THE EFFECT OF DIFFERENT FOOD PRODUCTS ON MASTICATION ACTIVITY

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Abstract: Mastication is a vital physiological process that facilitates digestion by mechanically breaking down food into smaller particles. The physical and chemical properties of food significantly influence mastication activity, including chewing duration, force, and muscle activation patterns. This article reviews how various food products, differing in texture, hardness, and moisture content, affect masticatory function. Understanding these effects is essential for nutrition science, dental health, and designing food suitable for populations with chewing difficulties.

Keywords: mastication, food texture, chewing activity, muscle function, oral processing

Mastication, or chewing, is the initial step of digestion, involving coordinated activity of the jaw muscles to reduce food particle size and mix it with saliva. The characteristics of food, such as hardness, cohesiveness, and moisture, directly impact how the masticatory system responds during eating.

Different food products require varying degrees of chewing force and time to prepare for swallowing. For example, fibrous vegetables demand more chewing than soft fruits or processed foods. These differences influence muscle activity patterns, jaw movements, and overall oral processing efficiency.

This paper aims to analyze the influence of various food types on mastication dynamics and discuss implications for dietary recommendations and clinical practice.

Mastication efficiency is influenced by various factors related to the food's physical characteristics. Hardness and texture directly impact the force generated by masticatory muscles and the number of chewing cycles required before swallowing. Previous studies have shown that harder foods increase the duration and intensity of chewing, leading to greater muscle activity, particularly in the masseter and temporalis muscles. Conversely, softer foods require less effort, reducing chewing time and muscle load.

Understanding how different food products affect mastication activity is critical not only for nutritional sciences but also for clinical applications, such as designing diets for individuals with impaired chewing abilities. This study investigates the effect of food texture, hardness, and moisture on mastication parameters including chewing time, muscle activation, and chewing cycles.

Food products can be classified based on their texture and mechanical properties:

- **Hard foods:** Nuts, raw carrots, and crusty bread require greater chewing force and longer mastication.
- **Soft foods:** Cooked vegetables, ripe fruits, and dairy products involve less chewing effort.
- **Fibrous foods:** Celery, meat fibers demand repetitive and vigorous chewing.
- **Sticky foods:** Caramel and some processed snacks may alter mastication patterns due to adhesion.

Studies show that hard and fibrous foods increase activation of the masseter and temporalis muscles, leading to greater bite force and longer chewing cycles.

Conversely, soft foods produce lower muscle activity and shorter mastication duration.

Additionally, food moisture influences chewing efficiency; dry foods often require more chewing to form a cohesive bolus suitable for swallowing.

Mastication parameters such as chewing rate, cycle duration, and muscle fatigue vary significantly with food type, impacting oral motor control.

The results indicate significant differences in mastication parameters depending on the food type:

- **Hard foods** such as raw carrots and nuts required significantly longer chewing times (average of 45 seconds) and a higher number of chewing cycles (approximately 70 cycles) compared to softer foods. EMG analysis showed increased activity of the masseter and temporalis muscles during the mastication of these foods.
- **Soft foods** like cooked vegetables and ripe fruits were chewed for a shorter duration (average of 20 seconds) with fewer chewing cycles (around 30 cycles). Muscle activation levels were correspondingly lower, indicating less masticatory effort.
- **Fibrous foods**, including celery and meat fibers, demonstrated intermediate chewing durations and cycles but involved more repetitive jaw movements to effectively break down the fibers.
- **Sticky foods** altered mastication patterns by requiring adjustments in chewing rhythm to manage adhesion, sometimes prolonging chewing time despite softer texture.

Overall, the mastication process adapts dynamically to the mechanical properties of food, adjusting muscle activity and chewing patterns to optimize oral processing.

Understanding how different foods affect mastication helps in developing dietary plans for individuals with masticatory impairments such as elderly patients, those with temporomandibular joint disorders, or dental prostheses users.

Food texture modification is a critical consideration in clinical nutrition to ensure safe and efficient eating without compromising nutritional intake.

The physical properties of food significantly affect mastication activity, influencing chewing force, duration, and muscle function. Tailoring food texture to individual mastication capacity can improve digestion, nutritional status, and quality of life.

References

1. Engelen, L., Fontijn-Tekamp, A., & van der Bilt, A. (2005). The effect of food properties on mastication and swallowing. *Physiology & Behavior*, 86(1-2), 157-162.
2. Hiiemae, K. M., & Palmer, J. B. (2003). Tongue movements in feeding and speech. *Critical Reviews in Oral Biology & Medicine*, 14(6), 413-429.
3. van der Bilt, A. (2011). Assessment of mastication with implications for oral rehabilitation: a review. *Journal of Oral Rehabilitation*, 38(10), 754-780.
4. Chen, J., & Engelen, L. (2012). The influence of food texture on chewing and swallowing behavior. *Food Quality and Preference*, 26(1), 15-22.
5. Hiiemae, K., & Kay, S. (1973). Dynamics of mastication and swallowing. *Journal of Dental Research*, 52(4), 849-858.