Objective: The aim of this study was to determine the correlation between the diameter D0 of gutta-percha points from three different commercial brands (Tanari Man, Cone Tech and Dentsply) and their original respective values. 

Materials and methods: A high precision micrometer was used by a single calibrated operator to evaluate if the gutta-percha points are in agreement with the n. 57 ANSI/ADA specification. 

Results: For the 0.04 tapered points, Cone Tech showed lower percentage of inadequate points (52%), followed by Dentsply (56%) and Tanari (80%). For the 0.06 tapered points, Cone Tech showed lower percentage of inadequate points (50%), followed by manufacturers Dentsply (53%) and Tanari (81%). 

Conclusions: It can be concluded that there is no standardization in the diameter D0 of the gutta-percha points of different commercial brands.

Keywords: Gutta-percha points. Taper. Filling material.

Resumo

Objetivo: O objetivo deste estudo foi determinar a correlação entre o diâmetro D0 dos cones de guta-percha de três diferentes marcas comerciais (Tanari Man, Cone Tech e Dentsply) com seus respectivos valores originais.
Thus, the aim of this study was to evaluate the tip diameter \( D_0 \) of 0.04 and 0.06 tapered gutta-percha points from different commercial brands, since endodontic treatment success depends on adequate apical sealing.

Materials and methods

To conduct this study, gutta-percha points of the following manufacturers were used: Tanari Man (Manacapuru, AM, Brazil), Cone Tech (Manaus, AM, Brazil) and Dentsply (Dentsply/Maillefer, Tulsa, OK, USA), being three boxes of 0.04 tapered points and three boxes of 0.06 tapered points from different lots of each manufacturer, totaling 1,080 points. The diameter \( D_0 \) of each gutta-percha cone was measured with the aid of a high precision micrometer by a single and trained operator, under the same conditions. To verify the standardization regarding to the n. 57 ANSI/ADA specification, a sample mean with known standard deviation and level of confidence of 95% for each diameter \( (15, 20, 25, 30, 35, 40) \) was prepared for each manufacturer evaluated in this study. After obtaining the sample mean, the results were considered inappropriate if the value specified were outside the tolerance established by n. 57 ANSI/ADA specification. The values were recorded in millimeters and submitted to statistical analysis (Student’s-t test, \( p < .05 \)) to compare the correlation of the diameter of the gutta-percha points with the standardization of nickel-titanium instruments.

Results

The data are shown in Table 1.
Tip diameter of 0.04 and 0.06 tapered gutta-percha points from different commercial brands

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It is important to evaluate the diameter $D_0$ of the gutta-percha points because it is a critical region and it is responsible for the fitting or locking in the apical filling limit of the prepared root canal (1-3). Ideally, the gutta-percha points should have the same diameter as the last file used at the working length (8, 9). Thus, the correlation between the diameter of the master gutta-percha points and the endodontic instruments facilitates and improves the obturation quality of the root canal systems (8).

The high percentage of the number of inadequacies of the diameter $D_0$ among the points of the same taper found in this study showed a great variation in the initial diameter of the gutta-percha points. This shows that despite standardization, some manufacturers fabricate points that are below expectations, which may lead to an increase in working time and cause clinical failures during treatment (1, 5, 6).

In this study, the gutta-percha points fabricated by Tanari presented the largest number of inadequate points, which is in disagreement with the mentioned studies. This shows that the results may depend on the lots studied, manufacturing system (manual or mechanical) and the quality control inside and outside the company (8).

**Table 1** - Comparison of the mean values of the tip diameter of gutta-percha points in relation to the standard values for diameter $D_0$

<table>
<thead>
<tr>
<th>Manufacturer/taper</th>
<th>Standard</th>
<th>Dentsply (0.04)</th>
<th>Dentsply (0.06)</th>
<th>Tanari (0.04)</th>
<th>Tanari (0.06)</th>
<th>Cone tech (0.04)</th>
<th>Cone tech (0.06)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td></td>
<td>Mean + SD</td>
<td>Mean + SD</td>
<td>Mean + SD</td>
<td>Mean + SD</td>
<td>Mean + SD</td>
<td>Mean + SD</td>
</tr>
<tr>
<td>0.15</td>
<td>30</td>
<td>0.14 ± 0.01</td>
<td>0.15 ± 0.02</td>
<td>0.17 ± 0.02</td>
<td>0.17 ± 0.02</td>
<td>0.17 ± 0.02</td>
<td>0.17 ± 0.03</td>
</tr>
<tr>
<td>0.20</td>
<td>30</td>
<td>0.20 ± 0.01</td>
<td>0.20 ± 0.01</td>
<td>0.25 ± 0.03</td>
<td>0.20 ± 0.03</td>
<td>0.25 ± 0.05</td>
<td>0.22 ± 0.03</td>
</tr>
<tr>
<td>0.25</td>
<td>30</td>
<td>0.26 ± 0.01</td>
<td>0.25 ± 0.01</td>
<td>0.26 ± 0.02</td>
<td>0.30 ± 0.04</td>
<td>0.28 ± 0.04</td>
<td>0.28 ± 0.04</td>
</tr>
<tr>
<td>0.30</td>
<td>30</td>
<td>0.32 ± 0.03</td>
<td>0.31 ± 0.02</td>
<td>0.27 ± 0.03</td>
<td>0.28 ± 0.03</td>
<td>0.30 ± 0.03</td>
<td>0.28 ± 0.02</td>
</tr>
<tr>
<td>0.35</td>
<td>30</td>
<td>0.36 ± 0.01</td>
<td>0.33 ± 0.02</td>
<td>0.29 ± 0.04</td>
<td>0.32 ± 0.05</td>
<td>0.35 ± 0.02</td>
<td>0.34 ± 0.01</td>
</tr>
<tr>
<td>0.40</td>
<td>30</td>
<td>0.41 ± 0.01</td>
<td>0.42 ± 0.02</td>
<td>0.39 ± 0.04</td>
<td>0.37 ± 0.03</td>
<td>0.41 ± 0.02</td>
<td>0.41 ± 0.01</td>
</tr>
<tr>
<td>Inadequate</td>
<td></td>
<td>56%</td>
<td>53%</td>
<td>80%</td>
<td>81%</td>
<td>52%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Source: Research data.
The manufacturers Cone Tech and Dentsply presented less inadequate points whereas Tanari Man presented the highest number of inadequate ones. Therefore, long-term follow-up of the quality of these points is imperative, as well as a providing feedback of search results to the company in order for the manufacturers to be informed of the quality of their products and the need to improve them and maintain long-term quality (7, 9).

As observed, the results obtained corroborate the several findings in the literature, showing that there is an inaccuracy or large variation in the diameter $D_0$ of the gutta-percha points, which reinforces the importance of using filling cements and thermoplasticized techniques to correct defects and failures in the obturation procedure (7, 9). With the lack of precision in the diameter of the master gutta-percha points, the professional is required to seek for resources to approximate the tip diameter of the cone with the diameter of the last instrument used to prepare the apical stop.

References


Received: 08/18/2011
Recebido: 18/08/2011
Approved: 08/28/2011
Aprovado: 28/08/2011