IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 4, Issue 2 Ver. V (Mar.-Apr. 2015), PP 38-43
www.iosrjournals.org

Differences In The Speed Of Wound Healingby Provision Of Betadine And Chitosan On Guinea Pig (Mus - Musculus)

Ida Prijatni, Yuniasih, Susilawati
Health Polytechnic of Malang, Republic of Indonesia

Abstract: *Wound is a condition whensome body tissues are lost or broken. It may be caused by incision, as the effect of surgery. Wound healing is started since the injury happens and the skin will be the first defender from dangerous organisms.To fasten wound healing, the wound must be kept in clean and sterile condition. Betadin And Chitosan will be able to helpthe healing process by maintaining the wound hygiene. It willalso stimulate tissues growth. A quick healing process will lessen the risk of infection. This research used True Experiment technique by using the Post Test Only Control Group Design. The sample were 25 guinea pigs (Mus - musculus) aged 8-10 weekswith body weightabout 25-30 grams and in good health. The analysis technique was using One-Way ANOVA. The research results indicate that there were no significant difference between betadine and chitosan, but there was a significant difference between betadin and control and also between chitosan and control. Although statistically there were no difference between applying betadine and applying chitosan in the control group, it can be seen that chitosan was effective enough for wound healing, but it will not give a continuous effect if it is only given once.*

Keyword:*the speed of wound healing speed, Betadine, Chitosan.*

I. Introduction

In any labor, spontaneous perineal tear or episiotomy often occur. A quick wound healing is desirable, not only to prevent infection but also to make clients able to meet their daily needs –such as taking care of their babies.Wound is a condition when some body tissues are lost or broken. This could due to the primary incision wounds. Wounds can be well healed if there is no infection by maintaining the cleanliness of the wound. Therefore, the speed of wound healing is necessary, so that it will not be contaminated by the surrounding environment and not hinder its recovery.

Betadin is a solution containing 10% Povidone Iodide, either in the form of liquid or ointment, both equally as a disinfectant and antiseptic. The differences are only in its practicality. The liquid form is more widely used before and after surgery, to treat and prevent wound infection, ulcers and for umbilical cord care.

In addition, a solution has more water content so it is more quickly absorbed by the skin and quicker to dry due to gauze absorption or evaporation process.

Shrimp is a member of the phylum Arthropoda, sub-phylum Mandibulata and belongs to the class of Crustacea (Jasin, 1987). Its whole body is composed of sections wrapped by external skeleton or exoskeleton from chitin and reinforced by lime calcium carbonate (Soetomo, 1990).

Most of the shrimp waste generated by shrimp processing business comes from the head, skin and tail. Shrimp shell contains protein (25% -40%), chitin (15% -20%) and calcium carbonate (45% -50%) (Marganof, 2003). The raw material which is easily available is the shrimp, so that the process of chitin and chitosanmostly use shrimp waste (Anonymous, 2003).Isolation of chitin from shrimp/crab waste is done in some stages, namely mineral separation stage (demineralization), deproteination stage, bleaching stage and the transformation of chitin into chitosan (deastillation phase) with high concentration base (Ferrer et al, 1996; Fahmi, 1997) . By using the right technology, the potential of this waste can be further processed into a polysaccharide compound, which includes chitin (C8H13NO5) and chitin can be further processed into chitosan (C6H11NO4) and glucosamine (C6H13NO5). All those three are biodegradable and non-toxic so it is environment-friendly (Martin, 2004).

Chitosan is relatively more widely used in various fields of applied industrial and healthcare industries (Muzzarelli, 1986). Chitosan is also a multifunctional polymer because it contains three types of functional group, they are amino acid, primary, and also secondary hydroxyl groups.Thepresence of those three functional groups causes chitosan to have a very high chemical creativity (Tokura, 1986).

In medical world, chitosan is widely used as an anti-inflammatory, anticoagulant, flakulan, antibacterial, antifungal and it has anthelhemintic activities that will prevent microbes (Didik S, 2007).

General Objective

Knowing the difference in the speed of wound healing by provision of betadin and Chitosan.

Specific Objectives

1. To identify wound healing by provision ofbetadin
2. To identify wound healing by provision of Chitosan
3. To analyzethe difference in wound healing speed by provision of betadin and Chitosan

Benefits

1. It is expected that this study can be used as a reference and an input for the development of science and teaching materials about the speed of wound healing by provision of betadin and Chitosan.
2. This study can describe the speed of wound healing in the birth canal laceration either byprovision of betadin and Chitosan.
3. It can increase the knowledge about the speed of wound healing by provision of betadin and Chitosan.

II. Method

Design

Based on the research objectives, this study useda true experimental design because with this design the researchers can control all external variables that affect the course of the experiment. Thus the internal validity (quality of the study design) can be high. The main characteristic of true experimental is that, the samples were used for experiments as well as a randomly selected control group (random) of a given population. The method of approach used in this study was "Post Test Only Group Design" with two groups that were selected randomly (R). The first group was given a treatment (X) and the other group was not given any treatment. The first group was called an experimental group and the second group was called the control group. Since this study used more than one treatment group then the design is described as follows:

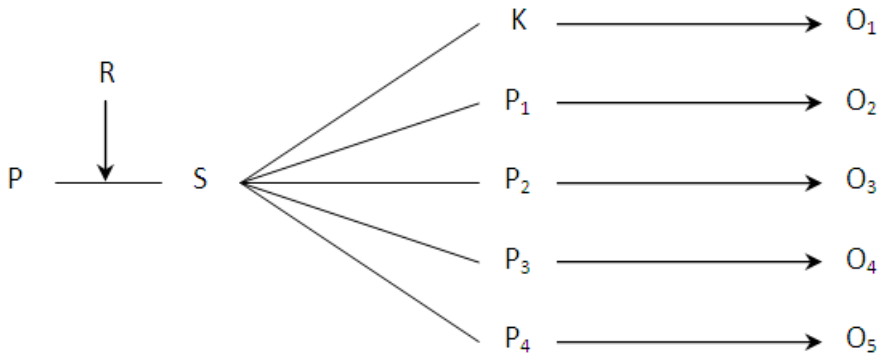

Figure 1: Chart of Post Test Only Group Design research.

Specifications:
P: Population
R: Randomization
S: Sample
K: The control group
P1: The treatment group was given betadin and chitosan
P2: The treatment group was given betadin and chitosan
P3: The treatment group was given betadin and chitosan
P4: The treatment group was given betadin and chitosan
O1: post-test data of control group
O2: post-test data of betadin and chitosantreatment group
O3: post-test data ofbetadin and chitosan treatment group
O4: post-test data of betadin and chitosan treatment group
O5: post-test data of betadin and chitosan treatment group

Research sample

Guinea pig (Mus - musculus), aged 8-10 weeks, with approximately 25-30 grams body weight, 25 samples.

Sampling technique

The sampling technique was using random sampling technique.

Research Variables
Independent Variables
In this study, the first independent variablesare betadin and chitosan.

Dependent Variables
The dependent variable is the process of wound healing.

Research Hypothesis
A hypothesis is a temporary answer to a research, a benchmark, or a proposition, and its truth will be proven in the study (Notoatmojo, 2005). The hypotheses are:
Ha: There is a differenceinwound healing speed by provision of betadin and chitosan in guinea pig (Mus musculus).

Data analysis
Once the data is the data is collected, an examination was conducted and tabulated. To find out the difference between wound speed healing by provision ofBetadindan Chitosan, the researchers used One Way Anova technique.

III. Results & Discussion

Healing woundsbyprovision of betadin

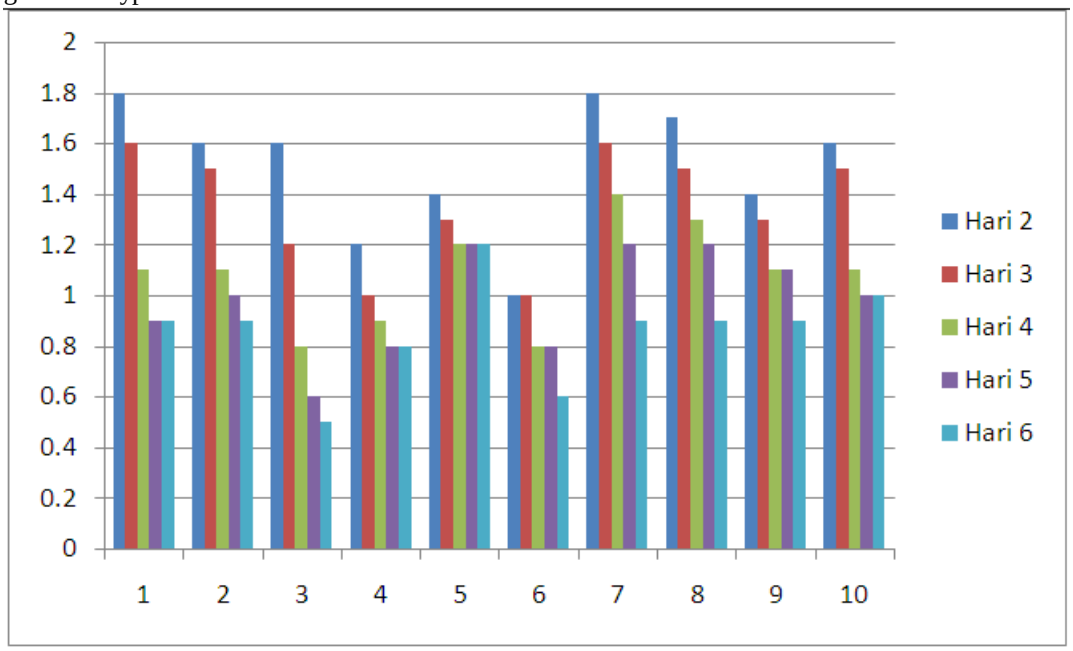

Fig.2 Wound size on day 2, 3, 4, 5 and 6 in guinea pig which were given betadin.

The wound healing ofthegroup which was givenbetadin showed good results, the wound got dry but not showing any size decrease on day 1.

Betadin is a superior antiseptic drug with iodine active ingredient with clinically proven ability to kill various types of germs in a short time. It can be used for wounds and preparation prior to surgery. Betadin is an elected as an antiseptic and is used as a multipurpose wound drug (solution).

Betadin is quite effectivefor wound healing, especially after day 1, this is possible due to betadin antiseptic properties that contains the active ingredient of Povidone iodine, that has the power to kill germs including bacteria, fungi, spores and virus. Inflammation phase is the initial phase of wound healing. If at this stage, a body with added betadin can kill the bacteria until no inflammatory reaction occurs, then exudateswill be released. Large amount release of fibroblasts derived from preexisting local fibroblasts will stimulate collagen formation. Myofibroblast is afibroblasts with contractility character responsible for wound size contraction and reduction. The wound edges will be contracted to cover the injured area. It can be seen on the wound decrease in the group given betadinfor six days showed. The decrease was between 0.8 cm to 1.5 cm

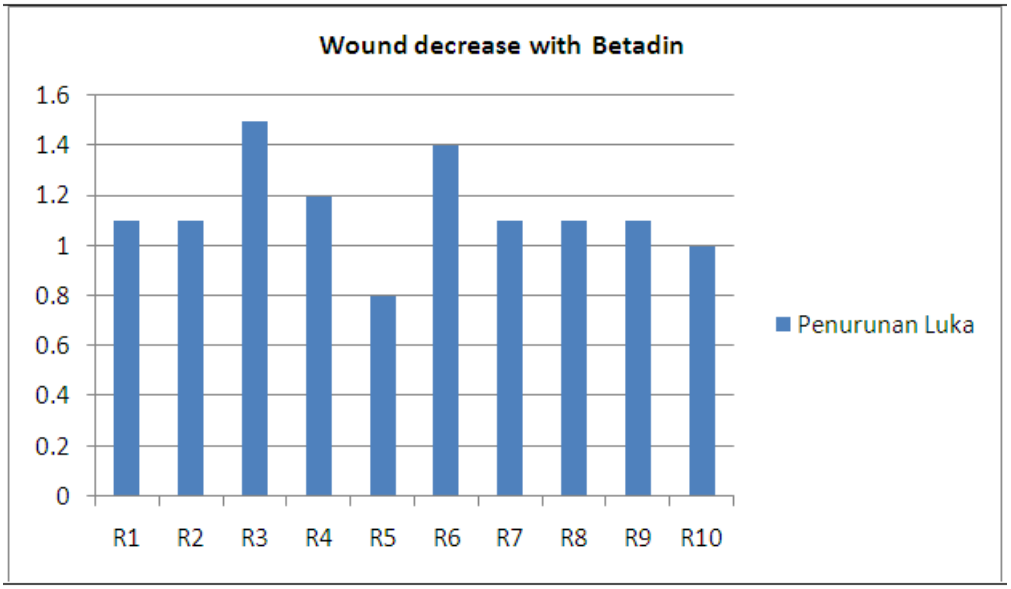

Fig.3 Wound decrease for 6 days by provision ofBetadin

Wound healing byprovision ofChitosan

It can be observed that wound healing of the chitosan group showed good results. Onday 2, the wound is already dry. At first, we planned to give Chitosan each day, but we couldn't do it because the wound is already dry.

Chitosan has a coagulation property, it affects the blood vessels to relax and start the endothelial tissue regenerativerepair. It begins with vascular and cellular responses in the wound which happens at the first 5 to 10 minutes in the form of vessel vasoconstriction, fibrinoplateletformationwhich functions as coagulation factor to control the bleeding, followed by vasodilation venules, so that the presence of chitosan will increase coagulation factor which will increase haemostasis of scar tissue quickly dry it. Chitosan has a positivecharged polycation capable of inhibiting the growth of bacteria, thus preventing wound infection that will help macrophage cellswork on inflammatory phase.

The effect of coagulation performed together with chitosan will accelerate scar tissue formationon endothelial layer. It can be seen on the decreased size of the wound given with chitosan from day2.

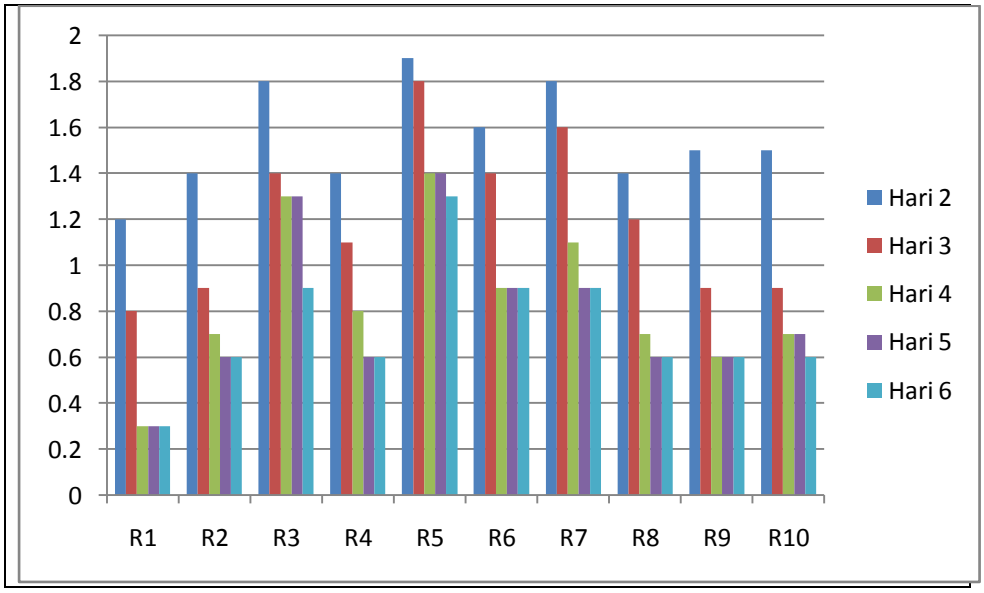

Fig. 4wound size of guinea pig given Chitosan on day 2,3,4,5, and 6

We can see in figure 4.2.2 that the size of the wound became better on day 3 and 4.Chitosan as a coagulant trigger faster drying. Chitosan also has biocompatible propertiesmeans that it has a a natural polymer which has no side effects, non-toxic, easily broken down by microbes (biodegradable) and are hemostatic,

fungistatic, spermisidal that can accelerate the inflammatory stage of a wound so that it soon gets into the proliferative stage (stage of rapid cell growth).

The second phase of the healing phase takes 3 - days until 21 days after the injury. In the proliferative phase fibroblasts are formed (connective tissue cells), which begin to migrate into the wound about 24 hours after the injury, they begin to accumulate and form collagen and a basic substance called proteoglycan about 5 days after the injury (Bastaman1989). It can be seen from the decline of the wound in the provision of chitosan on the sixth day, about 0.7 cm to 1.7 cm

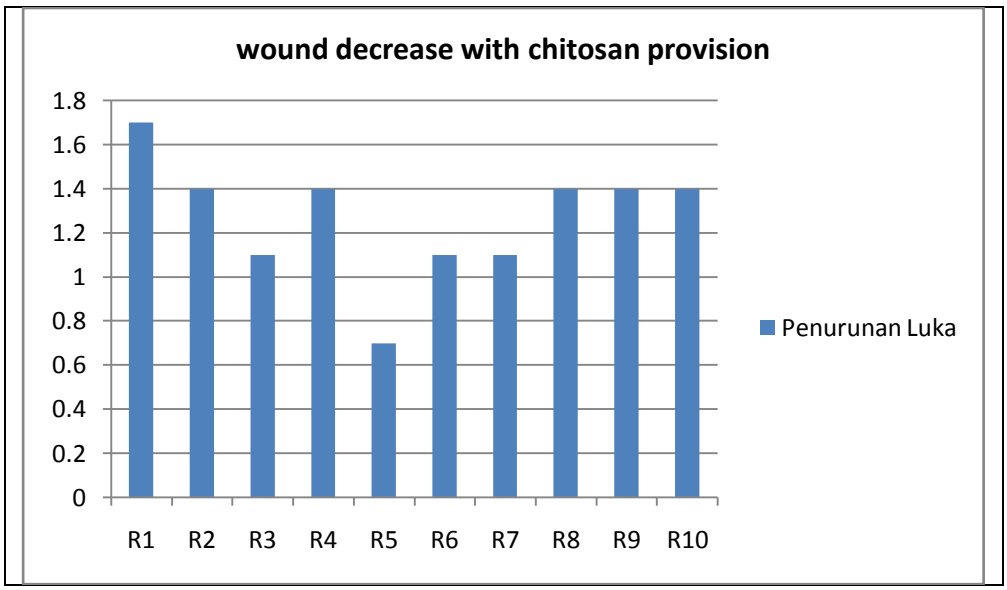

Fig. 5 Wound decrease after givenChitosan onday2, 3, 4, 5, 6

The difference inthe speed ofwound healing byprovision ofbetadinandChitosan
After being analyzedusingANOVAstatistical testwitha significantdegreeof 0.05, theaverageresult of betadin=1.130Chitosan=1.018andcontrol = 1.326. Aftertestedusing ANOVAit showednosignificant difference betweenbetadinandChitosanbutit differssignificantlybetweenbetadinwith control and it showedsignificantly difference between Chitosanandcontrol.

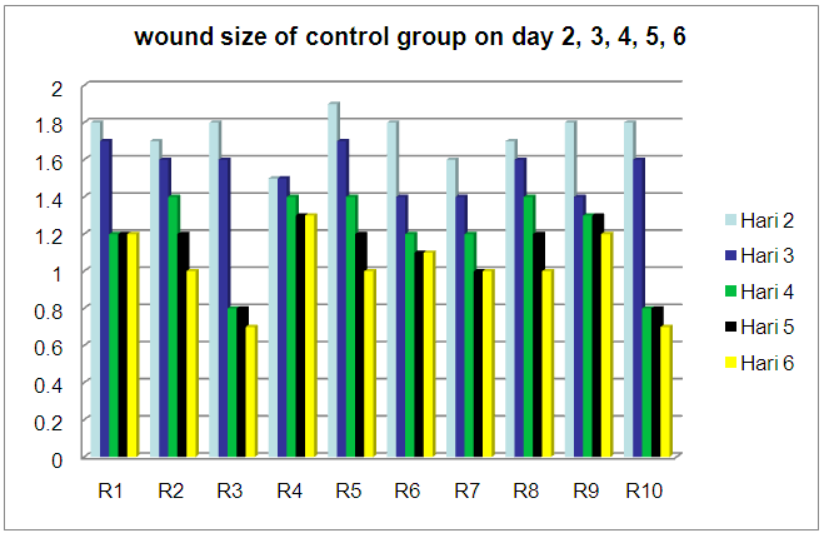

Fig. 6 woundsize of control group on day 2, 3, 4, 5and6

BetadinandChitosanhas their own strengths. Betadinhas agoodanti-bacterialpropertiesthatcanpreventinfection ininflammatoryphasethus allowingthe woundheal faster, similarly withchitosanwhichhasanti-bacterial propertieshelptopreventwound infection oninflammationphase. Both BetadinandChitosanhave anti-bacterial properties, but betadin doesnothavecoagulationpropertiespossessed byChitosan. Coagulation effectfrom Chitosancausedinjury to dry fasteron day2compared tothatbetadinorcontrol group.

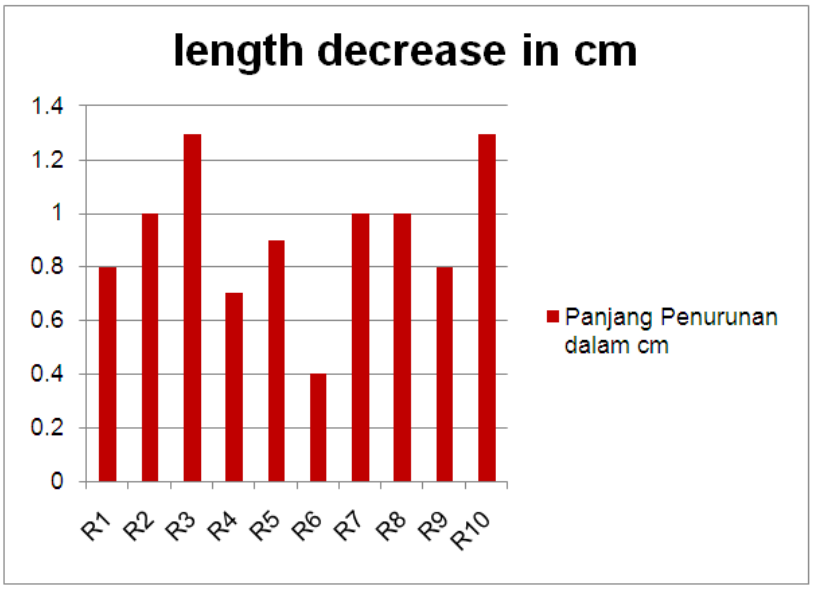

Fig. 7 Wound Decrease for 6 days in control group

Although statistically there is no difference between betadin and Chitosan provision but it showed significant difference in the control group, it indicates that chitosan is effective for wound healing, but giving Chitosan does not give effect continuously.

IV. Conclusion And Recommendation

Conclusion

1. There is a difference in wound healing in group given betadin with control group.
2. There is a difference in wound healing in group given Chitosan with control group.
3. There is no difference in wound healing in the group given betadin and Chitosan, which means giving betadin and Chitosan has the same effect on wound healing

Recommendation

1. It is expected that this study can be used as a reference and an input to the development of science and teaching materials about the speed of wound healing by provision of betadin and Chitosan.
2. Hopefully, it can provide an overview of the speed of wound healing in the birth canal laceration either given betadin and Chitosan.
3. Giving betadin and Chitosan is effective for wound healing, but betadin can be a good choice because of its cheaper price compared to Chitosan and more research needs to be done by using the repetition of treatment to see the difference.

References

[1]. Anonim, 2003. Pengolahan Dan Pemanfaatan Limbah Hasil Perairan Seri I. Dirjen Perikanan. Jakarta.
[2]. Ashkan Lahiji, Afshin Sohrabi, David S. Hungeford, Carmelita G. Frondoza. 2002. Chitosan Support The Expression Of Extra Cellular Matrix Protein Inhuman Osteoblasts And Chondrocytes. Department Of Orthopedic Surgery. Johns Hopkins University. Baltimore Maryland.
[3]. Fahmi, R. 1997. Isolasi Dan Tranformasi Khitin Menjadi Khitosan. Jurnal Kimia Andalas. 3 (01 Fahmi, R. 1997. Isolasi Dan Tranformasi Khitin Menjadi Khitosan. Jurnal Kimia Andalas.
[4]. Hirano, S. 1976. Chitin And Chitosan. Ulmann's Encyclopedia Of Industrial Chemistry. Republika If Germany. Ed.5.
[5]. Hasan, Iqbal. 2004. Analisis Data Penelitian Dengan Statistik.Jakarta : Bumi Aksara
[6]. Notoatmodjo, S. 2002. Metodologi Penelitian Kesehatan. Jakarta : Rineka Cipta.
[7]. Nursalam. 2003. Konsep &Penerapan Metodologi Penelitian Ilmu Keperawatan. Jakarta : Salemba Medika.
[8]. Marganof, P.2003. Potensi Limbah Udang Sebagai Penyerap Logam Berat (Timbal, Kadmium, Dan Tembaga) Di Perairan. Http:// Rudyct.Topcities. Com/ Pps 702_71034/Marganf.Htm. (Diakses 26/6/2006).Andriana, Evariny. 2007. Melahirkan Tanpa Rasa Sakit Dengan Metode Hypnobirthing. Jakarta: Bhina Ilmu.