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## Silver carp blood cells parameters challenging with Benzocaine as an anaesthetic in fish

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Anaesthetics are used with increasing frequency in aquaculture, mainly to reduce the stress and to prevent mechanical damage to fish during handling. In this study, we evaluated the efficacy of benzocaine as an anaesthetic in silver carp (*Hypophthalmichthys molitrix*), in terms of the time required to become anaesthetized ('anesthetic time') and recovery time. In the first experiment, fish were exposed to various doses of benzocaine (20, 40, 60, 80 and 100 mg/L) and temperatures (15, 24 and 30°C). The second experiment examined the effects of duration of exposure to 120 mg/L of benzocaine. In the third experiment, fish were exposed to 60 mg/L at temperatures of 24°C, 27°C, and 30°C. Stages of anaesthesia like increased respiration, erratic swimming and reduced activity of fish were monitored and also ability of fish handling for intra-peritoneal injection was assessed. A benzocaine concentration of 60 mg/L was considered ideal for quickly inducing total immobilization and fast recovery. A significant relationship between concentration and temperature ( $P < 0.05$ ) was observed. Recovery time increased as the concentration increased and temperature decreased. Fish exposed to 120 mg/L benzocaine exhibited around 50% mortality. Benzocaine anaesthesia had no effect on the hematological profile. No changes in hematocrit were recorded in fish exposed to different concentrations of benzocaine. Plasma glucose increased significantly when fish were exposed to benzocaine concentrations greater than 80 mg/L. No mortality was observed 72 h after exposure to 60 mg/L benzocaine for 10 and 20 min. Dosages in the 60-80 mg/L range were effective for periods of up to 20 min of anesthesia. In conclusion, benzocaine which is less expensive anaesthetics than other available one in aquaculture, is an effective anesthetic agent for silver carp, providing rapid immobilization and rapid recovery.

**Keywords:** silver carp, hematological profile experimental research, anaesthetics, benzocaine

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## Evaluation of the effect of topical Silymarin ointment on wound healing process in rat model under heat stress situation

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Oxidative stress to be one feature accompanying early heat stress. Elevated body temperature can induce the metabolic changes that are involved in the induction of oxidative stress. In recent years, oxidative stress and free radicals have been implicated in impaired wound healing. Herbal therapy is becoming increasingly popular among patients and physicians. Silymarin is a plant derived flavonoid which is extracted from the fruits and seeds of the milk thistle (*Silybum marianum* L. Gaertn.), possesses anti-inflammatory and antioxidant properties. The present study was undertaken to assess the potential *Silybum marianum* extract in wound healing in Wistar albino rats under heat stress situation. The rats were divided into three groups of ten animals each. All groups were exposed to heat stress for twenty four hours per day during three weeks. Group 1 is normal wounded control and the other two groups were treated with topical applications of 50% silymarin ointment and basic ointment. The wound healing parameters were evaluated by histopathological analysis in extract-treated rats and controls. Histopathological analysis revealed that 50% silymarin ointment significantly increased the speed of fibroblast proliferation, granulation tissue formation, angiogenesis and epithelialization, when compared with two other groups. The results suggest that 50% silymarin ointment has antioxidant properties, which may be responsible and favorable for faster wound healing and this plant extract may be useful in the management of abnormal healing under heat stress situation.

**Keywords:** heat stress, oxidative stress, Silymarin, wound, rat.