

# Effect of Oral Supplementation of *Channa striatus* Extract on Total Antioxidant Status during Wound Healing in Post Lower Segment Caesarean Section Women

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## ABSTRACT

**Objective:** *C.striatus* has been suggested to have antioxidant and anti-inflammatory properties for wound healing. This study was conducted to determine the level of Total Antioxidant Status (TAS) and the effectiveness of oral supplementation of *C.striatus* extract in post Lower Segment Caesarean Section (LSCS) patients during wound healing.

**Design:** This was a randomized; double blinded, placebo-controlled study among post LSCS women conducted in Department of Obstetric and Gynaecology, Hospital Universiti Sains Malaysia from March 2010 to December 2012.

**Material and Methods:** A total of 39 patients from *C.striatus* and 34 patients from placebo group were included in this study. After randomization, the treatment group consumed 500 mg of freeze dried *C.striatus* extract daily while the placebo group consumed 500 mg of placebo (maltodextrin) daily for 6 weeks. For each subject, venous bloods for TAS were taken postoperatively at day 1, day 3, week 2, week 4 and week 6. Repeated measure for analysis of variance (ANOVA) was used to determine the changes of TAS between and within both groups throughout the 6 weeks intervention.

**Results:** The result suggested an increment of TAS level within *C.striatus* group from second week postoperative onwards which might involve in the enhancement of wound healing.

**Conclusion:** The administration of *C.striatus* extract has beneficial effect during wound healing by enhancing the process in post-operative LSCS women.

## KEY WORDS

*Channa striatus*, wound healing, total antioxidant status, lower segment caesarean section, reactive oxygen species

## INTRODUCTION

*Channa striatus* (*C.striatus*) or Haruan is a fresh water, air breathing fish from family Channidae. It is widely distributed within Malaysia<sup>1)</sup>. It is extensively consumed to promote wound healing and proven to have high antioxidant activities<sup>2)</sup>. The content of *C.striatus* which high in amino acids and fatty acids contribute for better wound healing<sup>1,3)</sup> and to the antioxidative property of *C.striatus*<sup>4)</sup>.

Wound healing comprises of three overlapping phases which is inflammation, new tissue formation and remodeling of the tissue. Reactive oxygen species (ROS) involved in all stages of the wound healing process. During inflammatory phase, there is production of large amounts of ROS. ROS is very important and essential to protect against the unwanted microorganisms and be part of the innate immune

system of the organism<sup>5)</sup>. Process of wound healing depends on these oxidative stress and low levels of ROS. Suppression or overexposure to oxidative stress can lead to impaired and delayed wound healing<sup>6)</sup>. Antioxidant play an important role in wound healing by reducing the ROS and enhance the healing process<sup>7)</sup>.

*C.striatus* extract has been studied and suggested to have antioxidant and anti-inflammatory content for better healing of the wound<sup>1,8)</sup>. This study was to assess the possible role of *C.striatus* in wound healing in post Lower Segment Caesarean Section (LSCS) women by analyzing the Total Antioxidant Status (TAS). The aim of this study was to determine the level of TAS during wound healing in post LSCS women supplemented with *C.striatus* extract and placebo (maltodextrin).

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## RESULTS

Initially, 82 patients were successfully randomized into the study after considering inclusion and exclusion criteria (41 patients for each group). However, 2 patients from *C.striatus* group and 7 patients from placebo group need to be excluded from the study due to no baseline data or no at least one result after baseline. A total of 73 patients remain in this study for ITT analysis; 39 patients were in the *C.striatus* and 34 patients were in the placebo groups. A total of 60 patients completed all the study visits; 34 in *C.striatus* and 26 in the placebo groups (PP analysis). Table 1 shows age and baseline TAS level of the subjects. The result showed no significant difference between the two groups.

Table 2 shows comparison of TAS level between *C.striatus* and placebo group based on time. There was a significant increase of TAS level started from week 2 onwards (higher at the later stage) compared to the placebo group. The level of TAS when compared between both groups showed no significant differences in all the period studied (ITT:  $F = 0.65$ ,  $p = 0.629$ ; PP:  $F = 0.58$ ,  $p = 0.676$ ). Table 3 shows comparison of TAS within *C.striatus* and placebo group based on time for 73 subjects based on (ITT) analysis. There were significant differences in the TAS levels in patients who consumed *C.striatus* when compared between Day 1 with Week 2 till week 6. The level of TAS for placebo group showed no significant differences throughout the study period. Table 4 shows comparison of TAS within *C.striatus* and placebo group based on time (PP analysis) for 60 subjects that completed the entire visit. The results showed similar findings as ITT analysis.

## DISCUSSION

The present study has examined the nutritional values of *C.striatus* and its' beneficial effect for wound healing which include anti-microbial, anti-inflammatory, induction of cell proliferation and platelet aggregation, anti-nociceptive and high antioxidant activities<sup>1,8,10</sup>. The principal finding of this study was the enhancement of the TAS levels from week 2 onwards in *C.striatus* group post-operatively that indicates the beneficial effect of *C.striatus* administration during wound healing of post-operative LSCS women.

*C.striatus* extract were proven to have high antioxidant activities<sup>2</sup>. The antioxidant property of *C.striatus* is due to its high content in amino acids especially cysteine, methionine, histidine and lysine and to a lesser extent, proline and tyrosine<sup>10</sup>. These amino acids work as primary antioxidants and act as metal chelators in linoleic acid system<sup>9</sup>. The antioxidants are most likely to be lipophilic antioxidants which has significant powerful defense tools especially against omega-3 oxidation<sup>11</sup>. The antioxidant nature of amino acids are involve against lipid oxidation and also probably due to the action at their side-chain as well<sup>10</sup>.

The results of this study were similar to the study done by Daud and Dahlan (2011) which showed *C.striatus* has high antioxidant property. In that study, they demonstrated that antioxidant capacity was high in *C.striatus* compared to other extracts. High level of antioxidant play an important role in wound healing by preventing the oxidative damage of cells and enhance the healing process. This study is also consistent with a study done by Ali Khan *et al.* (2014). In that study, the researchers used orally administered freeze dried aqueous extract of *C.striatus* in experimentally induced gastric ulcers in Wistar rats. They found that *C.striatus* possesses anti-secretory and antiulcer activities due to the unsaturated fatty acids and essential amino acids especially aspartic acid that is involved in antioxidant mechanism and was found to be in high amount in *C.striatus*<sup>12</sup>.

Besides rich in amino acids, *C.striatus* also contains glutamic acid and dietary mineral such as zinc<sup>8,9</sup> which might contribute to the enhancement of wound healing. The enhancement of wound healing after supplementation with *C.striatus* has been shown to have shorter time of wound closure that eventually can prevent delayed wound healing. This enhancement also might be due to the antioxidant properties of *C.striatus*. Study done by Blass *et al.* (2012) demonstrated that in patients with delayed wound healing, the wound closure was accelerated and took shorter time to heal after the patients were given glutamine and high dose of oral antioxidants micronutrients such as ascorbic acid and  $\alpha$ -tocopherol<sup>13</sup>.

However, this study could not demonstrated significant findings between *C.striatus* and the placebo groups. The possibly could be due to the limited number of samples. It could be a logistic problem to some

patients to come for blood taking at hospital as scheduled after discharge. Apart from that, in the ward, as a standard post-operative pain relief, the patients were given non-steroidal anti-inflammatory drugs (NSAIDs) which were a suppository Diclofenac sodium 100 mg twice a day for three days post operatively and continued with tablet Diclofenac sodium 50 mg, three times a day for the next consecutive four days. NSAIDs could inhibit inflammation which is an integral part of wound healing as a results of inhibition of cyclooxygenases that involved in prostaglandin production, leading to a marked decrease in prostaglandin synthesis<sup>14</sup>. The level of TAS perhaps will be higher if NSAIDs were not given to the patients. The dosage of *C.striatus* tablet use in this study could also affect the result. The patients were only given 500 mg of *C.striatus* tablet once daily which might not be sufficient for better wound healing process.

## SUMMARY

This study indicates *C.striatus* administration has beneficial effect during wound healing by enhancing the process in post-operative LSCS women. However, further studies are required to confirm and understand the mechanism of action of it.

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