ANALYSIS OF THE SURFACE OF DENTAL PASTES IMPREGNATED WITH LATEX FROM *MACLURA TINCTORIA* (L.) GAUD. (MORACEAE) USING SCANNING ELECTRON MICROSCOPY (SEM) AND EDX MICROANALYSIS

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ABSTRACT
Dental pastes play a fundamental role in clinical practice, being used in different procedures and combinations. This experimental study, which collected *Maclura tinctoria* latex in the region of Terezópolis de Goiás and analyzed it by scanning electron microscopy (SEM), aimed to analyze the external surface of pastes containing calcium hydroxide associated with *Maclura tinctoria* latex and compare them with calcium hydroxide pastes associated with saline solution and isolated *M. tinctoria* latex. The results showed that the calcium hydroxide + M. tinctoria latex paste (24 hours and 6 months) presented irregular surfaces at various magnifications. The *M. tinctoria* latex paste (6 months) showed a more regular surface, especially at 200x magnification. The calcium hydroxide + saline paste presented a regular surface at lower magnifications, but irregular at higher magnifications. The *M. tinctoria* latex paste (24 hours) was excluded due to lack of consistency. It was concluded that the combination of calcium hydroxide and M. *tinctoria* latex results in irregular surfaces, indicating a possible complex interaction between the components. On the other hand, *M. tinctoria* latex alone presented more regular surfaces after 6 months. These findings suggest that further studies are needed to better understand the functionality and stability of dental pastes with these components.
Keywords: *Maclura tinctoria*; Dentistry; Traditional Folk Medicine; Endodontics.

INTRODUCTION

Dental pastes play a fundamental role in clinical practice, being used in procedures such as root canal filling and dental restorations. Among the materials used in the composition of these pastes, calcium hydroxide has been widely used due to its antibacterial properties and its ability to stimulate the formation of mineralized tissue. However, the search for effective alternatives has sparked interest in exploring the potential of different substances, such as *Maclura tinctoria* latex. Through in vitro studies related to the use of M. *tinctoria* leaves and bark, due to their antibacterial, anti-inflammatory, and analgesic activities; and due to the scarcity of studies using its latex in the dental field, studies were conducted by this group on the traditional knowledge and use of M. *tinctoria* and a preliminary evaluation of its toxicity on *Artemia salina* (CHANG et al., 2011; ALVARO et al., 2015). In this context, the present study aimed to analyze the external surface of the formulated pastes and verify the variations in the external surface of the pastes with

the variation in the time of collection of *M. tinctoria* latex. Different paste compositions were investigated, including those containing calcium hydroxide associated with *Maclura tinctoria* latex at different time intervals (24 hours and 6 months), in addition to isolated *M. tinctoria* latex and calcium hydroxide paste associated with saline solution. To achieve these objectives, an experimental study was conducted based on collections made at sites where *M. tinctoria* occurs, located in the region of Terezópolis de Goiás, Goiás. The external surface of the pastes was analyzed using scanning electron microscopy (SEM).

METHODOLOGY

Type of research: This is an experimental study analyzing the external surface of pastes associated with *M. tinctoria*.

Collection site: Latex was collected at sites where the species under study occurs and in the Cerrado region of Terezópolis de Goiás, Goiás.

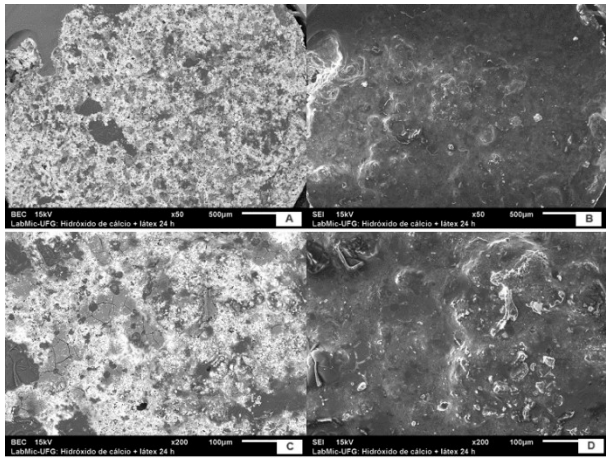
External surface analysis: Five prepared pastes were used in the experiment: Calcium hydroxide + *Maclura tinctoria* latex 24 hours; Calcium hydroxide + *Maclura tinctoria* latex 6 months; *Maclura tinctoria* latex 24 hours; *Maclura tinctoria* latex 6 months; Calcium hydroxide + saline solution. Fifteen tubes with an internal diameter of 3 mm and a length of 5 mm were prepared using a caliper and a No. 15 scalpel blade. Three tubes for each paste group were placed on a polished glass plate, and with the aid of a No. 24 spatula, the tubes were completely filled with small portions of the materials to be evaluated. The groups were analyzed in the laboratory using scanning electron microscopy (SEM) at the Multiuser High Resolution Microscopy Laboratory of the Federal University of Goiás (LabMic/UFG).

RESULTS

The results obtained by scanning electron microscopy (SEM), with an analysis magnification of 500µm and 100µm at 50x and 200x magnification, showed that in all magnifications, calcium hydroxide + *Maclura tinctoria* latex 24 hours ( ) had an irregular surface. (Figure 1) had an irregular surface. The same occurred with the calcium hydroxide + *Maclura tinctoria* latex pastes after 6 months (Figure 2) and *Maclura tinctoria* latex *after* 6 months, although the latter had a regular surface at

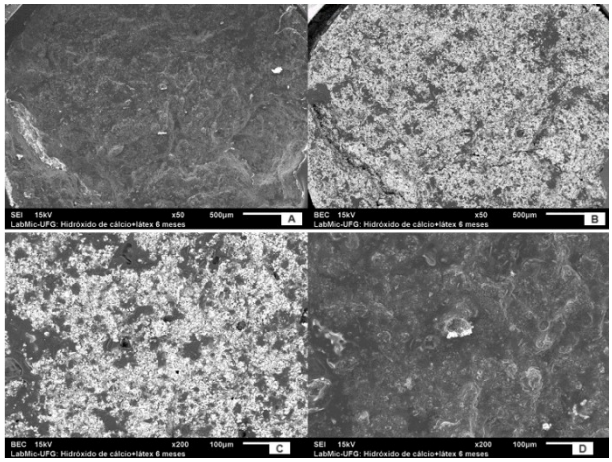
200x magnification at 100µm (Figure 3). For the calcium hydroxide + saline paste (Figure 4), it was possible to observe a regular surface at magnifications of 50x and 200x at an approximation of 100 µm, remaining irregular in the other analyses. The *Maclura tinctoria* paste after 24 hours did not reach the necessary consistency and was therefore excluded from the analysis.

Figure 1. Scanning electron microscope image of the calcium hydroxide + *Maclura tinctoria* latex sample after 24 hours at 50X magnification (A and B) and 200X magnification (C and D), showing an irregular surface.



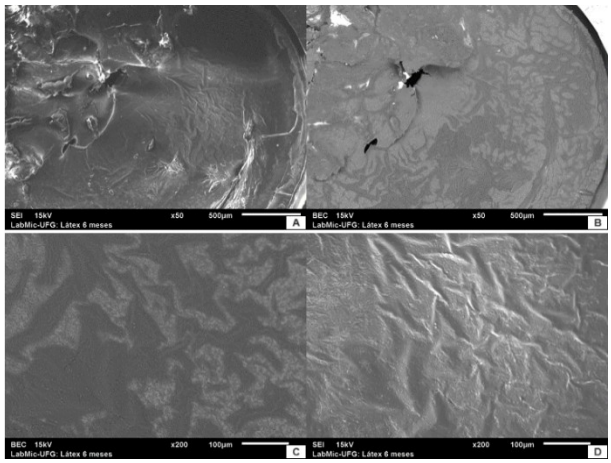
Source: The authors.

Figure 2. Scanning electron microscopy image of the calcium hydroxide + *Maclura tinctoria* latex sample after 6 months at 50X magnification (A and B) and 200X magnification (C and D), showing an irregular surface.



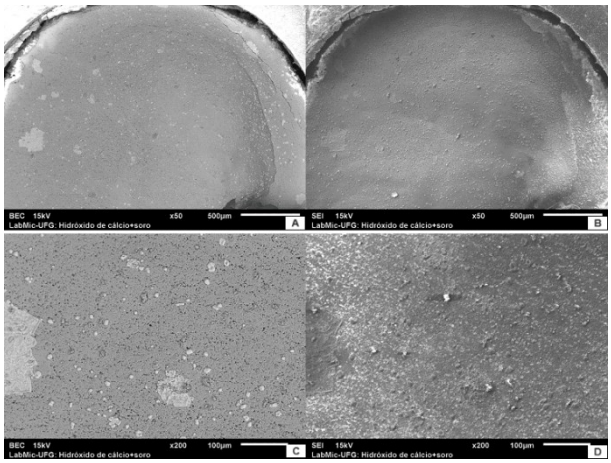
Source: The authors.

Figure 3. Scanning electron microscopy image of the *Maclura tinctoria* latex sample after 6 months at 50X magnification (A and B) and 200X magnification (C and D), showing an irregular surface; (C) at 200X magnification shows a regular surface.



Source: The authors.

Figure 4. Scanning electron microscopy image of the calcium hydroxide + saline solution sample at 50X magnification (A and B), showing a regular surface; and at 200X magnification (C and D), showing a regular and irregular surface, respectively.



Source: The authors.

CONCLUSION

The present study provided, through scanning electron microscopy (SEM), an analysis of the external surface of calcium hydroxide pastes associated with saline solution, associated with *M. tinctoria* latex, as well as isolated *M. tinctoria* latex; from which it was possible to observe morphological differences in the pastes depending on the material and the sampling period. The results revealed that the pastes composed of the combination of calcium hydroxide and *M. tinctoria* latex had irregular surfaces, which may suggest a complex interaction between the components that affect the stability and texture of the material. In contrast, the paste isolated from M*. tinctoria* after *six* months presented more regular surface

characteristics under the analysis conditions. Therefore, these findings highlight the need for further research on the isolated or combined use of calcium hydroxide and *M. tinctoria* latex, especially considering the impacts on the stability and functionality of dental pastes.

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