

Diclofenac Induced Vulture Deaths in Odisha, India: Time to Debate or Conserve Them?

Biswaranjan Paital^{1*} and Sushil Kumar Dutta²

¹Department of Zoology, Orissa University of Agriculture and Technology, College of Basic Science and Humanities, Bhubaneswar-751 003, Odisha, India

²Center for Ecological Sciences, Indian Institute of Science, Bangalore, Karnataka, India

*Corresponding author: Biswaranjan Paital, Department of Zoology, Orissa University of Agriculture and Technology, College of Basic Science and Humanities, Bhubaneswar, Pin-751003, Odisha, India, Tel: +91-674-2397964; Fax +91-674-2397780; E-mail: biswaranjanpaital@gmail.com

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Introduction

Diclofenac and its derivative compounds were traced in carcasses of vultures in India and neighboring countries. The source of diclofenac from infected domestic carcasses passed to vultures through trophic level transfer. And, it is believed that this reason mainly attributes to their mortality by severe renal failure. On the other hand, reports also indicate that problems associated with their habit and habitats, food and feeding behavior, nesting and breeding, reproduction, environmental factors like high temperature and cyclones, epidemic and endemic diseases might also contribute to their mortality. It is also argued, reports are not adequate to confirm whether diclofenac is the main cause of vulture mortality or their susceptibility to microbial pathogens, diseases or physiological conditions such as oxidative stress after biomagnifications of diclofenac is the cause of their mortality. The contribution of other contaminants or pollutants as the possible causes of death of vultures is also very poorly studied. Probably future investigations may be able to conclude the argument whether biomagnification of diclofenac or organic/inorganic pollutants or any other reasons are responsible for vulture deaths in many South Asian Countries. Investigations on their health issues, life cycle and pathology need to be done in order to restore their sharp declining population. In this context, India is ahead by adapting the plans for recovery of vultures for which the rate of decline of long-billed vultures is placed at 16% per year as against the decline rate for oriental white-backed vulture's stands at 44% per year [1].

Diclofenac induced vulture death

In some of the South Asian countries such as India, Pakistan and Nepal, severe decline in vulture population is a major concern for eco-physiologists. Declining of the populations of Gyps vultures in India started from 1990s and it continues. In India and Nepal, diclofenac induced hepato-toxicity and renal failure are believed to be the major causes of their deaths. It is also debated that vulture mortality in India is not only due to diclofenac-mediated hepato-toxicity, but also due to the effects of environmental extremities. For example, super cyclonic storms could be a contributory factor. Odisha super cyclone, was of category 05B (category 5 in Saffir-Simpson scale) which is accepted as the strongest tropical cyclone blown in the North Indian Ocean. It was blown over the east coast of India on 29th October 1999 with a speed of the cyclonic storm 260 km h^{-1} . Uncountable wild life including birds and >10,000 human lives were lost. The area affected by the storm was the eastern districts of India such as Balasore, Bhadrak, Jajpur, Kendrapara, Jagatsinghpur, Puri and Ganjam of Odisha state. Mostly coastal areas of Jagatsinghpur such as Chakulia, Banipat, Potak and padmapur were centrally affected. Most visibly, the village Padmapur lost its 90% of landscape in the sore of the Bay of Bengal. Prior to the

episode of unnatural death in the cyclone, Gyps vultures were found to exclusively live on the large coconut trees of the areas of Kusupur, Tentulibelari, Bardia and Pdmapur as well (Figure 1). At least 11 vulture colonies totaling more than 125 individuals were counted in these areas. After the event of super cyclonic storm, all the colonies were just disappeared from these areas. Few carcasses were located floating over the water among other dead bodies along with humans. The reason behind their death might be due to large feather size and heavy body weight, as a result, it could be difficult on their part to leave the place prior to cyclone struck their habitat area. In the core areas such as Bardia (20.020820°N, 86.362666°E), Kusupur (20.040495°N, 86.389617°E) and Tentulibelari (20.032916°N, 86.379146°E) of Jagatsinghpur district, where, they had been exclusively noticed, the species became locally extinct after the super cyclonic episode. Local experts decline about the possibility of relocation of the birds prior to the arrival of the cyclonic storm. Similar episodes of another severe cyclone in 1990, was also believed to be the factor for the locally extinction of approximately 100 vulture population in the Guntur and Prakasham areas of the state Andhra Pradesh, India. High temperature, another environmental extremity caused neck-drooping followed by mortality in oriental white-backed vultures (*G. bengalensis*) and the mechanism is explained with failure to body thermoregulation by the birds. Therefore, along with diclofenac biomagnification, the increased susceptibility of vultures to microbial pathogens, diseases or metabolic depression related physiological disorders might be responsible for their massive die-off event [2].



Figure 1: Resting of vultures in coconut trees (source cannundrum.blogspot.in).

Some numerical features

As summarized recently, in protected areas of India, vultures are found to exist in few countable two-digit numbers. Instances also found indicating the numbers of the park's white-rumps decline from a peak of 1,800 in 1985-86 to only 86 in 1998-99, while long-bills fell from 816 to 25 in Rajasthan's Keoladeo National Park, India. Records show a 96% decline in the Indian white-backed vulture population and a 97% decline in the long-billed vulture population between 1985 and 1999. Similar observations were also observed in nation-wide surveys and in especially in Nepal and Pakistan [1,2].

Conservation measures

As a measure of one of the conservation strategies in India, meloxicam is recommended to be used in veterinary science against the banned diclofenac. The former veterinary drug has multi-fold lesser toxicity in *G. africanus*, *G. bengalensis* and *G. indicus*. Demographic survey report indicates the effectiveness of the step to revive vulture population in India. Vulture restaurant in several national parks of India have been established to avoid food scarcity and consumption of contaminated food. Veterinary analysis of morbid and dead birds is also established in India and public awareness made

to save their population. It is also demanded but not yet employed to use different tissue culture techniques as a tool for the conservation of different endangered or threatened species including vulture population. Automated surveillance system can be used, for example, that was used to monitor the siblicide in a bearded vulture (*Gypaetus barbatus*) nest in Crete from 2003-2006. Therefore, further multiple field and laboratory approaches must be implemented to revive vulture populations in India and elsewhere the problem persists [3,4].

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