

Abstract

More Thorough Mastication of Bread May Stimulate Early-Phase Insulin Release: Preliminary Associative Results from a Double-Blind Randomized Controlled Trial [†]

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Abstract: Background and objectives: Oral processing behavior is suggested to modulate metabolic responses to foods. In this study, we examined the impact of variations in oral processing characteristics during bread consumption on appetite and postprandial metabolic responses. Methods: Thirty healthy, normal-weight participants consumed three types of bread, differing in the leavening agent, in a randomized cross-over trial, while being video recorded to determine specific oral processing behaviors. At each study visit, gastric emptying, subjective appetites, and glucose and c-peptide levels were measured at regular time points for 4 h. After 4 h, the ad libitum energy intake was measured. The average values of each outcome were calculated to derive a single characteristic value per participant across the three types of bread. Results: A Spearman's correlation analysis showed that the participant age was associated with a faster eating rate ($r = 0.562$, $p = 0.001$), a shorter oral exposure time ($r = -0.569$, $p = 0.001$), and less chews/bites ($r = -0.387$, $p = 0.034$). As expected, a slower eating rate was correlated with more chews per bite ($r = -0.603$, $p < 0.001$). Surprisingly, higher hunger ratings before bread consumption were associated with a smaller bite size ($r = -0.518$, $p = 0.003$). More chews/bites were associated with a higher AUC of C-peptide during the first 30 min after consumption ($r = 0.398$, $p = 0.036$). Oral processing behavior did not correlate with appetite, the energy intake in the subsequent meal, gastric emptying, or the glucose response ($p > 0.05$) to bread. However, slower gastric emptying was associated with a lower glucose AUC_{30min} ($r = -0.453$, $p = 0.015$) and c-peptide AUC_{30min} ($r = -0.631$, $p < 0.001$). Discussion: Although, overall, the metabolic responses to bread consumption were not affected by oral processing, thorough mastication of bread stimulated the cephalic phase of digestion, resulting in early release of insulin. This is in line with the existing literature, according to which anticipatory sight, smell, and taste of food can initiate the cephalic phase of insulin secretion, which is further enhanced by chewing and swallowing the food. However, the importance of the cephalic phase insulin release in overall glucose regulation is still unclear. Further research is needed to investigate to what extent and according to which mechanisms natural variations in oral processing can affect postprandial metabolic responses to food.



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