Scientific article

Influence of two paraffin wax chewing gums with different consistencies on the stimulated salivary flow rate

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Keywords
dry mouth, xerostomia, oligosialia, hyposalivation, sialometry, stimulated salivary flow rate, paraffin wax chewing gum

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Abstract
This study investigated and compared the consistency and compressive strength of two commercially available paraffin wax chewing gums (Aurosan (AU) and GC Europe (GC)), as well as their impact on stimulated salivary flow rate. Instrumental texture analysis was utilized to assess the consistency and compressive strength of AU and GC during a 7-min chewing period. Subsequently, stimulated salivary flow rate (sSFR) was evaluated in healthy subjects using AU and GC over a 7-minute period. The compressive strengths from the preliminary test were compared over time with the sialometry data. Eighty-one test subjects, comprising 33 men and 48 women, participated. Over the 7-min measurement period, differences were observed in the total amount of saliva accumulated per minute. Direct comparison of AU and GC revealed that regardless of age and gender, the amount of saliva formed after 1 min was 0.63 times less with AU than with GC (95% CI: 0.56 - 0.70; \( P < 0.001 \)). The accumulated saliva volume with AU was also significantly lower than that with GC in the first 4 min (\( P = 0.016 \)). However, from minute 5 onwards, the two products no longer showed statistical differences in the total amount of saliva. Comparison of the compressive strength of AU and GC showed that the values after 1 and 2 min were significantly higher for AU than for GC (\( P < 0.05 \)); for all other time points, the compressive strength was higher for GC. In the mixed-effects model after log-transformation of compressive strength and saliva volume, GC exhibited decreasing saliva volumes with increasing compressive strength (\( P < 0.001 \)). Conversely, the opposite was observed for AU (\( P = 0.019 \)). The study suggests that the consistency or compressive strength of paraffin wax chewing gums from different manufacturers could impact sSFR.
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Introduction

A dry mouth is a common condition, with 16 to 63% of the population reporting symptoms (1). The prevalence increases with age. Women are affected more frequently than men (2). The most common cause of dry mouth is medication-induced salivary gland dysfunction (MISGD) (3). However, local or systemic diseases can also cause or exacerbate dry mouth (4).

Strictly speaking, the term “dry mouth” is only an umbrella term. Xerostomia describes a subjective sensation of dry mouth, while hyposalivation refers to an actual reduction in saliva production, and oligosialia is a reduction in saliva flow (1, 5, 6). This differentiation is important as not all patients with xerostomia necessarily have hyposalivation or oligosialia and vice versa (7, 8, 9). Most patients report xerostomia when there is a reduction of 50% in the stimulated salivary flow (10).

Salivary flow rate measurement (sialometry) is conducted if dry mouth is suspected as part of saliva diagnostics. The unstimulated salivary flow rate (uSFR) and/or the stimulated salivary flow rate (sSFR) are measured over 5 to 15 minutes. Differentiating between these rates is important, as restrictions in the uSFR and/or sSFR can indicate different causes (1). The reference values from Ericson & Hardwick (11) are often used as a reference for the uSFR and sSFR (uSFR: < 0.1 ml/min very low/hyposalivation, 0.1 - 0.25 ml/min low/oligosalia, 0.25 - 0.35 ml/min normal/normosalivation, sSFR: < 0.7 ml/min very low/hyposalivation, 0.7 - 0.9 ml/min low/oligosalia, 1 - 2 ml/min normal/normosalivation). However, defining these threshold values is challenging due to intra-individual (e.g., time of day, hydration) and inter-individual (e.g., gender, age, body weight, and size of the salivary glands) fluctuations (1). Consequently, other limit values exist in the literature (1, 12, 13, 14, 15, 16, 17, 18, 19, 20).

Tasteless paraffin wax chewing gums are used to measure the sSFR by stimulating salivary flow through mastication. However, the manufacturing of these gums is not subject to ISO standards. Variations in the consistency or compressive strength of available paraffin wax gums could influence the sSFR results and, consequently, the diagnosis of hyposalivation or oligosialia. At the very least, one study suggests that increasing chewing force increases saliva secretion (21). This variability could also have insurance-related consequences if the choice of paraffin wax gum influences the measurement result or the diagnosis.

This study aimed to analyze two paraffin wax gums currently available on the dental market, focusing on their consistency, compressive strength, and influence on the sSFR.

Materials and methods

The present study was conducted at the Centre for Saliva Diagnostics, Hyposalivation and Halitosis of the University Centre of Dental Medicine Basel. It was reviewed and approved by the Ethics Committee of Northwestern and Central Switzerland (Study ID: 2020-00470).

Adult, healthy, non-smoking volunteers were recruited. Additionally, the subjects could not to be pregnant or take regular medication (excluding contraceptives) during the study. Prior to the examination, the test subjects completed a health form with specific questions regarding their age, height, and weight, current stress levels, and whether they felt they had a dry mouth.
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Paraffin wax chewing gum

The paraffin wax chewing gums from Aurosan GmbH, Essen, Germany (AU) and from GC Europe, Tallak, Austria, included in the Saliva-Check Buffer (GC) saliva diagnostics set were used for the two-part test (instrumental texture analysis and sialometry). According to Aurosan and GC Europe, the main ingredient of these chewing gums is paraffin wax. Additional ingredients remain unknown or have yet to be disclosed by the manufacturers. The two paraffin wax chewing gums differed in shape, consistency, and flavor. Aurosan's chewing gum had a homogeneous cylindrical mass, while GC's chewing gum consisted of a firmer coating with a softer center and a slightly sweet taste, resembling an oval, chewy sweet.

Instrumental texture analysis

As part of the preliminary study, the consistency and changing compressive strength of the paraffin wax chewing gums AU and GC during chewing were analyzed using the chewing simulator (Universal testing machine, Z020, Zwick/Roell, Ulm, Germany). The chewing simulator set the penetration depth to 50% (= 3 mm) and the contact pressure time to one second with a pre-force of 0.2 N.

The first measurement was taken on an unchewed piece of paraffin wax chewing gum. This was then chewed in the authors' mouths for one minute at a frequency of once per second and returned to its original shape with the help of a mold. Another measurement of the compressive strength in the chewing simulator followed. This process was repeated seven times for each paraffin wax chewing gum to mimic the process of sialometry (2 minutes pre-chewing time and 5 minutes measuring time). A total of ten samples of both paraffin wax chewing gums were analyzed. The different behaviors of the paraffin wax chewing gums during the instrumental texture analysis prompted the in-situ investigation using sialometry.

Sialometry (sSFR)

The sialometry, or testing of the respective paraffin wax chewing gums, occurred between 8 a.m. and 11 a.m. Only one of the two paraffin wax chewing gums was tested per day, and the sequence of the paraffin wax chewing gums was randomized.

As part of the preparation, the test subjects were not allowed to eat, chew gum, drink, smoke, or practice oral hygiene for 90 minutes before the sialometry. The sialometry was performed in a standardized sitting position with the head bent forward. The total measurement time was seven minutes: two minutes of "pre-chewing time" to stimulate saliva flow and five minutes corresponding to the regular measurement time of a sialometry. During this time, the paraffin wax chewing gums had to be chewed at a frequency of once per second, and the secreted saliva spit into a cup. The results were then analyzed using a precision balance (T-1479J, Tanita, Tokyo, Japan).

Statistics
The descriptive statistics comprised mean values (SD), median values (IQR), or frequency values (proportion) with corresponding significance tests (Kruskal-Wallis test).

The difference in the measured saliva volume was calculated separately for each time point. In rare cases (< 1%), the differences in saliva volume were ≤ 0 ml/min. These values were then set to 0.1 ml/min to enable a log transformation for the regression analysis. A linear mixed-effects model was calculated to compare the paraffin wax chewing gums AU and GC over time. The regression model had a nested design to estimate separate geometric means for each time point. In addition, 95% CIs and the corresponding P-value were provided.

The regression model was also adjusted for age and gender. A P-value < 0.05 was considered statistically significant, and P < 0.001 indicated a highly significant statistical difference. The values were log-transformed and analyzed using a mixed linear model to compare the products in terms of compressive strength values or salivary flow rate. The regression model had a nested design to obtain the effects at each time point. The back-transformed estimators are ratios between the two products or per unit compressive strength (for the model of the preliminary study) with a 95% confidence interval and p-value. An adjustment of the significance level for multiple comparisons was omitted due to the descriptive nature of the study. All analyses were conducted using the statistical program R version 4.1.3 (22).

Results
A total of 81 participants took part in this study. Of these, 33 were men (41%) with a median age of 30 years (IQR 26 - 56) and 48 were women (59%) with a median age of 27 years (IQR 25 - 32.8).

Instrumental texture analysis
The decrease in the compressive strength of AU in correlation with time (Fig. 1) was strongest in the first minute. Subsequently, it continued to decrease with lower pressure differences (160 N, 100 N, 92 N, 88 N, 84 N, 79 N, 79 N and 78 N).
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Figure 1: Compressive strength of AU over the measurement period of seven minutes.

GC also showed an initial drop in pressure in the first minute (Fig. 2). However, this then increased continuously with lower pressure differences (721 N, 54 N, 76 N, 91 N, 109 N, 113 N, 121 N, and 135 N).

Figure 2: Compressive strength of GC over the measurement period of seven minutes.

Both paraffin wax chewing gums showed a decrease in compressive strength in the first minute, with the effect being more pronounced for GC than for AU. From the 1st to the 7th minute, the compressive strength of GC increased continuously, whereas AU showed a continuous decrease (Fig. 3). When comparing the compressive strengths of AU and GC (Tab. I),
the values at minute 1 and minute 2 were significantly higher for AU than for GC ($P < 0.05$); for all other time points, the compressive strength was higher for GC.

Figure 3: Comparison of the compressive strength of AU and GC.

Table I: Ratio of the compressive strength of AU and GC from minute 0 to minute 7.

<table>
<thead>
<tr>
<th></th>
<th>Ratio</th>
<th>95% CI</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>4.631</td>
<td>4.039 – 5.310</td>
<td>&lt; 0.001**</td>
</tr>
<tr>
<td>1 min</td>
<td>0.556</td>
<td>0.485 – 0.638</td>
<td>&lt; 0.001**</td>
</tr>
<tr>
<td>2 min</td>
<td>0.862</td>
<td>0.751 – 0.988</td>
<td>0.033*</td>
</tr>
<tr>
<td>3 min</td>
<td>1.095</td>
<td>0.955 – 1.256</td>
<td>0.191</td>
</tr>
<tr>
<td>4 min</td>
<td>1.359</td>
<td>1.185 – 1.558</td>
<td>&lt; 0.001**</td>
</tr>
<tr>
<td>5 min</td>
<td>1.492</td>
<td>1.301 – 1.711</td>
<td>&lt; 0.001**</td>
</tr>
<tr>
<td>6 min</td>
<td>1.594</td>
<td>1.390 – 1.828</td>
<td>&lt; 0.001**</td>
</tr>
<tr>
<td>7 min</td>
<td>1.823</td>
<td>1.590 – 2.090</td>
<td>&lt; 0.001**</td>
</tr>
</tbody>
</table>

(*$P < 0.05$, **$P < 0.001$)

Sialometry

When analyzing the products in detail, it was found that the summed saliva volumes [g] from minute 1 to minute 7 differed significantly ($P < 0.001$) from minute to minute for both GC and AU (Table II, Fig. 4).
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Table II: Summarized saliva quantity of the paraffin wax chewing gums AU and GC in [g].

<table>
<thead>
<tr>
<th>Product</th>
<th>1 min Median (IQR)</th>
<th>2 min Median (IQR)</th>
<th>3 min Median (IQR)</th>
<th>4 min Median (IQR)</th>
<th>5 min Median (IQR)</th>
<th>6 min Median (IQR)</th>
<th>7 min Median (IQR)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU</td>
<td>1.56 (0.97 – 2.44)</td>
<td>2.86 (2.04 – 4.43)</td>
<td>4.11 (3.19 – 5.91)</td>
<td>5.73 (4.17 – 7.61)</td>
<td>7.08 (5.27 – 9.51)</td>
<td>8.47 (6.19 – 11.37)</td>
<td>9.75 (7.26 – 13.31)</td>
<td>&lt; 0.001**</td>
</tr>
<tr>
<td>GC</td>
<td>2.57 (1.91 – 3.68)</td>
<td>4.23 (3.26 – 6.22)</td>
<td>5.64 (4.18 – 7.93)</td>
<td>6.67 (5.21 – 8.94)</td>
<td>7.65 (6.06 – 10.35)</td>
<td>8.75 (6.69 – 12.38)</td>
<td>9.66 (7.52 – 13.99)</td>
<td>&lt; 0.001**</td>
</tr>
</tbody>
</table>

(*P < 0.05, **P < 0.001)

Figure 4: Summed saliva volume of the paraffin wax chewing gums AU and GC in [g].

Regarding the saliva difference between two consecutive time points, significant differences (P < 0.001) were only found from minute to minute for GC’s paraffin wax chewing gum (Table III, Fig. 5).
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Table III: Saliva difference of paraffin wax gum AU and GC between two consecutive time points.

<table>
<thead>
<tr>
<th></th>
<th>1 min Median (IQR)</th>
<th>2 min Median (IQR)</th>
<th>3 min Median (IQR)</th>
<th>4 min Median (IQR)</th>
<th>5 min Median (IQR)</th>
<th>6 min Median (IQR)</th>
<th>7 min Median (IQR)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU</td>
<td>1.56 (0.97 – 2.44)</td>
<td>1.26 (1.00 – 1.99)</td>
<td>1.39 (0.98 – 1.74)</td>
<td>1.4 (1.03 – 1.83)</td>
<td>1.33 (1.00 – 1.86)</td>
<td>1.36 (0.95 – 1.86)</td>
<td>1.32 (1.01 – 1.85)</td>
<td>0.688</td>
</tr>
<tr>
<td>GC</td>
<td>2.57 (1.91 – 3.68)</td>
<td>1.65 (1.26 – 2.47)</td>
<td>1.28 (0.97 – 2.01)</td>
<td>1.09 (0.87 – 1.72)</td>
<td>1.03 (0.74 – 1.48)</td>
<td>0.99 (0.67, 1.54)</td>
<td>1.00 (0.79 – 1.47)</td>
<td>&lt; 0.001**</td>
</tr>
</tbody>
</table>

(*P < 0.05, **P < 0.001)

![Figure 5: Saliva difference of the paraffin wax gums AU and GC between two consecutive time points in [g].](image)

The direct comparison of AU and GC showed that regardless of age and gender, the amount of saliva formed after 1 minute was significantly 0.63 times smaller with AU than with GC (95% CI: 0.56 - 0.70; P < 0.001). In the first 4 minutes, the total amount of saliva was significantly lower with AU than with GC (P = 0.016). From the 5th minute onwards, the two paraffin wax chewing gums, AU and GC, approached each other regarding the total amount of saliva and no longer differed statistically. A linear mixed-effects model was calculated (Tab. IV), in which...
the log-transformed saliva values for the two products were compared separately for each time point (nested design).

Table IV: Ratio of the summed saliva volumes of AU and GC from minute 1 to minute 7.

<table>
<thead>
<tr>
<th></th>
<th>Ratio</th>
<th>95% CI</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 min</td>
<td>0.629</td>
<td>0.564 – 0.701</td>
<td>&lt; 0.001**</td>
</tr>
<tr>
<td>2 min</td>
<td>0.771</td>
<td>0.638 – 0.792</td>
<td>&lt; 0.001**</td>
</tr>
<tr>
<td>3 min</td>
<td>0.795</td>
<td>0.714 – 0.885</td>
<td>&lt; 0.001**</td>
</tr>
<tr>
<td>4 min</td>
<td>0.876</td>
<td>0.787 – 0.976</td>
<td>0.016*</td>
</tr>
<tr>
<td>5 min</td>
<td>0.941</td>
<td>0.845 – 1.048</td>
<td>0.270</td>
</tr>
<tr>
<td>6 min</td>
<td>0.991</td>
<td>0.890 – 1.104</td>
<td>0.870</td>
</tr>
<tr>
<td>7 min</td>
<td>1.028</td>
<td>0.924 – 1.145</td>
<td>0.609</td>
</tr>
</tbody>
</table>

(*P < 0.05, **P < 0.001)

In 16 of 81 test subjects (19.8%), the two results of the sSFR of AU and GC differed to such an extent that this influenced the diagnosis of normosalivation, hyposalivation or oligosialia (limit values < 1ml/min (11)).

**Correlation of the saliva difference to the compressive strength**

In GC, there was a negative correlation between the saliva difference and increasing compressive strength, i.e., the higher the pressure, the less saliva was produced. An increase of 10 N led to a ratio of 0.90 (95% CI: 0.89 - 0.91; P < 0.001). The opposite was true for AU, although the effect was less pronounced. An increase of 10 N resulted in a ratio of 1.05 (95% CI: 1.01 - 1.09; P = 0.019) (Fig. 6).
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Figure 6: Correlation of saliva differences to compressive strength for AU (dark circle) and GC (pale circle).

Discussion

The standard limit values used today in sialometry were published by Ericsson and Hardwick in 1978 (11). They defined the following limits: an sSFR of 1-2 ml/min corresponds to normosalivation, a reduced sSFR of between 0.7 and 0.9 ml/min indicates hyposalivation, and an sSFR ≤ 0.7 ml/min indicates severe hyposalivation or oligosialia. These thresholds are recognized by the Fédération Dentaire Internationale (FDI) as well as most insurance companies and are still used for reimbursements decisions (1). However, the original paper does not precisely explain how these limits were determined. Additionally, other limit values for the sSFR in the literature vary between 0.1 and 0.7 ml/min (20, 23, 24, 25). These different thresholds are attributed to inter- and intraindividual factors influencing the salivary flow rate such as gender, age, body weight, salivary gland size, circadian rhythm, and hydration level (1, 26). Therefore, determining such limit values is challenging.

In the present investigations, differences were found between AU and GC regarding compressive strength, saliva volume, and saliva difference per minute. No statistical difference was observed in the total amount of saliva from minute 5 onwards. The total saliva amount represents the saliva collected from minute 0 to minute 7, while the saliva difference indicates the change in saliva amount between consecutive time points. A peak in the saliva flow rate was
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noted in the first minute of both paraffin wax chewing gums, reflecting significant pressure differences in the instrumental texture analysis of AU and GC. Other studies reached similar conclusions (12, 19, 27, 28). Due to substantial variance at the beginning of an sSFR measurement, the pre-chewing time is critical in sialometry. The first 2 minutes of a sialometry serve as the pre-chewing time to homogenize the paraffin wax gum’s consistency through chewing. Thus, the pre-chewing time is not included in the final saliva flow rate evaluation (1).

The sSFR pattern observed in this study, characterized by an initial sharp rise followed by a gradual leveling off, aligns with previous literature observations. Dawes & Kubieniec (29) had subjects chew different gums for two hours and collected saliva after 2-5 minutes each time. The sSFR initially rose and then stabilized to a lower plateau after 35-40 minutes (29).

In the preliminary instrumental texture analysis, AU and GC showed differences in compressive strength over seven minutes. Initially, both gums experienced a drop in compressive strength. While AU’s compressive strength decreased after the first minutes, GC’s increased continuously. These differences likely result from their varying compositions.

Some subjects noted differences between AU and GC: GC had a firmer outer shell with a softer interior and a slightly sweet, peppermint-like flavor, while AU was described as a tasteless, homogeneous mass resembling candle wax. Literature indicates that flavor and mechanical stimuli, such as the size and shape of chewing gum, influence the salivary flow rate (27, 29). The texture or composition of chewing gum could significantly impact sialometry.

Although both gums reported contain paraffin wax as the main component, their compositions differ significantly. Despite repeated inquiries, the manufacturers Aurosan and GC Europe did not disclose the exact compositions. It is also noteworthy that paraffin wax chewing gums lack ISO standards for sSFR measurement.

Regarding saliva amount and compressive strength, a negative correlation was observed with GC, where higher pressure corresponded to lower saliva amount. AU showed a positive correlation, albeit weaker. A positive correlation between saliva amount and compressive strength supports Yeh et al.’s (21) findings, indicating increased chewing force leads to increased saliva secretion (21). The negative correlation with GC can be explained by its significantly higher initial compressive strength (714.7 N) compared to AU (153.7 N), but after the first minute, it dropped (53.7 N) well below AU’s value (95.9 N). Thus, the correlation was analyzed considering saliva amount and compressive strength after the first minute, not the initial period.

It is assumed that chewing mass consistency and flavor affect saliva production over time. However, assessing this effect’s strength on sialometry and its impact on diagnosing hyposalivation or oligosialia remains challenging. This study observed that the choice of paraffin wax influenced the diagnosis of hyposalivation or oligosialia (threshold < 1 ml/min) in 16 of 81 healthy volunteers, suggesting that chewing gum selection affects diagnosis in healthy individuals. The lack of specific ISO standards for paraffin wax gum production complicated product comparison. If only food regulations are considered, the composition of such gums could vary widely.
To summarize, AU and GC paraffin wax gums differ mainly at the beginning of a saliva flow rate measurement. Significant differences in saliva amount were observed in the first 4 minutes, and considerable differences in compressive strength were noted, particularly in the first minute. This emphasized the importance of a longer pre-chewing time than the previously recommended 1-2 minutes for direct comparison. Further studies are needed for more precise conclusions. Additionally, ISO standards for producing paraffin wax gums should be introduced to ensure quality standards in sialometry.

Conclusions

Two paraffin wax chewing gums available on the dental market, AU and GC, were analyzed for their consistency, compressive strength, and influence on the sSFR. Initially, the gums were examined in a chewing simulator over 7 minutes to determine their compressive strength.

Due to the varying results, sialometry was conducted in a second step. Eighty-one test subjects performed sialometry with both gums on two different days. Differences were found in consistency, compressive strength, saliva amount, and the saliva difference. The preliminary test showed an initial drop in compressive strength for both gums, but after one minute, GC’s strength increased continuously, while AU’s decreased. GC showed a negative correlation between saliva amount and compressive strength, while AU showed a positive correlation. It can be cautiously concluded that a gum’s consistency or compressive strength could influence the stimulated salivary flow rate. Further studies are required to clarify this effect, and standardize ISO production standards should be introduced to ensure comparability in sialometry. Without these standards, reliable diagnoses cannot be made, affecting reimbursement decisions by health insurance companies.
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Material und Methoden

Resultate
In der Messperiode von 7 Minuten gab es Unterschiede bei der Speicheldifferenz und der pro Minute aufsummierten Speichel mengen. Der direkte Vergleich von AU und GC zeigte: Unabhängig von Alter und Geschlecht war die gebildete Speichelmenge nach 1 Minute mit AU signifikant 0,63 mal kleiner als mit GC (95% CI: 0,56 - 0,70; P < 0,001). In den ersten 4 Minuten war die aufsummierte Speichelmenge von AU signifikant niedriger als mit GC (P = 0.016). Ab der 5 Minute haben sich die beiden Produkte bezüglich der aufsummierten Speichelmenge nicht mehr statistisch unterschieden. Im Vergleich der Druckfestigkeit von AU und GC zeigte sich, dass die Werte bei Minute 1 und Minute 2 für AU signifikant höher sind als bei GC (P < 0,05), für alle anderen Zeitpunkte war die Druckfestigkeit bei GC höher. Im Mixed-effects Modell nach Log-Transformation der Druckfestigkeit und Speichelmenge, zeigte GC bei steigender Druckfestigkeit sinkende Speichel mengen (P < 0.001), bei AU war es umgekehrt (P = 0.019).

Diskussion

Résumé
Introduction
La sécheresse buccale est un symptôme courant. En réalité, le terme « sécheresse buccale » est générique. La xérostomie décrit la sensation subjective de bouche sèche, tandis que l’hyposalivation fait référence à une réduction effective de la production de salive et l’oligosalivation à une diminution du flux salivaire. Cette distinction est cruciale, car les patients souffrant de xérostomie ne présentent pas nécessairement une hyposalivation ou une oligosalivation,
et vice versa. En cas de suspicion de sécheresse buccale, le taux d’écoulement salivaire est mesuré dans le cadre du diagnostic salivaire (sialométrie). Pour ce faire, des gommes à mâcher en cire de paraffine au goût neutre sont utilisées afin de déterminer le taux de sécrétion salivaire stimulé (sSFR) par la mastication. Toutefois, la fabrication de ces gommes à mâcher n’est pas soumise à des normes ISO. Les variations de consistance ou de résistance à la compression des gommes à mâcher en cire de paraffine disponibles sur le marché dentaire peuvent influencer le sSFR et, par conséquent, le diagnostic d’hyposalivation ou d’oligosalivation. L’objectif de cette étude était d’analyser deux types de gommes à mâcher en cire de paraffine actuellement disponibles sur le marché dentaire en termes de consistance, de résistance à la compression, et leur influence sur le sSFR.

Matériel et méthodes
Les gommes à mâcher en cire de paraffine d’Aurosan GmbH (AU) et de GC Europe (GC) ont été analysées. Le dispositif expérimental comprenait un examen préliminaire (analyse de texture instrumentale) et une sialométrie. L’analyse instrumentale de la texture a permis d’examiner la consistance ou la résistance à la pression des gommes AU et GC après mastication. Les auteurs ont mâché le même chewing-gum en cire de paraffine pendant un total de 7 minutes. Après chaque minute, la résistance à la compression/consistance des gommes à mâcher a été analysée ex vivo à l’aide d’un simulateur de mastication. En raison des données divergentes, une sialométrie pour les gommes AU et GC a été réalisée à différents jours chez 81 sujets sains dans le cadre d’un essai ultérieur. Les sSFR induits par les différents chewing-gums en cire de paraffine ont été mesurés sur une période de 7 minutes. Les paramètres suivants ont été évalués statistiquement : taux d’écoulement salivaire stimulé par minute (différence de salive) et quantité de salive cumulée par minute. Les résistances à la pression du pré-test ont été comparées dans le temps avec les données de la sialométrie.

Résultats
Pendant la période de mesure de 7 minutes, il y avait des différences dans la quantité de salive produite par minute et dans les quantités de salive cumulées par minute. La comparaison directe des gommes AU et GC a montré que, indépendamment de l’âge et du sexe, la quantité de salive produite après 1 minute était significativement 0,63 fois plus faible avec l’AU qu’avec la GC (IC à 95% : 0,56 - 0,70 ; P < 0,001). Au cours des 4 premières minutes, la quantité de salive cumulée était significativement plus faible avec l’AU qu’avec la GC (P = 0,016). À partir de la 5ème minute, les deux produits ne se différenciaient plus statistiquement en termes de quantité de salive cumulée. La comparaison de la résistance à la pression des gommes AU et GC a montré que les valeurs à la minute 1 et à la minute 2 étaient significativement plus élevées pour l’AU que pour le GC (P < 0,05), alors que pour tous les autres moments, la résistance à la pression était plus élevée pour le GC. Dans le modèle à effets mixtes après transformation logarithmique de la résistance à la pression et de la quantité de salive, la GC montrait une diminution de la quantité de salive lorsque la résistance à la pression augmentait (P < 0,001), alors que c'était l'inverse pour l'AU (P = 0,019).

Discussion
Les gommes à mâcher en cire de paraffine AU et GC se distinguent surtout au début de la mesure du taux d’écoulement de la salive. La quantité de salive était significativement différente au cours des 4 premières minutes, et une différence plus marquée a également été
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constatée en termes de résistance à la compression, surtout au cours de la première minute. Ce résultat souligne l’importance du temps de pré-mâchage. Pour une comparaison directe, celui-ci devrait être plus long que les 1 à 2 minutes recommandées jusqu’à présent. De plus, des normes ISO devraient être introduites pour la fabrication de gommes à mâcher en cire de paraffine, afin de garantir un standard de qualité en matière de sialométrie.

Acknowledgements

We would like to thank Dr. Urs Simmen for conducting the statistical analysis. The authors declare that they have no conflict of interest.

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