16.9% glucose and 0.7% fructose; and 9% sialic acid to improve the immune system.<sup>10</sup> The glycoprotein component can increase cell proliferation and decrease TNF $\beta$  production as a proinflammatory factor.<sup>10</sup>

Similar results in another study found that bird's nest extracts can decrease production of TNF $\alpha$  and NO in macrophage inflammatory activation induced induced by polysaccharide in *invito*.<sup>11</sup>

Another related study conducted by the institute in Thailand found that bird's nest contains glycoproteins that improve the immune system and cleanse the lungs, and contains growth factors that can improve cell regeneration and increase the production of collagen in the skin.<sup>12</sup> However, the use of bird's nest extract creams for incision wound healing is still difficult to obtain and has not been widely applied in everyday life. It is just widely used for beauty products. Therefore, this

study aimed to examine the effect of bird's nest cream extract on wound healing perineum of *rattus norvegicus*.

## METHODS

### Design

This was a randomized posttest only group design, conducted in October 2016 at Animal Laboratory Unit of Diponegoro University, Semarang, Indonesia.

### Population and Sample

This study used a complete randomized design. There were 30 samples recruited in this study, divided into three groups: 1) the control group (with povidone iodine 10% solution), 2) the first treatment group with a bird's nest 50% cream, and 3) the second treatment group with a bird's nest 70% cream.

### Intervention

Bird's nest cream was applied directly on the perineal of white rat (*rattus norvegicus* strain wistar) three times per day in the first and second treatment group with a dose of 5 mg per day. The control group was given povidone iodine 10% solution three times a day.

### Instrument

To assess postpartum perineal trauma in this study, the REEDA scale was used. The REEDA scale is a tool for assessing perineal healing that was primarily developed by Davidson<sup>13</sup> and later reviewed by Carey.<sup>14</sup> It includes five items related to the healing process: hyperemia, edema, ecchymosis, discharge and coaptation of the wound edges (Redness, Edema, Ecchymosis, Discharge, Approximation - REEDA). The length of time and level of wound density were measured and observed one day after treatment.

Points	Redness	Oedema	Ecchymosis	Discharge	Approximation
0	None	None	None	None	Close
1	Within 0.25 cm of the incision bilaterally	Perineal, less than 1 cm from incision	Within 0.25 cm bilaterally or 0.5 cm unilaterally	Serum	Skin separation 3 mm or less
2	Within 0.5 cm of the incision bilaterally	Perineal and/or between 1 to 2 cm from the incision	Between 0.25 cm to 1 cm bilaterally or between 0.5 to 2 cm unilaterally	Serosan-guinous	Skin and subcutaneous fat separation
3	Beyond 0.5 cm of the incision bilaterally	Perineal and/or vulvar, greater than 2 cm from incision	Greater than 1 cm bilaterally or 2 cm unilaterally	Bloody, purulent	Skin, subcutaneous fat and fascial layer separation
Score					
				Total	

Figure 1 REEDA Scale<sup>14</sup>

### Ethical Consideration

This study has been approved by the Health Research Ethics Committees (K.E.P.K) of the Health Polytechnic of Semarang with number 100/KEPK/ Poltekkes-Smg/EC/ 2016.

### Data Analysis

Data were analyzed using descriptive statistics and frequency distribution. One-way ANOVA test was also used to see the

effect of the intervention on perineal healing.

## RESULTS

Table 1 shows that the age of *rattus norvegicus* between the groups of povidone iodine 10%, Bird's nest 50%, and Bird's nest 70% were almost the same with mean ranged between 2.30-2.40 months.

**Table 1** Characteristics of Rattus Norvegicus based on Age (*Levene's test*)

Group	Mean (Month)	Median	SD
Povidone iodine 10%	2.40	2.00	0.51
Bird's nest 50%	2.30	2.00	0.483
Bird's nest 70%	2.40	2.00	0.516

**Table 2** Rattus Norvegicus Based on Weight (*Levene's test*)

Group	Mean (Gram)	Median	SD
Povidone iodine 10%	162	160.00	10.32
Bird's nest 50%	156	155	6.99
Bird's nest 70%	159	160	8.75

There was a slightly different of the weight of rattus norvegicus as shown in the Table 2 that the group of povidone iodine 10% was 162 grams with standard

deviation 10.32, bird's nest 50% was 156 with standard deviation 6.99, and bird's nest 70% was 159 with standard deviation 8.75.

**Table 3** Rattus Norvegicus Based on Perineal Wound Healing Period

Group	Mean (Days)	Median	SD
Povidone iodine 10%	5.80	6.00	0.42
Bird's nest 50%	4.90	5.00	0.31
Bird's nest 70%	3.20	3.00	0.42

Table 3 shows that there was a different mean time of the wound healing between the three groups, which was 5-6 days for

povidone iodine 10% group, 4-5 days for bird's nest 50% group, and 3 days for bird's nest 70% group.

**Table 4** Characteristics of Rattus Norvegicus Based on Degree of Perineal Wound Density

Group	Mean (µm)	Median	SD	Degree of density	
				Minimum	Maximum
Povidone iodine 10%	0.37	0.35	0.10	0.2	0.5
Bird's nest 50%	0.13	0.15	0.12	0.0	0.3
Bird's nest 70%	0.02	0.00	0.04	0.0	0.1

Table 4 shows that the mean degree of perineal wound density in the bird's nest 70% group (0.37) was better than the bird's nest 50% group (0.13) and povidone iodine 10% group (0.02). Further analysis was conducted using

One-Way ANOVA as shown in the Table 5 with p-value 0.000 ( $< 0.05$ ), which indicated that there were statistically significant mean differences between the three groups.

**Table 5** Difference of Degree of Perineal Wound Density Using One-Way ANOVA

Group	Mean	Median	SD	95% Confidence Interval		P value
				Min	Max	
Povidone iodine 10%	0.37	0.35	0.10	0.29	0.44	0.000*
Bird's nest 50%	0.13	0.15	0.12	0.44	0.22	
Bird's nest 70%	0.02	0.00	0.04	0.01	0.05	

\*Significant p-value  $< 0.05$

**Table 6** Degree of Perineal Wound Density Using Post Hoc ANOVA

Group	Mean Difference	Std. Error	Sig.	95% Confidence Interval	
				Min	Max
Povidone iodine 10%- Bird's nest 50%	0.2400	0.0437	0.000	0.150	0.330
Povidone iodine 10%-Bird's nest 70%	0.3500	0.0437	0.000	0.260	0.440
Bird's nest 50%-Bird's nest 70%	0.1100	0.0437	0.018	0.020	0.200

As shown in the Table 6, post hoc test revealed that the degree of perineal wound density was statistically significant better after given bird's nest 70% (0.3500)

compared to bird's nest 50% and povidone iodine 10%. There was no significant difference between bird's nest 50% and bird's nest 70%.

**Table 7** Difference of Perineal Wound Healing Time Using Kruskal Wallis Test

Group	Mean±SD	Mean rank	P-value
Povidone iodine 10%	5.80±0.42	24.60	0.000*
Bird's nest 50%	4.90±0.31	16.30	
Bird's nest 70%	3.20±0.42	5.60	

\*Significant p-value <0.05

Table 7 shows that there was statistically significant difference of perineal wound healing time between groups (p 0.000). Kruskal Wallis test revealed that the wound healing time after given bird's nest

70% (3.20 days) was faster than the healing time in the bird's nest 50% group (4.90 days) and povidone iodine 10% group (5.80 days).

**Table 8** Difference of Perineal Wound Healing Time Using Post Hoc ANOVA

Group	Mean Difference	Std. Error	Sig.	95% Confidence Interval	
				Min	Max
Povidone iodine 10%- Bird's nest 50%	0.900	.174	0.000	0.54	1.26
Povidone iodine 10%-Bird's nest 70%	2.600	.174	0.000	2.24	2.96
Bird's nest 50%-Bird's nest 70%	1.700	.174	0.000	1.34	2.06

Post hoc test revealed that the duration of perineal wound healing after given bird's nest 70% was 2.600 faster compared to the wound healing time in bird's nest 50% group and povidone iodine 10% group.

## DISCUSSION

Findings indicated that there were statistically significant mean differences between the three groups, and it revealed that the perineal wound healing time and density in bird's nest 70% group were faster and better compared to the wound healing time and density in bird's nest 50% group and povidone iodine 10% group. This finding proved that the bird's nest 70% is very effective on perineal wound healing.

The effect of bird's nest extract on wound healing is dose-dependent,<sup>15</sup> and this study found that bird's nest 70% was better than bird's nest 50%. The better effect shown in the bird's nest 70% because it contained epidermal growth factor (EGF), is a low molecular weight, 53-amino acid polypeptide that stimulate cell and proliferation.<sup>16</sup> Bird's nest extract also promoted the proliferation of normal keratinocytes and fibroblasts dose-dependently. Keratinocytes plays important role in healthy skin barrier function, improved proliferation on keratinocytes directly improves skin barrier function, thus promote skin suppleness and improve overall skin texture.<sup>17</sup> Meanwhile, fibroblasts synthesize extracellular matrix and

collagen, plays critical role in wound healing, influence skin elasticity and physical apparent age.<sup>18</sup>

On the other hand, to support the wound healing process, bird's nest contains glycine that serves as anti-inflammatory to suppress the activation of transcription factors and the formation of free radicals of inflammatory cytokines.<sup>9</sup>

#### *Limitation of the study*

This study did not conduct laboratory tests (toxicity test) on bird's nest. Researchers only did research by macroscopy and not microscopically to the wound healing process due to limited time.

### **CONCLUSION**

It can be concluded that bird's nest has a significant effect on wound healing process. Findings indicated that the bird's nest 70% extract was very effective to accelerate wound healing than bird's nest 50% extract and povidone iodine 10%. This study provides the insight of knowledge to further study to examine the effect of bird's nest on mothers with perineal wound.

#### **Declaration of Conflicting Interest**

None declared.

#### **Acknowledgement**

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#### **Authorship Contribution**

Authors equally contributed in this study.

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