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Characterization of antioxidant peptides from rice bran protein hydrolysate stimulated by *in vitro* gastrointestinal digestion

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Rice bran, a by-product of rice milling process, has been annually produced more than 800 thousand metric tons. Rice bran contains high quality protein with high amounts of essential amino acids, especially aromatic amino acids that act as strong antioxidants. Normally, macroproteins are generally inactive within the sequence of the original structure. Enzymatic hydrolysis is an effective method to expose and release bioactive peptides without affecting nutritional value. Mostly, the activities of the non-purified rice bran protein hydrolysates were reported and the characterization of antioxidant peptides is also still limited. For better understanding of antioxidant activities of rice bran protein hydrolysate, the peptides contributing to those activities should be examined. Thus, the aims of this study were to stimulate the antioxidant properties of rice bran protein using digestive enzymes and characterize peptides possessing antioxidant activities using membrane filtration and chromatography techniques including anion-exchange chromatography (IEC), size-exclusion chromatography (SEC), and reverse phase-HPLC (RP-HPLC). The derived protein hydrolysate was filtered through 5 kDa-membrane and permeate was collected for further fractionation. Three fractions of peptides were obtained after separating on DEAE Sepharose™ Fast Flow column. The fraction number 2 was pooled and then further purified by SEC, since it has the highest $ABTS^{\bullet+}$ radical scavenging and metal chelating activities of 121.29±3.66 μmoL Trolox/ gram sample and 167.20±7.99 μmoL EDTA/gram sample, respectively ($p<0.05$). The fraction number 1 derived from SEC exhibited strongest activities on scavenge $ABTS^{\bullet+}$ radical and chelate metal ion (122.86±3.00 μmoL Trolox/gram sample and 247.70±1.51 μmoL EDTA/ gram sample). Afterwards, the four fractions (F1-H, F2-H, F3-H, and F4-H) were successfully fractionated on RP-HPLC column. The F4-H was investigated to be the most active fraction on scavenging $DPPH^{\bullet}$ & $ABTS^{\bullet+}$ radicals and reducing ferric to ferrous. Meanwhile, the F1-H showed the highest metal chelating activity. The results suggested that the hydrophobic amino acids may serve as the major primary antioxidants, whereas the polar amino acids can be accounted as the secondary antioxidants. In addition, it can be concluded that the potent antioxidant peptides from rice bran might also be generated during the gastrointestinal digestion in the human body.

Biography

Suphat Phongthai is a PhD student in Food Technology Program, Mae Fah Luang University, Thailand. His current research projects focus on the isolation of rice bran protein using emerging techniques such as ultrasonic- and microwave-assisted extraction in comparison with conventional extraction method. Additionally, he is interested in the production, purification and determination of activities of bioactive peptides, and the application of rice bran protein in gluten-free products.

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