ABSTRACT

Excessive salt consumption far surpasses human physiological requirements and is strongly linked to high blood pressure, a major risk factor for cardiovascular disease (CVD). Food reformulation has been explored to reduce CVD-related morbidity and mortality and improve consumer acceptance of sodium-reduced food products. Allyl isothiocyanate (AITC), found in wasabi, mustard, and horseradish, has been shown to enhance perceived saltiness in model tomato soups. However, it is limited by undesirable bitter, sour, and metallic notes, reducing consumer acceptance. This study investigated the encapsulation of AITC using maltodextrin (MD) and gum Arabic (GA) with and without Tween-20 (T20) or Tween-80 (T80) via spray-drying (SD) and freeze-drying (FD). Gas chromatography with a flame ionization detector (GC-FID) revealed low AITC retention in all FD formulations, while SD formulations with surfactants achieved up to 136.71 mg AITC/g powder. Microcapsules exhibited high surface oil concentrations and low to moderate moisture content. Eight formulations were tested in model tomato soups (0.500 mg AITC/100 mL) using a nine-point hedonic scale, and RATA Likert scale to evaluate the perceptions of basic tastes and other sensory attributes in an untrained consumer panel (SD trial: n = 79, and FD trial: n = 93). None of the formulations significantly differed in basic taste perceptions (sweet, sour, salty, bitter, or savoury). However, FD soups, particularly the FD-MD-T80 formulation, enhanced thickness, creaminess, and significantly enhanced tomato flavour, leading to increased overall liking, flavour, and texture ratings. These findings suggest that encapsulation may reduce AITC off-flavours, though it may also diminish its saltiness-enhancing properties. Future research should further investigate encapsulated AITC in various food products and concentrations and use a trained panel to discern small differences in the sensory properties of these food products.