

Efficacy of Aloe Vera gel and Egg albumin as slide coating adhesives- A Comparative Pilot study

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Abstract

Introduction: The problem with the staining process is the tendency for tissue section to detach from glass slides during the heat treatment used in the further processing of the slides. This has been minimised by the use of slide adhesives. The most commonly used slide adhesives for daily use are gelatine and egg albumin.

Aim: To compare the efficacy of Aloe Vera gel as slide coating adhesives with egg albumin.

Methods: 15 formalin fixed paraffin embedded tissue blocks of known histopathological diagnosis were sectioned from the archives of the Department of Oral and Maxillofacial Pathology for the study, with n= 15 for Aloe Vera gel and n= 15 for egg albumin coating. The Aloe Vera gel was prepared and the slides were coated by the same and the routine staining procedure was done. The slides were viewed under the microscope by two independent blinded observers and grading was done for ease of handling, viscosity, ability to withstand heat and chemicals and adhesion.

Results: Our study showed that Aloe Vera gel when used as a slide adhesive was found have more advantage than routine albumin slide coating with a p <0.05 value for ease of handling and absence of background staining.

Conclusion: Aloe Vera gel was found to be superior to routinely used egg albumin as a slide coating agent.

Key Words: Aloe Vera, Egg Albumin, Histopathology, Slide coating agent.

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Introduction

Slide adhesives are frequently used for attaching paraffin sections to slides, the most commonly used is the albumin-glycerol mixture which was introduced by P. Mayer, in 1883. The major disadvantage of using egg albumin is that most of the stain especially hematoxylin often adheres to the slide adhesive

coating, thus consuming time in the removal of the excess unwanted background staining. In order to avoid the disadvantages of the albumin-glycerol adhesive, numerous modifications of its use have been proposed.

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S. V. Apathy (1912) and some others, used the so-called “egg-white-glycerine water”, a diluted albumin-glycerol in distilled water, in which one drop of stock albumin-glycerol was mixed with 4-5 ml of distilled water.

Aloe Vera is known as a miracle plant which is the derivative of nature and contains excellent therapeutic value and more than nutritional element (1). Aloe Vera gel is derived from inside of Aloe leaf. It is the mucilaginous gel produced from centre (parenchyma) of the plant leaf (2). Aloe Vera gel is a clear, pale yellow coloured viscous gel obtained from the Aloe Vera plant and is reported to contain glycoproteins, polysaccharides and other constituents (enzymes etc). Thus, making the gel viscous and renders the gel an inherent stickiness. Due to this inherent sticky nature of the gel, it was used in this study as an alternative slide coating adhesive. Aim is to compare the efficacy of Aloe Vera gel as slide coating adhesives with egg albumin.

Methodology

Preparation of Aloe Vera gel

Aloe Vera leaves were procured and the gel was prepared by peeling the outer portion of skin and pericarp. From the collected leaves, the serrated edges were cut off and the leaf was left in the upright position for the darker resin to drain out, following which the leaf was peeled and the thick transparent gel was collected. The gel was blended, filtered and stored in the refrigerator until used.

Preparation of slides

15 formalin fixed paraffin embedded tissue blocks were obtained from the archives of the Department of Oral and Maxillofacial Pathology. From each block two sections were cut using semi-automatic soft tissue microtome Leica Model RM 2245 for comparative evaluation of Aloe Vera gel and Egg Albumin as slide coating. The tissue blocks were procured from the Department of Oral and Maxillofacial Pathology with proper guidelines and approval from the Institutional Ethical committee (Clearance No.OP18-25).

Slide coating

15 slides were coated with 0.5 mm of egg albumin and the other 15 slides were coated with Aloe Vera gel and the sections were

picked after approximately 5 minutes and the slides were transferred into the incubator for dewaxing.

Staining protocol

The sections were deparaffinised using Xylene for 20 minutes and rehydration was done using alcohol for 10 minutes. Sections were washed in running tap water for 3-5 minutes and were stained with Harris’s haematoxylin for 5 minutes, washed in running tap water; differentiation was achieved by dipping the slides in acid alcohol for one dip, then dipped in ammonia for one dip and washed in running tap water for bluing. Slides were transferred to eosin for a single dip after which the slides were dehydrated through descending grades of alcohol; the slides were cleared in xylene and mounted with DPX.

Data collection

The slides were viewed under the microscope by two independent blinded observers and grading was done for the criteria given in table 1. The grading was tabulated and statistical analysis was done using the SPSS software, version 20. Independent t Test was used and the Kappa statistics was done to check the inter observer agreement.

Results

We compared Egg albumin and Aloe Vera gel as slide coating adhesives and they were graded by the technician as well as the pathologist for the physical properties and adhesive properties. It was found that the handling properties and absence of back ground staining of Aloe Vera gel was found to be statistically significant when compared to egg albumin ($p < 0.05$). The handling properties, adhesion, ability to withstand chemical treatment and heat were found to be on par with egg albumin. The means and the standard deviation for properties that were taken into consideration for the study are graphically represented in the figure 1. The inter observer agreement the kappa statistics showed a strong agreement with the kappa value of .80.

Figure 1: Chart representing the means of each criterion assessed.

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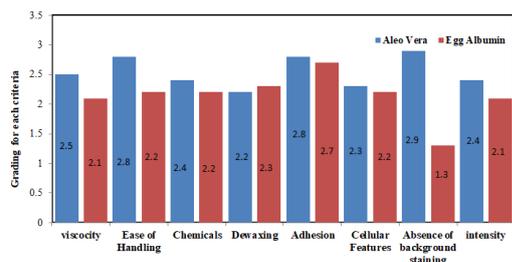


Figure 2: The picture shows alternating slides coated with egg albumin and aloe vera gel as slide coating agent. Notice how the stains are adherent to the slides coated with egg albumin (EA) and the slides coated with aloe vera gel (AV) is comparatively clear.



Discussion

Tissue sections detach from glass microscopic slides only in a small minority of the time. This minority of cases, unfortunately, occupies a disproportionate amount of the histotechnologist time (3,4).

The use of glycerinated egg albumin as an adhesive for histologic sections has been practiced for a long time. The disadvantage of the egg albumin when used on slides as an adhesive is the fact that, in the process of staining, much of the stain (especially the hematoxylin) adheres to the slides (Figure 2).

Since then, certain modifications have been made with gelatine as an adhesive for paraffin sections. The protein components and gelatine have an affinity for basic aniline dyes, and excessive amounts of stains adhere to the slides in the process of staining (5).

Jacob Prima (1954) used blood serum for slide coating and suggested that the dried serum is practically unstainable. After the sections have been stained, it is very easy to remove the dried serum from that part of the slide which is free

from the sections and have a clean and nice-looking slide. It is not so easy to do this when using albumin-glycerol (6).

But the use of blood serum as a slide coating adhesive is not very common, thus in our study we have found that Aloe Vera gel can be used as an alternative slide coating agent.

Aloe Vera gel contains a group of polysaccharides which has been given the name Acemannan. The main active component in the mucilaginous gel is Acemannan which is an ordered linear polymer of substantially acetylated mannose monomers and acetylated glucomannan which gives the inherent viscosity and stickiness.

Aloe Vera gel is used for an array of uses in dentistry, owing to the fact that the gel possesses anti-microbial properties and due to its ease of handling. In our study, we found that the viscosity of the Aloe Vera gel is on par with the egg albumin which is routinely used as a slide coating agent.

Aloe Vera gel also was also found to be on par with egg albumin; as the chemical properties of the gel did not interfere with the staining or heat treatment of the slides. The handling characteristics and the absence of the background staining was found to be statistically significant $p < 0.005$. Both the acid and basic dye do not adhere to the slide when coated with Aloe Vera gel when compared to egg albumin this is due to the presence of proteins found in egg albumin, which is not present in the gel. The disadvantage of using the gel is that fresh solution must be prepared every day and the fact that commercially available gels are found to be costly. But in recent days we can see that there is a shift from these company manufactured products to more organic options, thus, the use of Aloe Vera gel can be used more widely and for daily use as a slide coating agent. In our study we were able to find that Aloe Vera gel is an excellent alternative for egg albumin when used as a slide coating agent.

Conclusion

Our study is the first of its kind to use Aloe Vera gel as a slide coating agent. The slide coating agent most commonly used is egg albumin, which has a lot of back ground staining thus to

reduce this common problem we can use Aloe Vera gel, which was found to have better ease of handling and absence of back ground staining and thus found to be more advantageous than the egg albumin.

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Conflict of interest

The author declares that there were no conflicts of interests in the present study.

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