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MALICIOUS POISONING IN RHINOCEROSES–A CASE REPORT

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Abstract

Two rhinocerose of a local zoo were found lying dead early in the morning on 27 January 1990. The post-mortem examination showed lesions of acute poisoning and the toxicological analysis confirmed the presence of Zinc Phosphide in autopsy materials. This paper reports the autopsy findings and the concentration of Zinc Phosphide in different organs/tissues of these protected wild animals. The intestinal tissue was found to contain the highest concentration of the poison.

Introduction

One horned rhinoceros (*Rhinoceros unicornis*) is the secondlargest terrestrial creature alive totay and is kept in the list of endangered species. Despite protective laws, it has been hunted extensively and poaching continues, mainly because of myths that the horn contains an aphrodisiac and other body parts also have magical qualities [Eltringham (1984); Felix (1983); The World Book Eocyclopedia (1984). Eltringham (1984) reports that the rhino horn has large market in the Far East and in North Yeman. Although the market price of the horn of *R. unicornis* is about US $ 1800/kg [Cha-Kravarthy and Baruah (1985)], it was on sale at unbelievable price of US$ 17000/ kg [Eltringham (1984)].

Martin (1983) reported that traditionally rhino horn was used in Unani and Ayurvedic medical practices while the skin was used in battle field. Rhino products

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like urine, dung, horn, skin, hoof, meat, bone, blood etc. are used as aphrodisiac, antidotal, analgesic, cardiac stimulent, antiinflammatory, anticonvulsant, purgative, carminative, muscle relaxant, antiemetic, antiallergic and antishock therapy. He further reported that rhino products were also used in development of full breast in female, stop bleeding, haemorrhoids, paralysis, polio, erysipelas, measles, influenza, leprosy, whooping coungh, typhoid, pleurisy, food poisoning, asthma, laryngitis, tonsilitis, caruncles, abscess, infantile, night blindness, high blood pressure, skin diseases and to keep away bad spirit too.

The anatomical study of rhino horn indicates that it is a kind of epidermal growth of skin in the form of modified hairs [Chakravarthy and Baruah (1985); Key, (1978)]. The actual medicinal value and its pharmaceutical effect within the system has not yet been reported. But the presumed medical proeprties of rhino horn are so highly regarded in the East, particulary in China, and there is little chance that immediately traditional doctors will discontinue its use in the name of conservation [Eltringham (1984)]. Consequently, the poachers are adopting various means of killing the protected animals.

Zinc phosphide is a commercially available rodenticide poison. Fatal cases of poisoning from zinc phosphide have been reported in man and in nearly all species of domestic animals and poultry [Clarke, Hervy, Humphreys (1981); Franklin (1988); Singh and Pahuja (1985)]. Various attempts have been made to study the toxicity of zinc phosphide in domestic animals and man. The gaseous phosphine (PH_3) is reported to be the toxic principle which is rapidly released through hydrolysis in dilute solution of hydrochloric acid of stomach but slowly in water. Therefore, zinc phosphide is more hazardous amongst horses (rhino has also similar digestive system) than in ruminents (rumen has alkaline pH) [Blood, Radostits and Henderson (1983)]. The cause of death due to phosphine poisoning in man is asphyxia [Dreisbah (1983)]. Fitzpatrick et al (1955) have given detail account of the postmortem findings in various species but not in rhinoceros.

The lethal dose of zinc phosphide for man is 1mg/Kg body weight [Dreisbach (1983)] while for cattle, sheep, pig, goat, dog and cat it is between 20-40 mg/kg [McGirr (1953)] but Fitzpatrick et al (1985) mentioned that the fatal single dose

orally is approximately 60 mg/kg and there is little species variation in this regard. In case of heavy intoxication, zinc phosphide may kill the animals immediately after ingestion and the symptoms are frequently not observed [Jones (1974)].

Commercial zinc phosphide contains two fractions, one rapidly and the other slowly attacked in the gut [Mcgirr 1953)], the later fraction is of considerable importance because its refractory nature allows the poison to be detected chemically after death. It has been proved that zinc phosphide is resistant to natural decomposing forces and in a homicide case it has been detected in the stomach after 8 days of burial [Tiwari (1965)]. Singh and Pahuja (1985) have estimated the concentration of phosphorus and zinc in different organs/tissues in a fatal case of zinc phosphide poisoning of a couple but the authors could not find any report about the chemical analysis of zinc phospide in visceral organs of rhinoceroses. The present case report will able to draw the attention of world's zoos and wildlife reserves about the possibility of such malicious poisoning, especially in endangered species of wild animals.

History of the Case

Two rhinoceroses ageing 15 and 6 years, sex female and male respectively, kept in two separate enclosures at Central Zoo of Nepal, were normal till 5:30 PM 26th Jan 1990. They were fed on usual routine food. Both the animals were found dead at 6:00 AM on 27th Jan. 1990. There were no remnants of bait or poison packets. The horn of male rhinos was cut and taken away by the poachers leaving behind a heavy bleeding.

Material and Methods

Post-mortem examination of the female rhino was carried out from 4:00 PM to 9:00 PM on the same day in a systematic manner where as post-mortem examination of male rhino was carried out from 10:00 AM to 3:00 PM on the next day Autopsy findings were noted and were photographed where appropriate.

Preliminary test for zinc phosphide was done in viscera and stomach content by treating with sulphuric acid and detecting the release of phoshine gas with mercuric

chloride paper. The phosphate was further confirmed by oxidizing with acidified potassium permangnate and testing with ammonium molybdate and 1.2,4-aminonapthol sulphonic acid reagent. Rinmann's green test was performed to confirm the presence of zinc. The quantitative estimation of zinc phosphide was done colorimetrically with known standard of potassium dihydrogen phosphate by Fiske and Subbarow method.

1ml of 1N KH^2PO^4 solution = 1.818 mg of Zn^3P^2

Results and Discussion

Autopsy examination revealed identical changes in both the cases. Externally animal was lying down on lateral recombency. Tympany was remarkable and froth was evident at the nostril. There was little bleeding from the nose as well as from rectum. The rectum was prolapsed. Visible mucus membranes of eye, rectum, nostril, lips and tongue were heavily congested. The pupils were dilated.

On opening of the stomach there was a characteristic smell of something between garlic and rotten fish. Glandular portion of stomach wall was severely congested and inflammed. Ingesta was containing some blackish pastelike material. At adjecent to stomach wall, the ingesta was covered with whitish material with some blackish spots. Small intestinal mucosa was highly congested, inflammed, and was filled with gas and bluish black fluid. The mesentric blood vessels were highly congested. The liver was highly inflammed, fragile and congested. Both the kidneys were also congested. The spleen was inflammed and spongy with patchial haemorrhage over the surface.

Internal wall of the thoracic cavity showed ecchymotic haemoorhage at several parts. The lungs were also highly congested with ecchymotic haemorrhage and interlobular oedema. All the blood vessels of the heart were highly congested and patchial haemorrhage was observed on endocardium.

Qualitative test for zinc phosphide gave positive result in stomach content, intestine, spleen, liver, kidney, lungs, and heart of both the rhinoceroses.

The values of residual zinc phosphide obtained in various specimen are noted as below:

Materials	Residual Zn_3P_2 (mg/100 gm)	
	Female rhino	Male rhino
Small intestine	3.6	4.545
Liver	0.259	0.3305
Spleen	0.1165	3.232
Kidney	0.101	0.101
Lungs	0.0505	0.04545
Heart	0.1818	0.1212

The blackish pastelike unmixed material found in the ingesta gave strong positive result for zinc phosphide while other portion of the stomach content was hardly positive. Due to this heterogeneous mixing nature of the stomach content it was not considered for quantitative estimation of the poison. The presence of considerable amount of blackish pastelike material in the stomach also suggests that the poison was given in a very high dose.

Since the amount of zinc phosphide given to the animals was very high, death occure within 12 hours and the findings that intestinal tissue contained highest concentration of zinc phosphide is consistant with the expection.

Pathological changes caused by zinc phosphide intoxication in the rhinoceroses were not different from those reported in other species. Therefore, it was evident that gaseous phosphine acted similarly and produced similar effects in rhinoceroses as it did in other animals and man. However, it was not clear that the traditional presumption as the horn and other bits and pieces of rhinoceroses can cure a variety of illness and can also be used as an antidote in many poisoning cases; why these rhinoceroses failed to produce antidotal substance in their own ? The question remained yet to study.

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