



Antioxidant and oxidant potential of *Rosa canina*

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Abstract

The present study aimed to determine the total antioxidant status, total oxidant status and oxidative stress index of the ethanol extracts obtained from the fruits of *Rosa canina* L. plant collected in Erzincan province (Turkey). In this context, the fruit samples of the plant were extracted with ethanol (EtOH) using a Soxhlet device. Total antioxidant status (TAS), total oxidant status (TOS) and oxidative stress index (OSI) were determined using Rel Assay kits. It was determined that the TAS value of the plant was 4.602 mmol/L, the TOS value was 6.294 µmol/L and the OSI was 0.138. As a result, *R. canina* exhibited high antioxidant activities.

Keywords: *Rosa canina*, antioxidant, oxidant, medicinal plant.

Introduction

Live organisms are equipped with a defense system to neutralize free radicals and other reactive oxygen species (ROS). This system in living organisms includes catalase, enzymes such as superoxide dismutase and glutathione peroxidase, and compounds such as vitamins E and C. One of the most significant indicators of a healthy body is the balance between the free radicals and antioxidative defense system. However, in cases where the antioxidant system is insufficient, oxidant compounds cannot be inhibited, leading to oxidative stress. Depending on the level of oxidative stress, various disorders such as diabetes, cardiologic disorders and cancer could occur. Supplementary antioxidants could inhibit or prevent oxidative stress. Several researchers investigated natural antioxidants that could be consumed antioxidant supplements (Fransen et al. 2012; Yumrutas et al. 2015; Rezaeian et al. 2015; Selamoglu et al. 2016; Bal 2018).

Rosehip or *Rosa canina* is a plant indigenous to large areas in Europe, North Africa and West Asia. It is a perennial and deciduous shrub with spinous, thin stems and could grow up to 2-3 meters high. The colors of the flowers range between light pink/white and dark pink. The

flowers have 5 leaves and the flower diameter is between 4 and 6 centimeters. Ripe fruits are red-orange in color. *R. canina* is considered to be a valuable source for polyphenol and vitamin C (Selahvarzian et al. 2018). Due to its nutritional content, rosehip supplements have positive effects on certain chronic diseases such as osteoarthritis, rheumatoid arthritis and cancer (Fan et al. 2014).

The present study aimed to investigate the total antioxidant status (TAS), total oxidant status (TOS) and oxidative stress index (OSI) of *Rosa canina* L. collected in Erzincan province (Turkey). It was suggested that the results would contribute the production of antioxidant agents.

Materials and Methods

R. canina samples were collected in Erzincan province (Turkey). The flower sections of the plant were dried in an incubator at 40°C. Then, the samples were extracted using ethanol (EtOH) in a Soxhlet device (Gerhardt EV 14). The samples were then condensed in a rotary evaporator and stored at +4°C until the experiments were conducted (Heidolph Laborota 4000 Rotary Evaporator).

TAS, TOS and OSI Tests

Plant TAS, TOS and OSI values were determined using Rel Assay kits (Assay Kit Rel Diagnostics, Turkey). The TAS value was calculated as mmol Trolox equiv./L and Trolox was used as the calibrator (Erel, 2004). TOS value was calculated as μmol H₂O₂ equiv./L and hydrogen peroxide was used as the calibrator (Erel 2005). The following formula was used to calculate the OSI (arbitrary unit: AU) and expressed as a percentage (Erel 2005).

$$\text{OSI (AU)} = \frac{\text{TOS, } \mu\text{mol H}_2\text{O}_2\text{equiv./L}}{\text{TAS, mmol Trolox equiv./L} \times 10}$$

Results and Discussion

In order to minimize the adverse effects caused by synthetic food preservatives on humans, researchers and food industries focused on natural preservatives and the interest in natural antioxidant sources increased. Some plants are significant natural sources due to their antioxidant properties (Proestos et al. 2013; Selamoglu et al. 2017; Nageen et al. 2018). Thus, the determination of natural antioxidant sources is quite important. In the present study, antioxidant and oxidant status of EtOH extracts obtained from the fruits of *R. canina* plant were determined. The study data are presented in Table 1.

	TAS mmol/L	TOS μmol/L	OSI TOS/(TAS*10)
<i>R. canina</i>	4.602±0.215	6.294±0.191	0.138±0.010

* Values are presented as mean±SD; number of fruit samples n=6, experiments were made in 5 parallels

There are no previous studies on TAS, TOS and OSI of *R. canina*. Oxidative stress studies conducted on different plants suggested that mean TAS value of *Mentha longifolia* subsp. *longifolia* EtOH extract was 3.628 mmol/L, mean TOS value was 4.046 μ mol/L and mean OSI value was of 0.112 (Sevindik et al. 2017). In a different study, it was determined that the TAS value of *Salvia multicaulis* was 6.434 mmol/L, TOS value was 22.441 μ mol/L and OSI value was 0.349 (Pehlivan and Sevindik 2018). It was observed that the TAS value of *R. canina* was higher when compared to *M. longifolia* subsp. *longifolia*, and lower than *S. multicaulis* based on the above-mentioned studies. In another study conducted with MeOH extracts, the TAS values of *Muscari aucheri*, *Tulipa armena* var. *lycica* and *Bellevalia gracilis* were determined as 1.61, 1.34 and 1.66 mmol/L, respectively (Yıldırım et al. 2013). Compared to the above-mentioned studies, the TAS value of *R. canina* was higher. Thus, it could be suggested that the antioxidant potential of *R. canina* was high. Furthermore, the low oxidative stress levels of the plant indicated that the endogenous antioxidants in the plant significantly inhibited the endogenous oxidants.

CONCLUSION

In the present study, the total antioxidant status, total oxidant status and oxidative stress index of *R. canina* were determined. The present study findings demonstrated that the plant possessed a strong antioxidant potential. Furthermore, it was determined that the plant had low oxidative stress levels and the antioxidant defense mechanism was strong. In conclusion, *R. canina* has antioxidant potential and it could be consumed as a natural antioxidant source.

References

- Bal, C. (2018). A Study on antioxidant properties of *Gyrodon lividus*. Eurasian Journal of Forest Science, 6(2): 40-43
- Erel, O. (2004). A novel automated direct measurement method for total antioxidant capacity using a new generation, more stable ABTS radical cation. Clinical biochemistry, 37(4): 277-285.
- Erel, O. (2005). A new automated colorimetric method for measuring total oxidant status. Clinical biochemistry, 38(12): 1103-1111.
- Fan, C., Pacier, C., Martirosyan, D.M. (2014). Rose hip (*Rosa canina* L): A functional food perspective. Functional Foods in Health and Disease, 4(12): 493-509.
- Fransen, M., Nordgren, M., Wang, B., Apanasets, O. (2012). Role of peroxisomes in ROS/RNS-metabolism: implications for human disease. Biochimica et Biophysica Acta (BBA)-Molecular Basis of Disease, 1822(9): 1363-1373.
- Nageen, Bi, Sarfraz, I., Rasul, A., Hussain, G., Rukhsar, F., Irshad, S., Riaz, A., Selamoglu, Z., Ali, M. (2018). Eupatilin: a natural pharmacologically active flavone compound with its wide range applications. Journal of Asian natural products research, 1-16. doi: 10.1080/10286020.2018.1492565
- Pehlivan, M., Sevindik, M. (2018). Antioxidant and Antimicrobial Activities of *Salvia multicaulis*. Turkish Journal of Agriculture-Food Science and Technology, 6(5): 628-631.
- Proestos, C., Lytoudi, K., Mavromelanidou, O.K., Zoumpoulakis, P., Sinanoglou, V.J. (2013). Antioxidant capacity of selected plant extracts and their essential oils. Antioxidants, 2(1): 11-22.

Rezaeian, S., Pourianfar, H.R., Janpoor, J. (2015). Antioxidant properties of several medicinal plants growing wild in northeastern Iran. *Asian J Plant Sci Res*, 5(2): 63-8.

Selahvarzian, A., Alizadeh, A., Baharvand, P.A., Eldahshan, O.A., Rasoulian, B. (2018). Medicinal Properties of *Rosa canina* L. *Herbal Medicines Journal*, 3(1):1-8. DOI: <https://doi.org/10.22087/hmj.v0i0.615>

Selamoglu, Z., Akgul, H., Dogan, H. (2016). Environmental effects on biologic activities of pollen samples obtained from different phytogeographical regions in Turkey. *Fresenius Environmental Bulletin*, 25: 2484-2489.

Selamoglu, Z., Dugun, C., Akgul, H., Gulhan, M.F. (2017). In-vitro Antioxidant Activities of the Ethanolic Extracts of Some Contained-Allantoin Plants. *Iranian Journal of Pharmaceutical Research*, 16: 92-98.

Sevindik, M., Akgul, H., Pehlivan, M., Selamoglu, Z. (2017). Determination of therapeutic potential of *Mentha longifolia* ssp. *longifolia*. *Fresen Environ Bull.*, 26: 4757-4763.

Yildirim, N.C., Paksoy, M.Y., Yuce, E., Yildirim, N. (2013). Total antioxidant status and antifungal activities of endemic geophytic plants collected from Munzur Valley in Tunceli, Turkey. *Digest Journal of Nanomaterials & Biostructures (DJNB)*, 8(1): 403-408.

Submitted: 26.10.2018

Accepted: 15.12.2018