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Histopathological alterations in brains of rabies infected buffaloes and cattle

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ABSTRACT: The quantitative study of histopathological alterations in the nervous tissues of 47 rabid buffaloes and 23 rabid cattle, it was found that there were certain similarities and significant differences in the histopathological alterations in various nervous tissues of these two species - that were often over looked. Whereas there was significant detection of Negri bodies in cerebellum both in cattle (91.3%) as well as in buffaloes (85.1%), however, in case of cerebrum, significant presence of Negri bodies was found only in buffaloes (65.95%) than in cattle (13.0%). Thus, in case of non-availability of cerebellum, Negri body detection could be attempted only in buffalo while it would not be reliable approach in cattle. However, reactive inflammatory response was more consistently present in brainstem than in cerebrum and cerebellum of rabid buffaloes and cattle. Similarly, malacia was more consistent finding in buffaloes (51.6%) than in cattle (26.08%).

Key words: Rabies, Buffalo, Cattle, Histopathology.

INTRODUCTION - Rabies virus infection leads to fatal disease condition, by primarily affecting the brain in buffaloes and cattle. In case of bovines, inflammatory changes are usually present but, notably, may be mild. Intracytoplasmic eosinophilic inclusion bodies in Purkinje cells of cerebellum of bovines (Negri bodies) are considered as pathognomonic finding of rabies. Among the bovines, histopathological changes due to Rabies virus in nervous tissues have been qualitatively reported but have been seldom analysed quantitatively. Also, fewer attempts have been done to quantify the histopathological changes in brains of rabid buffaloes. Hence, present study was undertaken to compare and record quantitatively the histopathological alterations in various parts of brain of naturally infected rabid buffaloes and cattle.

MATERIAL AND METHODS - A total of 47 cases of natural rabies in buffaloes and 23 cases in cattle were diagnosed positive for rabies by employing nervous tissue impression smear examination, direct Fluorescent Antibody Technique on nervous tissue impression smears and histopathological examination of cerebrum, cerebellum and hippocampus and brain stem.

RESULTS AND CONCLUSIONS - Cerebellum of rabid buffaloes: Histopathological changes in cerebellum of rabid buffaloes revealed, neuronal necrosis in all the 47 samples (100%), satellitosis in 19% samples (9/47), gliosis in 31.9% samples (15/47); neuronophagia in 46.80% samples (22/47) and congestion in 76.59% samples (36/47) were observed. Whe-

reas edema, and perivascular cuffing was observed in 57.4% samples (27/47). Hemorrhage, meningitis and malacia were seen in 27.65% samples (13/47), 53.19% samples (25 /47) and 23.4% samples (11/47) respectively. Negri bodies were detected in Purkinje cells in 85.1% samples (40/47). The above alterations have been qualitatively reported by earlier workers (Jubb and Huxtable, 1996). **Cerebrum of rabid buffaloes:** Out of 47 samples of cerebrum of rabid buffaloes, neuronal necrosis, neuronophagia and congestion were observed in all the 47 samples (100%). Whereas, edema and gliosis were present in 85.1% samples (40/47). In other changes satellitosis in 57.4% samples (27/47), hemorrhage and meningitis in 27.65% samples (13/47) were observed. Perivascular cuffing was observed in 72.3% samples (34/47). Negri bodies were detected in 65.95 % samples (31/47). Malacia was present in 51.06% samples (24/47) as reported earlier (Singh and Grewal, 1998).

Brainstem of rabid buffaloes: Out of 47 samples of brainstems from rabid buffaloes, neuronophagia, Babe's nodules, perivascular cuffing and edema were observed in all the samples. Satellitosis, hemorrhage, malacia and congestion were noted in 74.4% samples (35/47). Whereas, meningitis was present in 25.5% samples (12/47). Negri bodies were not detected in any of the samples. Other researchers (Singh and Grewal, 1998) have reported the presence of these histopathological alterations.

Cerebellum of rabid cattle: Histopathological changes in cerebellum of rabid cattle revealed neuronal necrosis in all 23 samples. Whereas, satellitosis and meningitis were seen in 26% (6/23) samples. Gliosis, edema, congestion and malacia were present in 52.17% (12/23) samples, 78% (18/23) samples, 82.6% (19/23) samples and in 21.7% (5/23) samples respectively. Perivascular cuffing was present in 52.17% (12/23) samples. Negri bodies were present in 91.3 % (21/23) samples. Earlier researchers have cited presence of non-suppurative meningoencephalitis and Negri bodies in Purkinje cells in case of cattle (Theil et al, 1998).

Cerebrum of rabid cattle: Neuronophagia, congestion and neuronal necrosis were noted in all 23 samples of cerebrum of rabid cattle. Hemorrhages, meningitis and malacia were noted in 26.08% (6/23) samples; gliosis and edema were present in 86.9% (20/23) samples; satellitosis and Negri bodies were noted in 56.5% (13/23) samples, and 13% (3/23) samples respectively. Perivascular cuffing was noted in 69.5% (16/23) samples. Other researchers (Salem et al, 1995) found hemorrhagic lymphocytic meningoencephalitis along with Negri bodies in cerebrum of cattle.

Brainstem of rabid cattle: Neuronal necrosis, gliosis (Babes' nodules), edema, congestion, and hemorrhage were recorded in all 23 samples of brainstems of rabid cattle. Neuronophagia and malacia were seen in 60.8% (16/23) samples. Satellitosis was seen in 43.4% (10/23) samples. Whereas, Negri bodies and meningitis were not seen in any of the samples, perivascular cuffing was present in 78% samples (18/23) . Absence of meningitis could be attributed to complete peeling off of the meninges surrounding mid brainstem structure while collecting the specimen. The histopathological alterations are in agreement with those of earlier workers (Sullivan, 1985).

Comparison of histopathological alterations in brains of buffaloes and cattle: Comparison of histopathological alterations in cerebellum revealed that Negri bodies were detected in more proportion in cattle (91.3%) than in buffaloes (85.1%), but the difference in proportions is statistically non-significant. Similarly, buffaloes and cattle revealed neuronal necrosis in equal proportion (100%) in both the species. However, Negri bodies were found in significantly more proportion in cerebrum of buffaloes (65.95%) than in cerebrum of cattle

(13.0%). Similarly, malacia in cerebrum was more consistent finding in buffaloes (51.6%) than in cattle (26.08%) whereas neuronal necrosis and congestion were found in equal consistency in cerebrum of both the species. In case of brainstem, buffaloes and cattle revealed equal proportion (100%) of neuronal necrosis and gliosis in both species.

It was found that there were certain similarities and significant differences in the histopathological alterations in various nervous tissues of these two species - that were often overlooked. Rabies virus causes non-suppurative meningoencephalitis in buffaloes as well as in cattle. Neuronal necrosis, gliosis (Babes' nodules), edema, hemorrhages and perivascular cuffing, which are the reactive inflammatory changes, are found most consistently in brainstem region followed by cerebrum and least in cerebellum of buffaloes as well as cattle. Negri bodies, the pathognomonic lesion of Rabies are most consistently found in cerebellum, followed by cerebrum of buffaloes and cattle.

There exists a significant difference in proportion of distribution of Negri bodies in cerebrum of buffaloes and cattle. Cerebellum should be the tissue of preference for diagnosis of rabies in case of cattle and buffaloes by histopathological examination. In case if cerebellum is not available the second preference should be given to cerebrum in case of buffaloes. The tissue sample of only brainstem alone has little or no significance in diagnosing rabies using routine histopathological examination.

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