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Effect of Media Osmolarity on Vi Biosynthesis on Salmonella enterica serovar Typhi Strain C6524 Cultured on Batch System

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Abstract : Typhoid fever disease can be prevented by using a polysaccharide-based vaccine Vi which is a virulence factor of S.typhi. To produce high yield Vi polysaccharide from bacteria, it is important to know the biosynthesis of Vi polysaccharide and the regulators involved. In the In vivo condition, S. typhi faces different osmolarity, and the bacterial two-component system OmpR-EnvZ, regulate by up and down Capsular Vi polysaccharide biosynthesis. A high yielded Vi Polysaccharide strain, S. typhi strain C6524 used to study the effect of media osmolarity on Vi polysaccharide biosynthesis and the osmoregulation pattern of S. typhi strain C6524. The methods were performed by grown S. typhi strain C6524 grown on medium with 50 mM, 100 mM, and 150 mM osmolarity with the batch system. Vi polysaccharide concentration was measured by ELISA method. For further investigation of the osmoregulation pattern of strain C6524, the osmoregulator gene, OmpR, has been isolated and sequenced using the specific primer of the OmpR gene. Nucleotide sequence analysis is done with BLAST and Lallign. Amino Acid sequence analysis is done with Prosite and Multiple Sequence Alignment. The results of cultivation showed the average content of polysaccharide Vi for 50 mM, 100 mM, and 150 mM osmolarities 11.49 µg/mL, 12.06 µg/mL, and 14.53 µg/mL respectively. Analysis using Anova stated that the osmolarity treatment of 150 mM significantly affects Vi content. Analysis of nucleotide sequences shows 100% identity between S. typhi strain C6524 and Ty2. Analysis of amino acid sequences shows that the OmpR response regulator protein of the C6524 strain also has a α4-β5-α5 motif which is important for the regulatory activation system when phosphorylation occurs by domain kinase. This indicates that the regulator osmolarity response of S. typhi strain C6524 has no difference with the response regulator owned by S. typhi strain Ty2. A high Vi response rate in the 150 mM osmolarity treatment requires further research for RcsB-RcsC, another two-component system involved in Vi Biosynthesis.

Keywords : osmoregulator, OmpR, Salmonella, Vi polysaccharide
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