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Clinical studies on the use of Herbal Chitosan Spray for the clinical management of dog bitten wounds in veterinary practice

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ABSTRACT

Six dogs and six small ruminants presented with dog bitten wounds at different regions of the body were treated with Herbal Chitosan Spray. The clinical studies revealed the Herbal Chitosan spray was found to be superior in promoting healing process which may be recommended for management of dog bitten wounds.

Key words: Dog bitten wound, Herbal Chitosan Spray.

Bite wounds in animals and humans represent a significant global health issue (Aziz *et al* 2015). Bites are a very common health issue, causing significant morbidity and even, in rare scenarios, mortality. Most of the animal bite wounds were caused by dogs. These wounds were typically contaminated with the bacteria commonly present in the skin/ hair of victim, the attacker's oral bacteria and soil organisms (Swaim and Henderson, 1997). Kiliç and Sarierler, (2003) stated that the dog bitten wounds ranged from minor to extremely complex wounds. The dog bitten wounds had several unique characteristics and can be easily distinguished from other traumatic injuries. The authors also concluded that small dogs were at higher risk for bite wounds in general and had more severe and multiple injuries. Several studies of bite wounds have reported improved outcome with early diagnosis and immediate treatment. Swaim and Henderson, (1997) stated that there is no standard protocol available for the treatment of bite wounds in dogs and cats. Bite wounds can also transmit several viral diseases including rabies in both dogs and cats (Holt and Griffin, 2000).

Chitosan is a copolymer generally obtained by alkaline de-acetylation of chitin (Dodane and Vilivalam, 1998). Chitin is a common constituent of the exoskeleton in animals, particularly in crustaceans, mollusks and insects (Skotak *et al*. 2011). Chitosan have some unique properties such as biodegradability, non-toxicity, antibacterial effect, muco-adhesive properties and biocompatibility (Shakeel *et al*., 2014). Apart from the antibacterial nature, chitosan also had haemostatic and mucoadhesive properties (Patrulea *et al*., 2015) which helped in accelerating tissue regeneration and promoting the wound healing (Kifune, 1992).

Chitosan played a major role in all the stages of wound healing especially during the initial phase. Apart from the hemostasis it promoted infiltration and migration of neutrophils and macrophages which resulted in clearing of the foreign agents. It also helped in formation of granulation tissue, fibrous tissue and re-epithelialization by reducing the scar during the remodeling phase. (Park *et al.*, 2009). The objective of the present study was to evaluate the use of herbal Chitosan spray for the management of dog bitten wounds in veterinary practice.

The clinical study was conducted in six dogs and six small ruminants reported in Department of Veterinary Surgery and Radiology, Teaching Veterinary Clinical Campus, Rajiv Gandhi Institute of Veterinary Education and Research, Puducherry with history of dog bitten wounds. All the affected animals were subjected to clinical examination and objective evaluation of the wounds on the day of presentation and on the 3rd and 7th day. The location, colour, volume and nature of exudates if any and the nature of wound edges were noted (Abramo, 2004). A sterile moist swab was used to collect the discharge from the wound surface for antibiotic sensitivity test. The swabs were removed taking care to avoid contact with the skin and utilized for culture and antibiotic sensitivity test before initiation of the treatment in all the animals as described by Barrow and Feltham (1993).

Application of herbal Chitosan spray (Curee spray, Ecofab private Ltd, Pondicherry) (Fig.1) over the wound was carried out in all the animals daily, and then all the animals were protected with anti rabies vaccine as per the standard post bite schedule. According to the results of ABST, antibiotics were administered. The nature of healing on 7th day was studied as per the protocol given by Stanley *et al*. (2013).

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Fig 1: Herbal Chitosan spray

Eight animals were presented on the day of dog bite four animals were presented within 48 hours. The dog bite wounds were found on the head in three cases (25%), on the thigh region in six cases (50%) (Fig 2) and on the left thorax (8%) in one case and right thorax in two cases 17%). Wounds in nine animals were involving only the skin and subcutaneous tissue and other wounds were deeper, involving the sub cutis and muscles. In four cases the wounds were extensive with irregular wound edges and sparse of exudates. Ciprofloxacin was found most sensitive antibiotic in 22% of the cases followed by Cefpedoxime (20%) and Ceftriaxone (18%) as per ABST, (Table 1). The animals with extensive wounds were treated with Ciprofloxacin (Cflox, Intas Pharmaceuticals, Ahmedabad) @ 10mg/kg i/m daily for five consecutive days postoperatively.

On clinical examination extensive wounds in five animals treated with Herbal Chitosan spray showed uneventful healing with healthy and early epithelialisation on 7th day itself and without any complications (Fig 3). In one animal, the healing delayed due to self-mutilation, however it healed by 9th day.

Fig 2: Dog bitten wound on thigh region

Fig 3: Healed Dog bitten wound (Gr. III)

Shamir *et al*. (2002) reported that in dog bitten wounds mortality occurred only in cases with thoracic or abdominal injuries. In the present study only three cases were having dog bitten wound on thorax, all wounds were small in size without any perforation. Wounds treated with Herbal Chitosan showed early healing without any

Table 1: Results of Antibiotic sensitivity test in animals preoperatively.

Case no	Ciprofloxacin	Ceftriaxone	Amoxicillin	Enrofloxacin	Cefotaxim	Cefpodoxime
1	+	+	-	-	-	+
2	+	-	-	+	+	+
3	+	+	+	-	-	-
4	+	-	-	+	-	+
5	+	-	+	-	+	+
6	-	+	+	-	+	+
7	+	+	+	-	+	+
8	+	-	-	+	-	-
9	+	+	-	+	+	-
10	-	+	-	+	-	+
11	+	+	+	-	+	+
12	+	+	+	-	+	+
Total Sensitive	10	8	6	5	7	9

+ Sensitive, - resistant

complications which may be attributed to wound healing capacity of Herbal Chitosan (Abbaspour *et al.*, 2015). Hence, this treatment protocol can be recommended for the clinical management of dog bitten wounds, even in extensive wounds.

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