# *Therapeutic Potential of Radish Microgreens for Metabolic Fitness*

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**ABSTRACT**

Radish *[Raphanus sativus]* being a fibre rich vegetable is consumed largely in Asian households but apart from a source of fibre, it holds immense potent therapeutics such as bioactive compounds, flavonoids, glucosinolates, isothiocyanates, phenolic acids, vitamins and antioxidants. Due to the presence of these bioactive compounds, radish is being consumed to combat metabolic dysfunctions like non-alcoholic fatty liver disease, diabetes, inflammation, also possessing anti cancerous and anti-oxidants properties. Radish microgreens possess all these phytochemicals up to manifolds and hence even small consumption of these microgreens regularly can help in improving glycemic control, regulation of lipid metabolism, attenuating oxidative stress, enhance insulin sensitivity, cardiovascular complications. However clinical investigations are still being made to explain its better uses and to validate its efficiency.

## INTRODUCTION

Increase in lifestyle disease and nutritional restrictions in the available diet, demands a shift towards edibles that can meet the required essentials of the body and at the same time can take care of the metabolic fitness which is lagging behind.

Microgreens are one such food supplement that can meet the nutritional deficiencies, besides at this stage the plant possesses higher amount of nutrients than its mature stage including essential minerals that usually lacks in matured ones. (Zhang *et al*., 2021). The article discusses about the studies made with

radish microgreens and the results obtained for treatment of certain complication along with maintaining nutritional requirements.

**Fig. White Radish Microgreens**

The microgreens are low in calorie [16 kcal/100g], contain high water content [95.3g/100g], ample dietary fiber [1.6g/100g]. Apart from these, they are also rich in protein, lipids, vitamin C [18.4 mg/100g]. Minerals like potassium, calcium, phosphorus and vitamins like B3, B6 and folate are also suitably available. All these available nutrients make it a suitable food for tackling issues like weight loss, inflammation, diabetes, heart health, nonalcoholic fatty liver, stable brain function. (Tallei *et al*., 2025).

In the subsequent section, the therapeutic implications of radish microgreens have been discussed with reference to some major metabolic and chronic disorders, including non-alcoholic fatty liver disease, diabetes, oxidative stress, cardiovascular disease and cancer. Major focus is kept on discussing the antioxidant capacity, anti-inflammatory properties and metabolic regulatory effects of these microgreens.

**Treatment of non-alcoholic fatty liver**

Consumption of high fat and calorie diet, overeating and sedentary lifestyle could be some possible reasons that can induce non-alcoholic fatty liver disease. It is a condition of the liver occurring due to high lipid accumulation and is manifested due to obesity associated insulin resistance.

A bioactive sulphur containing phytochemical, 4-methylthio-3-butenyl isothiocyanate [MTBITC] which is found in Brassicaceae family especially in radish [higher content in microgreens] is found to possess high antioxidant and anti-inflammatory property. (You H *et al*., 2015) In the pathological studies it has been found that liver is one of the target organs of MTBITC and attributes to antioxidant properties (Salah *et al*., 2009). Lipid deposition over liver can cause generation of free radicals and ROS [reactive oxidation species], that damages the liver itself. (Lugasi A *et al*., 2005) MTBITC shows insulin resistance relief, thus conferring antioxidant property, also it attenuates the activity of LDL [low-density lipoprotein] receptors which therefore increases lipid metabolism.

Results from various studies thus points that administration of MTBITC regularly can ameliorate the severity of NAFLD [non-alcoholic fatty liver disease] at very early stage.

**Checking obesity**

Obesity is also an important metabolic dysfunction occurring due to high adipose tissue accumulation [adipogenesis] and is closely associated to insulin resistance, systemic inflammation and altered lipid metabolism. Radish microgreens contain important polysaccharides such as rhamnogalacturonans [RGP] that has prebiotic activity which inhibits fat accumulation in adipocytes, thus preventing development of obesity. (Lee YR *et al*., 2023)

**Glycemic Regulation**

Diabetes is one of the simplest yet crucial metabolic disorder prevailing in the global population and of which type 2 diabetes accounts for 90-95%. It occurs when the beta-cells of pancreas fail to produce insulin in sufficient amount which is required to convert available extra glucose into glycogen essentially to be stored in body. This causes glucose spike in diabetic patients after having starch rich food. Radish greens contain a class of tannins called proanthocyanidins that binds to alpha-glucosidase required to convert disaccharides and oligosaccharides [formed after the action of alpha-amylase] into glucose that can enter blood stream. (Kajszczak D *et al*., 2024) On binding with the active site of alpha-glucosidase, proanthocyanidins bring conformational change in the enzyme thus inhibiting its action and lowering the glucose spike in blood stream postprandial [post meal], thus helping slow release of glucose and its gradual absorption in the body. The flavanols available in radish greens inhibits non enzymatic glycation and thus reducing oxidative stress and preventing protein cross linking through which diabetic complications reduce. (Baenas N *et al*., 2016).

**Management of oxidative stress**

During the metabolic activity of mitochondria, leakage of electrons and their combining with oxygen proceeds to the formation of Reactive Oxygen Species [ROS] or can form due to active immune cells while they cause inflammation to kill pathogens, or due to hyperglycemia, smoking, UV radiations etc.

This stress can cause DNA damage via mutation, mitochondrial dysfunction, neurodegenerative disease, aging-related disorders and many more. The microgreen stage of radish microgreens is rich in metabolites such as phenols, flavonoids and glucosinolates having the property of free radical neutralization and ROS scavenging, thus managing the oxidative stress and protecting cells from the damage caused by it. (Rajendran *et al*., 2025)

**Anti-carcinogenic activity**

When cells lose their regulation over cell proliferation, cancer tends to grow, mainly occurring due to presence of free radicals causing mutation or the use of carcinogenic substances such as tobacco or excess consumption of processed food etc.

As already discussed in previous section about the free radical neutralizing ability of these microgreens which plays a part in cancer prevention too, besides this, radish microgreens contain two important secondary metabolites, Sulphoraphane and Sulphoraphene [compounds of isothiocyanate class], that are potentially helpful in managing controlled cell growth, reducing oxidative stress and also detoxifies substances that can cause cellular damage i.e., abnormal and damaged cells by apoptosis. (Kaimuangpak *et al*., 2025) Under clinical trials, radish microgreens have shown impactful prevention in cancer call growth on regular consumption and more trials are still being made to explore more.

## CONCLUSION

Through available research data and pathological results, we have enough to discuss about the benefits of radish microgreens and the above mentions in the article are few of those. Along with these, the microgreens have been found helpful in promoting gut health by improving intestinal bacterial fauna, balancing brain functions by scavenging ROS, rectifying cardiovascular health and many more lifestyle related disorders. Regular consumption also ensures the supply of essential minerals, vitamins and secondary metabolites required for healthy functioning of body and improving immunity

which itself serves in preventing diseases and disorders.

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