Poster Session | Food Function/Nutrition
[6-1130-P] Functional/Wellness Foods &Nutrition (6th)
Fri. Sep 6, 2019 11:30 AM - 12:30 PM Poster Place (Entrance Hall)

[6-1130-P-09] pH Adjustment and Thermal Treatments Affect Plant Extract Colors and Antioxidant Activities during *in vitro* Digestion

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Keywords: Anthocyanins , Carotenoids , Betalains, Chlorophylls, in vitro gastrointestinal digestion, Antioxidant

There are restrictions of use for natural pigments because of the low stability and change when adjust pH and applying heat during food processing. In this study, the stability of plant color extract based on pH and heat treatments and the stability of antioxidant activities during *in-vitro* digestions were investigated. Butterfly pea flower and dragon fruit peel was extracted by water whilst, turmeric rhizome and pandan leaves were extracted by 50% w/w aqueous ethanol and subsequently freeze dried into color powders. Each color powder was dissolved in water to concentration of 1.0% w/w and adjusted to pH 1.0-10.0 to observe color and the absorbance measured by spectrophotometry between 400-700 nm. Results showed the change in absorbance at different pH, indicating structural change of pigment compounds and consequently change in color parameters (L*, a*, b* and hue values). To investigate effect of pH adjustment and heat treatment, pure color extracts were adjusted to pH 3.0 and 7.0 and subjected to three heat treatments including (1) no heat (control), (2) pasteurization (75^{o}C for 15 min) and (3) sterilization (121^{o}C for 15 min). All samples were measured for color parameters and antioxidant properties were measured in terms of total phenol content (TPC), total flavonoid content (TFC) and antioxidant activities based on FRAP and DPPH assays. Results showed that pH adjustment and heat treatment affected visual color and color parameters, regarding to type of plant pigment and this could limit further food use. Color extracts at pH 3.0 and subjected to pasteurization better retained color, pigment compounds and related antioxidant properties than sterilization. The exception was for sample coloring with pandan leaves extract which retained the most color after adjusted to pH 7.0 and sterilized. To investigate the stability during *in-vitro* gastrointestinal digestion, all pasteurized plant color extract at pH 3.0 was tested in comparing with the corresponding unheated plant extract. During *in-vitro* gastrointestinal digestion, the greater amount of TPC, TFC and related antioxidant activities based on FRAP and DPPH in pasteurized samples than in unheated samples were observed. Results illustrated the effect of pasteurized heat on increasing bioavailablity of the studied bioactive compounds during *in-vitro* digestion. However, along digestion, all bioactive compounds increased slightly from oral phase (G0) to gastric phase (G30) but decreased gradually to the lowest values along intestinal phase (I0-I120). Data of this study supports of extension use and provides the limit use of natural colorants in food applications.

pH Adjustment and Thermal Treatments Affect Plant Extract Colors and Antioxidant Activities during *in vitro* Digestion

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ABSTRACT

There are restrictions of use for natural pigments because of the low stability and change when adjust pH and applying heat during food processing. In this study, the stability of plant color extract based on pH and heat treatments and the stability of antioxidant activities during *in-vitro* digestions were investigated. Butterfly pea flower and dragon fruit peel was extracted by water whilst, turmeric rhizome and pandan leaves were extracted by 50% w/w aqueous ethanol and subsequently freeze dried into color powders. Each color powder was dissolved in water to concentration of 1.0% w/w and adjusted to pH 1.0-10.0 to observe color and the absorbance measured by spectrophotometry between 400-700 nm. Results showed the change in absorbance at different pH, indicating structural change of pigment compounds and consequently change in color parameters (L*, a*, b* and hue values). To investigate effect of pH adjustment and heat treatment, pure color extracts were adjusted to pH 3.0 and 7.0 and subjected to three heat treatments including (1) no heat (control), (2) pasteurization (75^{o}C for 15 min) and (3) sterilization (121^{o}C for 15 min). All samples were measured for color parameters and antioxidant properties were measured in terms of total phenol content (TPC), total flavonoid content (TFC) and antioxidant activities based on FRAP and DPPH assays. Results showed that pH adjustment and heat treatment affected visual color and color parameters, regarding to type of plant pigment and this could limit further food use. Color extracts at pH 3.0 and subjected to pasteurization better retained color, pigment compounds and related antioxidant properties than sterilization. The exception was for sample coloring with pandan leaves extract which retained the most color after adjusted to pH 7.0 and sterilized. To investigate the stability during *in-vitro* gastrointestinal digestion, all pasteurized plant color extract at pH 3.0 was tested in comparing with the corresponding unheated plant extract. During *in-vitro* gastrointestinal digestion, the greater amount of TPC, TFC and related antioxidant activities based on FRAP and DPPH in pasteurized samples than in unheated samples were observed. Results illustrated the effect of pasteurized heat on increasing bioavailablity of the studied bioactive compounds during *in-vitro* digestion. However, along digestion, all bioactive compounds increased slightly from oral phase (G0) to gastric phase (G30) but decreased gradually to the lowest values along intestinal phase (I0-I120). Data of this study supports of extension use and provides the limit use of natural colorants in food applications.

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