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Food Hydrocolloids and Emulsion's Oral Behaviour

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Editorial

To give manufactured foods stability, texture, and appearance, biopolymers (polysaccharides and proteins) and their combinations are utilised in the food industry. In addition to discussing oral processing mechanisms in relation to the behaviour of hydrocolloids and emulsions in the oral cavity during eating, this paper reviews the physical measurements carried out to clarify textural properties such as creaminess, smoothness, sliminess, and thickness of food products. The study of the lubrication and deposition behaviour of food components is made possible by the use of tribology and evanescent wave spectroscopy techniques, which are covered in detail in this article. Physical observations compared to sensory attributes show that thin film rheology and surface deposition phenomena significantly influence sensory qualities as fattiness, smoothness, and astringency. Many of the difficult-to-define sensory characteristics of food, such as creaminess, smoothness, sliminess, and thickness, are likely connected to a variety of colloidal, bulk rheological, and thin-film rheological behaviours. Measurement of transient viscoelastic characteristics has grown to be a significant topic of research because food emulsions typically exhibit non Newtonian viscoelastic behaviour. While some features of how texture is experienced in the mouth seem to be correlated with viscosity data, it is now obvious that bulk rheology does not fully characterise the sensory qualities of many soft-solid meals. It is clear that the physical and rheological characteristics of emulsions, foams, and hydrocolloids are somewhat correlated with their microstructure [1].

The breaking down of the food into minute particles during the mastication process is the first stage of digestion for solid foods. Mastication is a complicated process that involves the lips, cheeks, tongue, palate, and salivary glands in addition to the muscles and teeth. As the teeth intermittently separate and close, it initially involves well-controlled compressive, shearing, and tensile stresses. The frequency of contact increases as the meal is broken down, and qualities like hardness, strength, and elasticity are detected by forced deformation behaviour. By forcing food against the hard palate and onto the occlusal surfaces of the teeth to guarantee adequate chewing, the tongue also plays a significant role in starting the breakdown process. Perceived thickness is one of the most thoroughly researched textural features in fluid foods and beverages. Perceived thickness has a significant impact in how fluids and semi-solid foods are perceived in terms of texture. Oral measurements of thickness have been found to correspond with rheological measurements of both small- and large-scale deformation in studies. Numerous research have sought to estimate the shear rates acting in the mouth in order to account for the non-Newtonian shear thinning behaviour of most foods in order to develop connections between sensory thickness and rheological qualities [2,3].

It has also been noted that the sensory experience of the stickiness and sliminess of fluid and semi-solid foods correlates with the measures of large and small deformation viscosity. Wood discovered that the feeling of sliminess was correlated with the material's shear thinning behaviour using massive deformation viscosity measurements; the greater the shear thinning, the less perceived sliminess. It was discovered that shear thinning per se was not the corresponding factor and that the sensory experience of stickiness and sliminess linked with the dynamic viscosity at 50 rad s21. Practically speaking, viscosity measurements taken at oscillations of 50 rad/s21 appear to have the highest association with the sensations of thickness, sliminess, and stickiness. Many of the sensory qualities of foods, such as smoothness, slipperiness, and astringency, are determined by the interfacial interactions between food components and the surfaces of the mouth. On analogues of oral epithelia made of mucin films, evanescent wave spectroscopy is a technique that can be used to quantify food material deposition. Our team has utilised this method to assess the deposition of food components on mucin-film-based oral epithelia models and has connected it to assessments of mouth coating and how it affects friction and lubrication in the mouth. This method is appropriate for researching the chemical interactions taking place close to the surface since the evanescent wave can only propagate at the interface [4,5].

A traction measurement tool called the MTM (PCS Instrument) offers completely automated traction mapping of fluids with hydrodynamic, mixed, and boundary lubrication. A polished 3/4-inch ball and a disc with a 46 mm diameter are driven separately to create a sliding/rolling contact for the test. AISI 440 bearing stainless steel is used to make the standard test specimens. The ball is end mounted on a pivoting shaft and is automatically loaded against the disc at the commencement of the test. The disc specimen is mounted on a vertical shaft in the compact stainless steel test fluid reservoir. A high sensitivity force is used to quantify the traction force supplied to the ball specimen while DC servomotors rotate the disc with precise speed control [2,5].

Conclusion

The relationship between food structure, texture, and mouthfeel may be better understood with the help of rheological techniques that measure the properties of bulk and thin film fluids as well as spectroscopic techniques that let researchers examine how food materials interact with oral analogue surfaces. Understanding psychophysical and physiological processes can help one better understand the key determinants of sensory experience. To further understand the connections between food microstructure, its physicochemical qualities, and its perceived organoleptic properties, a multidisciplinary approach will ultimately be needed.

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Conflict of Interest

The author reported no potential conflict of interest.

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