Natural sweetener agave inhibits gastric emptying by a glucagon-like peptide-1 (GLP1) receptor-dependent mechanism

• GI Tract

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Poster Communications: Natural sweetener agave inhibits gastric emptying by a glucagon-like peptide-1 (GLP1) receptor-dependent mechanism

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Enteroendocrine cells of the gut sense chemical components of ingested food and secrete several gastrointestinal satiation peptides, including glucagon-like peptide-1 (GLP1) and cholecystokinin (CCK), which influence gastric emptying, reduce food intake and increase satiety. In humans, hexose sugars were shown to release CCK release and delay gastric emptying by a CCK1 receptor-dependent mechanism. Several artificial sweeteners, used in the management of diabetes and obesity, were suggested to have no effect on gastric emptying and less effect on satiety hunger. The present study was conducted to compare the gastric emptying rate of agave nectar, a fructose-rich herbal liquid sweetener, with the rate of glucose and fructose, and to evaluate the involvement of CCK and GLP1 receptors in agave-induced alterations in gastric emptying. Under anesthesia (Ketamine 100 mg/kg and Chlorpromazine 3-5 mg/kg; intraperitoneally) Gregory cannulas were fitted onto the gastric corpus of female Sprague-Dawley rats (n=8). Following recovery, 3 ml of saline or test meals (agave, glucose or fructose) at 12.5, 25 and 50 % concentrations (containing phenol red as a non-absorbable dilution marker, 60 mg/l) were instilled into the gastric fistula on different days. The rate of gastric emptying was determined from the volume and phenol red concentrations recovered after 5 min. GLP1 (exendin 9-39; 30 µg/kg), CCK1 (Devazepide; 1mg/kg) or CCK2 (YM 022; 1mg/kg) receptor antagonist was injected subcutaneously before the emptying experiments. When compared to saline, gastric emptying of fructose was significantly delayed ($p<0.01$-0.001) at all 3 concentrations, while glucose and agave delayed gastric emptying at 25% and 50% concentration ($p<0.05$-0.001). At 50% fructose concentration, delayed gastric emptying was significantly reversed by both CCK1 and GLP1 receptor antagonists ($p<0.01$-0.001), while 50% glucose-induced delay in gastric emptying was abolished by the CCK2 receptor antagonist ($p<0.05$). GLP-1 receptor antagonist significantly facilitated gastric emptying rate that was delayed by 50% agave ($p<0.05$). The results of the study revealed that glucose, fructose and agave all delayed gastric emptying contributing to satiety, while higher concentrations of agave are required to reach a similar delay in gastric emptying. This inhibitory effect of agave on gastric emptying rate appears to be mediated by GLP1 receptors.

Where applicable, experiments conform with Society ethical requirements.

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