Modelling the immunopathophysiology of Brucella melitensis and its lipopolysaccharide in mice infected via oral route of exposure

ABSTRACT

Brucella melitensis is one of the leading zoonotic pathogens with significant economic implications in animal industry worldwide. Lipopolysaccharide, however, remains by far the major virulence with substantial role in diseases pathogenesis. Nonetheless, the effect of B. melitensis and its lipopolysaccharide on immunopathophysiological aspects largely remains an enigma. This study examines the effect of B. melitensis and its lipopolysaccharide on immunopathophysiological parameters following experimental infection using mouse model. Eighty four (n = 84) mice, BALB/c, both sexes with equal gender distribution and 6-8 weeks-old were randomly assigned into three groups. Group 1–2 (n = 72) were orally inoculated with 0.4 mL containing 109 CFU/mL of B. melitensis and its LPS, respectively. Group 3 (n = 12) was challenged orally with phosphate buffered saline and served as a control group. Animals were observed for clinical signs, haematological and histopathological analysis for a period of 24 days post-infection. We hereby report that B.melitensis infected group demonstrated significant clinical signs and histopathological changes than LPS infected group. However, both infected groups showed elevated levels of interleukins (IL-1β and IL-6) and antibody levels (IgM and IgG) with varying degrees of predominance in LPS infected group than B. melitensis infected group. For hormone analysis, low levels of progesterone, estradiol and testosterone were observed in both B. melitensis and LPS groups throughout the study period. Moreover, in B. melitensis infected group, the organism was re-isolated from the organs and tissues of gastrointestinal, respiratory and reproductive systems thereby confirming the infection and transmission dynamics. This report is the first detailed investigation comparing the infection progression and host responses in relation to the immunopathophysiological aspects in a mouse model after oral inoculation with B. melitensis and its lipopolysaccharide.

Keyword: Brucella melitensis; Lipopolysaccharide; Immunopathophysiology; Oral route of infection; Mouse model