

Characterization of bacterial crude lactase isolated from Jordan habitats (Milk whey)

Nadine M. Amara* and Basem F. Dababneh

Department of Nutrition and Dietetics, Faculty of Health Sciences, American University of Madaba

* Correspondence author; E-Mail: n.omara@aum.edu.jo

Background: Lactose intolerance is the inability or insufficient ability to digest lactose, a sugar found in milk and milk products. Lactose intolerance is caused by a deficiency of the enzyme lactase (β -galactosidase).

Primary lactase deficiency cause develops over time and begins after about age 2 when the body begins to produce less lactase. Secondary lactase deficiency cause results from injury to the small intestine that occurs with (severe diarrheal illness, celiac disease, Crohn's disease, or chemotherapy).

Adult primary lactase deficiency (or preferably lactase non-persistence) is widely distributed in the world. It is estimated that about 70% of the world population demonstrate 100% lactase non-persistenceAsians (Chinese, Korean, Japanese, and Filipinos) andNegroes demonstrate 100% lactase non-persistence, Egyptians 90% and the Arabs in general demonstrate 81%. Since the geographical distribution of lactase persistence parallels the parts of the world where traditionally milk was a part of the diet (since 4000 BC).

Importance: thisstudy has the impact on the health, environment, industry and technology of food.

The enzyme can solve a worldwide-distributed disorder the Lactose Intolerance and it is important to find a treatment for this disorder because it is associated with many other health problems such as the calcium deficiency and other problems associated with the disease symptoms.Lactase enzyme health benefits such as: Alleviation of Lactose Intolerance, Protection against Gastrointestinal Infection, Anti-carcinogenic Effect, Immune System Stimulation, Lowering of Serum Cholesterol, Alleviation of Constipation, and Antiallergenic Qualities.

People with lactose intolerance should follow lactose free or reduced diet according to the individuals' tolerance and consume fermented dairy products. As well could be treated by lactase liquid enzyme or in tablets.

Many organisms naturally synthesize β -galactosidase, products obtained from these organisms are generally recognized as safe (GRAS status) for human consumption.

A few studies were carried out on this aspect in Arab countries. It is important to create a study to find natural microorganisms in our habitat producing efficient lactase enzyme especially in whey milk as cheap and economic growth media, instead of switching it as a waste and environment pollutant. Thus innovation of natural lactase enzyme from microorganisms will be the goal of this research.

Objectives: To explore the importance of β -galactosidase enzyme, and to solve health disorders such as lactose intolerance by finding new cheap microbial sources of lactase, from our habitat that has not been studied before. In the addition, the most important goal is to determine and characterize natural lactase produced from biological agent.

Methodology: primarily the method of Rosenthal (1987) where carried out to determine whether the bacterial isolates producing the enzyme and catalyze lactose to glucose and galactose by the addition of the substrate ONPG (o-nitrophenyl-beta-galactopyranoside). Samples are incubated for 30 minutes, during which time the beta-galactosidase hydrolyzes the colorless substrate to o-nitro phenol, which is yellow. The reaction terminated by addition of sodium carbonate, and the absorbance is read at 420nm with a spectrophotometer.

Microorganisms are considered potential source of β -galactosidase for industrial applications. Characterization of crude lactase enzyme by hydrolyzing lactose, measuring enzyme-catalyzed reaction rates and concentrations of glucose was measured also by spectrophotometric method. As well as lactose concentration and pH.

Results: Bacteria isolated from the whey has been already identified at a gene level (PCR) coded A9. This study shows that this strain was able to produce a remarkable crude enzyme of lactase. In the addition it has been shown that lactose has digested to

Glucose and Galactose by increasing the lactose concentration, the Glucose production increased.

Lactase consumption by the isolate increases after two to three hours and also increased by increasing the lactase concentration from 10%-50%. In the addition, glucose formation gave the same trend, by increasing lactose concentrations glucose formation will increase. In parallel the more consumption of lactose the pH decreases indicating fermentation process and production of glucose.

Conclusion: isolated strain of lactic bacteria from whey confirmed to has a lactase activity and the best parameters of the enzymatic activity were identified. These findings are very important of evaluating a natural enzyme, which could help in treatment of lactose intolerance. Furthermore work and research is needed to run a research at a large scale in isolation, purification, and production of this enzyme, as well as processing for pharmaceutical production as capsules and tablets.