蜂王蛹蛋白及其酵素水解物對血管收縮素轉換酵素之抑制活性研究

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摘 要

蜂王蛹(bee pupa)是生產蜂王乳過程的副產品，過去僅少量浸泡在酒裡食用，多數當成飼料或廢棄物。本研究將蜂王蛹冷凍乾燥處理後，以不同溶劑萃取及利用硫酸銨沉澱法分離蛋白質，並將蛋白質進行酵素水解，以探討萃取物與蛋白質水解物對血管收縮素轉化酵素(angiotensin converting enzyme, ACE)之抑制活性。 結果發現蜂王蛹經乙醇、水及磷酸緩衝溶液萃取後，對ACE抑制作用不明顯，僅達2.6 %，經不同加熱處理後之ACE抑制作用亦不明顯。蜂王蛹經硫酸銨沉澱劃分，收集20~100 % 飽和度之蛋白質，其主要蛋白質之分子量約為50~35 kDa。 本實驗選用二種商業用酵素 (alcalase和flavourzyme)進行蜂王蛹蛋白之水解反應，結果顯示，使用單一酵素alcalase水解12小時後，水解度為7.27 %，其ACE抑制率可達29.86 %；而flavourzyme水解12小時後水解度為6.46 %，其ACE抑制率可達28.21 %。在不同濃度及水解時間下，使用1.5 % alcalase及水解10小時，其ACE抑制率可達37.85 %；使用2.0 % flavourzyme及水解10小時，其ACE抑制率可達29.85 %。在以alcalase和flavourzyme進行兩階段水解中，以使用1.5 % alcalase水解4小時後，再加入2.0 % flavourzyme水解6小時後，水解度為12.92 %，其ACE抑制率可達66.71 %。 將ACEI活性較佳之水解物進行腸胃道消化的體外試驗，alcalase水解物和兩階段水解之水解物，其ACE抑制能力可提高至41.87 %及72.49 %；flavourzyme水解物，其ACE抑制能力降低至27.17 %。將ACEI活性較佳之水解液經不同分子量之濾膜區分 (MWCO 5000, 3000及1000)，其分子量在5000~3000、3000~1000及1000以下之ACE抑制能力分別為69.77 %、61.53 %及96.98 %，IC50分別為20.04、31.78及0.66 mg/ml。膜過濾法所得區分物之胺基酸含量，以中性胺基酸、鹼性胺基酸、酸性胺基酸含量較高。?合本研究之結果，得知蜂王蛹蛋白水解物具有ACE抑制能力，可添加於其他飲料或食物中，以製備具保健功效之食品。

關鍵詞 : 蜂王蛹、血管收縮素轉換酵素、蛋白質水解物、ACE抑制劑、酵素水解

目錄

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