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Research Article

IS DICLOFENAC STILL A THREAT TO GYPS VULTURE? A CASE FROM EASTERN NEPAL AND ADJOINING AREAS IN INDIA

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ABSTRACT

Diclofenac, a non-steroidal anti-inflammatory drug (NSAID), used among livestock have been found to have a detrimental effect on scavengers including Gyps vultures contributing to a dramatic decline of the population in the Indian subcontinent. In an attempt to assess the status of different NSAIDs including diclofenac use and trade, the current study was conducted in eastern part of Nepal and adjoining areas in India. Despite its ban in use and trade, diclofenac was found to be in use in veterinary practices and was illegally kept for sale. The finding warrants an immediate concern, monitoring, awareness, and actions to curb the use and trade of this environmental poison for the recovery and conservation of Gyps vultures.

Keywords: NSAIDs, meloxicam, diclofenac, vulture, conservation.

INTRODUCTION

Non-steroidal anti-inflammatory drugs (NSAIDs) are among the most widely used of all therapeutic agents and have anti-inflammatory, analgesic and antipyretic effect. Administered orally and/or via injection, NSAIDs are primarily used to control post-operative pain, arthritis, joint pain, and inflammatory oedema. The downside is that these drugs have certain side effects like gastrointestinal disturbances, renal disturbances and skin reactions such as rashes, urticaria and photosensitivity for examples (Roy, 2004).

Diclofenac, a non steroid anti-inflammatory drug, is widely used for a variety of painful and inflammatory conditions in livestock in the Indian subcontinent. Indiscriminate use of potentially harmful NSAIDs and consumption of diclofenac treated carcasses by Gyps vultures have been found to be a primary cause of their population decline in Asia (Watson *et al*., 2004; Green *et al*., 2004; Oaks *et al*., 2004 and Shultz *et al*., 2004). For example, a population crash of more than 95% starting in 1990s was noted in *Gyps bengalensis* in India (Gilbert *et al.*, 2002). Diclofenac is associated with renal failure and subsequent death of these birds (Oaks *et al*., 2004). This has contributed to a dramatic population decline of three species (*G. bengalensis*, *G. indicus*, and *G. tenuirostris*) of these raptors in the Indian subcontinent. Owing to this catastrophic decline, these species now appear in critically endangered list by Birdlife International (Birdlife International, 2001). Moreover, habitat loss, food scarcity, disease, pesticides, environmental contamination, poisoning, calcium deficiency, nest predators, hunting, and aircraft strikes have also contributed to the decline of the birds (Prakash, 1999 and Wells, 1999).

Government of Nepal, Department of Drug Administration (DDA) announced a ban on the manufacture and import of diclofenac in Nepal in June 2006 as a response to the fatal effect of the drug. In the same announcement, the DDA also circulated information to all the country's pharmaceutical manufacturers to produce an alternative drug meloxicam. NSAID meloxicam

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has been found as a safe alternative to diclofenac (Cuthbert *et al.,* 2006) and is considered harmless for Gyps vulture (Swan *et al.,* 2006 and Swarup *et al.,* 2006). Ban on diclofenac use has indeed been found to reduce the mortality of these birds and, thus, has provided positive sign of recovery (Aryal, 2010 and Ramakrishnan *et al*., 2010). Thus, complete ban on use of diclofenac appears to be a paramount (if not silver-bullet) step for Gyps vultures' recovery. This, however, requires monitoring of the population and NSAIDs sale by veterinary shop in the areas of concern. The present study aims to assess the status of NSAIDs sale and use in eastern part of Nepal and adjoining border markets in India. It is expected that the findings will be an invaluable source and gateway for further steps to Gyps vulture conservation plan.

MATERIALS AND METHODS

The study was conducted in the major markets of Eastern Nepal (Saptari, Sunsari, Morang) and adjoining border markets (Fulkaha, Ghurna, Birpur, Vimpur, Kunauli) of India. Questionnaires on different types of NSAIDs, their availability, and price were prepared and asked to the veterinary shopkeepers. Moreover, respondents were asked about their attitude towards the current status of diclofenac use in veterinary practice and the level of awareness on negative effect of diclofenac use.

RESULTS

A total of 50 veterinary shops in Nepal and a total of 15 shops in adjoining area in India were surveyed during the first quarter of 2012. Nine different types of NSAIDs were found to be in use and kept for sale in the veterinary shops of Eastern Nepal and adjoining border areas in India (Table 1). Surprisingly, NSAID diclofenac which was considered to be banned and expected not to be found also appeared in the list. Of notable was the price of diclofenac compared to the other NSAIDs. A 30-ml vial of diclofenac was found to be cheaper compared to 30-ml of vials of the other NSAIDs. Meloxicam, diclofenac, and nimesulide contributed significant portion of NSAIDs in the studied shops (Figure 1). All the veterinary practitioners, however, were found to be aware of the detrimental effect of diclofenac.

Table 1. NSAIDs found in veterinary practices in the study area.

Formulation	Preparation	Price (INR)	No. of Shops	
Meloxicam	Vial-10ml	40.00	4	2*
	Vial-30ml	72.00	30	8*
	Vial-100ml	120.00 28	5*	-
	Bolus	8.00/bolus	16	-
Meloxicam+Paracetamol	Vial-30ml	90.00	18	7*
	Vial-100ml	140.00	10	4*
	Bolus	12.00/bolus	10	2*
Dicyclomine HCl** (Ridalpin®)	Vial-30ml	60.00	2	-
Nimesulide	Vial-15ml	74.00	4	-
	Vial-50ml	225.00 2	-	-
Nimesulide+Paracetamol	Vial-10ml	150.00 2	-	-
	Vial-30ml	250.00 6		
	Bolus	12/bolus	22	8*
Diclofenac	Vial-30ml	35	1	12*
Diclofenac+Paracetamol (Oxalgin®)	Bolus	-	-	8*
Paracetamol	Vial-30ml	30	2	-
	Bolus	10/bolus	2	-
Mefenamic acid+Paracetamol	Vial-30ml	48.00	2	2*
Acelofenac+Paracetamol	Bolus	-	-	8*

INR refers to Indian currency.
*=No. of veterinary shops in India.
**= Is an antispasmodic drug.

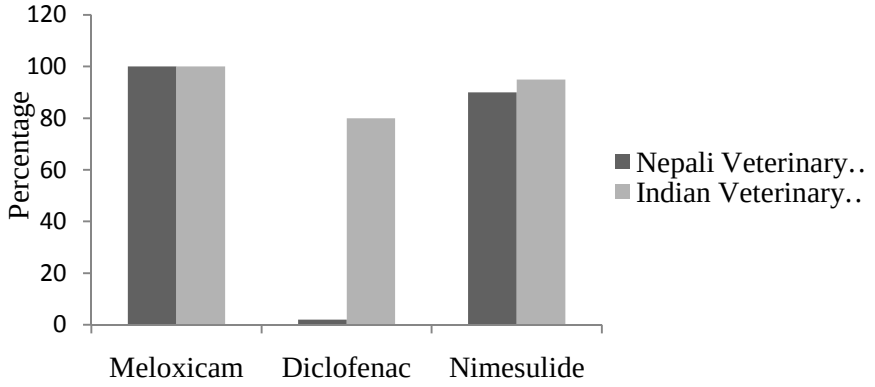

Figure 1. Major NSAIDs in veterinary practice in the study area.

DISCUSSION

Despite a ban on diclofenac use and trade, it still appears to be in indiscriminate use among veterinary practices in the area as indicated by their availability in the veterinary shops. This, however, could be due to low prices of the drug compared to other NSAIDs. Such a continued use and sell of diclofenac despite its known negative effects could potentially be detrimental to Gyps vultures' recovery. Thus, it warrants an immediate concern and effective vigilance on the trade of such drugs. Also, the local people and existing shops need to be made aware of the fatality of diclofenac (Oaks *et al.,* 2004 and Shultz *et. al.,* 2004). Although the veterinary practitioners are aware of the negative impacts of the drug, individual local people still need to be made responsive. Availability of meloxicam in almost all the shops, however, provides a hook for hope of its use as a substitute of diclofenac in the future. This potentially requires some awareness program and presumably some incentives for meloxicam use as a safer alternative (Cuthbert *et al.,* 2006). Besides, local governing bodies and conservation authorities should monitor the veterinary shops regularly.

High mortality rates and breeding failure has resulted to population crash of Gyps vulture in the Indian subcontinent which likely lead to extinction if the underlying threats are not addressed (Birdlife International, 2001 and Virani *et al.,* 2001). Since veterinary diclofenac residues is believed to be a prime cause of mortality of Gyps vultures (Oaks *et al.,* 2004), use and trade of these NSAIDs needs to be stopped immediately. Also, the carcasses should be frequently examined for diclofenac and other NSAIDs to ascertain that the recovery of Gyps vulture is hindered by diclofenac use in the area and that the other NSAIDs used are safe to the raptors (Naidoo *et al.,* 2010).

Conservation of Gyps vultures is crucial for ecological, economic, cultural, and religious significance (Houston and Cooper, 1975; Schuz and Konig, 1983 and World Health Organization, 1998), and thus their losses have important repercussions.

CONCLUSION

We suggest for more rigorous steps and actions to make the available food to these lords of sky free of harmful NSAIDs for their potential recovery and consequent ecosystem integrity. We believe that only ban on these harmful NSAIDs (diclofenac for example) is not a silver-bullet to the threats and panacea to the Gyps population recovery. Nonetheless, complete stoppage on use of such veterinary drug is arguably of utmost importance. Besides, a thorough and long term study needs to be conducted to uncover the prime causal factor for Gyps vultures' population decline and pragmatic conservation plan.

CONFLICT OF INTERESTS

The author declares that there is no conflict of interests associated with this article.

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