

Study on Host-Pathogen Interactions of *Listeria Monocytogenes* in Cell Culture, *Galleria Mellonella* and Mice

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Abstract:

In the present study, 23 putative *Listeria* isolates obtained from different sources, viz. food, animal, human, caterpillar and mosquito, were initially identified by MALDI-TOF MS. Confirmed *Listeria monocytogenes* isolates were subjected to serogrouping, most of them belonged to 4b serogroup. PCR was used to amplify *isp* and *prfA* genes for genus and species identification, while virulence profiling was performed by amplifying *plcA*, *hlyA*, *actA*, *prfA*, *inlC*, *inlJ*, *luxS*, and *fla* genes. All strains harbours virulence genes irrespective of origin. On biofilm formation assay, 11 isolates (47.8261%) were moderate followed by 10 strong (43.4783%) and 2 weak (8.69566%) biofilm producer. On basis of biofilm producing ability of isolates one strong, moderate, weak biofilm producer and two isolates from non-vertebrate source along with one standard strain (MTCC-1143) were taken into consideration for comparative study of *L. monocytogenes* between non-vertebrate and high vertebrate host/animals.

While performing experiments 7 groups were included viz., A, B, C, D, E, F and G comprising of Group B was challenged with MTCC strain of *L. monocytogenes*. In contrast, Group C, D, E were challenged with strong, moderate, weak (animal origin isolate) biofilm producer isolate and Group F and G were challenged with non-vertebrate origin isolate (mosquito and caterpillar). At the same time, Group A was served as control. In- vitro cell culture assay the level of cytokines revealed that there was increased expression of IL-6 there was severe upraise in expression during initial hours of infection in all groups by IL-6, IFN- γ and Cyt-C cytokines this might have achieved due to increased infection i.e increased septicemia during the initially phases of infection. On cell plaque assay, Group F and Group G (non-vertebrate) significantly produced larger size plaque while the moderate size plaques were produced by Group C.

Galleria mellonella a wax moth larvae was used as a non-vertebrate host for studying the pathogenesis in the present study. Total 150 larvae were included. Survival analysis showed that high biofilm groups showed poor survival (less than 20%) while low biofilm group showed good survival. On histopathological examination, maximum lesions were observed in high biofilm production Groups.



Swiss albino mice (n=160) were used as the vertebrate host for studying pathogenesis. The CFU results revealed that at 48 hrs of interval highest bacterial load was recorded in Group F and C. Increased cytokines levels were observed in Group D and G indicating the role of protective immunity against bacterial infection. The mRNA cytokine estimated in both the liver and spleen revealed similar result as that obtained by the in-vitro cell culture. While on histopathological examination maximum changes were observed in all groups during 24 to 72 hrs of interval in liver, spleen and brain.

Hence from the study it could be concluded that the severity of infection depends upon the nature of the biofilm forming ability of the bacteria.

Keywords:

Biofilm, cytokines, immunity and serogrouping.