



## Development of A Product Rich in Calcium Prepared Turnip Green Powder

### KEYWORDS

Oven dried turnip green powder, Calcium, Nachos.

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### ABSTRACT

*The present study "Development of snack from turnip green powder and evaluation of their acceptability and nutritive value" was designed to develop a Calcium rich product so that calcium deficiency can be properly managed with the consumption of such a product. Nachos which are commonly consumed among kids and adults was developed using Turnip greens powder to increase the calcium content. The level of calcium in turnip green powder was assessed and four different samples were prepared. Standard sample was prepared using the standard recipe of nachos whereas three other samples were prepared using different concentration of turnip green powder. Turnip green powder was prepared by oven drying the turnip greens. Sample A with 10gms, B with 20gms while C with 30gms of turnip green powder. Sensory evaluation was done for all the variants for different parameters. Sample A was more acceptable as comparative to other samples.*

### INTRODUCTION

Green leafy vegetables occupy an important place among the food crops as these provide adequate amounts of many vitamins and minerals for humans. They are rich source of carotene, ascorbic acid, riboflavin, folic acid and minerals like calcium, iron and phosphorous increase the per capita availability of foods. Since low consumption of green leafy vegetables in diet is one of the major factors, which leads to deficiency of vitamin A and iron<sup>(1)</sup> Plant-based foods contain significant amounts of bioactive compounds, which provide desirable health benefits beyond basic nutrition. Epidemiological evidence suggests that consumption of a diet rich in vegetables and fruits has positive implications for human health. In the last decades, special attention has been paid towards edible plants; especially those are rich in secondary metabolites called phytochemicals<sup>(6,7)</sup>

### TURNIP AND TURNIP LEAVES:

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<sup>(3)</sup>

These leaves are tough, light green in color, and the covering, which resembles hair but is actually just a sort of growth, is usually present. Turnips are bulbous in shape and are often a mixture of the colors purple, white, and/or yellow. There are many varieties of turnips, and each has a different flavor and storage capacity<sup>(8)</sup>

Turnip greens are grown both for fresh market and for processing. The crop is established by direct seeding in the field<sup>(2)</sup>

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<sup>(3)</sup> Nowadays, there is an increasing interest in the antioxidant activity of such phytochemicals present in the diet. Recent reports suggest that cruciferous vegetables act as a good source of natural antioxidants due to the high levels of carotenoids, tocopherols and ascorbic acid<sup>(7,6)</sup>. In addition to carotenoids, tocopherols, and ascorbic acid, most of the antioxidative effect related to plant food intake is mainly due to the presence of phenolic compounds, which have been associated with flavor and color characteristics of fruits and vegetables<sup>(6)</sup> Turnips are mainly used as an ingredient in soups and stews consumed mostly in the winter, but they have other potential uses as well. Turnips can be cooked as a mashed dish, baked, fried, boiled, or used to make wine<sup>(8)</sup>

Therefore the present study was conducted to develop a calcium rich turnip green nachos which will be beneficial in increasing the calcium status of the population.

### MATERIALS AND METHODS:

The study was done under four phases. Phase I was product development. Firstly the turnips green were dried by oven dried method and grinded to form powder. Then the assessment of calcium level of oven dried turnip green powder was done. The result revealed that calcium level was high in the oven dried turnip green powder. Therefore, the turnip green nachos were prepared by standardized recipe by using oven dried turnip green powder, corn flour and refined flour. After the standardized of normal nachos two variations of turnip green nachos were made.

The two variations of turnip green nachos were as followed: Sample T<sub>1</sub> (Nachos incorporated with 10g of turnip green powder). Sample T<sub>2</sub> (Nachos incorporated with 20g of turnip green powder). Sample T<sub>3</sub> (Nachos incorporated with 30g of turnip green powder). Phase II include sensory evaluation of the samples was carried out using 21 panelists from Manav Rachna International University. Composite score card for scoring the attributes was used.

The qualities assessed include taste, texture, color, flavor and overall acceptability. Phase III includes proximal analysis and calcium analysis of the product. The proximal analysis was done for moisture, ash, and crude fiber contents were determined by the AOAC. <sup>(2000)</sup> Calcium was determined using the standard method of (AOAC, 1995). The last phase was statistically test was done by using SPSS version 20 software. The analysis includes mean, standard deviation, t – test, Anova for comparative results.

## RESULTS AND DISCUSSION

**Table 1: level of calcium in turnip green powder**

| METHODS                         | $M \pm \text{SD}$ | P VALUE |
|---------------------------------|-------------------|---------|
| Oven drying turnip green powder | 232.6±0.47        | 0.000   |

\*Significance difference at 0.05 level.

After oven drying the mean value of the calcium in turnip green powder was 232.6±0.47. It was revealed that there is statistically significant difference ( $p < 0.05$ ).

**Table 2: Proximate analysis of standard and turnip green variants nachos: (ANOVA test)**

| Parameter   | Standard    | Sample A    | Sample B    | Sample C    | P Value |
|-------------|-------------|-------------|-------------|-------------|---------|
| Energy      | 388.7± 0.51 | 395.7±0.04  | 402.4±0.04  | 408.8±0.51  | 0.000   |
| Protein     | 11.06±0.00  | 11.46±0.00  | 11.86±0.00  | 12.26±0.00  | 0.000   |
| Calcium     | 14.54±0.004 | 85.5±0.004  | 156.5±0.004 | 227.5±0.004 | 0.000   |
| Moisture    | 14.33±0.004 | 22.52±0.004 | 30.71±0.004 | 38.9±0.004  | 0.000   |
| Ash Content | 2.84±0.004  | 2.74±0.004  | 2.86±0.04   | 2.81±0.004  | 0.005   |
| Crude fibre | 1.86±0.004  | 1.95±0.004  | 2.05±0.004  | 2.15±0.004  | 0.000   |

Standard sample: Normal Nachos

Sample A: Nachos with 10% incorporation of turnip green powder

Sample B: Nachos with 20% incorporation of turnip green powder

Sample C: Nachos with 30% incorporation of turnip green powder

\*Significant at the  $p < 0.05$  level.

Table 3: Shows the mean acceptability of attributes between the samples by proximate analysis. Sample C was found to be more nutritious than the standard product in terms of all parameters. In terms of Energy and protein of the sample C was 408.8±0.51 and 12.26±0.00 was high whereas the standard was 388.7± 0.51 and 11.06±0.00. Sample C contains 227.5±0.004 and 38.9±0.004 of calcium and moisture whereas standard contains 14.54±0.004 and 14.33±0.004. In terms of ash content and crude fiber of sample C was found high that is 2.81±0.004 and 2.15±0.004 whereas standard contains 2.84±0.004 and 1.86±0.004.

## CONCLUSION

Therefore, this study demonstrates that the level of calcium in turnip green powder was assessed. Standard sample was prepared using the standard recipe of nachos whereas three other samples were prepared using different amount of turnip green powder. Turnip green powder was prepared by oven drying the turnip greens. Sample A with 10gms, B with 20gms while C with 30gms of turnip green powder. Sensory evaluation was done for all the variants for different parameters. The acceptability of developed nachos with different proportion of turnip green powder was assessed by sensory evaluation using composite score for 10 panel member and hedonic score card for 30 untrained panel members with the criteria of taste, color, texture, flavor and appearance with a total score of 100. High turnip green powder concentration in nachos (30% turnip green powder) proved to be a high calcium rich product but the acceptability of the product contain 10% of turnip green powder was more as compared to 30% of powder. Therefore the best acceptable nachos in all the variations were of 10% with a highest score.

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