幾丁聚醣對油脂與膽固醇包覆及吸收影響之研究

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摘 要

幾丁聚醣（chitosan）為具有生理活性的生物高分子，應用於食品營養方面，可降低人體對於食物 中油脂的吸收。本研究主要探討以蟹殼為來源之幾丁質，利用化學法製備成各種不同去乙醯度及不同 分子量之幾丁聚醣，再與市售油脂（包括沙拉油、氫化油及豬油）混合，模擬腸胃道環境進行消化作 用，找出個別油脂與何種去乙醯度、何種分子量之幾丁聚醣具有最佳吸附效果及最適用量搭配比例， 可將脂解?（lipase）及膽鹽（bile salt）分解脂質作用降至最低。以上述所得條件，再進一步應用 於食品製造，模擬腸胃道環境，探討實際製成食品（豬油---香腸、氫化油---油條）後，所添加的幾 丁聚醣是否仍能對油脂作有效的包覆。除此之外，並以添加幾丁聚醣之食品進行揮發性成分分析及官 能品評，比較添加幾丁聚醣與否之食品其揮發性香氣成分有何差異，以及於風味、嚐味與整體喜好性 的接受度。最後再進行動物試驗，將幾丁聚醣分別以高、低劑量二組及纖維素為對照組添加於動物飼 料中，分析比較活體中脂質代謝情形及對於生長的影響。結果顯示，以分子量約一百萬左右之食品級 幾丁質，利用化學法反應不同時間所製備之幾丁聚醣其分子量介於100-500 kDa之間，而去乙醯度為 約75-96 %，顆粒大小120 mesh ；於模擬消化道環境下，相同去乙醯度條件，幾丁聚醣的分子量愈高 ，對油脂的包覆性愈佳，所產生的游離脂肪酸愈少，而在相同分子量條件，幾丁聚醣去乙醯度愈高， 對油脂的包覆性愈佳，所產生的游離脂肪酸也少，其最佳吸附油脂效果之幾丁聚醣為分子量約490kD a，去乙醯度約96 %，在吸附油量方面，為每1 g幾丁聚醣用量對三種油脂於10 g以下均有明顯吸附效 果；在應用於製造香腸及油條，以此幾丁聚醣對含油量1：10 (w/w) 的比例添加，再經由模擬消化道 環境作用後發現，添加幾丁聚醣之香腸及油條均較對照組有明顯之包覆油脂效果，在反應後經脂解?及 膽鹽所水解之游離脂肪酸量明顯低於未添加幾丁聚醣者，且經由揮發性成分的鑑定後得知，有添加幾 丁聚醣之香腸及油條在以低分子量醛類如亞麻油酸二次氧化生成物2,4-decadieneal 及hexanal所引起 的油耗味，其濃度明顯低於未添加幾丁聚醣者，顯示出幾丁聚醣於食品系統中亦具抗脂肪氧化效果， 而利用幾丁聚醣作為高脂含量食品的添加，除了降低食品中脂肪為人體吸收外，並且可於不影響食品 本身風味情形下，更進一步抑制油耗產生。在官能品評評比風味、嚐味及整體喜好性發現，對於添加 幾丁聚醣與否之香腸及油條在95 % 信賴區間之統計分析上無顯著差異，皆能為品評者所接受。而動物 試驗中，在與對照組比較之下，添加0.3 %（w/w）或0.7 %（w/w）幾丁聚醣於飼料中確實能明顯降低 血液中游離脂肪酸濃度10 %、血液中膽固醇濃度15 %及增加糞便中脂質的排出量，並且，此等劑量之 添加，對於實驗動物的生長發育並無顯著影響。

關鍵詞 : 幾丁質、幾丁聚醣、油脂、膽固醇、脂肪酸、去乙醯、分子量、倉鼠

目錄

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