Red Blood Cells Disease (hereditary spherocytosis): Propolis effect

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ABSTRACT

Propolis is a resinous substance collected from plants by bees, used since the Egyptian civilization. The hereditary spherocytosis (HS) is a type of transmission of hereditary anemia. Clinically, individuals usually present from asymptomatic conditions to severe hemolytic anemia. The objective of this study was to evaluate the effect of two propolis extracts, in the osmotic fragility of patient red blood cell (RBC) membrane with HS. It was found that propolis decreased the erythrocytes membrane fragility, being the effect of Borens propolis more pronounced. The obtained results suggest that in vitro, the membrane fragility may be increased under oxidative stress conditions in patient RBC’s, and the protection effect of propolis is due to its antioxidant properties. These results open doors for future investigations in order to elucidate the mechanisms, and identify the most relevant compounds involved in the fragility of the erythrocyte membrane.

INTRODUCTION

Propolis is a bee hive product produced by bees of Apis mellifera species. 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. 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. The HS is the most common red blood cell (RBC) membrane disorder in European Caucasians, and in Japanese population. This aims of this work were to investigate propolis effect on erythrocyte membrane of patients with HS, and to evaluate the propolis effect in RBC’s hemolysis after oxidative stress induced with H2O2.

RESULTS AND DISCUSSION

• RBC hemolysis decrease with both propolis extracts. In the subject with hereditary spherocytosis, the Borens propolis extract was more efficient than Fundão propolis extract (Fig. 1).

• HS RBC seem to be more prone to develop oxidative stress. As expected, Borens propolis showed a chelating activity twice higher that Fundão propolis (Fig. 2). This results its possible due to twice concentration of phenolic compounds in Borens propolis, that can contribute to membrane stability, by chelating and antioxidant activities, decreasing the damages in the RBC membrane.

• Osmotic fragility may be increased by oxidative stress conditions in RBCs of HS patient (Fig. 3). and when this test was performed in propolis presence this effect was blunted, supporting the concept that the protection of membrane integrity by propolis is due to its antioxidant properties.

• This work showed a high effectiveness of propolis in the membrane integrity, and open a field of future research which is necessary to identify the propolis compounds that act at on erythrocyte membrane fragility and confirm the hypothetic action mechanism made by our team (Fig. 4).

CONCLUSION

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

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

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

Fig. 4 – Hypothetic action mechanisms for propolis effect on osmotic fragility

References