Abstract

The Neurotoxic Effects of *Origanum minutiflorum* †

İsmail Sari 1,*, Gonca Dönmez 2, Fatma Esin Kirik 3, İşıl Aydemir 4, Oktay Özkan 5, Ahmet Savran 6, Kamil Vural 7 and Mehmet İbrahim Tuğlu 8

1 Department of Medicinal Biochemistry, Faculty of Medicine, Niğde Ömer Halisdemir University, Niğde 51000, Turkey
2 Department of Medicinal Biology, Faculty of Medicine, Niğde Ömer Halisdemir University, Niğde 51000, Turkey; gdonmez@ohu.edu.tr
3 Department of Medicinal Microbiology, Faculty of Medicine, Niğde Ömer Halisdemir University, Niğde 51000, Turkey; fatmaesinkirik@ohu.edu.tr
4 Department of Histology and Embryology, Faculty of Medicine, Niğde Ömer Halisdemir University, Niğde 51000, Turkey; isilaydemir@ohu.edu.tr
5 Department of Medicinal Pharmacology, Faculty of Medicine, Niğde Ömer Halisdemir University, Niğde 51000, Turkey; oktay.ozkan@ohu.edu.tr
6 Department of Arts and Sciences, Faculty of Medicine, Niğde Ömer Halisdemir University, Niğde 51000, Turkey; asavran@ohu.edu.tr
7 Department of Medicinal Pharmacology, Faculty of Medicine, Manisa Celal Bayar University, Manisa 45000, Turkey; klvural@yahoo.com
8 Department of Histology and Embryology, Faculty of Medicine, Manisa Celal Bayar University, Manisa 45000, Turkey; mituglu@yahoo.com
* Correspondence: isari@ohu.edu.tr; Tel.: +90-388-225-2566
† Presented at the 2nd International Conference on Natural Products for Cancer Prevention and Therapy, Kayseri, Turkey, 8–11 November 2017.

Abstract: The natural products are promising products for anti-proliferative effects in cancer. In this study our aim was to analyze the neurotoxic effect of *Origanum minutiflorum* O. Schwarz & PH. Davis on neuroblastoma cells in *in vitro* conditions. The neuroblastoma cells were treated with Oregano oil from *Origanum minutiflorum* and doxorubicin, and cytotoxic activities of these agents were evaluated by MTT assay for IC50 doses. The immunocytochemistry staining of eNOS, iNOS and TUNEL assay were performed. The results were analyzed using Graphpad software for one-way-ANOVA. The immunoreactivities of eNOS and iNOS were increased in neuroblastoma cells treated with oregano oil and doxorubicin. Both of Oregano oil and doxorubicin showed inhibitory activity against neuroblastoma cells via oxidative stress. Also the number of apoptotic cells was greater than the control group. The oregano oil enhanced the cytotoxic activity of doxorubicin. The compound of oregano oil should be considered with the other neuroblastoma cells for neurotoxicity.

Keywords: neuroblastoma; *Origanum minutiflorum*; neurotoxicity; oxidative stress; apoptosis

© 2017 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (http://creativecommons.org/licenses/by/4.0/).