



Carcinoma of the Ethmoid Mucosa in Cattle

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Carcinoma of the mucosa of the ethmoid in cattle and other livestock emerged as a problem in Kerala during 1960 and within the course of few years it got itself established in an endemic form in the state. Subsequently it was reported from many other parts of the country. In Kerala gradually it became economically important, sentimentally significant problem for the farmers and a challenging clinical entity for the Veterinarians of the state and a solution-demanding problem for the scientists. The author had the good fortune to work on this problem as the Principal Investigator for over three decades along with a team of devoted scientists and postgraduate students. The KAU, ICAR and USDA funded the project in a phased manner. The scientists at the Kerala Agricultural University have done pioneering work on this problem and has got the stamp of authority on ethmoid carcinoma in the country.

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The carcinoma of the mucosa of the ethmoid in cattle was reported to occur in an endemic form in Scandinavian countries in the beginning of this century (Stenstrom,1915, Magnusson, 1916).

The tumours of the mu-

cosa of the ethmoid was first recorded in cattle In Kerala in 1960 (Rajan *et al.*, 1972). It has also been reported from Andhrapradesh (Narayanan, 1960, Sastri and Rao, 1964), Tamilnadu (Damodaran *et al.*, 1974). Karnataka (Balasubramaniam, 1975) and Orissa (Nayak *et al.*, 1979). During the period 1960 to 1991, 1735 cases were recorded in domestic animals and made a detailed study of these cases. There are only cases that were examined in detail and there may be many cases that have not been brought to the notice of the veterinarians in the state. This included cattle (1396), buffaloes (107), pigs (136), goats (92), and domestic deer (4). Among cattle cross-breds (1360), non-descript (24), and pure bred (12) were found to be affected. The tumours were recorded from all the districts of the state.

The symptoms described by various authors were intermittent nasal discharge, epistaxis, respiratory difficulty characterised by snoring unilateral or bilateral exophthalmos, swelling of the forehead, difficulty in swallowing and occasionally circling movements (Fontaine *et al.*, 1983). Most of the animals were in the first or second trimester of pregnancy when they manifested the symptoms of the disease (Rajan *et al.*, 1972). Sreekumaran and Rajan (1983) described the epidemiological features of the tumour in Kerala. They concluded that this tumour has established itself in an endemic form in Kerala and there appears to be no species barrier. Although, the incidence was seen in all breeds of cattle including nondescript cattle the incidence was high in crossbred jersey cattle. There was no sex specificity. There was no seasonal incidence as the cases were recorded throughout the year. Pregnancy was found to exacerbate clinical symptoms and the incidence was high in the age group of 6-10 years.

Rajan (1980) reported the gross features of the tumour in detail. The tumour was found to arise from the mucosa of the ethmoid and it extended down in to the nasal cavity and often blocked the nasal passage. Posteriorly, it occasionally extended in to the brain perforating the horizontal plate of the ethmoid and invaded into the brain. Downward, the tumour extended into the pharynx and blocked it. Anteriorly, the tumour invaded into the frontal bone, perforated





it and bulged out as a tumour mass into the subcutaneous tissue.

The tumour was found to arise invariably from the mucosa of the ethmoid as a pedunculated mass and filled the nasal cavity and extended into the pharynx, frontal sinus, maxillary sinus, and rarely into the palatine sinus. The tumour mass rarefied the nasal septum and turbinate scrolls. Rarefied bony spicules were seen embedded in the tumour mass. After rarefaction of the ethmoid bone in certain cases, the tumour invaded the brain and formed adhesion with the brain. The lymphnodes showed metastatic foci in 32% cases (Rajan, 1980). Retropharyngeal and parotid lymphnodes were more frequently involved. Pulmonary and bronchial lymphnodes were involved in 5% of cases.

It was demonstrated that the tumour was a primary growth arising specifically from the olfactory mucosa of the ethmoid region. The primary tumour was considered as an adenocarcinoma and it was clarified that it progressed through a transitional stage to squamous cell carcinoma. Histologically, the tumours encountered by Rajan and Ramachandran (ICAR Scheme Report, 1985) were classified as adenocarcinoma (317), transitional cell carcinoma (90), squamous cell carcinoma (165) and undifferentiated carcinoma (56). There was no difference in the histological types of the tumours encountered in different species of animals. The serum protein pattern in tumour bearing animals was also described (Sreekumaran and Rajan, 1982a). They observed an increase in gammaglobulin, hypoalbuminaemia and decrease in albumin; globulin ratio.

For early diagnosis of the tumour exfoliative cytology with Papanicolou's stain was employed and the diagnostic criteria were perfected (Vijayan and Rajan, 1982). They described the methods for collection and processing of nasal discharge for exfoliative cytology. Masillamony *et al.* (1980) observed that staining with acridine orange and indirect fluorescent technique were of value in diagnosing early stages of ethmoid carcinoma. Sulochana *et al.* (1980) isolated seven haemagglutinating agents from the tumour tissue by chicken embryo inoculation.

Rajan *et al.* (1972) and Pospichil *et al.* (1979) reported simultaneous occurrence of ethmoid carcinoma in animals and mycotoxins in feed. They pointed out that the role of mycotoxins has to be assessed in causing the tumour though direct evidence for the involve-

ment of the toxin was lacking.

The immunological background of the tumour bearing animals was assessed employing different immunological markers. The cell-mediated immune response in tumour bearing animals was assessed using 2-4 dinitrochlorobenzene and phytohaemagglutinin (Sreekumaran and Rajan, 1981b, Reddi and Rajan, 1983a, 1983b, 1984a, 1984b) and leucocyte migration inhibition test (Sulochana *et al.*, 1982). The macrophage function in tumour bearing animals was assessed (Reddi and Rajan, 1983b). It was observed that tumour bearing animals were immunologically competent in early stages of tumour growth but the animals were immunologically unresponsive in late stage (Reddi and Rajan, 1984a).

Beneficial effects were reported by Rajan *et al.* (1983) following cobalt radiation therapy in goats bearing ethmoid carcinoma. Chemotherapy with endoxan (cyclophosphamide) was found to be of value in early stages of tumour growth. Local injection of anacarcin was found to be of value in treating ethmoid cancer (ICAR Scheme Report, 1983). Surgery, Chemotherapy and immunotherapy were also tried with encouraging results (ICAR Scheme Report, 1983). The studies conducted so far suggested the involvement of a virus in the causation of this tumour. The observations also suggested that aflatoxin may have a direct or indirect role in causing the tumour.

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