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ORIGINAL ARTICLE

Histo-morphology of cutaneous papillomatosis in indigenous cattle

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Abstract

Background

Papillomatosis is a viral disease manifested with benign cutaneous growths (skin epithelium hyperplasia) in different body parts which is encountered in cattle, goat, dog, rabbit, horse, rodent and also in human. The purpose of the present study is to detect the histo-morphological changes of cutaneous papillomatosis in indigenous cattle.

Methods

Ten (10) random samples from skin lesions of warts were collected from adult indigenous cattle (10 cattle) that were diagnosed as cutaneous papillomatosis by clinical examination at Veterinary Teaching Hospital, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh. For gross observations, location of appearance of warts, color and size was taken into consideration. Immediately after collection of sample, they were preserved in Bouin's fluid followed by dehydration, clearing and infiltration and finally embedded by paraffin wax. Then samples were sectioned using rotatory microtome and stained with Harris's Haematoxylin and Eosin Y to facilitate microscopic study.

Results

The results of present study revealed that cutaneous papillomas were mostly located on the head and neck, around eyes, under the chin and perineal region in indigenous cattle. Grossly, warts in cattle are bumpy or cauliflower-like masses of various sizes and numbers that projected from the skin having grey, rough, scaly, and dry surface. When incised, its cut surface has an external layer- keratinized epithelium and an internal core- moist white connective tissue. Histopathological changes indicate hyperplastic features of the affected skin layers of epidermis. Further, the microscopic analysis also revealed orthokeratotic hyperkeratosis, acanthosis and down word hyperplasia, fibrovascular area, keratohyalin granules and koilocytes at different layers of the affected skin.

Conclusion

The results of this present study might be useful for the classification and treatment of this common malady based on its histological changes.

Keywords: Papillomatosis, Histo-morphology, Indigenous cattle

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Introduction

Papillomatosis is caused by papillomaviruses (PV), belonging to genus Papillomavirus, family Parovaviridae. It is an oncoviruses that replicate in the nucleus of squamous epithelial cells and can induce warts in the skin and mucosal epithelia of higher vertebrate species. (de Villiers *et al.* 2004, Tozato *et al*. 2013).

Bovine papillomatosis is caused by BPV types from 1 to 10 (Singh *et al.* 2009), but BPV-1 and BPV-2 are outlined as main agents of fibropapillomatosis in cattle due to their affinity to epithelial tissue and skin (Singh *et al.* 2009, Pangty *et al.* 2010).

BPV infection results from the replication of the virus in basal cells and subsequent formation of wart-like growths, most of which are benign and do not proliferate infinitely (Terziev *et al.* 15). Cattle warts have been appeared mainly on the teats and mucosal surfaces of cattle, head, neck, perianal region, around eyes, ears and may spread to other areas of the body (Wosiacki *et al. 2006*, Maeda *et al.* 2007, Sabine *et al.* 2008, Kumar *et al.* 2013a, Kumar *et al*. 2013b Mansour *et al*. 2016).

Histopathological analysis of the lesion is an important procedure, since it identifies intraepithelial tumors associated with oncogenic viruses (Turk *et al.* 2005; Monteiro *et al.* 2008; Leto *et al.* 2011). Microscopically, all tumorous growths demonstrated similar histological features and include varying degrees of hyperkeratosis or parakeratosis with elongated digital-like proliferation of the squamous epithelium. In all tumor fragments evaluated, most keratinocytes demonstrated clear perinuclear halo, some having pyknotic nucleus (characterized as koilocytes), others revealed discrete ballooning degeneration; in some areas, two or more adjacent degenerated cells fused to produce microvesciles. Further, there was acanthosis, reduced mitotic index, foci of apoptosis of squamous epithelium, and severe accumulations of irregular keratohyalin granules within cells of the stratum granulosum. (Turk *et al.* 2005; Anjos *et al.* 2010; Marins and Ferreira, 2011, Tozato *et al.* 2013).

It is critical to identify the BPV types for the development of prophylactic and/or therapeutic procedures. In the development of therapeutic procedures, the evaluation of the characteristic lesions will be important (Araldi *et al.* 2014).

The purpose of the present study is to detect the histo-morphological changes of BPV induced cutaneous wart in indigenous cattle.

Materials and Methods

Sample collection

Randomly ten (10) wart samples were collected from different sites of body (head, neck, around eyelid, perineal region) from adult indigenous cattle (10 cattle) chronically affected with cutaneous papillomatosis from different cases at Veterinary Teaching Hospital, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh. After recording gross observations, samples were placed in sterile container with Bouin's fluid and transported to the laboratory as soon as possible for further investigations.

Histopathology

After proper fixation in Bouin's fluid, the samples were dehydrated using 70%, 80%, 90%, 100%, 100% and 100% alcohol for 2 hours in each and overnight for the last one followed by clearing using three changes of xylene, 2 hours at each and infiltration using three changes of paraffin, 30 minutes in each. The paraffin embedded tissues were cut into 5 micron thick section using rotatory microtome and stained with Harris's Haematoxylin and Eosin Y to facilitate microscopic study.

Results and Discussion

Gross observations

The results of this study revealed that grossly, all cutaneous lesions were exophytic (proliferating outwards) and these lesions of various sizes were mostly located on the head and neck, around eyes, under the chin and perineal region and sometimes spread other parts of the body in indigenous cattle (Figure 1).

Grossly, warts in cattle were bumpy or cauliflower-like masses of various sizes and numbers projected from the skin of the head and neck and around the whole body. The surface of a wart is usually grey, rough, scaly and dry. Occasionally, the upper area of the masses showed multifocal ulceration.

When incised, its cut surface revealed an external layer of keratinized epithelium and an internal core of moist white connective tissue (Figure 2a, 2b).

The clinical examination of the skin showed the warts take place indifferent sites of the body and this result agreed with Wosiacki *et al. 2006*, Radostitis *et al.* 2007, Sabine *et al.* 2008, Mansour *et al*. 2016. Also the presence of papillomas on the shoulder, neck and head, most commonly around the eyes and characterized by proliferative dry growth and horny cauliflower-like appearance which found similar to the result of Mehmet *et al.* 2012, Nenad *et al.* 2005, Mansour *et al*. 2016.

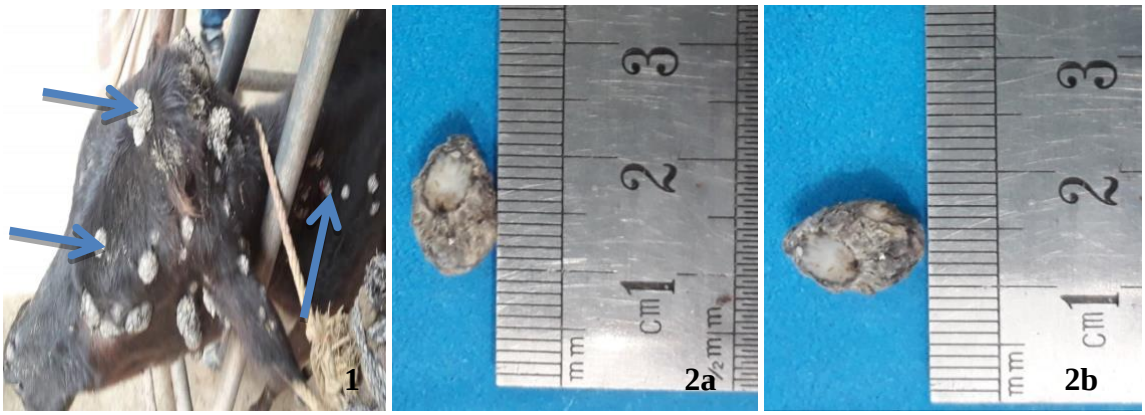

Figure 1: Gross appearance of masses. Many cauliflower-like cutaneous warts in head, around the eye and shoulder region (Blue arrow); **Figure 2a, 2b:** The surface of the cauliflower like growth is rough and dry. It's cut surface reveals an external layer of keratinized epithelium and an internal core of moist white connective tissue.

Microscopic observations

In this research, the results of histopathological changes of the affected skin included

- Presence of thickened epidermis (A) and all the layers of epidermis showing hyperplastic feature (stratum corneum-a, stratum granulosum-b, stratum spinosum-c, stratum basale-d) (Figure 3).
- The microscopic feature also characterized by the proliferation of squamous epithelial cells arranged in finger like projections and the stratum corneum was markedly widened by orthokeratotic hyperkeratosis (Figure 4).
- Presence of fibrovascular areas (Figure 5) within the epidermal layer was also found.
- The result also showed presence of elongated rete pegs penetrating in prominent dermal fibrous tissue (Figure 6).
- The nucleus of the most keratinocytes surrounded by a clear hollow (Figure 7).
- The stratum granulosum layer showed keratohyalin granules and koilocytes (Figure 8).

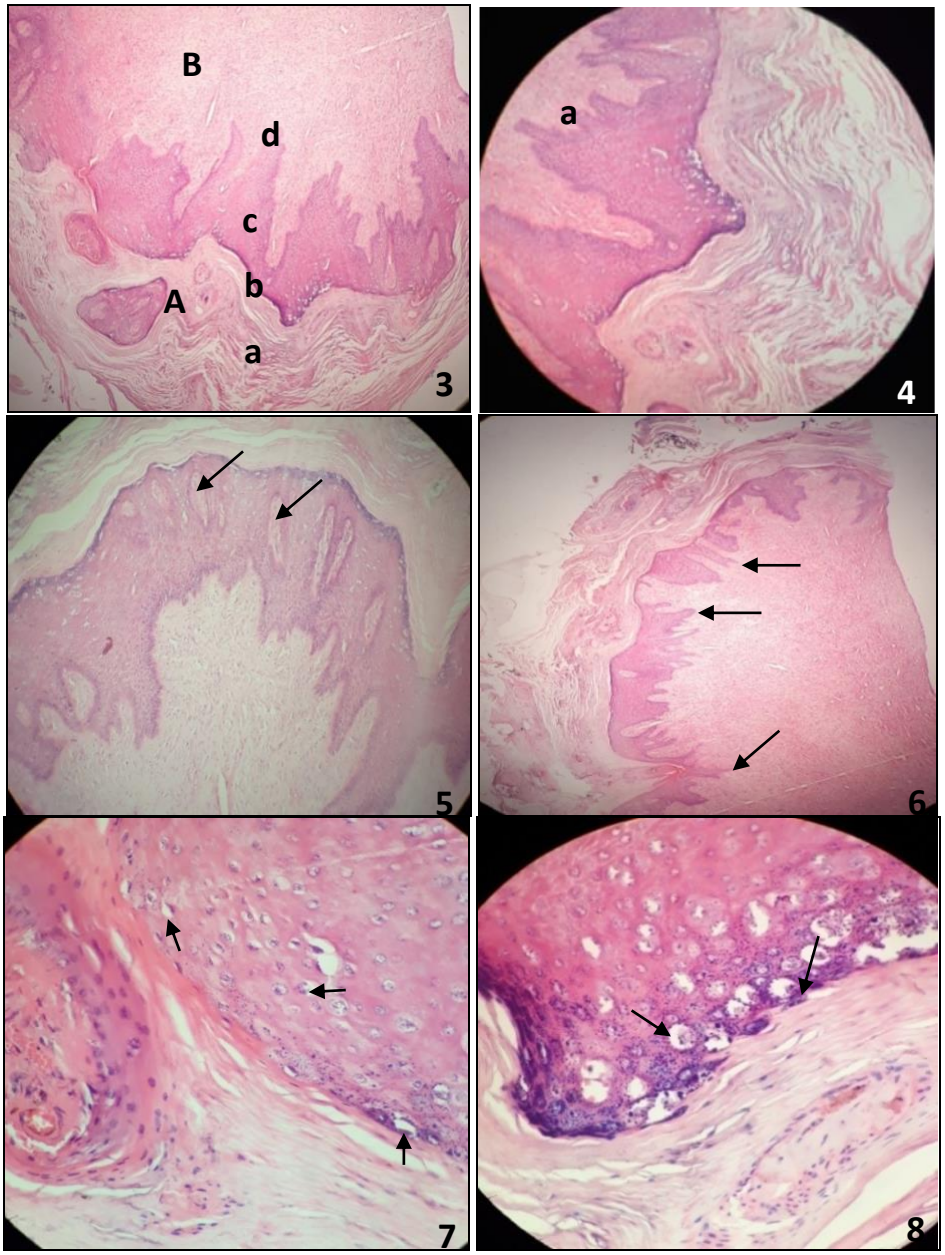

Figure 3: Epidermis (A), dermis (B); stratum corneum (a), stratum grnulosum (b), stratum spinosum (c), stratum basale (d); **Figure 4:** Proliferation of squamous epithelial cells and orthokeratotic hyperkeratosis of stratum basale (a); **Figure 5:** Presence of fibrovascular areas (arrow) within epidermal layer; **Figure 6:** Elongated rete pegs penetrating in prominent dermal fibrous tissue (arrow); **Figure 7:** The nucleus of the most keratinocytes surrounded by a clear hollow (arrow); **Figure 8:** Clumped stratum granulosum with keratohyalin granules of different sizes and koilocytes (arrow).

Histological analysis characterized by papilloma (exophytic) consisted of moderate to extensive degree of cornification (hyperkeratosis), proliferation of squamous epithelial cells arranged in finger like projections with presence of fibrovascular area; also hypergranulosis in the stratum granulosum were agreed with the findings of Tozato *et al.* 2013 and Araldi *et al.* 2014. Histologically, an active proliferation of anaplastic fibroblasts with large nuclei gives rise to a subcutaneous mass stretching the overlying epithelium.

Furthermore; there was marked acanthosis, keratohyalin granules of different sizes and koilocytes. The nucleus of the most keratinocytes surrounded by a clear hollow. All of these results are similar to the results explained by Claus *et al.* 2009, Mustafa *et al.* 2011.

Conflict of interest

The author declare no conflict of interest.

Conclusion

The common predilection site for cutaneous papillomatosis in indigenous cattle is head, neck, around eye, perineal region and sometimes may spread other parts of the body. The results of this present study might be useful for the diagnosis, classification and both for prophylactic and therapeutic treatment of this common malady based on its histological changes.

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