

Studies on cauliflower leaves powder and its waste utilization in traditional product

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■ **Abstract** : This review aim is to studied on cauliflower leaves powder. Cauliflower is one of the most common and popular vegetable grown in India. The family of cauliflower leaves is *Brassicaceae*. Cauliflower leaves rich source of β carotene, iron and calcium but it has higher waste index. Cauliflower leaves are also come in waste products category and thus can be utilized in value added products for treat anemia disease and those people who suffering from micronutrients deficiency. This review studied on the nutritional composition of cauliflower leaves powder and its utilization into traditional product. There is number of different drying methods tray drying, microwave oven drying and sun drying method are use for drying of cauliflower leaves at different temperature for specific time. After drying it can be store for use during lean season. These vegetables are also rich in beneficial plant's metabolites, which include sulfur containing glucosinolates, anthocyanin's, flavonoids, trepans, S-methyleysteine sulfoxide, and other compound to improve the nutritional, physico-chemical and sensory quality and very beneficial to health. Phytochemicals of cauliflower leaves are stronger antioxidants and are thought to reduce the risk of chronic diseases by protecting against free radical damage.

■ **Key words** : Cauliflower leaves, β carotene, Iron, Phyto-chemicals, Drying method

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Cauliflower is a one of cruciferous vegetable in the species *Brassica oleracea*, in the family *Brassicaceae*. It (Ambrosone and Tang, 2009). India is second in the world in the population of vegetables and third in population of fruits (Buyaneswari and Ramya, 2014). It is cultivated mainly in northeast from April to December (Chauhan *et al.*, 2014). It is also rich in nutrients and has higher waste index. Generally its leaves which are thrown away as waste are also rich authority of iron and beta carotene thus can be utilized in value added products (Kowsalya and Sangheetha, 1999).

Cauliflower leaves is also rich source of dietary fibre,

vegetable provide substantial quality of nutrients *i.e.* vitamins and minerals which help in preventing various diseases (Verhagen, 1993). The leaves contribute about 50% of the total production of cauliflower. Cauliflower leaves are available only for short time but it can be dried and stored for use during lean season (Singh *et al.*, 2005). The dried cauliflower green leaves are highly nutritious and a good source of β carotene – 43.11mg, Iron- 60.38mg, Copper- 1.55 mg, Manganese – 5.86mg, Zinc – 5.10mg per 100g (Wani and Kaul, 2011).

Cauliflower leaves good source of iron and other micronutrients. Multiple micronutrient deficiencies are

very common deficiency mainly in developing countries. Mostly people in the developed countries also suffer from different forms of these nutritional problems. According to this data in India women between 15 to 49 years of age are anemic and 79% of children of age group between 6 to 35 months age are anemic (Krishnaswamy, 2009). A brassica oleracea leaf contains several medical properties. It contains folate which helps in making and inspiring the blood and prevents symptoms of anemia (Brittenham, 2009 and Dreyfuss *et al.*, 2000).

Characterization of the Brassicaceae Family :

The *Brassicaceae*. It is a plant family of enormous economic importance, containing about 340 genera and 3700 species (Kapusta-Duch *et al.*, 2011). The cauliflower are the most important vegetables consumed in Europe and all over the world owing to their availability at local markets, cheapness and consumer preference (Thomson *et al.*, 2010; Kapusta- Duch *et al.*, 2011 and Lee *et al.*, 2004).

Traditional snack products :

A snack is a portion of food, smaller than regular meal generally eaten between meals. Traditional food is traditional in nature. It has a historic precedent in a national dish, regional cuisine (Kristbergsson and Oliveira, 2016). Traditional products rich in calories can co-operate to the changing diseases patterns. Traditional food is foods passing through generation (Kristbergsson and Oliveira, 2016). or which have been consumed in many generations (Sunder, 2017).

Traditional food such as chakali, potato chips, bhujiyashev, crackers etc. Traditional foods can be produced as homemade, restaurants and small scale industry and large scale industry (WHO regional office for the Eastern Mediterranean, 2010).

After studying on research paper I am doing work on development of traditional product with incorporation of cauliflower leaves powder because cauliflower leaves is higher waste index and beta carotene and iron rich. These products if noted in routine diet can help to reduce iron deficiency anaemia. so I am using the cauliflower leaves powder for development of value added product to overcome the health related problems like prevent anemia, cancer diseases.

Nutritional composition of cauliflower leaves per

100 g :

Protein 5.9g, Fat 1.3g, Carbohydrate 7.6g, Crude fibre 2g, Beta carotene 49.526mg, Iron 41mg, Energy 66 kcal. According to the Food Composition Table provided by the National institution of Nutrition, Hyderabad, India.

The beneficial effects of cauliflower leaves on human health :

Brassica vegetables beneficial effect on human health has been connected to phytochemicals. There are Phenolic compounds that apply to a large number of compounds detached from plants. Phenolic compound are classified into simple aromatic ringed compounds to large and complex tannins and derived polyphenols (Guerrero – Beltran *et al.*, 2012; Cieslik *et al.*, 2007 and Prereira *et al.*, 2009). Brassica leaves contain a sulfur compound that has also been shown to kill cancer stem cells, there by slowing tumor growth. Some researchers believe eliminating cancer stem cells may be key to controlling cancer (Guerrero – Beltran *et al.*, 2012).

Sulforaphane in cauliflower and other cruciferous vegetables has been found to significantly improve blood pressure and kidney functions (Cohen *et al.*, 2000; Knekt *et al.*, 2002 and Zhang and Hamauza, 2004). Preventing neurological diseases, Diabetes as well as bacterial infection by Consumption of anthocynins has been shown to have health beneficial influence a range of disorders (De Pascual-Teresa *et al.*, 2008; Hassan *et al.*, 2004 and Li *et al.*, 2012).

Cauliflower leaves contain antioxidants and other bioactive compound which has been strongly associated with cardiovascular diseases and chronic diseases (Cohen *et al.*, 2000; Knekt *et al.*, 2002 and Zhang and Hamauza, 2004). Reactive oxygen can cause lipid and protein oxidation, DNA damage and transition of gene expression in the body. They play impotence role in etiopathology of many diseases like stroke, heart attack, liver injury. Imbalance between ROS and antioxidants reason of oxidative stress may be caused by antioxidant defect in dieter increased production of free radicals by stress, smoking, environmental corruption which move into food and water (Lee *et al.*, 2004).

Cruciferous vegetables consumption come to lower the risk for some kinds of cancers such as renal cancer, prostate cancer and possibly colorectal cancer (Thomson *et al.*, 2010). All bioactive properties presented in these

vegetables may decrease inflammation for the reason that they may operate on different and complementary stages *i.e.* inspire detoxification enzymes scavenge free radicals and generate immune functions (Fimognari *et al.*, 2012).

Isothiocyanates present in cauliflower vegetable, suggest interesting chemopreventive activities against numerous chronic degenerative diseases together with cancer cardiovascular diseases, diabetes (Fimognari *et al.*, 2012). Brassica vegetables as excellent sources of pharmaceuticals, as well as beneficial effect on human health. Many compounds have been detached from cauliflower vegetables and its play important role in human health. Some compound of cauliflower vegetables (e.g. progoitrin) may apply antinutritive effects on the human body.

Conclusion :

After studying on research paper the study was carried out on some recipes like idali, dhokla, pancake, biscuit, and noodles. Cauliflower leaves is good source of dietary fibre, minerals, iron and beta carotene. Dehydration is one of the best methods of preservation of green leafy vegetables. Being rich in essential micro-nutrients the green leafy vegetables can be utilized for the purpose of enrichment of nutritional deficient products. Cauliflower leaves powder can be used in traditional products for value addition purpose to overcome the health related problems and anemia diseases prevent.

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