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**Geethanjali PV**  
Undergraduate Student,  
College of Veterinary and Animal  
Sciences, Pookode, Wayanad,  
Kerala, India

**Litty Elizabeth Louis**  
Undergraduate Student, College  
of Veterinary and Animal  
Sciences, Pookode, Wayanad,  
Kerala, India

**Deepa PM**  
Associate Professor,  
Department of Veterinary  
Epidemiology and Preventive  
Medicine, College of Veterinary  
and Animal Sciences, Pookode,  
Wayanad, Kerala, India

**M Vijayakumar**  
Assistant Professor,  
Department of Veterinary  
Surgery and Radiology VCRI  
Namakkal, Tamil Nadu, India

**A Velavan**  
Associate Professor,  
Department of Veterinary  
Surgery and Radiology VCRI  
Namakkal, Tamil Nadu, India

**Corresponding Author:**  
**Geethanjali PV**  
Undergraduate Student,  
College of Veterinary and Animal  
Sciences, Pookode, Wayanad,  
Kerala, India

## **A comprehensive treatment strategy for bovine Papillomatosis: Assessing the synergistic effects of Autohaemotherapy, surgical intervention, and Autogenous vaccination**

**Geethanjali PV, Litty Elizabeth Louis, Deepa PM, M Vijayakumar and A Velavan**

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### **Abstract**

Bovine papillomatosis is a common viral neoplastic skin disease characterized by the development of warts in various areas of a cattle's body. This study embarked on a holistic approach, intertwining Autohaemotherapy, surgical excision, and autogenous therapy. The study was conducted on three cows at TVCC, Namakkal, and cattle from ILFC pookode with papilloma's predominantly located around the eyes, ears, and poll region of the cattle. The warts had varying diameters ranging from 1 to 7 cm. The treatment began with autohaemotherapy, succeeded by surgical excision of the warts. The excised samples were then utilized to formulate an autogenous vaccine. A month following this treatment, a remarkable reduction in size of the wart was evident, solidifying a multifaceted approach can amplify the therapeutic outcome against Bovine papillomatosis.

**Keywords:** Papillomatosis, autohaemotherapy, autogenous vaccine

### **Introduction**

Bovine papillomatosis is a common viral neoplastic skin disease characterized by the formation of warts on various areas of a cattle's body. These warts are a result of hyper proliferative skin lesions affecting the tissue and mucosa of cattle, caused by bovine papillomavirus (BPVs), which are non-enveloped, double-stranded DNA viruses belonging to the Papillomaviridae family (Gallina *et al.*, 2020) <sup>[1]</sup>. The impact of these lesions on production performance can be significant, especially when they affect critical areas such as the udder and teats. Transmission of cutaneous papillomatosis occurs through abraded skin and direct contact (Tan *et al.*, 2012) <sup>[2]</sup>. The virus enters the stratum basale and infects it, typically due to trauma and damage to the epithelial tissue (Yildirim *et al.*, 2022) <sup>[3]</sup>.

Clinical manifestations include multiple, sessile, or Pedunculated, circumscribed grey-white to dark brown-black outgrowths that may be smooth surfaced, spherical, or horny. The size of warts varies from pea-sized to a tennis ball and cauliflower-like in appearance. While these warts can appear on different body parts, the neck, eyelids, teats, and the lower line of the abdomen are the most common sites (Namgyel, 2021) <sup>[4]</sup>. Diagnosis is typically based on clinical signs and histopathological examination, with confirmation methods including electron microscopy, gene expression analysis of papillomaviruses in peripheral blood and semen through PCR, and immunohistochemistry (Terziev *et al.*, 2015) <sup>[5]</sup>.

The present study aimed to investigate the combined therapeutic efficacy resulting from the integration of autohaemotherapy, surgical intervention, and autogenous vaccination for bovine papillomatosis to expedite the recovery process.

### **Materials and Methods**

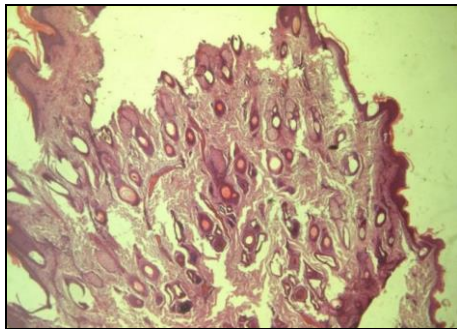
This study focused on three one-year-old heifers brought to the local veterinary dispensary with a complaint of wart-like lesions on their faces and heads persisting for the last six months. Upon examination, localized smooth raised nodules, ranging from 5-7 cm in diameter, were

observed predominantly on the head, eyes, ears, neck, and dorsal part of the body (fig. 1, 2, 3). Most of these papillomas exhibited a pedunculated structure, although some were sessile. Previous treatments involving Anthiomaline, Chlorpheniramine maleate, and thuja ointment, but no improvement was noted. All clinical parameters appeared normal.



**Fig 1, 2, 3:** Wart like lesions on head, face, ears, neck, and dorsal part of the body

Upon thorough gross examination of the three heifers with wart-like lesions in various body regions, samples for histopathological examination were collected through surgical excision. The results indicated hyperproliferation of the suprabasal layer in two samples, diagnosing the condition as a common wart. The third sample revealed mild hyperkeratotic papules, sebaceous gland cysts, and hyperplasia of hair follicles, leading to the diagnosis of the condition as a hamartoma. (Fig.4)



**Fig 4:** Hyperplasia of hair follicles (hamartoma)

**Results and Discussion**

The treatment commenced with autohaemotherapy, involving the collection of 10 ml of blood from the jugular vein, and the subsequent intramuscular injection of 5 ml on each side of the neck in each animal (Fig.5, 6).



**Fig 5:** Drawing blood from jugular vein

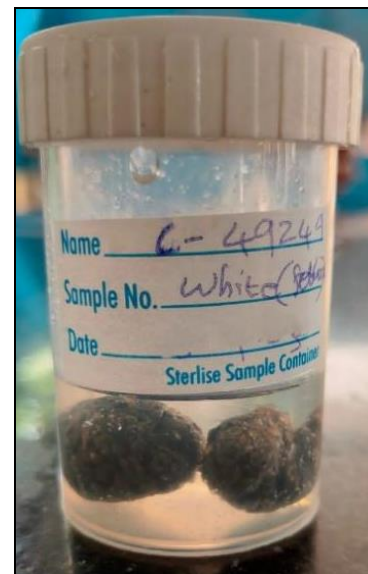


**Fig 6:** IM inj of blood in to neck of animal

This was followed by the surgical excision of the warts, targeting the removal of large pedunculated masses. (Fig.7, 8).



**Fig 7:** Animal after surgical excision of warts



**Fig 8:** Surgically excised wart material

The excised samples were then utilized to formulate an autogenous vaccine, a procedure characterized by its simplicity and cost-effectiveness. Notably, positive results were observed even with a single dose of this vaccine in field



conditions, and no local reactions or temperature increases were noted post-administration. One-month post-treatment, a significant reduction in the size of the warts became evident, reinforcing the notion that a multifaceted approach can enhance the therapeutic outcomes against Bovine papillomatosis.

Bovine papillomatosis, chronic proliferative tumor of cutaneous and mucosal epithelia that is commonly found in cattle of all ages and has high economic importance resulting in the loss of animal condition, secondary bacterial infection, interfering with production, and reduce the market price (Claus *et al.*, 2009; Jelinek and Tachezy, 2005) [6, 7]. Papillomatosis is most commonly observed among calves and heifers, particularly those under 2 years of age. In agreement with this findings, other researchers also reported that young animals were more prone for papillomatosis infection (Otter and Leonard, 2003; Mathewos *et al.*, 2021) [8, 9]. Young animals are more susceptible to papillomatosis might be due to factors like an underdeveloped immune system, alkaline pH of their skin, loss of maternally derived antibodies, and increased vulnerability to parasitic infestations and stress factors. In cattle, the cutaneous form of papillomatosis can manifest on almost all body parts. The characterization of papillomas into specific locations is influenced by antigen reaction and the DNA composition of the agents responsible for the infection (Terziev *et al.*, 2015) [5]. In the present case reports also showed lesions predominantly in head, eyes, ears, neck, and dorsal part of the body. This is in agreement with findings of Mathewos *et al.*, 2021) [9] who also observed papilloma in different body parts such as the head, neck, hind quarter, forequarter, and body surface with a frequency of 21.6%, 25.5%, 25.5%, 9.8%, and 17.6%, respectively. The location of papilloma in our study also aligns with findings of Ayman and Das (2019) [10] and Ozsoy *et al.* (2011) [11]. The characteristics of bovine papillomatosis included elevated and multiple nodular proliferation, cauliflower-like lesions with a rough and dense surface, pediculated and firm masses, a lichenified appearance with epidermal thickening, and loss of hair forming ulcers with inflamed surfaces and local to general infiltration (Jelinek and Tachezy, 2005; Ozsoy *et al.*, 2011; Hamad *et al.*, 2017) [6, 11, 12].

The histopathological findings reported in bovine papillomatosis were acanthosis, hyperkeratosis, parakeratosis, papillomatosis, and Koilocytosis (Marins and Ferreira, 2011) [13]. Hyperplasia was present primarily in the animals infected with the BPV-2 subtype (Rojas-Anaya *et al.*, 2016) [14]. The histopathological features of papillomatosis revealed diverse degrees of epidermal proliferation, characterized by a hyperplastic epidermis. Within the epidermis, squamous differentiation of keratinocytes, along with the presence of numerous koilocytes, was observed. In the dermis, there was an excessive proliferation of spindle to plump-shaped fibroblasts, accompanied by a fibrovascular core (Tozato *et al.*, 2013; Mansour, 2017) [15, 16].

Basaloid follicular hamartoma (BFH) on the other hand, represents a rare and benign neoplasm of hair follicles. This condition is histologically defined by an epithelial proliferation of basaloid cells and can clinically present in various forms, with or without associated diseases (Mills *et al.*, 2010) [17]. Histology of BFH was characterised as anastomosing strands and cords of basaloid cells that make up the affected hair follicles (Wheeler *et al.*, 2000) [18]. Since BFH is only found within hair follicles, the tissue is histologically normal in the dermis between follicles as well as in the reticular dermis (Requena *et al.*, 1999) [19].

In the present study, autogenous vaccine is found to be effective in treatment of papillomatosis. Similarly, Paulik *et al.* (2001) [20] observed a decrease in the blastogenic activity of lymphocytes in bulls affected by persistent cutaneous papillomatosis and reported that the use of an autologous vaccine resulted in a continuous regression of tumors and a gradual increase in lymphocytic activity. Autogenous vaccines activate the immune system against papilloma viruses. Response variations are linked to the virus type, papilloma developmental stages, tissue collection method, vaccine preparation, administration schedule, and the patient's immune function.

Auto-hemotherapy was reported to cause complete cure of papillomatosis in cattle (Kumar, 2011) [21]. This is in agreement with our present findings which showed a synergistic effect along with autogenous vaccination and surgical excision. Auto-hemotherapy is thought to stimulate the reticulo-endothelial system, increasing macrophage population in the circulating blood, potentially enhancing papilloma regression. Simultaneous administration of immunity inducers supports rapid wart regression, boosting the effectiveness of autogenous vaccines (Inayat *et al.*, 1999; Turk *et al.*, 2005) [22, 23]. Auto-hemotherapy can complement autogenous vaccines, providing a cost-effective and easily applicable therapeutic approach at the field level (Ranjan *et al.*, 2013) [24].

## Conclusion

Cutaneous papillomatosis is a benign proliferative neoplasm caused by papilloma virus. Histopathology stands as a cornerstone in diagnosing bovine papillomatosis, providing essential insights into lesion characteristics, guiding treatment decisions, and contributing to ongoing advancements in veterinary care. The success of the integrated approach, combining autohaemotherapy, surgical excision, and autogenous therapy, underscores the effectiveness of multifaceted interventions in achieving higher cure rates and faster recovery for cutaneous papillomatosis. This comprehensive strategy not only proves its efficacy but also emphasizes the importance of adopting holistic treatment approaches to elevate overall livestock health. The positive outcomes highlight the need for continued research and the development of comprehensive management protocols for bovine papillomatosis, aiming for sustained improvements in veterinary practices.

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