Abstract:

Background:

Cellulose, the major component of plant cell wall, is the most abundant and cheap polymer on earth. It can be efficiently used by varieties of cellulolytic enzymes. Cellulases can hydrolyze cellulose to its glucose monomers which can be fermented to many biotechnological products such as biochemicals, bioplastics, and biofuels. Actinomycetes are potential sources of cellulases.

Objective:

The current study shed light on the cellulolytic activity of *Thermobifida cellulosilytica*, a previously isolated thermophilic actinomycete. In addition to analysis of the lignocellulases produced in the secretome as a result of induction by different carbon sources.

Methods:

The cellulolytic activity was qualitatively confirmed by Congo red method showing a large halo zone around the colonies. The activity was also assayed using the 3,5-dinitrosalicylic acid (DNS) method. The secretome analysis was conducted by liquid chromatography tandem mass spectroscopy (LC-MS/MS) based proteomic approach.

Results:

The cellulolytic activity increased by two folds upon growth of *T. cellulosilytica* on rice straw (RS) as a complex substrate comparatively to carboxymethylcellulose (CMC) as a simple one. Actually, these results were highly assured by LC-MS/MS. Where, more proteins (n=31) were produced in the RS secretome unlike CMC which produced only six proteins including only one cellulase. The different classes of proteins produced in the RS secretome were cellulases (26%), hemicellulases (16%), proteases (10%) and others (48%).

Conclusion:

Lignocellulases are inducible enzymes. RS as a complex substrate induced *T. cellulosilytica* for expression of more lignocellulolytic enzymes than CMC.