

Study of Variation in Secondary metabolites from rhizomes of *Raphanus sativus L*, *Daucos carota L*, *Beta vulgaris L*

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Abstract

Medicinal plants play an important role in human health. The three rhizomes viz *Raphanus sativus L*, *Daucos carota L* and *Beta vulgaris L* were selected for the study. All the rhizomes have been serving as a Salad in India.

The present study was undertaken to investigate the secondary metabolites present in water extract of *Raphanus sativus L*, *Daucos carota L* and *Beta vulgaris L*. The water extract of rhizomes of *Raphanus sativus* contains highest number of phytochemicals whereas *Daucos carota* contain least. Cardiac glycosides and Diterpene were present in all extract indicating useful on gastrointestinal drugs, and pain relievers.

Keywords: *Raphanus sativus L*, *Daucos carota L* and *Beta vulgaris L*, Qualitative Phytochemical analysis.

1. Introduction

According to World Health Organization medicinal plants would be the best source to obtain a variety of drugs. About 80% of individuals from developed countries used traditional medicine, which has compounds derived from medicinal plants (Aggarwal BB et.al 2007). Herbal products are suitable for treating a wide range of infections and diseases (Chattopadhyay et.al 2004, Godghate et.al 2013).

Raphanus sativus belongs to family Brassicaceae. It has been used as a medicinal plant from a long time. It has laxative effects on intestine and acts as an appetizer used for curing liver dysfunction and poor digestion. It is also very well known for its use in the treatment of bronchitis and diarrhea. *Raphanus sativus* seeds were found to contain alkaloid like coumarin, saponin, flavonoids and anthocyanin (Sana, et.al, 2001). It also has antimicrobial activity, antimutagenic, anticarcinogenic and antiatherosclerosis activity (Suh et al., 2006)

Daucos carota Linn, commonly known as carrot, is a vegetable which has beta-carotene content. Roots of *Daucos carota* Linn. have been used for treatments of inflammation and some chronic diseases. It is regarded as a healthy food item because of its high vitamin and fiber content (Nilsson, 1987; Chen et.al, 1998 and Negi et.al 2000)

Beta vulgaris Linn. is an important medicinal plant of family Chenopodiaceae. It is commonly known as Beet root or garden beet. The root is used in Indian traditional systems of medicine specifically for the treatment of fertility, hypertension, cancer and urinary tract disorders (Kirtikar, et.al, 2005, Khare, et.al, 2007)

On the basis of all above medicinal uses these plants were considered for the present study.

2. Material and Methods

2.1 Collection and Authentication:

Fresh rhizomes of *Raphanus sativus L*, *Daucos carota L* and *Beta vulgaris L* were purchased from Gadhinglaj area of Kolhapur district of Maharashtra state. Authentication was done at Department of Botany, Dr. Ghali College, Gadhinglaj, District Kolhapur of Maharashtra State.

2.2 Preparation of Extracts:

200 ml of juice of rhizomes of *Raphanus sativus L*, *Daucos carota L* and *Beta vulgaris L* were mixed with 300 ml of distilled water and heat on water bath for 1/3rd of original concentration. Then it was used for further analysis.

2.3 Qualitative Phytochemical Analysis

All the extracts of plants were individually analyzed for the various classes of phytochemicals (Table 1) using standard methods (Seema et.al 2011, S.De. et.al 2010, Sunil et.al 2012, Ashokan et.al 2012, Harborne 1973 & Sofowora 1993, Ashvin et.al 2014 and Godghate et.al 2015).

Beta cyanine:

1 ml of 2N NaOH was added to 2 ml of plant extract and heated for 5 min at 100°C Formation of yellow colour indicated the presence of Beta cyanine.

Coumarin:

3ml of 10% NH₄OH was added to 2 ml of aqueous extract formation of yellow colour indicates coumarin.

Acid: Plant extract 1 ml was treated with Sodium Bicarbonate solution formation of effervances indicates presence of Acids.

Phlobatannins:

Deposition of red ppt when aqueous extract of each plant sample is boiled with 1% aqueous HCl was taken as evidence for presence of Phlobatannins.

Leucoanthocyanin:

5 ml of isoamyl alcohol added to 5 ml of aqueous, upper layer appear red in colour indicates the presence of Leucoanthocyanin.

Chalcones:

2 ml of NH₄OH was added to 0.5 gm ethanol extract, appearance of red colour showed presence of chalcones.

Cardiac Glycosides:

Plant extract treated with 2 ml glacial acetic acid containing a drop of FeCl₃. A brown colour ring indicates the presence of positive test.

Phytosterol:

Extract was treated with chloroform and filtered. The filtrate was treated with few drops of Concentrated H₂SO₄ and shakes, allow standing, appearance of golden red indicates the positive test.

Diterpene:

Extract where dissolved in water and treated with 10 drops of copper acetate solution, Formation of emerald green colour indicates presence of diterpene.

Emodins:

2ml of NH₄OH and 3 ml of benzene was added to extract appearance of red colour indicates presence of emodins.

3. Table 1 : Phytochemical Analysis of water extracts of rhizomes of *Raphanus sativus L.*, *Daucos carota L.* & *beta vulgaris L.*

Where, W.E.B-Water Extract of *Beta vulgaris L.*; W.E.D-Water Extract of *Daucos carota L.* and W.E.R-Water Extract of *Raphanus sativus L.* Note: [(+) means presence (-) means absent]

3. Conclusion:

Qualitative phytochemical analysis of water extract of rhizomes of *Daucus carota* indicates the presence of Cardiac glycosides & Diterpene whereas beta cyanine, Coumarin, acid, Phlobatannins, Leucoanthocyanin, Chalcones, Phytosterol, & emodins were absent. Similar investigation was carried out by Mehmet et.al 2007.

The phytochemical test for *Beta vulgaris L.* (Sugar beet) rhizome (Plant material) we observed that Coumarin, Leucoanthocyanin, cardiac glycosides, Phytosterol, Diterpene & emodins were present whereas betacyanine, Coumarin, acid, Phlobatannins, Leucoanthocyanin & Chalcones were absent. Jain et.al 2012 also reported phytochemical study of *Beta vulgaris L.*

Raphanus sativus L. (Radish) contains cardiac glycosides, diterpene & Phytosterol qualitatively. Similar study has been reported by Safia et.al, 2013.

Sr.No	Phytochemicals	W.E.B	W.E.D	W.E.R
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1	Beta cyanine	-	-	-
2	Coumarin	+	-	-
3	Acid	-	-	-
4	Phlobatannins	-	-	-
5	Leucoanthocyanin	+	-	-
6	Chalcones	-	-	-
7	Cardiac Glycosides	+	+	+
8	Phytosterol	+	-	+
9	Diterpene	+	+	+
10	Emodins	-	-	-

4. References

- [1] Aggarwal BB, Sundarma C, Malini N & Ichikawa H. *Adv. Exp. Med. Biol.* Vol 5, No 95, 2007, 1-75.
- [2] Chattopadhyay I, Biswas U, Badopadhyay and Banerjee R.K. *Curr. Sci.*, Vol. 8 No. 7, 2004, 44-53.
- [3] R.S.Sawant & A.G.Godghate, Qualitative phytochemical screening of rhizomes of *Curcuma longa* L. *International Journal of Science, Environment and Technology*, Vol. 2, No 4, 2013, 634 – 641.
- [4] Sanaa, T. EL-Sayed, Purification and characterization of Raphanin, a natural protease, from *Raphanus sativus* leaves. *Pakistan J. Biol. Sci.*, Vol.4, 2001, 564-568.
- [5] Suh, S. J.; Moon, S. K. and Kim, C. H., *Raphanus sativus* and its isothiocyanates inhibit vascular smooth muscle cells proliferation and induce G1 cell cycle arrest *International Immunopharmacology*, Vol 6, 2006, 854– 861.
- [6] Nilsson T., Carbohydrate composition during long term storage of carrots as influenced by the time of harvest. *J.Hort Sci.* Vol 6 No. 2, 1987, 191-203.
- [7] Chen, BH, Tang YC. 1998. Processing and stability of carotenoid powder from carrot pulp waste. *J. Agric.Food Chem.* Vol. 46, 1998, 2312-2318.
- [8] Negi PS, Roy SK., Effect of low-cost storage and packaging on quality and nutritive value of fresh and dehydrated carrots. *J. Sci. Food Agric.* Vol 80, 2000, 2169-2175.
- [9] Kirtikar K.R., Basu B.D.: Indian Medicinal Plants, Lalit Mohan Basu, Allahabad 2005.
- [10] Khare C.P.: Indian Medicinal Plants: An Illustrated Dictionary, Springer Science & Business Media LLC, New York 2007.
- [11] Seema Firadouse, Parwez Alam. Phytochemical investigation of extract of *Amorphophallus Campanulatus tubers*. *International Journal of Phytomedicines*, vol 3, 2011, 32-35.
- [12] S.De, Y.N.Dey, A.K. Ghosh. Phytochemical investigation and Chromatographic Evaluation of the different Extracts of Tubers of *Amorphophallus Paeonifolius* (Araceae). *International Journal of Pharmaceutical and Biomedical Research*, Vol. 1 No. 5, 2010, 150-157.
- [13] Sunil H. Ganatra, Sweta P. Durge, Patil S.U. Preliminary Phytochemical investigations and TLC Analysis of *Ficus racemosa* leaves. *Journal of chemical and Pharmaceutical Research*, Vol. 4, No. 5, 2012, 2380-2384.
- [14] Ashokan Damodaran and Sandhya Manohar. Qualitative Screening for Phytochemicals of various solvents extracts of *Cassia alata* Linn. *Leaves. Herbal Tech Industry*, 2012, 11-13.
- [15] Harborne JB. *Phytochemical Methods: A guide to modern techniques of plant analysis.* Chapman and Hall. New York, pp. 279. 3rd Edition. 1973.
- [16] Sofowora A. *Medicinal Plants and Traditional Medicinal in Africa.* 2nd Ed. Sunshine House, Ibadan, Nigeria: Spectrum Book Ltd; Screening Plants for Bioactive Agents pp.134-156, 1993.
- [17] Godghate, AG and Sawan, RS. Phytochemical analysis of *Tectona grandis* Linn. *Int J Pharm Bio Sci*, Vol. 5, No.1, 2014, 355 – 359.
- [18] Ashvin G. Godghate, Rahul Shivaji Patil and Rajaram S. Sawant. Screening of Secondary Metabolites and Antibacterial Activity of Some Indian Spices. *Biolife* Vol. 3, No.3, 2015, 614-619
- [19] Mehmet Musa Özcan1 and Jean Claude Chalchat, Chemical composition of carrot seeds (*Daucus carota* L.) cultivated in Turkey: characterization of the seed oil and essential oil. *Grasas Y Aceites*, Vol 58. No.4, 2007, 359-365.
- [20] Nilesh Jain and Abhayk Singha. Protective role of Beta vulgaris L. leaves extract and fractions on ethanol mediated hepatic toxicity. *Acta Poloniae Pharmaceutical and Drug Research*, Vol. 69 No. 5, 2012, 945-950.
- [21] Safia Janjua, Maliha Shahid and Fakhir-i-Abbas. Phytochemical analysis and *in vitro* antibacterial activity of root peel extract of *Raphanus sativus* L. var niger. *Advancement in Medicinal Plant Research* Vol.1, No.1, 2013, 1-7.