

Importance of Mastication for Memory and Learning

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Mastication is performed every day, being indispensable for life. The masticatory process helps in the food ingestion, alimentary bolus formation and swallowing process, involving complex movements performed by orofacial muscles and sensory functions [1,2]. Mastication has also been related to the maintenance of memory function [1-3], and several studies in humans and animals have shown that an impairment in masticatory performance may affect the memory and learning process, accompanied by alteration in the hippocampus [1,2,4].

Mastication efficiency has been correlated with cognitive functions in elder patients, as both memory and learning are altered by masticatory impairment [5,6]. In elder patients the loss of cognition is related to dementia, and other cognitive dysfunctions, including Alzheimer, being the cases of these alterations being more common nowadays as life expectancy is longer, and elder population is increasing.

During mastication, there are sensory inputs from the mastication-associated tissues and organs that go up to the central nervous system through the trigeminal nuclei, which influences on the hippocampus, that is responsible for memory and learning functions and is also associated with spatial and long-term memories [4,7,8].

As masticatory performance is mostly related to the number of teeth present [9], there are several alternatives to enhance the mastication for patients who have lost most of their teeth, such as dental implants and dental prosthetic appliances. Nevertheless, the type of food is also related to the masticatory muscles force, as demonstrated in several studies that compare both soft and hard food intake as a model for masticatory impairment. A soft-food intake affects directly the masticatory performance, as there is less stimulation to the masticatory muscles, hence decreasing their activity [1,2].

A soft-food diet is common in elder people, and this decision is mostly based on the convenience of the subject to have an easier and more comfortable way to eat due to tooth loss, dental prosthetic problems, discomfort, fatigue, pain, etc.. These changes in food intake over the years decrease the masticatory muscles activity, and may lead to masticatory impairment. If non-tooth related problem, we should analyze if the problem is from the masticatory-muscles, the temporomandibular joint, the digestive tract or any problem on the digestive process that make the patient choose for a soft diet. Based on this, we, as health professionals, should find the real reason for the masticatory impairment.

In younger populations, a decrease in the masticatory frequency has also been related to decreases in the learning ability, and masticatory stimulus has more influence on children than in elders [1,10]. Also, as patients are during the growth period, masticatory impairment may also influence the normal growth, development and function of the craniofacial and neural structures.

A proper assessment of the masticatory impairment is necessary in order to improve not only the food intake, but also may help in memory and learning processes, achieving a better quality of life, especially in elder people. More studies related to mastication and memory and learning functions may lead to novel treatment alternatives to cognitive dysfunctions.

Bibliography

1. Fukushima-Nakayama Y, *et al.* "Reduced Mastication Impairs Memory Function". *Journal of Dental Research* 96.9 (2017): 1058-1066.
2. Okihara H, *et al.* "Liquid diet induces memory impairment accompanied by a decreased number of hippocampal neurons in mice". *Journal of Neuroscience Research* 92.8 (2014): 1010-1017.
3. Le Reverend B, *et al.* "Adaptation of mastication mechanics and eating behaviour to small differences in food texture". *Physiology and Behavior* 165 (2016): 136-145.
4. Ono Y, *et al.* "Occlusion and brain function: mastication as a prevention of cognitive dysfunction". *Journal of Oral Rehabilitation* 37.8 (2010): 624-640.
5. Weijenberg RA, *et al.* "Oral mixing ability and cognition in elderly persons with dementia: a cross-sectional study". *Journal of Oral Rehabilitation* 42.7 (2015): 481-486.
6. Hansson P, *et al.* "Relationship between natural teeth and memory in a healthy elderly population". *European Journal of Oral Sciences* 121.4 (2013): 333-340.
7. Teixeira FB, *et al.* "Masticatory deficiency as a risk factor for cognitive dysfunction". *International Journal Medical Sciences* 11.2 (2014): 209-214.
8. Sosa M, *et al.* "Neural activity patterns underlying spatial coding in the hippocampus". *Current Topics in Behavioral Neurosciences* (2016).
9. Elsig F, *et al.* "Tooth loss, chewing efficiency and cognitive impairment in geriatric patients". *Gerodontology* 32.2 (2015): 149-156.
10. Frota de Almeida MN, *et al.* "Spatial memory decline after masticatory deprivation and aging is associated with altered laminar distribution of ca1 astrocytes". *BMC Neuroscience* 13 (2012): 23.

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