

A review on brassica oleracea var. Gongylodes

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ABSTRACT

Our environment contains wide variety of plant species containing their own pharmacological activities, therapeutic benefits, morphological structure, uses etc., which are essential to cure the ill effects in human beings. These plant species are included in our daily diet. A vegetable from Cruciferae family called kohlrabi. A winter vegetable containing mainly glucosinolates and its derivatives as an active constituent responsible for reducing the risk of various cancer diseases. It is mainly grown in winter season, temperature ranges from 15.5-18°C. Kohlrabi is cultivated in Kashmir, West Bengal, Maharashtra, Assam, Uttar Pradesh, Punjab & in some regions South India. This variety of brassica is a major source of vitamins and minerals, dietary fibers, the main intention of this review is to understand the nutritional benefits of brassica oleracea var. gongylodes which in turn helps in health promotion.

KEYWORDS: Cruciferae, Glucosinolates, Pharmacological activity, Phytochemical constituents

1. INTRODUCTION

Brassica oleracea var. gongylodes A biennial vegetable consists of long leafy stem & round bulb (Sathasivam R et al., 1939). Belongs to mustard family. These are consumed either by cooked or raw. Kohlrabi said to be a main source of vit-c and minerals like Copper, Calcium, potassium Iron, manganese & phosphorous and dietary fibre (Choudary A K et al., 2014) phytochemical present in Knol-Khol on isothiocyanates, sulforaphane and indole-3 carbinol. These constituents help in protection and colon cancer (Chauhan E S et al., 2016).

1.1 Vernacular names

Table no.1: Vernacular names of Brassica oleracea var. Gongylodes (Sathasivam R et al., 1939)

Language	Names
English	German turnip
Kannada	Navilukosu
Hindi	Navalgol/Nawalagoi
Malayalam	Seema mullangi
Tamil	Noolkol
German	Kohlrabi
French	Chourave



Fig – 1: *Brassica oleracea* var. *Gongylodes* Plant

1.2 Taxonomical classification

Table no.2: Taxonomic rank of *Brassica oleracea* var. *Gongylodes* (German turnip) (Jung H A et al.,2014)

Kingdom	Plantae
Order	Brassica
Family	Cruciferae
Genus	Brassica
Species	<i>Brassica oleracea</i>

2. BOTANICAL DISCRIPTION

Kohlrabi is a cruciferous vegetable, which is available in pale green and purple color (Sathasivam R et al., 1939) The enlargement of stem of kohlrabi develops or grows above the base. Its leaves are crunchy and taste of kohlrabi is slightly sweet (Sathasivam R -1939, Pasko et al., 2022). It is a herbaceous plant of tap root system, stems are erect, branched, herbaceous and leaves are alternatively arranged, Sometimes lobed. Fully grown kohlrabi weighs about 150gm ,10cm in size.

3. PHYTOCHEMICAL EVALUATION

Kohlrabi contains Tannins, Phenols, Flavonoids, Saponins, Sterols, Triterpenes.

Table no.3: Phytochemicals present in the *Brassica oleracea* var. *Gongylodes* (German turnip)

Plant parts	Chemicals
Stem	Tannins, Phenols, Flavonoids, Saponins, Sterols, triterpenes

Table no.4: Methods and results of qualitative chemical tests

Phytochemicals	Qualitative detection method
Alkaloids	To a few ml of filtrate, a drop or two drops of Mayer's reagent were added by the side of the test tube. There is no white or creamy precipitate indicates the absence of alkaloids.
Glycosides	To 2 ml of aqueous extract of samples, 5ml of Benedict's solution & few drops of dilute HCL were added and heated for minutes. There is no red precipitate which indicated the absence of glycosides.
Saponins	In a test containing about 5 ml of an aqueous extract of the drug, a drop of sodium bicarbonate solution was added. The mixture was shaken vigorously and left for 3 minutes. Honeycomb like froth was formed which indicates the presence of saponins.
Terpenoids	2ml of acetic anhydride solution was added to 1ml of petroleum ether extract of the drug in chloroform, followed by 1 ml of concentrated sulphuric acid. A violet colouring was formed

	indicating the presence of terpenoids.
Flavonoids	In a test tube containing 0.5 ml of alcoholic extract of the drug, 5-10 drops of dilute HCL was added followed by small pieces of magnesium. In the presence of flavonoids, a reddish pink or brown colour produced.
Steroids	2 ml of acetic anhydride solution was added to 1 ml of petroleum ether extract of the drug in chloroform followed by 1 ml of concentrated sulphuric acid, A greenish colour was developed which turned to blue indicates the positive result.
Tannins	To 1-2 ml of plant extract, a few drops of 5% FeCl ₃ solution were added. A green colour indicated the presence of gallo tannins which brown color indicated the presence of tannins.
Phenols	To 2ml of plant extract, a few drops of ferric chloride solution were added. A violet colour indicated the presence of phenols mg FeCl ₃ was added to 1 mL of sample, followed by vigorous shaking. Green coloration would indicate the presence of Phenols.

4. ECOLOGY AND DISTRIBUTION OF *Brassica oleracea* var. *Gongylodes*

Kohlrabi is a cruciferous vegetable, which is available in pale green and purple colour. The enlargement of stem of kohlrabi develops or grows above the base. Its leaves are crunchy and taste of kohlrabi is slightly sweet. It is a herbaceous plant of tap root system, stems are erect, branched, herbaceous and leaves are alternatively arranged, Sometimes lobed. Fully grown kohlrabi weighs about 150gm, 10cm in size. As kohlrabi is a cold weather crop, & it is grown in winter season and early spring season. Climatic condition of Afghanistan is suitable to cultivate this type of Cruciferous vegetables. The maximum required temperature for crop formation is about (15.5-18°C) Widely distributed in the region of Northern state of Kashmir, West Bengal, Karnataka. Soil pH should be maintained at 6.5-6.8. For better yield it grown in heavy loamy soil.

5. PHARMACOLOGICAL ACTIVITY

Antioxidant Activity

Kohlrabi is rich in antioxidants such as glucosinolates which is hydrolysed by myrosinase into isothiocyanates, nitriles, thiocyanates, these compounds helps in prevention of free radical chain reaction by scavenge free radicals formed within the redox reactions. A phytochemical present in kohlrabi also act as anti-oxidant. Ex: flavonoids, polyphenols. Kohlrabi contains good phenolic compounds as a secondary metabolite helps in health promotion, removing free radicals. it also comprises of anti-aging property (Pasko et al.,2022).

Anti-inflammatory activity

Inflammation which is rised quickly by the COX-enzyme, It contains cox-2 mRNA in turn results COX-2 mRNA expression also increased, so the proteins occurs in site of inflammation. Cox-1 & Cox-2 enzymes are responsible for the production prostaglandins. NSAID's on prefered to inhibit cox-2 but kohlrabi extract shows better anti-inflammatory action than NSAID's (Pasko et al.,2022).

Anti- diabetic activity

Uptake of vegetables which are rich in phenolic content like kohlrabi. This helps in reducing oxidative stress & inhibit macromolecular oxidation in turn results in reducing risk of chronic diseases. The inhibition of polyol pathway efflux and PTP1B is a method to control the Diabetic mellitus.

Anti-thyroids

Kohlrabi contains glucosinolates which is an active constituent responsible for inhibiting the key protein such as Iodide/Sodium symporter (NIS), present in basolateral membrane of thyroid follicle results in iodide uptake which in turn results in antithyroid effect. The thyroid peroxidase, which is located in apical membrane oxidises the iodide and control the thyroid hormone synthesis in turn results in anti-thyroid effect. The TPO (thyroid peroxidase), which is located in apical Membrane oxidises the iodide & control the thyroid hormone synthesis.

Promotion of Eye health

Kohlrabi is rich in carotenes like beta-carotene, which is an antioxidant compound in the body. Beta- carotene is effective in the ocular area. Kohlrabi also contain Vitamin A and this will slow down macular degeneration and

eliminate the appearance of cataracts. This also helps to neutralize free radicals in the eyes and prevent oxidative stress.

Nerve and Muscle functions

Kohlrabi contains calcium and potassium has a rich source. Potassium helps to store carbohydrates which are then used to fuel the muscles, Nerve transmissions and nerve excitability heavily depend on an adequate potassium level in the body. The primary role of potassium is associated with muscle and nerve function.

Promotion of healthy guts

Kohlrabi contains both soluble and insoluble fiber. The fiber is essential for optimal gut health, and those fibers are the food source for probiotic bacteria such as Bifidobacteria and Lactobacilli. These bacteria will nourish our gut cells. In addition to this insoluble fiber are not digested in the intestine, results in increasing the bulk of stools and promoting bowel movement.

Promotion of immune system

Kohlrabi is high in vitamin C, it is essential for promoting immune health. Vitamin C intake at sufficient levels ensures the formation of cytokines and lymphocytes to overcome the infections and has a wide range of advantages in enhancing collagen synthesis, promote moisture retention, and protect skin from UV radiation.

Treating Heart disease

Kohlrabi is rich in anti-oxidants such as glucosinolates and isothiocyanates, which is found in cruciferous vegetables. High intake of glucosinolate leads to decreased risk of heart disease due to its ability to widen blood vessels and reduce inflammation. In addition to that isothiocyanates have antioxidant effects that may help prevent plaque buildup in your arteries. These bacteria will nourish our gut cells. In addition to this insoluble fiber are not digested in the intestine, results in increasing the bulk of stools and promoting bowel movement.

Improve Bone strength

Kohlrabi is high in calcium and magnesium, which help to promote stronger bones. The calcium acts as a hardening and strengthening mineral. Magnesium helps in bone density improvement, increasing bone hardness and decreasing the risk of fractures.

6. CONCLUSION

This review is based upon the pharmacological activities, phytochemical constituents, habitat, distribution of Brassica oleracea gongylodes. It is a having wide range of nutritional values such as vit-c, vit - B6, K, Mg, Mn, folate which are in turn useful in wound healing property reducing blood level, treatment of colon cancer. The active constituents such as flavonoids, tannins, saponins, alkaloids also majorly involved in pharmacological activities. Brassica family include wide variety of species whose unknown activities are still need to be studied.

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