WHITE BLOOD CELL RESPONSE AFTER IMPLANTATION OF WILD NATURAL SILK *(Attacus atlas L)* AS A BIOMATERIAL SURGICAL SUTURE

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ABSTRACT

White blood cell response after implantation of wild natural silk (*Attacus atlas* L.) as a biomaterial surgical suture was described in this study. Twenty four 8-10 weeks old of male mices were used in this study. They were divided into 4 groups: control, commercial silk, plain cut gut, and natural silk of *Attacus atlas* L.. Each groups except control was implanted with different suture materials within 1,5cm length wound on the right femoral muscle. The blood were collected from blood venous at sinus retroorbitalis of anesthetized mices by using microhaematocrit tube on first day before and 7 day post after implantation. The result showed that the number of white blood cell before implanted are normally (9.2±1.3 x 10^3cells) but after 7 day implanted in natural silk *Attacus Atlas* L. group (11.3±1.4 x 10^3cells) were higher compared with control (8.0±0.5 x 10^3cells), but slightly higher than commercial silk (10.9±0.6 x 10^3cells), and lower than catgut (14.1±1.2 x 10^3cells) as highed response sample group. This result indicated that *Attacus atlas* L. silk had same performed with the commercial silk suture.

Keywords: white blood cell (WBC), *Mus musculus*, *Attacus atlas* L., implant, surgical suture

INTRODUCTION

Attacus atlas L. is native to Indonesia, this insect is polyvoltin which can live more than two generations in a year and are polipagus which can consume more than 90 types of feed crops (ISA 2000). Silkworm Attacus atlas L. produce the type of silk that has a better advantage than silkworm *Bombyx mori* (*B. mori*), which is more delicate, heat resistant, does not cause itching (allergies), and anti-bacterial (Akai 1997).

The ideal surgical suture thread is easily to held, had little reaction to the tissue, capable of inhibiting the growth of bacteria in the body thread, having security in the manufacture of nodes / bonds, have a little friction on the tissue, there is no capillary pore, does not cause allergies , non-toxic, is not affected by magnetic fields, and absorbed by the body with minimal reaction on wound healed (Fossum, 2002).

Natural surgical suture thread is divided into 2 general categories, namely, absorbed and unabsorbed (Jenkins *et al*, 2011; Kettle *et al*, 2011). Surgical suture thread, such as catgut is absorbed (either plain or cromic) will break down the tissue and loss of strength in 60 days. This thread is used on the organ in the body (internal) or in

special areas like the inside of the mouth. Meanwhile, nonabsorbable suture such as silk was able to maintain seam strength of more than 2 years. This thread is used to close the wounds of the skin (external) and the suture should be taken after the wounds heal about 10 - 14 days (Fossum, 2002).

MATERIAL AND METHODS

Twenty four male mice, aged 8-10 weeks and body weight 20-30 gr. Animal were acclimated for 14 days in the Pathology and Surgical Laboratory, Faculty of Veterinary Medicine, Bogor Agricultural University. All mice were housed per cage with *ad libitum* access to water and feed commercial pellets. In this experiment, they were devided into 4 groups: control, commercial silk, plain cat gut, and natural silk of *Attacus atlas* L.. Each groups except control was implanted with different suture materials within 1,5cm length on the right femoral muscle. The blood were collected from blood venous at sinus orbitalis of anesthetized mices by using microhaematocrit tube on first day before and 7 day post after implantation. The statistic data were expressed as mean and standard deviation.

RESULT AND DISCUSSION

Table 1. Total White Blood Cell (WBC) count in mice ($10^3/mm^3$)

Group (N=24)	Days	
	0	7
Control (n=6)	9.2±1.3	8.0±0.5
Cat gut plain (n=6)	9.2±1.3	14.1±1.2
Commercial silk (Bombyx mori) (n=6)	9.2±1.3	10.9±0.6
Attacus atlas L. (n=6)	9.2±1.3	11.3±1.4
Maximum*	10.1±0.0	10.1±0.6
Minimum*	2.6±0.0	2.6±0.6

*Jain NC. Essential of Veterinary Hematology. Philadelphia: Lea & Febiger, 1993: 54-71

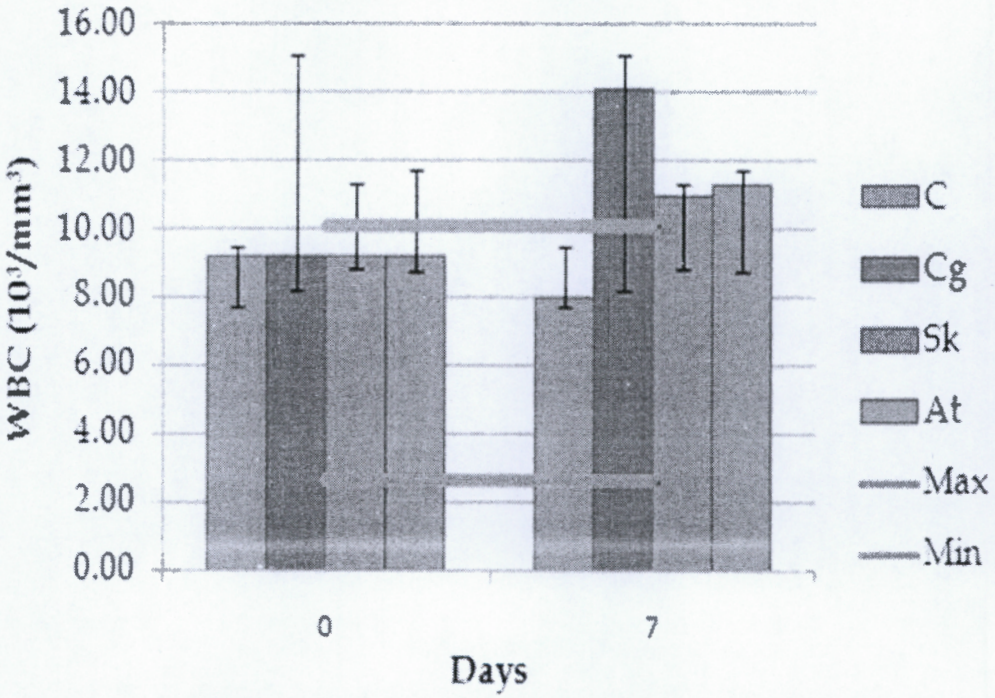

Figure 1. Total White Blood Cell (WBC) count in Mice ($10^3/mm^3$)
C=Control, Cg=Catgut, Sk=Silk commercial (*B. mori*), At=*A. atlas* L. M
Max=maximum value, Min=Minimum

From the table and figure 1, the number of total white blood cell count before implanted are normally (9.2±1.3 x 10^3cells) but after 7 days implanted in natural silk *Attacus Atlas* L. group (11.3±1.4 x 10^3cells) were higher compared with control (8.0±0.5 x 10^3cells), but slightly higher than commercial silk (10.9±0.6 x 10^3cells), and lower than catgut (14.1±1.2 x 10^3cells) as the highest response sample group.

Catgut had highest WBC responses between another groups on 7 days after implantation (Castelli *et al.* 1978; Fossum 2002; Postlethwait *et al.* 1975). However, WBC

in silk suture slightly increase (Leknes *et al.* 2005) because, the natural silk from the cocoon of *B. mori* contains at least two major fibroin proteins, light and heavy chains (Altman *et al.* 2003; Kaplan *et al.* 1998). Based on that same response, A. atlas is also a new material that has the same character as a commercial silk from *B. mori* (Rossitch *et al.* 1987).

CONCLUSION

According to this study, it was indicated that *Attacus atlas* L. silk had same performed with the commercial silk suture. Therefore, *Attacus atlas* L. have potential as surgical suture thread of future.

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