ВЛИЯНИЕ ЭКСТРАКТОВ *TARAXACUM OFFICINALE* НА АКТИВНОСТЬ ГЛУТАТИОНРЕДУКТАЗЫ ЭРИТРОЦИТОВ

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Клетки постоянно подвергаются влиянию большого количества факторов. Свободные радикалы могут нанести ущерб разным биомолекулам, включая белки, липиды и нуклеиновые кислоты. Антиоксиданты способны модифицировать формирование и активность свободных радикалов. Целью данной работы являлось установление влияния этанольных экстрактов корней и листьев Taraxacum officinale (TO) на активность глутатионредуктазы (GR) эритроцитов. В результате было установлено, что TO является сильным антиоксидантом, воздействуя на активность GR.

Ключевые слова: *Taraxacum officinale (TO) корни и листья; эритроциты; активность глутатионредуктазы; антиоксиданты.*

THE IMPACT OF *TARAXACUM OFFICINALE* EXTRACTS ON ERYTHROCYTES GLUTATHIONE REDUCTASE ACTIVITY

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Cells are continually exposed to a large number of factors. Free radicals can affect different biomolecules, including proteins, lipids and nucleic acids. Antioxidants can modify formation and activity of free radicals. The aim of present research was to assess the impact of different Taraxacum officinale(TO) roots and leaves ethanolic extracts on red blood cells glutathione reductase (GR) activity. As a result was determined that TO is a strong antioxidant by influencing GR activity.

Key words: *Taraxacum officinale (TO) roots and leaves; red blood cells; glutathione reductase activity; antioxidants.*

Introduction: *Taraxacum officinale (TO) F. H. Wigg* roots (TOR) and leaves (TOL) are natural, cheap and largely available sources, prescribed for many medicinal purposes: choleretic, diuretic, antirheumatic, anti-inflammatory, appetite-stimulating and laxative properties, antidiabetic, and antitumor drug [1]. TOR is considered a good surrogate of coffee and TOL is a good substitute of tea. Both are better known as a folk remedy in a treatment for liver and gallbladder disorders, digestive complaints, which can also decrease body weight, blood pressure and cholesterol. Chemical composition of TO roots and leaves is amazing. It is a rich source of microelements (potassium, iron, calcium, magnesium and phosphorus), vitamins (A, C, thiamine and riboflavin) and proteins. TOR and TOL represent one of richest vegetable source of beta-carotene and polifenolic compounds (chicoric, 4-caffeoylquinic, chlorogenic, caffeic, p-coumaric, ferulic acids and their derivatives). The antioxidants are key ingredients of TO extracts. It was established a high positive correlation between antioxidant activity of TO and total phenolic compounds.

But until now, there are no available simultaneous researches which will compare TOR and TOL ethanolic extracts influence on GR activity.

Aim of the study: To assess the impact of different *Taraxacum officinale* roots and leaves ethanolic extracts on red blood cells (RBC) glutathione reductase activity.

Materials and methods: The fresh middle sized *Taraxacum officinale F. H. Wigg* roots and leaves were harvested in May of 2017 from a natural habitat from Republic of Moldova. Respectively, after cleaning and weighing, roots and leaves were placed for drying in the lab conditions at room temperature, during 2 weeks. Dried specimens were pulverized with mortar and pestle. Six series (10, 20, 25, 40, 50 and 80%) of roots and six series (10, 20, 25, 40, 50 and 80%) leaves of ethanolic extracts were made. The ratio of biomass-to-solvent was 10:1(expressed in mg/ml). The extraction of active components was done in recipients of 100 ml during 24 hours, at room temperature. The extracts were filtered (Whatman No.1) and stored at $+4^0$C. Extracts' aliquots (1.5ml) were centrifuged (MPW 370, 5 min, 5000 rpm). The absence of stratification or sedimentation confirmed the samples purity. All further assays were made in triplicate in 24-wells microplates.

The influence of TOR and TOL extracts on RBC's GR was evaluated in accordance with Ryzhikov S.L. et al. (2011), modified by us [2], [3]. Healthy persons' blood was diluted 1:4 v/v with DMEM (Dulbecco medium), mixed up with gentamicin (100μg/ml), heparin (2.5 un/ml) and L-glutamine (0.6 mg/ml). An amount of 0.9 ml of diluted blood was supplanted with 0.1 ml of TOR/TOL ethanol extracts in all tested wells. The sodium chloride physiological solution substituted the TOR/TOL extracts in case of control group. The 24 hours of microplates incubation (37^0C, 3.5% CO_2 humidified atmosphere) was continued with centrifugation (5 min, 1500 rpm). The obtained RBC mass was used for further GR activity assessments. All results were expressed as nM/s.g.Hb.

The statistics included calculation of mean and standard deviation (M±SD), Mann-Whitney *U* test (control *vs* experimental groups, between TOL and TOR) and Spearman (r_s) correlation (ethanol concentration *vs* GR activity in tested samples). The *p*-values equal or less than *0.05* were considered statistically significant.

The present study was approved by the Research Ethics Committee of the "Nicolae Testemitanu" State University of Medicine and Pharmacy (nr.81 of 19.09.2020).

Results: The GR activity was different in ethanolic extracts of TO roots and leaves. This enzyme activity was evaluated in ethanolic extracts of 10% with 15.19±0.85* (TOR) and 11.6±0.31* in TOL; the extracts made with 20% ethanol: 19.20±1.80 for TOR and 10.1±1.3* in case of TOL. The GR activity changed to 23.78±0.91* under the influence of TOR in alcohol of 25%, respectively 20.4±0.9* by TOL. The TOR in 40% ethanol decreases the GR activity to 10.02±0.60* and less in case of TOL (19.2±0.7). The enzyme activity changed to 20.42±0.001* under the roots extracts made in alcohol of 50% and 24±2.2* by TOL. In case of highest ethanolic extracts, of 80% the GR activity was measured to 13.16±0.61* under TOR influence and 22.7±0.5* by TOL.

The Mann-Whitney U test, TOL *vs* TOR revealed statistically significant differences in all compared cases. Results marked with asterix confirmed a statistically significant difference of control and tested group. The GR activity in

TOL ethanolic extracts recorded a positive, strong and statistically significant correlation to alcohol concentration (r_s=0.88, p=0.0001). In case of TOR ethanolic extracts, GR activity recorded a negative, moderate and statistically significant correlation to alcohol concentration (r_s=-0.5, p=0.03). The greatest value of GR was determined in by TOR in ethanolic extracts of 25% and by TOL in alcohol of 50%. Further studies are needed to find the main mechanisms of this influence.

Conclusions: *Taraxacum officinale* roots and leaves ethanolic extracts exhibit a strong antioxidant activity. This plant has a great influence on glutathione reductase activity, which depends of alcohol concentration and plants parts. TOL and TOR exhibit a different influence on GR activity, which probably means a different composition of bioactive components.

References

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