Popular Article

BOVINE PAPILLOMATOSIS

Alka Bharia[1*], M.M. Mali[1], Somesh Sharma[1], Nupur Pandey[1]
[1]Department of Veterinary Medicine, Post Graduate Institute of Veterinary Education & Research, Jaipur, Rajasthan, India
**Corresponding author e-mail: alkabhariah@gmail.com*

ABSTRACT

Bovine papillomatosis, caused by bovine papillomavirus (BPV), is a common viral dermatological condition in young cattle, resulting in benign growths or warts that can impact livestock trade due to their unsightliness. Transmission occurs through direct and indirect contact, leading to cauliflower-like growths on various body parts. Clinical signs include growths on teats, udder, head, neck, and shoulders, with varying severity and duration. Histopathological examination reveals thickened epidermis with hyperplastic growths and occasionally intranuclear eosinophilic inclusion bodies. Diagnosis involves diverse methods such as clinical examination, histopathology, and molecular techniques. Treatment options include specialized formulations, surgical interventions, and autogenous vaccines. Prevention and control have advanced with the use of Newcastle disease vaccine for its oncolytic properties, offering both treatment and prevention.

Keywords: Cutaneous papillomatosis**,** bovine papilloma virus, histopathology

I. INTRODUCTION

Bovine papillomatosis is a common viral dermatological condition in young cattle, characterized by benign growths or warts caused by bovine papillomavirus (BPV). There are six recognized serotypes of BPV (Olson, 1990). This condition can diminish the attractiveness of livestock trade due to unsightly warts, leading to exclusion from shows and exhibitions (Zwandor *et al.,* 2008). Papillomatosis, commonly known as warts, is highly contagious and spreads through direct and indirect contact. It typically appears around eight weeks after exposure to the virus, forming cauliflower-like growths mainly on the nose, chin, lips, neck, and shoulders. Immunity usually develops within three to four weeks post-infection. Warts on lactating cow teats can pose milking challenges and increase the risk of mastitis, while perianal warts are visually unappealing but do not affect animal activity. Genital warts hinder mating, attract flies, and may require management due to their size and bleeding tendency (Constable *et al.,* 2017).

II. ETIOLOGY

Cutaneous papillomatosis, commonly known as warts, is a communicable skin condition in cattle caused by bovine papillomavirus (BPV). BPV is a small, non-enveloped virus with a circular DNA genome. It exhibits specificity for host, site, and lesion, primarily targeting squamous epithelial cells. There are thirteen characterized types of BPVs, divided into three genera: Delta papilloma virus, Epsilon papilloma virus, and Xi papilloma virus. These viruses replicate exclusively in terminally differentiated squamous cells and may also infect the Equidae family (Smith, 2002).

III. TRANSMISSION

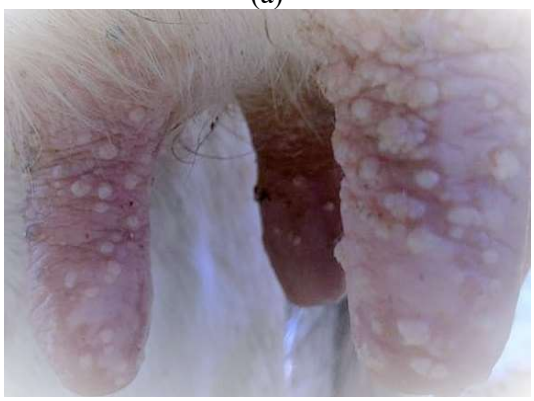
The infection spreads through direct and indirect contact, primarily via cattle, introducing the virus through scratches and vulnerabilities. Contributing factors include exposure to contaminated materials, malnutrition, hormonal imbalances, and prolonged sunlight, especially in immunocompromised cases. The incubation

period ranges from 3-8 weeks in experimental inoculation but may be longer naturally. Transmission occurs through direct contact, entering through skin abrasions. Economic impacts affect animal sales and exhibitions, with prolonged papillomatosis leading to declining health and disruptions in milking due to teat warts (Constable *et al.,* 2017). Papilloma virus infection occurs when the virus interacts with lesions in the skin epithelium, leading to the formation of warts. Most warts are noncancerous and do not undergo unlimited proliferation, reducing the likelihood of cancer (Shah and Howley, 1996).

IV. CLINICAL SIGNS

In cattle, growths commonly appear on various body parts such as the teats, udder, head, neck, shoulders, and occasionally on the back and abdomen (**Fig. 1 a, b**). These growths display cauliflower, filiform, rice-grain, or flat characteristics, with either a smooth or rough surface. (Rana, 2010).

(a)



(b)

Fig. 1 a, b: Growth on Different Organs

The severity and duration of the lesions depend on factors such as the virus variant, affected region, and vulnerability level. Warts typically emerge about two months after exposure and can persist for up to a year. Papillomatosis becomes a concern at the herd level when a significant number of young, susceptible animals contract the infection. While immunity usually develops within three to four weeks after the initial infection, sporadic recurrences may occur, likely due to a gradual decline in immunity (Kahn *et al.*, 2010).

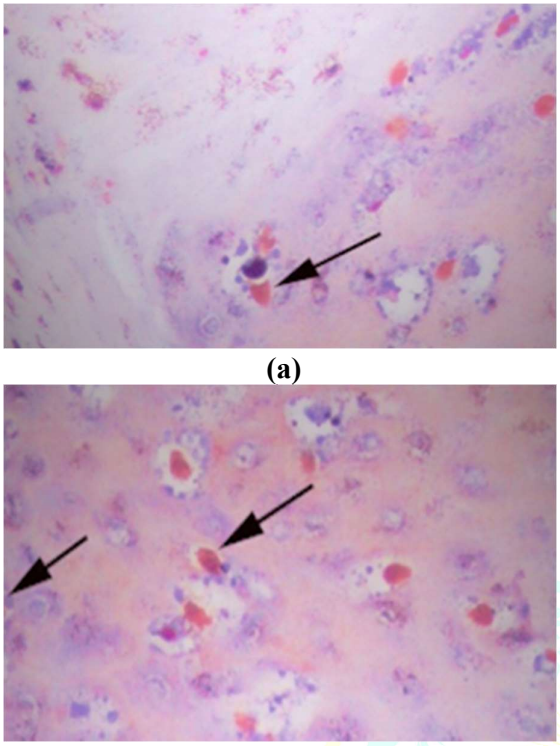
Warts commonly result from the skin's response to papillomavirus infection, often affecting areas like the teats and scrotum. They vary in shape and size, ranging from flat, pea-sized nodules to significant, orange-sized masses on stalks (Nenad *et al*., 2005).

Although warts generally cause minimal harm and tend to disappear spontaneously over time, their reappearance can be observed with inadequate hygiene and care (Sharma *et al.,* 2005).

V. HISTOPATHOLOGY

Microscopic examination of cutaneous papilloma in cattle reveals a thickened epidermis with elongated hyperplastic growths extending into the dermis, along with connective tissue cell proliferation.

Intranuclear eosinophilic inclusion bodies are occasionally observed in epithelial cells of the stratum spinosum. Rough warts exhibit marked epidermal hyperplasia and hyperkeratosis, while smooth warts show extensive fibrous component proliferation. Papilloma can be categorized as Squamous papilloma, Fibrous papilloma (Fibro papilloma), or mixed-type, characterized by varying degrees of epidermal hyperplasia, fibroblast proliferation, and hyperkeratosis. Viral intranuclear inclusion bodies in the basal cell layer of the epidermis are infrequently documented in naturally occurring skin papilloma (Ozsoy *et al.,* 2011) (**Fig. 2 a, b**).



(a)

(b)

Fig. 2 a, b: Histopathology of Cutaneous Papilloma in Cattle (H&E x40)

VI. DIAGNOSIS

Diverse diagnostic approaches are employed for the identification of Bovine Papillomavirus (BPV), including clinical examination, histopathology, polymerase chain reaction (PCR), Southern blot, dot blot, reverse blot, in situ hybridization, and immunohistochemistry. Together, these methodologies significantly contribute to the precise diagnosis of BPV (Constable *et al.,* 2017).

VII. TREATMENT

Various techniques and instruments are employed in papillomatosis management, including specialized formulations containing antimony and bismuth administered through injection, cauterization using trichloroacetic acid or 20% salicylic acid tincture, surgical excisions, traction or ligation removal, and rubber ring application. Newcastle disease virus (NDV), ivermectin, and levamisole are believed to possess antineoplastic and immunostimulatory properties (Avki *et al.*, 2004).

An autogenous vaccine made from sterile homogenized tumour tissue, formulated with or without immunomodulators, has shown promising results in tumour regression within three weeks of treatment initiation, with complete recovery within six weeks (Campo, 1987).

The vaccine is administered subcutaneously at a 5ml volume, followed by revaccination at seven-day intervals for four weeks. The papilloma lesions are excised, finely ground, and filtered after resuspension in normal saline. The filtrate is treated with 0.5ml of 10% formaldehyde to deactivate the virus, and streptomycin-penicillin is added before refrigeration until use (Mayil kumar *et al.,* 2014).

VIII. PREVENTION AND CONTROL

Recent advancements in papilloma control involve the use of the Newcastle disease vaccine, known for its oncolytic properties. An effective approach includes utilizing a formalinized suspension of bovine warts containing inactivated virus to develop an autogenous vaccine, offering both treatment and prevention for bovine papillomatosis. (Suveges and Schmidt, 2003).

IX. CONCLUSION

In conclusion, bovine papillomatosis poses significant challenges to the livestock industry, impacting animal health, trade, and productivity. Understanding its various aspects, including etiology, transmission, clinical signs, diagnostics, and treatment options, is crucial for developing effective management strategies. Accurate diagnosis facilitated by histopathology and molecular assays enables timely intervention, while treatment options range from chemical cauterization to emerging vaccines. Continued research and collaboration are essential for refining strategies to mitigate the impact of this condition on animal welfare and industry sustainability, emphasizing the importance of

comprehensive preventive measures and effective management protocols.

X. REFERENCES

Avki, S., Turutoglu, H., Simsek, A., & Unsal, A. (2004). Clinical and immunological effects of Newcastle disease virus vaccine on bovine papillomatosis. Veterinary Immunology and Immunopathology, 98(1-2), 9-16.

Campo, M. S. (1987). Papillomas and cancer in cattle. Cancer Surveys, 6(1), 39-54.

Constable, P. D., Hinchcliff, K. W., Done, S. H., & Grunberg, W. (2017). Veterinary Medicine: A Textbook of the Diseases of Cattle, Horses, Sheep, Pigs, and Goats. Elsevier Health Sciences.

Kahn, C. M., Allen, D. G., Constable, P. D., Quesenberry, K. E., Reeves, P. T., Sharma, J. M., Smith, R. K. W., & Treadwell, T. (2010). The Merck Veterinary Manual (10th Edition). Merck & CO. USA, pp. 1318-1319.

Mayilkumar, K., Kokila, S., Manimuthu, P., & Kuppusamy, G. (2014). Formalin inactivated autogenous vaccine for treatment of papillomatosis in adult dairy cow. Indian Journal of Veterinary Pathology, 91(10), 13-15.

Nenad, T., Zeljko, Z., Vilim, S., Snjezana, K., Tomislav, B., Mario, K., Stipica, C., Ljubo, B., & Zoran, M. (2005). Cattle papillomatosis. Veterinarski Arhiv, 75, 391-397.

Olson, C. (1990). Papillomaviruses. In Z. Dinter & B. Morein (Eds.), Virus Infections of Ruminants.

Ozsoy, Ş. Y., OZYILDIZ, Z., & Guzel, M. (2011). Clinical, pathological and immunohistochemical findings of bovine cutaneous papillomatosis. Ankara Üniversitesi Veteriner Fakültesi Dergisi, 58(3), 161-165.

Rana, S. (2010). Clinico-Therapeutic studies on Bovine cutaneous papillomatosis. MVSc Thesis, Department of Veterinary Medicine, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, India.

Shah, K. V., & Howley, P. M. (1996). Papillomaviruses. In B. N. Fields, D. M. Knipe, P. M. Howley, et al. (Eds.), Fields Virology (3rd Edition). Lippincott-Raven Publishers, pp. 2077-2101.

Sharma, S., Singh, K. B., Bansal, B. K., & Sharma, D. K. (2005). Buffalo Bull, 24, 12.

Smith, B. P. (2002). Large Animal Internal Medicine (3rd Edition). Mosby.

Suveges, T., & Schmidt, J. (2003). Newer data on the occurrence in Hungary of, losses caused by and ways of control of bovine papillomatosis. Magyar Állatorvosok Lapja, 125(2), 83-87.

Wadhwa, D. R., Rao, V. N., Mandial, R. K., & Prasad, B. (1992). Efficacy of anthiomaline and autogenous wart vaccine in bovine cutaneous papillomatosis. Indian Journal of Veterinary Medicine, 12, 21.

Zwandor, N. J., Akalusi, Y., Ngulukun, S., Meseko, C., Akanbi, O., Adedeji, A., & Fagbamila, I. (2008). Severe cutaneous bovine papillomatosis in a cattle herd. Vom Journal of Veterinary Science, 5(1).