

Contribution of Food Hardness to the Health Effects of Chewing

Toshitada Nagai

Takasaki University of Health and Welfare

Summary

Hypertension is one of the major lifestyle-related diseases that can lead to conditions such as myocardial infarction and stroke. One of its causes is excessive salt intake. While salt reduction is considered essential for preventing hypertension, salt also plays a significant role in Japanese food culture. Therefore, rather than merely reducing salt intake, exploring methods of salt intake that do not lead to hypertension is equally important.

The applicants focused on the health benefits of mastication and we have discovered a significant reduction in blood pressure in a long-term (15-week) rat model through mastication. This finding suggests a potential new approach to salt intake. However, previous studies on the health benefits of mastication, including those conducted by other research groups, have primarily compared two extreme feed types: powder (P) and solid (Chow, C). This approach did not allow for a quantitative analysis of the relationship between the amount of mastication and its effects.

In this study, in addition to existing solid feed (C1), we developed a harder solid feed (C2). Measurements using a texture analyzer showed that C2 had an approximately 11 times greater load at fracture than that of C1 feed, quantitatively confirming its hardness. However, concerns arose that altering the cornstarch ratio might affect factors beyond mastication amount (such as digestion rate). A preliminary 10-week study using C2 feed showed a significant decrease in total food intake, which was accompanied by a significant reduction in weight gain.

To address this, modifications were made to the feeding method. When C2 feed was crushed to make it easier to eat (C2_clash) and when a dedicated feeding device was used (C2_feed2), rats were raised from six weeks old for eight weeks. The results confirmed that there was no difference in food intake or body weight between the two groups. At the final week of the study, blood pressure measurements showed a tendency for blood pressure to decrease in the C2_feed2 group compared to the P-group. This suggests that C2_feed2 was the more suitable for analyzing the effects of mastication.

In future, experiments using spontaneously hypertensive rats as a disease model will be essential. Currently, a study comparing the effects of P- and C2-feed is underway.