PROPOLIS INCREASES THE TOTAL ANTIOXIDANT ACTIVITY (TAA) OF HUMAN SALIVA *IN VITRO* AND *IN VIVO*.

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CONTENT

- Introduction
- Materials and methods
- Results
- Conclusions

INTRODUCTION

- Propolis has been used in the dental practice, however, it is not clear its effects on the antioxidant status of human saliva.

INTRODUCTION

- Saliva is the first biological fluid that protects our organism against oxidative stress and free radicals found in the consumed food and formed during its digestion.

INTRODUCTION

- The antioxidant system of saliva includes various molecules.
- The most important of which are uric acid and the peroxidase enzymes.
- Uric acid contributes to approximately 70% of the total salivary capacity.

INTRODUCTION

- On the other hand, oxidative stress can occur in oral cavity as a result of imbalance between free radicals and inactivation of these species by salivary antioxidant defense system.
- We need to say that this oxidative stress can cause diseases by damaging various cellular and extracellular constituents in the oral cavity.

INTRODUCTION

- It has been shown that propolis has several biological activities including antibacterial, antifugal, antiviral, antioxidant, etc.
- The antioxidant activity of propolis could be used to attenuate the oral oxidative stress, therefore, could be important for the development of new therapies.

INTRODUCTION

- In dentistry, the use of propolis has been proposed in different areas including cariology, oral surgery, endodontics, oral pathology, periodontology and dental traumatology.
- However, less it is known about the effects of propolis on the antioxidant activity of human saliva.

AIM

- To determine the effect of *Apis mellifera* propolis on the TAA of human saliva *in vitro* and *in vivo*.

MATERIALS AND METHODS

- Propolis sample:
  - Ethanolic propolis extract (20%, w/v) was provided by La Casita de la Miel (Maya, Mérida, Venezuela).
- Saliva sample:
  - Whole saliva was collected in a quiet room between 9 and noon to avoid circadian changes, and was obtained by expectorating into disposable tubes.
  - About 1 mL of whole saliva collected in tubes and centrifuged immediately to remove any cell debris (5,000 rpm for 5 min).
  - The supernatant was removed and used for the TAA determination.

MATERIALS AND METHODS

- Saliva treatment:
  - *In vitro* treatment: Saliva sample was incubated for 10 min at 37 °C in the presence of 95% ethanol, propolis extract dilution, and propolis extract (20%, w/v).
  - *In vivo* treatment: a drop (25 µL) of propolis extract was put directly onto the tongue and saliva was collected during 3 min.
  - After treatment, salivary TAA was determined.

MATERIALS AND METHODS

- Total antioxidant activity (TAA):
  - Salivary TAA was assayed by the ABTS method (Re et al, 1999).
- Total polyphenol content:
  - Total polyphenol content of propolis was determined by the Folin-Ciocalteu method (Singleton et al, 1999).
- Total flavonoid content:
    - Total polyphenol content of propolis was determined by the method of Woisky and Salatino (1998).

RESULTS AND DISCUSSION

Table 1. Effect of propolis on the Trolox equivalent antioxidant capacity (TEAC) of human saliva *in vitro* and *in vivo.*

Samples	TEAC (mM)
Saliva alone	0.60 ± 0.05 (n = 6)
Saliva with 25 µL of propolis extract on the tongue (Saliva-Propolis).	0.78 ± 0.03 (n = 3)
Saliva alone + 10 µL of 95% ethanol .	0.65 ± 0.13 (n = 6)
Saliva alone + 10 µL of (1/10) diluted propolis extract.	1.66 ± 0.15 (n = 3)
Saliva alone + 10 µL of propolis extract.	2.21 ± 0.04 (n = 3)

RESULTS AND DISCUSSION

Table 2. Content of total polyphenols and flavonoids in the ethanolic propolis extract.

Sample	**Polyphenols** (mg GAE/g of propolis)	**Flavonoids** (mg QE/g propolis)
Ethanolic propolis extract (20%, w/v)	184.81 ± 4.18	91.27 ± 5.23

RESULTS AND DISCUSSION

- Although, propolis extracts were reported to have antioxidant activity, to our best knowledge this is the first report that has shown that propolis can increase salivary antioxidant capacity *in vitro* and *in vivo*.
- This observation could be explained by the fact that the ethanolic propolis extract had a relative high content of polyphenols and flavonoids. These compounds are known as potent antioxidants.

CONCLUSION

- In conclusion, propolis could be used to improve the antioxidant status of oral environment.

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