## Structure and function of a novel cold regulated cold shock domain containing protein from an obligate psychrophilic yeast, Glaciozyma antarctica

## ABSTRACT

Cold shock domain (CSD)-containing proteins are one of the groups of the evolutionarily conserved nucleic acid-binding proteins in all three domains of life consisting of an ancient beta-barrel fold that serves to bind nucleic acids. The cDNA of a novel protein-coding gene containing CSD was cloned from Glaciozyma antarctica designated as Ga16676. The full length of Ga16676 gene with the size of 1335 bp encodes for an N-terminal CSD with conserved nucleic acids binding motif RNP1 and RNP2. The Ga16676 gene was cloned in pET30 Ek/LIC, sequenced, expressed and its resistance towards cold was characterized. Recombinant protein expression of Ga16676 showed overexpressed soluble expression in both supernatant and pellet forms at 20. The effects of recombinant CSD °C protein overexpression on colony formation shows that E. coli cells were able to grow at 37 and 20 but not at 4 while °C°C °C E. coli\_Ga16676 cells were able to grow at all temperatures tested. In addition, E. coli\_Ga16676 cells showed higher growth rate compared to empty E. coli cells at 10. Structural analysis of °C Ga16676 reveals some interesting findings such as more aromatic interactions for efficient binding in low energy environment, a longer loop that may contribute to structural flexibility and clustering of charged amino acids on the protein surface that is important for protein stability and flexibility.