Active and passive surveillance of bovine spongiform encephalopathy in Bangladesh

Shukla Halder, Emdadul Haque Chowdhury*, Rokshana Parvin, Mohammad Moshiiyur Rahaman, Seikh Masudur Rahman, Shib Shankar Saha, Sajeda Sultana, Nadira Marium, Azharul Islam, Md. Siddiqur Rahman¹, Hee-Jong Song²

Department of Pathology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh
¹Department of Medicine, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh
²Department of Infectious Diseases, College of Veterinary Medicine, and Korea Zoonoses Research Institute, Chonbuk National University, Jeonju 561-756, Korea

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Abstract

The aim of the present study was to investigate whether Bovine Spongiform Encephalopathy (BSE) is present in this country and to analyze the Global BSE Risk (GBR) status in Bangladesh. A total of 2,000 brain samples were collected from cattle older than 30 months of age, slaughtered for human consumption in the district slaughter houses from 2005 to 2006. The brainstem (obex), Pyriform lobe, cerebrum and cerebellum were subjected to histopathological study. Samples that showed some nonspecific lesions were subjected to immunohistochemistry and only brain stem to ELISA for the detection of abnormal prion protein PrP⁰. In passive surveillance, annual overall diseases of cattle, buffalo, sheep and goats in Bangladesh were collected from Department of Livestock Services (DLS), Dhaka to investigate the occurrences of neurological diseases. Import related data were collected from “National Export Promotion Bureau” Kawran Bazar, Bangladesh Bank and DLS to analyze the importing products of animal origin (cattle, buffalo, sheep and goats) from different countries to find whether or not the imported products posed any risk for the BSE. In an active surveillance conducted in slaughter house, histopathologically BSE specific lesions were not detected in any of the brain samples, but other nonspecific lesions were observed. No PrP⁰ was detected from the samples by immunohistochemistry and ELISA. DLS report also supported the absence of BSE in cattle and buffalo and scrapie in sheep and goats in Bangladesh. It was also clearly recorded that Bangladesh imported livestock products from countries in GBR level I and II but not from countries in GBR level III and IV. From this study it apparently seems that BSE is not currently present in the indigenous animals in Bangladesh and poses no or negligible risk to human and animal health.

Key words: Bovine spongiform encephalopathy (BSE), Histopathology and immunohistochemistry, Brain tissues, Active and passive surveillance

INTRODUCTION

Bovine Spongiform Encephalopathy (BSE), commonly known as “Mad cow Disease” is a transmissible neurodegenerative diseases of cattle over 30 months of age (Wells et al, 1987). BSE was first observed in Great Britain in April 1985 and was officially diagnosed in November 1986 (Wells et al, 1987; Kimberlin, 1992). BSE belongs to the group of Transmissible Spongiform Encephalopathies (TSEs), together with scrapie of sheep, a chronic wasting disease of free-ranging and captive deer and elk, feline spongiform encephalopathy and
Creutzfeldt-Jakob disease (CJD) and Kuru of humans (Gabizon and Prusiner, 1990; Prusiner 1991; Weis-ssmann, 1991a, 1991b). The disease has a causal link with an old disease “Scrapie” which has been prevalent in sheep for over 200 years (Almond and Pattison, 1997; Chowdhury, 2005). Most scientific evidence suggests that prions are the causative agent of BSE (Prusiner, 1982). Transmission of BSE is thought to primarily occur through ingestion of feedstuff, especially ruminant-derived meat-and-bone meal (MBM), contaminated with the BSE agent (Wilesmith et al, 1992; Wilesmith et al, 1988). BSE was linked with a human disease “Varient Creutzfeldt-Jakob Disease” (vCJD) linked to humans eating of contaminated beef products infected with BSE. Most of the developed coun-tries of the world impose restriction on importation of livestock products. The developed countries want to know the status of BSE surveillance in the exporting country prior to export to exclude the risk of BSE (Prusi-ner, 2000; Vanopdenbosch and Roels, 2004; Chowd-hury, 2005).

Bangladesh is a Muslim populated country. So beef-meat is very popular in this country. Various commodities produced from livestock by-products (e.g. bone, hoofs, horn, gelatin) was also exported to different countries of the world.

Although Bangladesh is free from BSE, it is not recognized by other countries due to the lack of official BSE surveillance. For this reason nationwide official surveillance program is required. This study reports a pilot surveillance of BSE in Bangladesh.

MATERIALS AND METHODS

Study area

Study was conducted in three districts slaughter houses of Bangladesh namely Dhaka (Centre of the country), Mymensingh (North east) and Barishal (South east).

Collection of samples

A total of 2,000 brain samples were collected from cattle older than 30 months of age, slaughtered for human consumption. Out of 2,000 samples 1,000 samples from Dhaka, 500 samples from Mymensingh and 500 samples from Barishal. The brainstem (obex), Pyri-form lobe, pieces of cerebellum and cerebrum were collected for histopathology and immunohistochemistry and the brainstem (obex) alone for ELISA.

Transportation and storage of samples

The samples after collection was kept in ice box containing sufficient amount of dry ice packs. The samples for histopathology and immunohistochemistry were kept in 10% neutral buffered formalin and the samples for ELISA were kept in \(-20^\circ C\) until use.

Histopathology

The formalin fixed sections were trimmed, processed, paraffin-embedded, sectioned and were routinely stained with Hematoxylin and Eosin (H and E) as per standard procedure (Luna, 1968).

Immunohistochemistry

Immunohistochemistry was done by Labelled Streptavidin-Biotin (LSAB) Method using: DAKO Chem-Mate™ detection kit. Anti PrPsc monoclonal antibody (mAb 6H4) a mouse IgG1 subtype antibody: Light chain: K subtype with a dilution of 1 : 800 (Prionic AG, Switzerland) was used. The reaction was visualized using the AEC. Parallel negative and positive controls were run in each time. The formalin fixedpositive control was collected from Institute of Veterinary Pathology, University of Zurich, Switzerland.

ELISA

Samples that showed some non-specific lesions were subjected to ELISA and were done by the BetaPrion® BSE EIA test kit (Roboscreen, Germany) which consists of two modules, the BetaPrion® BSE Purification Kit, which includes the purification tools and the Beta Prion® BSE Detection Kit, which is based on a sensitive ELISA.