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Influence of Salts on the Textures and Swallowing Properties of Care Foods for Dysphagic Patients

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Summary

With the advent of an aged society, the incident of dysphagia has increased. Thickeners or gelling agents are used in foods for dysphagic patients to enhance both the viscosity of and cohesion between food particles. For care foods for dysphagic patients, polyelectrolyte gelling agents such as κ-carrageenan and gelatin are often used, and thus their texture is likely to be greatly affected by the addition of metal salts. Therefore, knowledge on effect of metal salts on the behavior if physical properties is important in texture design of care foods for dysphagic patients. In this study, we investigated the influence of salt addition on the texture of polyelectrolyte gels. As a gel sample, κ-carrageenan (CA), gelatin, and locust bean gum and xanthangum mixed gel (LOXA) were used. NaCl and $CaCl_2$ were used as added metal salts. As a texture evaluation method, TPA (Texture Profile Analysis) test and rupture test by uniaxial compression were performed using a rheometer. The TPA test was conducted in accordance with the test method of Ministry of Health, Labor and Welfare's, "Indication permission of Food Safety Bureau and Department of Food Safety": The parameters of hardness, adhesiveness and cohesiveness were obtained. Further, from the fracture test, the breaking force and the rapture strain were determined. The hardness of CA was increased by the addition of a small amount of NaCl and $CaCl_2$, and decreased by further addition of the metal salts. The hardness of gelatin did not change with addition of NaCl, and decreased with $CaCl_2$. The hardness of LOXA was increased by the addition of a small amount of $CaCl_2$, but it decreased at high concentration of $CaCl_2$ added: It did not change with NaCl. For all gels, cohesiveness decreased from 0.2 to 0.4 by salt addition. Regarding the breaking strength measurement, the gel was destroyed at low load and low strain in CA and LOXA due to the addition of high concentration of NaCl. For gelatin, there was no change in breaking force and rapture strain. With $CaCl_2$ addition, the gel fractured at low load and low strain in any of the gels. It was confirmed that by adjusting the kind and amount of the metal salt to be added, it is possible to prepare gels with various textures.