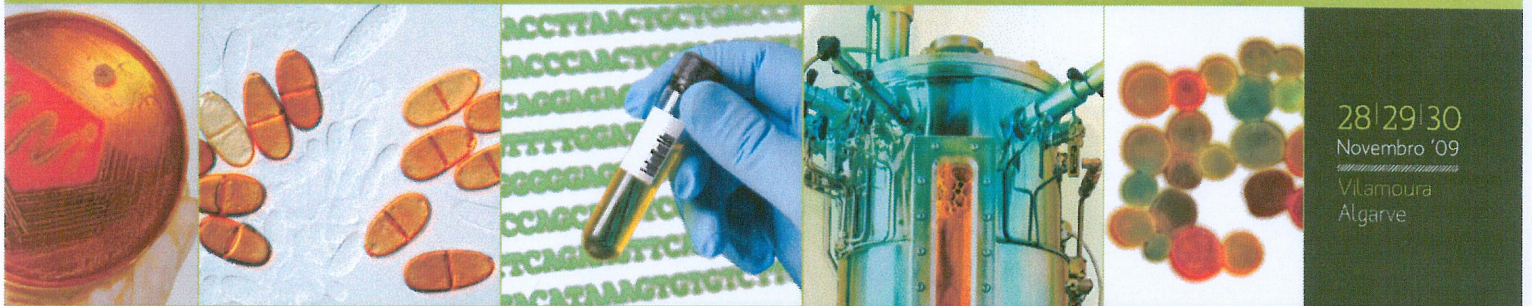


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Bee Propolis Effect on RBCs Membrane Integrity

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OBJECTIVE

The objective of this study was to evaluate the effect of two propolis extracts, from two different regions (Bornes and Fundão), in the osmotic fragility of patient red blood cell (RBC) membrane with HS.

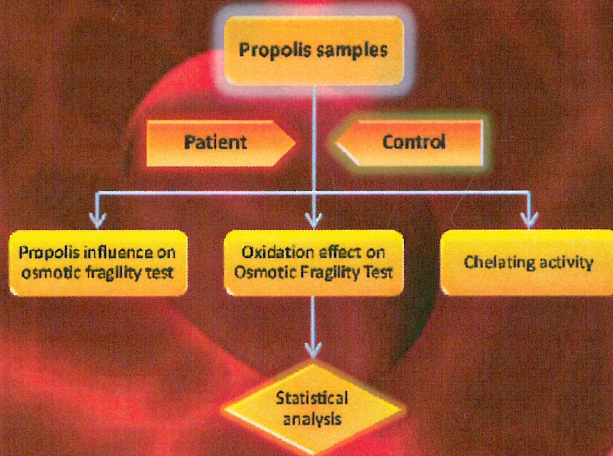
INTRODUCTION

Propolis is a beehive product produced by bees of *Apis mellifera* specie^{1,2}. The study of propolis properties that can be used in Human Health studies is important, since it has been shown to have many biological properties^{1,3,4,5}.

The hereditary spherocytosis (HS) is a congenital hemolytic anemia, with origin in the modification of erythrocytes membrane proteins, which leads to increased susceptibility to hemolysis and a decrease of the cell over-life^{6,8}. The HS is the most common red blood cell (RBC) membrane disorder in European Caucasians, and in Japanese population⁹.

This is an important work, because for the first time it was considered the application of propolis in HS. The results and information provided can be used for future investigations in order to elucidate the propolis mechanisms and compounds that affect the fragility of the erythrocyte membrane.

STUDY DESIGN



RESULTS AND DISCUSSION

Propolis effect in erythrocyte membrane integrity



Fig. 1 – Osmotic fragility results of the patient with hereditary spherocytosis

Chelating effect on ferrous ions

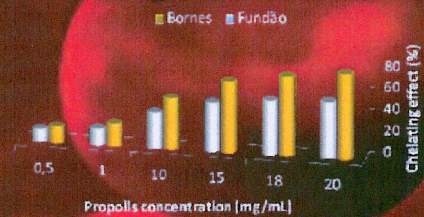


Fig. 2 – Chelating activity of propolis from two regions of Portugal

Influence of H₂O₂ in hemolysis and propolis effect

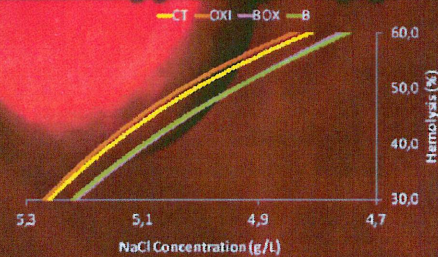


Fig. 3 – Oxidant effect on osmotic fragility of patient erythrocytes: CT- control ; OXI – oxidant; BOX – propolis and oxidant; B – propolis.

CONCLUSION

Results showed that RBC hemolysis decreased with both propolis extracts. In the subject with hereditary spherocytosis, the Bornes propolis extract was more efficient than Fundão propolis extract (Fig. 1). This difference can be related with the phenolic compounds, chemical composition and quantity, in the extracts, since, it was verified that Bornes propolis had twice phenolic compounds, than Fundão propolis.

The increase of hemoglobin values cause a increase of iron ions, so HS RBC seem to be more prone to develop oxidative stress. As expected, Bornes propolis showed a chelating activity twice higher than Fundão propolis (Fig. 2). The propolis can contribute to membrane stability, due to chelating and antioxidant activities, decreasing the damages in the RBC membrane.

In vitro, results showed that osmotic fragility may be increased by oxidative stress conditions in RBCs of HS patient. When tests were performed in propolis presence this effect was blunted (Fig. 3), supporting the concept that the protection of membrane integrity by propolis was due to its antioxidant properties.

The overall results showed a high effectiveness of propolis in the membrane integrity, and opens a field for future research, focusing in propolis compounds identification, and their action mechanism.

Reference

235

Bee propolis effect on protection of RBCs membrane integrity

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Abstract

Propolis is a resinous substance collected from plants by bees. The propolis composition depends on the surrounding vegetation, the season, and the area from which derive. This hive product usually contains a variety of chemical compounds such as polyphenols (flavonoids, phenolic acids and esters), steroids, and amino acids.

The hereditary spherocytosis (HS) is a congenital hemolytic anemia, with origin in the modification of membrane proteins of erythrocytes, which leads to increased susceptibility to hemolysis and a decrease of the cell over-life. The HS is the most common red blood cell (RBC) membrane disorder in European Caucasians, with a prevalence of roughly 200-300 per 10⁶, and to Japanese population 5.7-20.3 per 10⁶.

The aim of the present work was to determine if propolis extracts could affected the red cell membrane integrity and comparing the effect of two propolis extracts from different regions (Bornes - Trás-os-Montes; Fundão - Beira Interior).

In this work, two adults were studied, one with the syndrome HS splenectomized and one healthy used as control. Diagnosis of HS was made by clinical features, identification of spherocytes on peripheral blood smears and abnormal osmotic fragility.

The results show that the two propolis extracts affected the erythrocyte membrane fragility in both individuals (control and patient with HS).

There is also a possibility for an oxidative damage of red blood cell membrane in HS, similar to the one recorded in other hemolytic anemia. Indeed, the spherocytes were found to be more sensitive than normal erythrocytes to the action of oxidation inducing drugs. Phenolic compounds of propolis have a large spectrum of pharmaceutical properties, however the more studied was the antioxidant activity. The second aim of the present work was to determine if hemolysis of RBCs could be induced by oxidative stress conditions, and to verify if the propolis can inhibit the hemolysis doing its antioxidant properties. Results show that when RBCs of patient with HS were incubated with 1 mM of H₂O₂, the hemolysis with and without oxidant had different levels. This effect was blunted when the RBCs were incubated with propolis extract, which might indicate that propolis act as free radical scavenger protecting the membrane integrity against oxidative effect.