

## Scientific article

**Cariogenic potential of oral thickening agents in dysphagic patients: an intraoral plaque pH pilot study**Accepted: February 25, 2026  
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**Keywords**

Relative cariogenicity, Dysphagia, Hydration, Older adults, Thickening agents, Geriatric dentistry, pH Telemetry

**Abstract**

Dysphagia management in older adults often involves the use of oral thickening agents to modify the consistency of foods and liquids and thereby, reduce the risk of aspiration. Currently, there is limited evidence on the cariogenic potential of these agents and the consequences for oral health in elders.

This pilot, comparative in-vivo study evaluated the cariogenicity of four commercially available thickening agents in water: Ensure Multi-thick, Thick & Easy, Thicken Up Clear, and Thicken Up Gel Express. The products were tested in three older adult volunteers (n = 8 tests; two replicates per product across four products) using intraoral plaque pH telemetry. Absolute cariogenicity (AC) was assessed via acidogenic potential (area under the pH-curve below 5.7), and relative cariogenicity (RC) was calculated relative to a 10 % glucose control rinse. One-way ANOVA was used to compare mean AC and RC across products.

All four products demonstrated measurable cariogenicity (AUC < 5.7). Mean AC ranged from 13.70 (Thick & Easy) to 21.62 (Thicken Up Gel Express). Thicken Up Clear and Thicken Up Gel Express showed narrow standard deviations (SD = 0.09 and 0.49, respectively); Ensure Multi-thick showed high variability (SD = 21.02). RC values were highest for Thicken Up Gel Express (0.81 ± 0.15), then Thicken Up Clear (0.68 ± 0.08), and lower for Ensure Multi-thick (0.42 ± 0.42) and Thick & Easy (0.43 ± 0.36). The ANOVA revealed no statistically significant differences among products (P > 0.05).

Within the limitations of this pilot study, all tested thickening agents showed moderate relative cariogenicity that may be clinically relevant in older adults with existing caries risk factors. These preliminary findings suggest that product selection and preventive oral care strategies are important when thickening agents are used for dysphagia management. Further analyses with larger samples and in vivo clinical outcomes are needed to confirm and extend these results.

## Introduction

Oropharyngeal dysphagia (OD) is highly prevalent among older adults and individuals with neurological disorders. This condition significantly increases the risk of aspiration pneumonia due to the inhalation of food or liquids, and it contributes to a heightened risk of malnutrition (1). Moreover, OD is associated with increased morbidity, mortality, and overall healthcare expenditures (2, 3). In elderly individuals, dysphagia may arise from multiple factors, including reduced taste and smell, xerostomia (dry mouth), age-related sarcopenia, decreased oropharyngeal sensitivity impairing swallowing reflex initiation, and anatomical changes in the axial skeleton and connective tissues.

To reduce the risk of aspiration and its complications, oral thickening agents (OTAs) are commonly prescribed. These agents, primarily composed of complex carbohydrates, are low in calories and not intended for nutritional supplementation. Instead, their function is to alter the consistency of liquids and foods to facilitate safer swallowing (4, 5). OTAs are available as powders for manual preparation or as ready-to-use products offering convenience and standardized viscosity (6). With OTAs, thickened fluids are typically used for hydration, whereas thickened oral nutritional supplements are used primarily for nutritional support or as meal replacements (7, 8, 9).

The goal of thickening is to increase the viscosity to reduce the risk of aspiration, choking, dehydration, malnutrition, and even death (10, 11). When prescribing thickening agents, clinicians assess the safest consistency level for each patient. This assessment is guided by the International Dysphagia Diet Standardization Initiative (IDDSI), which categorizes food and liquid consistencies into a scale of eight levels (0-7), ranging from thin liquids (Level 0) to regular textured foods (Level 7), thereby offering a standardized framework for dietary modification (12).

From a dental and oral health perspective, the potential cariogenicity of modified foods and beverages - their capacity to contribute to the development of dental caries - is of concern, especially with frequent consumption. Caries formation is multifactorial and involves the susceptibility of teeth, host defense against cariogenic bacteria, the presence of fermentable carbohydrates, acidogenic and aciduric bacteria, the frequency and duration of exposure,

the product pH, and the lack of protective factors like saliva (13, 14). Enamel demineralizes at a plaque-pH of 5.5, while dentin is more vulnerable, demineralizing at a pH of 6.7 (15).

Viscosity also plays a crucial role in oral health. Foods and drinks with higher viscosity tend to clear more slowly from the oral cavity, prolonging sugar exposure and potentially increasing caries risk (16). This effect may be particularly relevant in patients with reduced salivary function and compromised oral hygiene (17). On the other hand, increased viscosity reduces diffusion rates within liquids, slowing the release and availability of ingredients making them less readily available to oral bacteria and therefore reducing the rate of acidogenic processes (18). For example, honey is less cariogenic than a sucrose solution with the same sugar content because the sugars in honey are trapped in a thick matrix and often swallowed before they can contribute to tooth decay. For the same reason, thickeners have also been incorporated into potentially erosive liquids in order to reduce their erosivity and potential harm to teeth (19). Thus, thickeners may play both harmful and protective effects on dental tissues, depending on their physicochemical properties and patterns of use. Frequent exposure to carbohydrate-containing, high-viscosity commercially available oral thickening agents (OTAs) may alter plaque ecology, prolong substrate availability, and affect demineralization dynamics.

Although thickened liquids are well-established in dysphagia management, most research has focused on swallowing safety and aspiration prevention rather than oral health outcomes. Evidence regarding the intrinsic cariogenic potential of commercially available OTAs remains limited, and product-specific differences have not been systematically examined. Emerging studies suggest potential long-term oral health implications (20), but current clinical nutrition guidelines support their use.

This knowledge gap is particularly relevant in vulnerable populations requiring long-term consumption of thickened fluids who often present with reduced salivary flow, compromised oral hygiene, or increased caries susceptibility. To date, no study has specifically addressed the cariogenic potential of OTAs commonly prescribed for adults with OD in Switzerland. Given their widespread use, understanding their effects on cariogenicity, oral clearance, and pH stability is essential for optimizing oral care in this population.

The primary aim of this pilot study was to assess the cariogenic potential of commonly used oral thickening agents (OTAs) prescribed for adults with oropharyngeal dysphagia (OD) in Switzerland. A secondary objective was to compare cariogenicity indices between products. The null hypothesis was that the OTAs currently used in the dietary management of OD exhibit low to negligible intrinsic cariogenic potential.

## Materials and methods

### *Ethics committee*

This study was performed under ethics approval for the pH telemetry procedure (KEK-Zurich, BASEC-Nr.: Req-2023-01447). The OTAs were purchased in Switzerland, where they must be registered with the Federal Office of Public Health (FOPH) to be listed as Foods for Special Medical Purposes (FSMP).

### *Study design*

This study employed a comparative experimental in-vivo in situ telemetry design to assess the cariogenic potential of four OTAs in older adult volunteers. Each test product was assessed in duplicate during separate sessions without long-term follow-up, resulting in a cross-sectional repeated-measures design at the sessions level. The pilot study evaluated both absolute and relative cariogenicity using standardized intraoral plaque pH telemetry measurements conducted according to the established test protocol. Participants were recruited from the volunteer pool ( $n = 5$ ) of the test center at the Clinic of Conservative and Preventive Dentistry, Center for Dental Medicine, University of Zurich, an internationally accredited test center for plaque pH telemetry methodology.

### *Materials*

Four commercially available thickeners intended for dysphagia management were randomly selected. Pre-thickened oral nutritional supplements (ONS) for malnutrition management were explicitly excluded to avoid overlap with prior work (21). The OTAs were purchased from a local pharmacy as over the counter products (OTC; no prescription required) and were available in powder or gel form for addition to fluids. The selected products were: Multi Thick Neutral (powder; Abbott Nutritional Products, Abbott Park, Illinois, USA), Thick & Easy (powder; Fresenius Kabi Deutschland GmbH, Bad Homburg,

Germany), Thicken Up Clear (powder; Nestlé S.A., Vevey, Switzerland), and Thicken Up Gel Express (gel; Nestlé S.A., Vevey, Switzerland).

Each thickener was prepared according to the manufacturer's instructions, using tap water, to achieve the highest viscosity level for drinks, corresponding to the International Dysphagia Diet Standardisation Initiative (IDDSI) Level 4: moderately thick liquids (12). Level 4 was chosen to delay oral clearance. The solutions were brought to room temperature before use. As per the study protocol, each solution was tested in duplicate under standardized conditions to ensure result validity.

### *Methodology*

Standardized intraoral plaque pH telemetry was used to assess the cariogenic potential of the test products. A miniature pH electrode was placed on individualized partial dentures to monitor acidogenic response of plaque in situ in interdental spaces. This method is well established in the literature as a valid approach for evaluating the cariogenic potential of foods and beverages.

Each participant attended multiple test sessions. All measurements were restricted to the test period. For each volunteer, baseline plaque pH was recorded after at least 72 hours without oral hygiene. A drop in pH below 5.7 during or within 30 minutes after exposure was predefined as indicating cariogenic potential (area under the curve;  $AUC < 5.7$ ).

As per test protocol, each volunteer consumed the test product via five consecutive 1-minute sips (T1-T5). Plaque pH was monitored continuously during the 30-minute exposure period and during the subsequent water rinse to facilitate neutralization. A 10 % sucrose rinse was then administered as a positive control, followed by continuous pH monitoring for an additional 30 minutes (Recall 2). The defined time points were T1 (sip 1, minute 1), T2 (sip 2, minute 2), T3 (sip 3, minute 3), T4 (sip 4, minute 4), and T5 (sip 5, minute 5).

The data acquired included acidogenic concentration ( $\mu\text{mol}\cdot\text{min}/\text{L}$ ) and the area under the curve (AUC) for  $\text{pH} < 5.7$ . Normal distribution was confirmed using the Shapiro-Wilk test ( $p > 0.05$ ). Differences across products were analyzed by one-way ANOVA with Fisher's LSD post-hoc comparisons (significance threshold  $P < 0.05$ ).

The participants were recruited from the volunteer pool of the test center and were eligible, if they had no medications, showed missing teeth in the mandibular/molar regions replaced by a personalized removable partial denture and were exempt from active or untreated caries, periodontal disease or other oral diseases. The stimulated whole-salivary secretion rate had to be  $> 0.6$  mL/min (measured over 5 minutes by collection of saliva when chewing an inert gum base).

At the completion of all product tests, each volunteer underwent a professional dental hygiene treatment including fluoride application. The methodology followed that of a previously published study (21), with modification of repetitive sip intakes. This modification simulated sip-by-sip consumption of the product and ensured constant contact with the plaque, accounting for higher oral clearance

compared to stickier foods that are typically tested using this set-up.

## Results

Three of the five permanent volunteers from the telemetry center pool at the Clinic of Conservative and Preventive Dentistry, Center for Dental Medicine, University of Zurich (Switzerland) - two women and one man, aged 74, 91 and 76 years, respectively – provided informed consent and participated in the study. All participants met the inclusion criteria, were independently living, cognitively intact older adults, were not taking medications, and exhibited normal salivary flow. Each product was tested twice, with different volunteers participating in each session.

**Table 1.** Absolute and relative cariogenicity of the tested products.

	Product	N	M	SD	SE	95 % CI		Min	Max
						Lower	Upper		
Absolute cariogenicity	Ensure Multi-thick	2	17.61	21.02	14.87	-171.27	206.48	2.74	32.47
	Thick & Easy	2	13.70	11.99	8.48	-93.99	121.38	5.22	22.17
	Thicken Up Clear	2	18.25	0.09	0.07	17.42	19.07	18.18	18.31
	Thicken Up Gel Express	2	21.62	0.49	0.35	17.23	26.00	21.27	21.96
	Total	8	17.79	9.63	3.40	9.74	25.84	2.74	21.96
Relative cariogenicity	Ensure Multi-thick	2	0.42	0.42	0.30	-3.33	4.17	0.12	0.71
	Thick & Easy	2	0.43	0.36	0.25	-2.80	3.67	0.18	0.69
	Thicken Up Clear	2	0.68	0.08	0.06	-0.03	1.40	0.63	0.74
	Thicken Up Gel Express	2	0.81	0.15	0.11	-0.53	2.16	0.71	0.92
	Total	8	0.59	0.28	0.10	0.35	0.82	0.12	0.92

Note. N = number, M = Mean, SE = standard error, 95 % CI = 95 % confidence interval, Min = Minimum, Max = Maximum.

### Absolute cariogenicity

The absolute cariogenicity (AC) of the four tested oral thickening agents (OTAs) varied across samples (Table 1). Thicken Up Gel Express showed the highest mean AC value ( $21.62 \pm 0.49$ ), followed by Thicken Up Clear ( $18.25 \pm 0.09$ ), Ensure Multi-thick ( $17.61 \pm 21.02$ ), and Thick & Easy ( $13.70 \pm 11.99$ ). Standard deviations were notably higher for Ensure Multi-thick and Thick & Easy compared to the more consistent Thicken Up products, indicating greater variability.

Confidence intervals (95 % CI) for AC ranged widely, particularly for Ensure Multi-thick ( $-171.27$  to  $206.48$ ), suggesting a high degree of uncertainty due to the small sample size ( $N = 2$  per product). The overall mean AC for the group was  $17.79$  ( $SD = 9.63$ ), with values ranging from  $2.74$  to  $32.47$ .

### Relative cariogenicity

The relative cariogenicity (RC) showed a more uniform distribution across products compared to absolute measures (Tab. 1). Thicken Up Gel Express again demonstrated the highest RC value ( $0.81 \pm 0.15$ ), followed by Thicken Up Clear ( $0.68 \pm 0.08$ ), Thick & Easy ( $0.43 \pm 0.36$ ), and Ensure Multi-thick ( $0.42 \pm 0.42$ ). The narrow confidence intervals for the Thicken Up products indicate consistent cariogenic profile per unit of sugar, whereas the broader intervals for the other two products reflect greater variability. The overall mean RC was  $0.59$  ( $SD = 0.28$ ), with minimum and maximum values ranging from  $0.12$  to  $0.92$ . Despite differences in absolute sugar content, the products exhibited broadly similar relative cariogenic responses.

ANOVA was used to test for statistically significant differences in AC and RC between the products (Tab. 2). No statistically significant differences were

found among the four products for either AC or RC ( $P > 0.05$ ). These results indicate that, although the mean values varied among the thickeners, the differences were not statistically significant ( $P > 0.05$ ). The small sample size ( $N = 2$  per product) likely

contributed to wide confidence intervals and reduced power to detect significant effects, so these results should be interpreted as preliminary and hypothesis-generating.

**Table 2.** Parameters of ANOVA model testing difference in the absolute and relative cariogenicity between the test products.

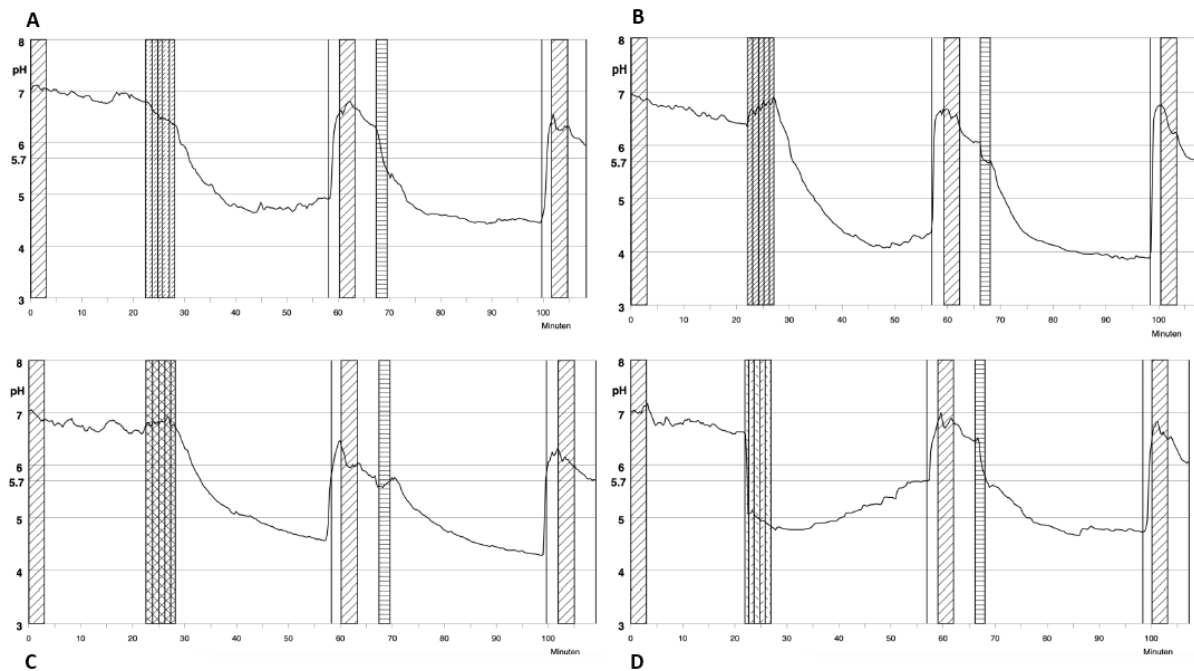
	Product	Sum of squares	df	Mean square	F	P-value
Absolute cariogenicity	Between groups	63.28	3.0	21.09	0.14	0.93
	Within groups	585.83	4.0	146.46		
	Total	649.12	7.0			
Relative cariogenicity	Between groups	0.23	3.0	0.8	0.91	0.51
	Within groups	0.33	4.0	0.8		
	Total	0.56	7.0			

Note. P-value = ANOVA; significance  $P < 0.05$ .

*pH telemetry curves*

Figure 1 illustrates example pH telemetry curves for the four tested products in a single participant. All products exhibited a biphasic pattern (sipping and recovery phase). During the sipping phase (T1–T5), each product reached the critical pH for root

demineralization (pH 6.5) in at least one of the two tests. Thicken Up Gel Express consistently demonstrated a pronounced pH drop below 5.7 during the first sip (T1). During the recovery phase (5–30 min), all products reached pH 5.7 within 15 minutes.



**Figure 1.** pH telemetry curves of the tested products in the same participant (A. Thick & Easy powder; B. Ensure Multi-thick powder; C. Thicken Up Clear powder; D. Thicken Up Gel Express).

Two characteristic pH patterns were observed. Thick & Easy and Ensure Multi-thick (both starch- and maltodextrin-based formulations), as well as Thicken Up Clear (maltodextrin/xanthan-based), showed a slow, gradual decrease in pH below 5.7, consistent with slow carbohydrate metabolism. Thicken Up Gel Express (a xanthan-based gel) demonstrated the steepest and most pronounced

initial pH drop, followed by a neutralization phase, suggesting the influence of an acid component in the formulation.

**Discussion**

This pilot comparative study evaluated the intrinsic cariogenic potential of various commercially

available thickening agents used to modify liquid consistency, particularly for individuals with dysphagia, a condition commonly affecting older adults and patients with neurological disorders. All products produced measurable acidogenic responses (AUC pH < 5.7) and moderate to high relative cariogenicity (RC) compared with a sucrose control, leading to rejection of the primary null hypothesis. While differences in AC and RC were observed among the products, statistical significance was not reached ( $P > 0.05$ ), which is likely attributable to the small pilot sample size and limited statistical power. This finding aligns with previous investigations of oral nutritional supplements showing that thickened formulations can contribute to cariogenic potential (16, 21).

The absolute cariogenicity responses (AUC pH < 5.7) indicated that all tested thickening agents could promote an acidic environment conducive to dental demineralization. The highest absolute cariogenicity was observed in Thicken Up Gel Express (mean = 21.62), followed by Thicken Up Clear (mean = 18.25), while the other two products (Ensure Multi Thick and Thick & Easy) showed slightly lower means but much greater variability, with standard deviations of 21.02 and 11.99 respectively. This may reflect more standardized manufacturing processes or more stable ingredient profiles. In contrast, the broad confidence intervals observed in the other products may indicate inconsistency in composition or reactivity, which could be clinically significant given the need for predictability in long-term use.

Meanwhile, RC, expressed as the proportion of a product's cariogenic potential in relation to the cariogenic potential of the test sugar rinse within the same test, was moderate to high across all products. While absolute cariogenicity measures the net acidogenic effect, the relative value provides a comparison of the product's cariogenic potential in relation to the established cariogenic potential of a sugar rinse. This value is particularly important in clinical contexts where even small amounts of sugars, consumed repeatedly throughout the day - as in hydration management - can contribute significantly to cumulative enamel demineralization (22, 23).

Older adults face numerous risk factors that heighten their susceptibility to dental caries (24-27). These include reduced salivary flow (often due to polypharmacy), impaired manual dexterity affecting

oral hygiene, cognitive impairment, and the presence of exposed root surfaces due to gingival recession (28-32). Saliva plays a crucial role in neutralizing acids, clearing food particles, and delivering remineralizing agents such as calcium and phosphate (33-36). In its absence, the oral environment becomes more conducive to the progression of caries. Moreover, older adults frequently have complex dental prostheses, such as crowns, bridges, or dentures, which can serve as plaque-retentive niches (37). If thickening agents are regularly consumed without adequate oral hygiene measures, these sites may become loci for demineralization and decay (38).

From a mechanistic standpoint, viscous agents by design prolong intraoral residence time. When fermentable carbohydrate components are present and salivary clearance or buffering capacity is compromised - as is common in older adults - the risk of enamel demineralization increases. Older adults face multiple caries promoting risk factors, including reduced salivary flow, impaired manual dexterity, root surface exposure, and prosthetic retention sites, meaning that even moderately cariogenic agents may have an amplified effect in this population.

Last but not least, it is important to note that commercially available thickening agents for dysphagia management frequently contain digestible carbohydrates in mixed composition - notably maltodextrins or modified starches, whereas other products are based primarily on hydrocolloids (e.g. xanthan gum, guar gum or tara gum). Because fermentable carbohydrate content drives cariogenic potential in thickened liquids and foods, both the specific carbohydrate composition and its overall carbohydrate content must be taken into account when assessing risks.

#### *Limitations*

Although this study followed a robust, standardized plaque pH telemetry protocol, several limitations inherent to its pilot design must be acknowledged. First, the small number of tests per product ( $N = 2$  tests per product across three volunteers) substantially restricts statistical power, limits the precision, and generalizability of the findings. Second, the controlled in situ plaque pH telemetry study conditions did not fully replicate the complex in-vivo oral environment, including natural variability in diet, salivary flow, oral hygiene practices, microbiota

composition, and real-world consumption patterns. Third, only four thickening agent formulations were tested despite the existence of additional products - including sugar free or alternative carbohydrate based thickeners - that may exhibit different cariogenic profiles. Furthermore, the current study also focused solely on cariogenicity and did not assess erosive potential, which may be another important factor, especially in formulations with low pH. These factors mean that the clinical recommendations below must be interpreted with caution and considered provisional until further in vivo and larger-scale studies are available.

Despite the limited sample size, the findings provide meaningful preliminary insights within the context of a pilot protocol. Plaque pH telemetry serves as a validated surrogate marker of cariogenic potential, though it does not directly measure clinical caries or erosion development. The adapted sipping protocol was designed to mimic the reduced oral clearance frequently observed in older adults, thereby enhancing the clinical relevance of the results. Although the recommended four measurements per product - required to confidently establish non-cariogenicity and achieve "tooth-friendly" certification - were not attained, this pilot study represents an important exploratory step toward identifying cariogenic risk and shaping hypotheses and methodology for larger-scale in vivo investigations.

#### *Implications for clinical practice*

While remaining mindful of these limitations, the following practice considerations may be helpful in older adults requiring thickened liquids:

1. **Product selection:** Clinicians should consider not only viscosity and palatability but also available evidence on acidogenic/cariogenic potential. Although no statistically significant differences were found in this study, the relative cariogenicity (RC) values suggest that some formulations may carry higher risk than others (21, 38), when prepared with water. Furthermore, when these thickening agents are used in combination with carbohydrate-containing foods and liquids, the cariogenic potential may be further altered - potentially raising cumulative risk (21, 38).
2. **Oral hygiene support:** Caregivers and healthcare providers should emphasize enhanced hygiene measures when thickening agents are used routinely - such as brushing

with fluoride toothpaste after meals, daily interdental cleaning, and scheduling professional dental check ups. Given that thickened fluids for hydration are often taken several times a day, the frequency and consistency of oral hygiene are critical (39, 40).

3. **Timing and frequency:** Where clinically feasible, consolidating intake of thickened fluids into fewer occasions rather than frequent small volumes may reduce the number of acidogenic episodes; subsequent oral clearance measures may assist in clearing residual substrate (18-19).
4. **Remineralizing interventions:** In patients at elevated caries risk, adjunctive preventive strategies (high fluoride toothpaste, fluoride varnish, casein phosphopeptide amorphous calcium phosphate [CPP ACP] products) may provide additional protection (41-44).
5. **Interdisciplinary collaboration:** Speech language pathologists, dietitians, dentists, geriatricians and nursing staff should work in concert to balance dysphagia management and oral health - ensuring that safe swallowing and minimal cariogenic load are jointly addressed (45-49).

#### *Future research*

Future investigations should aim to include larger samples of dysphagic older adults, expand the range of thickening agent formulations (including sugar free and alternative carbohydrate thickeners), incorporate longitudinal in-vivo clinical caries outcomes, and evaluate long term oral health effects of chronic thickened fluid consumption. Controlled prospective studies correlating acidogenic potential with incident caries development would provide stronger evidence for practice guidance.

#### **Conclusions**

The findings of this pilot study demonstrate that, although no statistically significant differences were detected among the commercial thickening agents, all showed measurable acidogenic responses and moderate relative cariogenicity that may be clinically relevant, particularly for older adults with existing oral health vulnerabilities.

Preventive oral care strategies, regular dental monitoring, informed product selection, and interprofessional collaboration are essential to minimizing caries risk while maintaining safe swallowing in

older adults requiring thickening agents. Further analyses with larger, adequately powered samples, an expanded range of formulations (including sugar-free products), and long-term clinical outcomes are needed to confirm these findings and to develop evidence-based guidance for balancing dysphagia management and oral health.

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## Zusammenfassung

Kariogenes Potenzial oraler Andickungsmittel bei Patienten mit Dysphagie: eine intraorale Plaque-pH-Telemetrie Pilotstudie.

### *Einleitung*

Das Management von Dysphagie bei älteren Menschen umfasst häufig den Einsatz oraler Andickungsmittel, um die Konsistenz von Speisen und Flüssigkeiten zu modifizieren und dadurch das Aspirationsrisiko zu reduzieren. Derzeit liegen nur begrenzte Evidenzen zum kariogenen Potenzial dieser Andickungsmittel und zu deren Auswirkungen auf die orale Gesundheit älterer Menschen vor.

### *Material und Methoden*

Diese in vivo vergleichende Pilotstudie untersuchte die Kariogenität von vier kommerziell erhältlichen Andickungsmitteln in Wasser: Ensure Multi-thick, Thick & Easy, Thicken Up Clear und Thicken Up Gel Express. Die Produkte wurden bei drei älteren Probanden mittels intraoraler Plaque-pH-Telemetrie getestet (n=8 Tests; jeweils zwei Replikate pro Produkt). Die absolute Kariogenität (AC) wurde anhand des azidogenen Potenzials (Fläche unter der pH-Kurve unter 5.7) bewertet und die relative Kariogenität (RC) relativ zu einer Zucker-Kontrollspülung (10 % Glucose) berechnet. Eine einfaktorielle Varianzanalyse (ANOVA) verglich die Mittelwerte von AC und RC zwischen den Produkten.

### *Resultate*

Alle vier Produkte zeigten messbare Kariogenität ( $AUC < 5,7$ ). Der durchschnittliche AC-Wert lag zwischen 13,70 (Thick & Easy) und 21,62 (Thicken Up Gel Express). Thicken Up Clear und Thicken Up Gel Express wiesen enge Standardabweichungen auf ( $SD = 0,09$  bzw.  $0,49$ ). Die höchsten RC-Werte wurden bei Thicken Up Gel Express ( $0,81 \pm 0,15$ ) beobachtet, gefolgt von Thicken Up Clear ( $0,68 \pm 0,08$ ), niedrigere Werte zeigten Ensure Multi-thick ( $0,42 \pm 0,42$ ) und Thick & Easy ( $0,43 \pm 0,36$ ). Die ANOVA zeigte keine statistisch signifikanten Unterschiede zwischen den Produkten ( $P > 0,05$ ).

### *Diskussion*

Innerhalb der Limitationen dieser Pilotstudie zeigten alle getesteten Andickungsmittel moderate relative Kariogenität, die für ältere Erwachsene mit bestehenden kariogenen Risikofaktoren klinisch relevant sein könnte. Diese vorläufigen Ergebnisse legen nahe, dass Produktauswahl und präventive Mundpflegestrategien bei der Verwendung von Andickungsmitteln im Dysphagiemanagement wichtig sind. Weitere Analysen mit grösseren Stichproben und in vivo Daten sind erforderlich um diese Ergebnisse zu bestätigen und zu erweitern.

## Résumé

Potentiel cariogène des agents épaississants oraux chez les patients dysphagiques: étude pilote de télémétrie du pH de la plaque intra-orale.

### *Introduction*

La prise en charge de la dysphagie chez les personnes âgées implique souvent l'utilisation d'agents épaississants oraux afin de modifier la consistance des aliments et des liquides, réduisant ainsi le risque d'aspiration. Actuellement, les données sur le potentiel cariogène de ces agents et leurs conséquences sur la santé bucco-dentaire des personnes âgées sont limitées.

### *Matériels et méthodes*

Cette étude pilote comparative in vivo a évalué la cariogénicité de quatre agents épaississants commerciaux dilués dans de l'eau: Ensure Multi-thick, Thick & Easy, Thicken Up Clear et Thicken Up Gel Express. Les produits ont été testés à l'aide de télémétrie du pH de la plaque intra-orale chez trois sujets âgés ( $n = 8$  tests; deux répliqués par produit). La cariogénicité absolue (AC) a été évaluée via le potentiel acidogène (aire sous la courbe de  $\text{pH} < 5,7$ ), et la cariogénicité relative (RC) calculée par rapport à un rinçage de contrôle à 10 % de glucose. Une ANOVA à un facteur a été utilisée pour comparer les valeurs moyennes d'AC et de RC entre les produits.

### *Résultats*

Les quatre produits ont montré une cariogénicité mesurable ( $\text{AUC} < 5,7$ ). La moyenne d'AC variait de 13,70 (Thick & Easy) à 21,62 (Thicken Up Gel Express). Thicken Up Clear et Thicken Up Gel Express présentaient des écarts-types étroits ( $\text{SD} = 0,09$  et  $0,49$  respectivement), tandis qu'Ensure Multi-thick montrait une forte variabilité ( $\text{SD} = 21,02$ ). Les valeurs de RC étaient les plus élevées pour Thicken Up Gel Express ( $0,81 \pm 0,15$ ), suivies de Thicken Up Clear ( $0,68 \pm 0,08$ ), plus faibles pour Ensure Multi-thick ( $0,42 \pm 0,42$ ) et Thick & Easy ( $0,43 \pm 0,36$ ). L'ANOVA n'a révélé aucune différence statistiquement significative entre les produits ( $P > 0,05$ ).

### *Discussion*

Dans les limites de cette étude pilote, tous les agents épaississants testés ont montré une cariogénicité relative modérée, susceptible d'être cliniquement pertinente chez les personnes âgées présentant des facteurs de risque cariogéniques. Ces résultats préliminaires suggèrent que le choix des produits et les stratégies préventives de soins bucco-dentaires sont importants lors de l'utilisation d'agents épaississants dans la prise en charge de la dysphagie. Des analyses supplémentaires, avec des échantillons plus larges et des données cliniques in vivo, sont nécessaires pour confirmer et étendre ces résultats.

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