

Evaluation of Natural Gums: Gum Tragacanth, Xanthan Gum, Guar Gum and Gum Acacia as Potential Hemostatic Agents

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Abstract : Excessive bleeding is the primary factor of avoidable death in both civilian trauma centers as well as the military battlefield. Hundreds of Indian troops die every year due to blood loss caused by combat-related injuries. These deaths are avoidable and can be prevented to a large extent by making available a suitable hemostatic dressing in an emergency medical kit. In this study, natural gums were evaluated as potential hemostatic agents in combination with calcium gluconate. The study compares the hemostatic activity of Gum Tragacanth (GT), Guar Gum (GG), Xanthan Gum (XG) and Gum Acacia (GA) by carrying out different in-vitro and in-vivo studies. In-vitro studies were performed using the Lee-White method and Eustrek method, which includes the visual and microscopic analysis of blood clotting. MTT assay was also performed using human lymphocytes to check the cytotoxicity of the gums. The in-vivo studies were performed in Sprague Dawley rats using tail bleeding assay to evaluate the hemostatic efficacy of the gums and compared with a commercially available hemostatic sponge, Surgispon. Erythrocyte agglutination test was also performed to check the interaction between blood cells and the natural gums. Other parameters like blood loss, adherence strength of the developed hemostatic dressing material incorporating these gums, re-bleeding, and survival of the animals were also studied. The data obtained from the MTT assay showed that Guar gum, Gum Tragacanth, and Gum Acacia were not significantly cytotoxic, but substantial cytotoxicity was observed in Xanthan gum samples at high concentrations. Also, Xanthan gum took the least time with its minimum concentration to achieve hemostasis, (approximately 50 seconds at 3mg concentration). Gum Tragacanth also showed efficient hemostasis at a concentration of 35mg at the same time, but the other two gums tested were not able to clot the blood in significantly less time. A sponge dressing made of Tragacanth gum was found to be more efficient in achieving hemostasis and showed better practical applicability among all the gums studied and also when compared to the commercially available product, Surgispon, thus making it a potentially better alternative.

Keywords : cytotoxicity, hemostasis, natural gums, sponge

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