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## Studies on prevalence, predisposing factors and microscopic evaluation of bovine horn cancer

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### Abstract

A total of thirty clinical cases of horn cancer were selected for the study. Prevalence of horn cancer in relation to species, breed, age, sex and side of the horn were studied. Prevalence of horn cancer was higher in nondescript cattle (67%) followed by Gir (22%) and Sahiwal (11%). Higher prevalence was recorded in cow bullocks above 8 years (69.33%). All cases involved unilateral affection of horn. Predisposing factors of horn cancer included yoke, painting of horn, irritation due to rope tying and exposure to sun. Microscopically well differentiated tumour was recorded. Cells containing keratinized cytoplasm without nuclei whorled together to form pink colored keratin pearls.

**Keywords:** Horn cancer, prevalence, predisposing factors, keratin pearl

### Introduction

Anatomically, horn is an extension of cornual process of frontal bone. Horn cancer is generally unilateral and is encountered in cattle of age group 5-10 years<sup>[1]</sup>. Approximately 1% bullock population of India is affected by horn cancer<sup>[2]</sup> and causing heavy economic losses to the farmers. The tumour is observed more commonly in long horned, white coat breeds of cattle. The predisposing factors for occurrence of horn cancer are considered to be multifactorial. Irritation due to yoke, trauma, tying the rope at the base of the horn, rubbing against hard object, fighting, genetic predisposition, paints, solar radiation, viruses, either alone or in combination, have been reported as the etiological factors<sup>[3]</sup>. Sunlight is probably the most important carcinogenic stimulant for these tumors<sup>[4]</sup>. High incidence of horn cancer in castrated bullocks indicates possible role of reproductive hormones imbalance in the induction of tumour<sup>[5]</sup>. Horn cancer is malignant in nature and originates from the squamous cell lining of the core at the base of the horn.

In order to prevent the occurrence of horn cancer, it becomes quintessential to investigate its prevalence, possible causes and predisposing factors. As treatment of horn cancer is based on either amputation of horn alone or along with chemotherapy using Vincristine sulphate<sup>[6]</sup>, timely diagnosis by microscopic examination could be helpful for clinician to select and initiate appropriate treatment option. As there is no systematic study in Chhattisgarh on bovine horn cancer, therefore the present study was planned to elucidate the prevalence, predisposing factors and micro pathological findings of bovine horn cancer in and around Durg district of this state.

### Materials and Methods

#### Clinical cases

A total of 30 clinical cases affected with horn cancer (Fig. 1) presented to the Department of Veterinary Surgery & Radiology and reported in and around Durg district of Chhattisgarh were investigated during present study.

#### Prevalence and predisposing factors of horn cancer

The prevalence in relation to species, breed, age, sex, and horn involved was studied. Predisposing factors associated with horn cancer were determined based on animal history taken from owners.

#### Surgical intervention and tissue sample collection

For surgical intervention and collection of tissue samples, initially animals were restrained in lateral recumbency in such a way so that the affected horn was in upward direction.

After corneal nerve block, the site was located by palpating the frontal crest as the corneal nerve passes subcutaneously just below this crest. 10 ml of lignocaine hydrochloride (2%) solution was deposited around the nerve. The hairs around the horn were clipped and area was cleaned with soap and then antiseptic solution 3-4 times to maintain the asepsis at operation site. Skin incision was made around the base of the horn and flap was prepared. After ligating the cornual vessel, the affected horn was removed while exposing periosteum of frontal bone. Tissue samples were collected in 10% formalin and processed for histopathological examination.

### Microscopic evaluation of tissue samples

Tissue samples were embedded in paraffin, and 5- $\mu$ m sections were stained for routine histopathological diagnosis with hematoxylin and eosin using standard protocol [7].

## Results and Discussion

### Prevalence of horn cancer

All 30 clinical cases of horn cancer reported during course of study were observed in cow bullocks only (Table 1). Among different breeds of cattle, 21 cases (67%) were non-descript, 7 cases (22%) Gir and 2 cases (11%) were of Sahiwal breed. High incidence of horn cancer in nondescript animals could be due to more population of animals in and around Durg district.

The average age of cattle suffering from horn cancer was 08 years. The highest incidence of horn cancer i.e. 21 cases (69.33%) was found in animals of age group 8 years and above and 9 cases (29.66%) in animals of age group below 8 years. However, Tyagi and Singh [1] reported higher incidence in the age group between 5 to 10 years which might be

attributed to more stress in aged animals as well as their regular use in agriculture operations [8]. Only unilateral affection of horn was reported in our study.

### Predisposing factors

Common predisposing factors associated with horn cancer during present study were yoke, trauma and rubbing against hard object.

### Histopathological findings

Histopathological examination of tissues affected with horn cancer revealed a well differentiated invasive type squamous cell carcinoma infiltrating into the basal layer and dermis with hyper keratinization (Fig. 2). Anastomosing cords and nests composed of polyhedral shaped cells with prickly borders, glassy eosinophilic cytoplasm and enlarged nuclei were present. These neoplastic squamous epithelial cells had originated from the basal cells of the epidermis, differentiated to form irregular islands of squamous epithelium and got surrounded by fibroblasts and collagen [9].

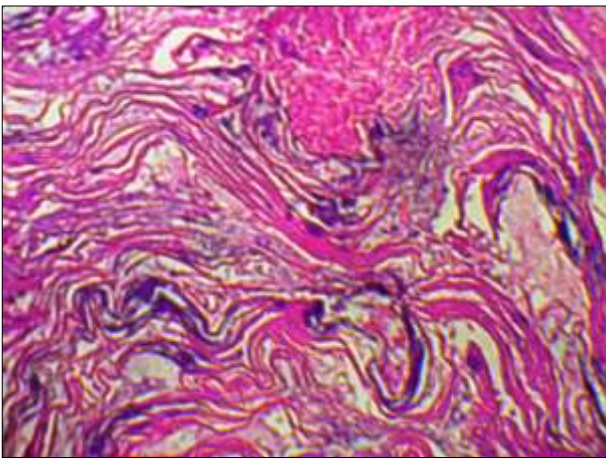
Squamous cell carcinoma showing early neoplastic changes characterized by lobulated distribution of squamous epithelial cells with pleomorphic changes in the nuclei and cell nest formation, non-distinct central portion were becoming acellular structure which started forming connective tissue nests or pearls structure which were observed in these poorly differentiated tumors (Fig. 3). A similar finding has been recorded by Pugliese *et al.* (2014) [10]. Cells with keratinized cytoplasm without nuclei whorled together to form pink colored keratin pearls [2]. All the above features indicated a well differentiated tumor.

**Table 1:** Prevalence and predisposing factors of bovine horn cancer

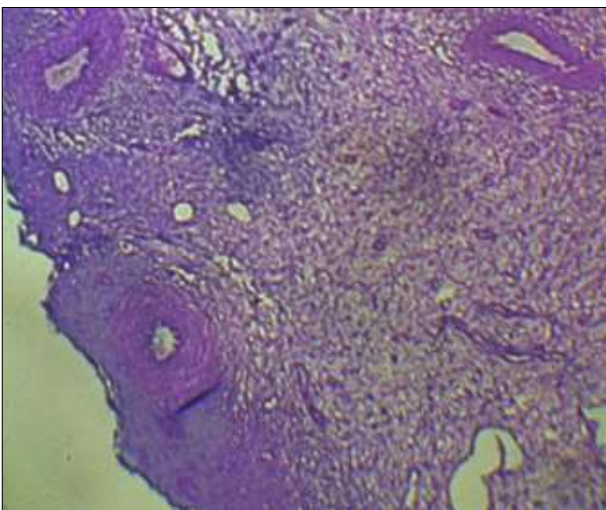
S.N.	Breed	Approx. age (in years)	Sex	Horn involved	Predisposing factors
1	Non-descript	9	Male	Unilateral	Yoke, trauma
2	Non-descript	8.5	Male	Unilateral	Yoke, rubbing against hard object
3	Non-descript	8.5	Male	Unilateral	Yoke, trauma
4	Non-descript	8.5	Male	Unilateral	Yoke, rubbing against hard object
5	Non-descript	8.5	Male	Unilateral	Yoke, rubbing against hard object
6	Non-descript	9	Male	Unilateral	Yoke, trauma
7	Non-descript	10	Male	Unilateral	Yoke, rubbing against hard object
8	Non-descript	10	Male	Unilateral	yoke, rubbing against hard objec
9	Non-descript	9	Male	Unilateral	Yoke, rubbing against hard object
10	Non-descript	9.5	Male	Unilateral	Yoke, trauma
11	Non-descript	8	Male	Unilateral	Yoke, rubbing against hard object
12	Non-descript	8	Male	Unilateral	Yoke, rubbing against hard object
13	Non-descript	8	Male	Unilateral	Yoke, rubbing against hard object
14	Non-descript	7.5	Male	Unilateral	Yoke, rubbing against hard object
15	Non-descript	8.5	Male	Unilateral	Yoke, rubbing against hard object
16	Non-descript	6	Male	Unilateral	Yoke, rubbing against hard object
17	Non-descript	7.5	Male	Unilateral	Yoke, rubbing against hard object
18	Non-descript	8.5	Male	Unilateral	Yoke, rubbing against hard object
19	Non-descript	8	Male	Unilateral	Yoke, rubbing against hard object
20	Non-descript	7	Male	Unilateral	Yoke, rubbing against hard object
21	Non-descript	8.5	Male	Unilateral	Yoke, trauma, rubbing against hard object
22	Gir	7.5	Male	Unilateral	Yoke, rubbing against hard object
23	Gir	8	Male	Unilateral	Yoke, rubbing against hard object
24	Gir	8	Male	Unilateral	Yoke, trauma, rubbing against hard object
25	Gir	6.5	Male	Unilateral	Yoke, trauma, rubbing against hard object
26	Gir	6	Male	Unilateral	Yoke, trauma, rubbing against hard object
27	Gir	6	Male	Unilateral	Yoke, rubbing against hard object
28	Gir	7	Male	Unilateral	Yoke, rubbing against hard object
29	Sahiwal	8.5	Male	Unilateral	Trauma, rubbing against hard object
30	sahiwal	7	Male	Unilateral	Yoke, rubbing against hard object



**Fig 1:** Clinical case of bovine horn cancer



**Fig 2:** Showing hyperkeratinisation of the dermis with irregular islands of squamous cells



**Fig 3:** Squamous cell carcinoma of horn tumor showing distinct keratin Pearls

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## Conclusion

The grading of squamous cell carcinoma can be done which coupled with prevalence, predisposing factors and microscopic evaluation that can apprise the surgeon/practitioner to initiate a therapeutic approach. Peculiar microscopic findings in the present study *viz.* well differentiated tumors arranged in whorls (pearls) with intensely eosinophilic keratinized centers could be very helpful for definitive diagnosis of such cases and to initiate early treatment.