



Abstract

Lysine decarboxylases are expressed in *Enterobacteriaceae* under conditions of low external pH with excess of lysine and anaerobiosis in the presence of their various amino acid substrates. One bacterial locus which is responsible for the decarboxylation of lysine and has been extensively studied in *E. coli* is *cad*. It consists of three genes. *cadA* encodes lysine decarboxylase, *cadB* acts as lysine-cadaverine antiporter and *cadC* acts as a positive regulator for the expression of *cadBA* through sensing signals induced by low pH and excess lysine. *cadA* participates in pH homeostasis by converting externally supplied lysine to cadaverine, an alkaline product that, when secreted by the cell, aids to neutralize the acidic environment.

In the current study, locally isolated culture of *Klebsiella pneumonia* was taken from the Cell and Molecular Biology Lab, Department of Zoology, GC University, Lahore. The *cadA* gene of *K. pneumoniae* was amplified by the PCR technique using the already gene specific primers. Analysis of amplified product showed the product size of 2100 bp. The PCR product was ligated in the pTZ57R/T cloning vector and then transformed into the *E. coli* DH5 α competent cells. The isolated recombinant pTZ57R/T plasmid was sent for sequencing. Lysine decarboxylase having polypeptide chain of 715 amino acids. BLAST results and phylogenetic analysis showed 99% homology with already reported *cadA* protein of *K. pneumoniae*. Structural analysis was performed by using I-Tasser software. Secondary structure showed that this protein has 25 α -helix, 31 β -pleated sheets and 33 random coils. Tertiary structure of this enzyme is globular which exist in decameric form. It consists of three domains: N-Terminal Wing domain, C-Terminal domain and the Core domain. The core domain is divided into further two subdomains. PLP-dependent sub-domain and Subdomain 4. PLP-dependent sub-domain plays in important role in the binding of cofactor Pyridoxal- 5'- phosphate that converts lysine into cadaverine through conformational changes. Hydropathy plot showed that *cadA* is a cytoplasmic protein.