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# Diagnosing oral hypofunction



## BACKGROUND

Older adults gradually become dependent and just as gradually change in oral health status. Declines in oral function accompany the declines in systemic function. To prevent oral function from becoming oral dysfunction, a means to diagnose the patient's condition is essential. The study group of the National Center for Geriatrics and Gerontology in Japan has developed a concept regarding the progressive process of general functional decline related to decreased oral function. Oral frailty was defined as frailty that manifests only in the oral cavity. Its signs and symptoms have been specified as decreased articulation, slight choking or spillage while eating, and an increase in the number of unchewable foods. To recover from oral frailty requires not only maintenance of oral hygiene to prevent oral disease but also restoration of function by providing any needed prostheses to counter the effects of tooth loss. Oral hypofunction was proposed as a term referring to the stage at which recovery can be expected and occurs before oral dysfunction develops. The concepts related to oral hypofunctional state were defined, along with signs and symptoms of the condition, and a method was developed to establish diagnostic criteria for oral hypofunction.

## CONCEPTUAL DEFINITIONS

A conceptual diagram was created to guide diagnosis from the healthy state through oral frailty, oral hypofunction, and oral dysfunction (Figure 1). Both oral frailty and oral hypofunction can be restored to a previous stage by specific remedies.

Seven conditions were selected as part of the diagnostic process used to identify oral hypofunction. These included poor oral hygiene, oral dryness, reduced occlusal force, decreased tongue-lip motor function, decreased tongue pressure, decreased masticatory function, and the deterioration of swallowing function. In addition, the initial thresholds for entering these conditions were defined. Oral hypofunction was defined as the state when 3 or more of these diagnostic criteria are present.

## SIGNS AND SYMPTOMSS

Poor oral hygiene was defined as an increased number of microorganisms in the mouths of older adults. Various methods are available to measure the number of microorganisms present. The diagnostic criterion is based on the total number of microorganisms expressed as colony-forming units per milliliter and was determined to be $10^{6.5}$ CFU/mL or more. If the Tongue Coating Index (TCI) is measured, the criterion is 50% or higher.

Oral dryness, which is an abnormally dry state in the oral cavity or a subjective perception of intraoral dryness, contributes to loss of homoeostasis of the oral structures. An oral moisture checker measures mucosal wetness, but the Saxon test can also be used. The diagnosis of oral dryness is made if the oral moisture checker obtains a value less than 27.0 or the Saxon test results are 2 *g*/2 min or lower.

Reduced occlusal force is strongly correlated with masticatory ability, influenced by the number of natural teeth present and the occlusal support. Muscular weakness can also contribute. If the occlusal force is less than 200 N or the number of natural teeth, excluding roots and highly mobile teeth, is less than 20, reduced occlusal force is diagnosed.

Both speed and dexterity are reduced in decreased tongue-lip motor function, which results from a decline in brain function and perioral muscle function, often caused by systemic disease and changes related to aging. Oral diadochokinesis is used to measure motor speed and dexterity of the tongue and lips. Decreased function is diagnosed when the number of any of the /pa/ta/or/ka/ produced per second is less than 6.

Patients with decreased tongue pressure suffer chronic functional decline in the muscles that move the tongue. With progression, normal mastication, bolus formation, and swallowing become impaired, which can lead to insufficient food intake to meet nutritional requirements. Maximum tongue pressure is measured by having the patient compress a balloon attached to a tongue pressure probe onto the anterior palate for a few seconds using the tongue's maximum voluntary force. The diagnosis of impairment is made when the pressure is less than 30 kPa.

Decreased masticatory function results in frequent spillage while eating and choking when swallowing, as well as having more foods considered unchewable. These events lead to a loss of appetite and reduced numbers and types of foods that are consumed. The state can progress to malnutrition and decreased metabolic rate. Glucose concentration obtained from chewed gummy jelly is used to evaluate a patient's masticatory function. The degree of eluted glucose is measured using a masticatory ability testing

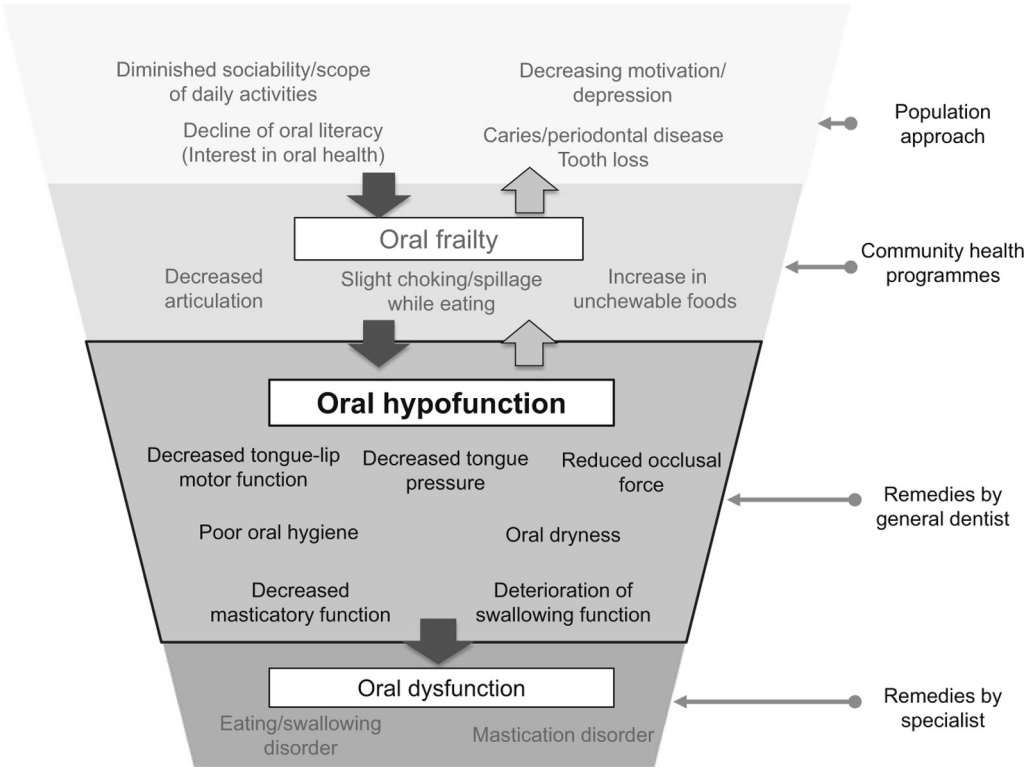


**Figure 1.** Oral hypofunction with age. (Courtesy of Minakuchi S, Tsuga K, Ikebe K, et al: Oral hypofunction in the older population: Position paper of the Japanese Society of Gerodontology in 2016. *Gerodontology* 35:317-324, 2018.)

system or by comparing the degree of fracture in the chewed gummy jelly with visual reference material. The latter requires no special instruments.

Deterioration of swallowing function is manifest by a decline in eating and swallowing function caused by aging and is present as a stage before a marked disorder is identified. A self-administered questionnaire (the 10-item Eating Assessment Tool) is used to screen for swallowing function, with a total score of 3 or higher indicating deterioration of swallowing function.

## APPLICATION OF DIAGNOSTIC CRITERIA

The diagnostic criteria were applied in a population of hospitalized patients. Five of the 7 measurements were assigned 0 or 1 point, and the patients' results were summed to yield an oral hypofunction score. The relationship between oral hypofunction score and nutritional status in the patients was measured using the Mini Nutritional Assessment (MNA).

Mean MNA score was 12.5 for the group with 0 points, 9.8 to 8.1 in the group with 1 to 3 points, and 7.9 in the group with 4 points. The relationship between oral hypofunction and malnutrition was shown to be close. Patients who had a 4-point hypofunction score tended to have significant malnutrition. Because oral hypofunction is the precursor of oral dysfunction, patients with a score of 3 points or higher are likely to have oral hypofunction. The criterion required for a diagnosis of oral hypofunction was therefore proposed to be a score of 3 or more when the 7 oral function measures were considered.

### Clinical Significance

Some challenges exist in the application of the proposed oral hypofunction measures. Several of the 7 criteria have overlapping concepts, making it difficult to determine which applies. In addition, further study is needed to determine the neuromuscular conditions that influence the proposed criteria. However, it would be helpful to clinicians if they could determine the patient's degree of oral function and intervene in ways that will prevent or at least delay the progression to oral frailty or dysfunction.

Minakuchi S, Tsuga K, Ikebe K, et al: Oral hypofunction in the older population: Position paper of the Japanese Society of Gerodontology in 2016. *Gerodontology* 35:317-324, 2018

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