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In Vitro Hydrogen peroxide Scavenging Activity of Royal Jelly

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Abstract

During normal cellular metabolicpathway the reactive oxygen species (ROS) like hydroxyl radicals, superoxide anion, hydrogen peroxide and nitric oxide, generated which produce oxidative damage to cells and tissues. The peroxyl radical attacks membrane protein and enzymes causing alteration in the structure and function of the membrane, mutations and cell death. Present investigation aims to detect the inhibitory activity of royal jelly against hydrogen peroxide assay was performed by Ruch et al method. Result of the study showed larger concentration of water dissolved royal jelly exhibit a significant inhibition of hydrogen peroxide radicals as ascorbic acid.it was concluded that Presence of certain antioxidant compounds such as flavonoids and phenolic compounds in royal jelly make it scavenger to inhibit a free hydrogen peroxide radicals. Thus it can be used as a dietary substance for reducing the oxidative stress.

Keywords: hydrogen peroxide, royal jelly, flavonoids,phenolic compounds.

Introduction

Royal Jelly, is a creamy product secreted by the hypo pharyngeal glands in the head of the young nurse worker bees primarily for developing and maintaining the queen bee. [1]. it is a yellowish-white, acidic secretion, with a pungent odor and taste. Royal jelly is considered as a richest diet of nature because of its unique composition. It containing the all five nutritive and building materials (proteins, fats, carbohydrates, vitamins and minerals) [2]. Previous studies showed that RJ has anti-microbial effects [3], suppression of allergic reactions, lowering the amount of blood cholesterol [4], preventing cell damage in cancer and HIV patients, as well as wound healing and growth acceleration. The RJ has a wide variety of unique health benefits: it enhances the immune system, promotes wound treatment, has antitumor/anticancer properties, lowers cholesterol levels, increases fat metabolism, and regulates blood sugar levels being a powerful antioxidant [2]. The action of RJ on the cell level was investigated on the genetic material proving that its disturbance was returned into a normal condition by the using of RJ [5].

The present study was carried out to determine the free hydrogen per oxide radical scavenging activity of royal jelly.

Materials and method

1.1.Preparation of Royal Jelly and ascorbic acid

Samples of RJ and ascorbic acid were prepared by dissolving different concentration i.e. 40 µg/mL, 80 µg/mL, 120 µg/mL, 160 µg/mL and 200 µg/mL in distilled water.

1.2.Assay for Scavenging activity of hydrogen peroxide

The scavenging effect of hydrogen peroxide was determined as described by Ruch, 1989. [6]. 1 ml of Rj solution was treated with 0.6 ml of hydrogen peroxide for 10 minutes, the absorbance was read at 230 nm against blank. Ascorbic acid was used as standard and the scavenging effect of hydrogen peroxide was expressed in terms of ascorbic acid equivalents.

1.3.Statistical analysis

The significance of differences between means of the groups were tested by the paired Student's t test using a graph pad prism 6.0 software. Results were considered statistically significant if $P < 0.05$.

Result

Hydrogen peroxide scavenging activity of water dissolved RJ were presented in the Table 1and figure 1. The percent inhibition of RJ against hydrogen peroxide radical were compared with that of standard ascorbic acid.

Royal jelly at a concentration of 40 µg/mL and 80 µg/mL exhibit a significant reduction ($P < 0.05$) compared to ascorbic acid. At the same time royal jelly at a concentration of 120 µg/mL, 160 µg/mL and 200 µg/mL exhibit a non-significant difference in term of inhibition of hydrogen peroxide compared to ascorbic acid.

Discussion

The reactive oxygen species (ROS) like hydroxyl radicals, superoxide anion, hydrogen peroxide and nitric oxide, produced during normal cellular metabolic functions, produce oxidative damage to tissues [7]. The peroxyl radical attacks membrane protein and enzymes are reinitiates lipid peroxidation. Peroxide radical induced through lipid peroxidation alter the structure and function of the membrane causing cellular abnormalities such as mutations and cell death [8].

RJ is a strong antioxidant which slowing or preventing the oxidation of other molecules .this effect May possibly be associated with the free radical scavenging activity of RJ suppressing oxidative stress. RJ contains phenolic compounds and flavonoids.

Flavonoids are strong antioxidants present in RJ because according to the chemical structures they invest phenolic hydrogen as the hydrogen donating radicalscavengers [9].

The phenolic compounds and flavonoids are responsible for antioxidant activity.These phenolic compounds interferes with propagation reactions [10], or inhibit the enzymatic systems involved in initiation reactions [11]. On the basis of obtained results it is clear that royal jelly has antioxidant capacity and it act as a hydrogen peroxide scavenger as ascorbic acid. Similar results were described by many investigators.

An in vivo study conducted on rats revealed that royal jelly reduces the lipid peroxidation in a brain cells of rat [12]. Guo et al., 2008 describe in vitro antioxidative and scavenging activities of RJ counters the lipid peroxidation caused by free radicals [13].

Conclusion

Presence of certain antioxidant compounds such as flavonoids and phenolic compounds in royal jelly make it scavenger to inhibit a free hydrogen peroxide radicals. Thus it can be used as a dietary substance for reducing the oxidative stress.

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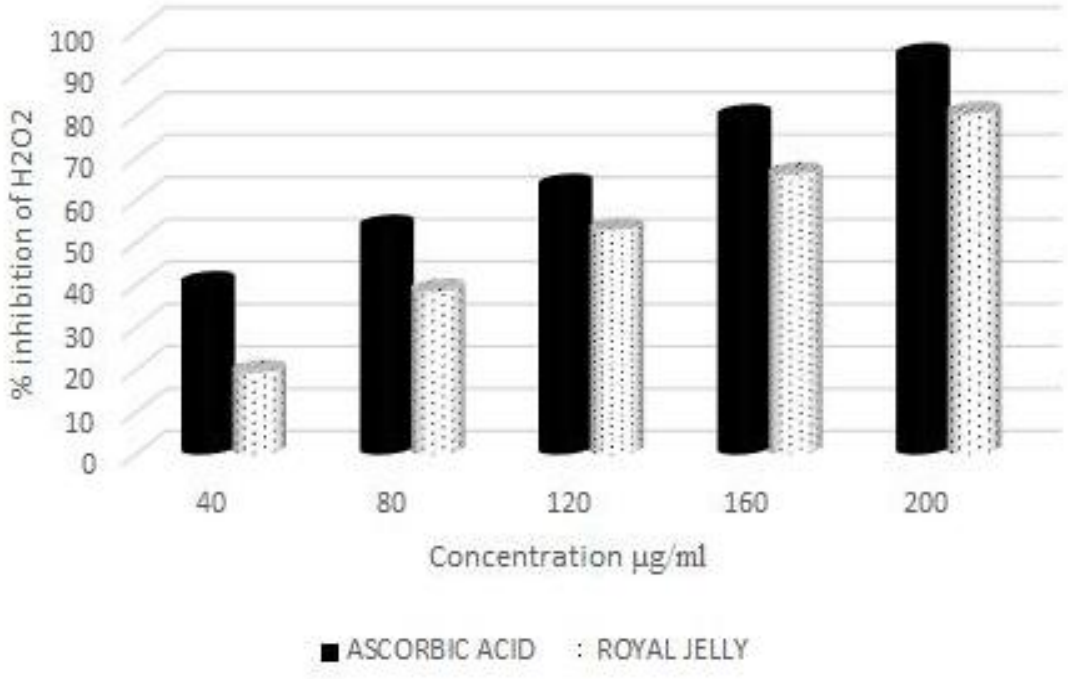
Table 1: percentage of inhibition of hydrogen peroxide by royal jelly and ascorbic acid.

Sr no	Concentration of Ascorbic acid and royal jelly sample (µg/mL)	Percentage of inhibition	
		Ascorbic acid	Royal jelly
1	40	40.20± 2.35	19.27 ± 3.02*
2	80	53.54 ± 3.43	38.47 ± 3.04*
3	120	63.18 ± 2.24	52.95 ±1.98
4	160	79.61 ± 3.04	66.02 ± 3.26
5	200	94.08 ± 2.66	80.35±3.45

Values are expressed as Mean ± SEM (N=3 Readings), *P<0.05, compared to ascorbic acid.

Figure1: graph exhibits % inhibition of hydrogen peroxide at different concentration by royal jelly and ascorbic acid.



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