

EFFECT OF ENZYMATIC HYDROLYSIS BY ALCALASE ON THE IRON-BINDING ACTIVITY OF CHICKPEA PROTEIN

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Iron deficiency is one of the most common nutritional deficiencies worldwide. Although conventional iron supplements can increase iron levels effectively, they may have poor absorption and cause gastrointestinal side effects. Iron-binding peptides have therefore emerged as an alternative, due to their ability to form soluble complexes with metal ions and potentially improve iron bioavailability. Chickpea (*Cicer arietinum*) is a valuable protein source that can be converted into bioactive peptides by enzymatic hydrolysis. This study evaluated the iron-binding activity of enzymatically hydrolyzed chickpea protein.

Chickpea protein was extracted from defatted chickpea flour by acidic precipitation and subsequently hydrolysed enzymatically. A 20 mg/ml protein solution was prepared using 25 mM NaOH and hydrolysed with Alcalase (2w/w) at 55 °C for 6 h. Aliquots were collected before hydrolysis and after 0.5, 1, 2, 3, 4, 5, and 6 h, and pH was monitored throughout hydrolysis. The degree of hydrolysis (DH, %) was determined by the o-phthaldialdehyde (OPA) method. Iron-binding activity was determined by ferrozine assay.

Enzymatic hydrolysis of chickpea protein progressively increased DH and altered the pH of the hydrolysate throughout the 6 h process (Figure 1), indicating continuous peptide bond cleavage by Alcalase.

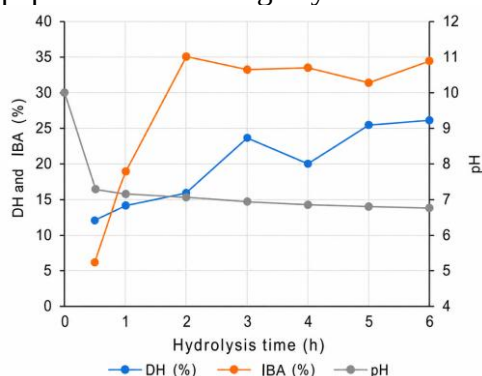


Figure 1. Changes in degree of hydrolysis (DH), iron-binding activity (IBA), and pH during enzymatic hydrolysis of chickpea protein.

Iron-binding activity also varied with hydrolysis time, reaching a maximum of 35% at 2h. This indicates that enzymatic hydrolysis changed the iron-binding properties of chickpea protein by producing peptides containing functional groups capable of interacting with Fe²⁺.

In conclusion, enzymatic hydrolysis of chickpea protein with Alcalase enhanced its iron-binding activity, with a maximum binding capacity of 35% at 2 h, demonstrating the potential of chickpea-derived peptides as functional ingredients for improving iron bioavailability.