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THE EFFECT OF ALOE VERA EXTRACT AND DISCHARGE PLANNING TO ACCELERATE WOUND HEALING OF OLDER ADULT HERNIA SURGERY PATIENTS

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ABSTRACT

Background: Older adult patients who underwent hernia surgery commonly get obstacles in the process of wound healing as a result of decline of body functions. Aloe vera which contains of anti-inflammatory, anti-microbial and skin fibroblasts stimulator, can be used as adjunctive therapy in treating wounds.

Objective: This study aimed to identify the effect of aloe vera extract and discharge planning to accelerate wound healing of older adult hernia surgery patients at dr. R. Soedarsono General Hospital, Pasuruan.

Method: This study uses Quasi-Experimental with Static-group comparison approach. The population is all post-operative hernia patients aged 55-65 years at the operating room of dr. R. Soedarsono General Hospital, Pasuruan. The sample consists of 20 respondents taken according to the inclusion criteria. The independent variable is the treatment of wounds using aloe vera extract accompanied by discharge planning, while the dependent variable was the acceleration of wound healing especially inflammatory and proliferation phases. The data were collected through observation of macroscopic current wound care. Data were analyzed using nonparametric Mann Whitney test with significance level of ≤ 0.05 .

Result: The results showed the effect of the treatment using aloe vera extract and discharge planning to accelerate wound healing of older adult hernia surgery patients, the inflammatory phase of healing occurs on the sixth day for inflammation, exudation, and edema ($p = 0.022$, $p = 0.028$, and $p = 0.029$, respectively). The proliferative phase occurs on day three with $p = 0.015$.

Conclusion: This research indicates further research on the benefits of aloe vera and discharge planning for wound healing especially in older adult patients is required. Thus, a stronger basis for recommending aloe vera extract as complementary therapy for wound care is available.

Key words: Aloe Vera, Discharge Planning, Surgical Wound, Older Adults Age.

INTRODUCTION

Wound is an injury experienced by humans. Wound is defined as losing epithelial integrity from skin (Schwartz et al, 2010). Smeltzer dan Bare (2010) state that wound can be distinguished by contamination consisting of clean wound, contaminated clean wound, and dirty wound. Clean wound generally comes from surgery

process, which has passed incision procedure prepared aseptically. Its healing takes fast because there is no infection.

At Dr. R. Soedarsono General Hospital, Pasuruan, wound care procedures performed using a solution of NaCl 0.9%. However, older adults who had hernia surgery takes days four wound healing. At the tenth day after surgery, the wound is

still moist. The wound edges are not fully connected. It is painful and inflamed. Those conditions are not suitable with a theory stated that at the 7-10 day, the surgical suture can be released and the wound has been in good condition. (Mansjoer, 2014).

The unhealed wound will trigger some risks, such as bleeding, infection, dehiscence, and eviscerations (Mansjoer, 2014). The problem in wound treatment after hernia surgery of older adults can be special attention in nursing. In caring patients, nursing profession is demanded to develop the independent and safe nursing intervention. Exploring natural stuffs containing chemical substance as antiseptic and micronutrient is developed since it is able to help wound healing process. It is included to complementary nursing. This effort is proper to Regulations of Nursing Practical Implementation stating that nursing practice is aimed for individual, family, group, and society through promotive preventive activities, social empowerment, and complementary nursing actions (Depkes RI, 2010).

Aloe vera (*Aloe vera linn*) contains many substances which are useful to precipitate wound healing by (1) serving essential micro-nutrient; (2) anti-inflammatory effect; (3) anti-microbial effect; and (4) stimulating skin fibroblasts. Aloe vera also gives positive effects for collagen balance which has an important role in wound healing. Nevertheless, the effects of aloe vera for hernia wound healing process of older adults.

Wound healing process in hernia surgery of older adults needs more intensive care. It is not only at the hospital, but also at home. Thus, health promotion needs to be prepared, both for clients and family who will take care of the patient. Discharge planning is a process of preparing patients before they go back to home. The process identifies the needs and plans for facilitating the continuity of treatment either at home or another health service unit

(Kozier, 2008). Discharge planning for patients after surgery is not implemented well in dr. R. Soedarsono General Hospital. The information given is only controlling time and instruction of taking medicine. Most discharge planning is used in resume of patients.

Data from Operating Rooms of dr. R. Soedarsono General Hospital reveal that in 2014 hernia was in the first position (209 cases). In 2015, that case increased to 330 cases, while in 2016 it decreased into 255 cases. For case distribution based on age, there were 138 (54%) patients at the age of 55 years and more. 117 patients (46%) were at the age of less than 55 years old. The data proved that most of its patients were older adults. Based on the medical records from Surgery Unit of dr. R. Soedarsono General Hospital in 2015, the surgical suture in less than 55 years old patients were released at the tenth day. Meanwhile, for older patients, the surgical sutures were put off at the fifteenth day. The releasing process of surgical suture is executed when the wound has been dry and its edges united, so that surgical suture is not necessary.

Wound healing process is divided into three main phases, these are: 1) hemostasis and inflammation, 2) proliferation, 3) maturity and remodelling. These phases are overlapping and they happen since the wound comes out until healing process. (Wilksman *et al*, 2007). Inflammation phase is the first phase of wound healing process. At this condition, the wound is reddish and inflamed. The body increases its temperature and the pain comes. This step takes 3-4 days after injury. This healing process means cleaning process of the rests. Inflammation response causes the artery seeps and releases plasma and PMN (polymorphonucleocytes) around the tissue. Neutrophils along with local cells phagocytose the rests and microorganisms.

Proliferation phase starts at the fourth day after injury and takes until the 24th day. Clinically, this phase is marked by red tissue which replaces dermal tissue. After

that, fibroblasts secrete the collagen for regenerating cells along with angiogenesis and epithelization. In the last process of epithelization, contracture happens where keratinocytes differentiate to form outside protective layer or stratum korneum. After the basic structures completed, finishing interior starts. Dermal tissue increases its power by fibroblasts. Maturation phase or remodelling takes one year or more after injury (Aminuddin, 2009).

There are many technics for treating wounds, one of them is applying antiseptic substances which are often used for treating wounds. These antiseptic stuffs have anti-microbial substances which can fight microorganism in wounds. However, it also has its side effect, these are irritated skin, skin color change, and scar tissue because scar tissue is due to foreign object during the wound healing process (Kurniawan, 2007). Because of the side effects from chemical substances, the wound treatment uses normal saline solvent. This solvent is easy to absorb by the body, thus it will not create disadvantages.

Aloe vera is plantable and easy to find everywhere. In some countries, people use aloe vera as the first aid of treating wound. Aloe vera contains active substances which are useful for precipitating in healing wound. It contains glucomanan, acemannan saponin, lignin, vitamin A, vitamin C, enzymes and amino acid for regenerating cells. Aloe vera stimulates epidermic, increase fibroblasts function, and form the new blood vessels (Furnawanthi, 2006).

This study aimed to identify the effect of aloe vera extract and discharge planning to accelerate wound healing of older adult hernia surgery patients at dr. R. Soedarsono General Hospital, Pasuruan.

METHODS

Study Design

This research uses Quasi Experimental design, with static-group comparison design approach.

Setting

This research was conducted at the dr. R. Soedarsono General Hospital, Pasuruan on February to March 2017.

Research Subject

The population for objects is entire patients of hernia surgery at the age of 55-65 years old in surgery room of dr. R. Soedarsono General Hospital, Pasuruan. The samples consist of 20 respondents with inclusion criteria, namely male gender, had albumin levels of 3.5-4.5 g%, Hb levels of 10-14 g%, GDA 85-125 mg%, using consecutive sampling method. The independent variable in the treatment group here is wound treating process using topical aloe vera extract after cleansing with Na Cl 0.9% along with discharge planning, while in the control group the surgical wound treating without topical aloe vera extract was given. Moreover, the dependent variable is precipitation of wound healing after hernia surgery in inflammation and proliferation phases.

Instruments

The instruments used are observation reports about wound healing after hernia surgery. These are inflammatory phase including inflammation, edema, and exudation. Meanwhile, proliferation phase includes measuring uniting wound edges. The measurement of wound healing is done macroscopically in the third and sixth day after surgery without pretest.

Data Analysis

The collected data are analyzed using Mann Whitney test with ≤ 0.05 for meaning level compared to controlling and measuring group in each measuring session.

Ethical Consideration

This research has gone obtained permission from the director of the dr. R. Soedarsono General Hospital, Pasuruan

with number license of Permit Letter: 800/734/423.212/2017.

RESULTS

Examination of the Effect of Aloe Vera Extract and Discharge Planning to Accelerate Wound Healing of Older Adult Hernia Surgery Patients at dr. R. Soedarsono General Hospital, Pasuruan

Table 1. Examination of the Effect of Aloe Vera Extract and Discharge Planning to Accelerate Wound Healing (Inflammatory Phase) of Older Adult Hernia Surgery Patients on Sixth Days After Surgery at dr. R. Soedarsono General Hospital, Pasuruan by using Mann Whitney Test (n = 20).

Component of Inflammatory	Group				Asymp. Sig.
	Control		Treatment		
	N	%	N	%	
Inflammation					0.022
> 2 cm	0	0	0	0	
0.6-2 cm	6	60	1	10	
No	4	40	9	90	
Total	10	100	10	100	
Edema					0.029
> 2 cm	0	0	0	0	
0.6-2 cm	4	40	0	0	
No	6	60	10	100	
Total	10	100	10	100	
Exudation					0.028
Unclear	0	0	0	0	
Clear	8	80	3	30	
No	2	20	7	70	
Total	10	100	10	100	

Source: Primary data of questionnaire, 2017

Based on table 1, It was found that the use of Aloe Vera Extract significantly had an impact on the inflammatory process, both inflammation, edema, and exudation ($p = 0.022$, $p = 0.029$, $p = 0.028$, respectively).

Table 2. Examination of the Effect of Aloe Vera Extract and Discharge Planning to Accelerate Wound Healing (Proliferation Phase) of Older Adult Hernia Surgery Patients on Third Days After Surgery at dr. R. Soedarsono General Hospital, Pasuruan by using Mann Whitney Test (n = 20).

Component of Proliferation Phase	Group				Asymp. Sig.
	Control		Treatment		
	N	%	N	%	
Uniting Wound Healing					0.015
Not Uniting	4	40	0	0	
Some	6	60	8	80	
Entire	0	0	2	20	
Total	10	100	10	100	

Source: Primary data of questionnaire, 2017

The results on the table 2 found that the use of Aloe Vera Extract on day 3rd had a significant impact on the proliferation phase (uniting wound healing) ($p = 0.015$).

DISCUSSION

The results of this study found that the use of Aloe Vera Extract significantly had an impact on the inflammatory process, both inflammation, edema, and exudation ($p = 0.022$, $p = 0.029$, $p = 0.028$, respectively). Inflammation is a response toward lesion in living tissue which has vascularization (Kumar, 2008). Vascular and cellular response happen when the tissue is cut or injured. Vasoconstriction of blood vessel happens and clotted fibro platelet is formed to control the bleeding. This reaction takes five until ten minutes and is followed by vasodilation of venular. Microcirculation loses its vasoconstriction ability because norepinephrine is ruined by intracellular enzyme. Histamine is released to increase permeability of capillary (Smeltzer dan Bare, 2010).

When microcirculation breaks, blood elements such as antibody, protein plasma, electrolyte, complement, and water come into vascular spatial in two until three days. It creates edema, increased temperature,

redness, and pain. The first thing happening is inflammation. When inflammatory reaction appears, arteriolar enlarges. Hence, much more blood flows into local microcirculation. The stretched capillary is filled by the blood. This condition is hyperemia or congestion triggering redness in severe inflammation. The change of local pH or local concentration of certain ions can stimulate tip of nerves. The release histamine or other bioactive substances can stimulate nerves. Some of inflammation is caused by hyperemia, and most of it is triggered by liquid supply and cells from blood circulation into interstitial tissue.

Exudation is the extra vascular inflammatory liquid, with high density (more than 1.020). It contains 2-4 mg% protein with emigrating leukocyte. This liquid is heaped up as the impact of vascular permeability increase, more intravascular hydrostatics as the impact of increased local blood circulation, and any other complicated things causing emigrating leukocyte (Kumar, 2008).

The inflammation healing phase using aloe vera extract and discharge planning on the third day does not result well compared to controlling method. It is related to the age factor, that is elderly will take more time for healing process. In elderly, Langerhans cells reduce and macrophage becomes less active, hence they reduce immune activity within the skin. Moreover, the less perspiration process makes the skin dry, so the healing process takes more time. It is proved when in the third day, the wound is still 60% reddish and has 30% edema. Besides, 70% patients still have moist wound. According to Gaylene and Patricia (2000), one of the factors obscuring wound healing is about age.

Extension of inflammation phase, basically occurs in two groups. Nevertheless, the group which uses aloe vera and discharge planning for treating wound takes shorter period in healing the wound. Probably it is due to saponin content in aloe vera. Saponin is able to be

antiseptic and cleanser to fight against germs and bacteria. According to Cowser (2010) and Kathuria (2011), ace Annan has anti-inflammatory effect by reducing bradykinin and histamine activities. Meanwhile, enzymes bradykinase and peptidase are able to construct bradykinins as anti-inflammation without toxicity effect. Furthermore, using Na Cl 0.9% as cleansing in wound treatment keeps the wound moist. The moist condition only keeps the situation optimal for granulation growth, hence redness, inflammation, and exudation continue.

Discharge planning is a method to help patient reaching optimal health level by promoting health to patient and family. One of the promotion methods is informing of how important early mobilization and its steps. The comparison of patient independence level for treatment group and controlling group shows that there is no significant difference ($p=0.137$). However, descriptively it shows that independence level of treatment group is higher. The early mobilization for patients after surgery can help the blood circulation runs well. Therefore, inflammatory phase can be minimized.

The effect of aloe vera in inflammation healing process is supported by a research by Akhoondinasab et.al (2014). They said that applying 300 mg/kg *mannose-6-phosphate* for mouse is able to accelerate wound healing process compared to giving sodium chloride 0.9% by controlling group. On the other hand, Hunter et.al (2006) stated that chromones 8-*C-glucosyl-(2'-O-cinnamoyl)-7-O-methylaloe diol A* given 200 micrograms to mouse can help equally with giving 200 micrograms hydrocortisone and does not reduce thymus gland size. Anti-inflammation is also resulted from bradykinase, carboxypeptidase enzyme and salicylic acid contained in aloe vera.

The research result for proliferation phase shows differences between wound treatment using aloe vera along with

discharge planning, and controlling group. Level of wound edges uniting on the third day after surgery shows significance value $p < 0.05$ ($p = 0.015$). It is the proof that treating wound using aloe vera along with discharge planning significantly affects toward wound edges uniting since the third day.

Proliferation phase is the continuing of inflammation phase. If inflammation phase is successful, it will be followed by proliferation phase. Fibroblasts multiply themselves and form the tissues for migrating cells. Epithelia cells form bud on the wound edges. The bud will bloom into capillary which is nutrition source for the new granule tissue. In this phase, fiber is formed and destroyed to adapt with wound stretching. (Sjamsuhidajat dan Jong, 2011).

Surgical wound treatment using NaCl 0.9% is aimed to keep skin's humidity that the wound will be healed soon. However, for elderly, they have low ability of absorption, thus the mass of liquid reduces 2.5% especially in dermal layer. Fibroblasts producing collagen and elastin decrease. The less Langerhans cells and less active macrophage reduce dermal immune activity. The dermal blood vessel becomes thicker and less permeable. The adipose fat tissue loses, so the migrating process of cells to surface takes longer period.

Aloe vera contains lignin which can increase skin absorbing ability. The research from Dal'Beló et.al (2006) about effect of aloe vera for skin hydration showed that aloe vera is a natural stuff which can hydrate skin effectively. According to Laursen and Nielson (2000) in Ramamorty (2011), in wound healing process, glucomannan completes by lectin way where mannose sugar component stimulates secretion of mannose binding lectin protein (MBL). It is tied with carbohydrate of bacteria wall. This bond acitifies 3b complement functioned as chemotaxis and opsonization, hence macrophage becomes more active in eradicating the germs. Macrophage will

release *Epidermal Growth Factor* (EGF), *Transforming Growth Factor β 1* (TGF), *Fibroblast Growth Factor* (FGF) dan *Interleukins* (IL-1) besides other cytokines. (Perdanakusuma, 2007). Ramamorty (2011) and Cowsert (2010) stated that Acemannan actifies macrophage and increase nitric oxide synthase in transcription level followed by increasing of *TGF- β* , *EGF*, *FGF*. They stimulate proliferation, cellular motion, contractility, differentiation, and angiogenesis which are crucial in wound healing process. The hypothesis is supported by a research from Atiba, et al (2011) stating that aloe vera can increase wound healing process. Aloe vera works through junctional intercellular stimulating communication and proliferation fibroblasts. Minerals and vitamins, especially vitamin C in aloe vera help fibroblast in forcing collagen.

Type I and III collagen are the primary dermal component which are important in proliferation. In wound healing process after hernia surgery, granulation tissue is not visible and scar tissue forming is minimal. It happens because the wound is tight, sterile, and minimum for tissue disorder. This wound healing process runs well and fast. Basically, the wound healing process in inflammation and proliferation phase occur in two groups. However, the treatment using aloe vera extract along with discharge planning runs more fast compared to the group using Na Cl 0.9%. Consequently, the wound healing process happens primarily. The result of this research proves that aloe vera along with discharge planning work well in wound healing process after hernia surgery in older adults.

CONCLUSION

The wound healing process after hernia surgery in older adults takes shorter period by using aloe vera extract along with discharge planning. It takes more fast compared to controlling group. Healing process of inflammation happens seriously

on the sixth day, while proliferation phase occurs on the third day.

SUGGESTIONS

Applying 25% aloe vera extract on the wound after hernia surgery is recommended because it significantly speeds up the wound healing process, both in inflammation and proliferation phase. *Discharge planning* can affect significantly toward level of depression after surgery, so that it can speed up wound healing process. The next researcher should modify nursing service in which respondent can stay and get treatment every day. Aloe vera extract is applied daily hence the phytochemical effect will be more optimal. The next researcher should study the effect of aloe vera for pain, inconvenience, psychological acceptance and financial matters.

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DECLARATION OF CONFLICTING INTEREST

None.

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AUTHOR CONTRIBUTION

Mukhammad Toha: Conduct research as the research leader and compile manuscripts.

Mokh Sujarwadi: Conduct research.

Ida Zuhroidah: Conduct research.

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