ABSTRACT

The present study on impact of abiotic stresses on genome profile of Sahiwal, Tharparkar, Kankrej breeds of *Bos indicus* and Murrah, Nili-Ravi buffalo of *Bubalus bubalis* was conducted to assessment of adaptability of indigenous breeds under tropical climatic conditions of northern India. The study was conducted on one hundred seventy five heifers selected from an organised herds of National Dairy Research Institute, Karnal, Rajasthan Agricultural University of Veterinary Animal Sciences, Bikaner, Central Institute of Research on Buffalo, Hisar and CIRB, Nabha, Punjab regional station. After collection of blood and all physiological parameters i.e. Body temperature, Rectal Temperature, Pulse rate, Respiration rate of each animal lymphocyte culture for chromosome preparation and total RNA isolation for gene expression experiment were performed. The cytogenetic markers i.e. chromosomal gaps, breaks and sister chromatid exchanges were evaluated for assessment of genome instability of different breeds of cattle and buffalo under arid and semi-arid regions. During present study the chromosomal breaks, gaps and sister chromatid exchange were significant higher in both breeds of cattle and buffalo of semi-arid region. The transcriptional studies indicated the genes (*HSP70.1, HSP70.2, HSP70.8, HSP90, HSP40, HSP10 and HSF1*) were up regulated during summer season in both species of cattle and buffalo compare to winter and control season. During summer season the expression level of all *HSP*’s genes were higher in Murrah buffalo compare to Sahiwal and Tharparkar cattle. *HSP 70.1, 70.2, HSP40, HSP10* was significant higher expressed during summer season whereas the expression of *HSP90 and HSP70.8* were higher non-significant expressed in lymphocytes all breeds of zebu cattle and buffalo during summer season. The expression of Hsp’s gene in the lymphocytes of Tharparkar breed of cattle were lower expressed in all seasons compare to Sahiwal cattle. The concentration of plasma cortisol, T3 and T4 concentration were lower in Tharparkar and Kankrej breeds compare to Sahiwal, Murrah and Nili-Ravi buffalo. The physiological responses (RR, PR, RT and body temperatures) were also lower recorded in Tharparkar and Kankrej breed under arid region. All breeds of cattle and buffalo differences in cellular stress markers, cortisol, T3, T4, *HSP70.1, 70.2, HSP90, HSP40, HSP10, HSF1*, chromosomal aberration, gaps, breaks, sister chromatid exchange, physiological responses to thermal stress and other abiotic stresses. These differences are important for adaptation of indigenous breed cattle and buffalo under arid and semi-arid regions of Northern India in context to climate change. From present study, it may be concluded that Tharparkar and Kankrej breed of cattle are more adapted in very harsh climatic condition of arid region compare to breeds of semi-arid region.