Anticancer and antioxidant properties of Brassica rapa L.

Mirzaliyev Tohirjon Madaminjon o'g'li-*Graduate student of Ferghana State Universit*
Erkinov Jamshidbek Dilshodbek ugli *– student of Fergana State University*
Nematullayeva Zuhra Jamoldin qizi *– student of Fergana State University*

Abstract.

The article presents the general botanical characteristics and distribution of turnips, as well as their use in food. Anticancer and antioxidant combinations of extracts and various substances contained in turnips are considered.

Keywords: Brassica, Brassica rapa L., turnip, anticanser, antioxidant.

Аннотация.

В статье приведены общая ботаническая характеристика и распространение репы, а также использование в пищу. Расмотрены протовораковые и антиоксидантные свайства экстрактов и различных веществ содержащихся в репе.

Ключевые слова: Brassica, Brassica rapa L., репа, антиканцероген, антиоксидант.

Brassica rapa L. (turnip) belonging to the genus Brassica (*Cruciferae*) is a biennial, out-crossing, mesopolyploid herbaceous plant. Turnip is indigenous to Europe, Russia, Central Asia, and the Near East, and is now widely cultivated as vegetable and oil source throughout the world[1]. Europe is the center of origin according to the earlier investigation[2] . Two races of turnip, namely, the Western race (oil-seed forms) and the Eastern race (vegetable forms) are differentiated from their comparative morphology. Many Asian civilizations have an aversion to eating turnips as they can cause flatulence; however in Western countries turnip plays a significant role in the diet. Further to its use as a vegetable, the medicinal attributes of turnip have been well documented, for example as a traditional therapeutic agent for liver and kidney diseases and various other ailments[3].Turnip leaves are usually light green, thin and sparsely pubescent. A white-fleshed, large global or tapered root develops at the base of the leaf petioles. Branched flowering stems are also produced. The flowers are clustered at the top of the raceme and are usually raised above the terminal buds. In many countriesl, turnip is usually used for its leaves and roots. Bolting occurs in late winter followed by the formation of flower buds, which are also consumed before opening and while still green. Turnip edible parts are commonly consumed as a boiled vegetable, being used in the preparation of soups and stews, too. In addition, the flower buds are also eaten saute´ed, with a mixture of hot olive oil and garlic, and with rice[4].

The crude extract and different fractions of the fruit part of B. rapa shows strong antioxidant activity on glutathione peroxidase (GPx), superoxide dismutase (SOD) enzymes and total antioxidant status (TAS) in blood sample at concentration dependent manner. The anticancer potential of vegetable *Brassica* species is directly linked to the presence of these bioactive substances. It enhances detoxifcation enzymes, minimizes the oxidative stress, evokes immune response, lower cancer risk and malignancy, inhibits the mutation and also lowers cancer cells proliferation.

The presence of glucosinolates undergoes break down to other important bioactive compounds i.e. indoles and isothiocyanates with the help of important plant tissue enzyme called myrosynase. The resultant biologically active substances with the help of two phase enzymes (Phase I and II) of xenobiotic metabolism may lead the elimination of cancer causing factors; inhibit DNA methylation and cancer growth. The strongest antioxidant activities of the aqueous extract of both aerial parts and roots of *B. rapa* are also investigated. However more antioxidant activities were reported from root extract than turnip greens. The ethyl acetate fraction of *B. rapa* roots give maximum free radical scavenging, lipid peroxidation inhibition and reducing power activities due presence of highest amount of total phenolic compounds.The antioxidant potential and phenolic contentis higher in white cabbage than Chinese cabbage (*B. rapa*). But the antioxidant amount in cabbage was much higher in the frst 8-12 weeks. The choy sum genotype of *B. rapa* have higher antioxidant activity than broccoli, cabbage and cauliflower. The broccoli shows maximum antioxidant activities followed by cabbage and cauliflower. The antioxidant activities among different *Brassica* species vary with steaming, boiling and microwave processes. The antioxidant activity is higher in steamed followed by boiled and microwave respectively. In Chinese cabbage slight boiling leads to unchanged or minor decrease the antioxidant activity. The nutrient rich soil increases the antioxidant capacity of green cabbage. The sulphur availability leads to increased of antioxidant activity in two *B. rapa* sub-species sylvestris. *B. rapa* has strong anticancer and moderate antioxidant activityagainst human lung cancer A-549 cell line (ATCC#CCL- 185).The crude extract of *B. rapa* contain glucosonalates and it work as mutagenic agent in human lymphocytes. The *in-vitro* cytotoxic activity of *B. rapa* roots was also recorded in three different types of cancer cell line including Hela, Hep-2 and AMN-3. However, the cytotoxic potential of crude root extracts varies with type of dose concentrations and its timing and with type of cells. The maximum growth inhibition of 42 and 63% were recorded at 1250µg/ml concentration against Hep-2 and ANM-3 cell lines respectively. While, the optimum growth inhibition (64%) against Hela cell was recorded at 10,000µg/ ml concentration after exposure for 24hours exposure. The juice of *Brassica* species provides protection to human hepatome cells against the genotoxic effect of the carcinogens. The studied the anti-tumor effect of methanolic extract and nanoparticles of *Brassica* rapa Chinensis at two different doses (800 mg/kg b.wt and 1mg/kg b.wt). Also reported that DLA tumor induced mice might survive long due to the presence of some important anti-tumor secondary metabolites.

REFERENCES

1. Sun, R. Economic/Academic interest of *Brassica rapa*. In X. Wang & C. Kole (Eds.), *TheBrasica rapa genome*. Heidelberg, New York, Dordrecht, London: Springer. 2015.pp. 1–16.

2. Takahashi, Y., Yokoi, & Takahata, Y. Genetic divergence of Turnip (*Brassica rapa*L. em. Metzg. subsp. *rapa*) inferred from simple sequence repeats in

chloroplast and nuclear genomes and morphology. *Genetic Resource and Crop Evolution*,2016.63,pp.869–879.

3. Ullah, S., Khan, M. R., Shah, N. A., Shah, S. A., Majid, M., & Farooq, M. A. Ethnomedicinal plant use value in the Lakki Marwat district of Pakistan. *Journal of Ethnopharmacol*, 2014.158,pp.412–422.

4. F. Fernandes et al. Chemical and antioxidative assessment of dietary turnip (*Brassica rapa* var. *rapa* L.). *Food Chemistry*. 2007.105.pp.1003–1010.

5. Jan SA, Shinwari ZK, Malik M, et al. Antioxidant and anticancer activities of *Brassica rapa*: a review. *MOJ Biol Med.* 2018.3(4).pp.175–178.