Pathomorphology and ethno-veterinary herbal intervention in an outbreak of turkey pox

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ABSTRACT


The present report describes clinical, pathological findings and successful ethno-veterinary herbal treatment of avian pox infection encountered in turkey poults in Tamil Nadu. Initially the turkey poults showed dullness, anorexia, emaciation, later with respiratory distress with 89.28% morbidity and 8% mortality. Lesions consisted of erosion initially, then crusted nodules of variable sizes were noticed on the unfeathered areas. Histopathological changes consisted of hyperplastic epithelium overlying with ballooning degeneration of keratinocytes, many of which had eosinophilic intracytoplasmic inclusion bodies (Bollinger bodies), and heterophilic infiltrations admixed with mononuclear cells extending into dermis. The mixture of medicinal plants were given both topically and orally. Leaves of Moringa oleifera and Azadirachta indica, seeds of Cuminum cyminum, Piper nigrum, cloves of Allium sativum, root/ rhizome of Curcuma longa were given orally. In addition, the above mentioned mixture was warmed in, neem oil (A. indica) and caster oil (Ricinus communis), camphor (Cinnamomum camphora) was mixed and used externally to control turkey pox. Following the herbal treatment, all the affected turkey poults recovered completely from pox, within 4 days. This investigation showed that the combination of various medicinal plants continues to play an important role in the healthcare system of poultry, even in acute infectious condition.

Keywords: Ethnoveterinary medicine, pathomorphology, turkey pox

INTRODUCTION

Avian pox (AP) is an infectious viral disease of worldwide distribution that affects different avian species including commercial poultry (e.g., chickens, turkeys) and free-living birds and caused by genus Avipoxvirus of the family Poxviridae. It is the most commonly reported disease in wild turkeys. The disease occurs in avian species and the causal agent has been classified as fowl, turkey, pigeon, canary and ostrich pox, according to the species from which it was first isolated.

Ethno-veterinary practice plays a vital role in the primary healthcare of livestock and poultry within the contexts of a traditional medical system to ensure therapeutical efficacy in ailing livestock and poultry. In order to control various poultry diseases and there by prevent high mortality rates, ethno-veterinary medical (EVM) practices in India and Africa. For the treatment of fowl pox, individual herbs such as leaves or the combination of different parts of herbs were given to the infected fowl. The present study, describes the clinical, pathomorphological studies and ethno-veterinary herbal intervention in an outbreak of turkey pox under field condition.

MATERIALS AND METHODS

An outbreak of turkey pox in a turkey farm was investigated. The affected turkey poults revealed nodular lesions in unfeathered areas such as head, face, leg etc. Post mortem examination was conducted in three poults and samples of skin lesions was fixed in 10% buffered formalin, processed under routine histopathological procedure and tissue sections were stained with haematoxylin & eosin stain for light-microscopic examination. For the treatment of turkey pox, combination of fresh parts of medicinal plants from ethno-botanical garden maintained by the local farmers were administered orally twice a day for four days successively. For every 10 turkey poults, the following herbal ingredients were used. Cumin seeds (Cuminum cyminum) -10 g, turmeric powder (Curcuma longa)-5g, black pepper (Piper nigrum)-5 numbers, garlic (Allium sativum) - 5 pulp, neem leaves (Azadirachta indica) -10 numbers, leaves of Moringa oleifera -30 grams and leaves of thulasi (Ocimum sanctum )-30 grams. They were ground as paste and the herbal medicinal mixture was administered orally at the rate of 2 g/ kg body weight. For external application of turkey pox affected poults, garlic cloves (Allium sativum) - 10 numbers; leaves of Ocimum sanctum, Moringa oleifera, Azadirachta indica50 gram each, turmeric powder (Curcuma longa)-10 g, camphor (Cinnamomum camphora) -5 g and seeds of Cuminum cyminum -20 g were mixed and ground well . The ground herbal mixture was warmed with 100 ml of castor oil (Ricinus communis seed oil) and 100 ml of neem oil (A. indica seed oil ). The mixture of freshly prepared herbal medicinal paste was applied on pox lesions of skin twice a day for four days consecutively.

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RESULTS

Fifty out of fifty six turkey poults (aged 10 week) had small vesicles, on the head region. In severely affected poults, total closure of the eyes due to adhesion of eyelids was noticed. The turkey poults showed depression and ruffled feathers and emaciation due to reduced feed intake. A few poults showed laboured breathing. The disease spread slowly among the birds of fifty poults affected, four of them died within three days of showing clinical signs. The estimated morbidity and mortality were 87.5% and 8%, respectively.

Gross pathology: Turkey poults showed nodules, erosions and crust formation on head, eye lid, beak and legs. The face was swollen with closed eyelids. The vesicles which contained a yellowish serous fluid developed in to scabs as crust within nine days. The size of the nodules varied from 0.3 to 0.8 cm in diameter (Figs. 1&2). The intestines revealed diffuse mucosal and serosal congestion or haemorrhages with mucus exudation.

Histopathology: Microscopic examination of the lesions revealed hyperplasia (acanthosis) and hypertrophy of the epithelium. The stratum spinosum layer revealed congestion, haemorrhages, heterophilic and lymphocytic infiltration and balloon degeneration. Various sizes of Bollinger bodies were noticed as intra cytoplasmic eosinophilic inclusion bodies which compressed the nucleus of the cell to a side (Fig. 3). The presence of eosinophilic inclusions in the cell cytoplasm made the cells necrotic among which heterophilic infiltration was observed.

In a few poults, the trachea revealed moderate hyperplasia of lining epithelium with eosinophilic inclusion bodies. The lumen of the trachea showed desquamated epithelial cells with mucus exudate. Severe infiltration of mononuclear cells, composed mainly of macrophages, lymphocytes and plasma cells was observed in lamina propria. Lungs revealed severe congestion and inter alveolar heterophilic infiltration. In advanced cases, lymphocytic infiltration with plasma cells and macrophages were recorded in the lining epithelium of trachea, bronchi and bronchioles. Disorientation of surface epithelium and sloughing were also noticed. In a few cases, mild to moderate fibrous tissue proliferation was noticed in the interstitium. More keratin layers were noticed on the top of the hyperplastic cells in the skin. Both small and large intestine showed diffuse congestion and haemorrhages with degeneration of enterocytes in the intestinal villi.

Ethno veterinary herbal treatment: All the affected birds recovered within four days without any secondary bacterial complication. On sixth day, scab formation and denudation of all the cutaneous nodular lesions in unfeathered areas was noticed without any secondary complications. On seventh day all the affected poults showed normal.

DISCUSSION

Morbidity and mortality recorded in this disease outbreak were 89.28% and 18%, respectively. Mortality is rare in cutaneous type of pox, however, when pox
virus infection spreads to the mucous membranes of the oral cavity and upper respiratory tract, or when the flock is affected with a secondary infections mostly in poor environmental conditions, mortality rates are usually higher in Bantams\(^5\), wild red-legged partridges (*Alectoris rufa*)\(^7\), white tailed Laurel-pigeons\(^13\) and chicken\(^14\). High mortality in the present investigation might be due to stress induced by transportation for a long distance during summer and possibly harboring the turkey pox infection sub-clinically from the previous farm. Over stocking of poults and intermixing of other avian species such as desi fowls and guinea fowls within a limited housing space would have aggravated the disease status.

In this case study, it was noted that hyperplasia and distension of epithelial cells containing cytoplasmic inclusion bodies led to ballooning degeneration and necrosis of the cells. Respiratory epithelial cell changes such as disorganization and sloughing observed in this study might be the result of the virus proliferation in the cells which is in concurrent with the results reported by various authors\(^14,15\).

Clinical observations, pathognomic histopathological findings confirmed the diagnosis of turkey pox disease. Proliferative and necrotic dermatitis were also noted in the affected poults. These lesions would have been predisposed by mosquitoes and lice which were found on the skin of poults under present investigation. The clinical signs, gross and histopathological lesions observed in the turkey poults resembled those described in avian pox in other avian species\(^2,3,16\).

Herbal remedies from traditional knowledge helped to control high incidence of poultry diseases including pox in poultry\(^7\). In ethno-veterinary medicine (EVM), the natural products, especially those of plant origin are generally used for the treatment and/or, in some cases, the prevention of disease\(^7\). Generally, the fresh part of the plant and or with other plant parts are used for the treatment of fowl pox\(^16,19\). For the treatment of fowl pox, individual herbs such as leaves of *Aloe excels*, oil of *Elaris guineensis*, oil of *Elaris guineensis*\(^7,8,9\) or the combination of different parts of herbs such as *Microglossa pyriforma* roots with *Agave sisalana* leaves and *Aloe* sp. leaves were given in drinking water to the infected fowl. To control the fleas, chopped or ground bulbs of *Allium sativum* is mixed in 4 litres of water and used as bird wash once daily until birds are free of lice\(^10\).

In the present study, on 4\(^{th}\) day of outbreak the ethno-veterinary herbal treatment was started. On sixth day, scab formation and or denudation of all the cutaneous nodular lesions in unfeathered areas was noticed without any secondary complications. On seventh day all the affected poults appeared normal and no other spread of disease was noticed neither in the same species nor in other. The quick healing of the disease in the turkey flock could possibly due to the combination of many herbal ingredients which showed additive and synergistic effect to cure the disease in the present investigation\(^20,21,22\). Antianalgesic activity in muscle and joint by *Ricinus communis* L. oil have been reported which might have helped in the healing of pox lesion in turkeys poults\(^22\).

The results of the present study provide evidence that pathology, early diagnosis and control of turkey pox with the combination of various locally available medicinal plants continues to play an important role in the healthcare system of poultry.

REFERENCES


